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. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **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, 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, forward sensor(s), SDM and/or seat belt pretensioners) beforehand to avoid component damage or unintended activation.**

Foreword

This manual contains only different service information of the following applicable model as compared with SQ416/SQ420/SQ625 SERVICE MANUAL.

Applicable model: GRAND VITARA XL-7

Therefore, whenever servicing the above applicable model, consult this manual first. And for any section, item or description not found in this manual, refer to the related manual below.

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

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

RELATED MANUAL:

Manual Name	Manual No.
SQ416/SQ420/SQ625 Service Manual	99500-65D10-01E
SQ416/SQ420/SQ625 Unit Repair Manual for Manual Transmission, Automatic Transmission, Transfer and Differential	99501-65D01-01E
GRAND VITARA XL-7 Wiring Diagram Manual	99512-52D00-015

SUZUKI MOTOR CORPORATION
OVERSEAS SERVICE DEPARTMENT

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NOTE:

For the screen toned Sections in the above table, refer to the same section of the Related Manuals mentioned in FOREWORD of this manual.

SECTION 0A

GENERAL INFORMATION

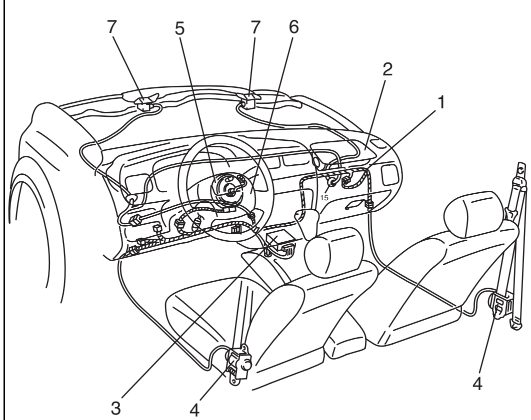
NOTE:

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

CONTENTS

Precautions

Precaution for Vehicles Equipped with A Supplemental Restraint (Air Bag) System

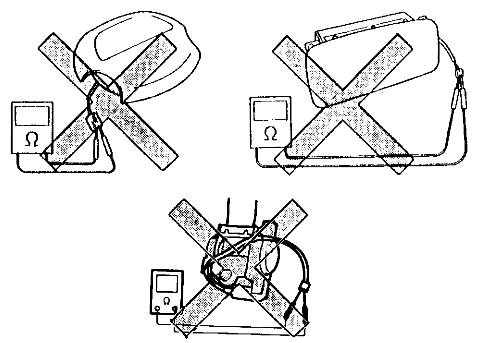


WARNING:
- **The configuration of air bag system parts are as shown in the figure. When it is necessary to service (remove, reinstall and inspect) these parts, be sure to follow procedures described in SECTION 10B. Failure to follow proper procedures could result in possible air bag system activation, personal injury, damage to parts or air bag system being unable to activate when necessary.**
- **If the air bag system and another vehicle system both need repair, SUZUKI recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.**
- **Do not modify the steering wheel, dashboard, or any other air bag system components. Modifications can adversely affect air bag system performance and lead to injury.**
- **If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended air bag system activation.**

1. Air bag wire harness	5. Contact coil
2. Passenger air bag (inflator) module	6. Driver air bag (inflator) module
3. SDM	7. Forward sensors
4. Seat belt pretensioners	

Diagnosis

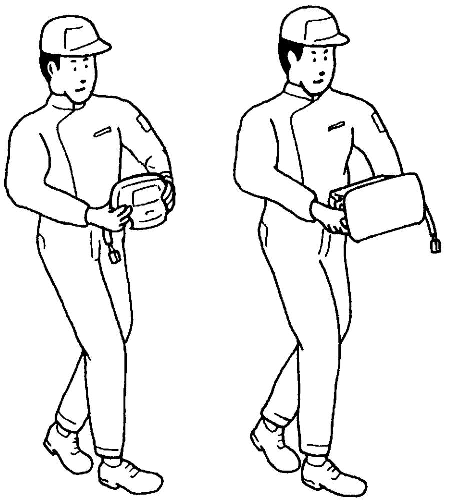
- **When troubleshooting air bag system, be sure to follow "DIAGNOSIS" in SECTION 10B. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis, and incorrect parts replacement.**
- **Never use electrical test equipment other than that specified in this manual.**



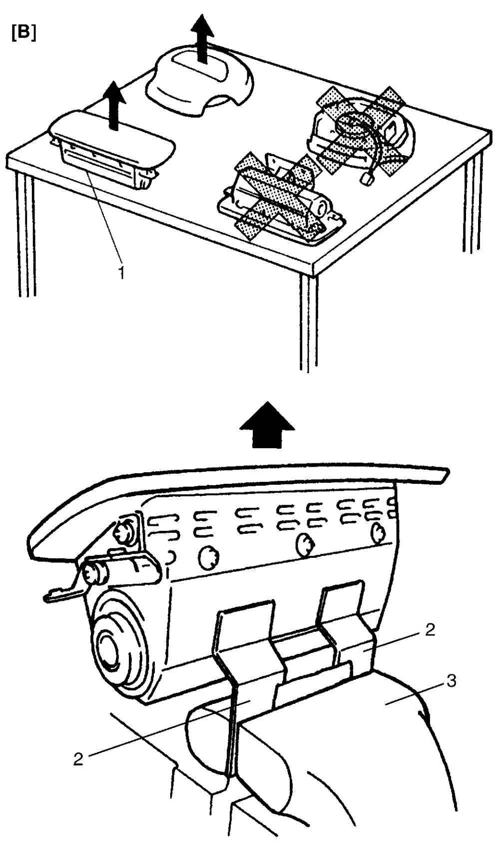
WARNING:
Never attempt to measure the resistance of the air bag (inflator) modules (driver and passenger) and seat belt pretensioners (driver and passenger). It is very dangerous as the electric current from the tester may deploy the air bag or activate the pretensioners.

Servicing and handling

[A]



[B]



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

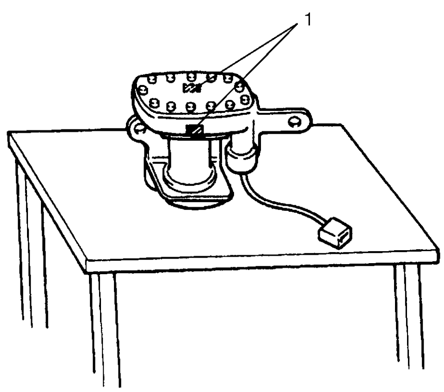
- **For handling and storage of a live air bag (inflator) module, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.**
- **When carrying a live air bag (inflator) module, make sure the bag opening is pointed away from you. In case of an 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 work-bench with a slit or use the workbench vise to hold it securely at its lower mounting bracket. This is neces-sary 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 neces-sary, be sure to deploy them according to deployment procedures described in SECTION 10B before dis-posal.**
- **The air bag (inflator) module immediately after deploy-ment 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 resi-due. This powder consists primarily of cornstarch (used to lubricate the bag as it inflates) and by-prod-ucts of the chemical reaction. As with many service procedures, gloves and safety glasses should be worn.**

[A] :	ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.
[B] :	ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.
1.	Slit on workbench
2.	Lower mounting bracket
3.	Workbench vise

WARNING:

SDM

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



WARNING:

Driver and Passenger Seat Belt Pretensioners

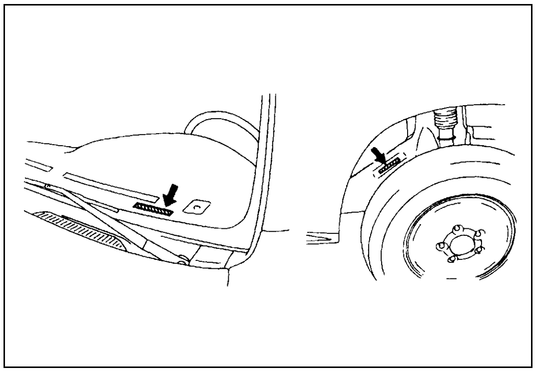
- **For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.**
- **Never carry seat belt pretensioner by wire or connector of pretensioner. When placing a live seat belt pretensioner on the workbench or some place like that, be sure not to lay it with its exhaust hole (1) provided side facing down. It is also prohibited to put something on its face with an exhaust hole or to put a seat belt pretensioner on top of another. Otherwise, personal injury may result.**
- **Never dispose of live (inactivated) seat belt pretensioners (drive and passenger). If disposal is necessary, be sure to activate them according to activation procedures described in SECTION 10B before disposal.**
- **The seat belt pretensioner immediately after activation is very hot. Wait for at least half an hour to cool it off before proceeding the work.**
- **With many service procedures, gloves and safety glasses should be worn to prevent any possible irritation of the skin or eyes.**

CAUTION:

- **Even when the accident was light enough not to cause air bags to activate, be sure to inspect system parts and other related parts according to instructions under "REPAIR AND INSPECTION REQUIRED AFTER AN ACCIDENT" in SECTION 10B.**
- **When servicing parts other than air bag system, if shocks may be applied to air bag system component parts, remove those parts beforehand.**
- **When handling the air bag (inflator) modules (driver and passenger), forward sensors 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), 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" in SECTION 10B.**
- **Never expose air bag system component parts directly to hot air (drying or baking the vehicle after painting) or flames.**
- **WARNING/CAUTION labels are attached on each part of air bag system components. Be sure to follow the instructions.**
- **After vehicle is completely repaired, perform "AIR BAG DIAGNOSTIC SYSTEM CHECK" in SECTION 10B.**

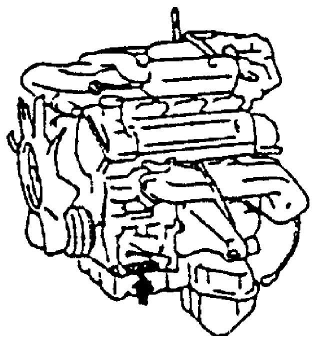
Identification Information

Vehicle Identification Number



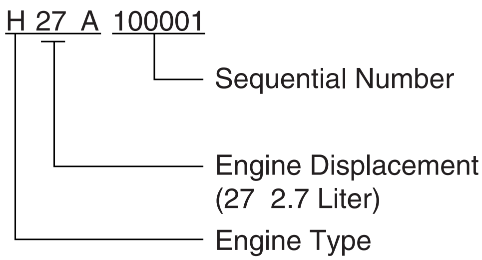
The vehicle body number is on the left side of instrument panel and punched on the chassis inside the tire housing on the right front side.

Engine Identification Number

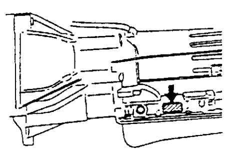


The number is punched on the cylinder block.

Engine Identification Number Specification



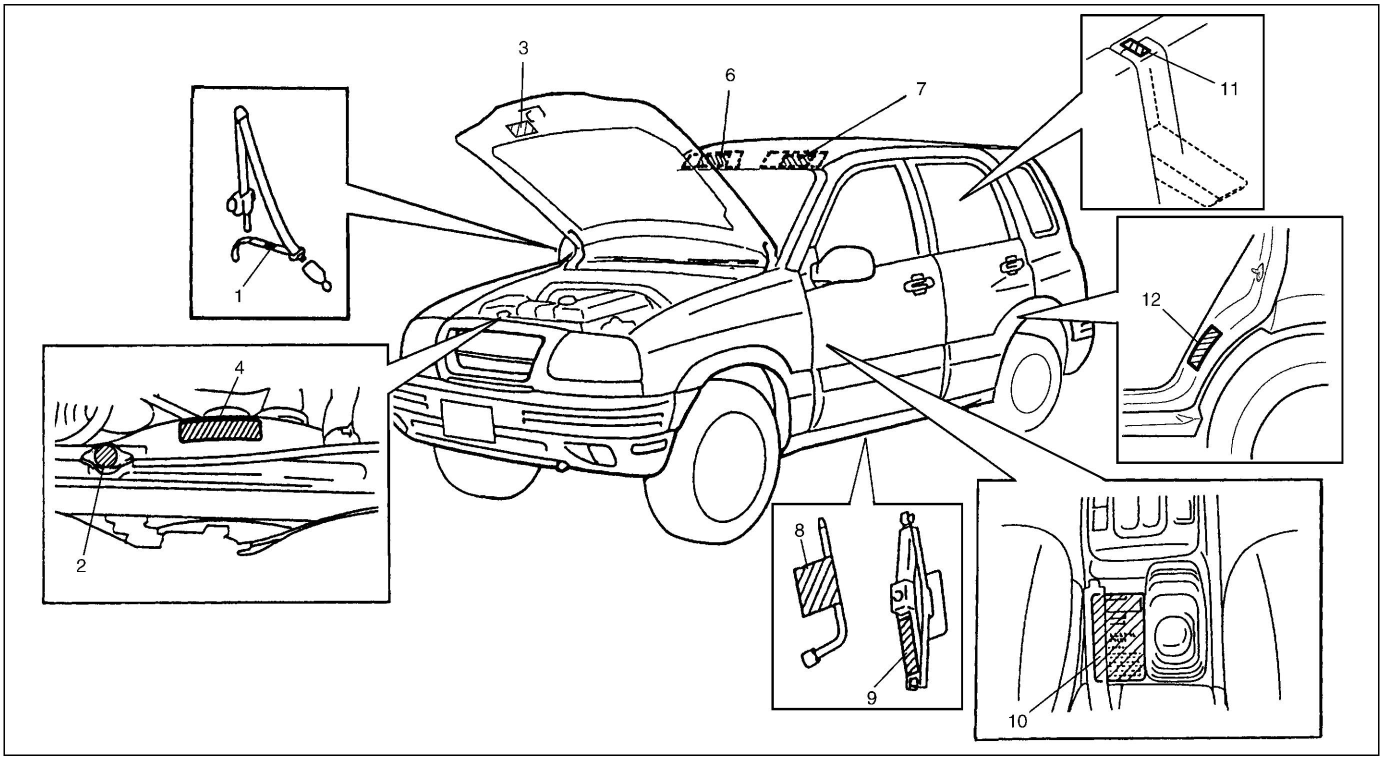
Transmission Identification Number



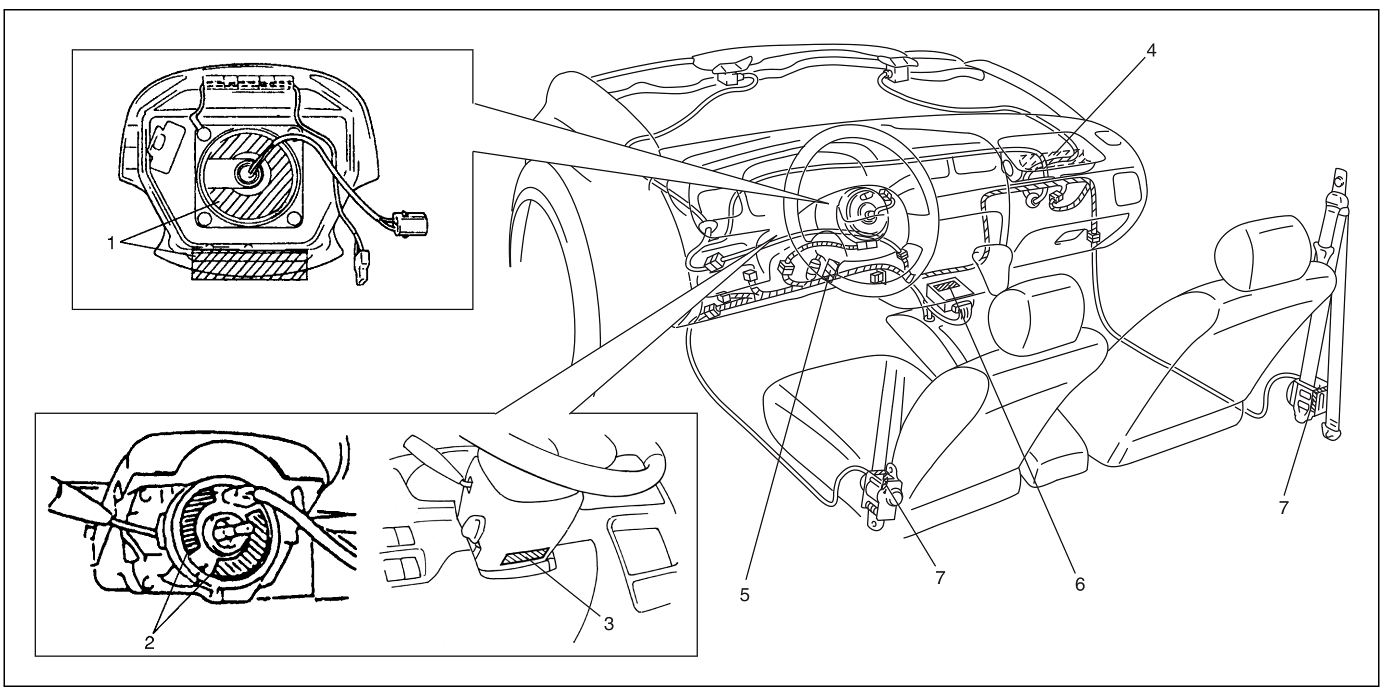
The A/T manufacture's identification number is located on the transmission case as shown. However, the M/T identification number is not assign.

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.



1. Passenger seat belt label (if equipped)	5. Blank	9. Jacking instruction label
2. Radiator cap label	6. Air bag label on sun visor	10. Transfer label (if equipped)
3. Air bag label	7. Air bag label on sun visor (Back side) Air bag label and utility vehicle label on sun visor (Face side)	11. Armrest label on strap
4. Engine cooling fan label	8. Jacking instructions	12. Seat label (if equipped)



1. Air bag label on driver air bag (inflator) module	5. Air bag label on wire harness
2. Air bag label on combination switch and contact coil assembly	6. Air bag label on SDM
3. Air bag label on steering column cover	7. Pretensioner label on seat belt pretensioner
4. Air bag label on passenger air bag (inflator) module	

SECTION 0B

MAINTENANCE AND LUBRICATION

WARNING:

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

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

NOTE:

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

CONTENTS

Maintenance Schedule

Maintenance Schedule under Normal Driving Conditions

NOTE:

- **This interval should be judged by odometer reading or months, whichever comes first.**
- **This table includes service as scheduled up to 90,000 km (54,000 miles) mileage. Beyond 90,000 km (54,000 miles), carry out the same services at the same intervals respectively.**

Interval									
		Km	(× 1,000)	15	30	45	60	75	90
		Miles	(× 1,000)	9	18	27	36	45	54
		Months		12	24	36	48	60	72
ENGINE									
1-1. Drive belt		V-rib belt (Flat type)		–	–	I	–	–	R
1-4. Engine oil and oil filter				R	R	R	R	R	R
1-5. Engine coolant				–	–	R	–	–	R
1-6. Exhaust system				–	I	–	I	–	I
IGNITION SYSTEM									
2-1. Spark plugs	When unleaded fuel is used	Vehicle without HO2S	Nickel plug	–	R	–	R	–	R
			Iridium plug	–	–	–	R	–	–
		Vehicle with HO2S	Nickel plug	–	–	R	–	–	R
			Iridium plug	Replace every 105,000 km or 63,000 miles					
	When leaded fuel is used, refer to “MAINTENANCE RECOMMENDED UNDER SERVER DRIVING CONDITIONS” in this section.								
FUEL SYSTEM									
3-1. Air cleaner filter				I	I	R	I	I	R
3-2. Fuel lines and connections				–	I	–	I	–	I
3-3. Fuel filter				Replace every 105,000 km or 63,000 miles					
3-4. Fuel tank				–	–	I	–	–	I
EMISSION CONTROL SYSTEM									
4-1. Crankcase ventilation hoses and connections (Vehicle without HO2S)				–	–	I	–	–	I
4-2. PCV valve		Vehicle without HO2S		–	–	I	–	–	I
		Vehicle with HO2S		–	–	–	–	–	I
4-3. Fuel evaporative emission control system		Vehicle without HO2S		–	I	–	I	–	I
		Vehicle with HO2S		–	–	–	–	–	I

NOTE:

- **“R”: Replace or change**
- **“I”: Inspect and correct, replace or lubricate if necessary**
- **For Sweden, item 2-1, 4-2 and 4-3 should be performed by odometer reading only.**
- **For Item 2-1. Nickel spark plugs, replace every 50,000 km if the local law requires.**
- **Nickel spark plug: BKR6E-11 or K20PR-U11**
- **Iridium spark plug: IFR5J11 or SK16PR11**

Interval		Km (× 1,000)	15	30	45	60	75	90
		Miles (× 1,000)	9	18	27	36	45	54
		Months	12	24	36	48	60	72
CHASSIS AND BODY								
6-1.	Clutch (pedal and fluid level)		–	I	–	I	–	I
6-2.	Brake discs and pads (thickness, wear, damage)		I	I	I	I	I	I
	Brake drums and shoes (wear, damage)		–	I	–	I	–	I
6-3.	Brake hoses and pipes (leakage, damage, clamp)		–	I	–	I	–	I
6-4.	Brake fluid		–	R	–	R	–	R
6-5.	Brake lever and cable (damage, stroke, operation)		Inspect at first 15,000 km (9,000 miles) only					
6-6.	Tires (wear, damage, rotation)		I	I	I	I	I	I
6-7.	Wheel discs (damage)		I	I	I	I	I	I
6-8.	Suspension system (tighteness, damage, rattle, breakage)		–	I	–	I	–	I
6-9.	Propeller shafts and drive shafts		–	–	I	–	–	I
6-10.	Manual transmission oil (leakage, level) (I: 1st 15,000 km only)		I	–	R	–	–	R
6-11.	Automatic transmission	Fluid level	–	I	–	I	–	I
		Fluid change	Replace every 165,000 km (99,000 miles)					
		Fluid hose	–	–	–	R	–	–
6-12.	Transfer oil (leakage, level)		I	–	I	–	I	–
6-13.	Differential oil (leakage, level) (R: 1st 15,000 km only)		R or I	–	I	–	I	–
6-14.	Steering system (tighteness, damage, breakage, rattle)		–	I	–	I	–	I
6-15.	Power steering (if equipped)		I	I	I	I	I	I
6-16.	All latches, hinges and locks		–	I	–	I	–	I
6-17.	Air conditioning filter (if equipped)		–	I	R	–	I	R

NOTE:

- **"R": Replace or change**
- **"I": Inspect and correct, replace or lubricate if necessary**

Maintenance Recommended under Severe Driving Conditions

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

Severe condition code :

A: Repeated short trips
B: Driving on rough and/or muddy roads
C: Driving on dusty roads
D: Driving in extremely cold weather and/or salted roads
E: Repeated short trips in extremely cold weather
F: Leaded fuel use
G: – – – – – – – – –
H: Trailer towing (if admitted)

Severe Condition Code	Maintenance		Maintenance Operation	Maintenance Interval
– B CD – – –	ITEM 1-1 Drive belt (V-rib belt)		I	Every 15,000 km (9,000 miles) or 12 months
			R	Every 45,000 km (27,000 miles) or 36 months
A – CDEF – H	ITEM 1-4 Engine oil and oil filter		R	Every 5,000 km (3,000 miles) or 4 months
– B– – – – – –	ITEM 1-6 Exhaust pipe mountings		I	Every 15,000 km (9,000 miles) or 12 months
– – C – – – – –	ITEM 3-1 Air cleaner filter *1		I	Every 2,500 km (1,5000 miles)
			R	Every 30,000 km (18,000 miles) or 24 months
ABC–EF–H	ITEM 2-1 Spark plugs	Nickel plug	R	Every 10,000 km (6,000 miles) or 8 months
		Iridium plug	R	Every 30,000 km (18,000 miles) or 24 months
– B – D E – – H	ITEM 6-9 Propeller shafts and drive shafts		I	Every 15,000 km (9,000 miles) or 12 months
– B – – E – – H	ITEM 6-10, 6-12, 6-13 Manual transmission, transfer and differential oil		R	Every 30,000 km (18,000 miles) or 24 months
– B – – E – – H	ITEM 6-11 Automatic transmission fluid		R	Every 30,000 km (18,000 miles) or 24 months
– B – – – – – –	ITEM 6-8 Suspension bolts and nuts		T	Every 15,000 km (9,000 miles) or 12 months
– B C D – – – H	ITEM 6-7 Wheel bearing		I	Every 15,000 km (9,000 miles) or 12 months
– – CD – – – –	ITEM 6-17 Air conditioning filter *2 (if equipped)		I	Every 15,000 km (9,000 miles) or 12 months
			R	Every 45,000 km (27,000 miles) or 36 months

NOTE:
“I”: Inspect and correct, replace or lubricate if necessary
”R”: Replace or change
”T”: Tighten to the specified torque
***1: Inspect or replace more frequently if necessary.**
***2: Clean or replace more frequently if the air from the air conditioning decreases.**

Maintenance Service

Engine and Emission Control

ITEM 1-1

Drive belt inspection and replacement

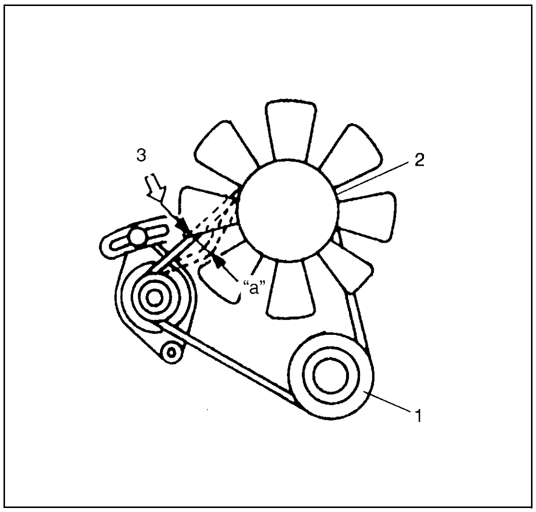
> **WARNING:**
> **All inspection and replacement are to be performed with ENGINE NOT RUNNING.**

WATER PUMP AND GENERATOR DRIVE BELT INSPECTION

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

Water pump and generator belt tension "a": 9-11 mm (0.35- 0.43 in.) deflection under 100 N, 10 kg or 22 lb pressure

NOTE:
When replacing belt with a new one, adjust belt tension to 7 - 9 mm (0.28 - 0.35 in.)

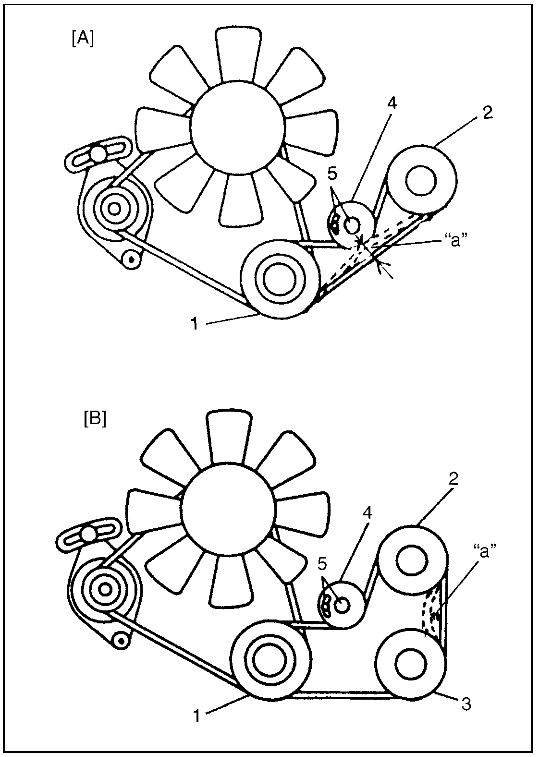


1.	Crankshaft pulley
2.	Water pump pulley
3.	100 N, 10 kg or 22 lb

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

WATER PUMP AND GENERATOR DRIVE BELT REPLACEMENT

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



POWER STEERING PUMP AND/OR A/C COMPRESSOR DRIVE BELTS (IF EQUIPPED) INSPECTION

1) Disconnect negative (–) cable at battery.
2) Inspect belt for cracks, cuts, deformation, wear and cleanliness. If any defect exists, replace.
   Check belt for tension.
   If belt tension is out of above specification, adjust it referring to Section 1B or 3B1.

Power steering pump and/or A/C compressor drive belt tension
"a" : 4 - 7 mm (0.16 - 0.28 in.) deflection under 100 N (10 kg, 22 lb) pressure

[A]:	H27 engine with P/S system
[B]:	H27 engine with P/S and A/C system
1.	Crankshaft pulley
2.	P/S pump pulley
3.	A/C compressor pulley (if equipped)
4.	Tension pulley
5.	Tension pulley bolts

3) Connect negative (–) cable to battery.

POWER STEERING PUMP AND/OR A/C COMPRESSOR DRIVE BELTS (IF EQUIPPED) REPLACEMENT

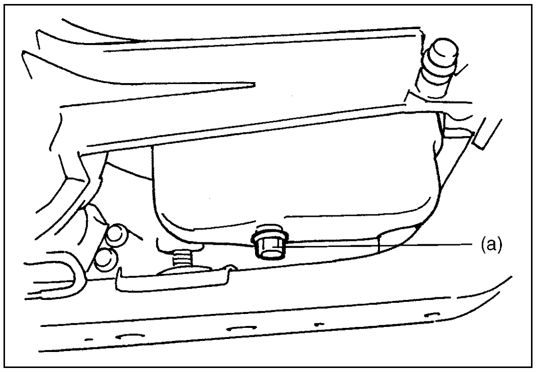
Replace belt referring to Section 1B or 3B1 for replacement procedure of belt.

ITEM 1-4

Engine oil and filter replacement

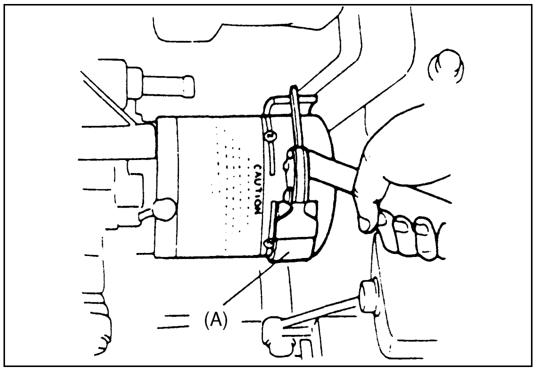
WARNING:
- **New and used engine oil can be hazardous.**
  Be sure to read "WARNING" in General Precaution in Section 0A and observe what in written there.
- **Step 1) - 7) outlined below must be performed with ENGINE NOT RUNNING. For step 8), be sure to have adequate ventilation while engine is running.**

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



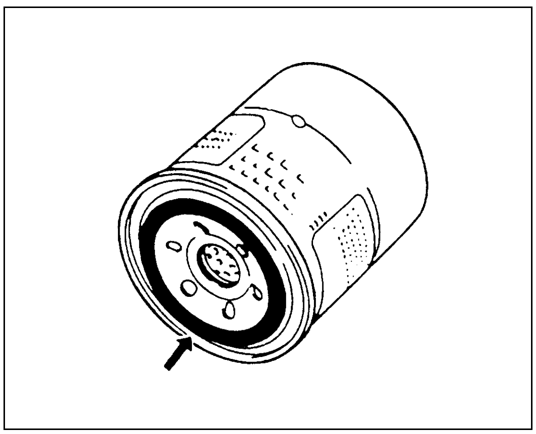
1) Drain engine oil by removing drain plug.
2) After draining oil, wipe drain plug clean. Reinstall drain plug, and tighten it securely as specified below.

Tightening torque
Engine oil drain plug (a) :
50 N·m (5.0 kg-m, 36.5 lb-ft)



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

Special tool
(A) : 09915-47310



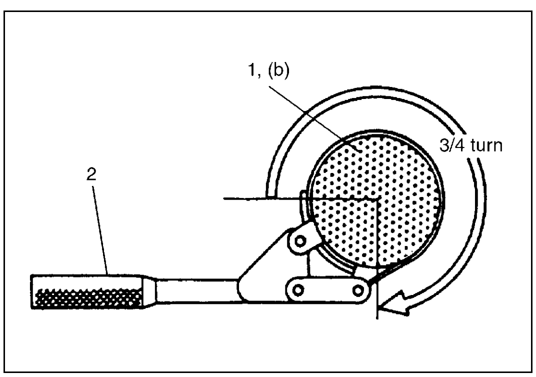
NOTE:

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

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

CAUTION:

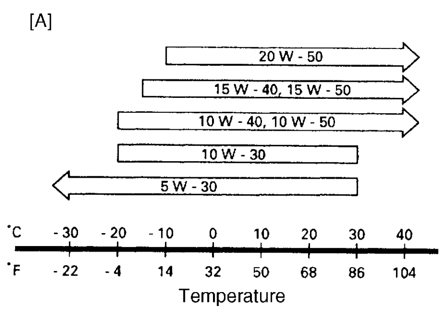
To tighten oil filter properly, it is important to accurately identify the position at which filter O-ring first contacts the mounting surface.



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

Tightening torque
(For reference)
Oil filter (b) : 14 N·m (1.4 kg-m, 10.5 lb-ft)

1.	Oil filter
2.	Oil filter wrench



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

NOTE:
Select the appropriate oil viscosity according to the proper engine oil viscosity chart [A].

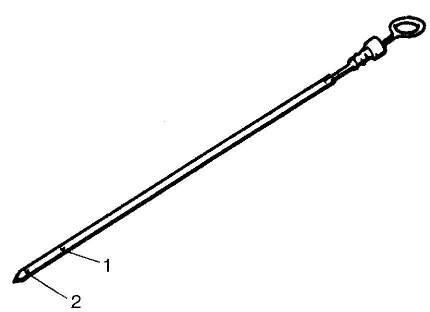
[A]: Proper engine oil viscosity chart

Engine oil specification :

		H27 engine
Oil pan capacity	liters (US/Imp pt.)	About 5.0 (10.6/8.8)
Oil filter capacity	liters (US/Imp pt.)	About 0.5 (1.1/0.9)
Others	liters (US/Imp pt.)	About 0.7 (1.5/1.2)
Total	liters (US/Imp pt.)	About 6.2 (13.1/10.9)

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

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



8) Start engine and run it for 3 minutes. Stop it and wait 5 minutes before checking oil level. Add oil, as necessary, to bring oil level to FULL level mark on dipstick.

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

SECTION 1A

HEATER AND VENTILATION

WARNING:

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

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in Section 10B in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in Section 10B before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either or these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

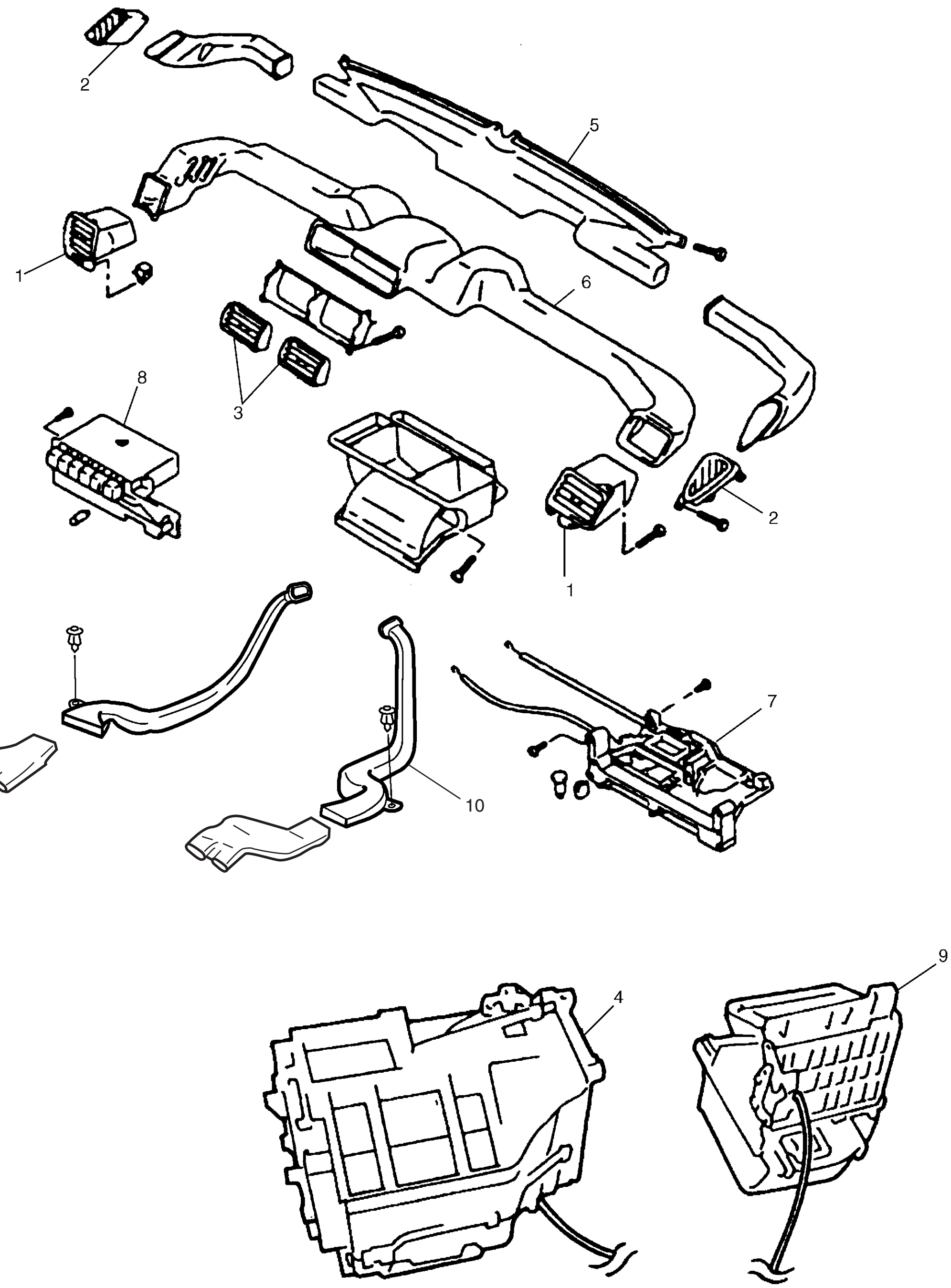
NOTE:

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

CONTENTS

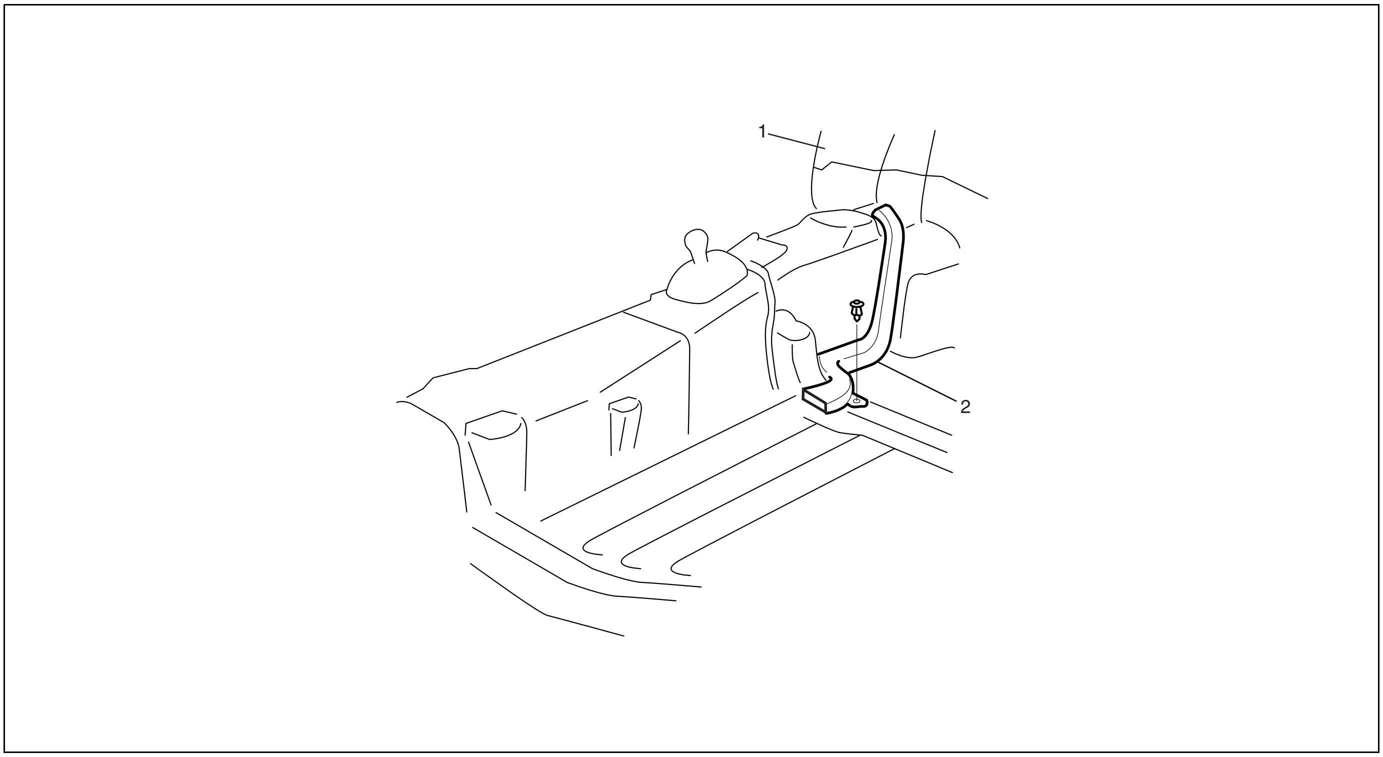
General Description

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



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

Rear Duct



1.	Heater unit
2.	Rear duct

REMOVAL

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

INSTALLATION

Reverse removal sequence to install rear duct.

SECTION 1B

AIR CONDITIONING (OPTIONAL)

WARNING:

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

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

CAUTION:

The air conditioning system of this vehicle uses refrigerant HFC-134a (R-134a).
None of refrigerant, compressor oil and component parts is interchangeable between two types of A/C: one using refrigerant CFC-12 (R-12) and the other using refrigerant HFC-134a (R-134a).
Be sure to check which refrigerant is used before any service work including inspection and maintenance. For identification between these two types, refer to "REFRIGERANT TYPE" in this section.
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.

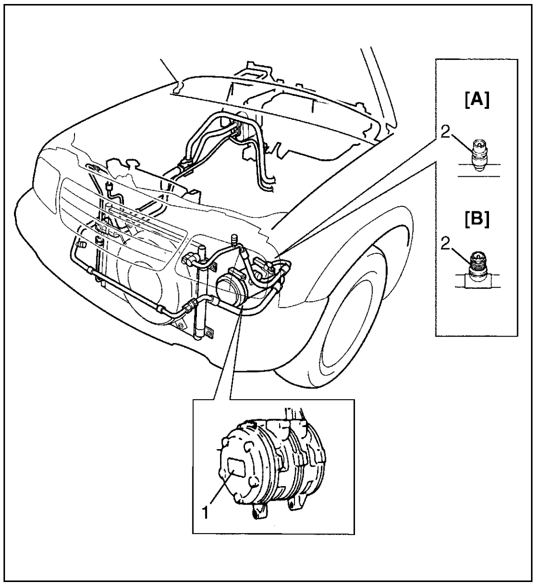
NOTE:

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

CONTENTS

General Description

Refrigerant Type



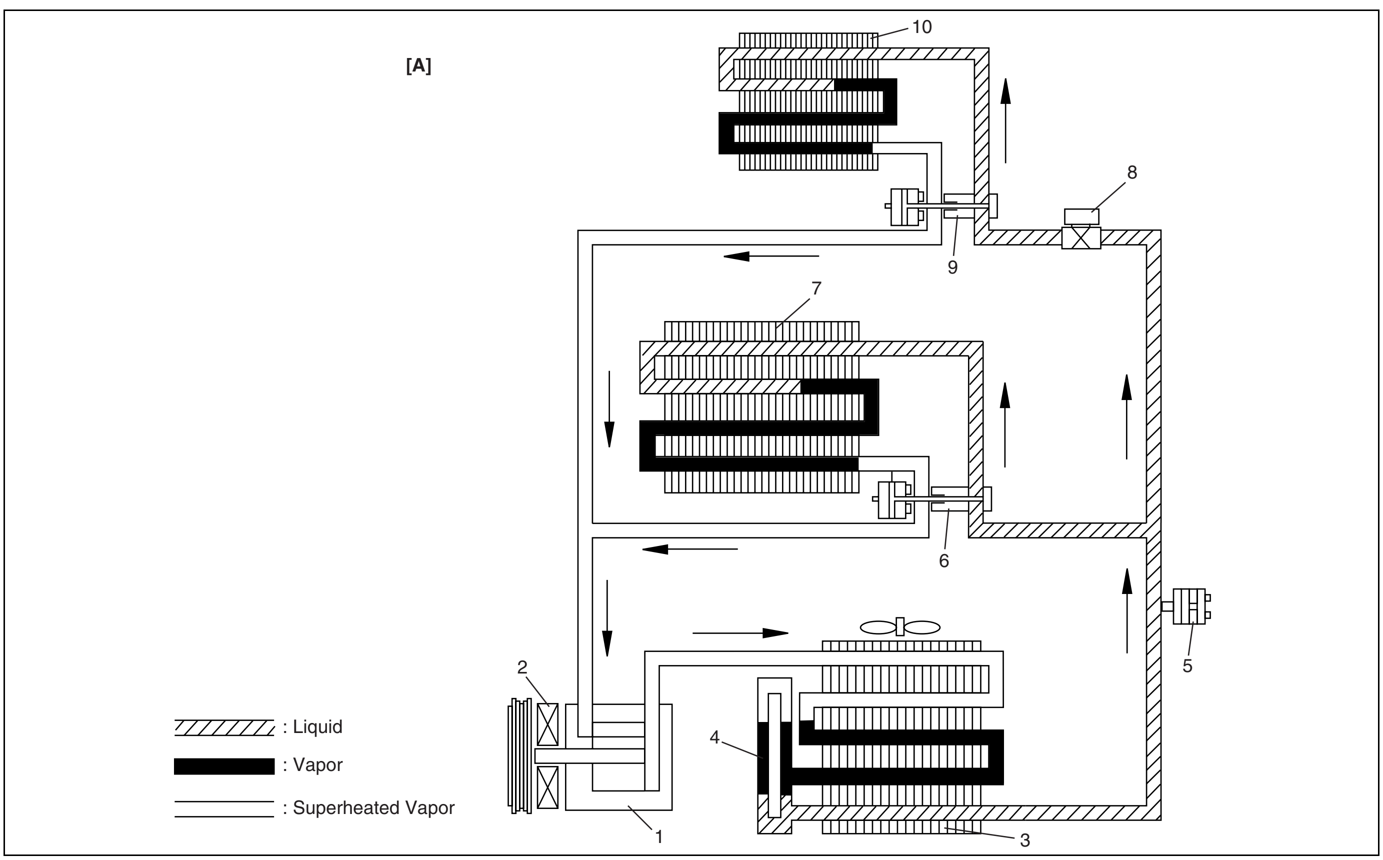
Whether the A/C in the vehicle being serviced uses HFC-134a (R-134a) or CFC-12 (R-12) is indicated on LABEL on the compressor. Also, it can be checked by the shape of the service (charge) valve.

[A] :	HFC-134a (R-134a)
[B] :	CFC-12 (R-12)
1.	Compressor label
2.	Service valve

Refrigerant Flow of Air Conditioning System

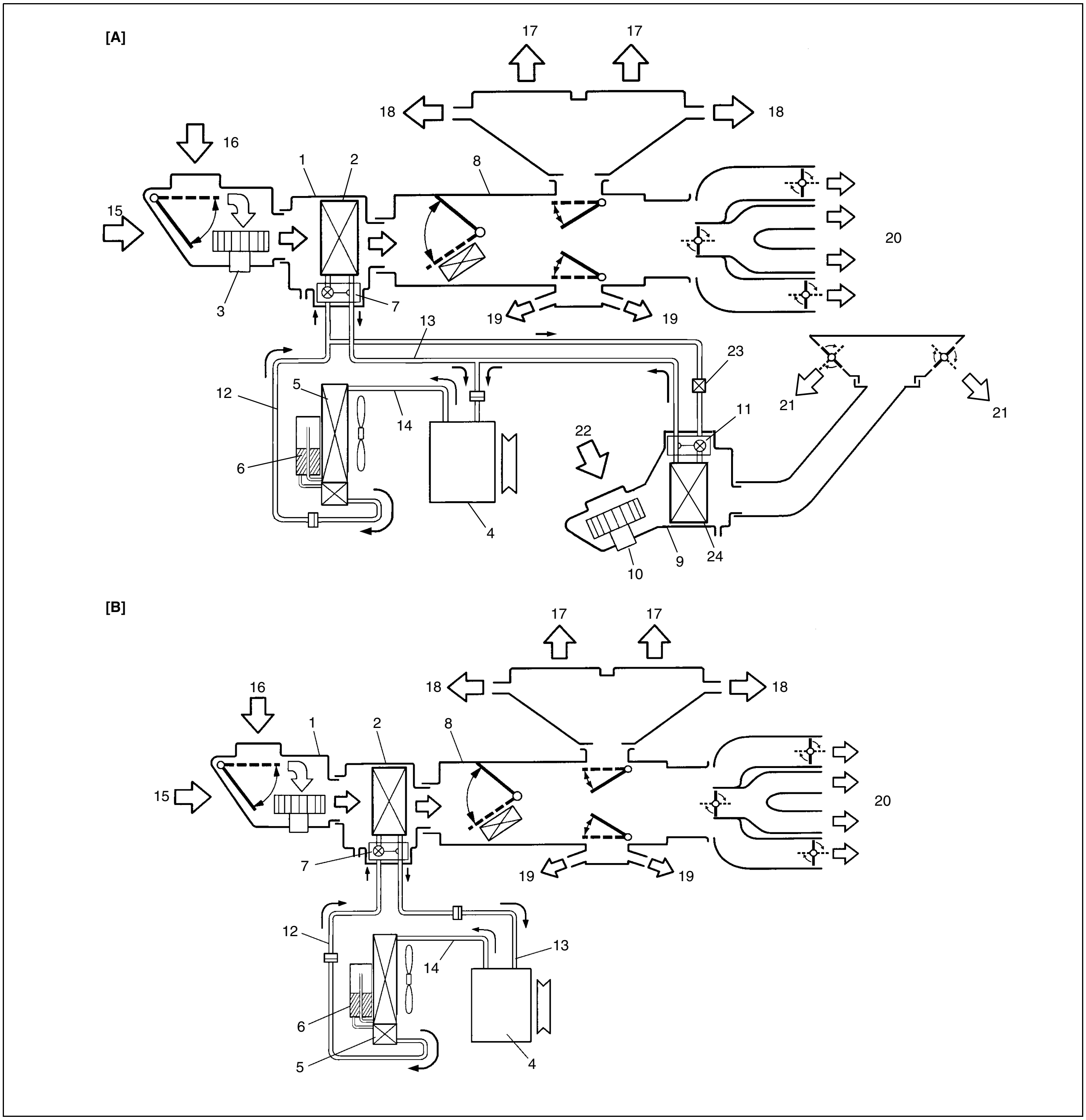
NOTE:

For single A/C model, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

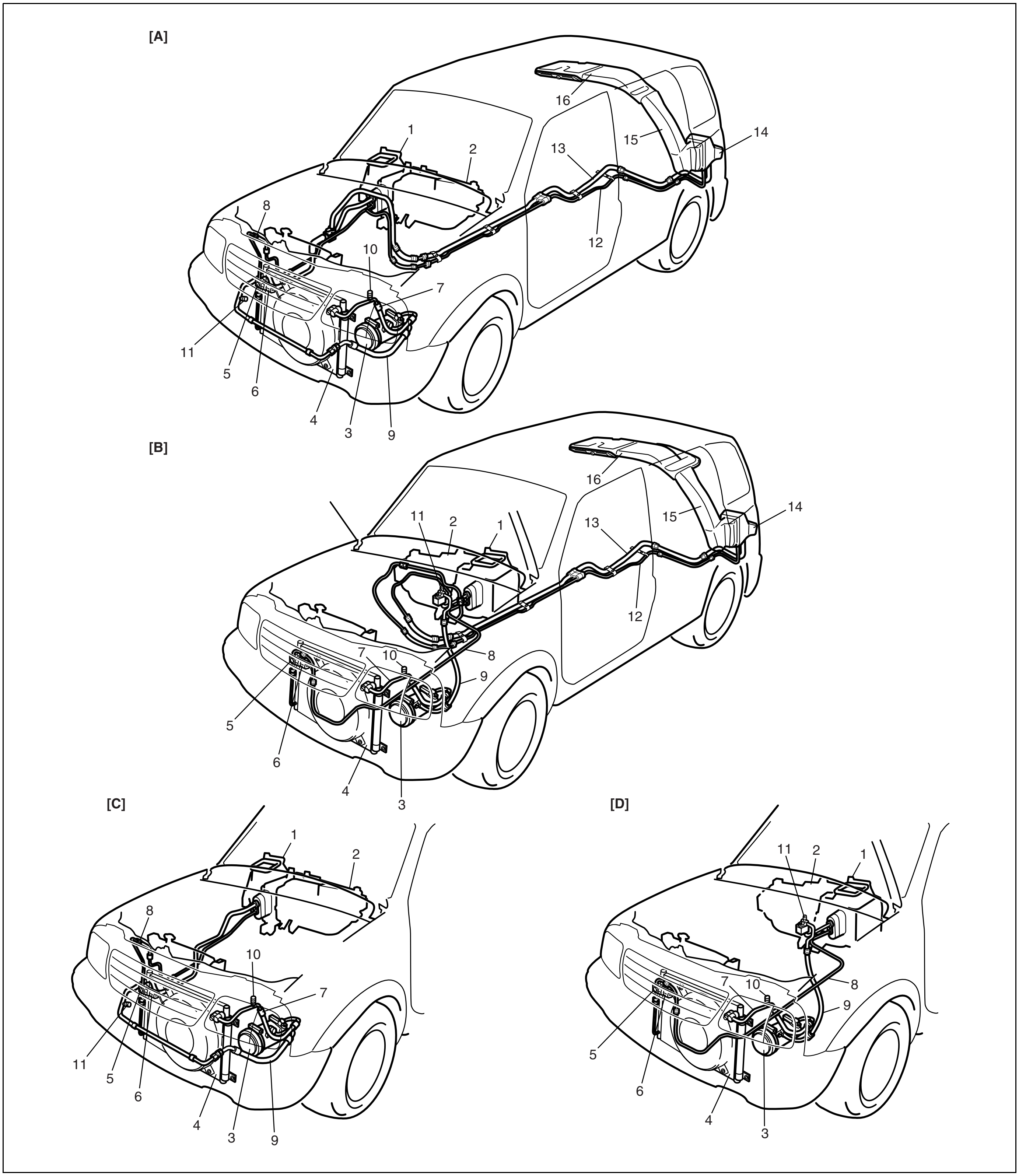


[A] :	Dual A/C model	3.	Condenser assembly	6.	Expansion valve	9.	Rear expansion valve
1.	Compressor	4.	Receiver/dryer	7.	A/C evaporator	10.	Rear A/C evaporator
2.	Magnet clutch	5.	Dual pressure switch	8.	Solenoid valve		

Major Components And Location



[A] : Dual A/C model	6. Receiver/dryer	13. Suction pipe	20. Ventilation air
[B] : Single A/C model	7. Front expansion valve	14. Discharge pipe	21. Rear A/C air
1. Front cooling unit	8. Heater unit	15. Recirculation air	22. Room air
2. Front A/C evaporator	9. Rear A/C unit	16. Fresh air	23. Solenoid valve
3. Front blower fan motor	10. Rear blower fan motor	17. Defroster air	24. Rear A/C evaporator
4. Compressor	11. Rear expansion valve	18. Demister air	
5. Condenser assembly	12. Liquid pipe	19. Foot air	



[A] : Dual A/C LH steering model	4. Condenser	11. Low pressure charge valve
[B] : Dual A/C RH steering model	5. Sight glass	12. Floor liquid pipe
[C] : Single A/C LH steering model	6. Refrigerant (dual) pressure sensor	13. Floor suction pipe
[D] : Single A/C RH steering model	7. Discharge pipe	14. Rear A/C unit
1. Front cooling unit	8. Liquid pipe	15. Rear A/C duct No.1
2. Heater unit	9. Suction pipe	16. Rear A/C duct No.2
3. Compressor	10. High pressure charge valve	

Diagnosis

General

Main A/C system (front A/C system)

Condition	Possible Cause	Correction
Cool air does not come out (A/C system does not operative)	No refrigerant	Perform recover, evacuation and charging.
	Fuse blown	Check “IG METER”, “REAR DEFG” and “A/C” fuses, and check for short circuit to ground.
	A/C switch faulty	Check A/C switch.
	Blower motor switch faulty	Check blower motor switch.
	A/C evaporator temperature sensor (A/C evaporator thermistor) faulty	Check A/C evaporator temperature sensor (A/C evaporator thermistor).
	Refrigerant (dual) pressure switch faulty	Check refrigerant (dual) pressure switch.
	Wiring or grounding faulty	Repair as necessary.
	A/C ON permission signal in ECM faulty	Check A/C ON permission signal.
	A/C controller and its circuit faulty	Check A/C controller and its circuit.
Cool air does not come out (A/C compressor does not operative (won’t rotative))	Magnet clutch faulty	Check magnet clutch.
	Compressor relay faulty	Check compressor thermal switch.
	Compressor relay faulty	Check compressor relay.
	Drive belt loose or broken	Adjust or replace drive belt.
	Compressor faulty	Check compressor.
	A/C ON permission signal in ECM faulty	Check A/C ON permission signal.
	A/C controller faulty	Check A/C controller.
Cool air does not come out (A/C condenser cooling fan motor does not operative)	Condenser cooling fan motor relay faulty	Check condenser cooling fan motor relay.
	Wiring or grounding faulty	Repair as necessary.
	A/C condenser fan motor relay signal in ECM faulty	Check A/C condenser cooling fan motor relay signal.
	Condenser cooling fan motor faulty	Check condenser cooling fan motor.
Cool air does not come out (Blower motor does not operative)	Fuse blown	Check “FRONT BLOW” and “REAR DEFG” fuses, and check for short circuit to ground.
	Blower motor relay faulty	Check blower motor relay.
	Blower motor resistor faulty	Check blower motor resistor.
	Blower motor switch faulty	Check blower motor switch.
	Wiring or grounding faulty	Repair as necessary.
	Blower motor faulty	Check blower motor.

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

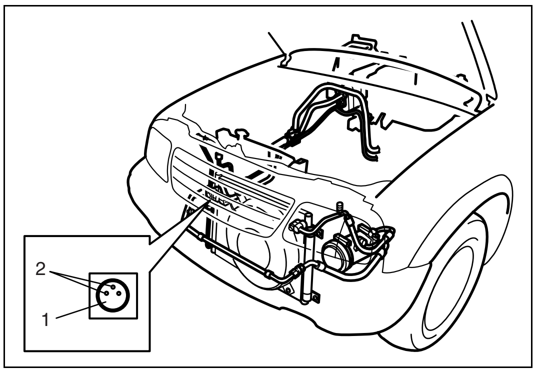
Rear A/C system

Condition	Possible Cause	Correction
Cool air dose not come out (Rear blower motor normal operative)	Solenoid valve relay faulty	Check solenoid valve relay, and then replace if necessary
	Solenoid valve faulty	Check solenoid valve, and then replace if necessary
	Diode in rear A/C harness faulty	Check diode, and then replace rear A/C harness if necessary
	Rear A/C evaporator temperature controller faulty	Check rear A/C evaporator temperature controller, and then replace if necessary
	Rear blower motor switch faulty	Check rear blower motor switch, and then repair rear A/C evaporator and check rear A/C evaporator temperature controller if necessary
	Rear A/C evaporator clogged or frosted	Check rear A/C evaporator, and then replace if necessary
	Rear expansion valve faulty	Check rear expansion valve, and then replace if necessary
	Air leaking from rear A/C unit or air duct	Check and repair if necessary
	Insufficient or excessive charge of refrigerant	Check charge of refrigerant, and then perform recovery, evacuation and charging if necessary
	Refrigerant pipe or hose deformed	Check pipe (hose), and then replace if necessary
Cool air dose not come out (Rear blower motor dose not operative)	Fuse blown	Check “A/C” and “REAR BLOW” fuses, and then check for short circuit to ground
	Rear blower motor relay faulty	Check rear blower motor relay, and then replace if necessary
	Rear A/C main switch faulty	Check rear A/C main switch, and then replace if necessary
	Rear blower motor switch faulty	Check rear blower motor switch, and then replace if necessary
	Rear blower motor resister faulty	Check rear blower motor resister, and then replace if necessary
	Wiring or grounding faulty	Check and repair
	Rear blower motor faulty	Check rear blower motor, and then replace if necessary
Cool air dose not come out at only intermittently	Loose or poor connected wiring connector	Connect connector correctly
	Rear expansion valve faulty	Check rear expansion valve, and then replace if necessary
	Rear A/C evaporator temperature controller faulty	Check rear A/C evaporator temperature controller, and then replace if necessary
	Wiring or grounding faulty	Check and repair
Cool air dose not come out at only high speed	Rear A/C evaporator frosted	Check rear A/C evaporator temperature, evaporator drain hose and then replace if necessary
Insufficient velocity of cooled air	Rear A/C evaporator clogged or frosted	Check rear A/C evaporator, and then repair rear A/C evaporator or check rear A/C evaporator temperature if necessary
	Air leaking from rear A/C unit or air duct	Check rear A/C unit and air duct, and then repair if necessary
	Rear blower motor faulty	Check rear blower motor, and then replace if necessary
	Wiring or grounding faulty	Check and repair

Quickly Checking of Refrigerant Charge (If Equipped with Sight Glass)

The following procedure can be used for quickly checking whether the A/C system has a proper charge of refrigerant or not.

1) Run engine at fast idle.
2) Operate A/C at the following conditions for a few minutes.
   - Main (front) A/C switch at ON position.
   - Rear A/C main switch at ON position (if equipped).
   - Front blower motor switch at max position.
   - Rear blower motor switch at max position (if equipped).
   - Air outlet control button at face position.
   - Temperature control lever at max cool position.
   - Vehicle door at all open.
   - Air inlet door at recirculation position.
3) Look at the sight glass (1) and compare what is observed with the symptoms listed in the table given below.



2. Bubbles

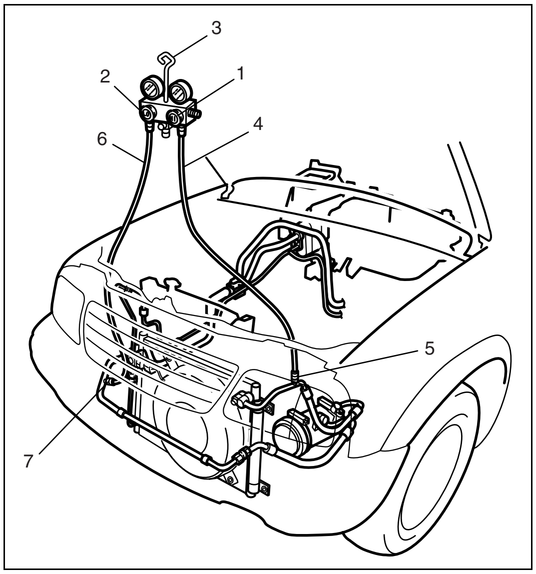
Condition	Possible Cause	Correction
Bubbles observed in sight glass	Insufficient charge of refrigerant in system	Check system for leaks with a leak tester.
No bubbles observed in sight glass	No charge or proper or too much charge of refrigerant in system	Refer to the following items.
No temperature difference between compressor inlet and outlet	Empty or nearly empty system	Perform recovery, evacuating and charging system and then check it for leaks with a leak tester.
Noticeable temperature difference between compressor inlet and outlet	Proper or too much charge of refrigerant in system	Refer to the following items.
When A/C is turned OFF, refrigerant in sight glass clears immediately and remains clear	Too much charge of refrigerant in system	Recharge with specified amount of refrigerant.
When A/C is turned OFF, refrigerant in sight glass once produces bubbles and then clears	Proper charge of refrigerant in system	Perform "PERFORMANCE DIAGNOSIS" in this section.

NOTE:

For specified amount of refrigerant, refer to "OPERATION PROCEDURE FOR CHARGING A/C WITH REFRIGERANT" in this section.

Performance Diagnosis

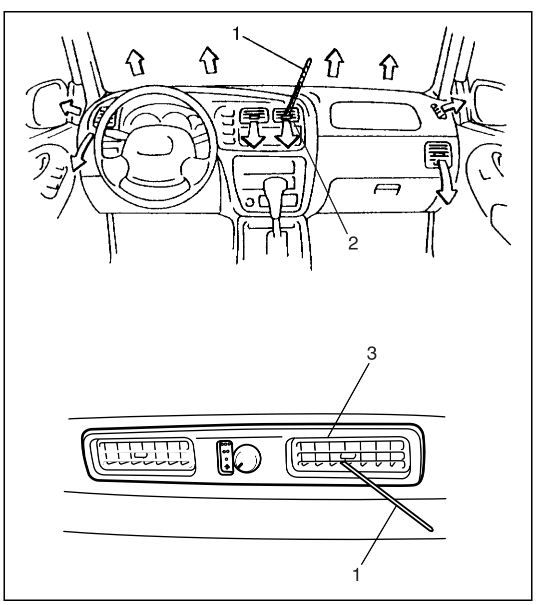
1) Confirm that vehicle and environmental conditions are as follows.
   - Vehicle is not exposed to direct sun.
   - Ambient temperature is within 15 - 35 °C (59 - 95 °F).



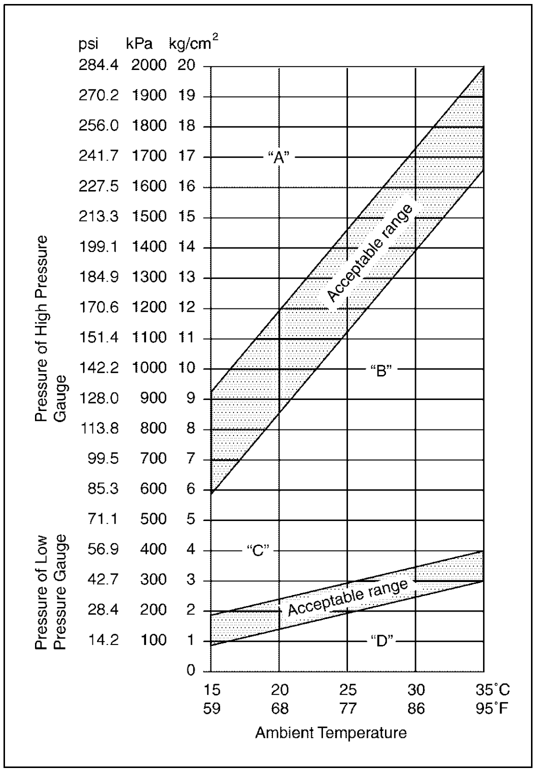
2) Make sure that high pressure valve (1) and low pressure valve (2) of manifold gauge (3) are firmly closed.
3) Connect high pressure charging hose (4) to high pressure service valve (5) on vehicle, and connect low pressure charging hose (6) to low pressure service valve (7) on vehicle.
4) Bleed the air in charging hoses (3), (4) by loosening their respective nuts on manifold gauge, utilizing the refrigerant pressure. When a hiss is heard, immediately tighten nut.

> **CAUTION:**
> **Do not interchange high and low pressure charging hoses by mistake.**

5) Warm up engine to normal operating temperature (engine coolant temperature at 80 - 90 °C (176 - 194 °F)) and keep it at specified idle speed.
6) Operate A/C at the following conditions.
   - Main (front) A/C switch at ON position.
   - Rear A/C main switch at ON position (if equipped).
   - Front blower motor switch at max position.
   - Rear blower motor switch at max position (if equipped).
   - Air outlet control button at face position.
   - Temperature control lever at max cool position.
   - Vehicle door at all open.
   - Air inlet door at recirculation position.
7) Keep all windows, doors and engine food open.



8) With about 20 mm (0.8 in.) of dry bulb thermometer (1) inserted into center face air outlet (2), rear A/C air outlet (3) (dual A/C model only) and near A/C evaporator air inlet, read temperature indicated on each thermometer.



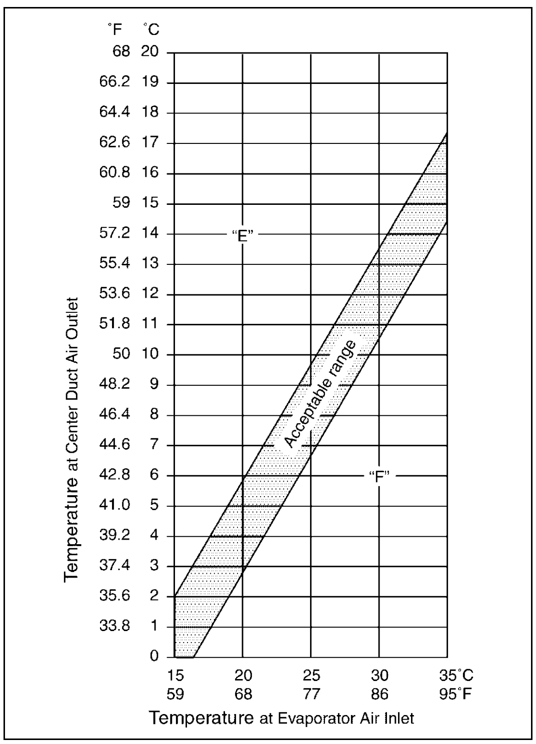
9) Check for each pressure of low side and high side if it is within shaded range of graph.
   If each gauge reading is out of specified pressure, correct defective part referring to "PERFORMANCE DIAGNOSIS TABLE".

Example :

Gauges should read as follows when ambient temperature is 30 °C (86 °F)	
Pressure on high pressure gauge (HI) :	1400 - 1750 kPa 14.0 - 17.5 kg/cm^2 199.1 - 248.9 psi
Pressure on high pressure gauge (LO) :	230 - 350 kPa 2.3 - 3.5 kg/cm^2 32.7 - 49.8 psi

NOTE:

Pressure registered on gauge varies with ambient temperature. Therefore, use the graphs when determining if pressures are normal or not.



10) Check inlet port temperature-to-outlet port temperature relationship using graph.
    For example, if A/C evaporator inlet port temperature is 25 °C (77 °F) and center face air outlet temperature is 8 °C (46.4 °F), their crossing point is within acceptable range as shown in graph.
11) If crossing point is out of acceptable range, diagnose trouble referring to "PERFORMANCE DIAGNOSIS TABLE".
12) Check that difference in temperature of center face air outlet air and rear A/C air outlet air are within 5 °C (41 °F).
    If the rear A/C air outlet air temperature is higher over 5 °C (41 °F) than center face air outlet air temperature, check rear A/C unit.

Performance diagnosis table

HIGH PRESSURE GAUGE

Condition	Possible Cause	Correction
Pressure high (“A” area of high side graph)	Refrigerant overcharged	Recharge.
	Expansion valve frozen or clogged	Check expansion valve.
	Clogged refrigerant passage of high side	Clean or replace.
	Condenser cooling fan malfunction (Insufficient cooling of condenser)	Check condenser cooling fan.
	Dirty or bent condenser fins (Insufficient cooling of condenser)	Clean or repair.
	Compressor malfunction (Insufficient oil etc.)	Check compressor.
	Engine overheat	Check engine cooling system.
Pressure low (“B” area of high side graph)	Insufficient refrigerant (Insufficient charge or leakage)	Check for leakage, repair if necessary and recharge.
	Expansion valve malfunction (valve opens too wide)	Check expansion valve.
	Compressor malfunction (Insufficient compression)	Check compressor.

LOW PRESSURE GAUGE

Condition	Possible Cause	Correction
Pressure high (“C” area of low side graph)	Expansion valve malfunction (valve opens too wide)	Check expansion valve.
	Compressor malfunction (Insufficient compression)	Check compressor.
Pressure low (“D” area of low side graph)	Insufficient refrigerant (Insufficient charge or leakage)	Check for leakage, repair if necessary and recharge.
	Expansion valve malfunction (valve opens too narrow)	Check expansion valve.
	Clogged refrigerant passage (crashed pipe)	Repair or replace.

THERMOMETER AT CENTER DUCT

Condition	Possible Cause	Correction
Outlet air temperature at center duct is high (Crossing point is in area “E”)	Insufficient or excessive charge of refrigerant	Check refrigerant pressure.
	Dirty or bent A/C evaporator fins	Clean or repair.
	Air leakage from cooling (heater) unit or air duct	Repair or replace.
	Malfunctioning, switch over function of damper in cooling (heater) unit	Repair or replace.
	Compressor malfunction	Check compressor.
Outlet air temperature at center duct is low (Crossing point is in area “F”)	Insufficient air volume from center duct (Heater blower malfunction)	Check blower motor and fan.
	Compressor malfunction	Check compressor.

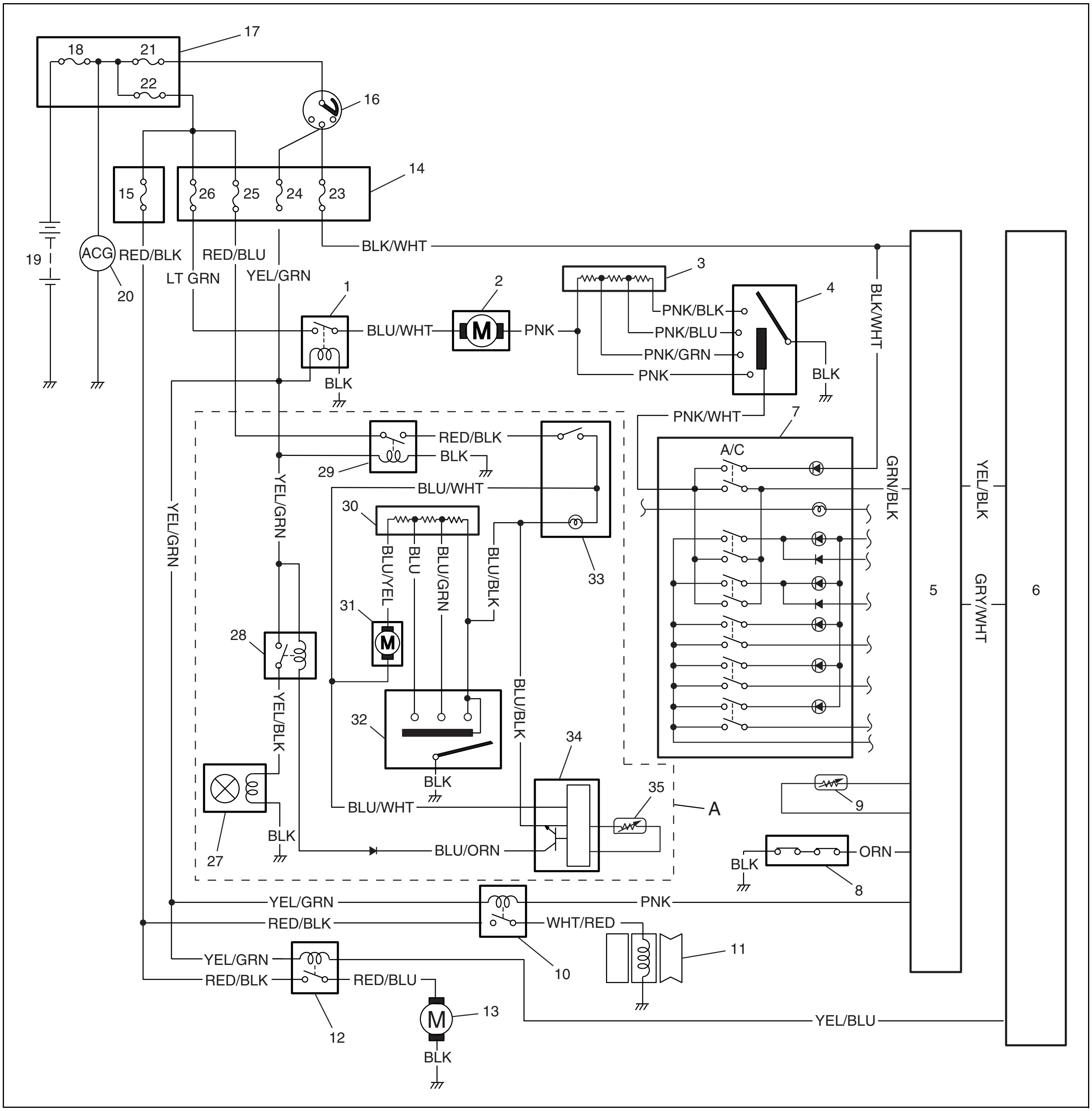
NOTE:

If ambient temperature is within 30 - 35 °C (85 - 95 °F), it is possible to do using “DETAIL DIAGNOSIS TABLE” in this section for detail diagnosis.

Detail diagnosis table (at ambient temperature within 30 - 35 °C (85 - 95 °F))

Condition			Possible Cause	Correction
MANIFOLD GAUGE Lo	MPa (kg/cm^2) (psi) Hi	Detail		
0.23 - 0.35 (2.3 - 3.5) (33 - 50)	**1.4 - 1.75 (14 - 17.5) (200 - 249)**	**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.	Clean expansion valve. Replace it if it cannot be cleaned. Replace condenser/dryer. Evacuate the A/C system and recharge with fresh refrigerant.
Normal : 0.23 - 0.35 (2.3 - 3.5) (33 - 50) ↑↓ Abnormal : Negative pressure	**Normal : 1.4 - 1.75 (14 - 17.5) (200 - 249) ↑↓ Abnormal : 0.7 - 1.0 (7 - 10) (100 - 142)**	**During A/C operation, the low pressure side sometimes indicates negative pressure, and sometimes normal pressure. Also high pressure side reading fluctuates between the abnormal and normal pressure.**	Expansion valve is frozen due to moisture in the system, and temporarily shuts off the refrigeration cycle.	Replace expansion valve. Replace condenser/dryer. Evacuate A/C system and recharge with fresh refrigerant.
0.05 - 0.15 (0.5 - 1.5) (4.2 - 21.3)	**0.7 - 1.0 (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.
0.35 - 0.45 (3.5 - 4.5) (50 - 64)	**2.0 - 2.5 (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 condenser dryer. Inspect quantity of compressor oil and presence of contaminants in oil. Evacuate system and recharge with fresh refrigerant.
0.45 - 0.55 (4.5 - 5.5) (64 - 78)		**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. Refrigerant flow is not regulated properly.	Replace expansion valve.

Wiring Circuit

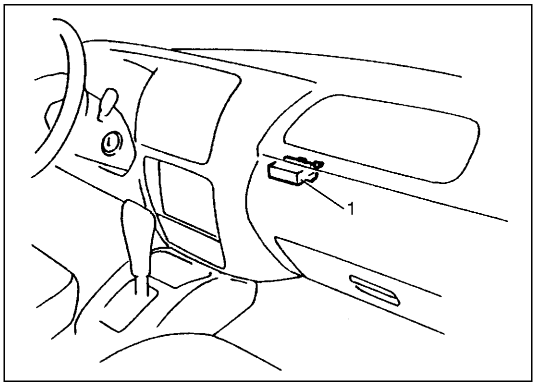


1.	Front blower motor main relay	10.	Compressor relay	19.	Battery	28.	Solenoid valve relay
2.	Front blower motor	11.	Compressor	20.	Generator	29.	Rear blower motor relay
3.	Front blower motor resistor	12.	Condenser cooling fan motor relay	21.	Ignition main fuse 60 A	30.	Rear blower motor resistor
4.	Front blower motor switch	13.	Condenser cooling fan motor	22.	Heater/A/C main fuse 60 A	31.	Rear blower motor
5.	A/C controller	14.	Fuse box	23.	“IG METER” fuse 20 A	32.	Rear blower motor switch
6.	ECM (PCM)	15.	“A/C” fuse 25 A	24.	“REAR DEFG” fuse 25 A	33.	Rear A/C main switch
7.	Heater mode control switch	16.	Ignition switch	25.	“REAR BLOW” fuse 20A	34.	Rear A/C evaporator temperature controller
8.	Dual (refrigerant) pressure switch	17.	Main fuse box	26.	“FRONT BLOW” fuse 30A	35.	Rear A/C evaporator temperature sensor
9.	A/C evaporator thermistor (A/C evaporator temperature sensor)	18.	Battery main fuse 100 A	27.	Solenoid valve	[A] :	Rear A/C wiring circuit (if equipped)

Inspection of A/C Controller and Its Circuits

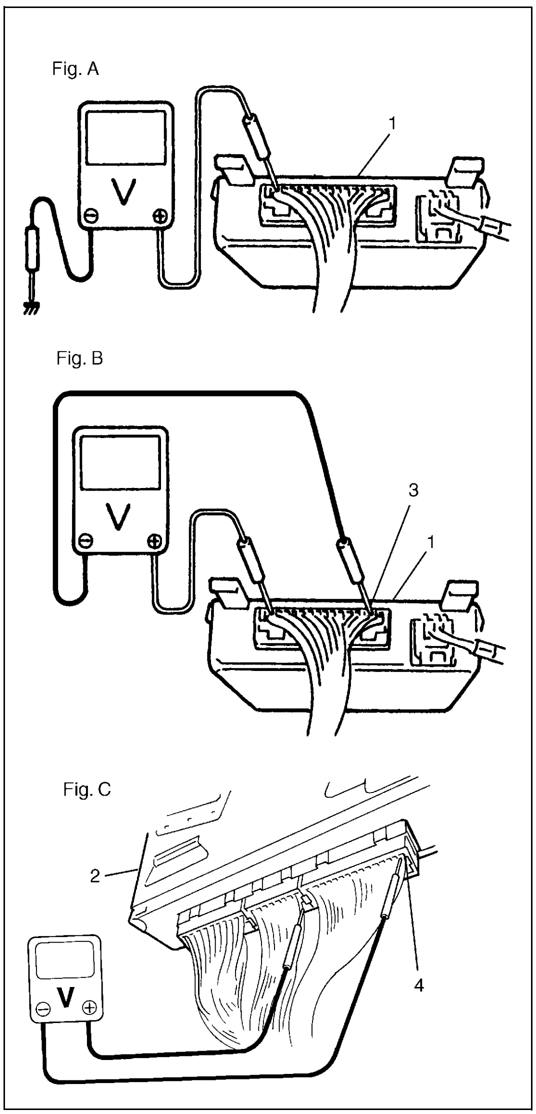
CAUTION:

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



A/C Controller (1) and its circuits can be checked at A/C controller wiring couplers by measuring voltage.

Voltage check



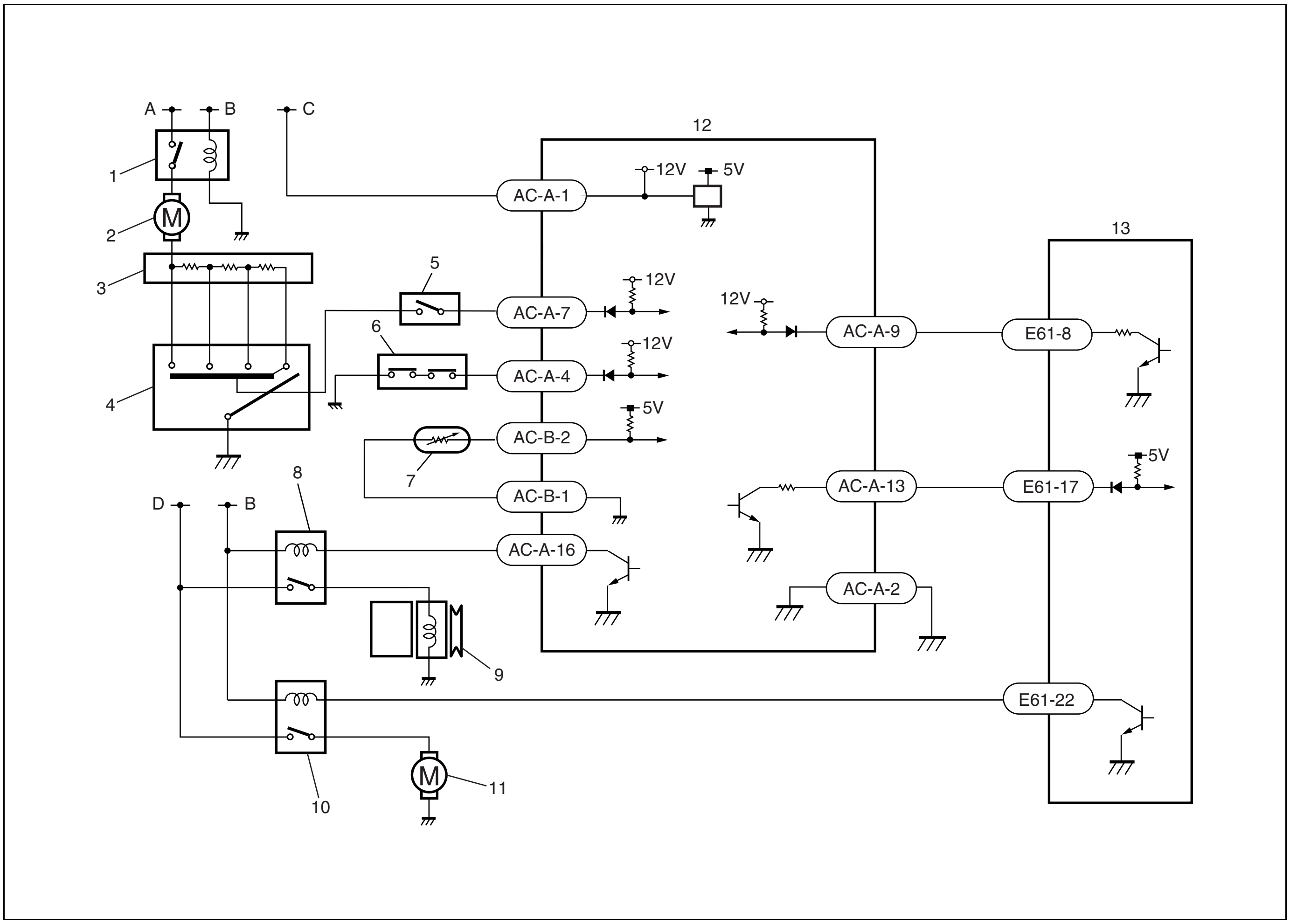
1) Remove A/C controller (1) from vehicle referring to "A/C CONTROLLER" in this section.
2) Remove ECM (2) from vehicle.
3) Connect A/C controller couplers to A/C controller and connect ECM couplers to ECM.
4) Check each terminal voltage with couplers connected by referring to "A/C CONTROLLER VOLTAGE VALUES TABLE".

3.	Terminal AC-A-2
4.	Terminal C51-3-6

NOTE:

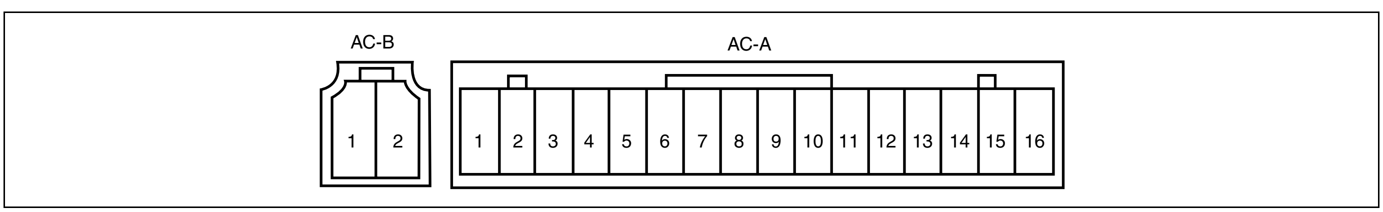
For "Fig. A", "Fig. B", "Fig. C" in the figure, refer to "A/C CONTROLLER VOLTAGE VALUES TABLE".

SYSTEM CIRCUIT

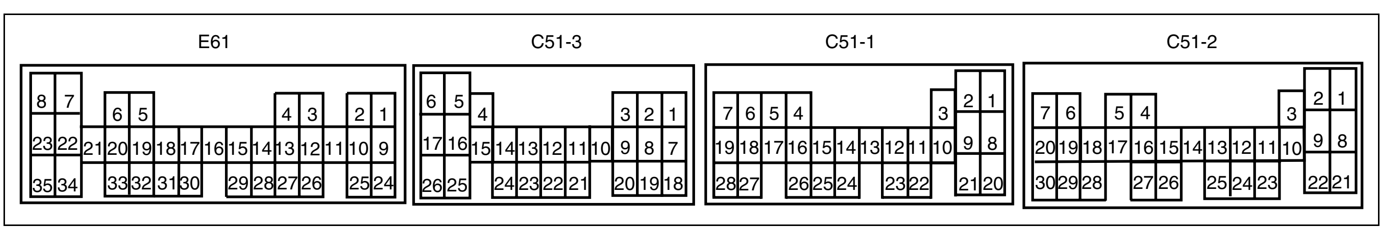


A: To "FRONT BLOW" fuse	1. Front blower motor relay	6. Dual (refrigerant) pressure switch	11. Condenser cooling fan motor
B: To "REAR DEFG" fuse	2. Front blower motor	7. A/C thermistor (evaporator temperature sensor)	12. A/C controller
C: To "IG METER" fuse	3. Front blower motor resistor	8. Compressor relay	13. ECM
D: To "A/C" fuse	4. Front blower motor switch	9. Compressor	
	5. A/C switch	10. Condenser cooling fan motor relay	

Terminal arrangement of A/C controller



Terminal arrangement of ECM



A/C CONTROLLER VOLTAGE VALUES TABLE

Terminal	Wire	Circuit	Measurement ground	Normal value	Condition
AC-A-1	BLK/ WHT	Controller main power supply	Ground to engine (Fig B)	10 – 14 V	Ignition switch ON with engine stopped
AC-A-2	BLK/ YEL	Controller main ground	Ground to body (Fig A)	–0.4 – 0 V	Engine running
AC-A-4	ORN	Refrigerant (dual) pressure switch input	Ground to engine (Fig B)	0 – 1 V	Refrigerant pressure within 225 kpa (2.3 kg/cm^2, 32.7 psi) to 2548 kpa (26 kg/cm^2, 370 psi) with engine running
				10 – 14 V	Refrigerant pressure below 196 kpa (2.0 kg/cm^2, 28 psi) or above 3140 kpa (32 kg/cm^2, 455 psi) with engine running
AC-A-7	GRN/ BLK	A/C switch and/ or defroster switch input	Ground to engine (Fig B)	8 – 14 V	Blower fan motor switch or A/C or defroster switch OFF with engine running
				0 – 1.5 V	Blower fan motor switch and A/C or defroster switch ON with engine running
AC-A-9	GRY/ WHT	Signal input from ECM (A/C ON permission sig- nal)	Ground to engine (Fig B)	10 – 14 V	Approve of A/C ON
				0 – 1 V	A/C ON forbid
AC-A-13	YEL/ BLK	Signal output to ECM (A/C ON request signal)	Ground to engine (Fig B)	0 – 1.5 V	Blower fan motor switch and A/C or defroster switch ON with engine running at A/C evaporator temperature sensor temperature input more than approx. 2.5 °C (less than 2.5 V (5840 Ω)) and refrigerant pressure switch is ON
				10 – 14 V	Except the above-mentioned with engine running
AC-A-16	PNK	Compressor magnet clutch relay output	Ground to engine (Fig B)	0 – 1 V	Blower fan motor switch and A/C or defroster switch ON with engine running at A/C evaporator temperature sensor temperature input more than approx. 2.5 °C (less than 2.5 V (5840 Ω)), refrig- erant pressure switch ON and signal input from ECM ON
				10 – 14 V	Except the above-mentioned with engine running
AC-B-1	BLU/ YEL	Sensor ground	Ground to body (Fig A)	–0.4 – 0 V	Engine running

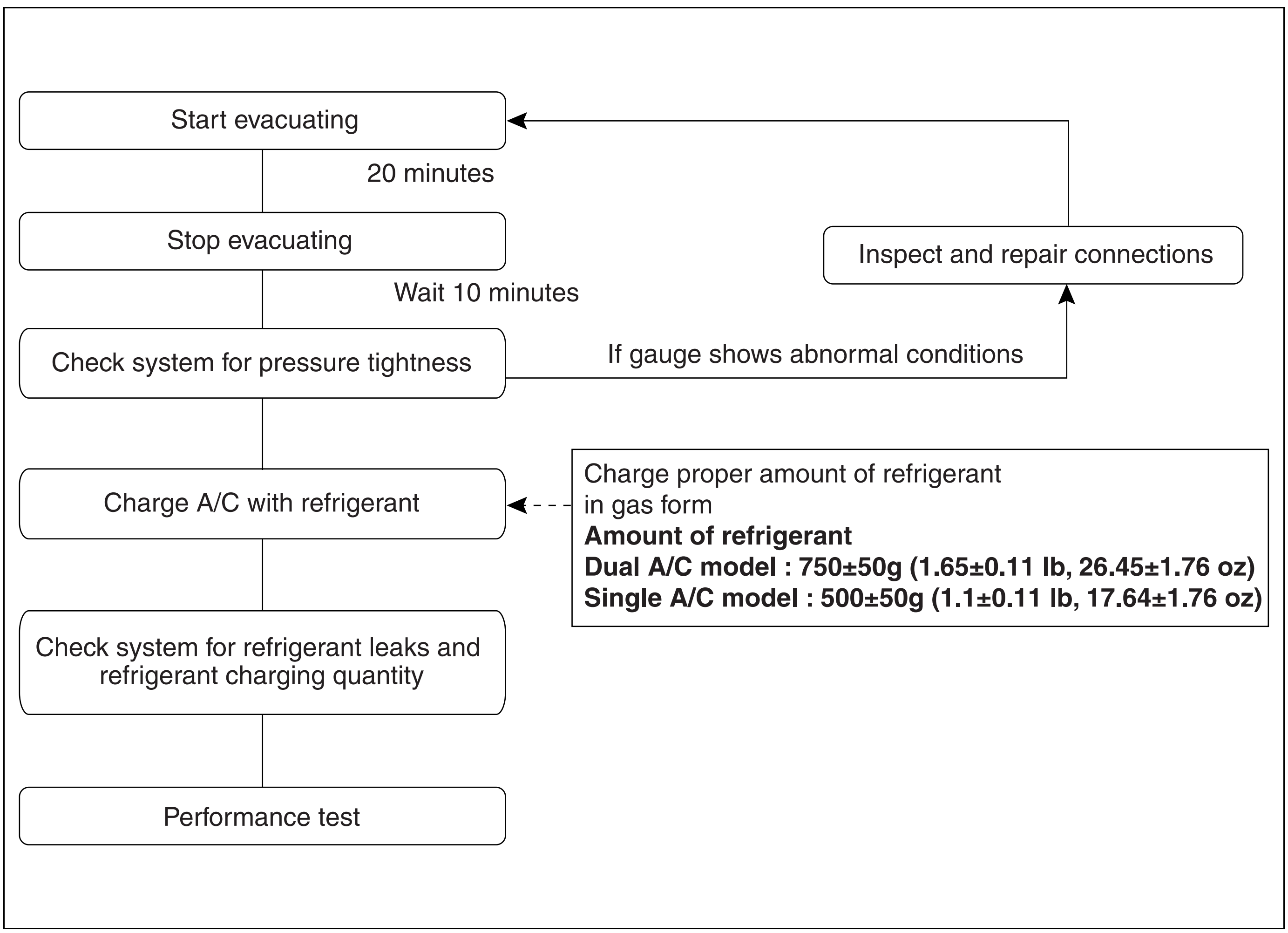
Terminal	Wire	Circuit	Measurement ground	Normal value	Condition
AC-B-2	WHT/ BLK	A/C evaporator temperature sensor (A/C evaporator thermistor) input	Ground to engine (Fig B)	1.8 V (3520 Ω)	A/C evaporator temperature sensor temperature at approx. 15 °C (59 °F) with engine running
				2.51 V (5.855 Ω)	A/C evaporator temperature sensor temperature at approx. 4.5 °C (34 °F) with engine running If the temperature is less than approx. 4.5 °C, in this case compressor and condenser fan should be stop (come back at more than approx. 6.1 °C (less than 5403 Ω, 2.4 V))
E61-8	GRY/ WHT	Signal output to A/C controller (A/C ON permission signal)	Ground to engine (Fig C)	10 – 14 V	Required A/C ON (terminal AC-A13) at engine running with normal condition (refer to “INSPECTION OF ECM AND ITS CIRCUIT” in Section 6E)
				0 – 1 V	Except the above-mentioned with engine running In this case compressor should be stop
E61-17	YEL/ BLK	Signal input from A/C controller (A/C ON request signal)	Ground to engine (Fig C)	0 – 1.5 V	Require A/C ON
				10 – 14 V	Turn off the A/C
E61-22	YEL/ BLU	Condenser cooling fan motor relay output	Ground to engine (Fig C)	0 – 1 V	Blower fan motor switch and A/C or defroster switch ON with engine running at A/C evaporator temperature sensor temperature input more than approx. 2.5 °C (less than 2.5 V (5840 Ω)), refrigerant pressure switch ON and signal input from ECM ON Engine coolant temperature sensor more than 113 °C (236 °F) with engine running
				10 – 14 V	Except the above-mentioned with engine running

Refrigerant Recovery, Evacuation and Charging

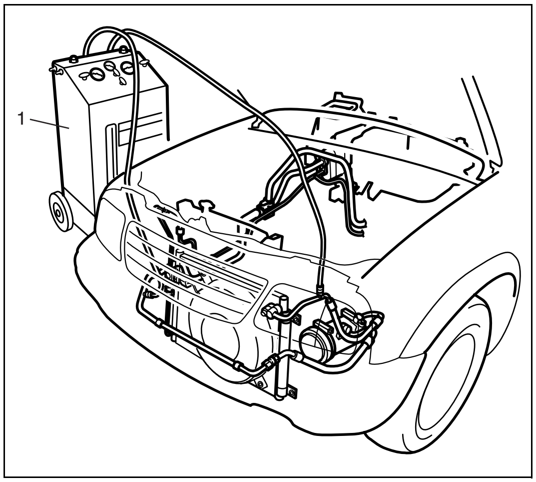
WARNING:

- **Your eyes should not be exposed to refrigerant (liquid).**
  Any liquid Refrigerant-134a escaping by accident shows a temperature as low as approx. –6 °C (21.2 °F) 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.
  - **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.**
  - **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.**

Operation Procedure for Charging A/C with Refrigerant



Recovery



NOTE:

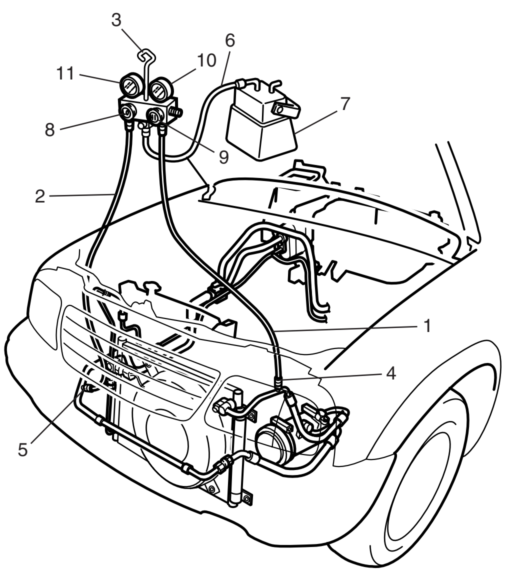
- **When discharging refrigerant out of A/C system, always recover it by using refrigerant recovery and recycling equipment (1). Discharging it into atmosphere would cause adverse effect to environments.**
- **When handling recovery and recycling equipment, be sure to follow the instruction manual for the equipment.**

Evacuating

Evacuating procedure

CAUTION:
Do not evacuate before recovering refrigerant in system.

NOTE:
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. 20 minutes.



1) Connect high charging hose (1) and low charging hose (2) of manifold gauge set (3) respectively as follows:
   High Charging Hose (1) → High pressure charging valve (4) on Discharge Hose
   Low Charging Hose (2) → Low pressure charging valve (5) on Suction Pipe
2) Attach center charging hose (6) of manifold gauge set (3) to vacuum pump (7).
3) Operate vacuum pump (7), and then open discharge-side valve (9) (Hi) of manifold gauge set (3).
   If there is no blockage in the system, there will be an indication on high pressure gauge (10).
   When this occurs, open the other-side valve (8) (Lo) of the set.
4) Approx. 10 minutes later, low pressure gauge (11) should show –10 kPa (–1.0 kg/cm^2, –760 mmHg, –14.2 psi) providing no leakage exists.

NOTE:
- **If the system does not show –10 kPa (–1.0 kg/cm^2, –760 mmHg, –14.2 psi), 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.**

5) Evacuation should be carried out for a total of at least 20 minutes.
6) Continue evacuation until low pressure gauge indicates –10 kPa (–1.0 kg/cm^2, –760 mmHg, –14.2 psi), and then close both valves (8), (9).
7) Stop vacuum pump (7). Disconnect center charging hose (6) from pump inlet. Now, the system is ready for charging refrigerant.

Checking system for pressure leaks

After completing the evacuation, close manifold gauge high pressure valve (HI) and low-pressure valve (LO) and wait 10 minutes. Verify that low-pressure gauge reading has not changed.

CAUTION:

If the gauge reading moves closer to "0", there is a leak somewhere. Inspect the tubing connections, make necessary corrections, and evacuate system once again, making sure that there are no leaks.

Charging

CAUTION:

- **ALWAYS CHARGE THROUGH LOW PRESSURE-SIDE of A/C system at after the initial charging is performed from the high-pressure side with the engine stopped.**
- **NEVER CHARGE TO HIGH PRESSURE-SIDE of A/C system with engine running.**
- **Do not charge while compressor is hot.**
- **When installing tap valve to refrigerant container to make a hole there through, 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 (104 °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.**

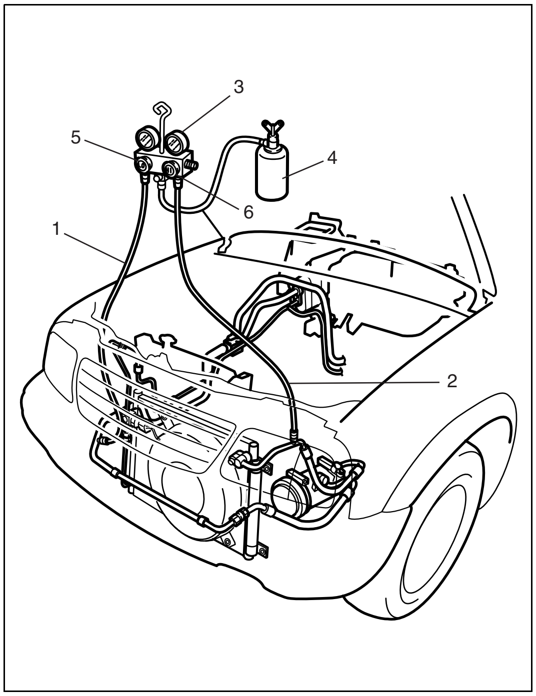
NOTE:

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 and recycling equipment (when recycling refrigerant), follow the procedure described in the equipment manufacturer's instruction manual.

The initial charging of the A/C system is performed from the high-pressure side with the engine stopped.

And next, this method must be followed by charging from the low-pressure side with the engine running.

1) Check to make sure that hoses are routed properly after evacuating the system.



2) Connect Low-side hose (1) and High side hose (2) of the manifold gauge set (3) in position. Thus open refrigerant container valve (4) to purge the charging line.
3) Open the high-pressure side valve (6) and charge refrigerant to system.
4) After a while, open the low-pressure side valve (5) and close the high-pressure side valve (6).

WARNING:

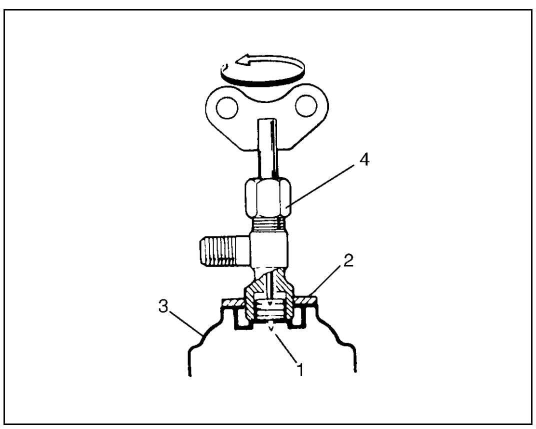
Make sure that high pressure-side valve is closed securely.

5) Start engine and keep engine speed at 1500 rpm. Then, operate air conditioning.

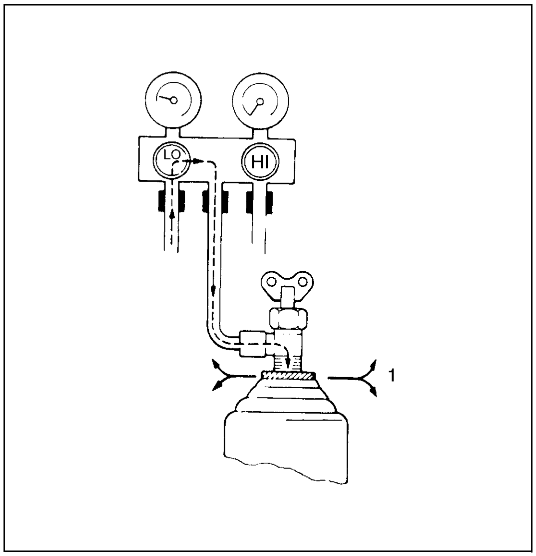
NOTE:

Dual A/C model must be operated rear A/C system, too.

6) Charge A/C system with refrigerant in vapor state. At this time, refrigerant container should be held upright.

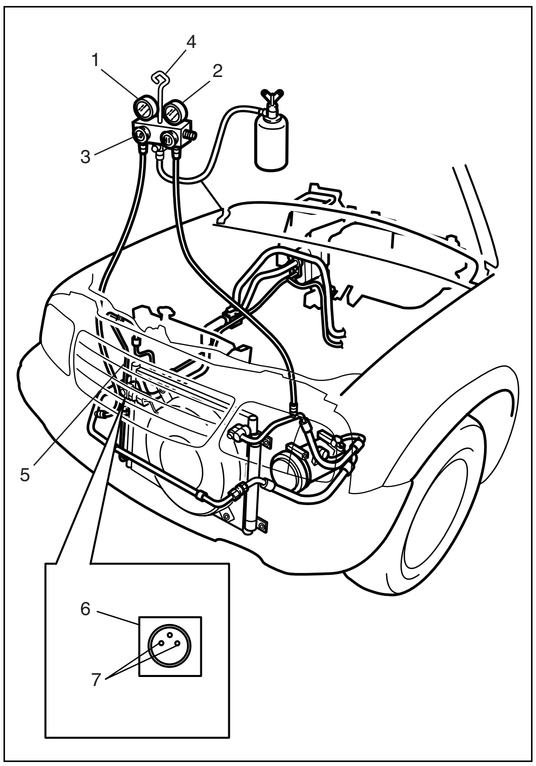


7) When refrigerant container (3) is emptied, the use following procedure to replace it with a new refrigerant container (3).
   a) Close low pressure valve.
   b) Replace empty container (3) with a refrigerant container which has been charged with refrigerant. When using refrigerant container tap valve (4), use following procedure for replacement.
      i) Retract needle (1) and remove refrigerant container tap valve (4) by loosening its plate nut (2).
      ii) Install previously-removed refrigerant container tap valve (4) to a new refrigerant container (3).



c) Purge any air existing in center charging hose
When using refrigerant container tap valve, use following procedure to purge air.
  i) Once fully tighten refrigerant container tap valve and then loosen (open) plate nut slightly.
  ii) Open low pressure valve of manifold gauge set a little.
  iii) As soon as refrigerant comes out with a “hiss” through a clearance between refrigerant container and tap valve, tighten plate nut as well as manifold gauge set low pressure valve.
  iv) Turn handle of tap valve clockwise so that its needle is screwed into the new container to make a hole for refrigerant flow.

1. “Hiss”



8) After the system has been charged with specified amount of refrigerant or when low pressure gauge (1) and high pressure gauge (2) must indicated the following specified amount, close low pressure side valve (3) of manifold gauge set (4). If equipped with sight glass in this time, look into the sight glass (6) of condenser outlet pipe (5) and check that there are no bubbles (7) in it, which means that the system is fully charged.

Low pressure gauge when charged with specified amount :

About 200 - 300 kPa (2 - 3 kg/cm^2, 29 - 43 psi)
(At A/C inlet temperature 30 - 35 °C (86 - 95 °F))
High pressure gauge when charged with specified amount :

About 1370 - 1670 kPa (14 - 17 kg/cm^2, 200 - 244 psi)
(At A/C inlet temperature 30 - 35 °C (86 - 95 °F))

On-Vehicle Service

WARNING:

Should refrigerant HFC-134a (R-134a) strike your eye(s), consult a doctor immediately.

- **DO NOT USE YOUR HAND TO RUB AFFECTED EYE(S).**
  Instead, use quantities of fresh cold water to splash it over affected area to thus gradually raise its temperature above the freezing point.
- **Obtain proper treatment as soon as possible from a doctor or eye specialist.**
  Should liquid refrigerant HFC-134a (R-134a) get on your skin, such affected part should be treated in the same manner as when skin is frostbitten or frozen.

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 "REFRIGERANT TYPE" in this section.
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.

Precaution

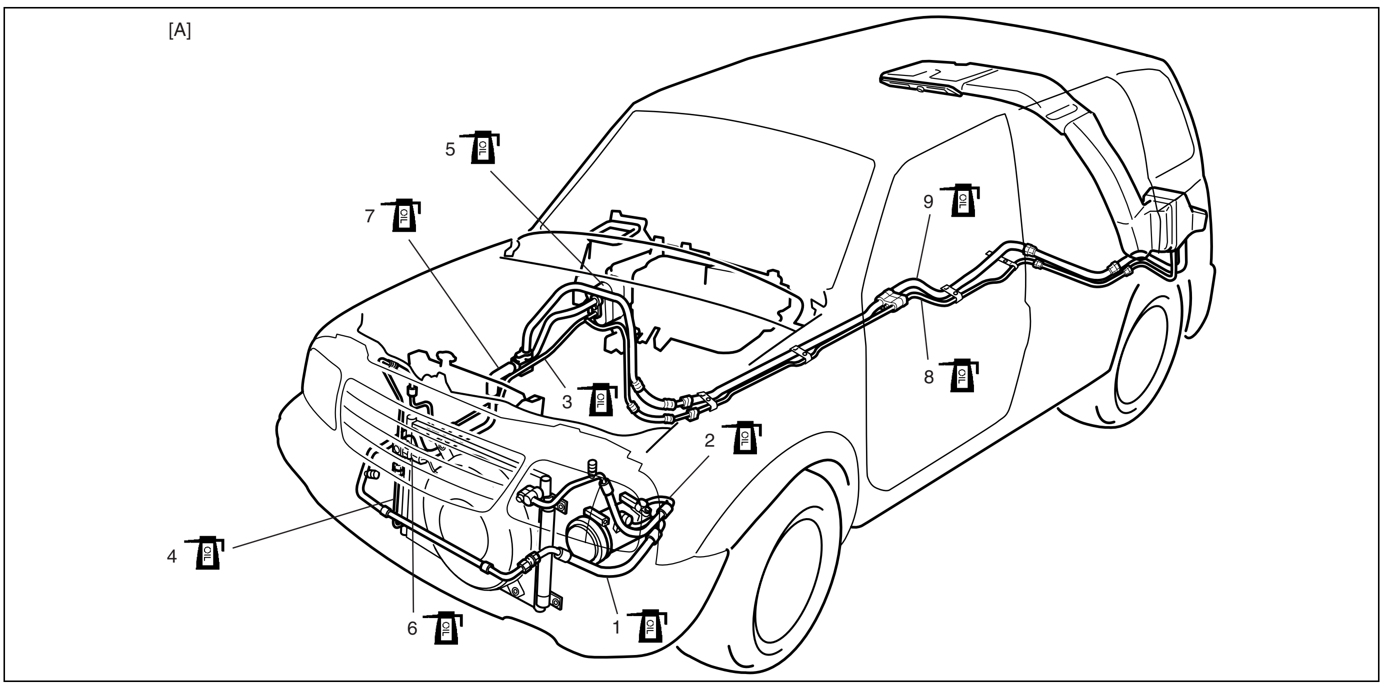
When servicing air conditioning system, the following rules must be observed.

Piping

- When connecting hoses and pipes, apply a few drops of compressor oil (refrigerant oil) to seats of coupling nuts and O-ring.

NOTE:

Single A/C model is the same as SQ625 (H25 engine) model. Refer to the same section of the Service Manual mentioned in FOREWORD of this manual.



[A]:	Dual A/C model	1. Suction hose	4. Condenser outlet pipe	7. Front suction pipe	
OIL	Apply compressor oil (refrigerant oil) to O-ring.	2. Discharge hose	5. Expansion valve	8. Rear liquid pipe	
		3. Front liquid pipe	6. Dual (refrigerant) pressure switch	9. Rear suction pipe	

- Never use heat for bending pipes. When bending a pipe, try to make its bending radius as slight as possible.
- Keep internal parts of air conditioning free from moisture and dirt. When disconnecting any line from system, install a blind plug or cap to the fitting immediately.
- When tightening or loosening a fitting, use two wrenches, one for turning and the other for support.
- Tighten flared nuts to specified torque.

Tightening torque
8 mm (0.31 in.) pipe : 13 N·m (1.3 kg-m, 9.5 lb-ft)
12.7 mm (0.5 in.) pipe : 22 N·m (2.2 kg-m, 16.0 lb-ft)
16 mm (0.63 in.) pipe : 33 N·m (3.3 kg-m, 24.0 lb-ft)

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

Handling refrigerant HFC-134a (R-134a)

- When handling refrigerant, always wear goggles to protect your eyes.
- Avoid you direct contact to liquid refrigerant.
- Do not heat refrigerant container higher than 40 °C (104 °F).
- Do not discharge refrigerant into atmosphere.
- Do not allow liquid refrigerant to touch bright metals. Refrigerant combined with moisture is corrosive and will tarnish surfaces of bright metals including chrome.
- After recovering refrigerant from system, the amount of compressor oil removed must be measured and the same amount added to the system.

Refrigerant recovery

When discharging refrigerant out of A/C system, always recover it by using refrigerant recovery and recycling equipment. Discharging refrigerant HFC-134a (R-134a) into atmosphere would cause adverse effect to environments.

NOTE:
When handling recovery and recycling equipment, be sure to follow the instruction manual for the equipment.

Refrigerant charge

Charge a proper amount of refrigerant to A/C system according to charging procedure described in recovery, evacuation and charging.

CAUTION:
Do not perform an additional refrigerant charging to A/C system. This cause it to overcharge.

Replenishing compressor oil

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

When replacing air conditioning parts with new ones, it is necessary to replenish oil by the amount supposedly remaining in each part.

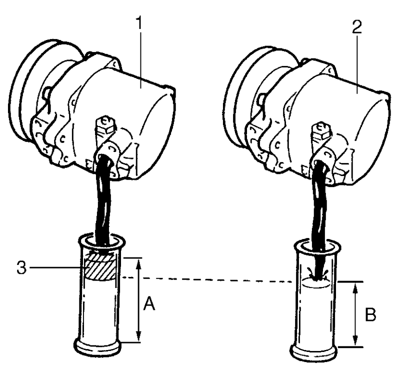
WHEN CHANGING GAS ONLY

When it is unavoidable to change gas without replacing any component part for engine removal and installation or for some other reason, replenish 20 cm^3 (20cc) oil. When replenishing gas only, oil replenishment is not necessary.

WHEN REPLACING COMPRESSOR

Compressor oil is sealed in each new compressor by the amount required for air conditioner cycle. Therefore, when using a new compressor for replacement, drain oil from it by the amount calculated as follows.

"C" = "A" – "B"
"C" : Amount of oil to be drained
"A" : Amount of oil sealed in a new compressor
"B" : Amount of oil remaining in removed compressor



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

Amount of oil in new compressor :
Dual A/C model 140 cm^3 (140 cc)
Single A/C model 100 cm^3 (100 cc)

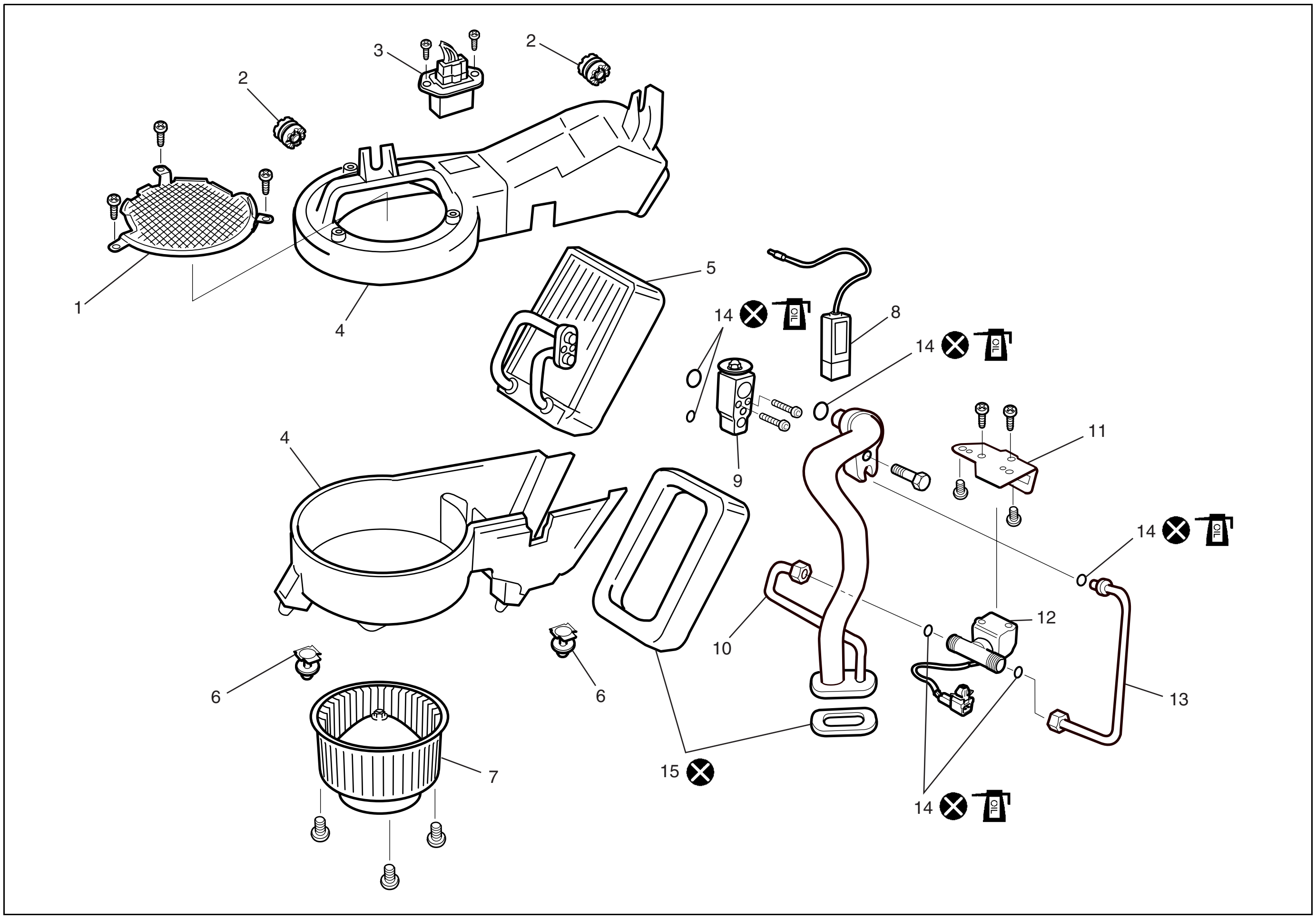
WHEN REPLACING OTHER PART

Amount of compressor oil :

Replaced part	Amount of compressor oil to be replenished
Evaporator	25 cm^3 (25 cc)
Rear evaporator (for dual A/C model)	25 cm^3 (25 cc)
Condenser	15 cm^3 (15 cc)
Receiver/dryer	20 cm^3 (20 cc)
Hoses	10 cm^3 (10 cc) each
Pipes	10 cm^3 (10 cc) each

1. New compressor
2. Removed compressor
3. Excess oil (A–B)

Rear A/C Unit (Rear A/C Evaporator)

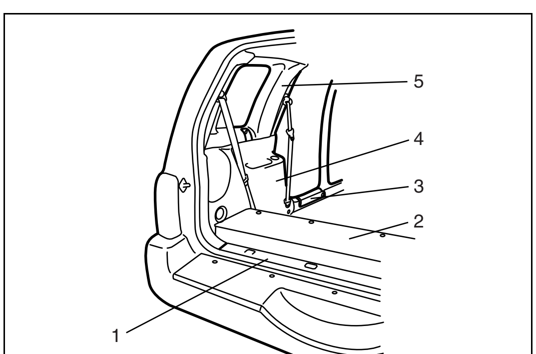


1. Rear blower fan cover	6. Rear A/C unit mounting clip	11. Solenoid valve mounting bracket	Do not reuse
2. Rear A/C unit mounting bush	7. Rear blower motor assembly	12. Solenoid valve	Apply compressor (refrigerant) oil to O-ring
3. Rear blower fan resistor	8. Rear A/C evaporator temperature controller	13. Rear liquid pipe	
4. Rear A/C unit cover	9. Rear expansion valve	14. O-ring	
5. Rear A/C evaporator	10. Rear suction pipe	15. Packing	

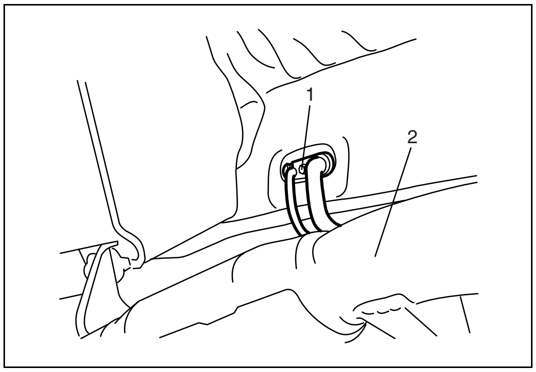
REMOVAL

1) Disconnect negative (–) cable at battery.
2) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment.

   The amount of compressor oil removed must be measured and the same amount added to the system.

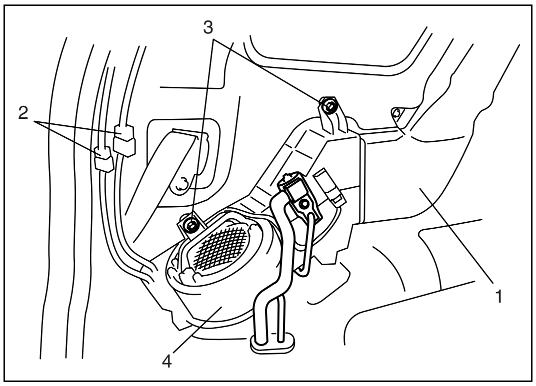


3) Remove rear luggage mat end garnish (1), rear luggage box (2) (if equipped), rear side sill scuff (3) rear quarter lower trim (4) and rear quarter upper trim (5).



4) Loosen floor suction pipe and floor liquid pipe mounting bolt (1).

2. Muffler



5) Remove rear A/C No.1 duct (1).
6) Disconnect rear A/C unit wire couplers (2).
7) Remove rear A/C unit mounting bolts (3), and then remove rear A/C unit (4).

NOTE:

Cap open fitting immediately to keep moisture out of system.

INSPECTION

Check the following.

- Clog of rear A/C evaporator fins.
  If any clogs are found, rear A/C evaporator fins should be washed with water, and should be dried with compressed air.
- Rear A/C evaporator fins for leakage and breakage.
  If any defects are found, repair or replace rear A/C evaporator.

INSTALLATION

Reverse removal procedure to install rear A/C unit noting the following points.

- Evacuate and charge system. Refer to “RECOVERY” and “EVACUATING” in this section.
- When the rear A/C evaporator thermistor (temperature sensor) removed, it should be reinstalled in original position.
- If rear A/C unit or rear A/C evaporator is replaced, pour 25 cm^3 (25 cc) of refrigerating oil to compressor suction-side.

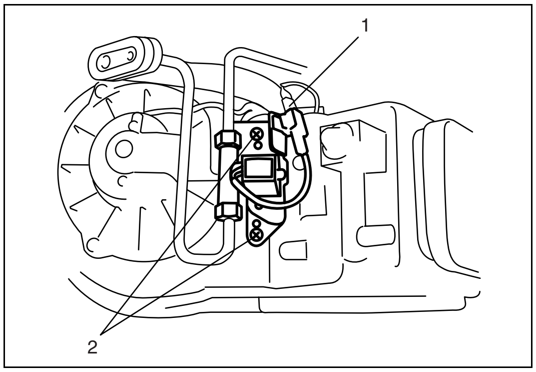
Rear Expansion Valve

INSPECTION

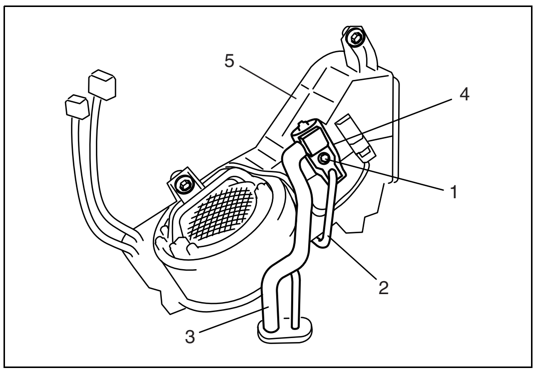
Refer to “PERFORMANCE DIAGNOSIS” in this section.

REMOVAL

1) Remove rear A/C unit referring to "REAR A/C UNIT" in this section.



2) Disconnect solenoid valve connector (1).
3) Loosen solenoid valve bracket mounting screws (2).



4) Remove rear liquid pipe and rear suction pipe bolt (1), and then disconnect rear liquid pipe (2) and rear suction pipe (3) with solenoid valve and its bracket from rear expansion valve (4).
5) Remove rear expansion valve (4) from rear A/C unit (5).

NOTE:

Cap open fitting immediately to keep moisture out of system.

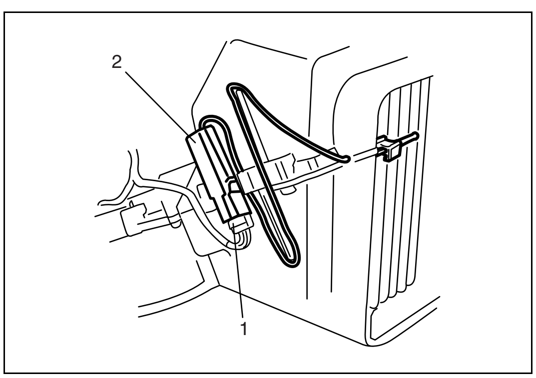
INSTALLATION

Reverse removal procedure to install rear expansion valve.

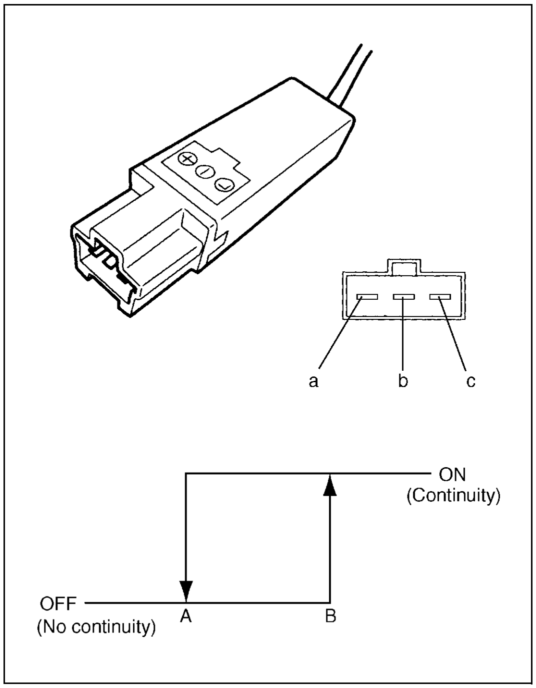
Rear A/C Evaporator Temperature Controller

REMOVAL

1) Remove rear A/C unit referring to "REAR A/C UNIT" in this section.



2) Disconnect rear A/C evaporator temperature controller connector (1).
3) Remove rear A/C evaporator temperature controller (2) from rear A/C unit.



INSPECTION

1) Connect battery positive (+) cable to terminal “b” and battery negative (–) cable to terminal “c” as shown.
2) Using ohmmeter, check continuity between terminal “a” and terminal “b” at specified temperature as shown.

Rear A/C evaporator temperature controller specification :
“A” : Approximately 3.5 °C (38.3 °F)
“B” : Approximately 5.0 °C (41 °F)

INSTALLATION

Reverse removal procedure to install rear A/C evaporator temperature controller noting the following instruction.

- When the rear A/C evaporator thermistor (temperature sensor) removed, it should be reinstalled in original position.

Refrigerant Pipes and Hoses

INSPECTION

- Use a leak tester to check hoses and pipes for any gas leakage.
- Check each hose or pipe clamp for tightness. Retighten or replace loose clamp as required, if any.

REMOVAL

CAUTION:
As soon as the above hose or pipe is disconnected, cap its opened fitting to prevent moisture and dust from entering.

1) Recover refrigerant by using recovery and recycling equipment. Be sure to follow the instruction manual for the equipment.
   The amount of compressor oil removed must be measured and the same amount must be added to the system when reinstalling.
2) Replace defective hose or pipe.

NOTE:
Remove EVAP canister and fuel tank cover, if necessary

INSTALLATION

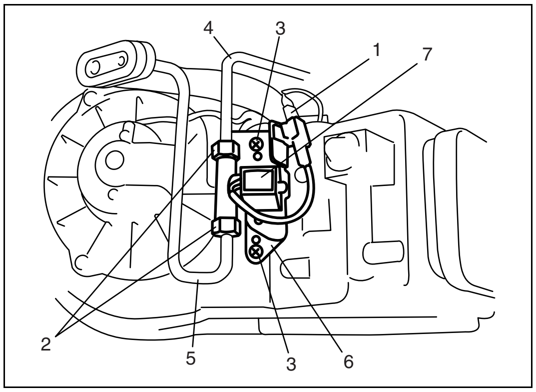
Reverse removal procedure to install refrigerant line noting the following instruction.

- Evacuate and charge system. Refer to “EVACUATING” and “CHARGING” in this section.

Solenoid Valve

REMOVAL

1) Remove rear A/C unit referring to “REAR A/C UNIT” in this section.

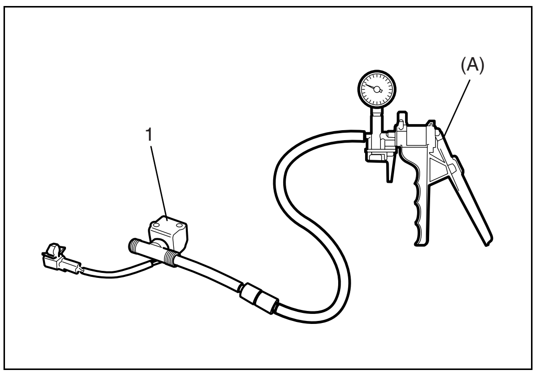


2) Disconnect solenoid valve connector (1).
3) Loosen solenoid valve flared nuts (2).
4) Remove solenoid valve bracket mounting screws (3), and then remove rear liquid pipe (4) and rear suction pipe (5) from rear expansion valve.
5) Remove rear liquid pipe (4), rear suction pipe (5) and solenoid valve bracket (6) from solenoid valve (7).

NOTE:

Cap open fitting immediately to keep moisture out of system.

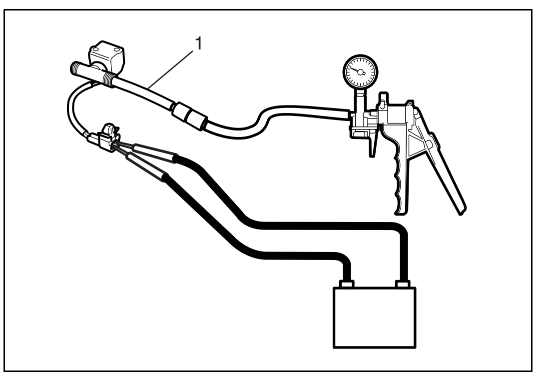
INSPECTION



1) Connect special tool to solenoid valve (1).

   Special tool
   (A) : 09917-47910

2) Check that solenoid valve is closed when vacuum is applied to solenoid valve.
   If solenoid valve is opened, replace solenoid valve.



3) Check that solenoid valve (1) is opened when connect battery to solenoid valve as shown in figure.

NOTE:

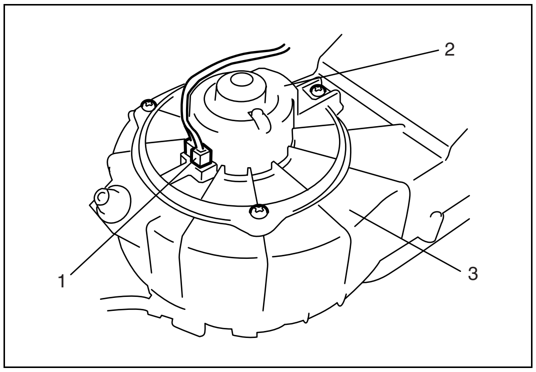
Solenoid valve terminal is no polarity.

INSTALLATION

Reverse removal procedure to install solenoid valve.

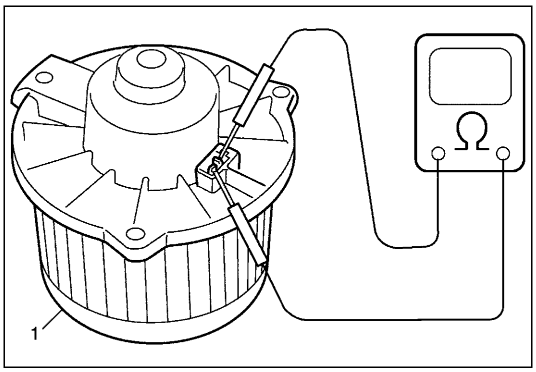
Rear Blower Motor Assembly

REMOVAL

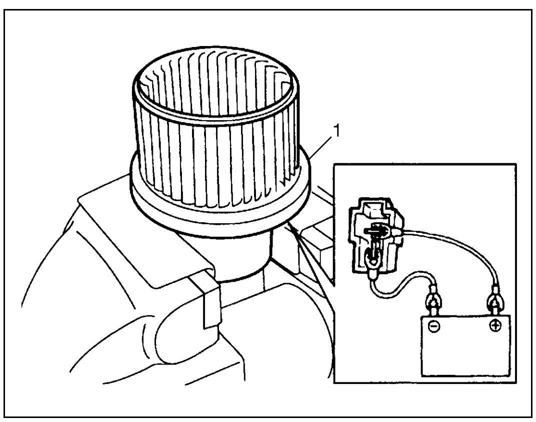


1) Remove solenoid valve referring to "SOLENOID VALVE" in this section.
2) Disconnect rear blower motor coupler (1).
3) Remove rear blower motor assembly (2) from rear A/C unit (3).

INSPECTION



1) Check continuity between two terminal as shown.
   If check results are no continuity, replace rear blower motor assembly (1).



2) Check operate and current.
   a) Fix rear blower motor assembly (1) by using vise.
   b) Connect battery to rear blower motor assembly (1) as shown.
   c) Check that there is smoothly operates and no noise.
   d) Check that ammeter indicates specified current.
      If measure current is incorrect, replace blower motor assembly.

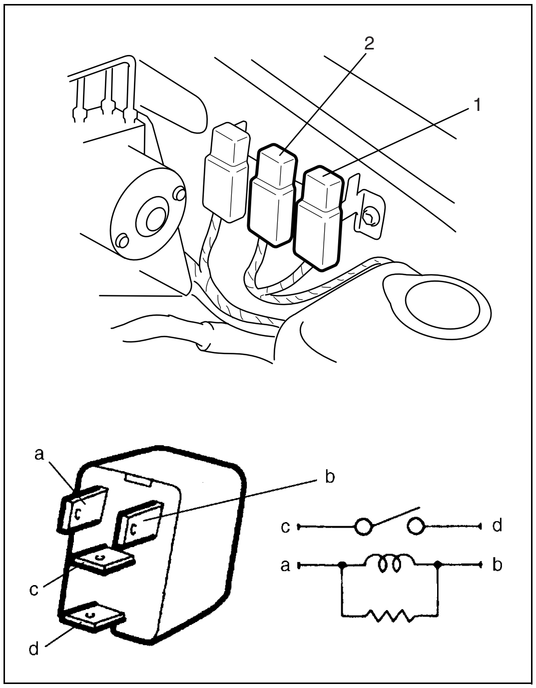
Rear blower fan motor specified current at 12V
: 16 A maximum

INSTALLATION

Reverse removal procedure for installation.

Rear Blower Motor Relay and Solenoid Valve Relay

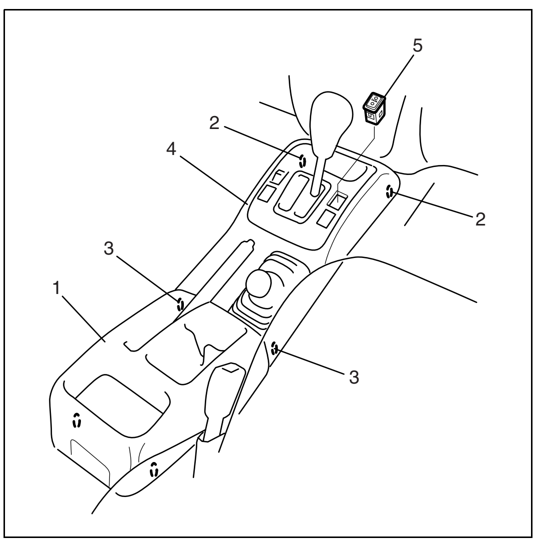
INSPECTION



1) Disconnect negative (–) cable at battery.
2) Remove rear blower motor relay (1) and/or solenoid valve relay (2) from vehicle.
3) Check that there is no continuity between terminal “c” and “d”. If there is continuity, replace relay.
4) Connect battery positive (+) terminal to terminal “a” of relay.
5) Connect battery negative (–) terminal “b” of relay.
6) Check continuity between terminal “c” and “d”.
   If there is no continuity when relay is connected to the battery, replace relay.

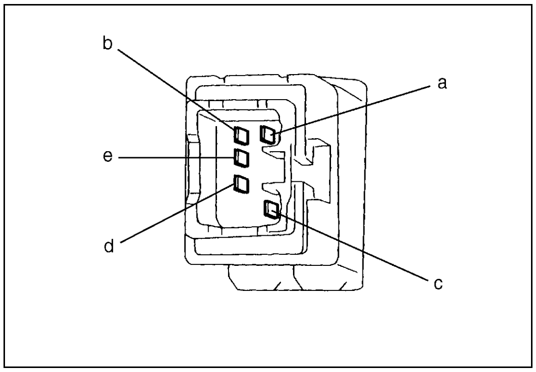
Rear A/C Main Switch

REMOVAL



1) Remove rear console box (1).
2) Remove front console box mounting screws (2) and clips (3).
3) Disconnect console box wire coupler.
4) Remove rear console box (4).
5) Disconnect rear A/C main switch connector.
6) Remove A/C main switch (5) from front console box (4).

INSPECTION



- Check rear A/C main switch for each terminal-to-terminal continuity.
  If check results are not specified, replace rear A/C main switch.

TERMINAL / POSITION	a	b	c	d	e
ON	○	○	○	○	○
OFF	○	○	○	○	

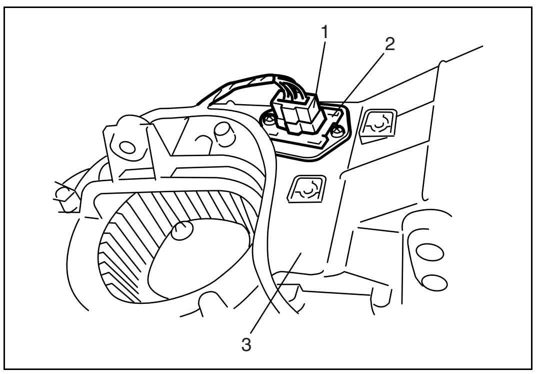
INSTALLATION

Reverse removal procedure for installation.

Rear Blower Motor Resistor

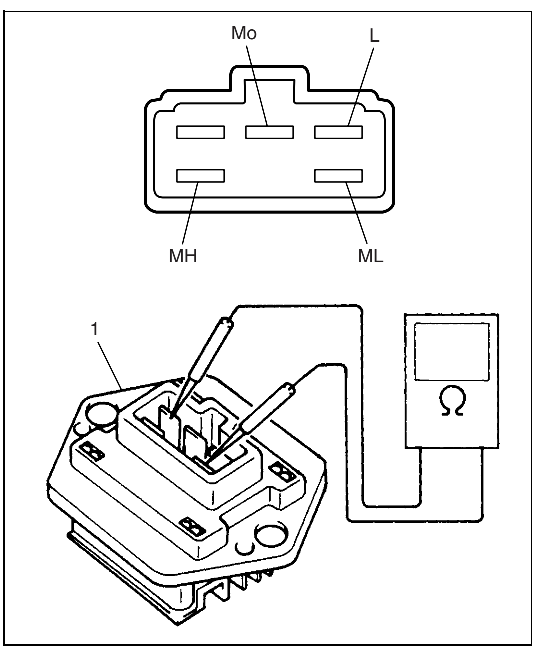
REMOVAL

1) Remove rear A/C unit referring to “REAR A/C UNIT” in this section.



2) Disconnect rear blower motor resistor connector (1).
3) Remove rear blower motor resistor (2) from rear A/C unit (3).

INSPECTION



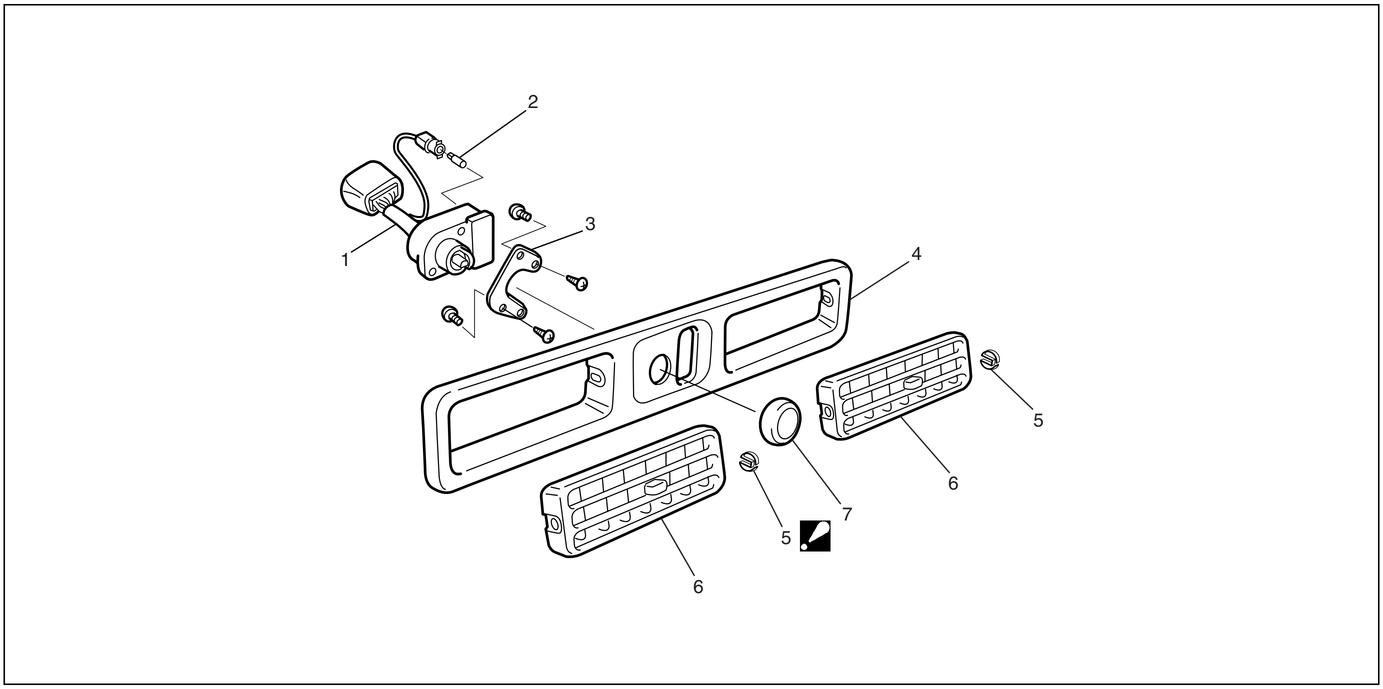
Measure each terminal-to-terminal resistance.
If measured resistance is incorrect, replace rear blower motor resistor (1).

Rear blower motor resister resistance
Mo-L : Approx. 2.4 Ω
Mo-ML : Approx. 1.2 Ω
Mo-MH : Approx. 0.6 Ω

INSTALLATION

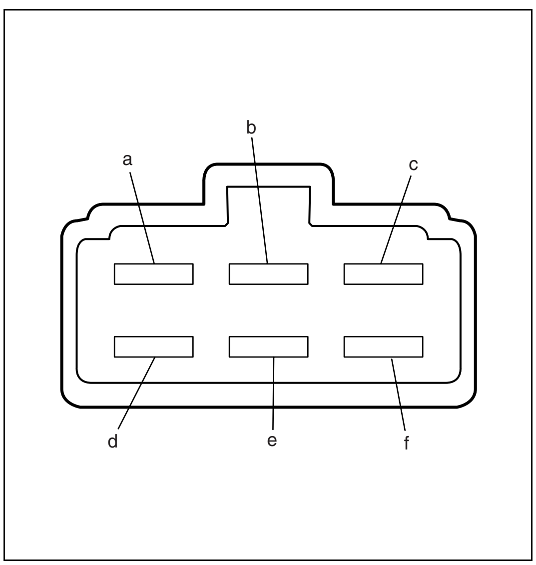
Reverse removal procedure to install rear blower motor resistor.

Rear Blower Motor Switch



1. Rear blower motor switch	5. Rear A/C air louver holder Install proper direction as shown in figure
2. Bulb	6. Rear A/C air louver
3. Bracket	7. Knob
4. Rear A/C air louver case	

INSPECTION



- Check rear blower motor switch for each terminal-to-terminal continuity.
  If check results are not specified, replace rear blower motor switch.

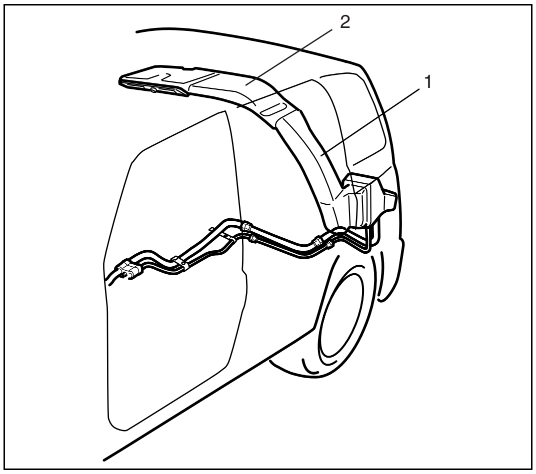
POSITION \ TERMINAL		a	b	d	e
OFF					
Low	•			O	O
Middle	• •	O		O	O
High	• • •		O	O	O

- Check rear blower motor switch bulb come ON when connect battery positive (+) cable to terminal “c” and battery negative (–) cable to terminal “f”.
  If A/C blower fan switch bulb does not come ON, replace it.

Rear A/C No.1 and No.2 Duct

Rear A/C No.1 duct

REMOVAL



1) Remove rear A/C unit referring to “REAR A/C UNIT” in this section.
2) Remove rear A/C No.1 duct (1).

INSTALLATION

Reverse removal procedure to install rear A/C No.1 duct (1).

Rear A/C No.2 duct

CAUTION:

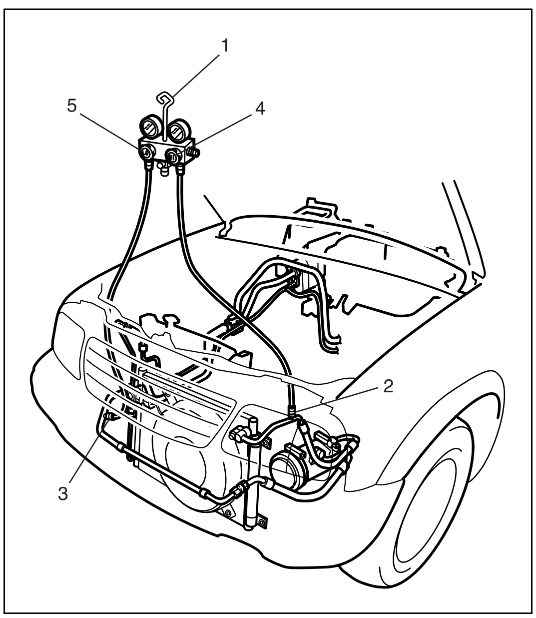
Never remove rear A/C No.2 duct (2) from head lining. Performing this prohibited service will break head lining.

Compressor Assembly

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 66.
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.
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 Trichloromethane, naphtha, kerosene or equivalent solvent and dried with dry air. Use only lint free cloths to wipe parts.
The operations described are based on bench overhaul with compressor removed from the vehicle, except as noted. They have been prepared in order of accessibility of the components.
When compressor is removed from the vehicle for servicing, the oil remaining in the compressor should be discarded and new refrigerant oil added to the compressor.
Minor repair procedures may be done on the vehicle without discharging the system. Major repair procedures require that the system be discharged of refrigerant.

INSPECTION



1) Install manifold gauge set (1) as shown in the figure.
2) Close Hi (4) and Lo (5) side valves.

2.	High pressure side (Delivery side hose)
3.	Low pressure side (Suction side pipe)

3) Run engine at fast idle.
4) Check compressor for the following items.
   If any of the above checks indicated a defect, repair compressor.
   - High pressure gauge reading is not low and low pressure gauge reading is not higher than normal.
   - Metallic sound.
   - Leakage from compressor.

REMOVAL

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

NOTE:

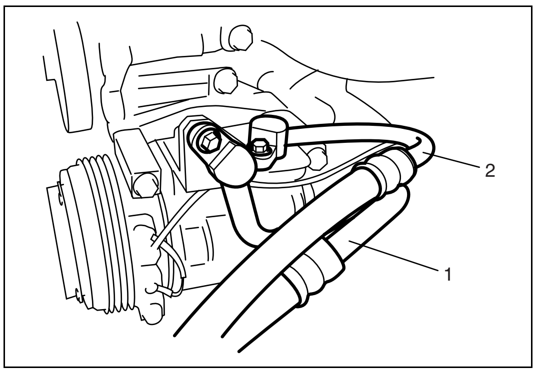
The amount of compressor oil at removed must be measured and the same amount must be poured when installing the compressor.

4) Remove P/S pump referring to step 4) to 7) of "REMOVAL" under "P/S PUMP" in Section 3B1.

NOTE:

It is not necessary to drain P/S fluid.

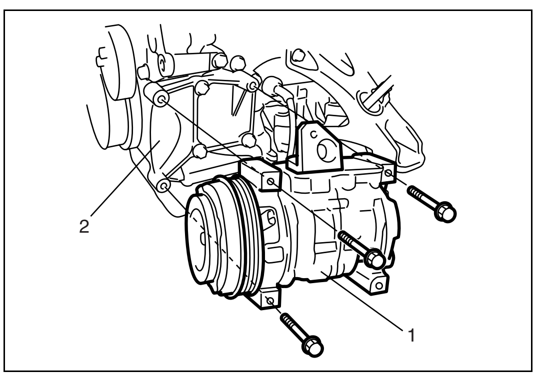
5) Disconnect magnet clutch connector.



6) Disconnect suction hose (1) and discharge hose (2) from compressor.

NOTE:

Cap open fitting immediately to keep moisture out of system.



7) Remove compressor (1) from its mount (2).

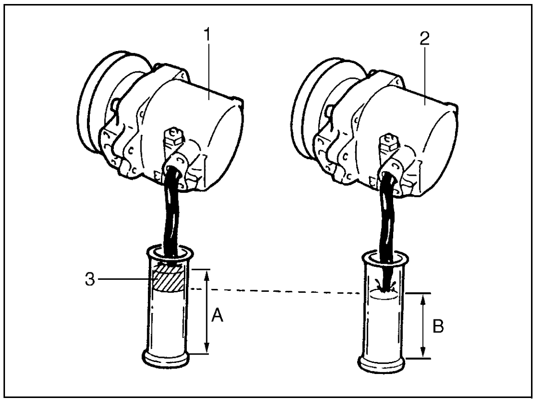
NOTE:

If compressor assembly is replaced. Drain oil from compressor, and measure its amount.

INSTALLATION

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

Reverse removal procedure to install compressor assembly noting the following instructions.

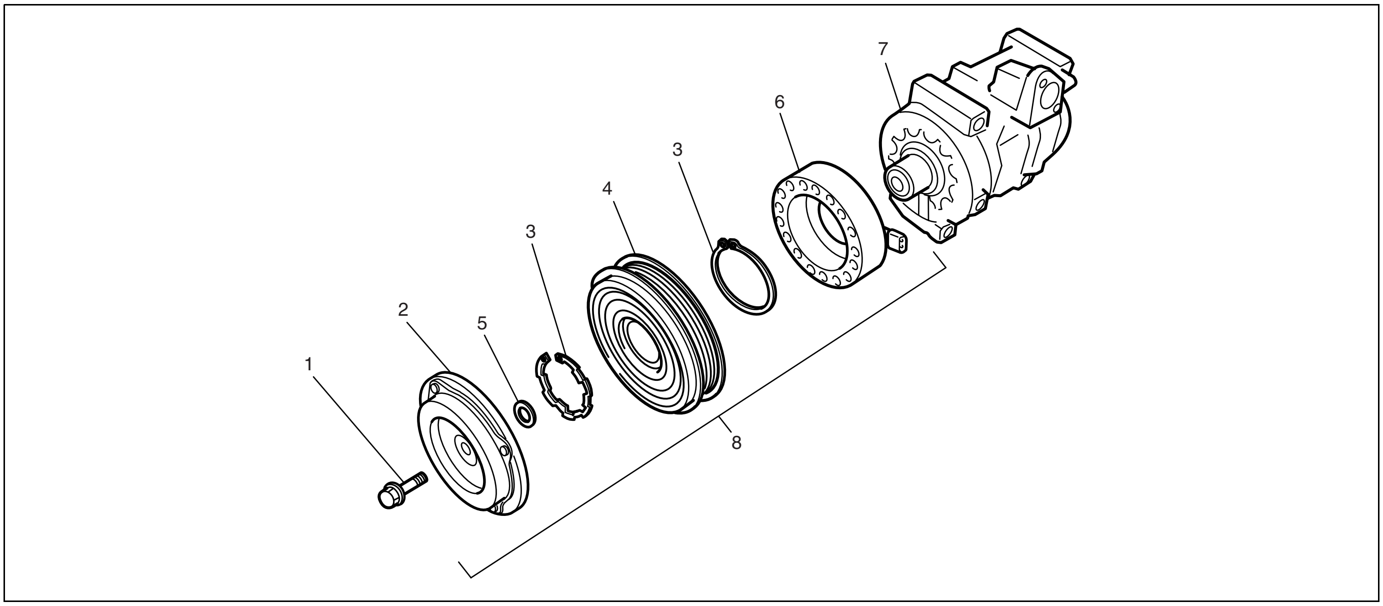


1.	New compressor
2.	Removed compressor
3.	Excess oil (A–B)

- If compressor was replaced, pour new compressor oil with the same amount as that drained from compressor.
  Refer to “REPLENISHING COMPRESSOR OIL” in this section.

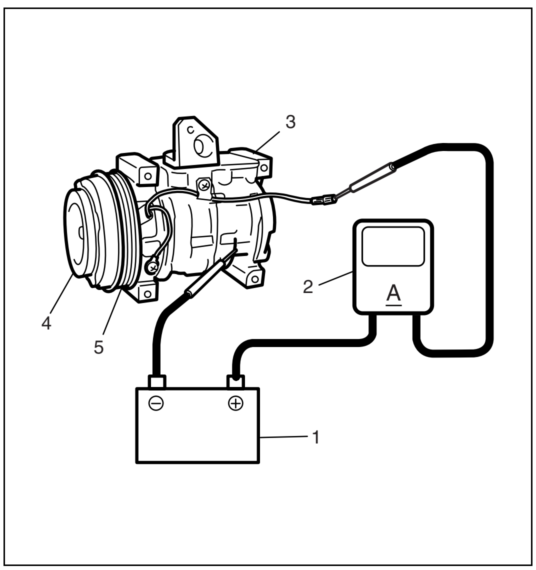
- Install P/S pump referring to “P/S PUMP” in Section 3B1.
- Evacuate and charge system. Refer to “EVACUATING” and “CHARGING” in this section.

Magnet Clutch



1. Armature plate bolt	3. Circlip	5. Shim (s)	7. Compressor body assembly
2. Armature plate	4. Magnet clutch	6. Magnet clutch coil	8. Magnet clutch assembly

INSPECTION



Check the following items.

- Check no sigh of compressor oil leakage
- Check magnet clutch pulley bearing for noise and grease leakage.
- Check magnet clutch operation as follows :

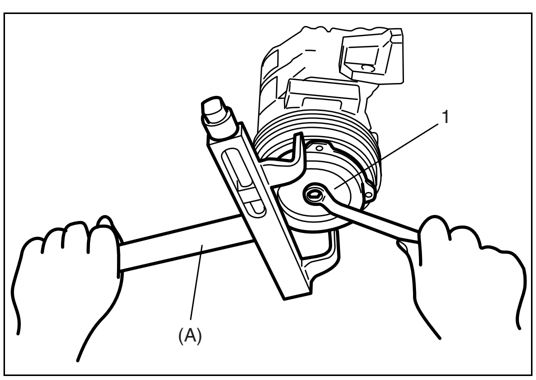
a) Connect battery (1) and ammeter (2) to compressor (3) as shown.
b) Check that steadily locks between armature plate (4) and magnet clutch pulley (5).
c) Check that ammeter (2) indicates specified current.

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

If any detects are found, repair or replace magnet clutch assembly.

REMOVAL

1) Remove compressor from vehicle. Refer to “COMPRESSOR ASSEMBLY” in this section.



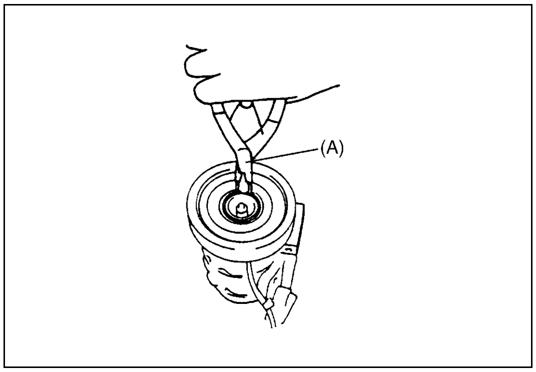
2) Fix armature plate (1) with special tool and remove armature plate bolt.

Special tool
(A) : 09920-53740

NOTE:

Do not reuse armature plate bolt.

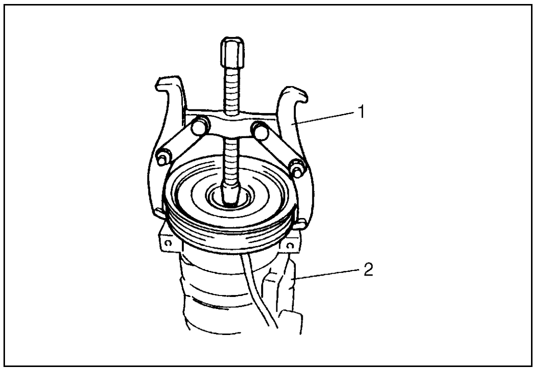
3) Remove armature plate (1).
4) Remove shims from shaft.



5) Using special tool, remove circlip.

Special tool
(A) : 09900-06107

6) Remove magnet clutch lead wire clamp screw, and remove magnet clutch read wire ground terminal.

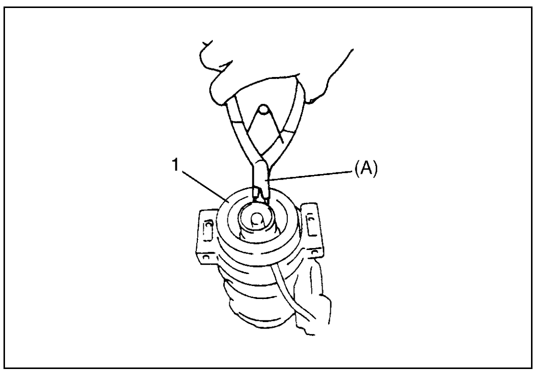


7) Remove magnet clutch with puller.

NOTE:

Be careful not to damage pulley when tapping magnet clutch.

1.	Puller
2.	Compressor

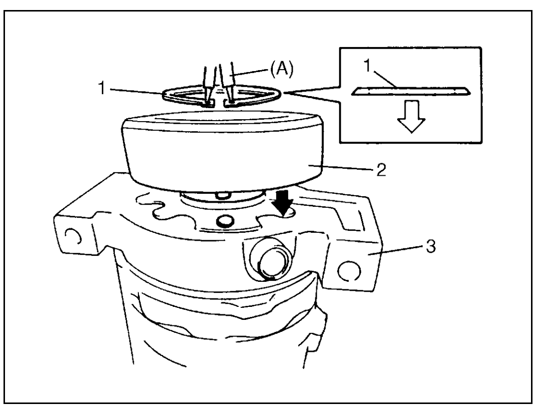


8) Remove circlip using special tool.

Special tool
(A) : 09900-06107

9) Remove magnet clutch coil (1).

INSTALLATION



1) Install magnet clutch coil (2).

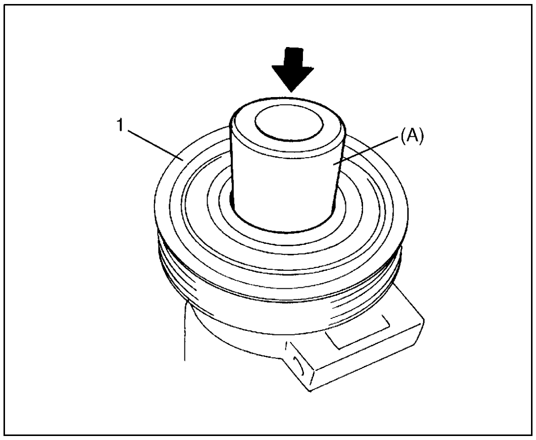
NOTE:

Protrusion on under side of magnet clutch coil (2) must match hole in compressor assembly (3) to prevent movement and correctly locate lead wire.

2) Using special tool, install new circlip (1) as shown.

Special tool
(A) : 09990-06107

3) Install clamp portion and ground terminal of lead wire.

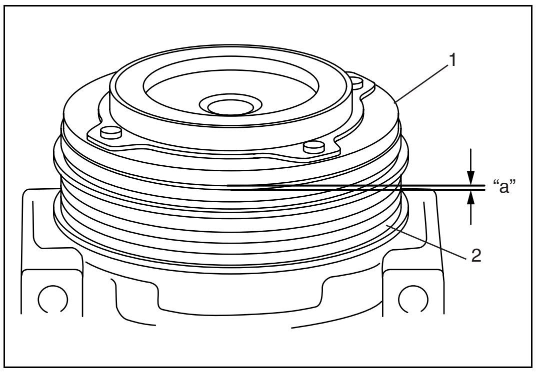


4) Install magnet clutch (1).
  a) Set magnet clutch squarely over clutch installation boss.
  b) Place special tool onto clutch bearing.
     Ensure that edge rests only on inner race of bearing.

Special tool
(A) : 09991-06010

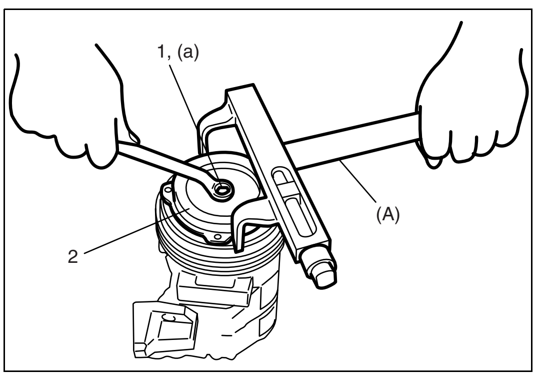
  c) Install new circlip.

CAUTION:
Be careful not to scratch bearing seal.



5) Adjust clearance between armature plate (1) and magnet clutch (2) by putting shim(s) on compressor shaft.

Standard clearance between armature plate and magnet clutch "a" :
0.35 - 0.6 mm (0.014 - 0.023 in.)



6) Tighten new armature plate nut (1) to specified torque.

Tightening torque
Armature plate nut (a) :18 N·m (1.8 kg-m, 13.0 lb-ft)

Special tool
(A) : 09920-53740

2. Armature plate

7) Install compressor to vehicle. Refer to "COMPRESSOR ASSEMBLY" in this section.

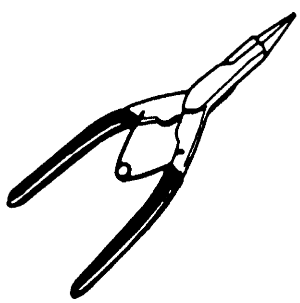
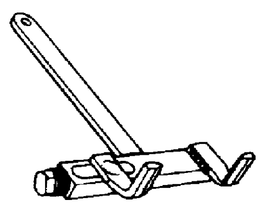
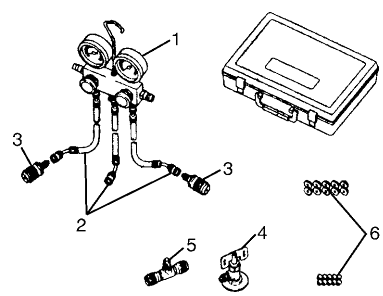
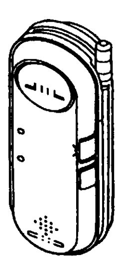
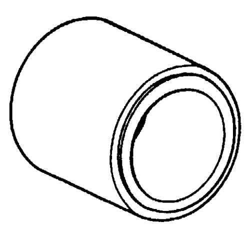
Required Service Materials

Material	Recommended SUZUKI product (Part Number)	Use
Compressor oil (refrigerant oil)	COMPRESSOR OIL (ND-OIL8, 250 cc) (99000-27080)	• O-ring • Each component

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Refrigerant pipe (8 mm (0.31 in.))	13	1.3	9.5
Refrigerant pipe (12.7 mm (0.5 in.))	22	2.2	16.0
Refrigerant pipe (16 mm (0.63 in.))	33	3.3	24.0
Armature plate nut	18	1.8	13.0

Special Tools

 09900-06107 Snap ring pliers (Opening type)	 09920-53740 Armature plate holder	 09990-06010 Manifold gauge set See NOTE below.
 09990-86011 Gas leak detector	 09991-06010 Magnet clutch pulley installer	

NOTE:

This kit includes the following items.

1. Manifold gauge, 2. Changing hose, 3. Quick connector, 4. Refrigerant container tap valve, 5. Refrigerant container T joint, 6. Packing set

SECTION 3A

FRONT END ALIGNMENT

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

CONTENTS

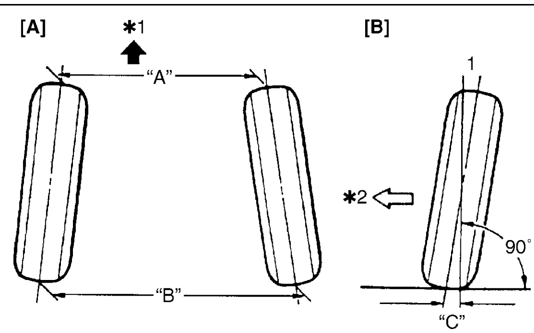
General Information

Alignment Service Data (without Load)

Toe-in (Toe-in gauge measurement) "B" – "A" :
1 ± 2 mm (0.04 ± 0.08 in.)

Camber angle "C" :
0 ± 1° 30'

Caster :
2° 30' ± 1°



[A] : Top view	1. Center line of wheel	✱1.	Forward
[B] : Front view		✱2.	Body center

On-Vehicle Service

Reference Information

SIDE SLIP

For inspecting front wheel side slip with side slip tester

Side slip limit :
IN 4 mm/m – OUT 2 mm/m
(IN 0.158 in/3.3 ft – OUT 0.078 in/3.3 ft)

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

SECTION 3B1

POWER STEERING (P/S) SYSTEM

WARNING:

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

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

NOTE:

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

CONTENTS

General Description

Power Steering (P/S) Pump

Power steering (P/S) pump specification :

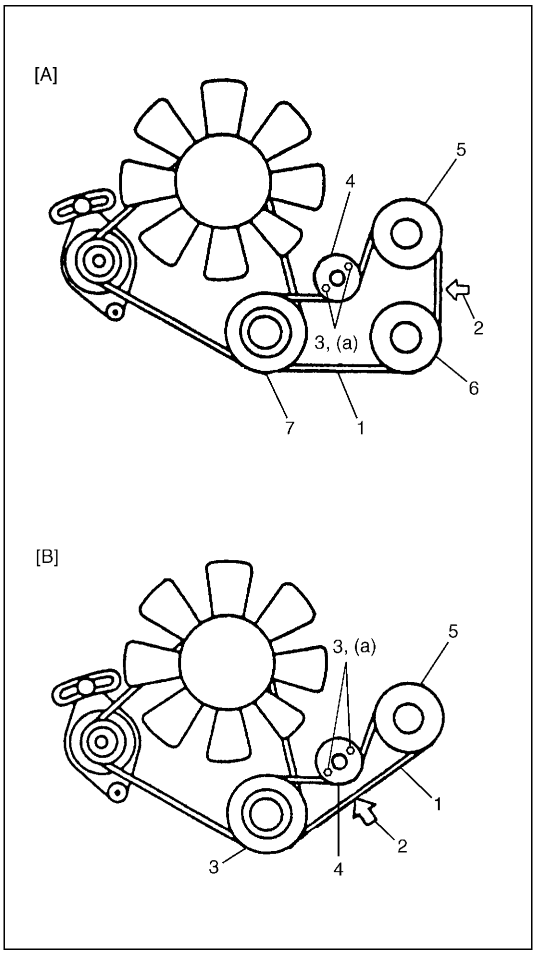
The specification of this power steering pump is the same as the specification of the same section in the service manual mentioned in this manual except for data of relieved pressure shown below.

Relieved pressure :
7850 kPa (78.5 kg/cm^2, 1116 psi)

Diagnosis

Power Steering Pump Drive Belt

Belt inspection



Check P/S pump drive belt (1) is free from any damage and properly fitted in pulley groove.

Belt tension check

Check belt tension by measuring how much it deflects when pushed at arrow point (2) between pulleys with about 10 kg (22 lb) force.

Deflection of P/S belt :
4 – 7 mm (0.16 – 0.28 in.)

Belt tension adjustment

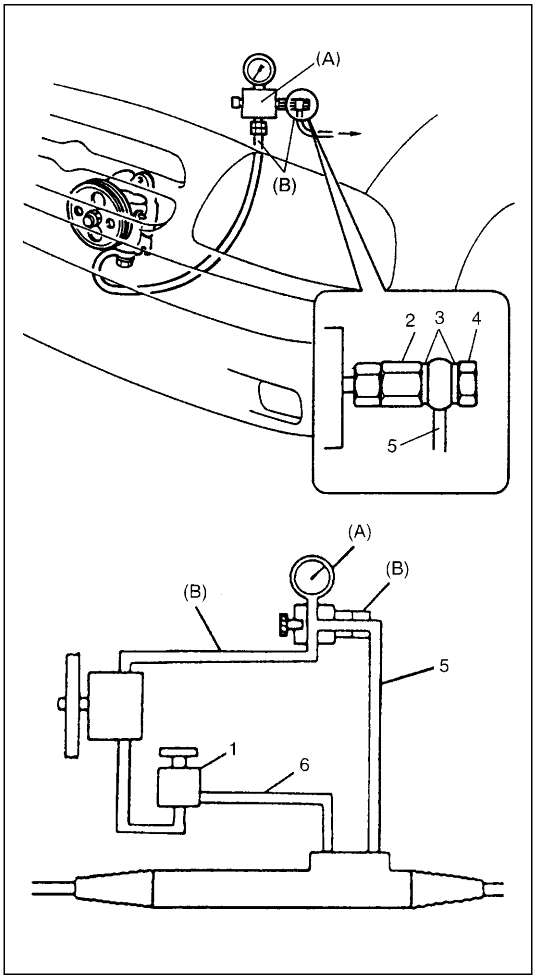
1) To adjust P/S pump drive belt (1) tension, loosen tension pulley bolts (3) and turn tension pulley (4) using hexagon wrench.
2) Adjust belt tension to above specification.
   Then tighten tension pulley bolts (3) to specified torque.

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

5.	P/S pump pulley
6.	A/C compressor pulley (if equipped)
7.	Crankshaft pulley
[A] :	With A/C
[B] :	Without A/C

Hydraulic Pressure in P/S Circuit

Hydraulic pressure check



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

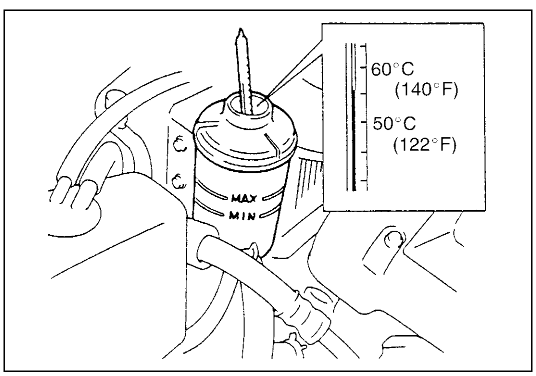
CAUTION:

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

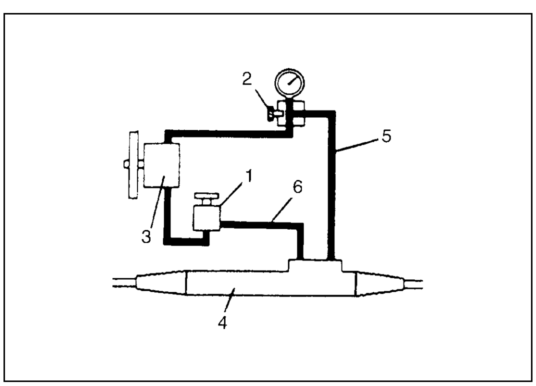
Special tool
(A) : 09915-77410
(B) : 09915-77420

2) Check each connection for fluid leakage and bleed air.
   Refer to “AIR BLEEDING PROCEDURE” in this section.

1. P/S fluid reservoir
2. Attachment
3. Gasket
4. Union bolt
5. High pressure side
6. Low pressure side



3) With engine idling, turn steering wheel and warm up engine till temperature of fluid in P/S fluid reservoir rises to 50 – 60°C (122 – 140°F).

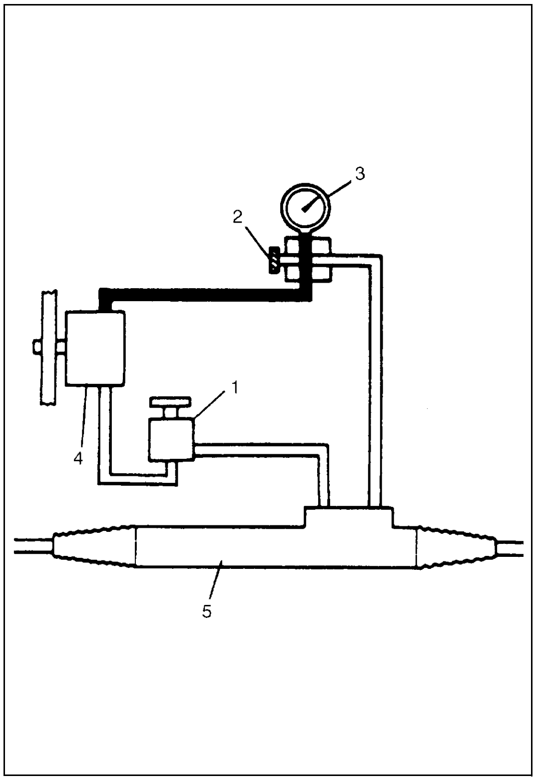


4) Check back pressure by measuring hydraulic pressure with engine idling and hands off steering wheel.
   When back pressure is higher than specified values, check control valve and piping for clogging.

Back pressure :

Lower than 1000 kPa (10 kg/cm^2, 142 psi)

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



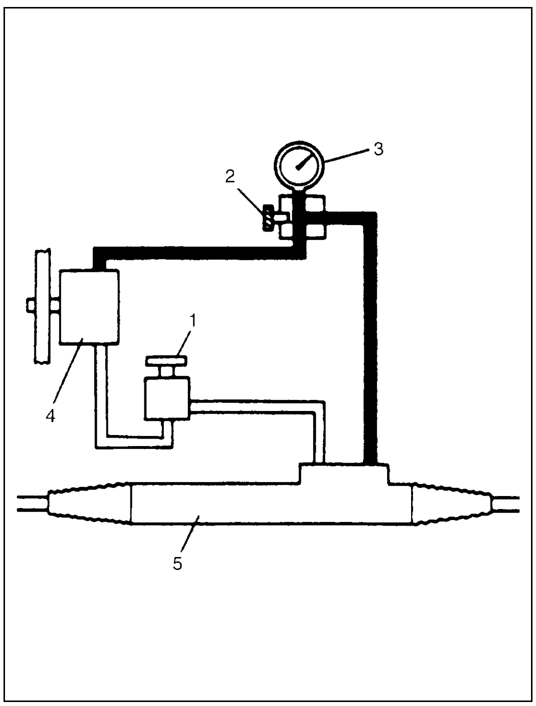
5) Check relief pressure.

a) Increase engine speed to about 1500 r/min (rpm). Close gauge valve gradually while watching pressure increase indicated by gauge and take reading of relief pressure (maximum hydraulic pressure).
When it is higher than specified values, possible cause is malfunction of relief valve.
When it is lower than specified values, possible cause is either failure of P/S pump or settling of relief valve spring.

Relief pressure (when gauge valve is closed) :
7650 – 8350 kPa (76.5 – 83.5 kg/cm^2, 1088 – 1187 psi)

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

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



b) Next, open gauge valve fully and increase engine speed to about 1500 r/min (rpm). Then turn steering wheel to the left or right fully and take reading of relief pressure.
When it is higher than specified values, possible cause is malfunction of relief valve.
When it is lower than specified values, possible cause is failure in steering gear box. Replace gear box.

Relief pressure (when gauge valve is opened) :
7650– 8350 kPa (76.5 – 83.5 kg/cm^2, 1088 – 1187 psi)

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

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

SECTION 3C1

AIR BAG STEERING WHEEL AND COLUMN

WARNING:

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **The procedures in this section must be followed in the order listed to disable the air bag system temporarily and prevent false diagnostic trouble codes from setting. Failure to follow procedures could result in possible activation of the air bag system, personal injury or otherwise unneeded air bag system repairs.**

CAUTION:

When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above procedures are not followed, parts or system damage could result.

NOTE:

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

CONTENTS

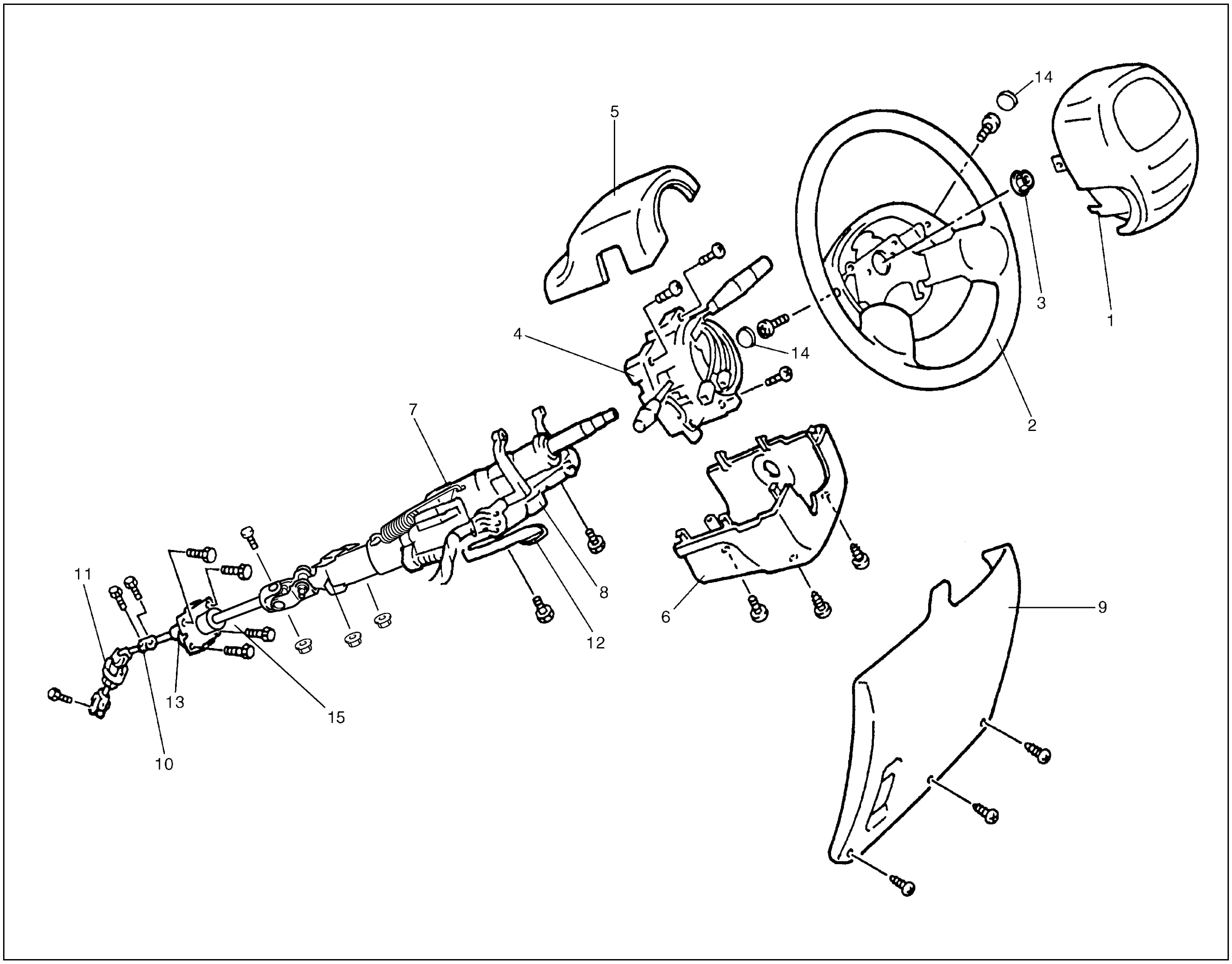
General Description

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

- The column is energy absorbing, designed to compress in a front-end collision.
- The ignition switch and lock are mounted conveniently on this column.
- With the column mounted lock, the ignition and steering operations can be locked to inhibit theft of the vehicle.

To insure the energy absorbing action, it is important that only the specified screws, bolts, and nuts be used as designated and that they are tightened to the specified torque. When the column assembly is removed from the vehicle, special care must be taken in handling it. Use of a steering wheel puller other than the one recommended in this manual or a sharp blow on the end of the steering shaft, leaning on the assembly, or dropping the assembly could shear the plastic shear pins which maintain column length and position.

The driver air bag (inflator) module is one of the supplemental restraint (air bag) system components and is mounted to the center of the steering wheel. During certain frontal crashes, the air bag system supplements the restraint of the driver's and passenger's seat belts by deploying the air bags. The air bag (inflator) module should be handled with care to prevent accidental deployment. When servicing, be sure to observe all WARNINGS in this section. Refer to "SERVICE PRECAUTIONS" in Section 10B.



1. Driver air bag (inflator) module	5. Steering column upper cover	9. Steering column hole cover	13. Steering column lower seal
2. Steering wheel	6. Steering column lower cover	10. Steering shaft joint	14. Cap (if equipped)
3. Steering wheel nut	7. Steering column assembly	11. Steering lower shaft assembly	15. Steering upper shaft assembly
4. Contact coil and combination switch assembly	8. Steering lock assembly	12. Adjustable steering column release lever	

Diagnosis

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

Inspection and Repair Required after Accident

After an accident, whether the air bag has been deployed or not, be sure to perform checks, inspections and repairs described under “CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE” in this section as well as “REPAIRS AND INSPECTIONS REQUIRED AFTER ACCIDENT” in Section 10B.

On-Vehicle Service

Service Precautions

For service precautions, refer to “SERVICE PRECAUTIONS” under “ON-VEHICLE SERVICE” in Section 10B.

Diagnosis and servicing

For diagnosis and servicing, refer to “DIAGNOSIS AND SERVICING” under “SERVICE PRECAUTIONS” in Section 10B.

Disabling air bag system

For disabling air bag system, refer to “DISABLING AIR BAG SYSTEM” under “SERVICE PRECAUTIONS” in Section 10B.

Enabling air bag system

For enabling air bag system, refer to “ENABLING AIR BAG SYSTEM” under “SERVICE PRECAUTIONS” in Section 10B.

Handling and storage

For handling and storage, refer to “HANDLING AND STORAGE” under “SERVICE PRECAUTIONS” in Section 10B.

Disposal

For disposal, refer to “DISPOSAL” under “SERVICE PRECAUTIONS” in Section 10B.

Steering Column

CAUTION:

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

NOTE:

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

REMOVAL

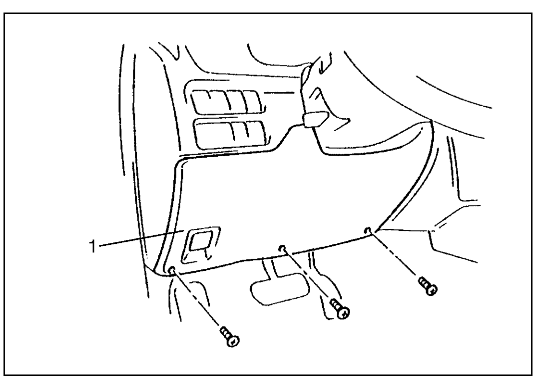
WARNING:

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

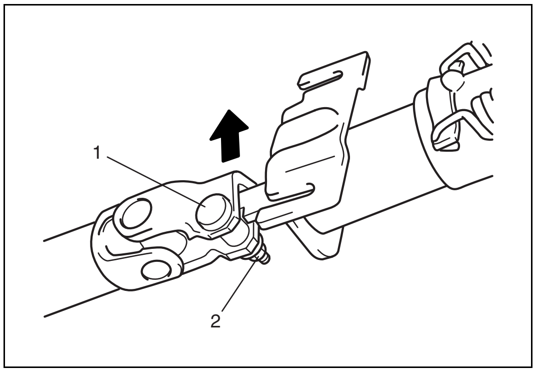
CAUTION:

Never turn steering wheel while steering column with steering wheel is removed. Turning steering wheel more than about two and a half turns will break contact coil.

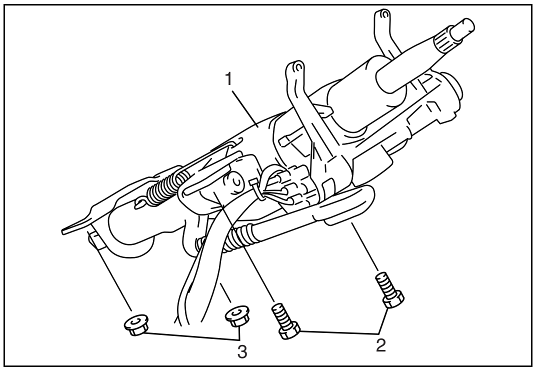
1) Disconnect negative (–) cable at battery.
2) Disable air bag system. Refer to "DISABLING AIR BAG SYSTEM" under "SERVICE PRECAUTIONS" in Section 10B.
3) Remove steering wheel and contact coil and combination switch assembly, if necessary. Refer to "STEERING WHEEL" and "CONTACT COIL AND COMBINATION SWITCH ASSEMBLY" in this section.
   Perform the following procedure if not removing steering wheel and/or combination switch.
   a) Turn steering wheel so that vehicle's front tires are at straight-ahead position.
   b) Turn ignition switch to "LOCK" position and remove key.



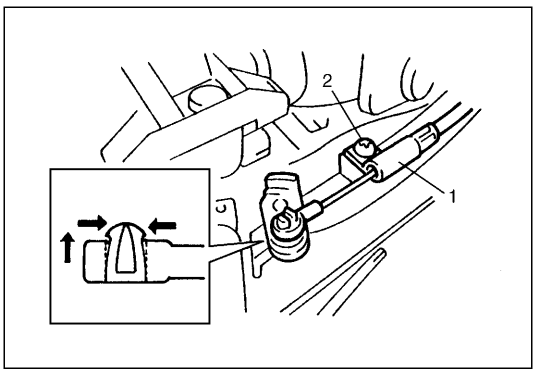
4) Remove steering column hole cover (1).
5) Disconnect all connectors for the following parts.
   - Contact coil and combination switch
   - Ignition switch



6) Remove steering upper shaft upper joint bolt (1) and nut (2) and disconnect steering upper shaft upper joint removing in arrow direction in the figure.



7) Remove steering column (1) mounting bolts (2 pieces) (2) and nuts (2 pieces) (3).

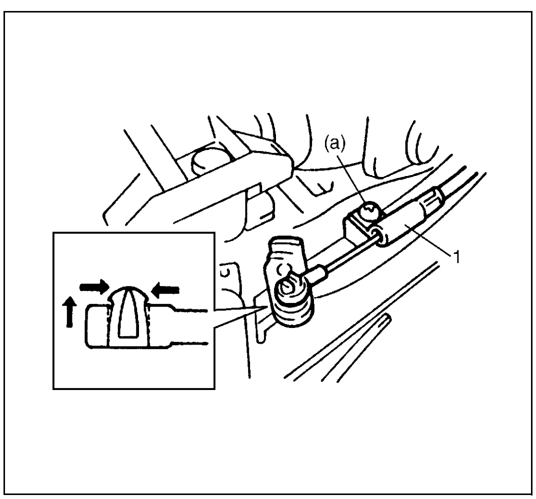


8) If equipped with shift (key) interlock cable (1), remove shift (key) interlock cable screw (2) and then disconnect its cable (1) from ignition switch.
9) Remove steering column from vehicle.

INSPECTION

Check steering column for damage and operation referring to CHECKING STEERING COLUMN AND STEERING UPPER SHAFT FOR ACCIDENT DAMAGE later in this section.

INSTALLATION

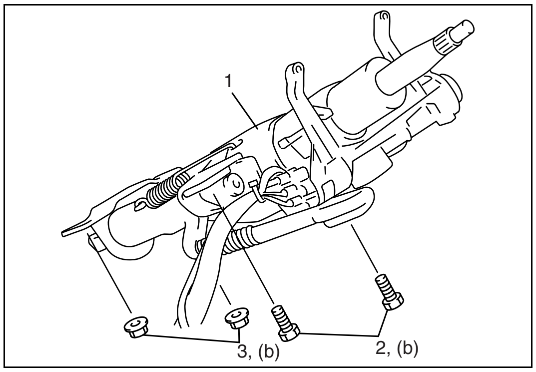


CAUTION:

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

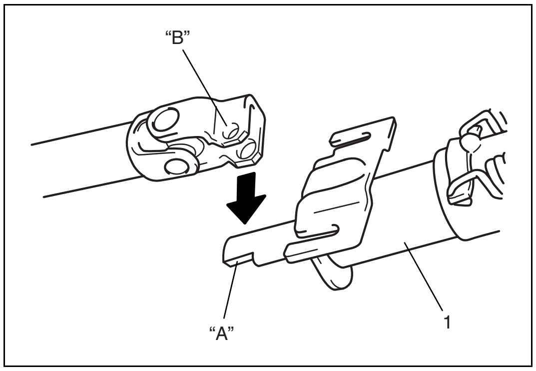
1) Be sure that front wheels and steering wheel are in straight-ahead position.
2) If equipped with shift (key) interlock cable (1), install shift (key) interlock cable (1) to ignition switch.

Tightening torque
Shift (key) interlock cable screw (a) :
2.2 N·m (0.22 kg-m, 1.6 lb-ft)

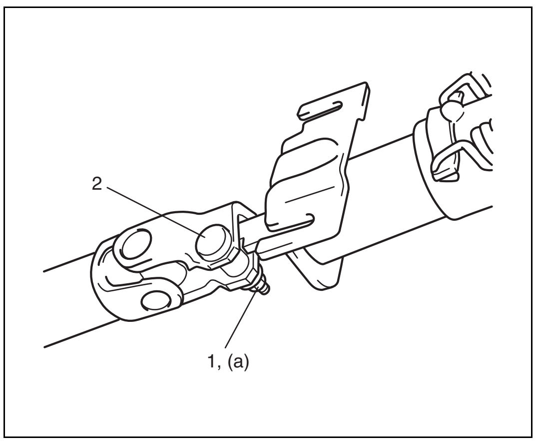


3) Install steering column assembly (1) with contacting upper side of lower bracket slits to mounting bolts. Tighten steering column lower mounting nuts (3) first and then upper mounting bolts (2) to specified torque.

Tightening torque
Steering column mounting bolts and nuts (b) :
25 N·m (2.5 kg-m, 18.0 lb-ft)



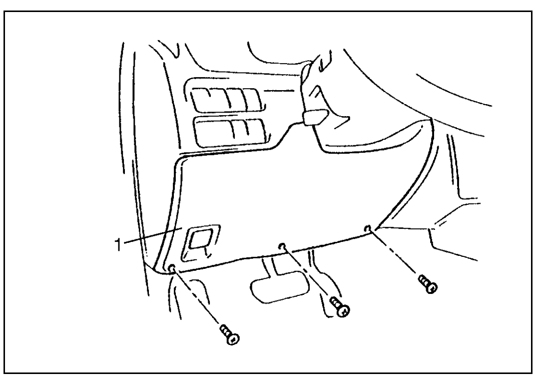
4) Align cutting point "A" of steering column assembly (1) with bolt hole "B" of steering upper shaft upper joint as shown in the figure. Then connect steering upper shaft upper joint.



5) Install steering upper shaft upper joint bolt (2) and nut (1). Tighten steering upper shaft upper joint nut (1) to specified torque.

Tightening torque
Steering upper shaft upper joint nut (a) :
23 N·m (2.3 kg-m, 17.0 lb-ft)

6) If contact coil and combination switch assembly is removed, install it, referring to "CONTACT COIL AND COMBINATION SWITCH ASSEMBLY" in this section.
7) Connect all connectors that have been removed in removal.



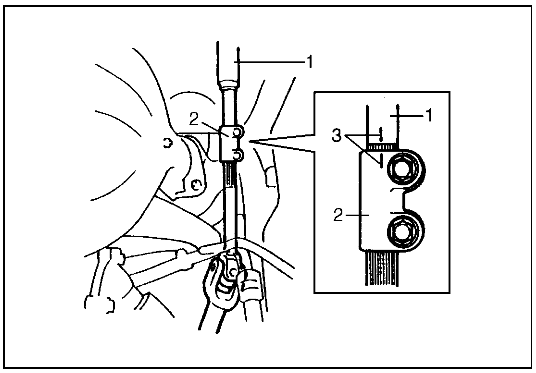
8) Install steering column hole cover (1).
9) If steering wheel is removed, install it by referring to "STEERING WHEEL" in this section.
10) Connect negative (–) cable to battery.
11) After installing steering column assembly, be sure to enable air bag system by referring to "ENABLING AIR BAG SYSTEM" under "SERVICE PRECAUTIONS" in Section 10B.

Steering Upper Shaft Assembly

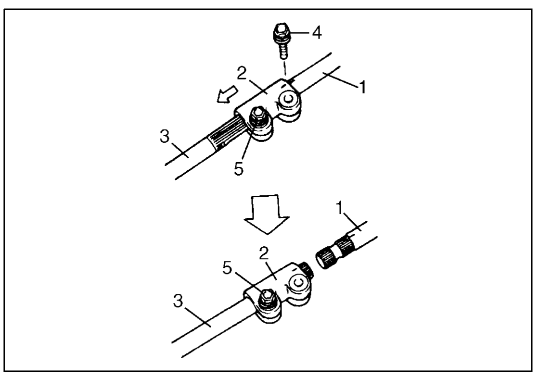
CAUTION:
Never turn steering wheel while steering upper shaft assembly is removed.
Should it have been turned and contact coil (on combination switch) have got out of its centered position, it needs to be centered again. Also, turning steering wheel more than about two and a half turns will break contact coil.

REMOVAL

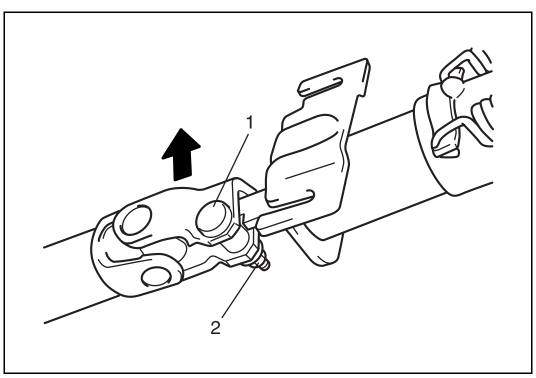
1) Turn steering wheel so that vehicle's front tires are at straight-ahead position.
2) Turn ignition switch to "LOCK" position and remove key.



3) Make alignment marks (3) on shaft joint (2) and shaft (upper shaft assembly side) (1) for a guide during reinstallation.



4) After removing bolt (4) on upper shaft assembly (1) side of shaft joint (2) and loosening bolt (5) on its lower shaft assembly (3) side, move shaft joint (2) to lower shaft assembly (3) side (in arrow direction in the figure).



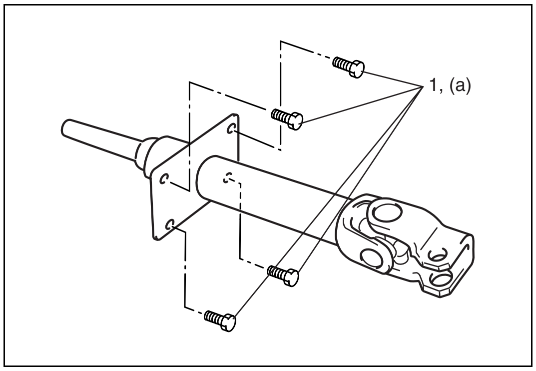
5) Remove steering upper shaft upper joint bolt (1) and nut (2) and disconnect steering upper shaft upper joint removing in arrow direction in the figure.
6) Remove steering upper shaft mounting bolts (4 pieces).
7) Remove steering upper shaft assembly from vehicle.

INSPECTION

Check steering shaft damage and operation referring to CHECK STEERING COLUMN AND STEERING UPPER SHAFT FOR ACCIDENT DAMAGE later in this section.

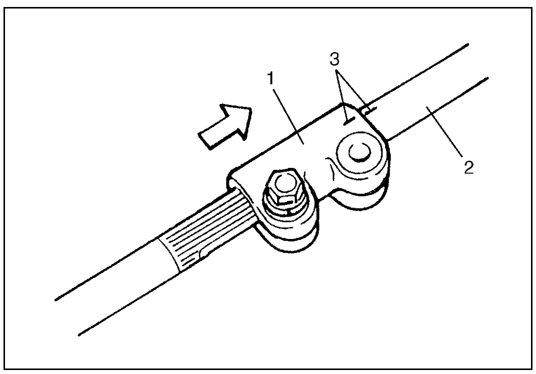
INSTALLATION

1) Be sure that front tires and steering wheel are in straight ahead position.

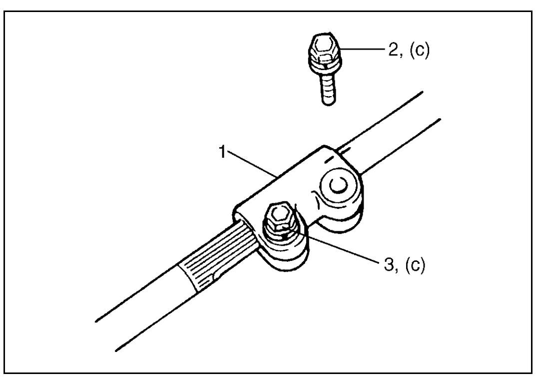


2) Install steering upper shaft assembly to dash panel. Tighten steering upper shaft mounting bolts (1) to specified torque.

Tightening torque
Steering upper shaft mounting bolts (a) :
23 N·m (2.3 kg-m, 17.0 lb-ft)

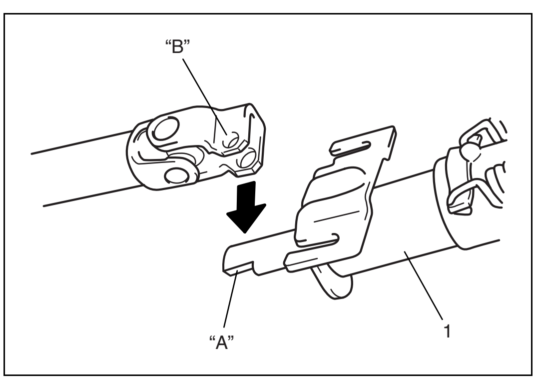


3) Install steering shaft joint (1) to steering upper shaft (2) by matching it to marks (3) made before removal.

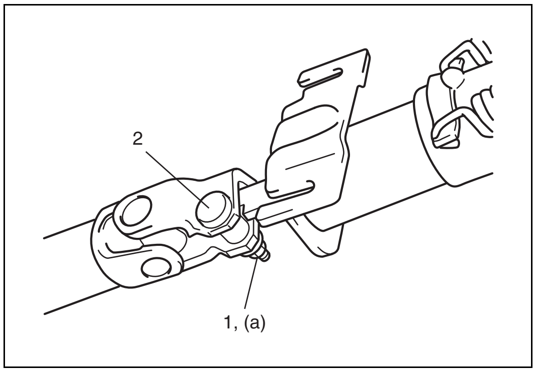


4) Install shaft joint bolt (upper shaft assembly side) (2) to steering shaft joint (1). Tighten shaft joint bolt (upper shaft assembly side) (2) to specified torque first and then shaft joint bolt (lower shaft assembly side) (3) to specified torque.

Tightening torque
Steering shaft joint bolt (c) : 25 N·m (2.5 kg-m, 18.0 lb-ft)



5) Align cutting point "A" of steering column assembly (1) with bolt hole "B" of steering upper shaft upper joint as shown in the figure. Then connect steering upper shaft upper joint.



6) Install steering upper shaft upper joint bolt (2) and nut (1). Tighten steering upper shaft upper joint nut (1) to specified torque.

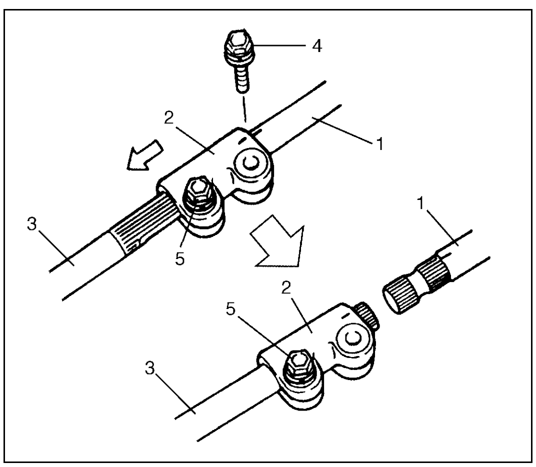
Tightening torque
Steering upper shaft upper joint nut (a) :
23 N·m (2.3 kg-m, 17.0 lb-ft)

Steering Lower Shaft Assembly

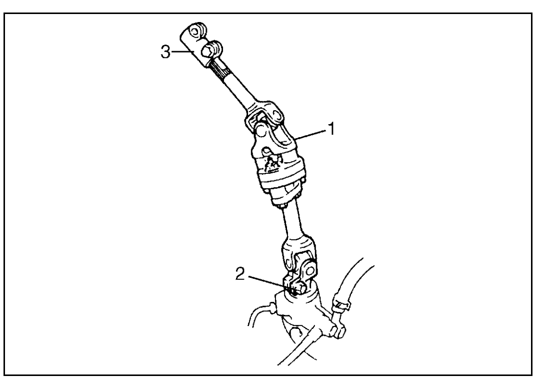
CAUTION:
Never turn steering wheel while steering lower shaft assembly is removed.
Should it have been turned and contact coil (on combination switch) have got out of its centered position, it needs to be centered again. Also, turning steering wheel more than about two and a half turns will break contact coil.

REMOVAL

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



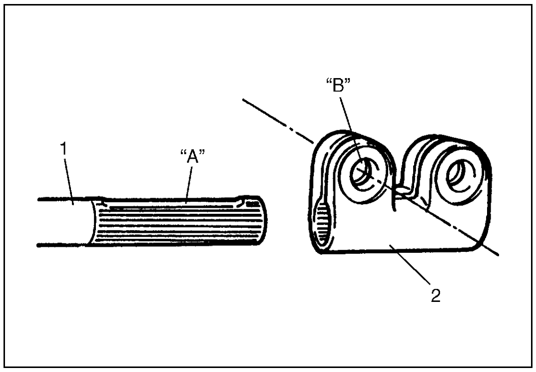
3) After removing bolt (4) on upper shaft assembly (1) side of shaft joint (2) and loosening bolt (5) on its lower shaft assembly (3) side, move shaft joint (2) to lower shaft assembly side (3) (in arrow direction in figure).



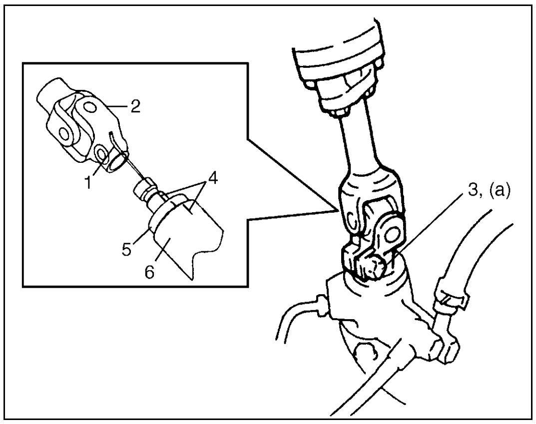
4) Remove lower shaft assembly lower joint bolt (2) and then remove lower shaft assembly (1).
5) Remove shaft joint bolt (lower shaft assembly side) from shaft joint (3) and then remove shaft joint (3) from lower shaft assembly (1).

INSTALLATION

1) Be sure that front wheels and steering wheel are in straight ahead position.

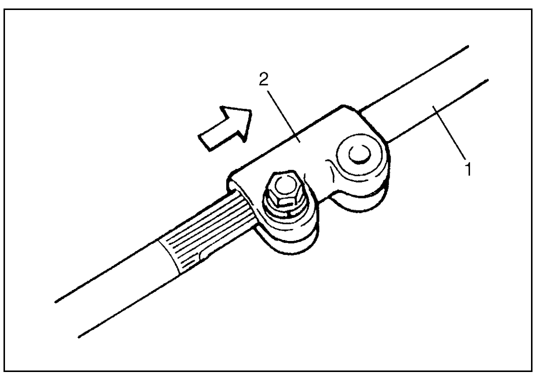


2) Align flat part "A" of lower shaft assembly (1) with bolt hole "B" of shaft joint as shown in the figure. Then insert shaft joint (1) into lower shaft assembly (2).
3) Install shaft joint bolt (lower shaft assembly side) to shaft joint (2). Then tighten it by hand.



4) Insert pinion shaft into lower shaft assembly lower joint (2) with slit (1) of lower joint, marks (4) on pinion shaft (5) and gear case (6) aligned.
   And then install lower shaft assembly lower joint bolt (3) to lower shaft assembly lower joint (2). Tighten it to specified torque.

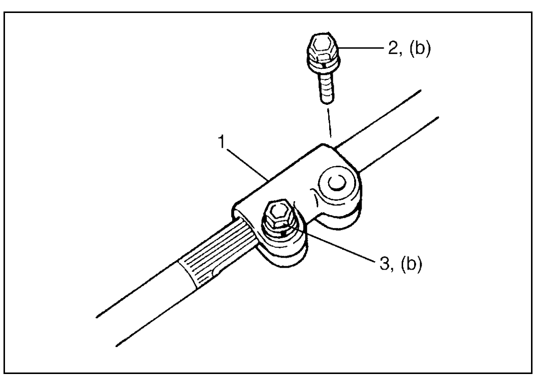
Tightening torque
Lower shaft assembly lower joint bolt (a) :
25 N·m (2.5 kg-m, 18.0 lb-ft)



5) Install steering shaft joint (2) to steering upper shaft (1).

NOTE:

Be sue that front wheels and steering wheel are in straight-ahead position.



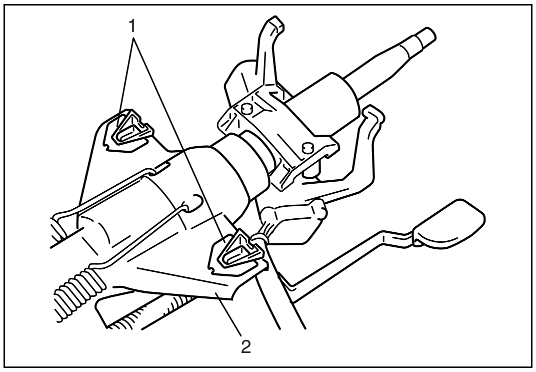
6) Install shaft joint bolt (upper shaft assembly side) (2) to shaft joint (1). Tighten shaft joint bolt (upper shaft assembly side) (2) to specified torque first and then shaft joint bolt (lower shaft assembly side) (3) to specified torque.

Tightening torque
Steering shaft joint bolt (b) : 25 N·m (2.5 kg-m, 18.0 lb-ft)

Checking Steering Column and Steering Upper Shaft for Accident Damage

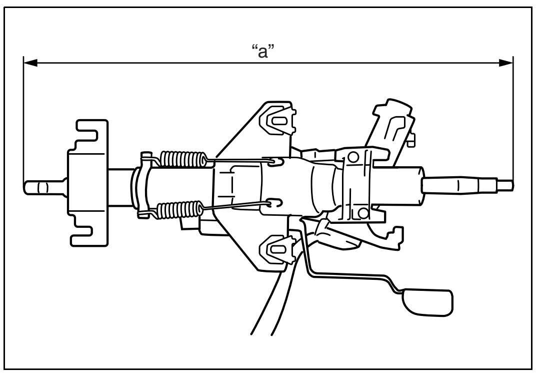
NOTE:

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.



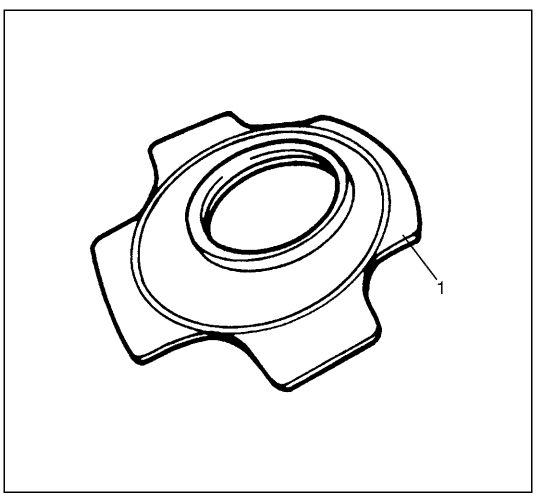
- Check that 2 capsules are attached to steering column bracket securely. Check clearance between capsules and steering column bracket. Clearance should be 0 mm (0 in.) on both sides. If found loose or clearance, replace steering column assembly.

1.	Capsule
2.	Steering column bracket

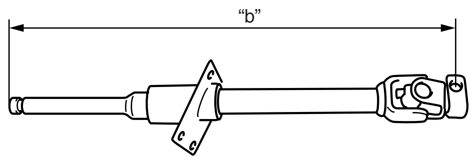


- Take measurement “a” as shown in the figure. If it is shorter than specified length, replace column assembly with new one.

Steering column assembly length “a” :
490.3 ± 1.0 mm (19.30 ± 0.04 in.)



- Check steering shaft for smooth rotation.
  If found defective, replace as column assembly.
- Check steering shaft and column for bend, cracks or deformation.
  If found defective, replace as column assembly.
- Check steering upper shaft lower seal (1) for breakage or deformation.
  If found defective, replace.
- Check steering shaft joints and shaft for any damages such as crack, breakage, malfunction or excessive play.
  If anything is found faulty, replace steering upper shaft assembly, steering lower shaft assembly or steering column assembly.



- Take measurement "b" as shown in the figure. If it is shorter than specified length, replace steering upper shaft assembly with new one.

Steering upper shaft assembly length "b" :
419.0 ± 1.0 mm (16.50 ± 0.04 in.)

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Driver air bag (inflator) module bolt	9	0.9	6.5
Steering shaft nut	33	3.3	23.5
Steering column mounting bolt and nut	25	2.5	18.0
Steering shaft joint bolt	25	2.5	18.0
Steering lower shaft assembly lower joint bolt	25	2.5	18.0
Shift (key) interlock cable screw	2.2	0.22	1.6
Steering upper shaft mounting bolt	23	2.3	17.0
Steering upper shaft upper joint nut	23	2.3	17.0

SECTION 3D

FRONT SUSPENSION

CAUTION:

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

NOTE:

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

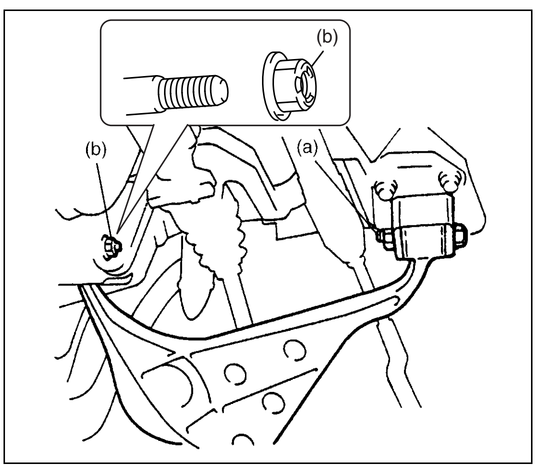
CONTENTS

On-Vehicle Service

Suspension Control Arm/Bushings

INSTALLATION

For the details, refer to the same item of the same section in the Service Manual mentioned in the FOREWORD of this manual noting following point.



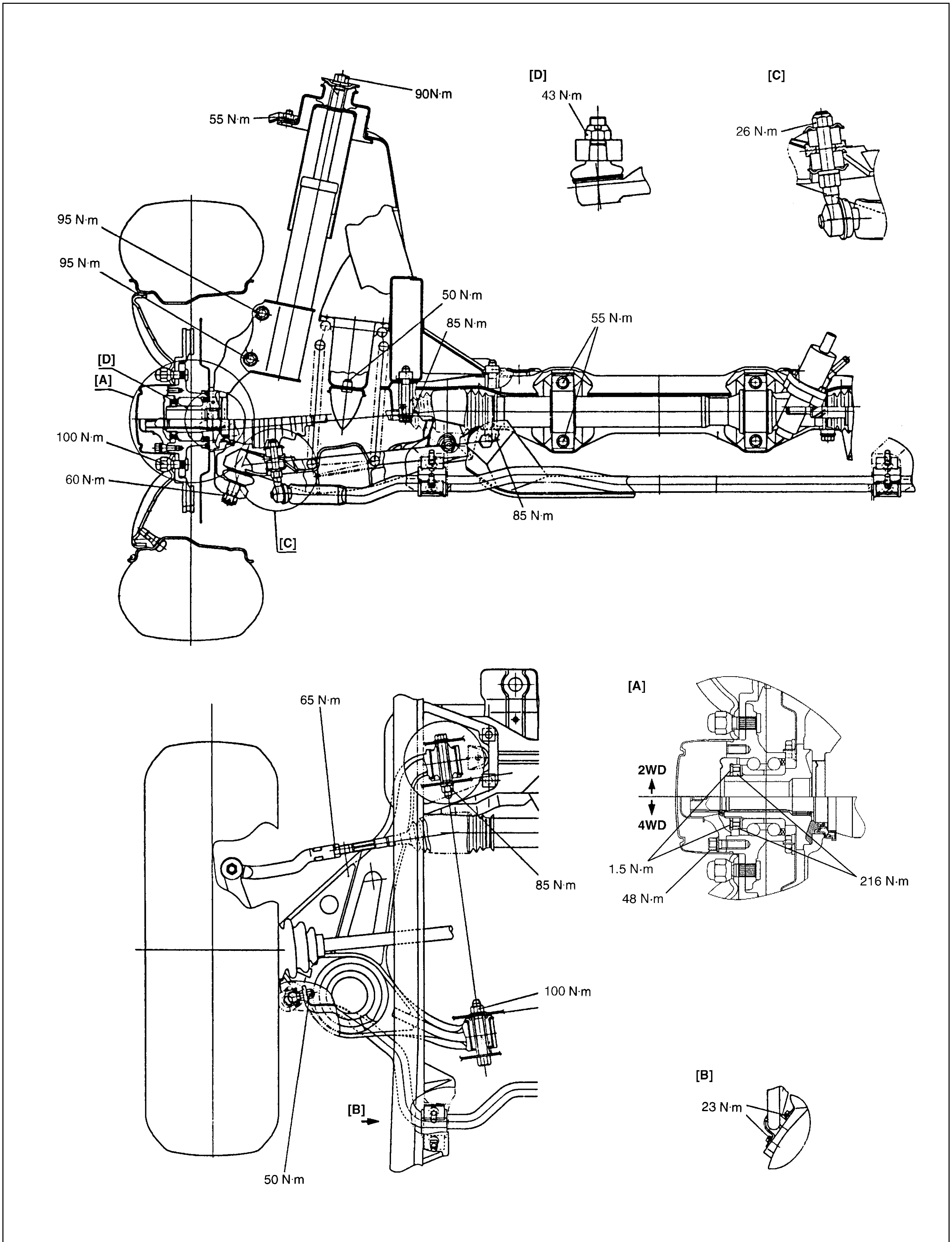
- Install control arm to chassis.
  Tighten suspension arm nuts to specified torque after lowering hoist and vehicle in non-loaded condition.

Tightening torque
Front suspension arm nut (a) :
85 N·m (8.5 kg-m, 61.5 lb-ft)
Front suspension arm nut (b) :
100 N·m (10.0 kg-m, 72.5 lb-ft)

NOTE:

Don’t reuse front suspension arm nut (b).

Tightening Torque Specification



SECTION 3E

REAR SUSPENSION

NOTE:

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

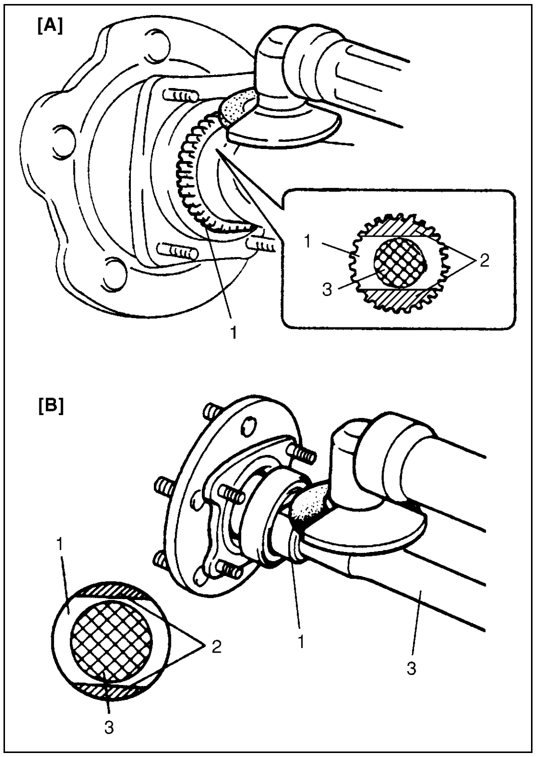
CONTENTS

On-Vehicle Service

Rear Axle Shaft and Wheel Bearing

REMOVAL

1) Remove axle shaft from axle housing according to Step1) to 6) in the same section in the service manual mentioned in the FOREWORD of this manual noting following points.

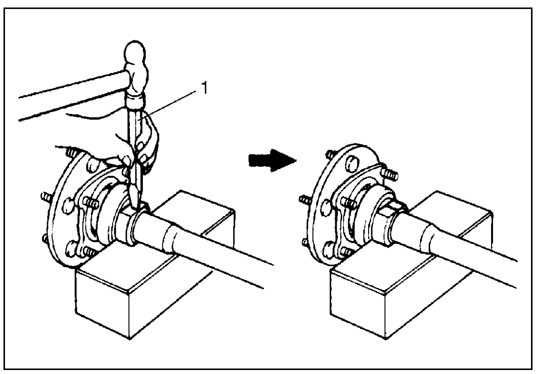


2) Remove circlip from axle shaft.

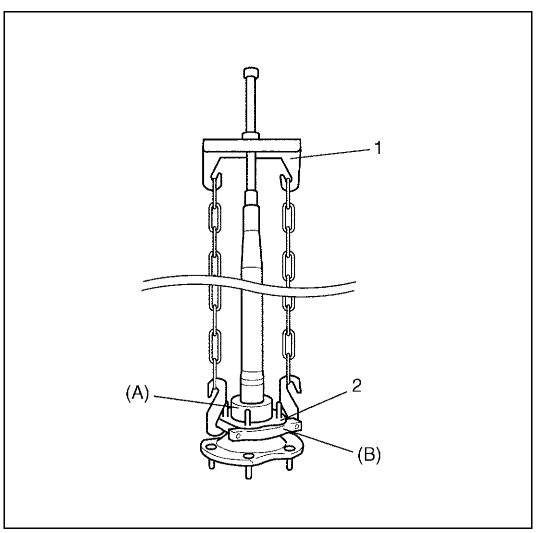
3) In order to remove retainer ring (1) from axle shaft (3), grind with a grinder two portion (2) of bearing retainer ring as illustrated till it becomes thin.

> **CAUTION:**
> **Be careful not to grind axle shaft.**

[A]:	Vehicle with ABS
[B]:	Vehicle without ABS



4) Break with a chisel (1) the thin ground sensor rotor and retainer ring, and it can be removed.



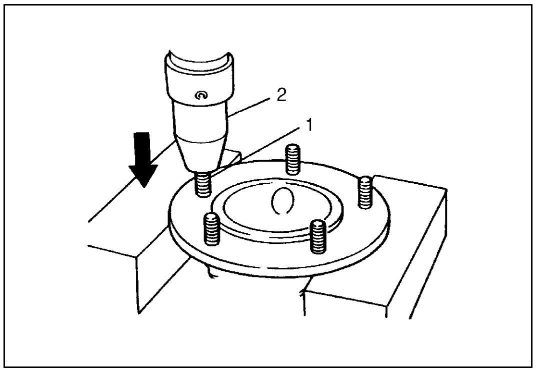
5) Remove wheel bearing (1) and bearing retainer (2) using special tools as shown in figure.

Special tool
(A) : 09927-18411
(B) : 09921-57810

NOTE:

If inner race of wheel bearing is left in axle shaft, remove it from axle shaft with the same procedure as above-mentioned.

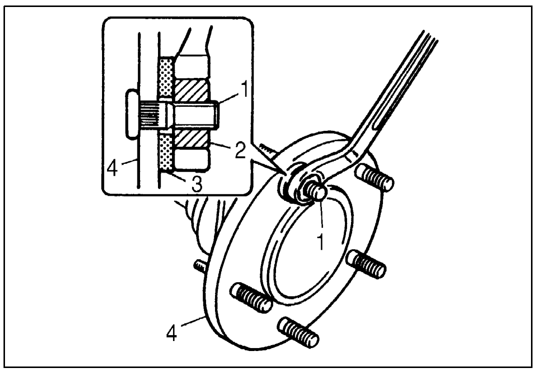
> **CAUTION:**
> **Do not reuse wheel bearing.**



6) Remove stud bolt(s) (1) by using hydraulic press (2).

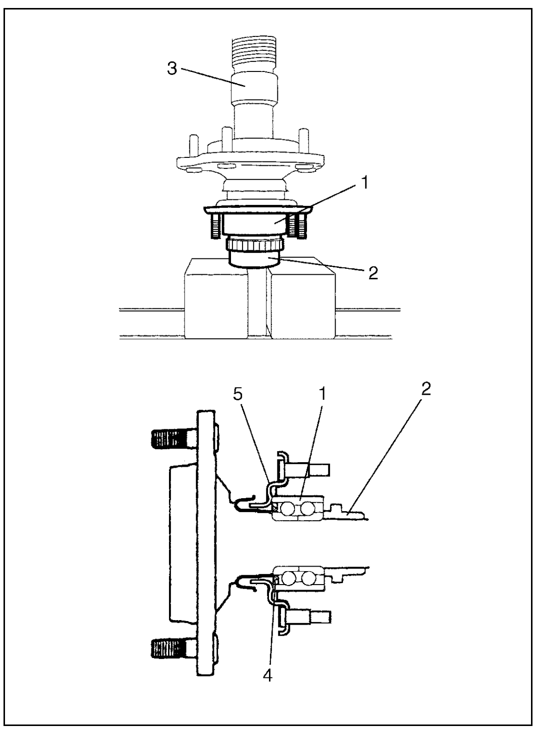
INSTALLATION

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



1) Aligning serrations between new stud bolt(s) (1) and flange (4), install new stud bolt(s) (1) by tightening nut (2) as shown in the figure.

3. Washer

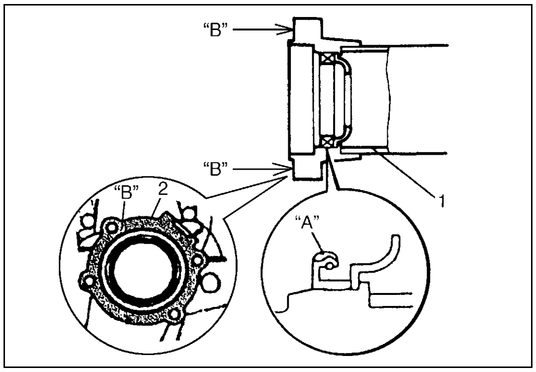


2) Install bearing retainer (2) to axle shaft (1).
3) Press fit new wheel bearing (1) and new retainer ring (2) using press (3).

NOTE:

- **Use care not to cause any damage to outside of retainer ring (2).**
- **Seal side (4) of wheel bearing must face bearing retainer (5) side.**

4) Install circlip to axle shaft.



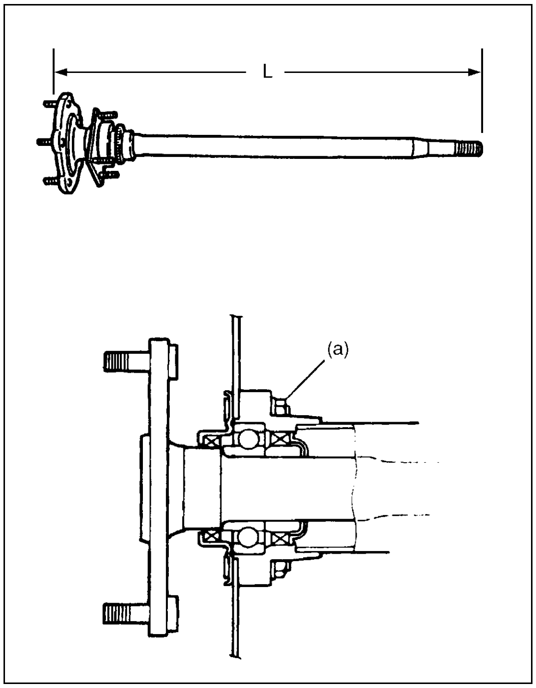
5) Apply grease "A" to axle shaft inner oil seal lip as shown in the figure.

"A" : Grease 99000-25010

1. Axle housing

6) Apply water tight sealant "B" to mating surfaces of brake back plate and rear axle hub (2).

"B" : Water tight sealant 99000-31110



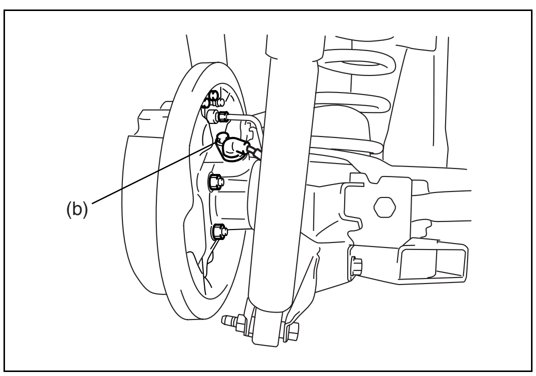
7) Install rear axle shaft to rear axle housing and tighten bearing retainer nuts to specified torque.

Rear axle shaft length "L"
Left side : 700.5 mm (27.6 in.)
Right side : 769.5 mm (30.3 in.)

NOTE:

When installing rear axle shaft, be careful not to cause damage to oil seal lip in axle housing.

Tightening torque
Bearing retainer nut (a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)



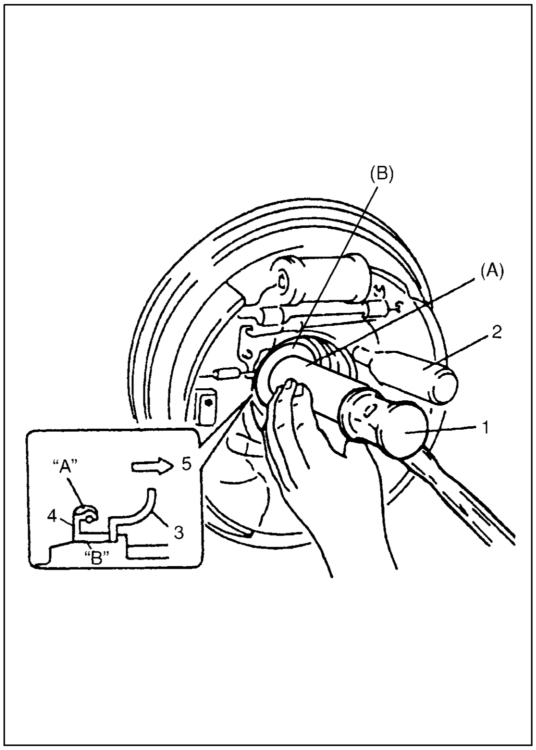
8) Tighten wheel speed sensor bolt to specified torque (if equipped with ABS).

Tightening torque
Wheel speed sensor bolt (b) : 21 N·m (2.1 kg-m, 15.5 lb-ft)

9) Refill rear axle housing with new specified gear oil.
   Refer to "MAINTENANCE SERVICE" in Section 7F.
10) Install brake drum. Refer to "BRAKE DRUM" in Section 5C.

Rear Axle Shaft Inner Oil Seal

INSTALLATION



1) Using special tool drive in oil seal until it contacts oil seal protector in axle housing.

NOTE:
- **Make sure that oil seal is free from inclination as it is installed.**
- **Refer to the figure so that oil seal is installed in proper direction.**

Special tool
(A) : 09924-74510
(B) : 09944-88210

"A" : Grease 99000-25010
"B" : Sealant 99000-31110

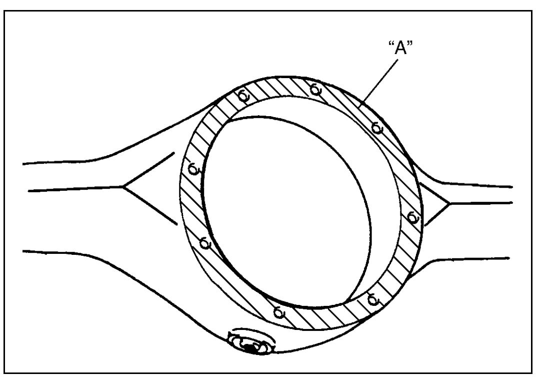
1. Hammer	4. Oil seal
2. Rod	5. Body center
3. Oil seal protector	

2) For procedure hereafter, refer to steps 6) to 11) of "INSTALLATION" under "REAR AXLE SHAFT" in the service manual mentioned in the FOREWORD of this manual.

Rear Axle Housing

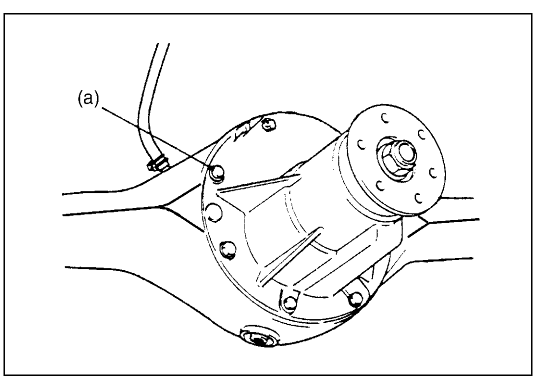
INSTALLATION

For Step 1) to 4), 7) and 9) to 30), refer to the same section in the Service Manual mentioned in the FOREWORD of this manual.



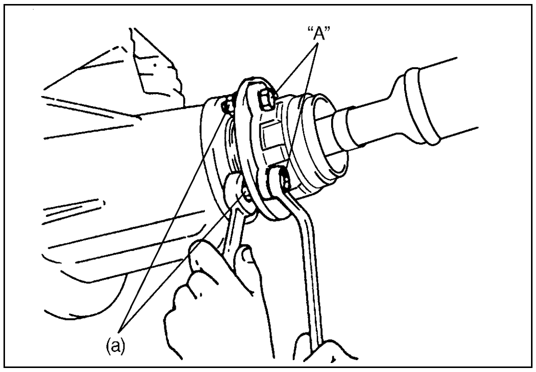
3) Clean mating surfaces of axle housing (1) and differential carrier and apply sealant "A" to housing side.

"A" : Sealant 99000-31110



4) Install differential carrier assembly to axle housing and tighten carrier bolts to specified torque.

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



5) Apply thread lock cement to thread of propeller shaft flange bolt if reused. Install propeller shaft to joint flange aligning match marks and torque flange nuts to specification.

"A" : Cement 99000-32110

Tightening torque
Propeller shaft nut (a) :
60 N·m (6.0 kg-m, 43.5 lb-ft)

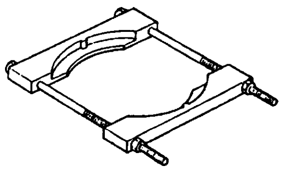
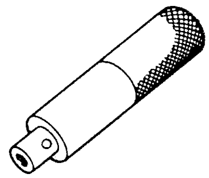
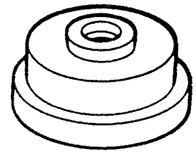
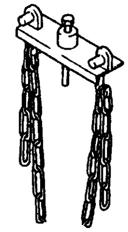
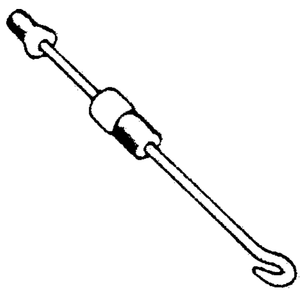
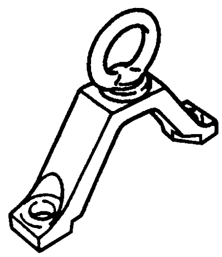
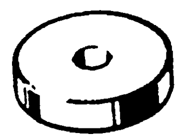
Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Shock absorber nut	29	2.9	21.0
Shock absorber lower nut	85	8.5	61.5
Lower rod bolt and nut	100	10.0	72.5
Upper rod bolt and nut	100	10.0	72.5
Lateral rod bolt	100	10.0	72.5
Differential carrier bolt	55	5.5	40.0
Propeller shaft nut	60	6.0	43.5
Brake pipe flare nut	16	1.6	11.5
Bearing retainer nut	50	5.0	36.5
Differentiation gear oil filler & drain plug (filler plug)	50	5.0	36.5
Differentiation gear oil filler & drain plug (drain plug)	27	2.7	16.0
Wheel nut	100	10.0	72.5
Wheel speed sensor bolt	21	2.1	15.5

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Oil seal lip
Brake fluid	DOT 3	• Brake reservoir tank
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	• Joint seam of axle and brake back plate • Joint seam of bearing retainer and brake back plate • Joint seam of differential carrier and axle housing • Drain plug • Mating surface of oil seal and axle housing
Gear oil	For gear oil information, refer to Section 7F	• Differential gear (Rear axle housing)
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 (99000-32110)	• Rear propeller shaft flange bolts

Special Tool

 09921-57810 Counter shaft holder	 09924-74510 Bush remover handle	 09926-88310 Oil seal installer	 09927-18411 Universal puller
 09942-15510 Sliding hammer	 09943-35512 Brake drum remover	 09944-88210 Bearing installer	

SECTION 3F

WHEELS AND TIRES

NOTE:

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

CONTENTS

General Description

Tires

This vehicle is equipped with following tire.

Tire specification :
P235/60 R16 or 235/60 R16

The tires are of tubeless type. The tires are designed to operate satisfactorily with loads up to the full rated load capacity when inflated to the recommended inflation pressure.
Correct tire pressures and driving habits have an important influence on tire life. Heavy cornering, excessively rapid acceleration, and unnecessary sharp braking increase tire wear.

Wheels

Standard equipment wheels are following steel wheels.

Wheel specification :
16 x 7 JJ

SECTION 4A2

FRONT DRIVE SHAFT/SHAFT BEARING, OIL SEAL

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

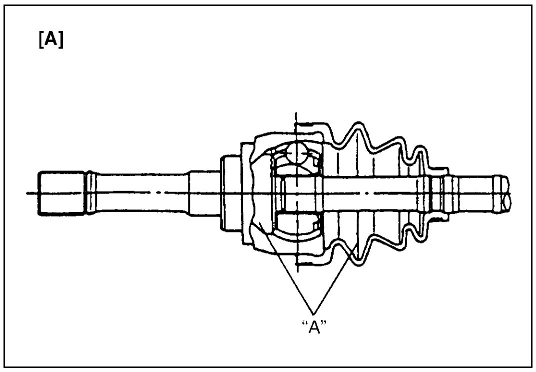
CONTENTS

On-Vehicle Service

Drive Shaft

ASSEMBLY

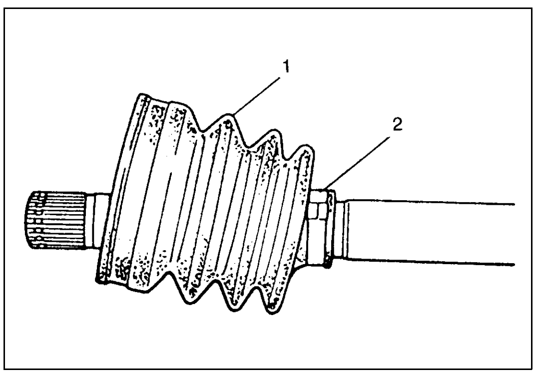
CAUTION:
- **To prevent any problem caused by washing solution, do not wash joint boots. Degreasing of those parts with cloth is allowed.**
- **Bend each boot band against forward rotation.**
- **Do not squeeze or distort boot when fastening it with bands.**
  Distorted boot caused by squeezing air may reduce its durability.



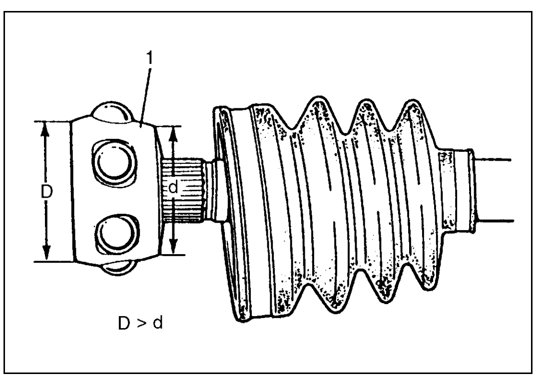
1) Fully apply joint grease to wheel side joint.
   Use joint grease in the tube included in spare part.

"A" : Joint Grease (about 85- 95 g (3.0 - 3.4 oz) (Yellow))

[A] : Wheel side

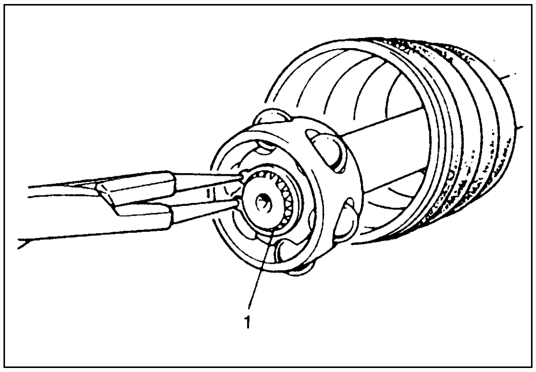


2) Fit wheel side boot (1) on shaft.
   Fill up inside of boot (1) with joint grease.
   Before fixing boot band (2), insert screwdriver into boot (1) on joint side and allow air to enter boot so that air pressure in boot (1) becomes the same as atmospheric pressure.
3) Fixing boot band (2).
4) Install boot (1) onto drive shaft till its small diameter side fits to shaft groove and fix there with boot band (2).

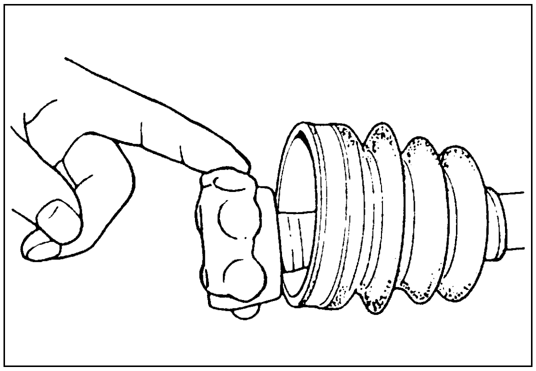


5) Install cage (1) to shaft.

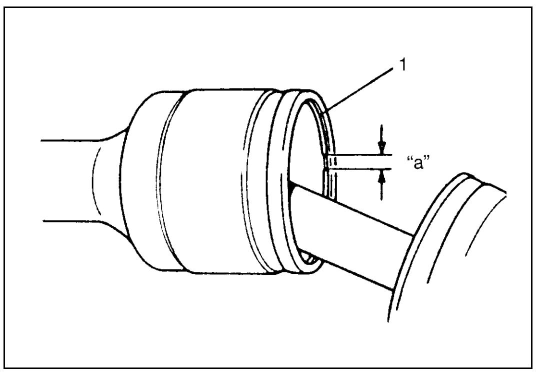
CAUTION:
Install cage (1) directing smaller outside diameter side to shaft end.



6) Install circlip (1) by using snap ring plier.

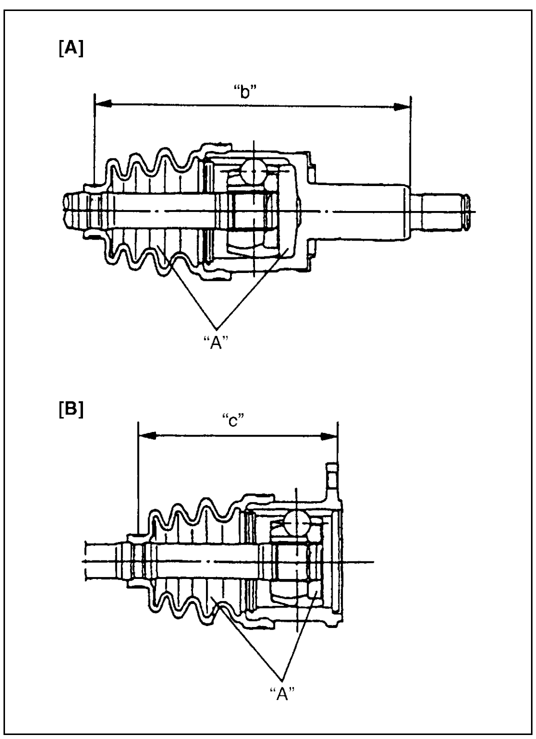


7) Apply grease to entire surface of cage.
   Use joint grease in tube included in spare part.



8) Insert cage into outer race and fit circlip (1) into groove of outer race.

CAUTION: **Position opening of circlip "a" so that it will not be lined up with a ball.**



9) Apply grease in tube included in spare part to inside of outer race, and fit boot to outer race.
   Fill up inside of boot with joint grease.

   "A" : Joint Grease
   (about 90 - 100 g (3.2 - 3.5 oz) (Black))

10) Fitting boot to outer race, adjust so that measurements "b" and "c" become as shown in the figure.

   Differential side (RH) boot installation position
   (Length "b") : 196.8 - 206.8 mm (7.75 - 8.14 in.)

   Differential side (LH) boot installation position
   (Length "c") : 127.5 - 137.5 mm (5.02 - 5.41 in.)

11) Before fixing boot band, insert screwdriver into boot on joint side and allow air to enter boot so that air pressure in boot becomes the same as atmospheric pressure.
12) Clamp boot band. Check boots for distortion or dent.

[A] :	Differential side (RH)
[B] :	Differential side (LH)

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Drive shaft oil seal • Wheel spindle part of differential side drive shaft (RH)
Sealant	SEALING COMPOUND 366E (99000-31090)	• Axle shaft drive flange

SECTION 4B

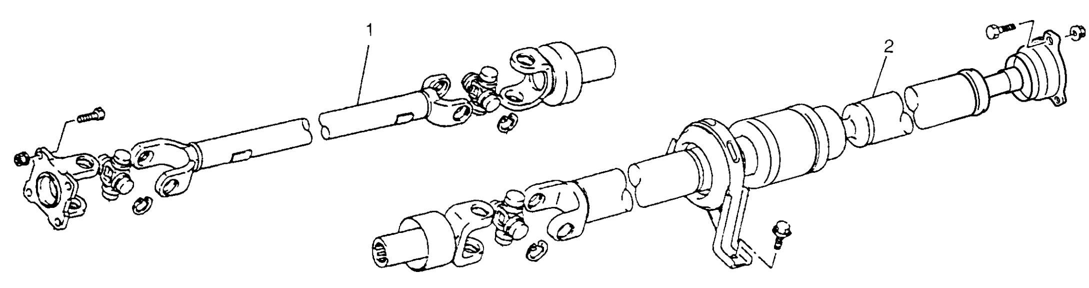
PROPELLER SHAFTS

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

CONTENTS

General Description

Two universal non-constant velocity joints which are called cardan joints are provided on front propeller shaft and one universal non-constant velocity joint, two universal constant velocity joints and a rubber mounting center support are provided on rear propeller shaft. On the front end of rear propeller shaft, cardan joint same as that of front propeller shaft is provided. On the rear end of rear propeller shaft, ball fixed type constant velocity joint (BJ) is provided. On the middle of rear propeller shaft, double offset type constant velocity joint (DOJ) is provided just behind the center support.
Most universal joints require no maintenance. They are lubricated for life and can not be lubricated on the vehicle. If a universal joint becomes noisy or worn, it must be replaced.
The propeller shaft is a balanced unit. Handle it carefully so that balance can be maintained.



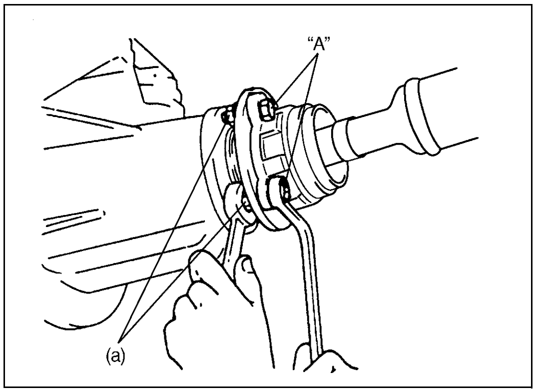
1.	Front propeller shaft
2.	Rear propeller shaft

On-Vehicle Service

Propeller Shaft

For the descriptions other than those mentioned below, refer to the same item in the same section of the Service Manual mentioned in the FOREWORD of this manual.

INSTALLATION



Use the following specification to torque universal joint flange nuts. For rear propeller shaft flange bolt, apply thread lock cement to thread part of bolts if reused.

"A" : Cement 99000-32110

Tightening torque
Front propeller shaft flange nuts (a) :
50 N·m (5.0 kg-m, 36.5 lb-ft)
Rear propeller shaft flange nuts (a) :
60 N·m (6.0 kg-m, 43.5 lb-ft)

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Front propeller shaft flange nuts	50	5.0	36.5
Rear propeller shaft flange nuts	60	6.0	46.5
Center support bolts	50	5.0	36.5

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 (99000-32110)	• Rear propeller shaft flange bolts

SECTION 5

BRAKES

WARNING:

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

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

NOTE:

- **For the description (items) not found in this section refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.**
- **When inspecting and servicing vehicle equipped with ABS, be sure to refer to section 5E2 first.**
- **All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.**

CONTENTS

Diagnosis

Diagnosis Table

For the item not found in this column, refer to the same item of the same section in the service manual mentioned in the FOREWORD of this manual.

Condition	Possible Cause	Correction
Brake warning light turns on after engine start	Parking brake applied	Release parking brake and check that brake warning light turns off.
	Insufficient amount of brake fluid	Add brake fluid.
	Brake fluid leaking from brake line	Investigate leaky point, correct it and add brake fluid.
	Brake warning light circuit faulty	Repair circuit.
	Malfunctioning EBD system	Check system referring to “DIAGNOSIS” of Section 5E2.
ABS warning light does not turn on for 2 – 3 sec. after ignition switch has turned ON.	Bulb burnt out	Replace bulb.
	ABS warning light circuit open (including check relay)	Check system referring to “DIAGNOSIS” in Section 5E2.
ABS warning light remains on after ignition switch has turned on for 2 – 3 sec.	Malfunctioning ABS	Check system referring to “DIAGNOSIS” in Section 5E2.

SECTION 5A

BRAKES PIPE/HOSE/MASTER CYLINDER

WARNING:

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

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

CONTENTS

General Description

Master Cylinder Assembly

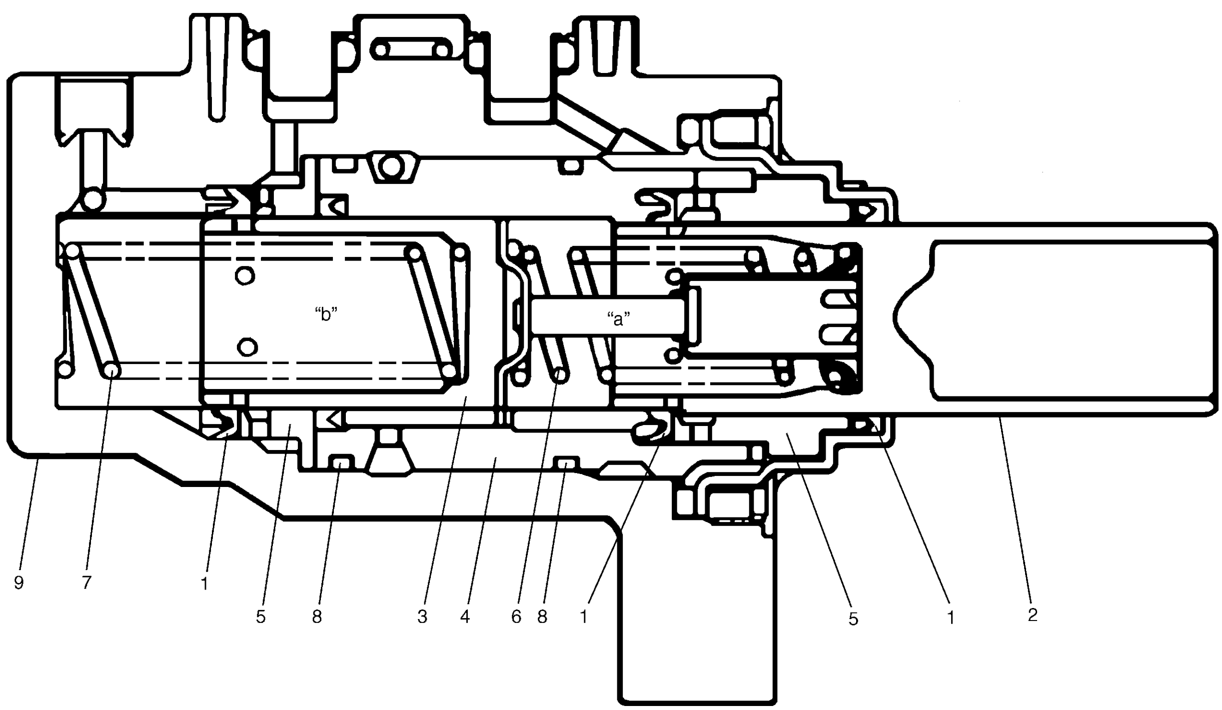
The master cylinder has two pistons and three piston cups. Its hydraulic pressure is produced in the primary (“a” in the figure below) and secondary (“b”) chambers. The hydraulic pressure produced in the primary chamber (“a”) acts on the rear wheel brakes.
Also, the hydraulic pressure produced in the secondary chamber (“b”) acts on the front wheel brakes.

WARNING:

Brake master cylinder cannot be disassembled. When anything faulty is found in it, it must be replaced as an assembly.

CAUTION:

Brake master cylinder cannot be disassembled in principle. Should primary piston have come off from cylinder while dismounting or handling it, wash it in the same specified fluid as that in reservoir and place it back in cylinder.



1. Piston cup	4. Sleeve	7. Secondary piston return spring
2. Primary piston	5. Ring guide	8. O-ring
3. Secondary piston	6. Primary piston return spring	9. Master cylinder body

On-Vehicle Service

Front Brake Hose/Pipe

REMOVAL

1) Raise and suitably support vehicle. Remove tire and wheel.
   This operation is not necessary when removing pipes connecting master cylinder and flexible hose.
2) Clean dirt and foreign material from both hose end or pipe end fittings. Remove brake hose or pipe.

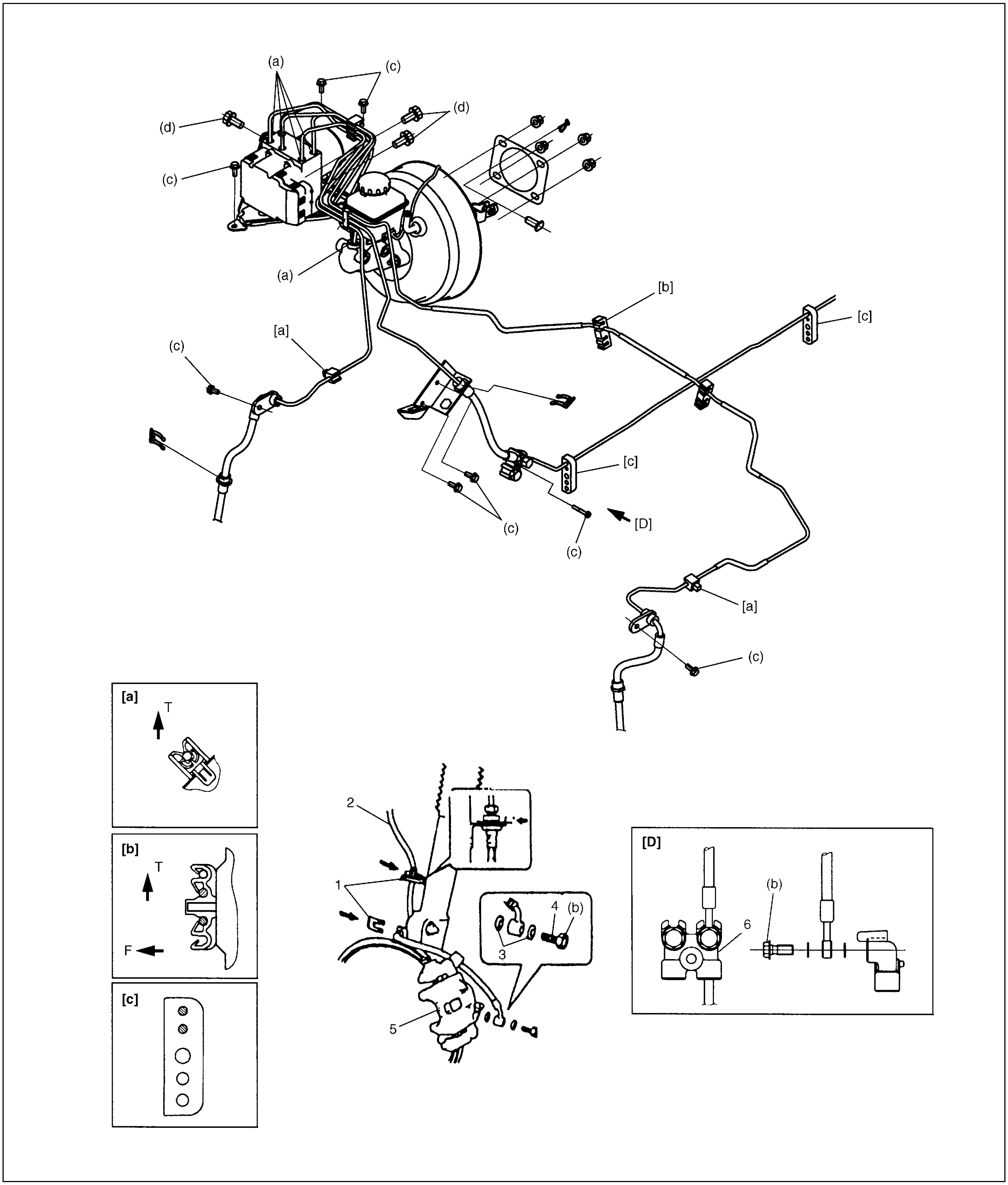
INSTALLATION

1) Reverse removal procedure for brake hose and pipe installation procedure.
   For installation, make sure that steering wheel is in straightforward position and hose has no twist or kink. Check to make sure that hose doesn't contact any part of suspension, both in extreme right and extreme left turn conditions. If it does at any point, remove and correct. Fill and maintain brake fluid level in reservoir. Bleed brake system.
2) Perform brake test and check installed part for fluid leakage.

Tightening torque
Brake pipe flare nut (a) : 16 N·m (1.6 kg-m, 12.0 lb-ft)
Brake flexible hose bolt (brake caliper/2 joint) (b) : 23 N·m (2.3 kg-m, 17.0 lb-ft)
2-way joint mounting bolt (c) : 10 N·m (1.0 kg-m, 7.5 lb-ft)
Brake hose/pipe bracket bolt (c) : 10 N·m (1.0 kg-m, 7.5 lb-ft)
ABS actuator bracket bolt (c) : 10 N·m (1.0 kg-m, 7.5 lb-ft)
ABS actuator mounting bolt (d) : 9 N·m (0.9 kg-m, 6.5 lb-ft)

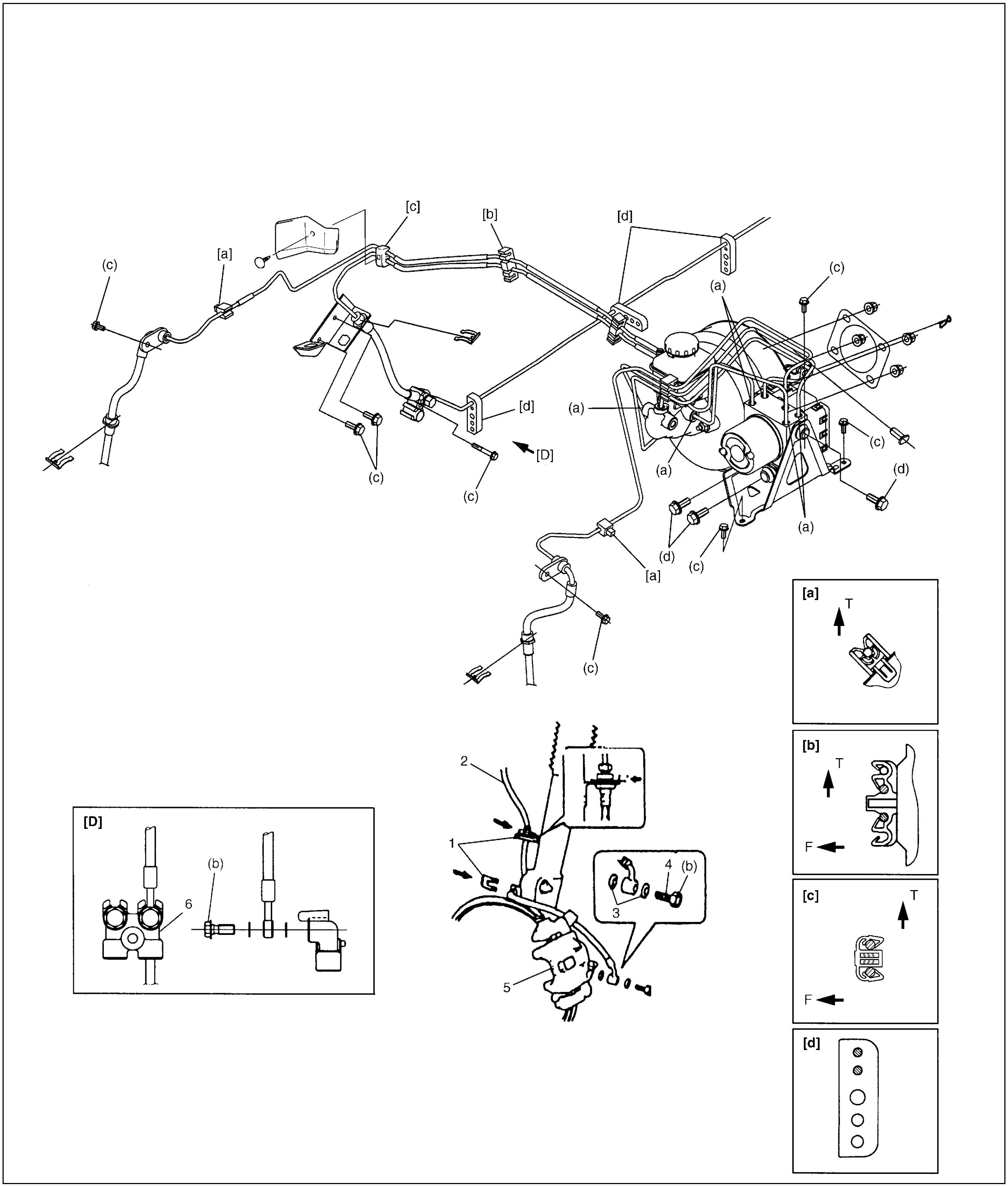
NOTE:
Insert E-ring till its end surface is flush with or lower than bracket end surface.

For RH steering vehicle



[D]: View D	1. E-ring
[a]: Clamp a	2. Flexible hose
[b]: Clamp b	3. Hose washer
[c]: Clamp d	4. Hose bolt
T: Top side	5. Brake caliper
F: Front side	6. 2 way joint

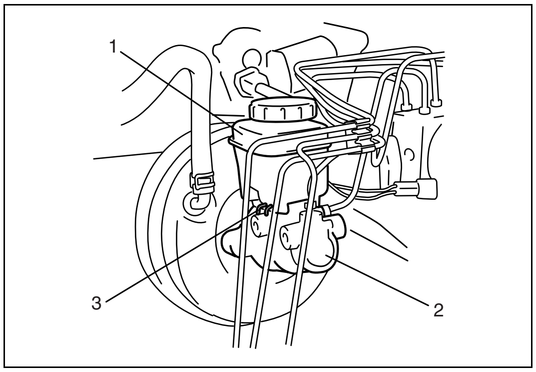
For LH steering vehicle



[D]: View D	1. E-ring
[a]: Clamp a	2. Flexible hose
[b]: Clamp b	3. Hose washer
[d]: Clamp d	4. Hose bolt
T: Top side	5. Brake caliper
F: Front side	6. 2 way joint

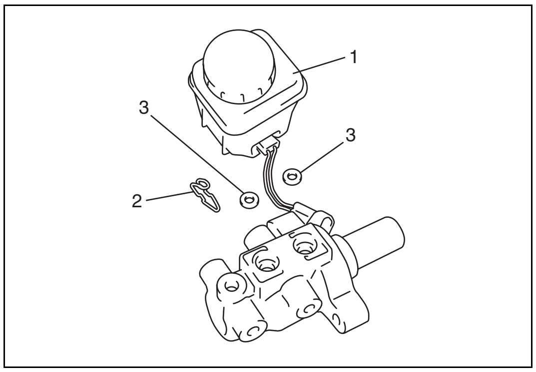
Master Cylinder Reservoir

REMOVAL



1) Disconnect reservoir lead wire at coupler.
2) Clean outside of reservoir (1).
3) Take out fluid with syringe or such.
4) Remove reservoir stopper (3).

2.	Master cylinder



5) Remove reservoir (1).

NOTE:

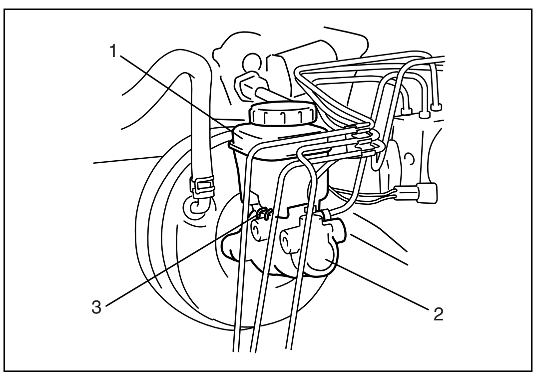
Do not allow brake fluid to get on painted surfaces.

2.	Stopper
3.	Grommets

INSTALLATION

NOTE:

See NOTE at the beginning of this section.

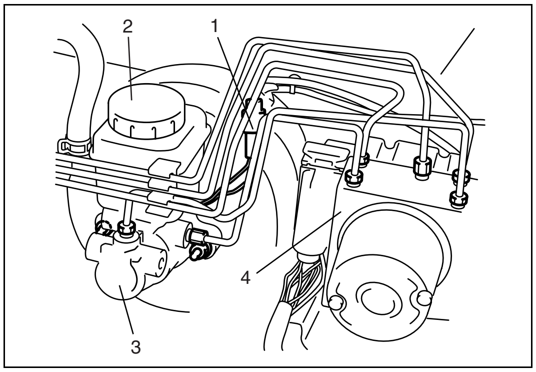


1) When using new grommets, lubricate them with the same fluid as the one to fill reservoir (1) with. Then press-fit grommets to master cylinder (2). Grommets must be seated in place.
2) Install reservoir (1) and then insert stopper (3).
3) Connect reservoir lead wire.
4) Fill reservoir (1) with specified fluid.
5) Upon completion of installation, check for fluid leakage.

Master Cylinder Assembly

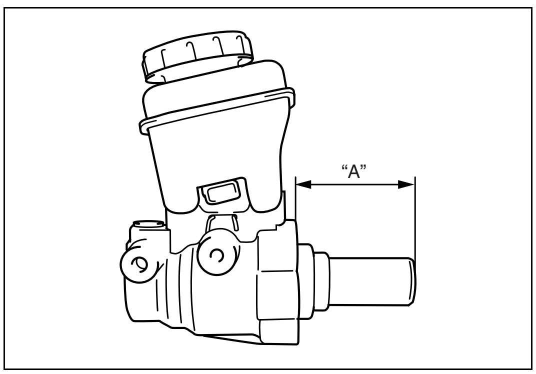
REMOVAL

NOTE:
Do not allow brake fluid to get on painted surfaces.



1) Disconnect reservoir lead wire (1) at coupler.
2) Clean around reservoir cap (2) and take out fluid with syringe or such.
3) Disconnect brake pipes from master cylinder (3) and ABS actuator (4).

INSPECTION



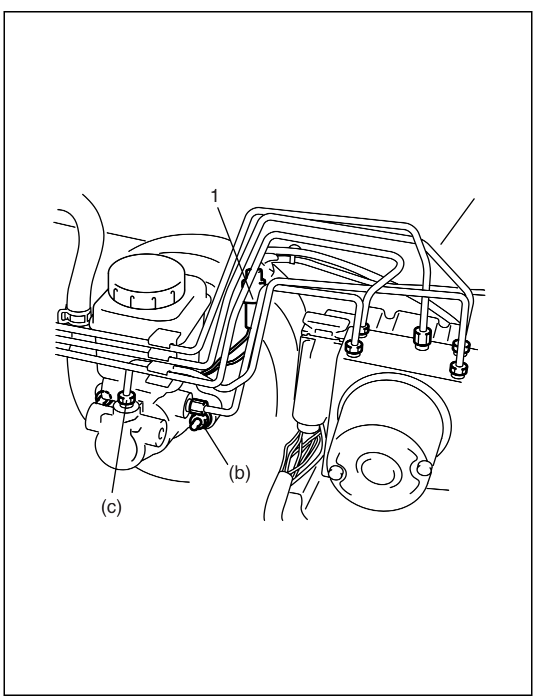
Inspect distance “A” to be the following.

Distance “A” :
57.4 mm (2.26 in) or more

If measurement is out of above specification, replace master cylinder assembly.

INSTALLATION

NOTE:
See NOTE at the beginning of this section.



1) Install master cylinder to brake booster.
2) Tighten master cylinder attaching nuts to specified torque.

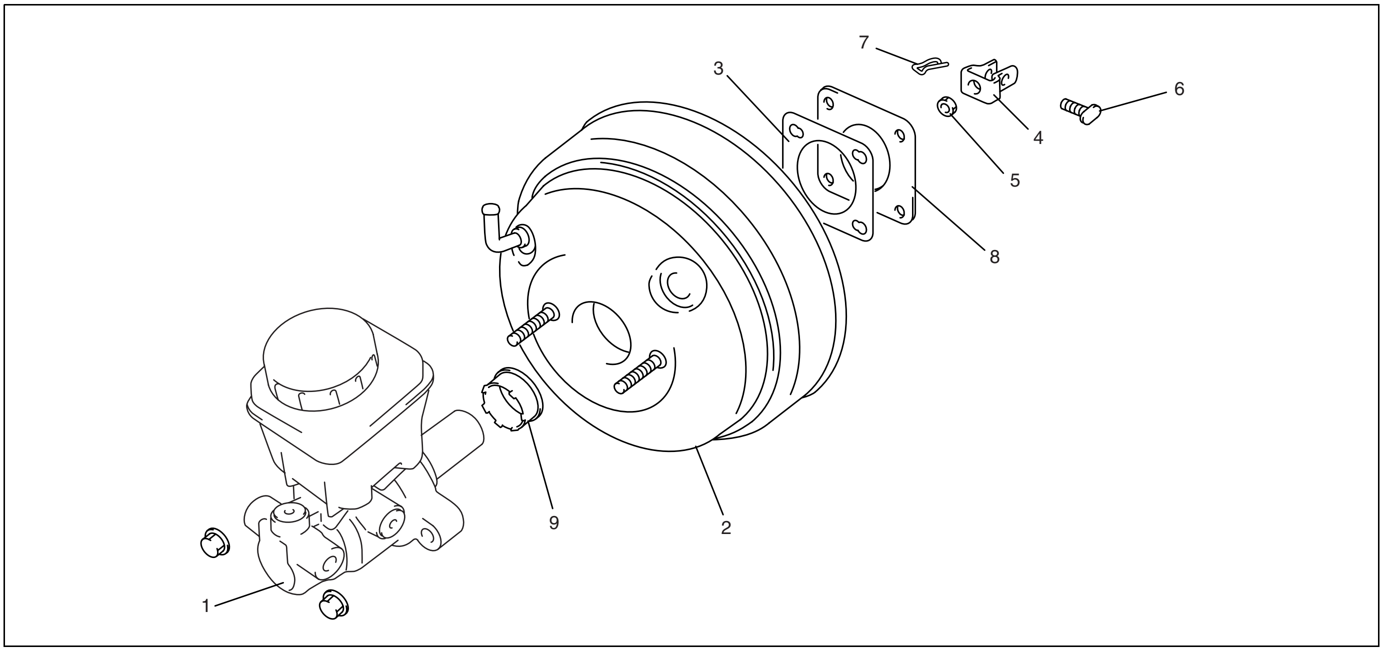
Tightening torque
Master cylinder attaching nut (b) :
13 N·m (1.3 kg-m, 9.5 lb-ft)

3) Connect hydraulic lines to master cylinder and ABS actuator and tighten flare nuts to specified torque.

Tightening torque
Brake pipe flare nut (c) : 16 N·m (1.6 kg-m, 12.0 lb-ft)

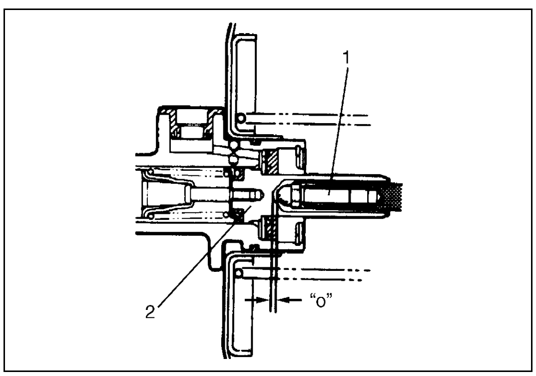
4) Connect reservoir lead wire (1).
5) Fill reservoir with specified brake fluid.
6) After installing, check brake pedal play and bleed air from system (Refer to “BRAKE PEDAL PLAY CHECK” and “BLEEDING BRAKE” in Section 5).
7) Perform brake test and check each installed part for fluid leakage.

Brake Booster



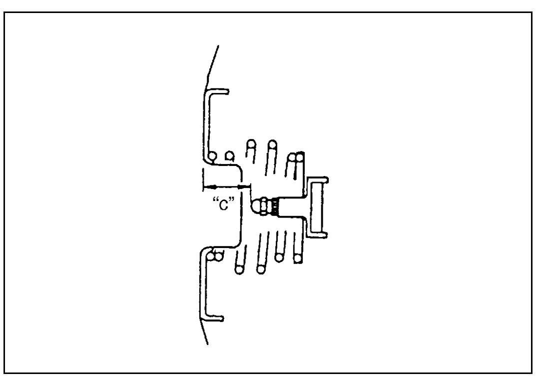
1. Brake master cylinder assembly	4. Push rod clevis	7. Clip
2. Brake booster assembly	5. Nut	8. Plate
3. Gasket	6. Clevis pin	9. Seal

CLEARANCE BETWEEN BOOSTER PISTON ROD AND MASTER CYLINDER PISTON CHECK AND ADJUSTMENT



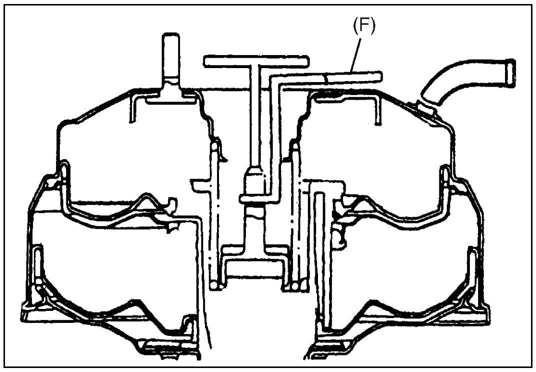
The length of booster piston rod (1) is adjusted to provide specified clearance "0" between piston rod (1) end and master cylinder piston (2).

1) Before measuring clearance, push piston rod several times so as to make sure reaction disc is in place.
2) Keep inside of booster at atmospheric pressure for measurement.



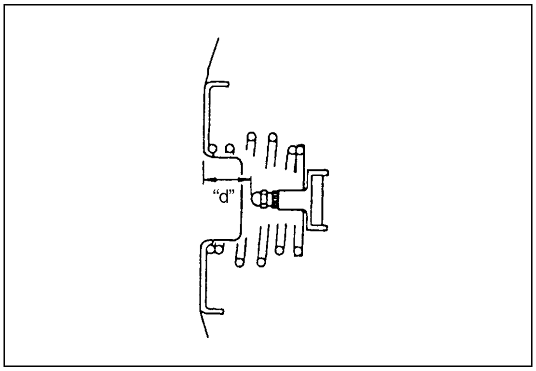
3) Check depth of piston rod, i.e. distance between piston rod and mating surface of booster-to-master cylinder.

Depth "c" of piston rod for check :
15.8 – 16.6 mm (0.623 – 0.653 in.)



4) If measured depth is out of above specifications, adjust to specifications below by turning adjusting screw of piston rod.

Special tool
(F) : 09952-16021

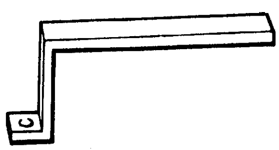
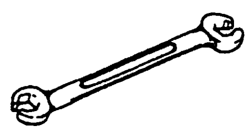


Depth "d" of piston rod for adjustment :
16.3 – 16.6 mm (0.642 – 0.653 in.)

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Brake flexible hose bolt (Brake caliper/2 way joint)	23	2.3	17.0
Brake hose / pipe bracket bolt	10	1.0	7.5
ABS actuator bracket bolt	10	1.0	7.5
Master cylinder attaching nut	13	1.3	9.5
Booster nut	13	1.3	9.5
Clevis nut	25	2.5	18.0
2-way joint mounting bolt	10	1.0	7.5
Brake pipe flare nut	16	1.6	12.0
Brake bleeder plug (Front caliper (M8))	8	0.8	6.0
Brake bleeder plug (Wheel cylinder)	7.5	0.75	5.5
Wheel nut	100	10.0	72.5

Special Tool

 09952-16021 Booster piston rod adjuster	 09950-78220 Flare nut wrench (10 mm)

SECTION 5C

PARKING AND REAR BRAKE

WARNING:

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

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

NOTE:

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

CONTENTS

General Description

Drum Brake Assembly

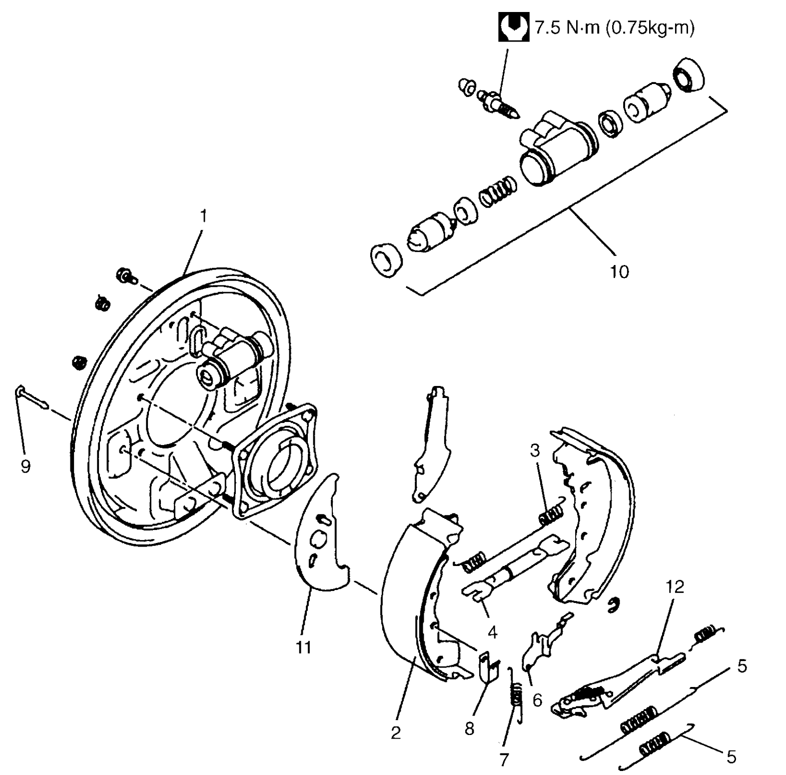
The drum brake assembly has a self shoe clearance adjusting system so that drum-to-shoe clearance is maintained appropriate at all times. Rear brake is a drum type. It uses leading trailing operation when brake pedal is depressed and when parking brake is applied on level road.
It also uses duo servo operation when parking brake is applied on gradient road and load is applied in longitudinal direction of vehicle.

NOTE:

Replace all components included in repair kits to service this drum brake. Lubricate parts as specified.

WARNING:

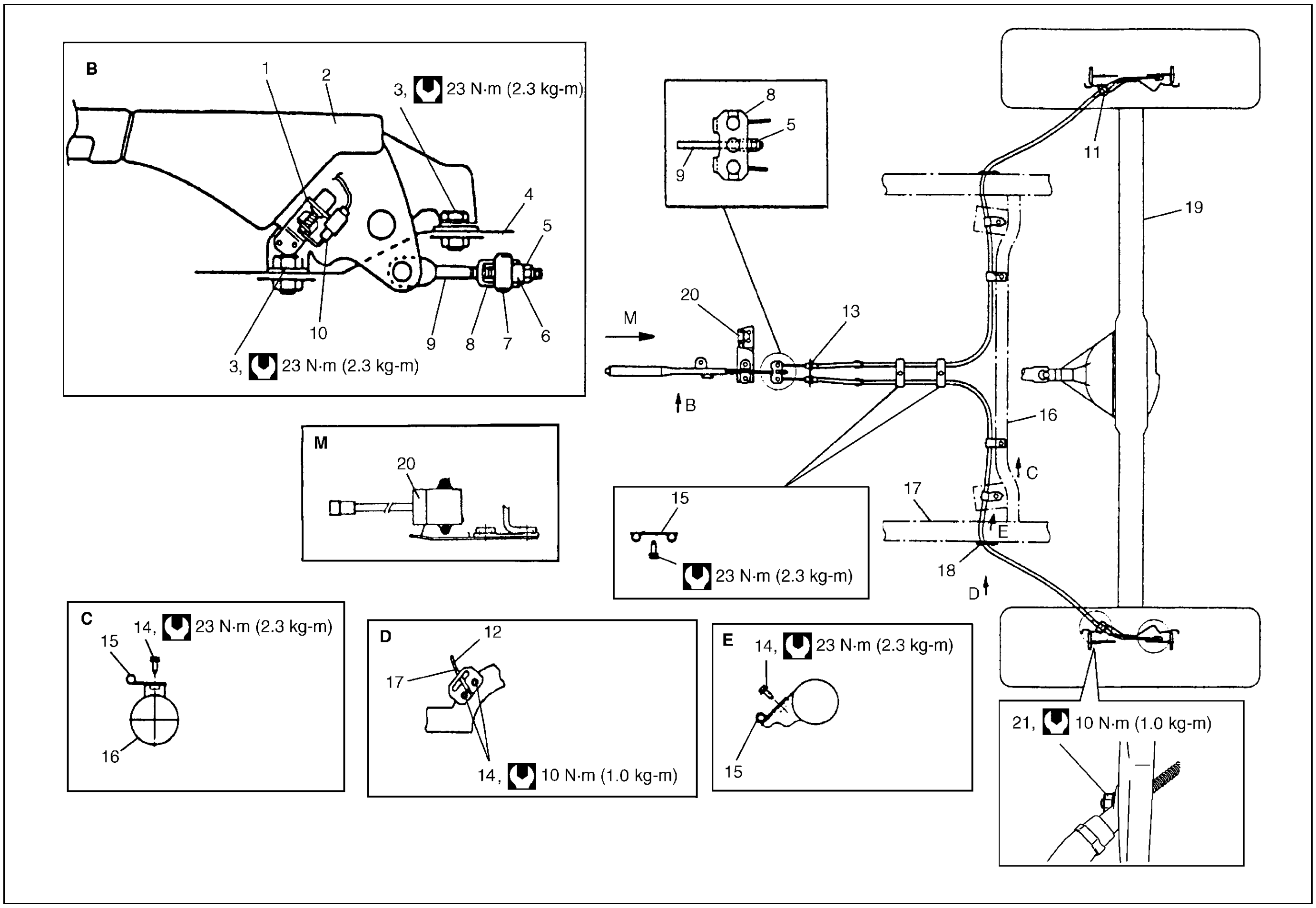
If any hydraulic component is removed or brake line disconnected, bleed the brake system. The torque values specified are for dry, unlubricated fasteners.



1. Brake back plate	6. Adjuster lever	11. Link
2. Brake shoe	7. Adjuster spring	12. Brake strut
3. Shoe return upper spring	8. Shoe hold down spring	Tightening torque
4. Adjuster	9. Shoe hold down pin	
5. Shoe return lower spring	10. Wheel cylinder	

On-Vehicle Service

Parking Brake Cable

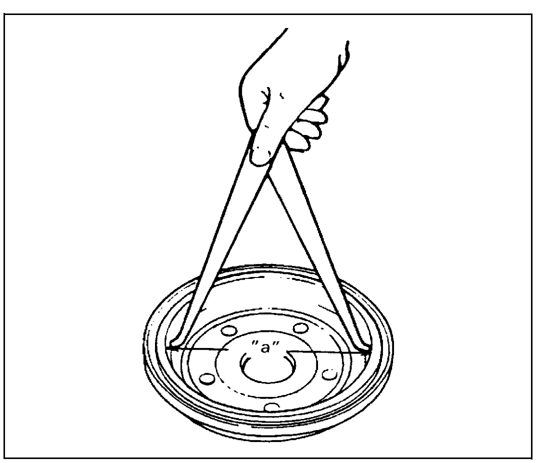


1. Parking brake switch	6. Equalizer	11. Color ring	16. Crossmember	21. Parking brake cable nut
2. Parking brake lever	7. Pin	12. Cable	17. Chassis frame	Tightening torque
3. Parking brake lever bolt	8. Equalizer	13. Grommet	18. Hanger	
4. Floor	9. Adjust rod	14. Bolt	19. Rear axle	
5. Locking nut	10. Coupler	15. Clamp (if equipped)	20. G-sensor (if equipped)	

Brake Drum

INSPECTION

Brake drum



Inspect drum for cleanliness. Check wear of its braking surface by measuring its inside diameter.
Whenever brake drums are removed, they should be thoroughly cleaned and inspected for cracks, scores, deep grooves.

Brake dram inside diameter "a"
Standard : 254 mm (9.99 in.)
Service Limit : 256 mm (10.07 in.)

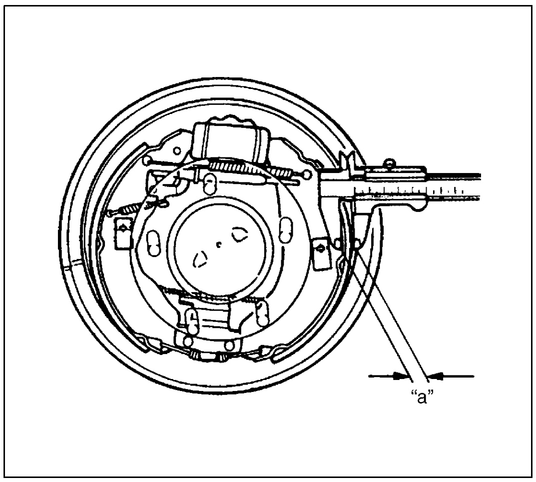
Cracked, scored, or grooved drum

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 no be turned.

NOTE:

When drum is removed, visually inspect wheel cylinder for brake fluid leakage. Correct leaky point, if any.

Brake shoe



Where lining is worn out beyond service limit, replace shoe.
If one of brake linings is to service limit, all linings must be replaced at the same time.

Rear brake drum shoe thickness "a"
Standard : 7.1 mm (0.28 in.)
Service limit : 3.6 mm (0.14 in.)

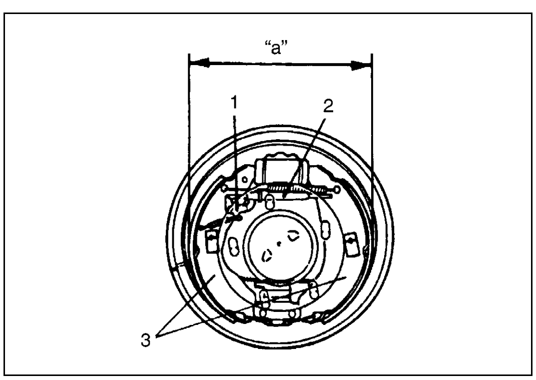
CAUTION:
Never polish lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage drum. When it is required to correct lining, replace it with a new one.

INSTALLATION

NOTE:

See NOTE at the beginning of this section.

For the details, refer to the same item of the same section in the service manual mentioned in the FOREWORD of this manual noting the following.



- Before installing brake drum, check outer diameter of brake shoes (3). If it is not within value as specified below, adjust it to specification by turning adjuster (2).

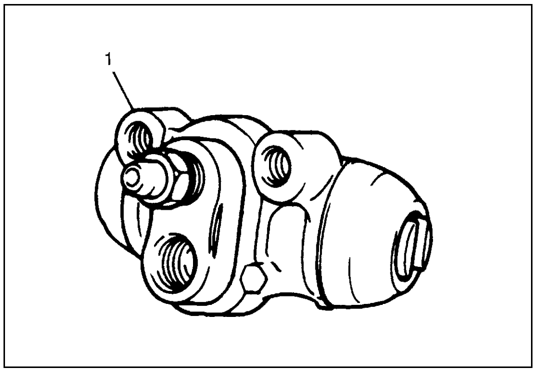
Rear brake shoe outer diameter "a" :
253.3 – 253.7 mm (9.972 – 9.988 in.)

1. Pawl lever

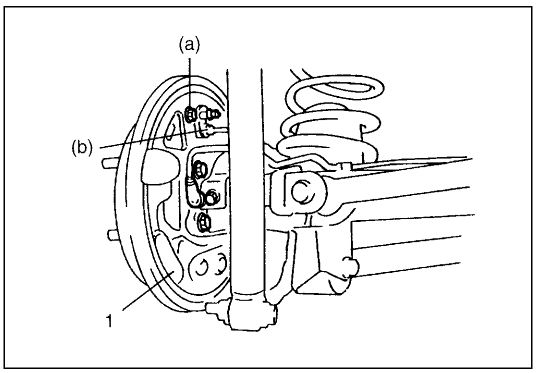
Wheel Cylinder

INSTALLATION

For the details, refer to the same item of the same section in the service manual mentioned in the FOREWORD of this manual noting the following points.



- Take off bleeder plug cap from brake pipe and connect pipe (or pipes) to wheel cylinder (1) just enough to prevent fluid from leaking.

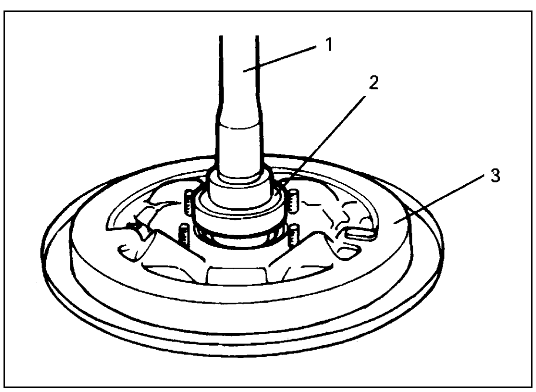


- Tighten wheel cylinder to brake back plate (1) to specified torque.

Tightening torque
Wheel cylinder bolt (for non sealed type) (a):
13.5 N·m (1.35 kg-m, 10.0 lb-ft)
Brake pipe flare nut (b):
16 N·m (1.6 kg-m, 12.0 lb-ft)

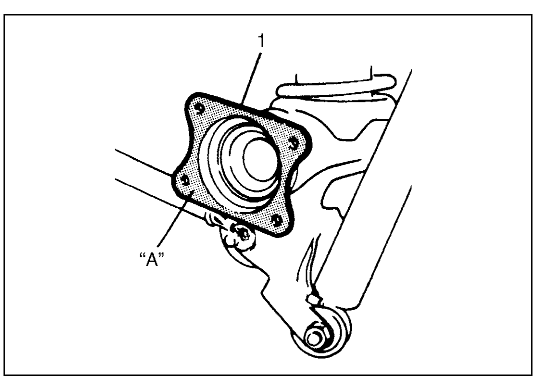
Brake Back Plate

INSTALLATION



1) Install brake back plate (3) to rear axle shaft (1).

2. Wheel beaning

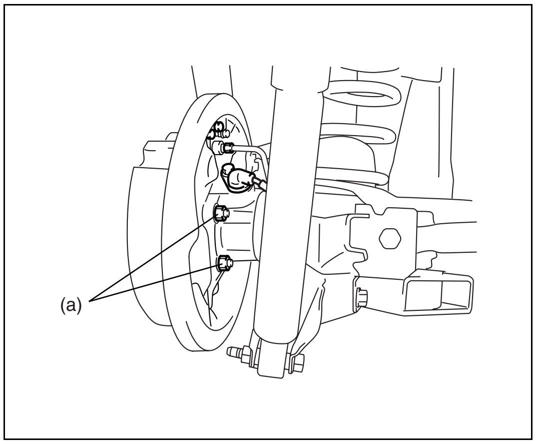


2) Apply sealant "A" to joint seam of rear axle housing (1) and brake back plate.

"A" : Sealant 99000-31110

NOTE:
Make sure to remove old sealant before applying it anew.

3) Install rear axle shaft to rear axle housing.

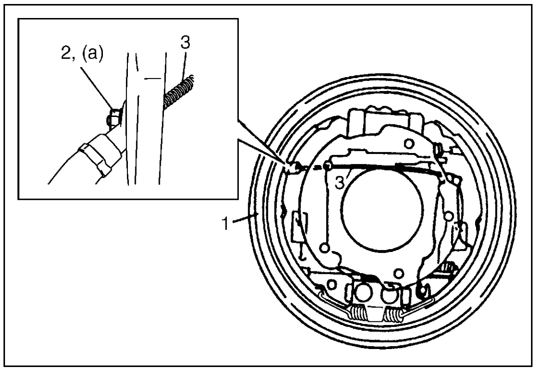


4) Tighten brake back plate nuts to specified torque.

Tightening torque
Brake back plate nut (a) :
50 N·m (5.0 kg-m, 36.5 lb-ft)

5) Install wheel cylinder, and tighten wheel cylinder bolts and brake pipe flare nut (or nuts) to specified torque.

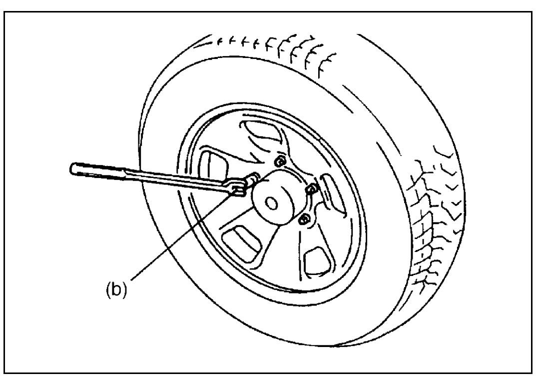
Tightening torque
Wheel cylinder bolt :
13.5 N·m (1.35 kg-m, 10.0 lb-ft)
Brake pipe flare nut : 16 N·m (1.6 kg-m, 12.0 lb-ft)



6) Install parking brake cable (3) to brake back plate (1) and tighten parking brake cable nut (2) to specified torque.

Tightening torque
Parking brake cable nut (a) : 10 N·m (10 kg-m, 7.5 lb-ft)

7) Install brake shoes, referring to steps 1) to 4) of “INSTALLATION” under “BRAKE SHOE” in this section.
8) Install brake drum. Refer to steps 1) to 2) of “INSTALLATION” under “BRAKE DRUM” in this section.
9) Refill differential housing with new specified gear oil. Refer to “ON-VEHICLE SERVICE” in Section 7F for refill.
10) Fill reservoir with brake fluid and bleed brake system. (For bleeding operation, refer to “BLEEDING BRAKE” in Section 5).



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

Tightening torque
Wheel nut (b) : 100 N·m (10.0 kg-m, 72.5 lb-ft)

12) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load 3 to 10 times so as to obtain proper drum-to shoe clearance.
    Adjust parking brake cable. (For adjustment, refer to “PARKING BRAKE CHECK AND ADJUSTMENT” in Section 5).
13) Tighten parking brake lever cover screws.
14) 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).
15) Check each installed part for oil leakage.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Wheel cylinder bleeder plug	7.5	0.75	5.5
Parking brake lever bolt	23	2.3	17.0
Wheel cylinder bolt	13.5	1.35	10.0
Brake pipe flare nut	16	1.6	12.0
Brake back plate nut	50	5.0	36.5
Wheel nut	100	10.0	72.5
Parking brake cable nut	10	1.0	7.5

SECTION 5E2

ANTILOCK BRAKE SYSTEM (ABS)

WARNING:

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

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

NOTE:

- **For the descriptions (items) not found in this section, refer to Section 5E1 of the Service Manual mentioned in the FOREWORD of this manual.**
- **All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.**

5E2

CONTENTS

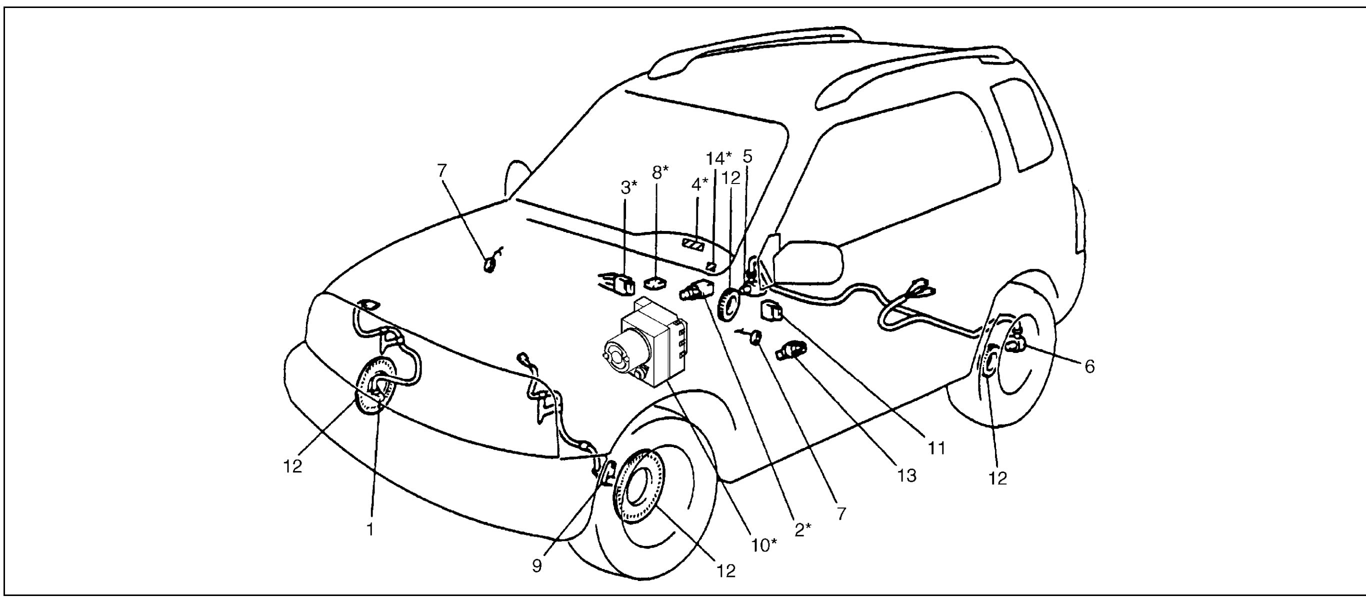
General Description

Components/Parts Location

The ABS (Antilock Brake System) controls the fluid pressure applied to the wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied.
This ABS has also the following function.
While braking is applied, but before ABS control becomes effective, braking force is distributed between the front and rear so as to prevent the rear wheels from being locked too early for better stability of the vehicle.The main component parts of this ABS include the following parts in addition to those of the conventional brake system.

- Wheel speed sensor which senses revolution speed of each wheel and outputs its signal.
- ABS warning lamp which lights to inform abnormality when system fails to operate properly.
- ABS hydraulic unit/control module assembly is incorporated ABS control module, ABS hydraulic unit (actuator assembly), fail-safe relay and pump motor relay.
  - ABS control module which sends operation signal to ABS hydraulic unit to control fluid pressure applied to each wheel cylinder based on signal from each wheel speed sensor so as to prevent wheel from locking.
  - ABS hydraulic unit which operates according to signal from ABS control module to control fluid pressure applied to wheel cylinder of each 4 wheels.
  - Fail-safe relay (solenoid valve) relay which supplies power to solenoid valve in ABS hydraulic unit and pump motor relay.
  - Pump motor relay which supplies power to pump motor in ABS hydraulic unit.
- G sensor which detects body deceleration speed. (For 4WD model only)

This ABS is equipped with Electronic Brake force Distribution (EBD) system that controls a fluid pressure of rear wheels to best condition, which is the same function as that of proportioning valve, by the signal from wheel sensor independently of change of load due to load capacity and so on. And if the EBD system fails to operate properly, the brake warning lamp lights to inform abnormality.



1. Wheel speed sensor (Right-front)	6. Wheel speed sensor (Left-rear)	11. G sensor (For 4WD model only)
2. Stop lamp switch	7. Ground	12. Wheel speed sensor rotor (ring)
3. Data link connector	8. Diagnosis connector (Black connector)	13. 4WD switch (For 4WD model only)
4. "ABS" warning lamp	9. Wheel speed sensor (Left-front)	14. EBD warning lamp (Brake warning lamp)
5. Wheel speed sensor (Right-rear)	10. ABS hydraulic unit/control module assembly (with ABS pump motor relay and fail-safe relay)	

NOTE:

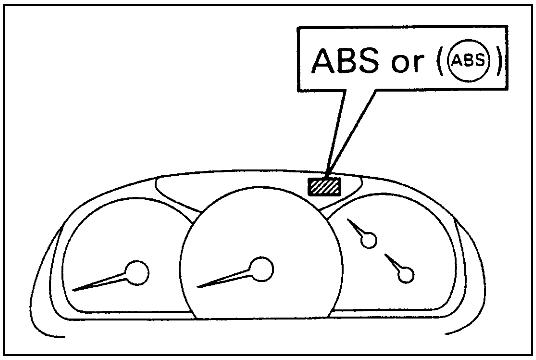
Above figure shows left-hand steering vehicle.
For right-hand steering vehicle, parts with (*) are installed at the side of symmetry.

ABS Hydraulic Unit/control Module Assembly

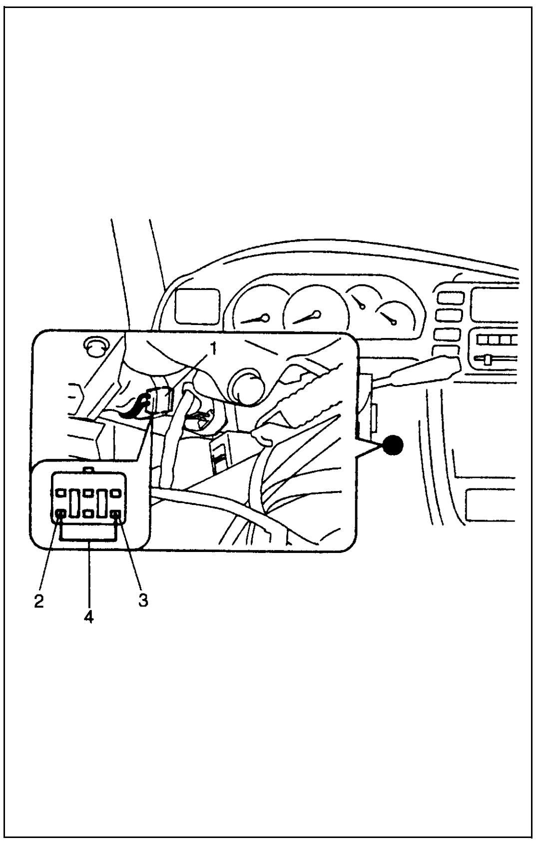
ABS control module is a component of ABS hydraulic unit/control module assembly and has the following functions.

Self-diagnosis function

ABS control module diagnoses conditions of the system component parts (whether or not there is any abnormality) all the time and indicates the results (warning of abnormality occurrence and DTC) through the ABS warning lamp as described below.



1) When ignition switch is turned ON, ABS warning lamp lights for 2 seconds to check its bulb and circuit.
2) When no abnormality has been detected (the system is in good condition), ABS warning lamp turns OFF after 2 seconds.
3) When an abnormality in the system is detected, ABS warning lamp lights and the area where that abnormality lies is stored in the memory of EEPROM in ABS control module.



4) When Diag. switch terminal (2) of diagnosis connector (1) (monitor connector) is grounded, the abnormal area is output as DTC. It is indicated by flashing of ABS warning lamp. (Refer to the table below.)

SYSTEM CONDITION		ABS WARNING LAMP	
		Diag. switch terminal is not grounded	Diag. switch terminal is grounded
In good condition at present	No trouble in the past	OFF	DTC 12
	Trouble occurred in the past	OFF	History DTC
Abnormality exists at present	No trouble in the past	ON	Current DTC
	Trouble occurred in the past	ON	Current and history DTCs

5) For procedure to clear all DTC's, refer to "DIAGNOSTIC TROUBLE CODE CLEARANCE" in this section.

3.	Ground terminal
4.	Service wire

Also ABS control module turns ON EBD warning lamp (brake warning lamp) depending on the trouble that detected by the module and EBD warning lamp does not indicate DTC.

Fail-safe function

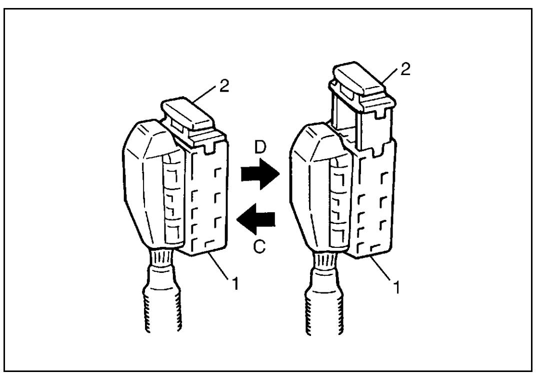
When an abnormality occurs (an abnormal DTC is detected), ABS control module turns OFF the fail-safe relay which supplies power to ABS hydraulic unit. Thus, with ABS not operating, brakes function just like the brake system of the vehicle without ABS.

Diagnosis

To ensure that the trouble diagnosis is done accurately and smoothly, observe “PRECAUTIONS IN DIAGNOSING TROUBLES” and follow “ABS DIAGNOSTIC FLOW TABLE”.

Precautions 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 diagnosis trouble code may be stored by mistake in the memory of ABS control module during inspection.)



- When disconnecting ABS hydraulic unit/control module connector (1), pull up lock (2) of connector.
  When connecting, set the connector on ABS hydraulic unit/control module assembly and push the lock (2) down.

D :	Disconnect
C :	Connect

ABS Diagnostic Flow Table

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

Step	Action	Yes	No
1	1) Perform “Customer Complaint Analysis”. 2) Perform “Problem Symptom Confirmation”. 3) Perform “Diagnostic Trouble Code Check, Record and Clearance”. Is there any malfunction DTC?	Go to Step 2.	Go to Step 5.
2	1) Perform “DRIVING TEST”. Is trouble symptom identified?	Go to Step 3.	Go to Step 6.
3	1) Check diagnostic trouble code. Is it malfunction code?	Go to Step 4.	Go to Step 5.
4	1) Inspect and repair referring to applicable diagnostic trouble code table in this section. 2) Perform “FINAL CONFIRMATION TEST” after cleared DTC. Does trouble recur?	Go to Step 7.	End.
5	1) Inspect and repair referring to “DIAGNOSIS” in “BRAKES” section. 2) Perform “FINAL CONFIRMATION TEST”.	–	–
6	1) Check intermittent troubles referring to “INTERMITTENT AND POOR CONNECTION” in “GENERAL INFORMATION” section and related circuit of trouble code recorded in Step 2. 2) Perform “FINAL CONFIRMATION TEST” after cleared diagnostic trouble code. Does trouble recur?	Go to Step 7.	End.
7	1) Perform “Diagnostic Trouble Code Check, Record and Clearance”. Is there any malfunction code?	Go to Step 2.	Go to Step 5.

1) MALFUNCTION ANALYSIS
   a) 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 of Reg:	Date of problem:	Mileage:

Problem Symptoms	• ABS warning lamp abnormal: fails to turn on/fails to go off/flashes • Abnormal noise while vehicle is running: from motor, from valve, other ________ • Wheel is locked at braking: • Pump motor does not stop (running): • Braking does not work: • Other:
Frequency of occurrence	• Continuous/Intermittent (times a day, a month)/ other ________
Conditions for Occurrence of Problem	• Vehicle at stop & ignition switch ON: • When starting: at initial start only/at every start/Other ________ • Vehicle speed: while accelerating/while decelerating/at stop/ while turning/while running at constant speed/ other ________ • Road surface condition: Paved road/rough road/snow-covered road/ other ________ • Chain equipment:
Environmental Condition	• Weather: fair/cloudy/rain/snow/other ________ • Temperature: °F (°C)
Diagnostic Trouble Code	• First check: Normal code/malfunction code ( ) • Second check after test drive: Normal code/malfunction code ( )

b) Problem Symptom Confirmation
Check if what the customer claimed in “CUSTOMER QUESTIONNAIRE” is actually found in the vehicle and if that symptom is found, whether it is identified as a failure. (This step should be shared with the customer if possible.) Check warning lamps related to brake system referring to “EBD WARNING LAMP (BRAKE WARNING LAMP) CHECK” and “ABS WARNING LAMP CHECK” in this section.

c) Diagnostic Trouble Code (DTC) Check, Record and Clearance
Perform “DIAGNOSTIC TROUBLE CODE CHECK” procedure in this section, record it and then clear it referring to “DIAGNOSTIC TROUBLE CODE CLEARANCE” in this section.
If the malfunction DTC which was once displayed and then cleared cannot be detected (indicated) again when the ignition switch is turned ON, attempt to diagnose the trouble based on the DTC recorded in this step may mislead the diagnosis or make diagnosing difficult. Proceed to Step 2) to check control module for proper self-diagnosis function.
If the malfunction DTC which was once displayed and then cleared can be detected (indicated) again when ignition switch is turned ON, proceed to Step 3).

2) DRIVING TEST
Test drive the vehicle at 40 km/h for more than a minute and check if any trouble symptom (such as abnormal lighting of ABS warning light) exists.
If the malfunction DTC is confirmed again at ignition switch ON, driving test as described in above is not necessary. Proceed to Step 3).

3) DIAGNOSTIC TROUBLE CODE CHECK
Recheck diagnostic trouble code referring to “DTC CHECK” as shown in the following page.

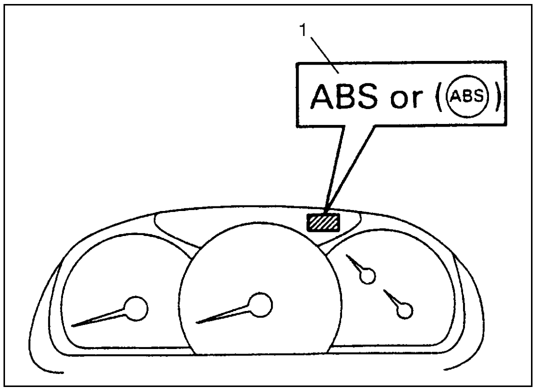
4) DIAGNOSTIC TROUBLE CODE FLOW TABLE
According to Diagnostic flow table for the diagnostic trouble code confirmation in Step 3), locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator assembly or other part and repair or replace faulty parts.

5) “DIAGNOSIS” IN “BRAKES” SECTION
Check the parts or system suspected as a possible cause referring to “DIAGNOSIS” in “BRAKES” section and based on symptoms appearing on the vehicle (symptom obtained through Steps 1)-a, 1)-b and 2) and repair or replace faulty parts, if any).

6) CHECK FOR INTERMITTENT PROBLEM
Check parts where an intermittent trouble is easy to occur (e.g., wire harness, connector, etc.), referring to “INTERMITTENT TROUBLE” in “GENERAL INFORMATION” section and related circuit of trouble code recorded in Step 1)-c.

7) FINAL CONFIRMATION TEST
Confirm that the problem symptom has gone and the ABS is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and perform test driving and confirm that no DTC is indicated.

ABS Warning Lamp Check

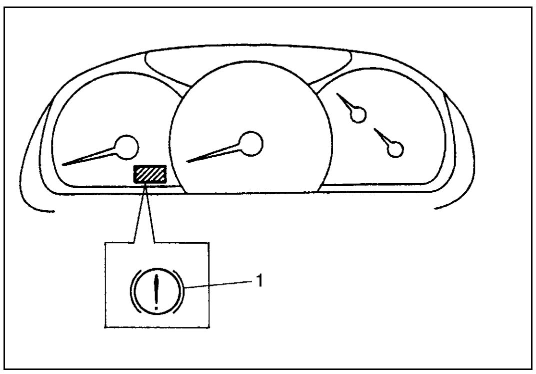


1) Turn ignition switch ON.
2) Check that ABS warning lamp (1) comes ON for about 2 seconds and then goes off.
   If any faulty condition is found, advance to Diagnostic Flow Table-A, B, C or D.

EBD Warning Lamp (Brake Warning Lamp) Check

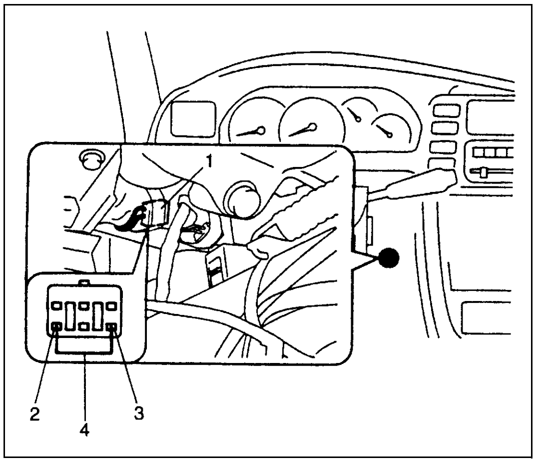
NOTE:

Perform this check on a level place.



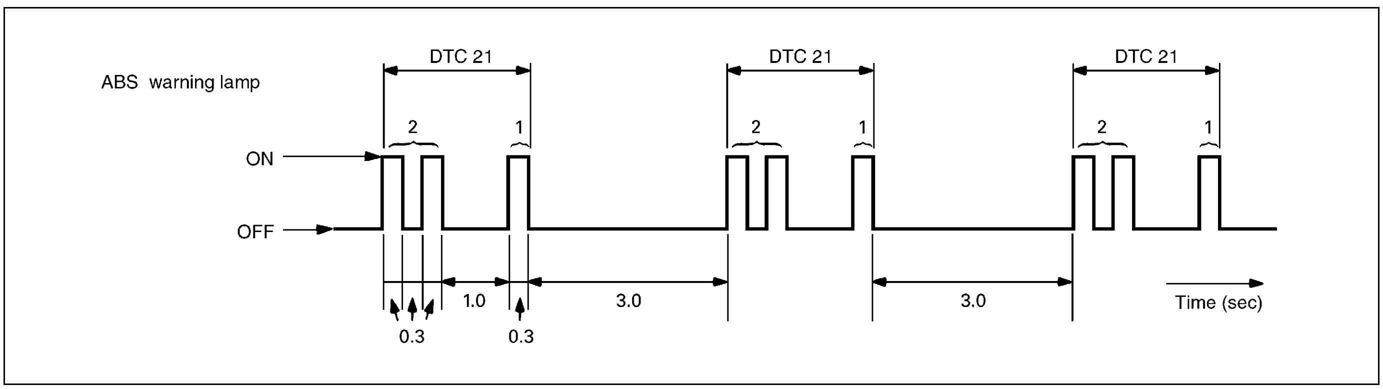
1) Turn ignition switch ON with parking brake applied.
2) Check that EBD warning lamp (brake warning lamp) (1) is turned ON.
3) Release parking brake with ignition switch ON and check that EBD warning lamp (brake warning lamp) goes off.
   If it doesn't go off, go to "TABLE-E" in this section.

Diagnostic Trouble Code (DTC) Check (Using ABS Warning Lamp)



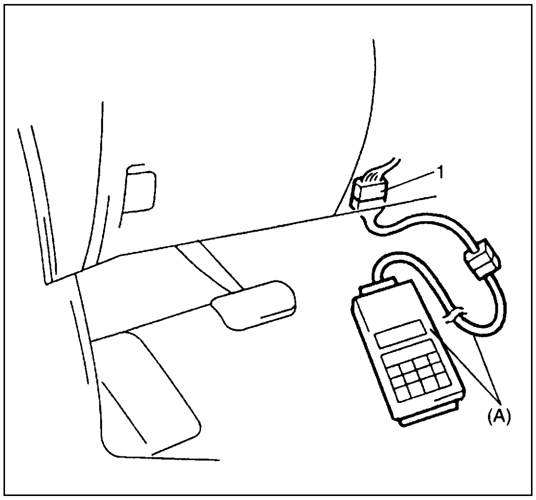
1) Perform ABS WARNING LAMP CHECK described above.
2) Using service wire (4), connect diagnosis switch terminal (2) of monitor coupler (1) to ground (3).
3) Turn ignition switch ON.
4) Read flashing of ABS warning lamp which represents DTC as shown in example below and write it down. When more than 2 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)



5) After completing the check, turn ignition switch off, disconnect service wire from monitor coupler.

Diagnostic Trouble Code (DTC) Check (Using SUZUKI Scan Tool)



1) After setting cartridge for ABS to SUZUKI scan tool, connect SUZUKI scan tool to data link connector.

   Special tool
   (A) : SUZUKI scan tool

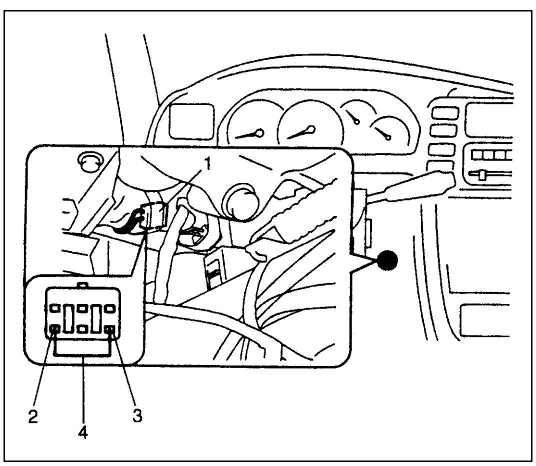
2) Turn ignition switch ON.
3) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.
4) After completing the check, turn ignition switch off and disconnect SUZUKI scan tool from DLC.

Diagnostic Trouble Code (DTC) Clearance

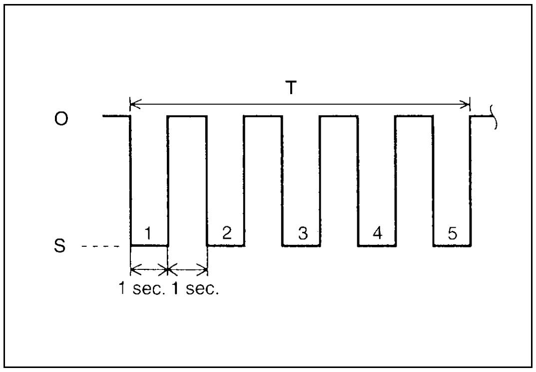
> **WARNING:**
> **When performing a driving test, select a safe place where there is neither any traffic nor any traffic accident possibility and be very careful during testing to avoid occurrence of an accident.**

After repair or replace malfunction part(s), clear all DTCs by performing the following procedure.

1) Turn ignition switch OFF.



2) Using service wire (4), connect diagnosis switch terminal (2) of diagnosis monitor coupler (1) to ground terminal (3).
3) With connection described in above Step 2) maintained, turn ignition switch ON.



4) Repeat disconnecting and reconnecting of service wire between diagnosis and ground terminals 5 times or more at about 1sec. interval within 10 seconds.

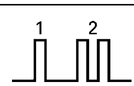
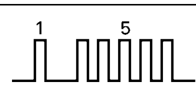
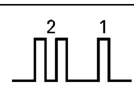
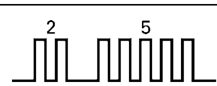
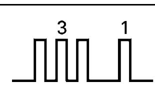
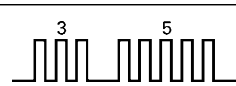
O :	Open
S :	Short
T :	About 10 seconds

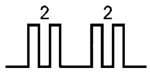
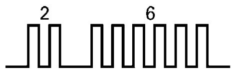
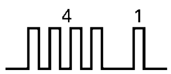
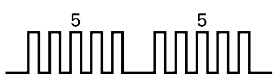
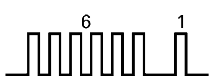
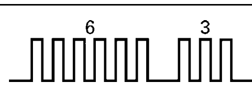
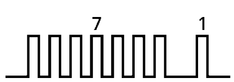
5) Turn ignition switch OFF and disconnect service wire from monitor coupler.
6) Perform "DRIVING TEST" (Step 2 of "ABS DIAGNOSTIC FLOW TABLE" in this section) and "DTC CHECK" and confirm that normal DTC (DTC 12) is displayed ; not malfunction DTC.

NOTE:
It is also possible to clear DTC by using SUZUKI scan tool. Refer to Cartridge Manual for procedure to clear DTC.

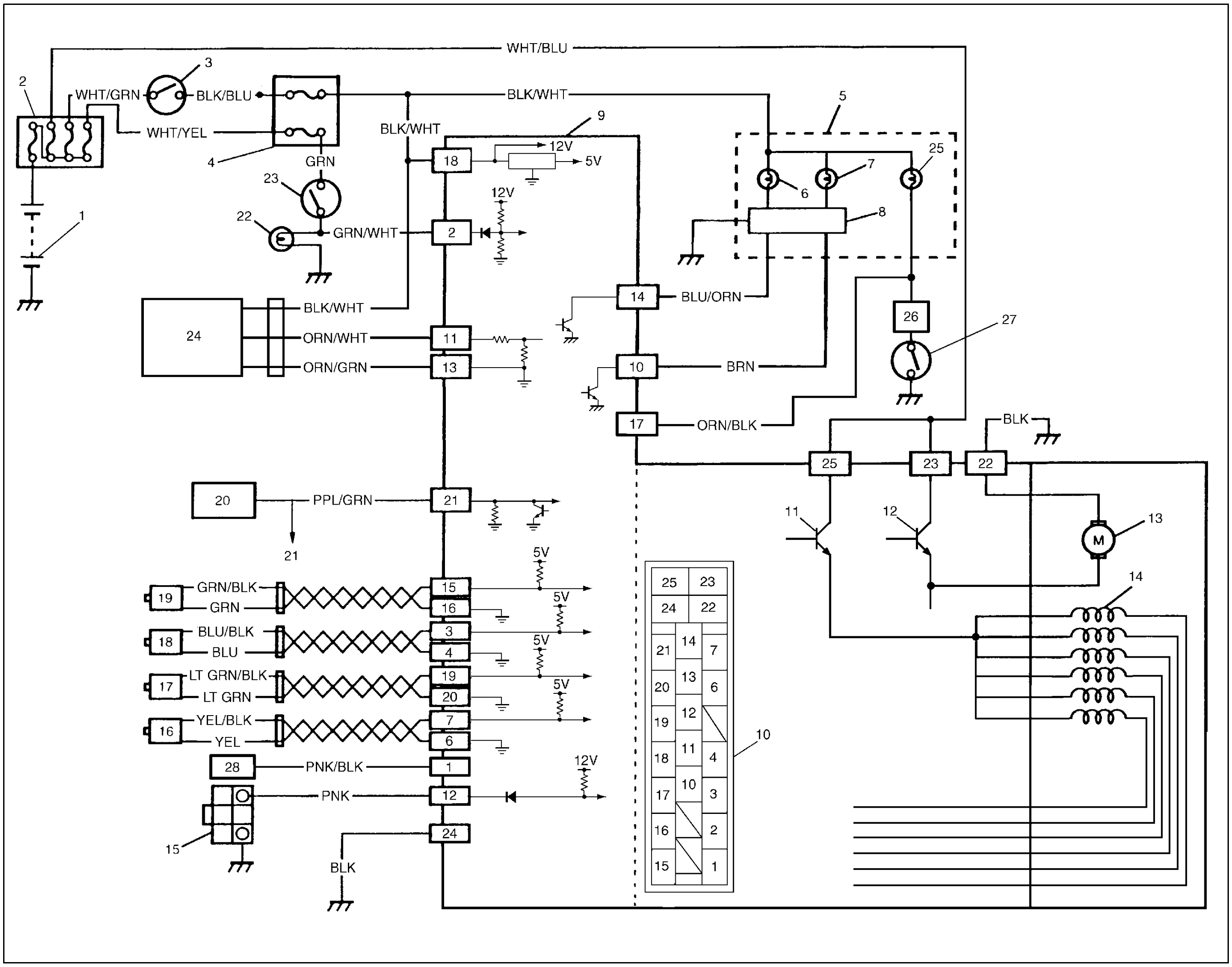
Diagnostic Trouble Code (DTC) Table

CAUTION:
Be sure to perform "ABS DIAGNOSTIC FLOW TABLE" before starting diagnosis.

DTC (displayed on SUZUKI scan tool)	DTC (indicated by ABS warning lamp)	ABS warning lamp flashing pattern	DIAGNOSTIC ITEMS	
NO DTC	12		Normal	
C1015	15		G sensor circuit and 4WD lamp circuit	
C1021	21		RF	Wheel speed sensor circuit
C1025	25		LF	
C1031	31		RR	
C1035	35		LR	

DTC (displayed on SUZUKI scan tool)	DTC (indicated by ABS warning lamp)	ABS warning lamp flashing pattern	DIAGNOSTIC ITEMS	
C1022	22		RF	Wheel speed sensor circuit or sensor ring
C1026	26		LF	
C1032	32		RR	
C1036	36		LR	
C1041	41		RF	Inlet solenoid valve circuit
C1042	42			Outlet solenoid valve circuit
C1045	45		LF	Inlet solenoid valve circuit
C1046	46			Outlet solenoid valve circuit
C1055	55		REAR	Inlet solenoid valve circuit
C1056	56			Outlet solenoid valve circuit
C1057	57		Power source	
C1061	61		ABS pump motor and/or motor relay circuit	
C1063	63		Fail safe-relay	
C1071	71		ABS control module	

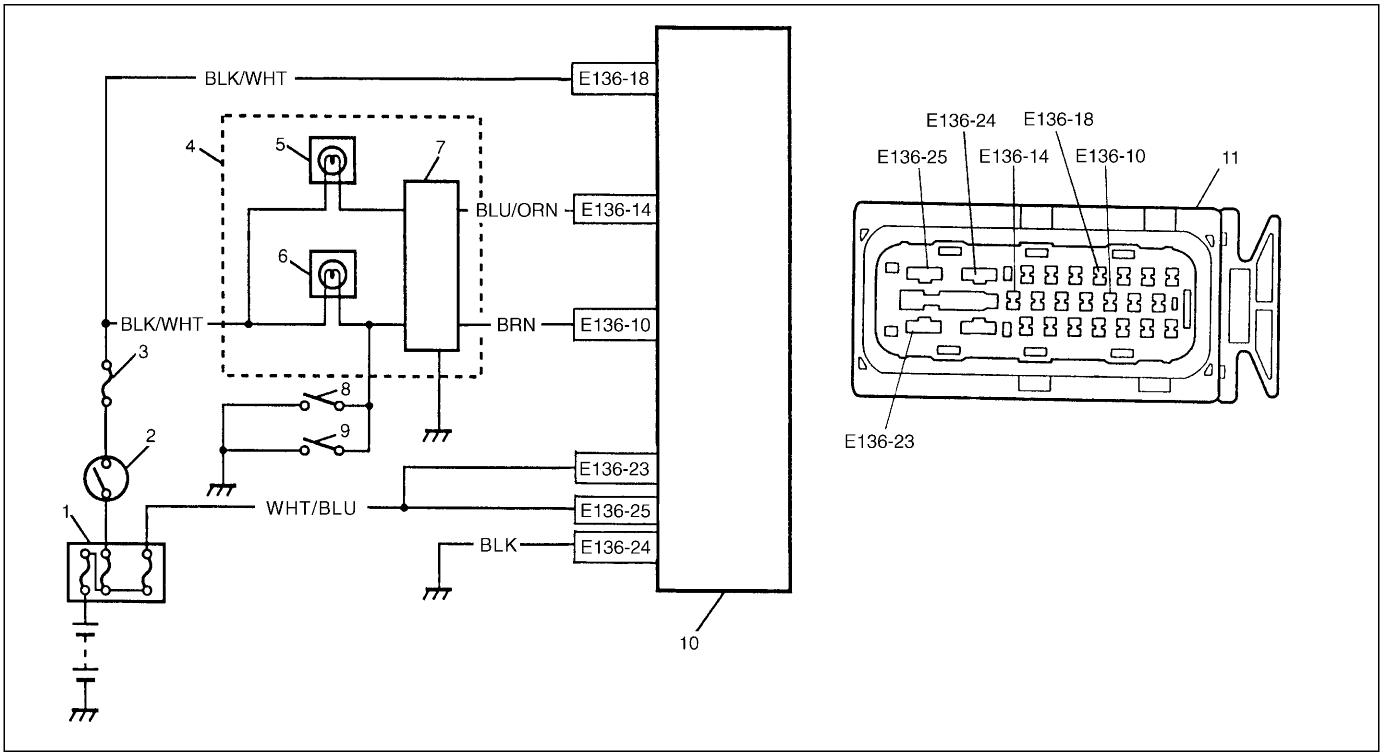
System Circuit



1. Battery	11. ABS fail-safe transistor (Solenoid valve transistor)	21. To ECM and SDM (if equipped)
2. Main fuses	12. ABS pump motor transistor	22. Stop lamp
3. Ignition switch	13. Pump motor	23. Stop lamp switch
4. Circuit fuses	14. Solenoid valves	24. G sensor (For 4WD vehicle only)
5. Combination meter	15. Diagnosis monitor coupler	25. 4WD lamp (For 4WD vehicle only)
6. ABS warning lamp	16. Right-rear wheel speed sensor	26. ECM (PCM) (For 4WD vehicle only)
7. Brake warning lamp ("EBD" warning lamp)	17. Left-rear wheel speed sensor	27. 4WD switch (For 4WD vehicle only)
8. Warning lamp driver module (for ABS)	18. Right-front wheel speed sensor	28. ECM (PCM)
9. ABS hydraulic unit/control module assembly	19. Left-front wheel speed sensor	
10. Terminal arrangement of connector E136 for ABS hydraulic unit/control module assembly	20. Data link connector	

TERMINAL		CIRCUIT	TERMINAL		CIRCUIT
	1	Idle up signal		14	ABS warning lamp
	2	Stop lamp switch		15	Left-front wheel speed sensor (+)
	3	Right-front wheel speed sensor (+)		16	Left-front wheel speed sensor (–)
	4	Right-front wheel speed sensor (–)		17	4WD switch
	5	–		18	Ignition switch
	6	Right-rear wheel speed sensor (–)	E136	19	Left-rear wheel speed sensor (+)
E136	7	Right-rear wheel speed sensor (+)		20	Left-rear wheel speed sensor (–)
	8	–		21	Data link connector
	9	–		22	Ground (for ABS pump motor)
	10	Brake warning lamp (EBD warning lamp)		23	ABS pump motor relay
	11	G sensor (For 4WD vehicle only)		24	Ground (for ABS control module)
	12	Diagnosis switch terminal		25	ABS fail-safe relay
	13	Ground (For G sensor) (For 4WD vehicle only)			

Table-A ABS Warning Lamp Circuit Check – Lamp Does Not Come “ON” at Ignition Switch ON



1. Main fuse	5. ABS warning lamp	9. Brake fluid level switch
2. Ignition switch	6. Brake warning lamp	10. ABS hydraulic unit/control module assembly
3. Circuit fuse	7. Lamp driver module	11. ABS hydraulic unit/control module connector
4. Combination meter	8. Parking brake switch	

CIRCUIT DESCRIPTION

Operation (ON/OFF) of ABS warning lamp is controlled by ABS control module through lamp driver module in combination meter.

If the Antilock brake system is in good condition, ABS control module turns ABS warning lamp ON at the ignition switch ON, keeps it ON for 2 seconds and then turns it OFF. If an abnormality in the system is detected, ABS warning lamp is turned ON continuously by ABS control module. Also, it is turned ON continuously by lamp driver module when the connector of ABS control module is disconnected.

INSPECTION

Step	Action	Yes	No
1	1) Turn ignition switch ON. Do other warning lamp come ON?	Go to Step 2.	Go to Step 4.
2	1) Disconnect ABS hydraulic unit/control module connector. Does ABS warning lamp light with ignition switch ON?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 3.
3	1) Remove combination meter. Is bulb of ABS warning lamp in good condition?	“BLU/ORN” circuit shorted to ground. If OK, replace combination meter (lamp driver module).	Replace bulb.
4	Is IG fuse in good condition?	Open in “BLK/WHT” wire to combination meter or poor connection.	Repair and replace.

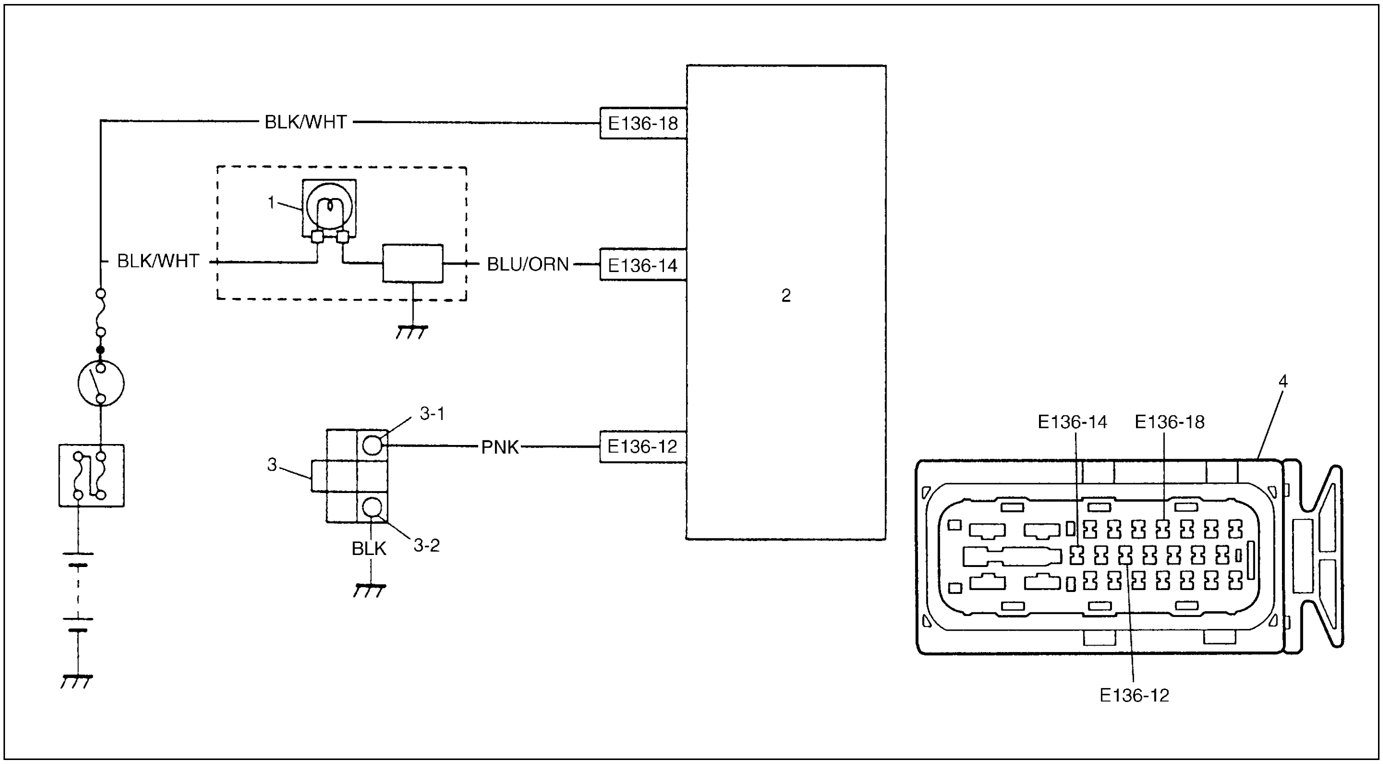
Table-B ABS Warning Lamp Circuit Check – Lamp Comes "ON" Steady

Refer to TABLE – A for System Circuit Diagram and Circuit Description.

INSPECTION

Step	Action	Yes	No
1	Perform diagnostic trouble code check. Is there any DTC (including code No.12, NO CODES on SUZUKI scan tool) exists?	Go to Step 2.	Go to Step 3.
2	Does malfunction DTC (other than code No.12) exist at Step 1?	Go to Step 7 of "ABS DIAGNOSTIC FLOW TABLE" in this section.	Go to Step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals "E136-14", "E136-18" and "E136-24". 3) If OK then ignition switch ON and measure voltage at terminal "E136-18" of connector. Is it 10 – 14 V?	Go to Step 4.	"BLK/WHT" circuit open.
4	1) With ABS hydraulic unit/control module connector disconnected, turn ignition switch ON and light ABS warning lamp. 2) Connect terminal "E136-14" of disconnected connector to ground using service wire. Does ABS warning lamp turn off?	Go to Step 5.	"BLU/ORN" circuit open. If wire and connection are OK, replace combination meter (lamp driver module).
5	1) Measure resistance from connector terminal "E136-24" to body ground. Is continuity indicated?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"BLK" circuit open.

Table-C ABS Warning Lamp Circuit Check – The Lamp Flashes Continuously While Ignition Switch Is ON



1. ABS warning lamp in combination meter	3. Diagnosis monitor coupler	3-2. Diagnosis ground terminal
2. ABS hydraulic unit/control module assembly	3-1. Diagnosis switch terminal	4. ABS hydraulic unit/control module connector

CIRCUIT DESCRIPTION

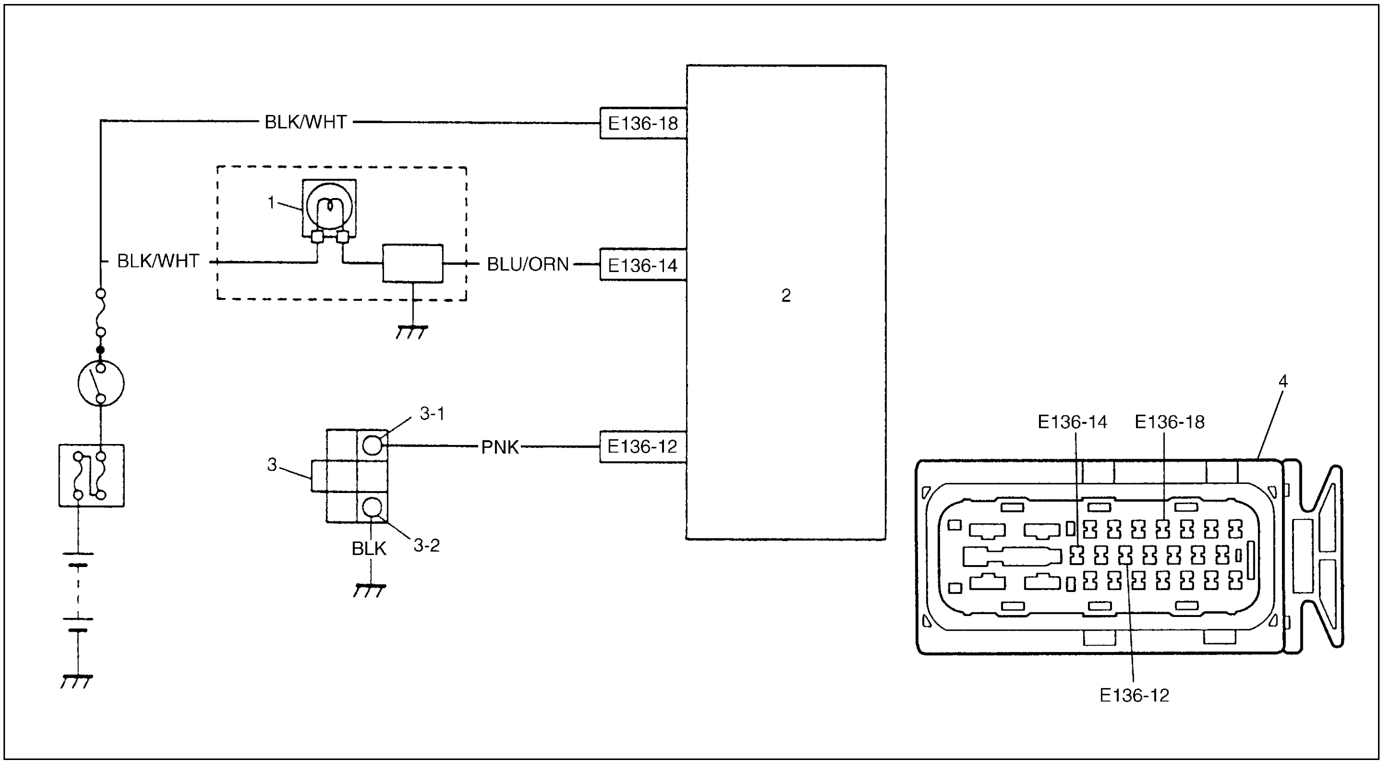
When diagnosis switch terminal is shorted or connected to the ground with ignition switch ON, diagnosis trouble code (DTC) is indicated by flashing of ABS warning lamp only in the following cases.

- Normal DTC (12) is indicated if no malfunction DTC is detected in the ABS.
- A history malfunction DTC is indicated by flashing of the lamp if a current malfunction DTC is not detected at that point although a history malfunction DTC is stored in memory.

INSPECTION

Step	Action	Yes	No
1	Is diagnosis switch terminal connected to ground via service wire?	Go to Step 3.	Go to Step 2.
2	1) Ignition switch ON. 2) Measure voltage between diagnosis switch terminal and ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"PNK" wire circuit shorted to ground.
3	1) Ignition switch ON. 2) Does flashing of ABS warning lamp indicate DTC?	Go to Step 7 of "ABS DIAGNOSTIC FLOW TABLE" in this section.	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.

Table-D Code (DTC) Is Not Outputted Even with Diagnosis Switch Terminal Connected to Ground



1. ABS warning lamp in combination meter	3. Diagnosis monitor coupler	3-2. Diagnosis ground terminal
2. ABS hydraulic unit/control module assembly	3-1. Diagnosis switch terminal	4. ABS hydraulic unit/control module connector

CIRCUIT DESCRIPTION

When diagnosis switch terminal is connected to ground with ignition switch turned ON, the ABS control module outputs diagnostic trouble code by flashing ABS warning lamp.

INSPECTION

Step	Action	Yes	No
1	Is it shorted diagnosis switch terminal and ground terminal by service wire properly?	Go to Step 2.	Connect service wire securely.
2	1) Disconnect service wire. 2) Disconnect ABS hydraulic unit/control module connector. 3) Measure resistance between diagnosis switch terminal and connector terminal "E136-12". Is it infinite (∞)?	"PNK" circuit open.	Go to Step 3.
3	1) Measure resistance between ground terminal of monitor coupler and body ground. Is continuity indicated?	Go to Step 4.	"BLK" circuit open or poor connection.
4	1) Check for proper connection to ABS hydraulic unit/control module at terminal "E136-12". 2) If OK, then check ABS warning lamp circuit referring to TABLE A, B and C. Is it in good condition?	Substitute a known-good ABS hydraulic with/control module assembly and recheck.	Repair "ABS" warning lamp circuit.

Table-E EBD Warning Lamp (Brake Warning Lamp) Check – Lamp Comes "ON" Steady

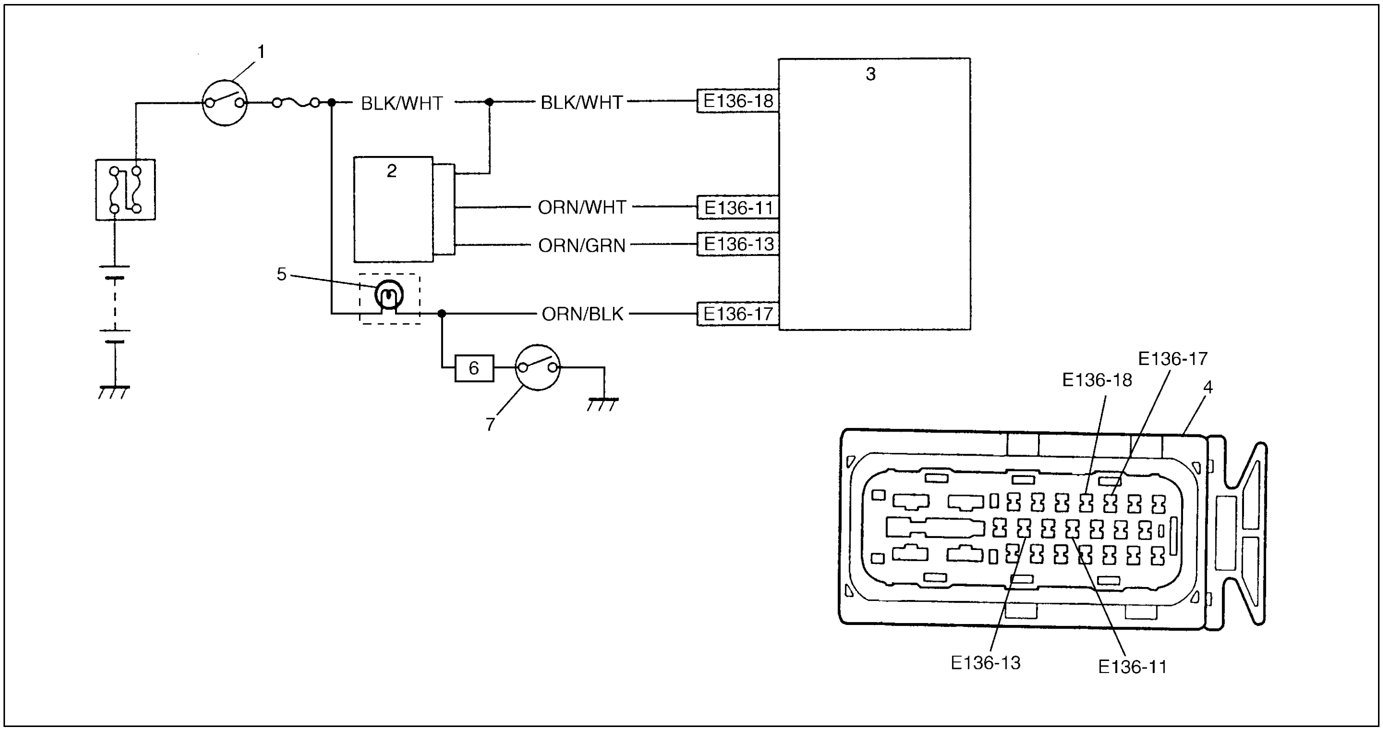
CIRCUIT DESCRIPTION

EBD warning lamp (brake warning lamp) is controlled by parking brake switch, brake fluid level switch and ABS control module/hydraulic unit assembly through lamp driver module in combination meter. Refer to "TABLE – A" for circuit diagram.

INSPECTION

Step	Action	Yes	No
1	1) Make sure that : • Parking brake is completely released. • Brake fluid level is upper than the minimum level. Are the check results OK?	Go to Step 2.	Release parking brake completely and/or replenish brake fluid.
2	Does "ABS" warning lamp come on?	Perform "TABLE – B" previously outlined.	Go to Step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals "E136-10". 3) If OK, apply chocks to wheels and select gear in neutral position (P range for A/T). 4) Keep brake pedal depressed and start engine. Release parking brake. 5) Connect terminal "E136-10" of disconnected connector to ground using service wire. Does EBD warning lamp (brake warning lamp) turn off?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	"BRN" circuit open. If wire and connection are OK, replace combination meter.

DTC C1015 (DTC 15) – G Sensor Circuit and 4WD Lamp Circuit



1. Ignition switch	3. ABS hydraulic unit/control module assembly	5. 4WD lamp	7. 4WD switch
2. G sensor	4. ABS hydraulic unit/control module connector	6. ECM (PCM)	

DESCRIPTION

G sensor

While a vehicle is at stop or running, if the potential difference between the sensor signal terminal “E136-11” and the sensor ground terminal “E136-13” is not within the specified voltage value, or if the signal voltage while at a stop does not vary from that while running, this DTC is set.
Therefore, this DTC may be set when a vehicle is lifted up and its wheel(s) is turned. In such case, clear the DTC and check again.
When G sensor is installed to 2WD vehicle, this DTC is set.

4WD lamp

When 4WD lamp circuit open or shorted, this DTC is set.

INSPECTION

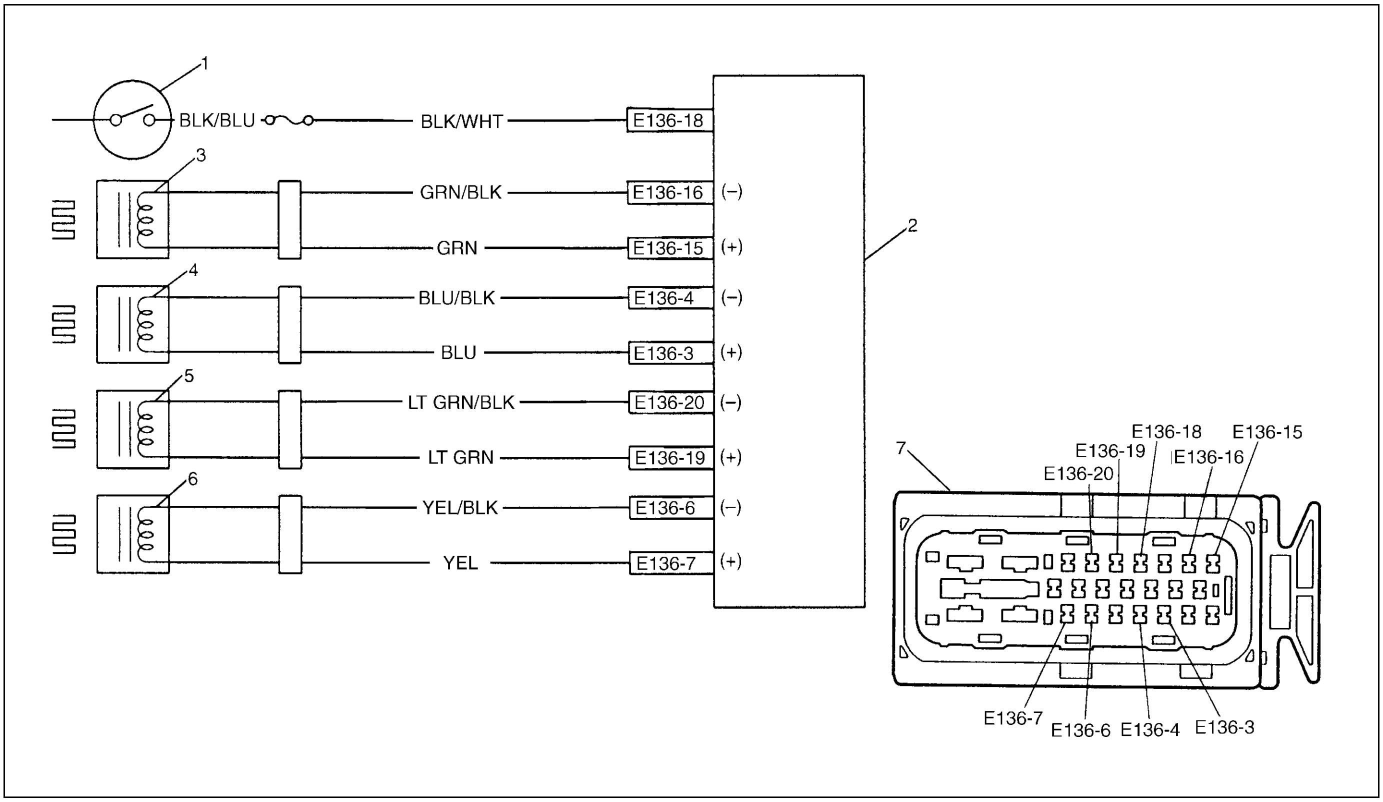
Step	Action	Yes	No
1	1) Turn ignition switch ON. Does 4WD lamp turn ON when 4WD switch turns ON?	Go to Step 2.	Replace bulb or repair its circuit.
2	1) Ignition switch OFF. 2) Check for proper connection to ECM (PCM) and 4WD switch. 3) If OK, then check 4WD control system referring to DIAGNOSIS in SECTION 7E. Is it good condition?	Go to Step 3.	Repair 4WD control system.
3	1) Ignition switch OFF. 2) Disconnect connector from ABS hydraulic with/control module assembly. 3) Check for proper connection to ABS control module at terminal “E136-17” 4) If OK, then turn ignition switch ON and 4WD switch ON. 5) Measure voltage between terminal “E136-17” of module connector and body ground. Is it 10 – 14 V?	Go to Step 4.	“ORN/BLK” circuit open or short to ground.
4	Is G sensor installed to 2WD vehicle?	Remove G sensor.	Go to Step 5.
5	Is G sensor installed floor securely?	Go to Step 6.	Tighten sensor or bracket screw securely. If not, using new screw.
6	1) Ignition switch OFF. 2) Remove G sensor with bracket. 3) Check for proper connection to G sensor. 4) If OK then check G sensor referring to INSPECTION of “G SENSOR”. Is it in good condition?	Go to Step 7.	Replace G sensor.
7	1) Disconnect connectors from ABS hydraulic unit/control module assembly and G sensor. 2) Check for proper connection to ABS control module at terminals “E136-11” and “E136-13”. 3) If OK, then turn ignition switch ON and measure voltage between “BLK/WHT” terminal of sensor connector and body ground. Is it 10 – 14 V?	Go to Step 8.	“BLK/WHT circuit open.
8	Measure voltage between “ORN/WHT” terminal of sensor connector and body ground. Is it 0 V?	Go to Step 9.	“ORN/WHT” circuit shorted to power circuit.
9	1) Ignition switch OFF. 2) Check that “ORN/WHT” circuit is free from open or short to ground and “ORN/GRN” circuit. Is it in good condition?	“ORN/GRN” circuit open. If circuit is OK, substitute a known-good ABS hydraulic unit/control module assembly.	“ORN/WHT” circuit open or shorted to ground or “ORN/GRN” circuit.

DTC C1021 (DTC 21), DTC C1022 (DTC 22) – Right-Front Wheel Speed Sensor Circuit or Sensor Ring

DTC C1025 (DTC 25), DTC C1026 (DTC 26) – Left-Front Wheel Speed Sensor Circuit or Sensor Ring

DTC C1031 (DTC 31), DTC C1032 (DTC 32) – Right-Rear Wheel Speed Sensor Circuit or Sensor Ring

DTC C1035 (DTC 35), DTC C1036 (DTC 36) – Left-Rear Wheel Speed Sensor Circuit or Sensor Ring



1. Ignition switch	4. Right-front wheel speed sensor	7. ABS hydraulic unit/control module connector
2. ABS control module/hydraulic unit assembly	5. Left-rear wheel speed sensor	
3. Left-front wheel speed sensor	6. Right-rear wheel speed sensor	

DESCRIPTION

The ABS control module monitors the voltage at the 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:

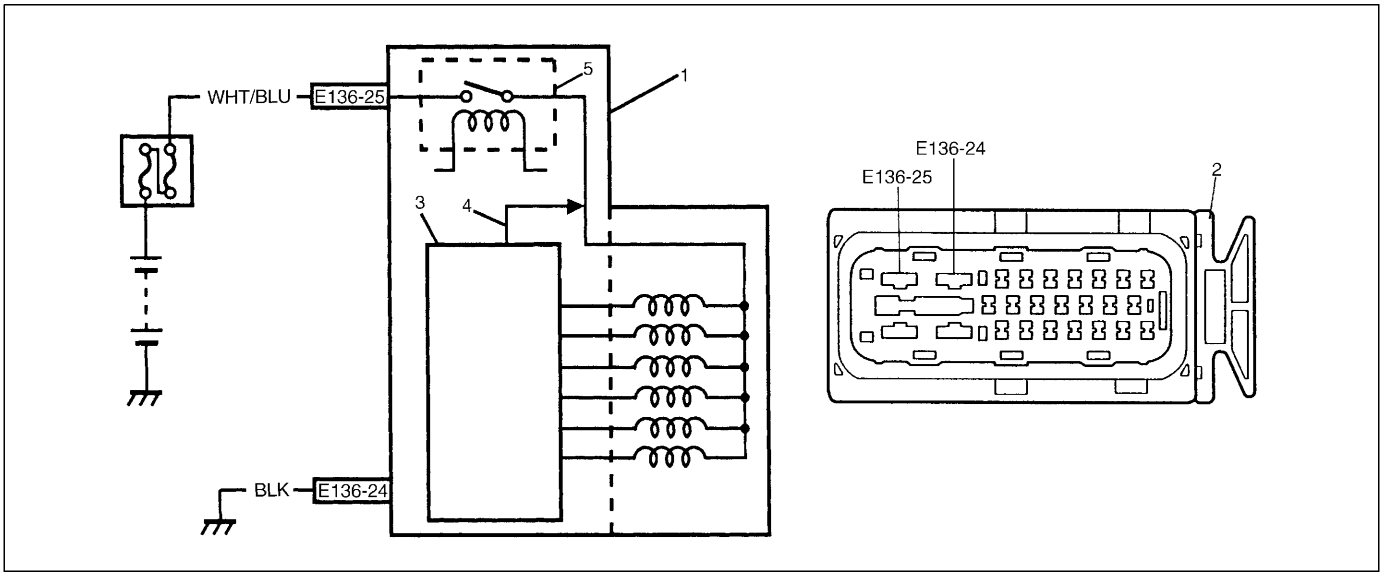
When the vehicle was operated in any of the following ways, one of these DTCs may be set even when the sensor is in good condition. If such possibility is suspected, repair the trouble (dragging of brake, etc.) of the vehicle, clear DTC once and then after performing the driving test as described in Step 2 of "ABS DIAGNOSIS FLOW TABLE", check whether or not any abnormality exists.

- **The vehicle was driven with parking brake pulled.**
- **The vehicle was driven with brake dragging.**
- **Wheel spin occurred while driving.**
- **Wheel(s) was turned while the vehicle was jacked up.**
- **The vehicle was stuck.**

INSPECTION

Step	Action	Yes	No
1	1) Disconnect applicable ABS wheel speed sensor coupler with ignition switch OFF. 2) Measure resistance between terminals of ABS wheel speed sensor. Refer to “FRONT WHEEL SPEED SENSOR” and/or “REAR WHEEL SPEED SENSOR” in this section. Is measured resistance value as specified?	Go to Step 2.	Replace ABS wheel speed sensor assembly.
2	1) Turn ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS control module at each sensor terminal. 4) If OK, then turn ignition switch ON and measure voltage between sensor terminal of module connector and body ground. Is it 0V?	Go to Step 3.	ABS wheel speed sensor circuit shorted to power.
3	1) Turn ignition switch OFF. 2) Connect ABS wheel speed sensor coupler. 3) Measure resistance between the following points. • Both ABS hydraulic unit/control module connector terminals of the corresponding sensor. This check result should be the same as above Step 1. • Either terminal of wheel speed sensor coupler and body ground. This check result should be no continuity. Are both check results OK?	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 front and/or rear sensor ring for the following (remove rear drum as necessary) : • 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 speed 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 “Reference” of “FRONT WHEEL SPEED SENSOR” and/or “Reference” of “REAR WHEEL SPEED SENSOR” in this section, check output voltage or waveform. Is specified voltage and/or waveform obtained?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Replace sensor and recheck.

DTC C1041 (DTC 41) – Right-Front Inlet Solenoid Circuit
DTC C1045 (DTC 45) – Left-Front Inlet Solenoid Circuit
DTC C1055 (DTC 55) – Rear Inlet Solenoid Circuit
DTC C1042 (DTC 42) – Right-Front Outlet Solenoid Circuit
DTC C1046 (DTC 46) – Left-Front Outlet Solenoid Circuit
DTC C1056 (DTC 56) – Rear Outlet Solenoid Circuit



1. ABS hydraulic unit/control module assembly	3. ABS control module	5. Fail-safe relay
2. ABS hydraulic unit/control module assembly connector	4. Signal	

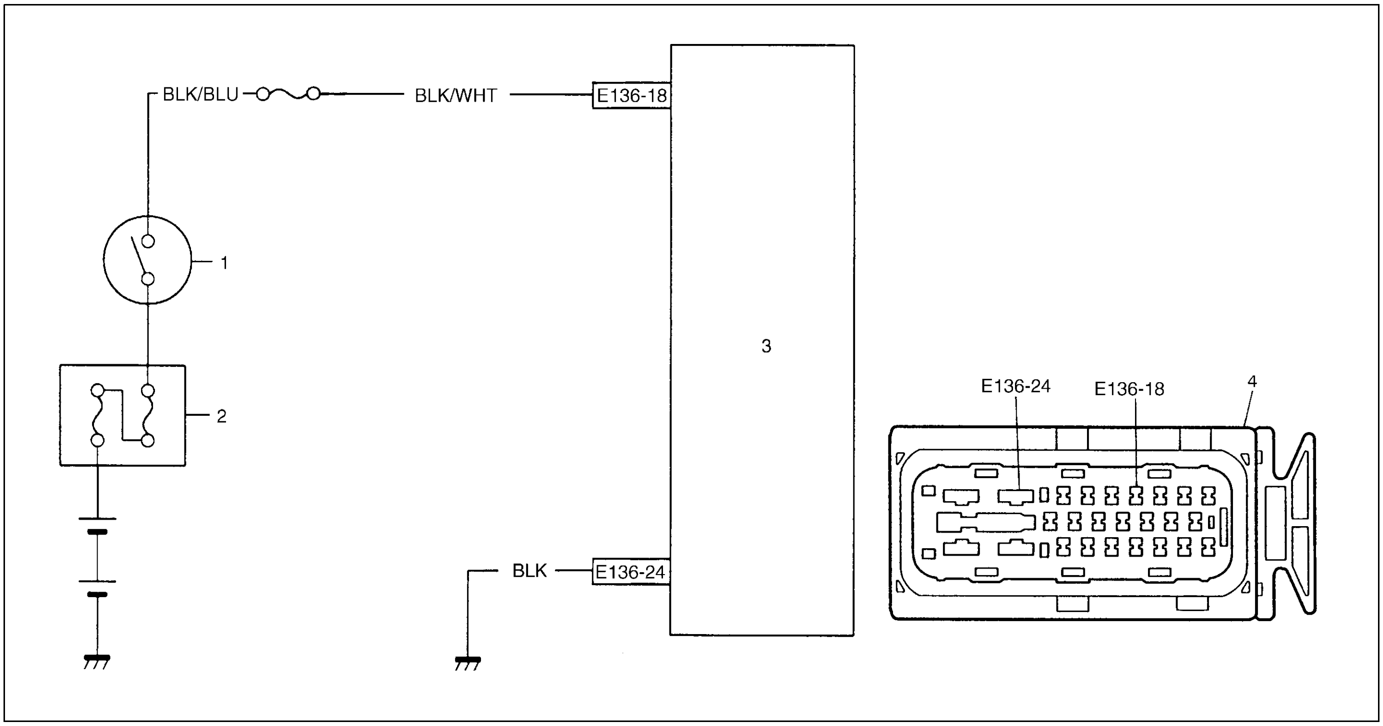
DESCRIPTION

The ABS control module monitors the output from the valve.
When the output of each valve exceeds the specified value compared with the signal sent from ABS control module, this DTC is set.

INSPECTION

Step	Action	Yes	No
1	1) Check solenoid operation referring to item “ABS HYDRAULIC UNIT OPERATION CHECK” in this section. Is it in good condition?	Check terminal “E136-25” connection. If connection is OK, substitute a known-good ABS hydraulic unit/control module assembly and recheck.	Go to Step 2.
2	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal “E136-25”. 4) If OK, then measure voltage between terminal “E19-25” of module connector and “E136-24”. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“WHT/BLU” or “BLK” circuit open.

DTC C1057 (DTC 57) – Power Source Circuit



1. Ignition switch	3. ABS hydraulic unit/control module assembly
2. Main fuse	4. ABS hydraulic unit/control module connector

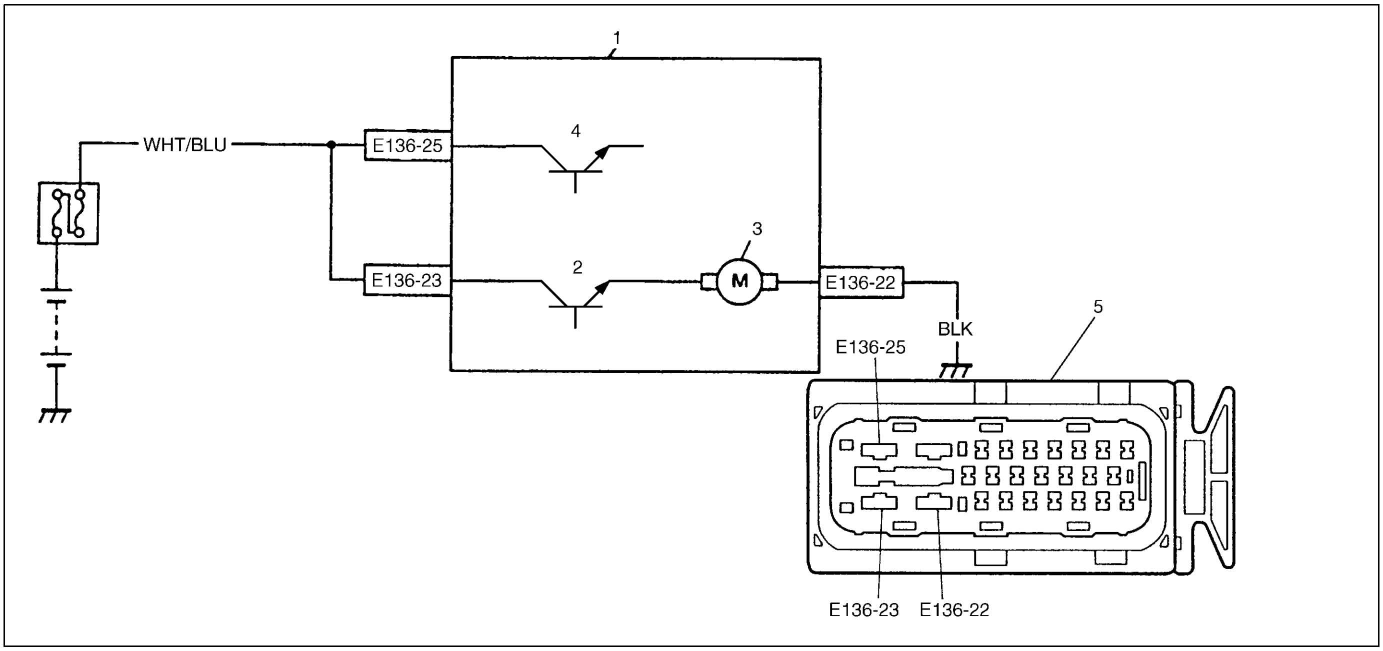
DESCRIPTION

The ABS control module monitors the power source voltage at terminal “E136-18”. 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 “CHARGING SYSTEM” section.	Go to Step 2.
2	1) Disconnect ABS hydraulic unit/control module connector. 2) Keep the engine idling, measure the voltage between terminal “E136-18” of ABS control module and body ground. Is it always under 9V?	Check charging system referring to “CHARGING SYSTEM” section. Imperfect short between wire “GRN/ORN” and ground.	Poor connection of terminal “E136-18” or “E136-24” of the ABS control module. If the above are in good condition, substitute a known-good ABS hydraulic unit/control module and recheck.

DTC C1061 (DTC 61) – ABS Pump Motor Circuit



1. ABS hydraulic unit/control module assembly	3. ABS pump motor	5. ABS hydraulic unit/control module connector
2. ABS pump motor relay	4. ABS fail safe relay	

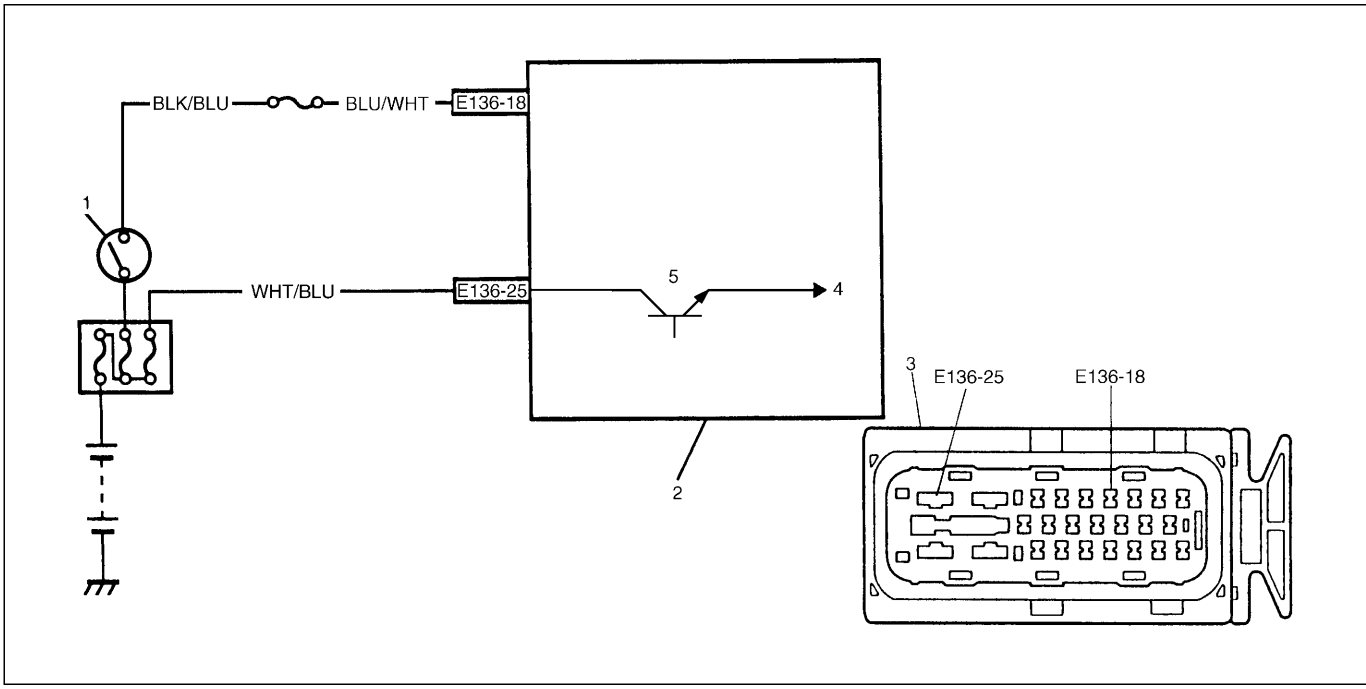
DESCRIPTION

The ABS control module monitors the voltage at monitor terminal of pump motor circuit constantly with the ignition switch turned ON. It sets this DTC when the voltage at the monitor terminal does not become high/low according to ON/OFF commands to the motor relay of the module (does not follow these commands).

INSPECTION

Step	Action	Yes	No
1	1) Check pump motor referring to “ABS HYDRAULIC UNIT OPERATION CHECK” in this section. Is it in good condition?	Check terminals “E136-25” and “E136-23” connection. If connections OK, substitute a known-good ABS hydraulic unit/ control module assembly and recheck.	Go to Step 2.
2	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check for proper connection to ABS hydraulic unit/control module connector at terminal “E136-23”. 4) If OK, then measure voltage between terminal “E136-23” of module connector and body ground. Is it 10 – 14 V?	Go to Step 3.	“WHT/BLU” circuit open.
3	Measure resistance between terminal “E136-22” of ABS hydraulic unit/control module connector and body ground. Is it infinite (∞)?	“BLK” circuit open.	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.

DTC C1063 (DTC 63) – ABS Fail-Safe Relay Circuit



1. Ignition switch	3. ABS hydraulic unit/control module connector	5. Fail-safe relay
2. ABS hydraulic unit/control module assembly	4. To solenoid valves	

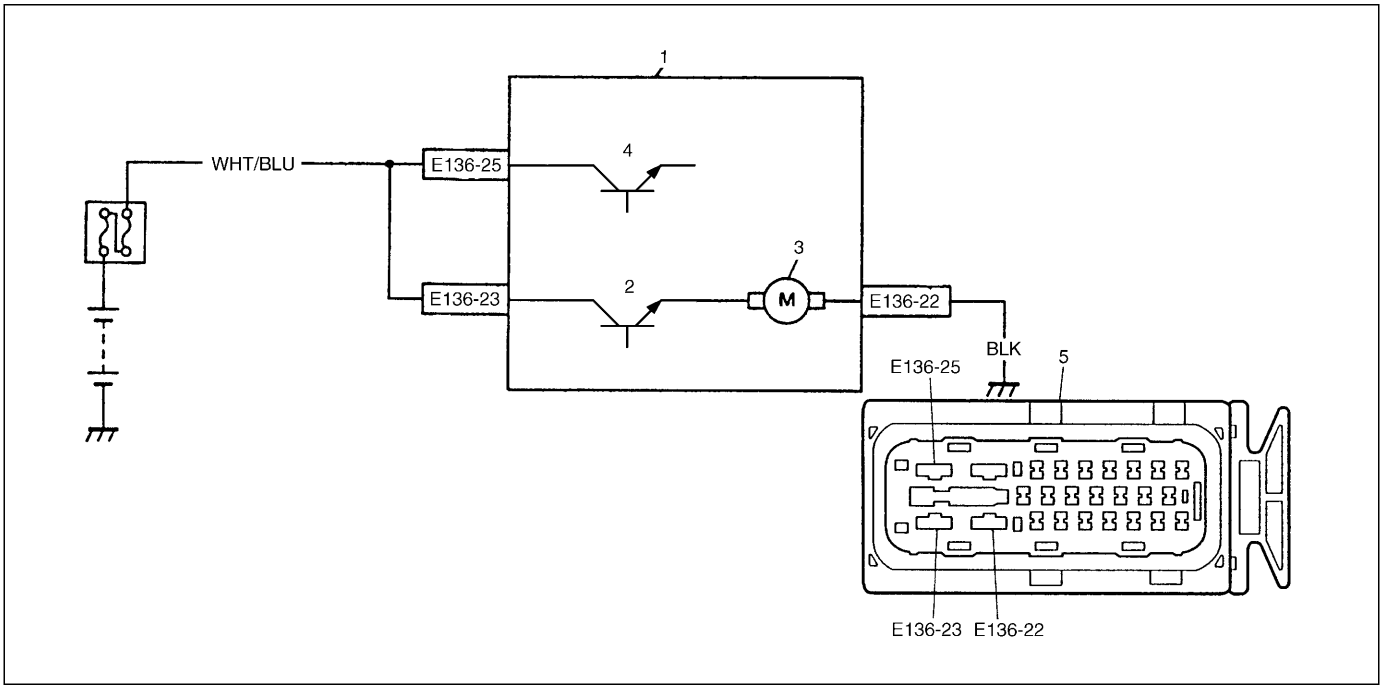
DESCRIPTION

ABS control module monitors the voltage at the terminal of solenoid circuit constantly with ignition switch turned ON. Also, immediately after ignition switch is turned ON, perform initial check as follows.
Switch fail-safe relay in the order of OFF → ON and check if voltage changes to Low → High. If anything faulty is found in the initial check and when the voltage is low with ignition switch turned ON, this DTC will be set.

INSPECTION

Step	Action	Yes	No
1	Check battery voltage. Is it about 11 V or higher?	Go to Step 2.	Check charging system referring to “CHARGING SYSTEM” section.
2	Check ABS main fuse and connection. Is it in good condition?	Go to Step 3.	Repair and/or replace fuse.
3	1) Ignition switch OFF. 2) Disconnect ABS hydraulic unit/control module connector. 3) Check proper connection to ABS hydraulic unit/control module at terminal “E136-25”. 4) If OK, then measure voltage between connector terminal “E136-25” and body ground. Is it 10 – 14 V?	Substitute a known-good ABS hydraulic unit/control module assembly and recheck.	“WHT/BLU” circuit open or short to ground.

DTC C1071 (DTC 71) – ABS Control Module



1. ABS hydraulic unit/control module assembly	3. ABS pump motor	5. ABS hydraulic unit/control module connector
2. ABS pump motor relay	4. ABS fail safe relay	

DESCRIPTION

This DTC will be set when an internal malfunction is detected in the ABS control module.

INSPECTION

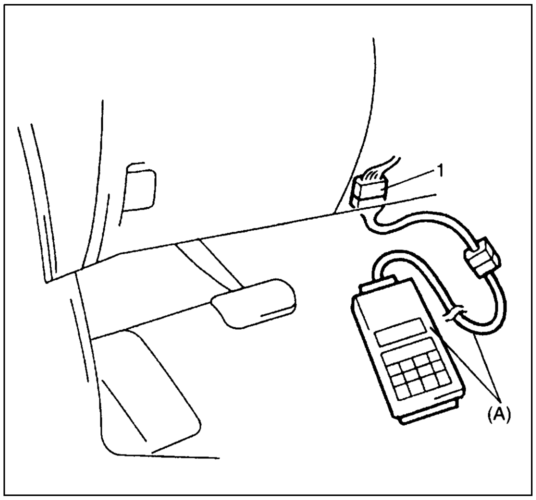
Step	Action	Yes	No
1	Clear all DTCs and check DTC. Is it DTC 71?	Go to Step 2.	Could be a temporary malfunction of the ABS control module.
2	1) Check proper connection of ABS hydraulic unit/control module connector. 2) If OK, disconnect ABS hydraulic unit/control module connector and check the followings. • Voltage “E136-25” terminal : 10 – 14 V • Resistance between “E136-22” and body ground : Continuity Are the check result as specified above?	Replace ABS hydraulic unit/control module assembly.	Repair and recheck.

On-Vehicle Service

Precautions

When connector are connected to ABS hydraulic unit/control module assembly, do not disconnect connectors of sensors and turn ignition switch ON. Then DTC will be set in ABS control module.

ABS Hydraulic Unit Operation Check (Using SUZUKI Scan Tool)



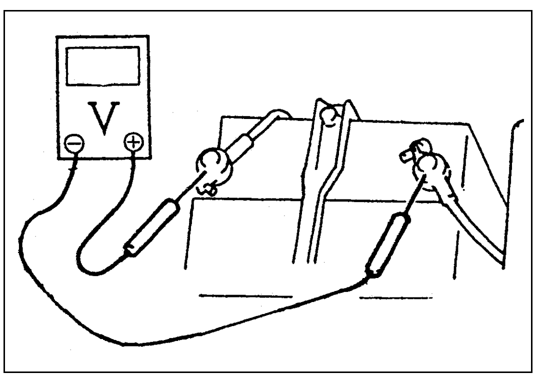
1) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool
(A) : SUZUKI scan tool

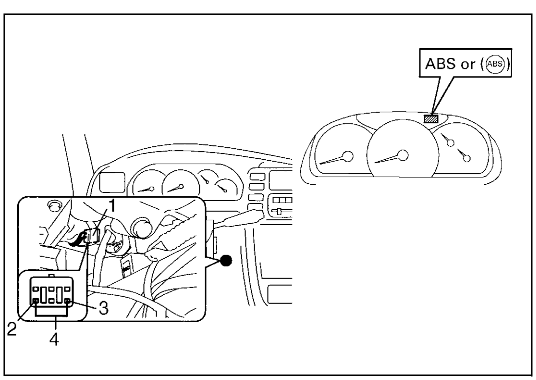
2) Turn ignition switch to ON position and check actuator operation using "HYDRAULIC CONTROL TEST" under "miscellaneous test" ("MISC. TEST") mode of SUZUKI scan tool.

ABS Hydraulic Unit Operation Check (Not Using Suzuki Scan Tool)

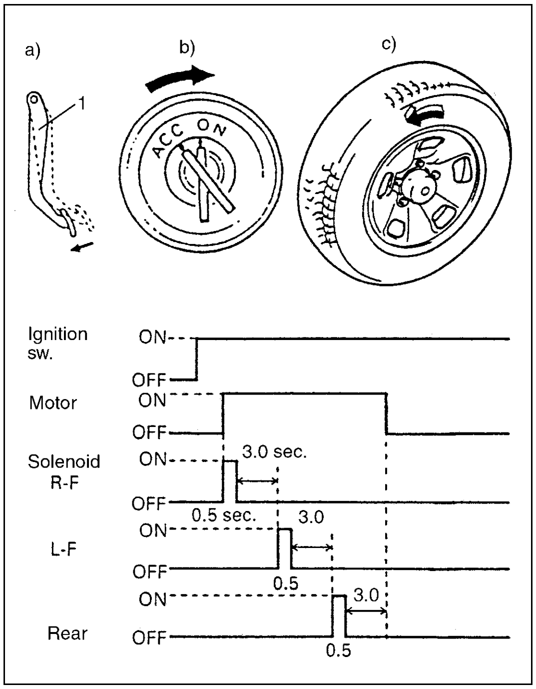
1) Check that basic brake system other than ABS is in good condition.



2) Check that battery voltage is 11V or higher.
3) With "ABS" warning lamp, check that no abnormality is detected in ABS. Refer to "DIAGNOSTIC TROUBLE CODE (DTC) CHECK" in this section.
4) Lift up vehicle.
5) Set transmission to neutral and release parking brake.
6) Turn each wheel gradually by hand to check if brake dragging occurs. If it does, correct.



7) With diag. switch terminal (2) of diagnosis connector (1) connected to ground by using service wire (4), turn ignition switch to ON position and check that "ABS" warning lamp indicates normal DTC (DTC 12) referring to "DIAGNOSTIC TROUBLE CODE (DTC) TABLE" in this section.
8) Turn ignition switch to OFF position.

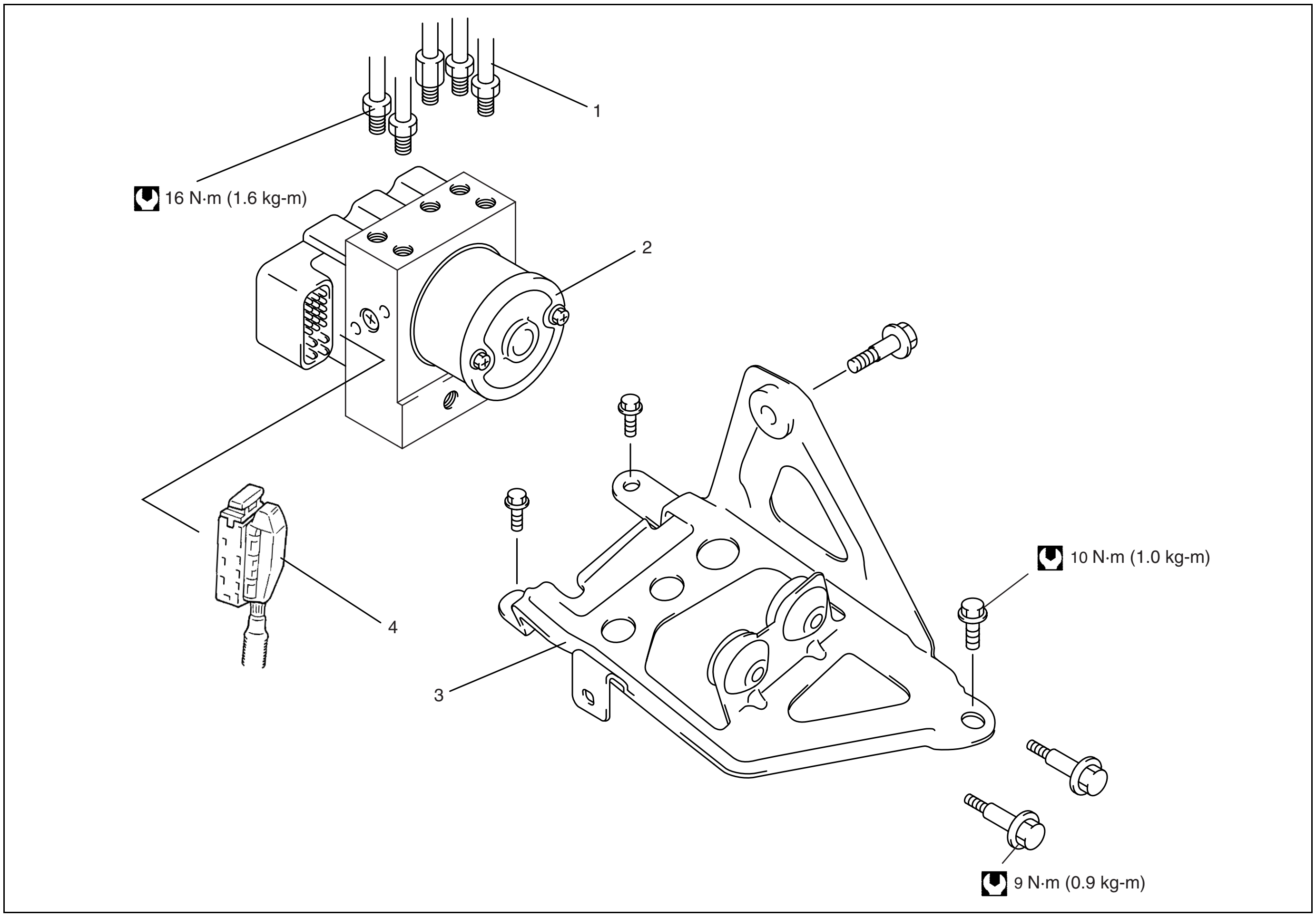


9) Perform following checks with help of another person.
10) Brake pedal (1) should be depressed.
   a) Ignition switch turned to ON position by one person.
   b) Wheel should be turned by another person's hand. At this time, check that:
   - Operation sound of solenoid is heard and wheel turns only about 0.5 sec. (brake force is depressurized).
   - Operation sound of pump motor is heard and pulsation is felt at brake pedal.
11) If all 4-wheels cannot be checked during one ignition cycle (OFF → ON), repeat Steps 8) and 9) till all 4 wheels are checked.
   If a faulty condition is found in Steps 9) and 10), replace hydraulic unit/control module assembly.

Turn ignition switch to OFF position and remove service wire from diagnosis connector.

ABS Hydraulic Unit/Control Module Assembly

> **CAUTION:**
>
> **Never disassemble ABS hydraulic unit/control module assembly, loosen blind plug or remove motor. Performing any of these prohibited services will affect original performance of ABS hydraulic unit/ control module assembly.**



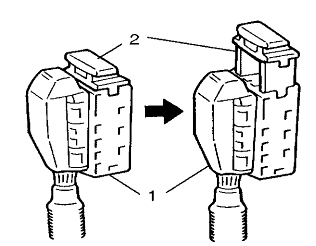
1. Brake pipe	3. Bracket
2. ABS hydraulic unit/control module assembly	4. Connector

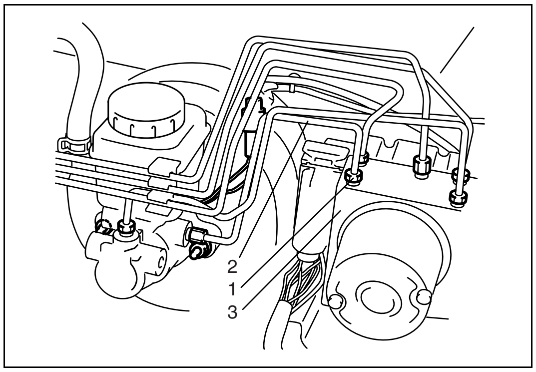
HYDRAULIC UNIT INSPECTION

Check hydraulic unit for fluid leakage.
If any, repair or replace.

REMOVAL

1) Disconnect negative cable at battery.
2) Disconnect ABS hydraulic unit/control module assembly connector (1) by pulling up lock (2).



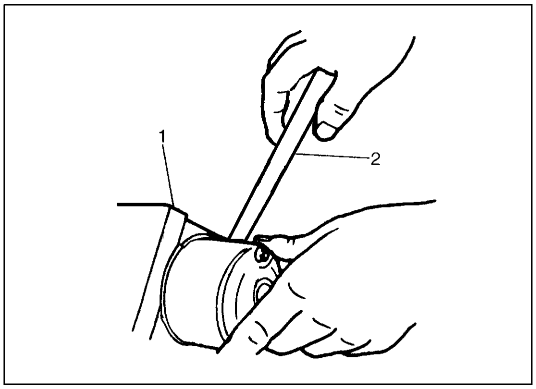


3) Using special tool, loosen flare nuts (1) and disconnect brake pipes (2) from ABS hydraulic unit/control module assembly (3).

Special tool
09950-78220

NOTE:

Put bleeder plug cap onto pipe to prevent fluid from spilling. Do not allow brake fluid to get on painted surfaces.

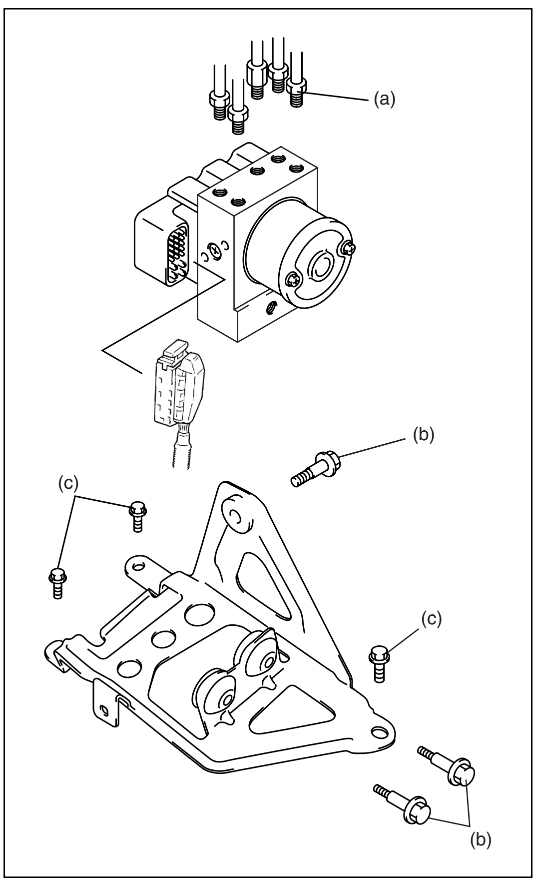


4) Remove three bolts and take out ABS hydraulic unit/control module assembly (1) from bracket using flat end rod or the like (2).

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.**

INSTALLATION



1) Install hydraulic unit/control module assembly by reversing removal procedure.

Tightening torque
Brake pipe flare nut (a) :
16 N·m (1.6 kg-m, 11.5 lb-ft)
ABS hydraulic unit/control module assembly bolt (b) :
9 N·m (0.9 kg-m, 6.5 lb-ft)
Bracket bolt (c) : 10 N·m (1.0 kg-m, 6.5 lb-ft)

2) Bleed air from brake system referring to “BRAKES” section.
3) Check each installed part for fluid leakage and perform “ABS HYDRAULIC UNIT OPERATION CHECK” in this section.

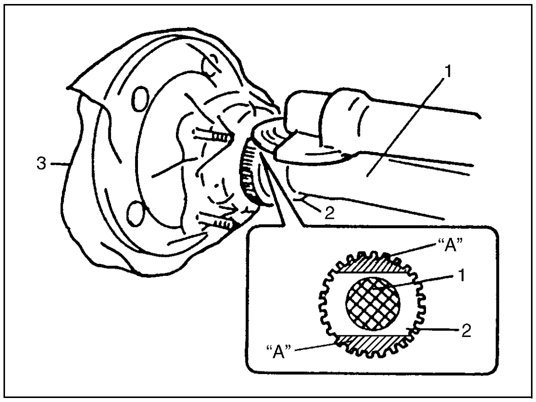
NOTE:

For new ABS hydraulic unit/control module assembly, if “ABS HYDRAULIC UNIT OPERATION CHECK” procedure has not been performed, “ABS” warning lamp may flash when ignition switch is turned ON position.
Accordingly preform “ABS HYDRAULIC UNIT OPERATION CHECK” to stop flashing of ABS warning lamp.

Rear Sensor Rotor (Retainer Ring)

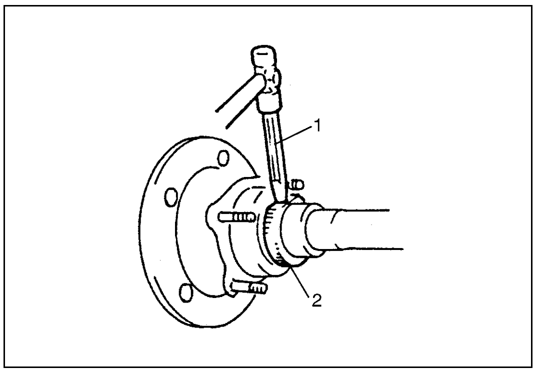
REMOVAL

1) Remove rear axle shaft assembly. Refer to “REAR AXLE SHAFT” in Section 3E.



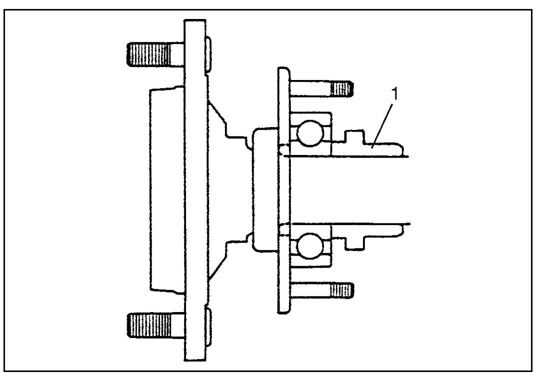
2) In order to remove sensor rotor (retainer ring) (2) from shaft (1), grind with a grinder one part “A” of the sensor rotor (retainer ring) as shown till it becomes thin.

CAUTION:
- **Cover vinyl sheet (3) or the like over wheel bearing so that fine grains from grinding will not enter there.**
- **Be careful not to go so far as to grind the retainer ring.**



3) Break with a chisel (1) the thin ground sensor rotor (retainer ring) (2), and it can be removed.

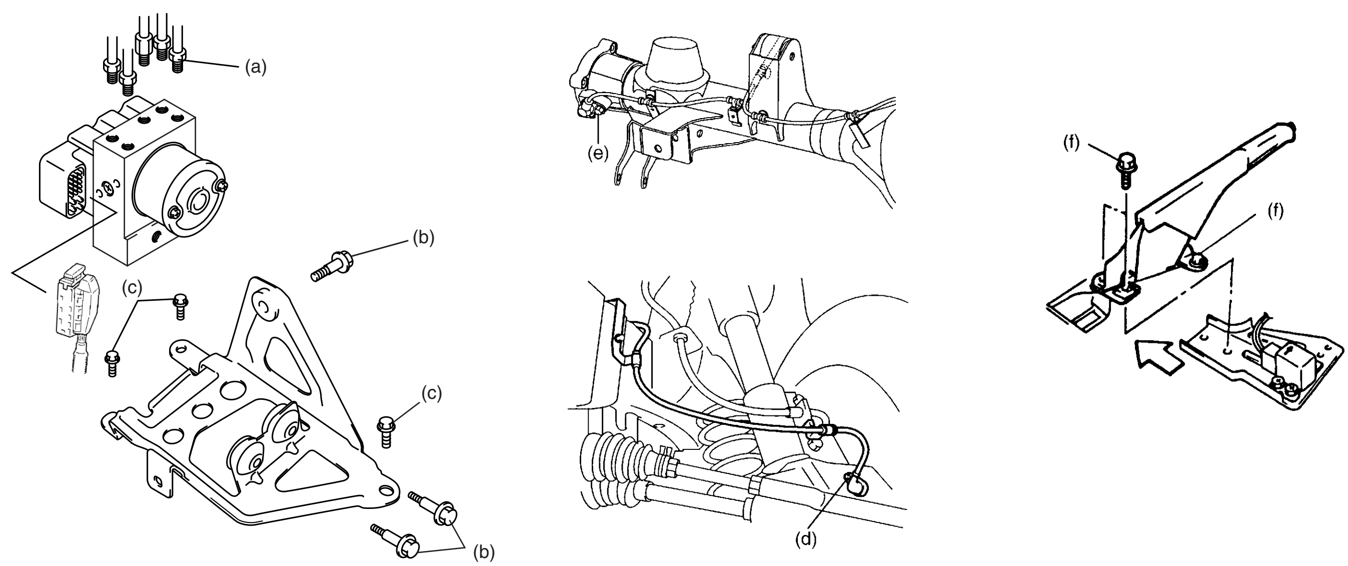
INSTALLATION



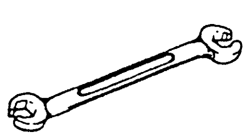
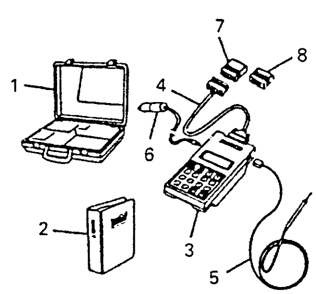
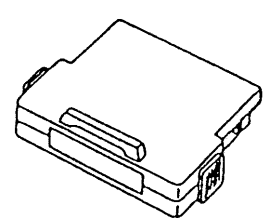
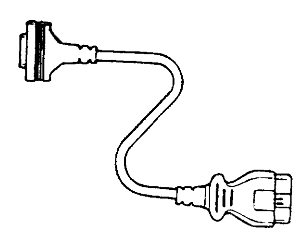
1) Press-fit sensor rotor (retainer ring) (1) as shown in the figure.
2) Install rear axle shaft assembly. Refer to “REAR AXLE SHAFT” in Section 3E.

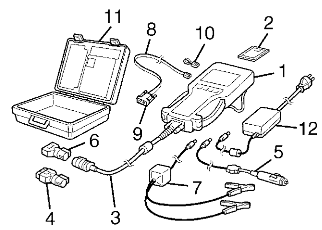
Tightening Torque Specification

Fastening part	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)	10	1.0	7.5
Wheel speed sensor bolt (Front) : (d)	23	2.3	17.0
Wheel speed sensor bolt (Rear) : (e)	21	2.1	15.5
Parking lever assembly mounting bolt : (f)	23	2.3	17.0



Special Tool

			
09950-78220 Flare nut wrench (10 mm)	09931-76011 Tech 1A kit (SUZUKI scan tool) (See NOTE A.)	Mass storage cartridge for Tech 1A	09931-76030 16/14 pin DLC cable for Tech 1A



Tech 2 kit (SUZUKI scan tool) (See NOTE B.)

NOTE:

A. This kit includes the following items and substitutes for the Tech 2 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

B. This kit includes the following items and substitutes for the Tech 1A kit.

1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 6-1

ENGINE GENERAL INFORMATION AND DIAGNOSIS (H27 ENGINE)

WARNING:

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

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

NOTE:

Whether following systems (parts) are used in the particular vehicle or not depends on specifications. Be sure to bear this in mind when performing service work.

- **Monitor connector**
- **CKP sensor**
- **MAP sensor**
- **EGR valve**
- **Heated oxygen sensor or CO adjusting resistor**
- **Three way catalytic converter, Warm-up three way catalytic converter**

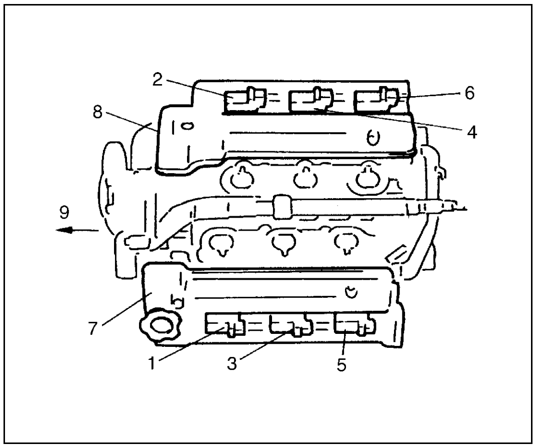
CONTENTS

General Information

Statement of Cleanliness and Care

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

- A liberal coating of engine oil should be applied to friction areas during assembly to protect and lubricate the surface 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 6 cylinders of the engine are identified by numbers; No.1, No.2, No.3, No.4, No.5 and No.6 as counted from crankshaft pulley side to flywheel side.
- Figure at the left shows engine with intake manifold removed and viewed from the top.
  LH (No.1) bank consists of No.1, No.3 and No.5 cylinders.
  RH (No.2) bank consists of No.2, No.4 and No.6 cylinders.

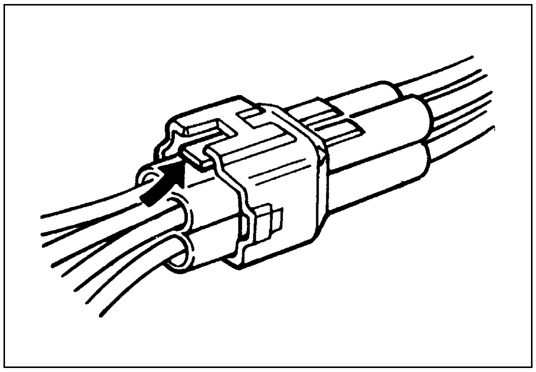
1. No.1 cylinder	6. No.6 cylinder
2. No.2 cylinder	7. LH (No.1) bank
3. No.3 cylinder	8. RH (No.2) bank
4. No.4 cylinder	9. Crank shaft pulley side
5. No.5 cylinder	

General Information on Engine Service

CAUTION:

The following information on engine service should be noted carefully, as it is important in preventing damage, and in contributing to reliable engine performance.

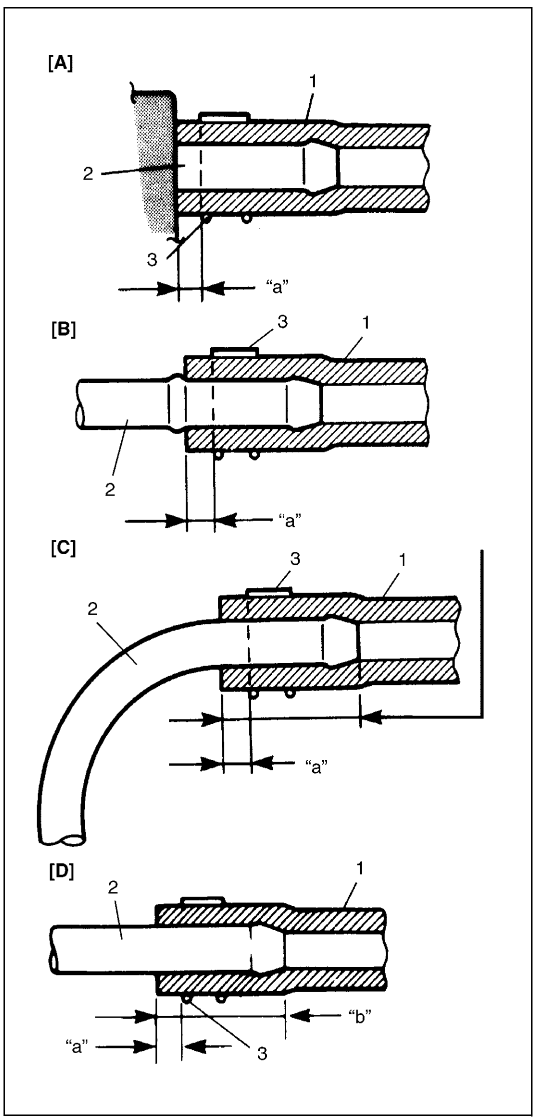
- When raising or supporting engine for any reason, do not use a jack under oil pan. Due to small clearance between oil pan and oil pump strainer, jacking against oil pan may cause it to be bent against strainer resulting in damaged oil pick-up unit.
- It should be kept in mind, while working on engine,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



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

Precaution on Fuel System Service

- Work must be done with no smoking, in a well-ventilated area and away from any open flames.
- As fuel feed line (between fuel 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" in this section.
  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.
  After connecting, make sure that the hose has no twist or kink.

[A] :	With short pipe, fit hose as far as it reaches pipe joint as shown.
[B] :	With following type pipe, fit hose as far as its peripheral projection as shown.
[C] :	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.
[D] :	With straight pipe, fit hose till pipe is about 20 to 30 mm (0.79 – 1.18 in.) into the hose.
1.	Hose
2.	Pipe
3.	Clamp
"a" :	Clamp securely at a position 3 to 7 mm (0.12 – 0.27 in.) from hose end.
"b" :	20 to 30 mm (0.79 – 1.18 in.)

- When installing fuel union bolt gasket, always use new gasket and tighten union bolt to specified torque according to "TIGHTENING TORQUE SPECIFICATION" in Section 6C.
- When installing injector, fuel feed pipe or fuel pressure regulator, lubricate its O-ring with gasoline.
- When connecting fuel pipe flare nut, first tighten flare nut by hand and then tighten it to specified torque.

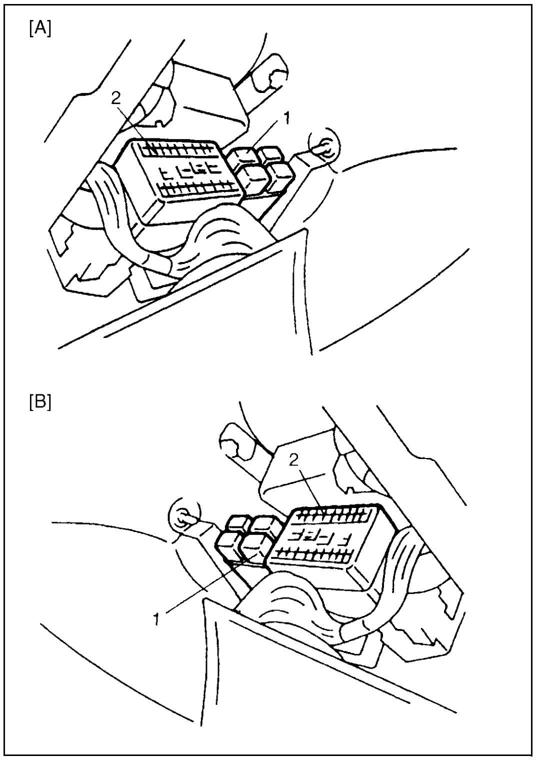
Fuel Pressure Relief Procedure

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 vehicle), set parking brake, and block drive wheels.



2) Remove fuel pump relay (1) from its connector.
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 of about 3 seconds each time to dissipate fuel pressure in lines. Fuel connections are now safe for servicing.
5) Upon completion of servicing, install fuel pump relay to relay box.

[A] :	Left hand steering vehicle
[B] :	Right hand steering vehicle
2.	Fuse box

Fuel Leakage Check Procedure

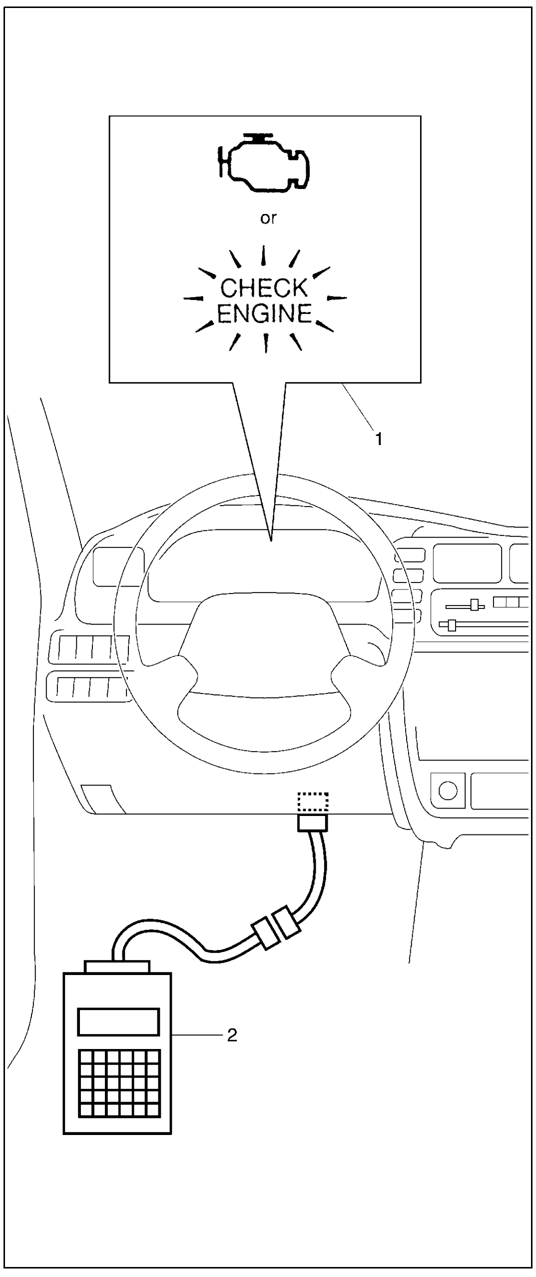
After performing any service on fuel system, check to make sure that there are no fuel leakages as follows.

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.

Engine Diagnosis

General Description

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



On-Board Diagnostic System (Vehicle without Monitor Connector)

ECM (PCM) in this vehicle has following functions.

- When the ignition switch is turned ON with the engine at a stop, malfunction indicator lamp (MIL) (1) turns ON to check the bulb of the malfunction indicator lamp (1).
- When ECM detects a malfunction which gives an adverse effect to vehicle emission while the engine is running, it makes the malfunction indicator lamp (1) in the meter cluster of the instrument panel turn ON or flash (flashing only when detecting a misfire which can cause damage to the catalyst) and stores the malfunction area in its memory.
  (If it detects that continuously 3 driving cycles are normal after detecting a malfunction, however, it makes MIL (1) turn OFF although DTC stored in its memory will remain.)
- As a condition for detecting a malfunction in some areas in the system being monitored by ECM (PCM) and turning ON the malfunction indicator lamp (1) due to that malfunction, 2 driving cycle detection logic is adopted to prevent erroneous detection.
- When a malfunction is detected, engine and driving conditions then are stored in ECM (PCM) memory as freeze frame data. (For the details, refer to description on Freeze frame data.)
- It is possible to communicate by using not only SUZUKI scan tool (2) but also generic scan tool. (Diagnostic information can be accessed by using a scan tool.)

WARM-UP CYCLE

A warm-up cycle means sufficient vehicle operation such that the coolant temperature has risen by at least 22°C (40°F) from engine starting and reaches a minimum temperature of 70 °C (160 °F).

DRIVING CYCLE

A “Driving Cycle” consists of engine startup, driving mode where a malfunction would be detected if present and engine shutoff.

2 DRIVING CYCLE DETECTION LOGIC

The malfunction detected in the first driving cycle is stored in ECM (PCM) memory (in the form of pending DTC) but the malfunction indicator lamp does not light at this time. It lights up at the second detection of same malfunction also in the next driving cycle.

PENDING DTC

Pending DTC means a DTC detected and stored temporarily at 1 driving cycle of the DTC which is detected in the 2 driving cycle detection logic.

FREEZE FRAME DATA

1.	TROUBLE CODE	P0100	(1st)
2.	COOLANT TEMP.	80 C	
3.	ENGINE SPEED	750 RPM	
4.	SHORT FT B1	– 0.8	
5.	SHORT FT B2	– 0.1	
6.	LONG FT B1	– 1.3	
7.	LONG FT B2	– 1.5	
8.	CALC LOAD	20.5	
9.	FUEL SYSTEM B1	CLOSED	
10.	FUEL SYSTEM B2	CLOSED	
11.	MAP	30.6 kPa	
12.	VEHICLE SPEED	0 km/h	

1

ECM (PCM) stores the engine and driving conditions (in the form of data as shown in the figure) at the moment of the detection of a malfunction in its memory. This data is called “Freeze frame data”. Therefore, it is possible to know engine and driving conditions (e.g., whether the engine was warm or not, where the vehicle was running or stopped, where air/fuel mixture was lean or rich) when a malfunction was detected by checking the freeze frame data. Also, ECM (PCM) has a function to store each freeze frame data for three different malfunctions in the order as the malfunction is detected. Utilizing this function, it is possible to know the order of malfunctions that have been detected. Its use is helpful when rechecking or diagnosing a trouble.

1. 1st, 2nd or 3rd in parentheses here represents which position in the order the malfunction is detected.

Priority of Freeze Frame Data

ECM (PCM) has 4 frames where the freeze frame data can be stored. The first frame stores the freeze frame data of the malfunction which was detected first. However, the freeze frame data stored in this frame is updated according to the priority described below. (If malfunction as described in the upper square “1” below is detected while the freeze frame data in the lower square “2” has been stored, the freeze frame data “2” will be updated by the freeze frame data “1”.)

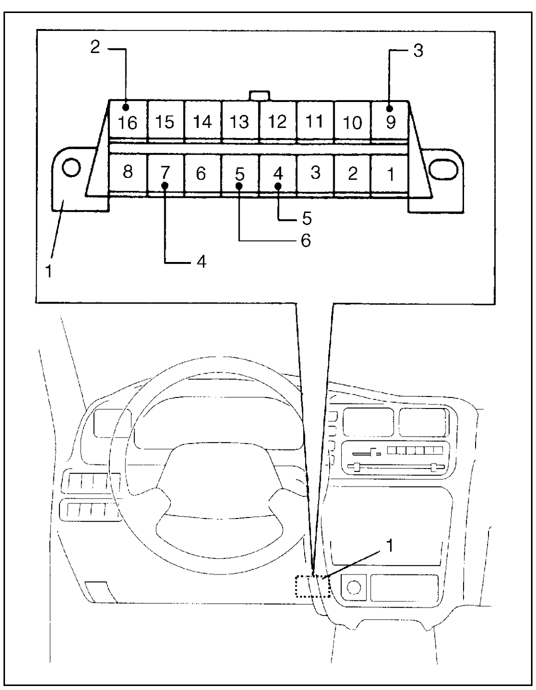
PRIORITY	FREEZE FRAME DATA IN FRAME 1
1	Freeze frame data at initial detection of malfunction among misfire detected (P0300-P0306), fuel system too lean (P0171, P0174) and fuel system too rich (P0172, P0175)
2	Freeze frame data when a malfunction other than those in “1” above is detected

In the 2nd through the 4th frames, the freeze frame data of each malfunction is stored in the order as the malfunction is detected. These data are not updated regardless of the priority.
Shown in the table below are examples of how freeze frame data are stored when two or more malfunctions are detected.

			FRAME 1	FRAME 2	FRAME 3	FRAME 4
			FREEZE FRAME DATA to be updated	1st FREEZE FRAME DATA	2nd FREEZE FRAME DATA	3rd FREEZE FRAME DATA
		No malfunction	No freeze frame data	No freeze frame data	No freeze frame data	No freeze frame data
MALFUNCTION DETECTED ORDER	1	P0110 (IAT) detected	Data at P0110 detection	Data at P0110 detection	No freeze frame data	No freeze frame data
	2	P0171 (Fuel system) detected	Data at P0171 detection	Data at P0110 detection	Data at P0171 detection	No freeze frame data
	3	P0300 (Misfire) detected	Data at P0171 detection	Data at P0110 detection	Data at P0171 detection	Data at P0300 detection
	4	P0301 (Misfire) detected	Data at P0171 detection	Data at P0110 detection	Data at P0171 detection	Data at P0300 detection

Freeze Frame Data Clearance

The freeze frame data is cleared at the same time as clearance of DTC.



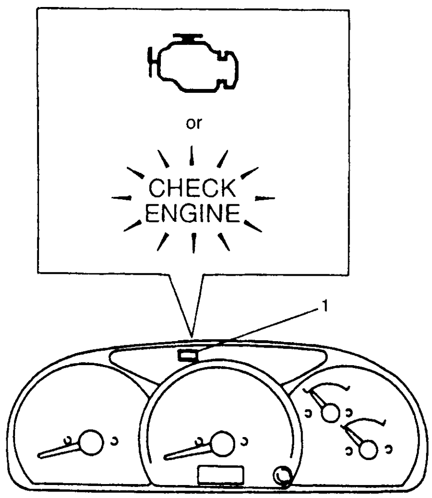
DATA LINK CONNECTOR (DLC)

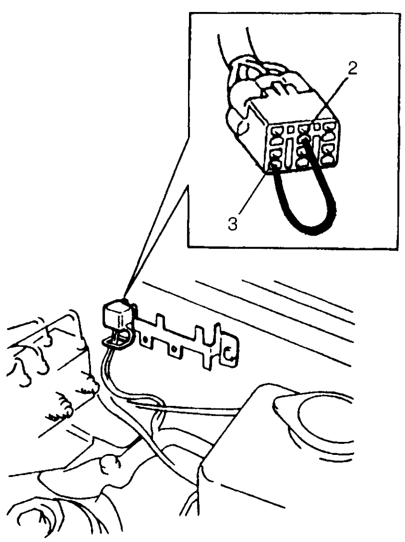
DLC (1) is in compliance with SAEJ1962 in its installation position, the shape of connector and pin assignment.

K line of ISO 9141 is used for SUZUKI scan tool or generic scan tool to communicate with ECM (PCM), ABS control module and Air bag SDM. SUZUKI serial data line is used for SUZUKI scan tool to communicate with Immobilizer control module.

2. B+
3. SUZUKI Serial data line
4. K line of ISO 9141
5. Body ground
6. ECM ground

On-Board Diagnostic System (Vehicle with Monitor Connector)





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

- Heated oxygen sensor (if equipped)
- ECT sensor
- TP sensor
- IAT sensor
- CMP sensor
- MAF sensor
- Knock sensor
- EGR (if equipped)
- VSS
- CPU (Central Processing Unit) of ECM

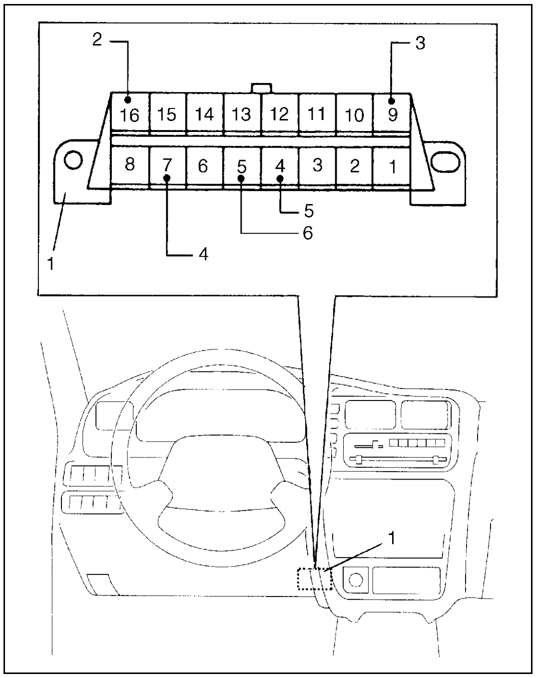
ECM and malfunction indicator lamp (1) operate as follows.

- Malfunction indicator lamp (1) light 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 (1) 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 (1) turns OFF.
- When ECM detects a trouble which has occurred in the above areas, it makes malfunction indicator lamp (1) turn ON while the engine is running to warn the driver of such occurrence of trouble and at the same time it stores the trouble area in ECM back-up memory. (The memory is kept as it is even if the trouble was only temporary and disappeared immediately. And it is not erased unless the power to ECM is shut off for specified time.)

  ECM also indicates trouble area in memory by means of flashing of malfunction indicator lamp (1) at the time of inspection. (i.e. when diagnosis switch terminal (2) is connected to ground terminal (3) with a service wire and ignition switch is turned ON.)

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 (1) lights and remains ON as the trouble exists but it turns OFF when the normal condition is restored.



DATA LINK CONNECTOR (DLC)

DLC (1) is in compliance with SAEJ1962 in its installation position, the shape of connector and pin assignment.
K line of ISO 9141 is used for SUZUKI scan tool to communicate with ECM (PCM), ABS control module and air bag SDM. SUZUKI serial data line is used for SUZUKI scan tool to communicate with Immobilizer control module.

2.	B+
3.	SUZUKI Serial data line
4.	K line of ISO 9141
5.	Body ground
6.	ECM ground

Precaution in Diagnosing Trouble

- Don’t disconnect couplers from ECM (PCM), battery cable from battery, ECM (PCM) ground wire harness from engine or main fuse before confirming diagnostic information (DTC, freeze frame data, etc.) stored in ECM (PCM) memory. Such disconnection will erase memorized information in ECM (PCM) memory.
- Diagnostic information stored in ECM (PCM) memory can be cleared as well as checked by using SUZUKI scan tool or generic scan tool. Before using scan tool, read its Operator’s (Instruction) Manual carefully to have good understanding as to what functions are available and how to use it.
- Priorities for diagnosing troubles (Vehicle without monitor connector)
  If two or more diagnostic trouble codes (DTCs) are stored, proceed to the flow table of the DTC which was detected earliest in the order and follow the instruction in that table.
  If no instructions are given, troubleshoot diagnostic trouble codes according to the following priorities.
  – Diagnostic trouble codes (DTCs) other than DTC P0171/P0172/P0174/P0175 (Fuel system too lean/too rich), DTC P0300/P0301/P0302/P0303/P0304/P0305/P0306 (Misfire detected) and DTC P0400 (EGR flow malfunction)
  – DTC P0171/P0172/P0174/P0175 (Fuel system too lean/too rich) and DTC P0400 (EGR flow malfunction)
  – DTC P0300/P0301/P0302/P0303/P0304/P0305/P0306 (Misfire detected)
- Be sure to read “PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE” in Section 0A before inspection and observe what is written there.
- ECM (PCM) Replacement
  When substituting a known-good ECM (PCM), check for following conditions. Neglecting this check may cause damage to a known-good ECM (PCM).
  – Resistance value of all relays, actuators is as specified respectively.
  – MAF sensor, MAP sensor and TP sensor are in good condition and none of power circuits of these sensors is shorted to ground.

Engine Diagnostic Flow Table

Refer to following pages for the detail of each step.

Step	Action	Yes	No
1	Customer Complaint Analysis 1) Perform customer complaint analysis. Was customer complaint analysis performed?	Go to Step 2.	Perform customer complaint analysis.
2	DTC(s)/Freeze Frame Data Check 1) Check DTC(s)/Freeze frame data. Is there any malfunction DTC(s)?	Record DTC(s)/Freeze frame data. Clear DTC(s). Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection. Is there any faulty condition?	Repair or replace malfunction part. Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection. Is there any faulty condition?	Repair or replace malfunction part. Go to Step 11.	Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom based on customer complaint analysis, DTC(s)/freeze frame data in Step 1. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	DTC/Freeze Frame Data Recheck 1) Recheck DTC/freeze frame data. Is there any malfunction DTC(s)?	Go to Step 9.	Go to Step 8.
7	DTC/Freeze Frame Data Recheck 1) Recheck DTC/freeze frame data. Is there any malfunction DTC(s)?	Go to Step 9.	Go to Step 10.
8	Engine Basic Inspection 1) Check and repair according to “ENGINE BASIC INSPECTION FLOW TABLE” and “ENGINE DIAGNOSIS TABLE” in this section. Are check and repair complete?	Go to Step 11.	Check and repair malfunction part(s). Go to Step 11.
9	DTC Trouble Shooting 1) Check and repair according to applicable “DTC Diag. flow table” in this section. Are check and repair complete?	Go to Step 11.	Check and repair malfunction part(s). Go to Step 11.
10	Intermittent Problems Check 1) Check for intermittent problems referring to “Check for Intermittent Problem” in “GENERAL INFORMATION” section. Is there any faulty condition?	Repair or replace malfunction part. Go to Step 11.	Go to Step 11.
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to “DTC CONFIRMATION PROCEDURE” in this section. Is there any problem symptom, malfunction DTC or abnormal condition?	Go to Step 6.	END.

STEP 1. CUSTOMER COMPLAINT ANALYSIS

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

CUSTOMER PROBLEM INSPECTION FORM (EXAMPLE)

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

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

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

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

NOTE:

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

STEP 2. DIAGNOSTIC TROUBLE CODE (DTC)/FREEZE FRAME DATA CHECK

First, check DTC, referring to “DIAGNOSTIC TROUBLE CODE CHECK” in this section. If DTC is indicated, record DTC and freeze frame data.
After that clear DTC referring to “DIAGNOSTIC TROUBLE CODE CLEARANCE” in this section. DTC indicates malfunction that occurred in the system but does not indicate whether it exists now or it occurred in the past and the normal condition has been restored now. To check which case applies, check the symptom in question according to Step 5 and recheck DTC according to Step 6, 7.
Attempt to diagnose a trouble based on DTC in this step only or failure to clear the DTC (including pending DTC) in this step will lead to incorrect diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting.

NOTE:
For A/T vehicle, if only DTC P0705, P0715, P0720, P0741, P0743, P0751, P0753, P0756, P0758, or P1875 is indicated in this step, proceed to “DIAGNOSIS” in SECTION 7B1.

STEP 3. and 4. VISUAL INSPECTION

Be sure to perform visual check of the following items that support proper function of the engine.

INSPECTION ITEM	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 0B
• Air cleaner element - - - - - dirt, clogging	SECTION 0B
• Battery - - - - - fluid level, corrosion of terminal	SECTION 0B
• Water pump belt and/or cooling fan belt - - - - - tension, damage	SECTION 6C
• Accelerator cable - - - - - play, installation	
• A/T throttle cable - - - - - play, installation	SECTION 6E2
• Vacuum hoses of air intake system	SECTION 6E2
- - - - - disconnection, looseness, deterioration, bend	SECTION 6A2
• Connectors of electric wire harness - - - - - disconnection, friction	
• Fuses - - - - - burning	
• Parts - - - - - installation, bolt - - - - - looseness	
• Parts - - - - - deformation	SECTION 8
• Other parts that can be checked visually	
• Also check following items at engine start, if possible	
– Malfunction indicator lamp - - - - - operation	
– Charge warning lamp - - - - - operation	
– Engine oil pressure warning lamp - - - - - operation	
– Engine coolant temp. meter - - - - - operation	SECTION 6-1
– Fuel lever meter - - - - - operation	SECTION 6H
– Abnormal air being inhaled from air intake system	SECTION 8/6A2
– Exhaust system - - - - - leakage of exhaust gas, noise	SECTION 8
– Other parts that can be checked visually	SECTION 8

STEP 5. TROUBLE SYMPTOM CONFIRMATION

Based on information obtained in Step 1 “CUSTOMER COMPLAINT ANALYSIS” and Step 2 “DTC/FREEZE FRAME DATA CHECK”, confirm trouble symptoms. Also, reconfirm DTC according to “DTC CONFIRMATION PROCEDURE” described in each “DTC FLOW TABLE”.

STEP 6. AND 7. RECHECKING AND RECORD OF DTC

Refer to “DTC Check” in this section for checking procedure.

STEP 8. ENGINE BASIC INSPECTION AND ENGINE DIAGNOSIS TABLE

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

Engine Basic Inspection Flow Table

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Check battery voltage. Is it 11 V or more?	Go to Step 3.	Charge or replace battery.
3	Is engine cranked?	Go to Step 4.	Go to “DIAGNOSIS” in Section 6H.
4	Does engine start?	Go to Step 5.	Go to Step 7.
5	Check engine idle speed/IAC duty referring to “IDLE SPEED/IAC DUTY INSPECTION” in Section 6E2. Is check result as specified?	Go to Step 6.	Go to “ENGINE DIAGNOSIS TABLE” in this section.
6	Check ignition timing referring to “IGNITION TIMING INSPECTION” in Section 6F2. Is check result as specified?	Go to “ENGINE DIAGNOSIS TABLE” in this section.	Adjust ignition timing.
7	Check fuel supply as follows : 1) Check to make sure that enough fuel is filled in fuel tank. 2) Turn ON ignition switch for 3 seconds and then OFF. Repeat this a few times. Is fuel return pressure (returning sounds) felt from fuel return hose when ignition switch is turned ON?	Go to Step 9.	Go to Step 8.
8	Check fuel pump for operating. 1) Was fuel pump operating sound heard from fuel filler for about 3 seconds after ignition switch ON and stop?	Go to “DIAG. FLOW TABLE B-3” in this section.	Go to “DIAG. FLOW TABLE B-1” in this section.
9	Check ignition spark referring to “IGNITION SPARK TEST” in Section 6E2. Is it in good condition?	Go to Step 10.	Go to “DIAGNOSIS” in Section 6F2.
10	Check fuel injector referring to “Fuel INJECTOR INSPECTION” in Section 6E2. Is it in good condition?	Go to “ENGINE DIAGNOSIS TABLE” in this section.	Go to “DIAG. FLOW TABLE B-2” in this section.

STEP 9. TROUBLESHOOTING FOR DTC

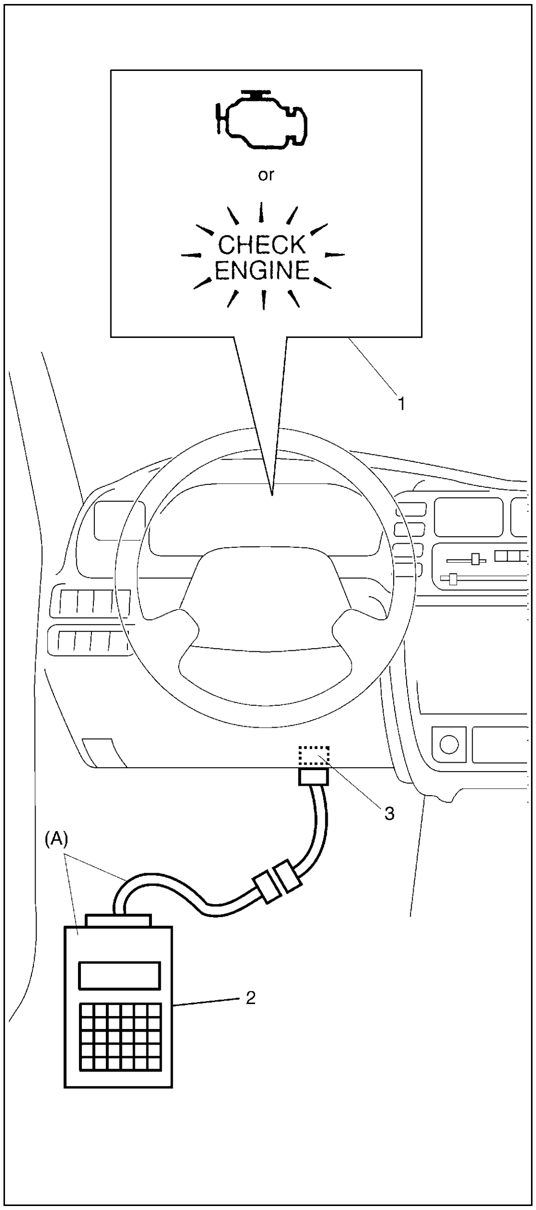
Based on the DTC indicated in Step 6 or 7 and referring to the applicable DTC diag. flow table in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, ECM (PCM) or other part and repair or replace faulty parts.

STEP 10. CHECK FOR INTERMITTENT PROBLEM

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

STEP 11. FINAL CONFIRMATION TEST

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



Malfunction Indicator Lamp (MIL) Check

1) Turn ON ignition switch (but the engine at stop) and check that MIL (1) lights.
   If MIL does not light up, go to "Diagnostic Flow Table A-1" for troubleshooting.
2) Start engine and check that MIL turns OFF.
3) If MIL remains ON, and no DTC is stored in ECM (PCM), go to "Diagnostic Flow Table A-2" for troubleshooting.

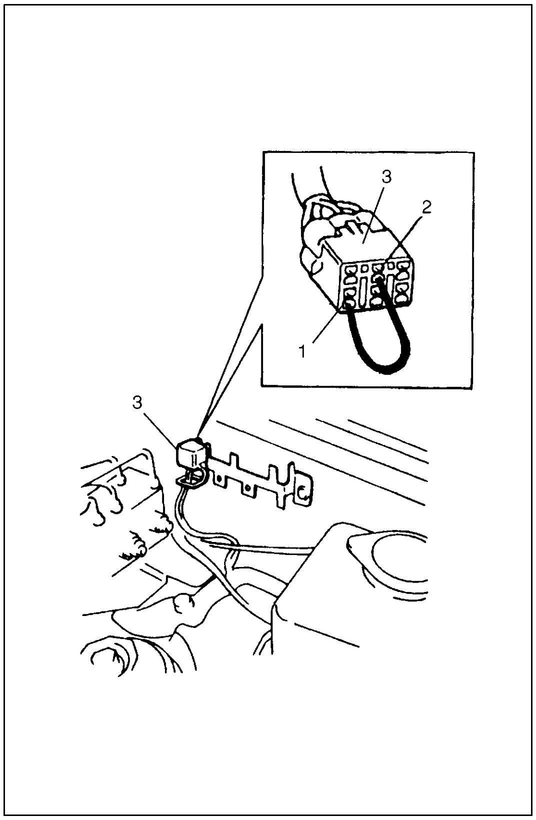
Diagnostic Trouble Code (DTC) Check

[Using SUZUKI scan tool]

1) Prepare generic scan tool or SUZUKI scan tool (2).
2) With ignition switch OFF, connect it to data link connector (DLC) (3) located on underside of instrument panel at driver's seat side.

Special tool
(A) : SUZUKI scan tool

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



[Without Using SUZUKI Scan Tool] (Vehicle with Monitor Connector)

1) Check malfunction indicator lamp referring to “Malfunction Indicator Lamp Check” in this section.
2) With the ignition switch OFF position, disconnect SUZUKI scan tool if connected and using service wire (4), connect diagnosis switch terminal (1) to ground terminal (2) in monitor connector (3).
3) With the ignition switch ON position and leaving engine OFF, read DTC from flashing pattern of malfunction indicator lamp. Refer to “Diagnostic Trouble Code Table”.
   If lamp remains ON, go to “Diagnostic Flow Table A-4”.

NOTE:

- **If abnormality or malfunction lies in two or more areas, malfunction indicator lamp indicates applicable codes three times each.**
  And flashing of these codes is repeated as long as diagnosis terminal is grounded and ignition switch is held at ON position.
- **Take a note of diagnostic trouble code indicated first.**

4) After completing the check, turn the ignition switch OFF position and disconnect service wire from monitor coupler.

Diagnostic Trouble Code (DTC) Clearance

[Using scan tool]

1) With ignition switch OFF, connect generic scan tool or SUZUKI scan tool to data link connector (DLC).
2) Turn ignition switch ON.
3) Erase DTC according to instructions displayed on scan tool. Freeze frame data is cleared with the DTC. Refer to scan tool operator’s manual for further details.
4) After completing the clearance, turn ignition switch off and disconnect scan tool from data link connector.

NOTE:

DTC and freeze frame data stored in ECM (PCM) memory are also cleared in following cases. Be careful not to clear them before keeping their record.

- **When power to ECM (PCM) is cut off (by disconnecting battery cable, removing fuse or disconnecting ECM (PCM) connectors)**
- **When the same malfunction (DTC) is not detected again during 40 engine warm-up cycles (refer to “WARM-UP CYCLE” of “ON-BOARD DIAGNOSTIC SYSTEM” in this section) (Vehicle without monitor connector)**

[Without using scan tool]

1) Turn the ignition switch OFF position.
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

DTC NO.	DETECTED ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle without monitor connector)	MIL (vehicle with monitor connector)
P0100 (No.34)	Mass air flow circuit malfunction	Sensor output too low	1 driving cycle	1 driving cycle
P0100 (No.33)		Sensor output too high		
P0110 (No.25)	Intake air temp. circuit malfunction	Intake air temp. circuit low input	1 driving cycle	1 driving cycle
P0110 (No.23)		Intake air temp. circuit high input		
P0115 (No.15)	Engine coolant temp. circuit malfunction	Engine coolant temp. circuit low input	1 driving cycle	1 driving cycle
P0115 (No.14)		Engine coolant temp. circuit high input		
P0120 (No.22)	Throttle position circuit malfunction	Throttle position circuit low input	1 driving cycle	1 driving cycle
P0120 (No.21)		Throttle position circuit high input		
P0121	Throttle position circuit performance problem	Poor performance of TP sensor	2 driving cycles	Not applicable
*P0130	HO2S circuit malfunction (Bank 1 - Sensor 1)	Min. output voltage of HO2S-1 is higher than specification.	2 driving cycles	Not applicable
		Min. output voltage of HO2S-1 is lower than specification.		
		Output voltage of HO2S-1 fails to go above specification.		
**P0130 (No.13)	HO2S (Bank 1 - Sensor 1) no activity detected	Output voltage of HO2S-1 fails to go above specification (or HO2S-1 circuit open).	2 driving cycles	2 driving cycles

DTC NO.	DETECTED ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle without monitor connector)	MIL (vehicle with monitor connector)
P0133	HO2S circuit slow response (Bank 1 - Sensor 1)	Response time of HO2S-1 output voltage between rich and lean is longer than specification.	2 driving cycles	Not applicable
P0135	HO2S heater circuit malfunction (Bank 1 - Sensor 1)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON.	2 driving cycles	Not applicable
P0136	HO2S circuit malfunction (Bank 1 - Sensor 2)	Max. voltage of HO2S-2 is lower than specification or its min. voltage is higher than specification.	2 driving cycles	Not applicable
P0141	HO2S heater circuit malfunction (Bank 1 - Sensor 2)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON.	2 driving cycles	Not applicable
*P0150	HO2S circuit malfunction (Bank 2 - sensor 1)	Min. output voltage of HO2S-1 is higher than specification.	2 driving cycles	Not applicable
		Min. output voltage of HO2S-1 is lower than specification.		
		Output voltage of HO2S-1 fails to go above specification.		
**P0150 (No.26)	HO2S (Bank 2 - Sensor 1) no activity detected	Output voltage of HO2S-1 fails to go above specification (or HO2S-1 circuit open).	2 driving cycles	2 driving cycles
P0153	HO2S circuit slow response (Bank 2 - Sensor 1)	Response time HO2S-1 output voltage between rich and lean is longer than specification.	2 driving cycles	Not applicable
P0155	HO2S heater circuit malfunction (Bank 2 - Sensor 1)	Terminal voltage i lower than specification at heater OFF or it is higher at heater ON.	2 driving cycles	Not applicable
P0156	HO2S circuit malfunction (Bank 2 - Sensor 2)	Max. voltage of HO2S-2 is lower than specification or its min. voltage is higher than specification.	2 driving cycles	Not applicable
P0161	HO2S heater circuit malfunction (Bank 2 - Sensor 2)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON (or heater circuit or short).	2 driving cycles	Not applicable
P0171	Fuel system too lean (Bank 1)	Short term fuel trim or total fuel trim (short and long terms added) is larger than specification for specified time or longer. (Fuel trim toward rich side is large.)	2 driving cycles	Not applicable
P0172	Fuel system too rich (Bank 1)	Short term fuel trim or total fuel trim (short and long terms added) is smaller than specification for specified time or longer. (Fuel trim toward lean side is large.)	2 driving cycles	Not applicable

DTC NO.	DETECTED ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle without monitor connector)	MIL (vehicle with monitor connector)
P0174	Fuel system too lean (Bank 2)	Short term fuel trim or total fuel trim (short and long terms added) is larger than specification for specified time or longer. (Fuel trim toward rich side is large.)	2 driving cycles	Not applicable
P0175	Fuel system too rich (Bank 2)	Short term fuel trim or total fuel trim (short and long terms added) is smaller than specification for specified time or longer. (Fuel trim toward lean side is large.)	2 driving cycles	Not applicable
P0300 P0301 P0302 P0303 P0304 P0305 P0306	Random misfire detected Cylinder 1 misfire detected Cylinder 2 misfire detected Cylinder 3 misfire detected Cylinder 4 misfire detected Cylinder 5 misfire detected Cylinder 6 misfire detected	Misfire of such level as to cause damage to three way catalyst	MIL flashing during misfire detection	Not applicable
		Misfire of such level as to deteriorate emission but not to cause damage to three way catalyst	2 driving cycles	Not applicable
P0325 (No.43)	Knock sensor circuit malfunction	Sensor output too low Sensor output too high	1 driving cycle	1 driving cycle
P0335	Crankshaft position sensor circuit malfunction	No signal during engine running and CMP sensor signal inputting	1 driving cycle	Not applicable
P0340 (No.42)	Camshaft position sensor circuit malfunction	No signal for 3 sec. during engine cranking, REF signal pattern incorrect or POS signal voltage too high or too low	1 driving cycle	Not applicable
P0400	Exhaust gas recirculation flow malfunction detected	Excessive or insufficient EGR flow.	2 driving cycles	Not applicable
P0403 (No.51)	EGR valve circuit malfunction	EGR valve electrical circuit open or shot to ground	1 driving cycle	1 driving cycle
P0420	Catalyst system efficiency below threshold (Bank 1)	Output waveforms of HO2S-1 and HO2S-2 are similar. (Time from output voltage change of HO2S-1 to that of HO2S-2 is shorter than specification.)	2 driving cycles	Not applicable
P0430	Catalyst system efficiency below threshold (Bank 2)	Output waveforms of HO2S-1 and HO2S-2 are similar. (Time from output voltage change of HO2S-1 to that of HO2S-2 is shorter than specification.)	2 driving cycles	Not applicable
P0443	Purge control valve circuit malfunction	Purge control valve circuit is open or shorted to ground.	2 driving cycles	Not applicable
P0500 (No.24)	Vehicle speed sensor malfunction	No signal while running in “D” range or during fuel cut at decelerating.	2 driving cycles	1 driving cycle

DTC NO.	DETECTED ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle without monitor connector)	MIL (vehicle with monitor connector)
P0505	Idle air control system malfunction	Difference between desired idle speed and actual idle speed continues to exceed specified value for longer than specified time.	2 driving cycles	Not applicable
P0601 (No.71)	Internal control module memory check sum error	Data write error (or check sum error) when written into ECM	1 driving cycle	1 driving cycle
P1408	Manifold absolute pressure sensor circuit malfunction	Manifold absolute pressure sensor output voltage is higher or lower than specified value (or sensor circuit shorted to ground or open).	2 driving cycles	Not applicable
P1450	Barometric pressure sensor circuit malfunction	Barometric pressure is lower or higher than specification.	1 driving cycle	Not applicable
P1451	Barometric pressure sensor performance problem	Difference between intake manifold pressure and barometric pressure is larger than specification.	2 driving cycles	Not applicable
P1500	Engine starter signal circuit malfunction	Engine starts with no starter signal or signal input during long period after start.	2 driving cycles	Not applicable
P1510	ECM back-up power supply malfunction	No back-up power after starting engine.	1 driving cycle	Not applicable

For A/T system (Refer to Section 7B1 for diagnosis)

DTC NO.	DETECTED ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle without monitor connector)	MIL (vehicle with monitor connector)
P0705 (No.72)	Transmission range switch circuit malfunction	Multiple signals inputted simultaneously or P, R, N, D, 2 or L range signal not inputted while running at 60km/h or more.	2 driving cycles	Not applicable
P0715 (No.76)	Input speed sensor circuit malfunction	Input speed sensor signal is lower than specification while running.	2 driving cycles	Not applicable
P0720 (No.75)	Output speed sensor circuit malfunction	Output speed sensor signal not inputted while VSS signal being inputted.	2 driving cycles	Not applicable
P0741	TCC (lock-up) solenoid performance or stuck off	Actual TCC operation does not agree with ON/OFF control from PCM to TCC.	2 driving cycles	Not applicable
P0743 (No.65) (No.66)	TCC (lock-up) solenoid electrical	Monitor signal OFF is detected when TCC control solenoid is ON or monitor signal ON is detected when it is OFF.	1 driving cycle	Not applicable
P0751	Shift solenoid A (#1) performance or stuck off	Gear change control from PCM to A/T does not agree with actual gear position of A/T.	2 driving cycles	Not applicable

DTC NO.	DETECTED ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle without monitor connector)	MIL (vehicle with monitor connector)
P0753 (No.61) (No.62)	Shift solenoid A (#1) electrical	Monitor signal OFF is detected when shift solenoid A (#1) is ON or monitor signal ON is detected when it is OFF.	1 driving cycle	Not applicable
P0756	Shift solenoid B (#2) performance or stuck off	Gear change control from PCM to A/T does not agree with actual gear position of A/T.	2 driving cycles	Not applicable
P0758 (No.63) (No.64)	Shift solenoid B (#2) electrical	Monitor signal OFF is detected when shift solenoid B (#2) is ON or monitor signal ON is detected when it is OFF.	1 driving cycle	Not applicable
P1875	4WD low switch circuit malfunction	Difference between vehicle speed detected by VSS and vehicle speed detected by output speed sensor and compensated by 4WD low switch is larger than specification.	2 driving cycles	Not applicable

For immobilizer control system (Refer to Section 8G for diagnosis)

DTC NO.	DETECTED ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle without monitor connector)	MIL (vehicle with monitor connector)
P1620 (No.84)	ECU code not registered	Refer to Section 8G		
P1621 (No.83)	NO ECU code transmitted from Immobilizer Control Module			
P1622 (No.82)	Fault ECM			
P1623 (No.81)	ECU code not matched			

NOTE:
- **DTC NO. with (*) is detected only vehicle without monitor connector.**
- **DTC No. with (**) is detected only vehicle with monitor connector.**
- **For ( ) marked No. in DTC column, it is used for vehicle with monitor connector.**
- **DTC No.12 appears when none of the other codes is identified.**

Fail-Safe Table

When any of the following DTCs is detected, ECM (PCM) enters fail-safe mode as long as malfunction continues to exist but that mode is canceled when ECM (PCM) detects normal condition after that.

DTC NO.	TROUBLE AREA	FAIL SAFE OPERATION
P0100 (No.33, 34)	MAF SENSOR	• Injector drive time (fuel injection volume) is determined according to throttle valve opening and engine speed. • EGR valve stops. • Air flow of IAC valve is limited.
P0110 (No.23, 25)	IAT SENSOR	Each control is performed on the basis of 22.1°C intake air temp.
P0115 (No.14, 15)	ECT SENSOR	• Each control except 4-A/T is performed on the basis of 29.9°C engine coolant temp. • 4-A/T control is performed assuming 31°C (engine warmed up) or higher after 15 min. from engine start.
P0120 (No.21, 22)	TP SENSOR	• Each control except 4-A/T is performed on the basis of 124.5° throttle valve opening. • 4-A/T control is performed on the basis of 0° throttle valve opening.
P0460	FUEL LEVEL SENSOR	Each control is performed in the basis of full fuel level.
P0500	VEHICLE SPEED SENSOR	Air flow of IAC valve is limited.
P1450	BAROMETRIC PRESSURE SENSOR	Each control is performed based on 760 mmHg barometric pressure.
P0705	TR SWITCH	A/T control is performed in priority order of L, 2, N, D, R and P.
P0720	OUTPUT SPEED SENSOR CIRCUIT MALFUNCTION	A/T control is performed by using signal from VSS.
P0753	SHIFT SOLENOID A (#1)	• A/T control using 3rd gear is performed when D range, 1st, or 2nd gear is used. • TCC solenoid OFF
P0758	SHIFT SOLENOID B (#2)	• A/T control using 4th gear is performed when D range, 2nd or 3rd gear is used. • When both shift solenoids A (#1) and B (#2) failed simultaneously, A/T control using 4th gear is always performed in D range. • TCC solenoid OFF
P0743	TCC (Lock-up) SOLENOID	TCC (Lock-up) solenoid OFF

Scan Tool Data

As the data values given below are standard values estimated on the basis of values obtained from the normally operating vehicles by using a scan tool, use them as reference values. Even when the vehicle is in good condition, there may be cases where the checked value does not fall within each specified data range. Therefore, judgment as abnormal should not be made by checking with these data alone.
Also, conditions in the below table that can be checked by the scan tool are those output from ECM (PCM) as Commands and there may be cases where the engine or actuator is not operating (in the condition) as indicated by the scan tool. Be sure to use the timing light to check the ignition timing referring to Section 6F2.

NOTE:
- **For asterisk (✱) marked item in "OTHER" column, item can be read only SUZUKI scan tool.**
- **When checking the data with the engine running at idle or racing, be sure to shift M/T gear to the neutral gear position and A/T gear to the "Park" position and pull the parking brake fully. Also, if nothing or "no load" is indicated, turn OFF A/C, all electric loads, P/S and all the other necessary switches.**

SCAN TOOL DATA	CONDITION	NORMAL CONDITION/ REFERENCE VALUE	OTHER
COOLANT TEMP. (Engine Coolant Temp.)	At specified idle speed after warming up	80 – 100 °C (176 – 212 °F)	
INTAKE AIR TEMP.	At specified idle speed after warming up	Environmental temp. +20 °C (+36 °F) –5 °C (–9 °F)	
DESIRE IDLE (Desired idle speed)	At idling with no load after warming up	700 rpm	✱
CLOSED THROT POS (Closed Throttle Position)	With ignition switch ON, accelerator pedal released	ON	✱
	With ignition switch ON, accelerator pedal depressed	OFF	
IAC FLOW DUTY	At specified idle speed after warming up	5 – 40 %	✱
ENGINE SPEED	At idling with no load after warming up	Desired idle speed ± 50 rpm	
SHORT FT B1 (Short term fuel trim)	At specified idle speed after warming up	–15 ~ +15 %	
SHORT FT B2 (Short term fuel trim)	At specified idle speed after warming up	–15 ~ +15 %	
LONG FT B1 (Long term fuel trim)	At specified idle speed after warming up	–15 ~ +15 %	
LONG FT B2 (Long term full trim)	At specified idle speed after warning up	–15 ~ +15 %	
IGNITION ADVANCE	At specified idle speed with no load after warming up	6 – 17°	
BATTERY VOLTAGE	Ignition switch ON/engine stopped	10 – 14 V	✱
MAF (Mass Air Flow Rate)	At specified idle speed with no load after warming up.	2.6 – 4.5 g/s 0.34 – 0.59 lb/min	
	At 2500 r/min with no load after warming up.	10 – 16 g/s 1.32 – 2.11 lb/min	
INJ PULSE WIDTH B1 (Fuel Injection Pulse Width)	At specified idle speed with no load after warming up.	2.0 – 3.3 msec	✱
	At 2500 r/min with no load after warming up.	2.2 – 3.2 msec	

SCAN TOOL DATA	CONDITION	NORMAL CONDITION/ REFERENCE VALUE	OTHER
INJ PULSE WIDTH B2	At specified idle speed with no load after warming up.	2.0 – 3.3 msec	*
	At 2500 r/min with no load after warming up.	2.2 – 3.2 msec	
THROTTLE POS (Absolute Throttle Position)	With ignition switch ON/warmed up engine stopped, accelerator pedal released	9.8 – 18.2 %	
	With ignition switch ON/warmed up engine stopped, accelerator pedal depressed fully	72 – 87.2 %	
TP SENSOR VOLT (TP Sensor Output Voltage)	With ignition switch ON/warmed up engine stopped, accelerator pedal released	0.49 – 0.91 V	*
	With ignition switch ON/warmed up engine stopped, accelerator pedal depressed fully.	3.76 – 4.36 V	
O2S B1 S1 (HO2S-1 Output Voltage)	At specified idle speed after warming up	0.05 – 0.95 V	
O2S B1 S2 (HO2S-2 Output Voltage)	When engine is running at 2000 r/min. for 3 min or longer after warming up.	0.05 – 0.95 V	
O2S B2 S1 (HO2S-2 Output Voltage)	When engine is running at 2000 r/min. for 3 min or longer after warming up.	0.05 – 0.95 V	
O2S B2 S2 (HO2S-2 Output Voltage)	When engine is running at 2000 r/min. for 3 min or longer after warming up.	0.05 – 0.95 V	
FUEL SYSTEM B1 (Fuel System Status)	At specified idle speed after warming up.	Closed	*
FUEL SYSTEM B2 (Fuel System Status)	At specified idle speed after warming up.	Closed	
CALC LOAD (Calculated Load Value)	At specified idle speed with no load after warming up.	10 – 25 %	
	At 2500 r/min with no load after warming up.	14 – 23 %	
TOTAL FT TRIM B1	At specified idle speed after warming up.	–30 – +30 %	*
TOTAL FT TRIM B2	At specified idle speed after warming up.	–30 – +30 %	
MAP	At specified idle speed after warming up.	25 – 35 kPa	
CANIST PRG DUTY (EVAP Canister Purge Flow Duty)	At specified idle speed after warming up.	0 %	*
VEHICLE SPEED.	At stop.	0 km/h 0 MPH	
FUEL CUT	When engine is at fuel cut condition	ON	*
	Other than fuel cut condition	OFF	
EGR VALVE	At specified idle speed after warming up	0 %	*
BLOWER FAN	Ignition switch ON, blower fan switch ON	ON	*
	Ignition switch ON, blower fan switch OFF	OFF	
A/C CONDENSER FAN	Ignition switch ON, A/C not operating	OFF	*
	Ignition switch ON, A/C operating	ON	
PSP SWITCH	Engine running at idle speed and steering wheel at straight ahead position	OFF	*
	Engine running at idle speed and steering wheel turned to the right or left as far as it stops	ON	
A/C SWITCH (if equipped)	When A/C not operating	OFF	*
	When A/C operating	ON	

SCAN TOOL DATA	CONDITION	NORMAL CONDITION/ REFERENCE VALUE	OTHER
PNP SIGNAL (Transmission Range Switch) (for 4-A/T)	With ignition switch ON, selector lever in “P” or “N” position	P/N Range	∗
	With ignition switch ON, selector lever in “R”, “D”, “2” or “L” position	D Range	
FUEL TANK LEVEL	Ignition switch ON	0 – 100 %	∗
ELECTRIC LOAD	Ignition ON, small light OFF	OFF	∗
	Ignition switch ON, small light ON	ON	∗
VSS (Vehicle speed sensor) (for 4-A/T)	At stop.	0 km/h 0 MPH	∗
GEAR POSITION (for 4-A/T)	Ignition switch ON, selector lever is shifted at “R”, “D”, “2” or “L” range and vehicle stops.	1st	∗
THROT POS LEVEL (Throttle position level for 4-A/T)	“0” (about idle position), “1”,“2”,“3”,“4”,“5”,“6” or “7” (about full open) appears according to throttle valve opening.		∗
SHIFT SOL #1 (A) CON (Shift solenoid #1 command signal) MON (Shift solenoid #1 monitor) (for 4-A/T)	Ignition switch ON Selector lever is shifted at “P”, “R”, “N”, “D”, “2” or “L” range. Vehicle stops.	ON	∗
SHIFT SOL #2 (B) CON (Shift solenoid #2 command signal) MON (Shift solenoid #2 monitor) (for 4-A/T)	Ignition switch ON Selector lever is shifted at “P”, “R”, “N”, “D”, “2” or “L” range. Vehicle stops.	OFF	∗
TCC SOL (for 4-A/T) CON (Torque converter clutch solenoid command signal) MON (Torque converter clutch solenoid monitor)	Ignition switch ON Selector lever is shifted at “P”, “R”, “N”, “D”, “2” or “L” range. Vehicle stops.	OFF	∗
TRANS RANGE (for 4-A/T)	Ignition switch ON, selector lever is at “P”, “R”, “N”, “D”, “2” or “L” range.	P, R, N, D, 2 or L	∗
BRAKE SW (Brake, stop lamp, switch) (for 4-A/T)	Ignition switch ON, Brake pedal is released.	OFF	∗
	Ignition switch ON, Brake pedal is depressed.	ON	
O/D OFF SW (Overdrive cut switch)	Ignition switch ON, Overdrive cut switch OFF	OFF	∗
	Ignition switch ON, Overdrive cut switch ON	ON	
MODE SELECT SW (Power/Normal change switch) (for 4-A/T)	Ignition switch ON, P/N change switch is at normal position.	NORMAL	∗
	Ignition switch ON, P/N change switch is at power position.	POWER	
4WD-L SW (4WD low switch)	Ignition switch ON, Transfer lever is shifted at “4H” or “2H” position.	OFF	∗
	Ignition switch ON, Transfer lever is shifted at “4L” position.	ON	

Scan tool data definitions

COOLANT TEMP (Engine Coolant Temp., °C/°F)

It is detected by engine coolant temp. sensor.

INTAKE AIR TEMP (°C/°F)

It is detected by intake air temp. sensor.

DESIRE IDLE (Desired Idle Speed RPM)

The desired idle speed is an ECM (PCM) internal parameter which indicates the ECM (PCM) requested idle. If the engine is not running, the number is not valid.

CLOSED THROT POS (Closed Throttle Position ON/OFF)

This parameter will read ON when the throttle valve is fully closed. Or OFF when the throttle is not fully closed.

IAC FLOW DUTY (%)

This parameter indicates IAC valve opening rate which controls bypass air flow.

ENGINE SPEED (RPM)

It is computed by reference pulses from the Camshaft Position Sensor.

SHORT FT B1 (Short Term Fuel Trim Bank 1, %) / SHORT FT B2 (Short Term Fuel Trim Bank 2, %)

Short term fuel trim value represents short term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

LONG FT B1 (Long Term Fuel Trim Bank 1, %) / LONG FT B2 (Long Term Fuel Trim Bank 2, %)

Long term fuel trim value represents long term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

IGNITION ADVANCE (Ignition Timing Advance For No.1 Cylinder, °)

Ignition timing of No.1 cylinder is commanded by ECM (PCM). The actual ignition timing should be checked by using the timing light.

BATTERY VOLTAGE (V)

This parameter indicates battery positive voltage inputted from main relay to ECM (PCM).

MAF (Mass Air Flow Rate, g/s, lb/min)

It represents total mass of air entering intake manifold which is measured by mass air flow sensor.

INJ PULSE WIDTH B1 (Fuel Injection Pulse Width Bank 1, msec) / INJ PULSE WIDTH B2 (Fuel Injection Pulse Width Bank 2, msec)

This parameter indicates time of the injector drive (valve opening) pulse which is output from ECM (PCM).

THROTTLE POS (Absolute Throttle Position, %)

When throttle position sensor is fully closed position, throttle opening is indicated as 0 % and 100 % for full open position.

TP SENSOR VOLT (TP Sensor Output Voltage, V)

Throttle Position Sensor reading provides throttle valve opening information in the from of voltage.

O2S B1 S1 (HO2S Bank 1 Sensor 1 Output Voltage, V) / O2S B2 S1 (HO2S Bank 2 Sensor 1 Output Voltage, V)

It indicates output voltage of HO2S SENSOR 1 installed on exhaust manifold (pre-catalyst).

O2S B1 S2 (HO2S Bank 1 Sensor 2 Output Voltage, V) / O2S B2 S2 (HO2S Bank 2 Sensor 2 Output Voltage, V)

If indicates output voltage of HO2S SENSOR 2 installed on exhaust pipe (post-catalyst). It is used to detect catalyst deterioration.

FUEL SYSTEM B1 (Fuel System Bank 1 Status) / Fuel System B2 (Fuel System Bank 2 Status)

Air/fuel ratio feedback loop status displayed as one of the followings.
OPEN : Open loop-has not yet satisfied conditions to go closed loop.
CLOSED : Closed loop-using oxygen sensor(s) as feedback for fuel control.
OPEN-DRIVE COND : Open loop due to driving conditions (Power enrichment, etc.).
OPEN SYS FAULT : Open loop due to detected system fault.
CLOSED-ONE O2S : Closed loop, but fault with at least one oxygen sensor may be using single oxygen sensor for fuel control.

CALC LOAD (Calculated Load Value, %)

Engine load displayed as a percentage of maximum possible load. Value is calculated mathematically using the formula : actual (current) intake air volume ÷ maximum possible intake air volume x 100%.

TOTAL FUEL TRIM (%)

The value of total fuel trim is obtained by putting values of short term fuel trim and long term fuel trim together. This value indicates how much correction is necessary to keep the air/fuel mixture stoichiometrical.

CANIST PRG DUTY (EVAP Canister Purge Flow Duty, %)

This parameter indicates valve ON (valve open) time rate within a certain set cycle of EVAP canister purge valve which controls the amount of EVAP purge.

VEHICLE SPEED (km/h, MPH)

It is computed based on pulse signals from vehicle speed sensor on transfer or transmission.

FUEL CUT (ON/OFF)

ON : Fuel being cut (output signal to injector is stopped).
OFF : Fuel not being cut.

MAP (Manifold Absolute Pressure, mmHg, kPa)

This parameter indicates the pressure in the intake manifold absolute pressure.

A/C CONDENSER FAN (ON/OFF)

This parameter indicates the state of the A/C Condenser Fan control signal.

BLOWER FAN (ON/OFF)

This parameter indicates the state of the blower fan motor switch.

EGR VALVE (%)

This parameter indicates opening rate of EGR valve which controls the amount of EGR flow.

A/C SWITCH (ON/OFF)

ON : Command for operation being output from A/C amplifier to compressor.
OFF : Command for operation not being output.

PSP SWITCH (ON/OFF)

ON : PSP switch detects P/S operation. (high P/S pressure)
OFF : PSP switch not detects P/S operation.

PNP SIGNAL (Transmission Range Switch, P/N or D range)

Whether the transmission range switch (P/N position switch) at P or N range or at R, D, 2 or L range is displayed. If at P or N range, “P/N range” is displayed and if at R, D, 2 or L range, “D range” is displayed.

FUEL TANK LEVEL (%)

This parameter indicates approximate fuel level in the fuel tank. As the detectable range of the fuel level sensor is set as 0 to 100 %, however, with some models whose fuel tank capacity is smaller, the indicated fuel level may be only 70 % even when the fuel tank is full.

ELECTRIC LOAD (ON/OFF)

ON : Small light switch ON or rear window defogger switch ON.
OFF : Small light switch OFF and rear window defogger switch OFF.

VSS (4-A/T) (km/h, MPH)

It is computed by using pulse signals from vehicle speed sensor on 4-speed automatic transmission.

THROT POS LEVEL (Throttle Position Level For 4-A/T, “0”, “1”, “2”, “3”, “4”,“5”,“6” or “7”)

This parameter indicates which level (zone) the throttle valve opening is in.
The throttle opening is divided into 8 levels (zones) from “0” (about idle position) to “7” (about full open) and signals are assigned to each opening level (zone). PCM controls the automatic gear change of the automatic transmission by using these signals according to the signal from the TP sensor.

GEAR POSITION (1ST, 2ND, 3RD or 4TH)

The gear position is determined on the basis of the command state signals generated from PCM to shift solenoids A and B (#1 and #2) and displayed as shown in the table below.

		SHIFT SOLENOID-A	SHIFT SOLENOID-B
DISPLAY	1ST	ON	OFF
	2ND	ON	ON
	3RD	OFF	ON
	4TH	OFF	OFF

SHIFT SOL #1 CON/MON (Shift Solenoid #1, A Command/monitor, ON/OFF)

CON-ON : ON command being output to shift solenoid #1, A.
CON-OFF : ON command not being output.
MON-ON : Electricity being passed to shift solenoid #1, A.
MON-OFF : Electricity not being passed.

SHIFT SOL #2 CON/MON (Shift Solenoid #2, B Command/monitor, ON/OFF)

CON-ON : ON command being output to shift solenoid #2, B.
CON-OFF : ON command not being output.
MON-ON : Electricity being passed to shift solenoid #2, B.
MON-OFF : Electricity not being passed.

TCC SOL CON/MON (Torque Converter Clutch Solenoid Command/monitor, ON/OFF)

CON-ON : ON command being output to TCC solenoid.
CON-OFF : ON command not being output.
MON-ON : Electricity being passed to TCC solenoid.
MON-OFF : Electricity not being passed.

TRANS RANGE (Transmission Range, P, R, N, D, 2 or L)

It indicates transmission range according to transmission range switch signal.

BRAKE SW (Brake, Stop Lamp, Switch, ON/OFF)

OFF : Brake pedal is released.
ON : Brake pedal is depressed.

O/D OFF SW (Overdrive Cut Switch, ON/OFF)

OFF : Overdrive cut switch OFF.
ON : Overdrive cut switch ON.

MODE SELECT SW (Power/normal Change Switch, Power/normal)

POWER : Switch button is at POWER position.
NORMAL : Switch button is at NORMAL position.

4WD-L SW (4WD-LOW Switch, ON/OFF)

ON : Transfer lever is shifted to 4L position.
OFF : Transfer lever is shifted to 4H or 2H position.

Engine Diagnosis Table

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

Condition	Possible Cause	Correction
Hard starting (Engine cranks OK)	Faulty idle air control system	“DIAG. FLOW TABLE B-4” in this section.
	Faulty ECT sensor or MAF sensor	ECT sensor or MAF sensor in Section 6E2.
	Faulty ECM (PCM)	Inspection of ECM (PCM) and its circuit in this section.
	Low compression	Compression check in Section 6A2.
	Faulty hydraulic valve lash adjuster	Valve lash adjuster in Section 6A2.
	Compression leak from valve seat	Valves inspection in Section 6A2.
	Sticky valve stem	Valves inspection in Section 6A2.
	Weak or damaged valve springs	Valves spring inspection in Section 6A2.
	Compression leak at cylinder head gasket	Cylinder head inspection in Section 6A2.
	Sticking or damaged piston ring	Piston ring inspection in Section 6A2.
	Worn piston, ring or cylinder	Cylinders, pistons and piston rings inspection in Section 6A2.
	Malfunctioning PCV valve	PCV system inspection in Section 6E2.
Engine has no power	Engine overheating	Refer to “OVERHEATING” in this table.
	Defective spark plug	Spark plugs in Section 6F2.
	Faulty ignition coil with ignitor	Ignition coil in Section 6F2.
	Fuel pressure out of specification (dirty fuel filter, dirty or clogged fuel hose or pipe, malfunctioning fuel pressure regulator, malfunctioning fuel pump)	“DIAG. FLOW TABLE B-3” in this section.
	Maladjusted TP sensor installation angle	TP sensor in Section 6E2.
	Faulty EGR system	“DTC P0400 DIAG. FLOW TABLE” in this section.
	Faulty injector	Fuel injector in Section 6E2.
	Faulty TP sensor, ECT sensor or MAF sensor	TP sensor, ECT sensor or MAF sensor in Section 6E2.
	Faulty ECM (PCM)	Inspection of ECM (PCM) and its circuit in this section.
	Low compression	Refer to the same item in “HARD STARTING” of this table.
	Dragging brakes	Diagnosis in Section 5.
	Slipping clutch	Diagnosis in Section 7C1.

Condition	Possible Cause	Correction
Improper engine idling or engine fails to idle	Faulty spark plug	Spark plugs in Section 6F2.
	Faulty ignition coil with ignitor	Ignition coil in Section 6F2.
	Fuel pressure out of specification	"DIAG. FLOW TABLE B-3" in this section.
	Engine overheating	Refer to "OVERHEATING" in this table.
	Maladjusted TP sensor installation angle if adjustable	TP sensor in Section 6E2.
	Faulty idle air control system	"DIAG. FLOW TABLE B-4" in this section.
	Faulty FIA (fast idle air) valve	FIA valve in Section 6E2.
	Faulty evaporative emission control system	EVAP control system in Section 6E2.
	Faulty EGR system	"DTC P0400 DIAG. FLOW TABLE" in this section.
	Faulty injector	Fuel injection in Section 6E2.
	Faulty ECT sensor, TP sensor or MAF sensor	ECT sensor, TP sensor or MAF sensor in Section 6E2.
	Faulty ECM (PCM)	Inspection of ECM (PCM) and its circuit in this section.
	Low compression	Refer to the same item in "HARD STARTING" of this table.
	Malfunctioning PCV valve	PCV system inspection in Section 6E2.
Engine hesitates (Momentary lack of response as the accelerator is depressed. Can occur at all vehicle speeds. Usually most severe when first trying to make the vehicle move, as from a stop sign.)	Spark plug faulty or plug gap as out of adjustment	Spark plugs in Section 6F2.
	Fuel pressure out of specification (clogged fuel filter, faulty fuel pressure regulator, clogged fuel filter, hose or pipe)	"DIAG. FLOW TABLE B-3" in this section.
	Engine overheating	Refer to "OVERHEATING" in this table.
	Faulty EGR system	"DTC P0400 DIAG. FLOW TABLE" in this section.
	Faulty injector	Fuel injector in Section 6E2.
	Faulty TP sensor, ECT sensor or MAF sensor	TP sensor, ECT sensor or MAF sensor in Section 6E2.
	Faulty ECM (PCM)	Inspection of ECM (PCM) and its circuit in this section.
	Low compression	Refer to the same item in "HARD STARTING" of this table.

Condition	Possible Cause	Correction
Surges (Engine power variation under steady throttle or cruise. Feels like the vehicle speeds up and down with no change in the accelerator pedal.)	Defective spark plug (excess carbon deposits, improper gap, and burned electrodes, etc.)	Spark plugs in Section 6F2.
	Variable fuel pressure (clogged fuel filter, kinky or damaged fuel hose and line, faulty fuel pressure regulator)	"DIAG. FLOW TABLE B-3" in this section.
	Faulty EGR system	"DTC P0400 DIAG. FLOW TABLE" in this section.
	Faulty MAF sensor	MAF sensor in Section 6E2.
	Faulty injector	Fuel injector in Section 6E2.
	Faulty ECM (PCM)	Inspection of ECM (PCM) and its circuit in this section.
Excessive detonation (The engine makes sharp metallic knocks that change with throttle opening. Sounds like pop corn popping.)	Engine overheating	Refer to "OVERHEATING" in this table.
	Faulty spark plug	Spark plugs in Section 6F2.
	Improper ignition timing	Ignition timing in Section 6F2.
	Clogged fuel filter and fuel lines	Fuel pressure check in Section 6E2.
	Faulty EGR system	"DTC P0400 DIAG. FLOW TABLE" in this section.
	Faulty ECT sensor or MAF sensor	ECT sensor or MAF sensor in Section 6E2.
	Faulty injector	Fuel injector in Section 6E2.
	Faulty ECM (PCM)	Inspection of ECM (PCM) and its circuit in this section.
	Excessive carbon deposits in combustion chamber	Piston and cylinder head cleaning in Section 6A2.
	Poor knock sensor performance	"DTC P0325 DIAG. FLOW TABLE" in this section.
Overheating	Inoperative thermostat	Thermostat in Section 6B.
	Poor water pump performance	Water pump in Section 6B.
	Clogged or leaky radiator	Radiator in Section 6B.
	Improper engine oil grade	Engine oil and oil filter change in Section 0B.
	Clogged oil filter or oil strainer	Oil pressure check in Section 6A2.
	Poor oil pump performance	Oil pressure check in Section 6A2.
	Dragging brakes	Diagnosis in Section 5.
	Slipping clutch	Diagnosis in Section 7C1.
	Blown cylinder head gasket	Cylinder head inspection in Section 6A2.

Condition	Possible Cause	Correction
Poor gasoline mileage	Faulty spark plug (improper gap, heavy deposits, and burned electrodes, etc.)	Spark plugs in Section 6F2.
	Fuel pressure out of specification	“DIAG. FLOW TABLE B-3” in this section.
	Faulty TP sensor, ECT sensor or MAF sensor	TP sensor, ECT sensor or MAF sensor in Section 6E2.
	Faulty EGR system	“DTC P0400 DIAG. FLOW TABLE” in this section.
	Faulty injector	Fuel injector in Section 6E2.
	Faulty ECM (PCM)	Inspection of ECM (PCM) and its circuit in this section.
	Low compression	Refer to the same item in “HARD STARTING” of this table.
	Poor valve seating	Valves inspection in Section 6A2.
	Dragging brakes	Diagnosis in Section 5.
	Slipping clutch	Diagnosis in Section 7C1.
	Thermostat out of order	Thermostat in Section 6B.
	Improper tire pressure	Diagnosis in Section 3.
Excessive engine oil consumption	Sticky piston ring	Piston cleaning in Section 6A2.
	Worn piston and cylinder	Cylinders, pistons and piston rings inspection in Section 6A2.
	Worn piston ring groove and ring	Pistons and piston rings inspection in Section 6A2.
	Improper location of piston ring gap	Pistons installation in Section 6A2.
	Worn or damaged valve stem seal	Valves and cylinder head in Section 6A2.
	Worn valve stem	Valves inspection in Section 6A2.
Low oil pressure	Improper oil viscosity	Engine oil and oil filter change in Section 0B.
	Malfunctioning oil pressure switch	Oil pressure switch inspection in Section 8.
	Clogged oil strainer	Oil pan and oil pump strainer cleaning in Section 6A2.
	Functional deterioration of oil pump	Oil pump in Section 6A2.
	Worn oil pump relief valve	Oil pump in Section 6A2.
	Excessive clearance in various sliding parts	“INSPECTION” for each parts in Section 6A2.

Condition	Possible Cause	Correction
Engine noise (Note : Before checking the mechanical noise, make sure the followings : Ignition timing is properly adjusted, Specified spark plug is used, Specified fuel is used.)	Faulty hydraulic valve lash adjuster	Hydraulic valve lash adjuster in Section 6A2.
	Worn valve stem and guide	Valves inspection in Section 6A2.
	Weak or broken valve spring	Valve springs inspection in Section 6A2.
	Warped or bent valve	Valves inspection in Section 6A2.
	Loose camshaft housing bolts	Camshafts in Section 6A2.
	Worn piston, ring and cylinder bore	Pistons and cylinders inspection in Section 6A2.
	Worn crankpin bearing	Crankpin and connecting rod bearing inspection in Section 6A2.
	Worn crankpin	Crankpin and connecting rod bearing inspection in Section 6A2.
	Loose connecting rod nuts	Connecting rod installation in Section 6A2.
	Low oil pressure	Refer to “LOW OIL PRESSURE” of this table.
	Worn crankshaft journal bearing	Crankshaft and bearing inspection in Section 6A2.
	Worn crankshaft journal	Crankshaft and bearing inspection in Section 6A2.
	Loose lower crankcase (bearing cap) bolts	Crankshaft installation in Section 6A2.
	Excessive crankshaft thrust play	Crankshaft inspection in Section 6A2.

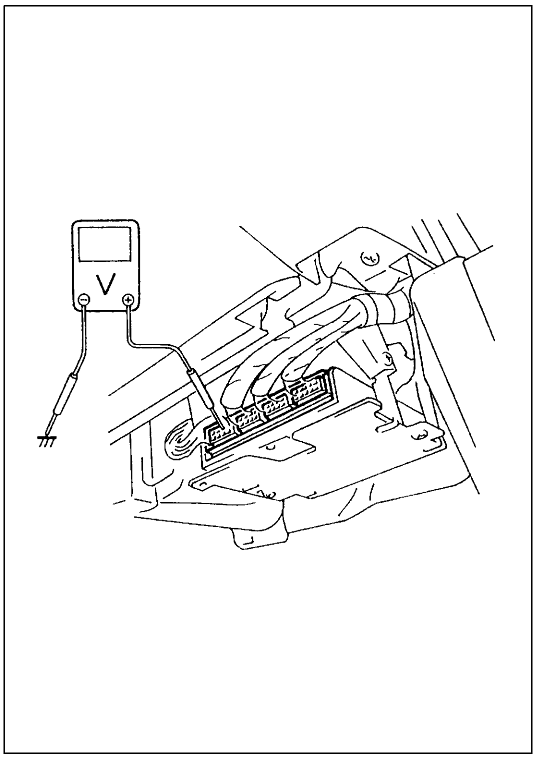
Inspection of PCM (ECM) and its Circuits

PCM (ECM) and its circuits can be checked at PCM (ECM) wiring couplers by measuring voltage and resistance.

CAUTION:

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

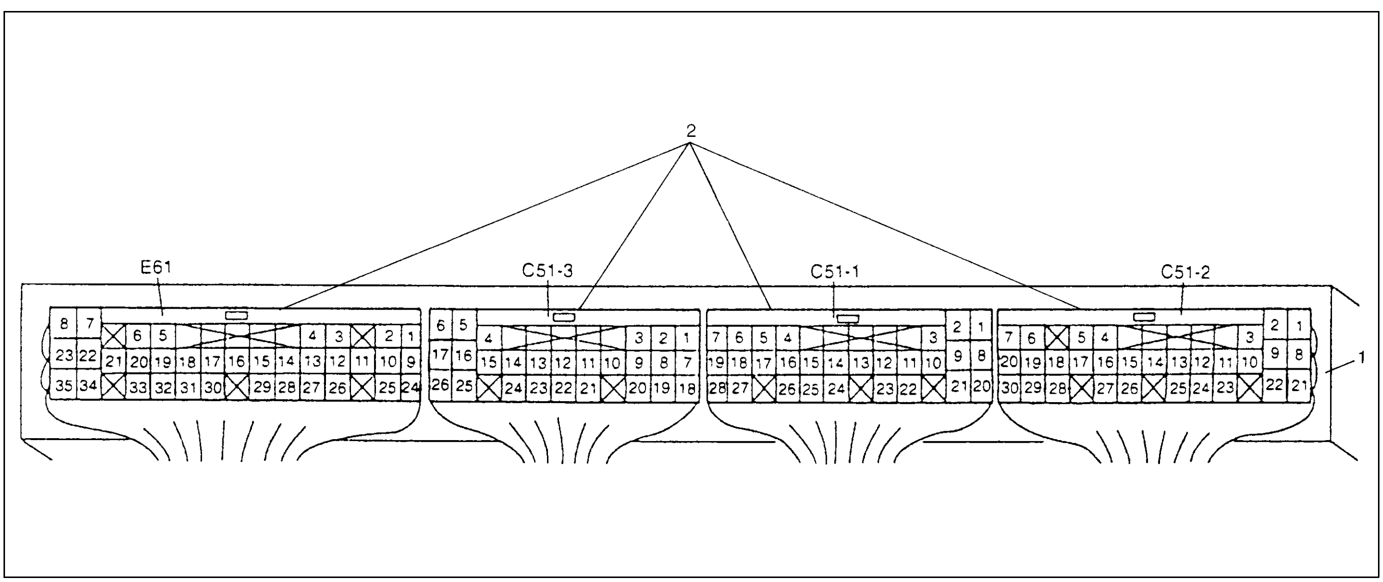
VOLTAGE CHECK



1) Remove PCM (ECM) cover from bracket referring to PCM (ECM) REMOVAL.
2) Check voltage at each terminal of couplers connected.

NOTE:

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



1.	PCM (ECM)
2.	PCM (ECM) connector (Viewed from harness side)

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
E61-1	Power source for CO adjusting resistor (if equipped)	10 – 14 V	Ignition switch ON
E61-2	Power source for back up	10 – 14 V	Ignition switch ON and OFF
E61-3	–	–	–
E61-4	Cruise control module (throttle opening signal) (if equipped)	Ignition switch ON, Voltage varies as specified at figure in cruise control diagnosis of Section 8E while throttle valve is opened gradually.	
E61-5	Duty output terminal (vehicle with monitor connector)	0 – 1 V	Ignition switch ON
E61-6	Tachometer	0 – 1 V	Ignition switch ON, engine stops
E61-7	Malfunction indicator lamp (“SERVICE ENGINE SOON” lamp)	0 – 2.5 V	Ignition switch ON, engine stops
		10 – 14 V	Engine running
E61-8	A/C cut signal (if equipped)	0 – 1.5 V	A/C is not operating
		10 – 14 V	A/C is operating
E61-9	Main relay	10 – 14 V	Ignition switch OFF
		0 – 2 V	Ignition switch ON or for 4 seconds after ignition switch OFF
E61-10	CO adjusting resistor (if equipped)	–	–
E61-11	–	–	–
E61-12	Data link connector (5V) (Vehicle with monitor connector)	4 – 6 V	Ignition switch ON
E61-13	Data link connector (12V)	10 – 14 V	Scan tool not connected to DLC
E61-14	Test switch terminal (Vehicle with monitor connector)	10 – 14 V	Ignition switch ON
E61-15	Rear defogger switch (if equipped)	0 – 1.5 V	Ignition switch ON, rear defogger switch OFF
		10 – 14 V	Ignition switch ON, rear defogger switch
E61-16	Heater blower switch	10 – 14 V	Ignition switch ON, heater blower switch OFF
		0 – 1.5 V	Ignition switch ON, heater blower switch ON
E61-17	A/C signal (if equipped)	10 – 14 V	Ignition switch ON, A/C switch or heater blower switch OFF
		0 – 1 V	Ignition switch ON, A/C switch ON and heater blower switch ON
E61-18	–	–	–
E61-19	“4WD” lamp	0 – 1 V	Ignition switch ON, Transfer lever : 4H or 4L range
		10 – 14 V	Ignition switch ON, Transfer lever : 2H range
E61-20	“O/D OFF” lamp (A/T vehicle)	0 – 1 V	For 4 sec. after ignition switch ON or overdrive cut switch ON
		10 – 14 V	After 4 sec. from ignition switch ON and overdrive cut switch OFF
E61-21	“POWER” lamp (A/T vehicle)	0 – 1 V	Ignition switch ON, P/N change switch : POWER mode
		10 – 14 V	Ignition switch ON, P/N change switch : NORMAL mode

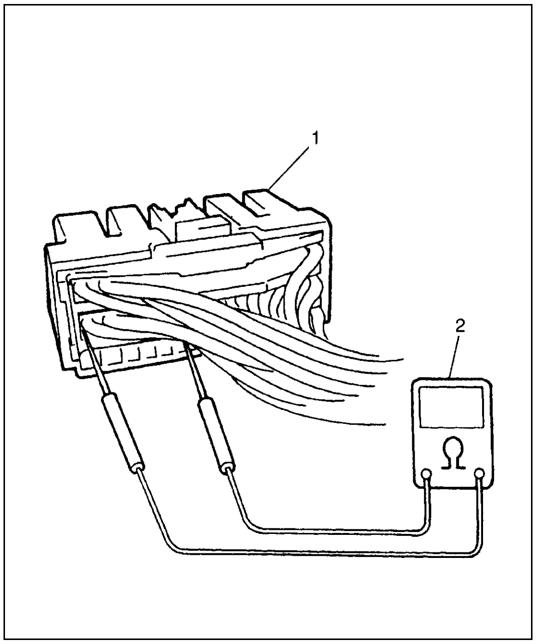
TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
E61-22	A/C condenser fan motor relay (if equipped)	10 – 14 V	Ignition switch ON, A/C not operated and Engine coolant temp. : less than 113°C, 235°F
E61-23	Fuel pump relay	0 – 2.5 V	For 3 sec. after ignition switch ON or while engine running
		10 – 14 V	After 3 sec. from ignition switch ON with engine stopped
E61-24	Ground for CO adjusting resistor (if equipped)	–	–
E61-25	–	–	–
E61-26	–	–	–
E61-27	–	–	–
E61-28	Fuel level sensor	0 – 6 V	Ignition switch ON Voltage depends on fuel level
E61-29	Diag. switch terminal (vehicle with monitor connector)	10 – 14 V	Ignition switch ON
E61-30	ABS control module	10 – 14 V	Ignition switch ON
E61-31	Power/Normal change switch (A/T vehicle)	0 – 1 V	Ignition switch ON, P/N change switch : POWER mode
		10 – 14 V	Ignition switch ON, P/N change switch : NORMAL mode
E61-32	Lighting switch	0 – 1 V	Ignition switch ON, lighting switch OFF
		10 – 14 V	Ignition switch ON, lighting switch ON
E61-33	Overdrive cut switch (A/T vehicle)	10 – 14 V	Ignition switch ON, overdrive cut switch released
		0 – 1 V	Ignition switch ON, overdrive cut switch pressed
E61-34	Stop lamp switch	0 – 1 V	Brake pedal released (switch OFF), Ignition switch ON
		10 – 14 V	Brake pedal depressed (switch ON), Ignition switch ON
E61-35	Cruise control module (if equipped)	10 – 14 V	Ignition switch ON
C51-3-1	Intake air temp. sensor	2.2 – 3.0 V	Ignition switch ON, Sensor ambient temp. : 20°C, 68°F
C51-3-2	Engine coolant temp. sensor	0.5 – 0.9 V	Ignition switch ON, Engine coolant temp. : 80°C, 176°F
C51-3-3	Knock sensor	About 2.5 V	With engine running at idle after warned up
C51-3-4	Power source	10 – 14 V	Ignition switch ON
C51-3-5	Ground for MAF sensor	–	–
C51-3-6	Ground	–	–
C51-3-7	4WD switch	0 – 1 V	Ignition switch ON, Transfer lever : 4H or 4L range
		10 – 14 V	Ignition switch ON, Transfer lever : 2H range
C51-3-8	Manifold absolute pressure sensor	3.3 – 4.3 V	Ignition switch ON and engine stops

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
C51-3-9	Throttle position sensor	0.5 – 1.2 V	Ignition switch ON, Throttle valve at idle position
		3.4 – 4.7 V	Ignition switch ON, Throttle valve at full open position
C51-3-10	Mass air flow sensor	1.0 – 1.6 V	Ignition switch ON and engine stops
		1.7 – 2.0 V	With engine running at idle speed
C51-3-11	Heated oxygen sensor-1 (bank 1) (if equipped)	Deflects between over and under 0.45 V	While engine running at 2,000 r/min. for 1 min. or longer after warmed up
C51-3-12	Ground for TP sensor	–	–
C51-3-13	Power source for TP sensor	4.75 – 5.25 V	Ignition switch ON
C51-3-14	Power source for MAP sensor		
C51-3-15	Power source	10 – 14 V	Ignition switch ON
C51-3-16	–	–	–
C51-3-17	Ground	–	–
C51-3-18	Pressure switch in 4WD air pump assembly	10 – 14 V	Ignition switch ON, Transfer lever : 4H or 4L range
		0 – 1 V	Ignition switch ON, Transfer lever : 2H range
C51-3-19	–	–	–
C51-3-20	Ignition switch	10 – 14 V	Ignition switch ON
C51-3-21	Heated oxygen sensor-1 (bank 2) (if equipped)	Deflects between over and under 0.45 V	While engine running at 2,000 r/min. for 1 min. or longer after warmed up
C51-3-22	Heated oxygen sensor-2 (bank 1) (if equipped)	Deflects between over and under 0.45 V	While engine running at 2,000 r/min. for 1 min. or longer after warmed up
C51-3-23	Heated oxygen sensor-2 (bank 2) (if equipped)	Deflects between over and under 0.45 V	While engine running at 2,000 r/min. for 1 min. or longer after warmed up
C51-3-24	Ground for ECT sensor	–	–
C51-3-25	Ground for IAT sensor, MAP sensor	–	–
C51-3-26	Ground for CMP sensor	–	–
C51-1-1	Shift solenoid B (A/T vehicle)	0 – 1 V	Ignition switch ON
C51-1-2	Shift solenoid A (A/T vehicle)	10 – 14 V	Ignition switch ON
C51-1-3	–	–	–
C51-1-4	IAC valve (stepper motor coil 2)	–	–
C51-1-5	IAC valve (stepper motor coil 1)	–	–
C51-1-6	Transmission range switch “R” (A/T vehicle)	10 – 14 V	Ignition switch ON, selector lever : “R” range
		0 – 1 V	Ignition switch ON, selector lever : Other than “R”
C51-1-7	Transmission range switch “P” (A/T vehicle)	10 – 14 V	Ignition switch ON, selector lever : “P” range
		0 – 1 V	Ignition switch ON, selector lever : Other than “P” range
C51-1-8	TCC solenoid (A/T vehicle)	0 – 1 V	Ignition switch ON
C51-1-9	4WD air pump assembly	10 – 14 V	Ignition switch ON, Transfer lever : 4H or 4L range
		0 – 1 V	Ignition switch ON, Transfer lever : 2H range

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
C51-1-10	A/T input speed sensor (–) (A/T vehicle)	About 2.5 V	Ignition switch ON
C51-1-11	A/T input speed sensor (+) (A/T vehicle)	About 2.5 V	Ignition switch ON
C51-1-12	Camshaft position sensor 1	Deflects between 0 – 1 V and 4 – 6 V	Ignition switch ON, crankshaft turned slowly
C51-1-13	Camshaft position sensor 2	Deflects between 0 – 1 V and 4 – 6 V	Ignition switch ON, crankshaft turned slowly
C51-1-14	Vehicle speed sensor	Deflects between 0 – 1 V and over 4V	Ignition switch ON, Rear right tire turned slowly with rear left tire locked
C51-1-15	EVAP canister purge valve	10 – 14 V	Ignition switch ON
C51-1-16	IAC valve (stepper motor coil 4)	–	–
C51-1-17	IAC valve (stepper motor coil 3)	–	–
C51-1-18	Transmission range switch “D” (A/T vehicle)	10 – 14 V	Ignition switch ON, selector lever : “D” range
		0 – 1 V	Ignition switch ON, selector lever : Other than “D” range
C51-1-19	Transmission range switch “N” (A/T vehicle)	10 – 14 V	Ignition switch ON, selector lever : “N” range
		0 – 1 V	Ignition switch ON, selector lever : Other than “N” range
C51-1-20	Shield wire ground for A/T output speed sensor (A/T vehicle)	–	–
C51-1-21	Shield wire ground for A/T input speed sensor (A/T vehicle)	–	–
C51-1-22	A/T output speed sensor (–) (A/T vehicle)	About 2.5 V	Ignition switch ON
C51-1-23	A/T output speed sensor (+) (A/T vehicle)	About 2.5 V	Ignition switch ON
C51-1-24	Engine start signal	10 – 14 V	While engine cranking
		0 – 1 V	Other than above
C51-1-25	Power steering pressure switch	10 – 14 V	Ignition switch ON
		0 – 1 V	With engine running at idle speed, turning steering wheel to the right or left as far as it stops
C51-1-26	4WD low switch	0 – 1 V	Ignition switch ON, Transfer lever : 4WD low range
		10 – 14 V	Ignition switch ON, Transfer lever : 4H or 2H range
C51-1-27	Transmission range switch “L” (A/T vehicle)	10 – 14 V	Ignition switch ON, selector lever : “L” range
		0 – 1 V	Ignition switch ON, selector lever : Other than “L” range
C51-1-28	Transmission range switch “2” (A/T vehicle)	10 – 14 V	Ignition switch ON, selector lever : “2” range
		0 – 1 V	Ignition switch ON, selector lever : Other than “2” range

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
C51-2-1	Fuel injector No.2	10 – 14 V	Ignition switch ON
C51-2-2	Fuel injector No.1		
C51-2-3	–	–	–
C51-2-4	Heater of HO2S-1 (bank 1) (if equipped)	10 – 14 V	Ignition switch ON
		0 – 2 V	At specified idle speed after engine warmed up
C51-2-5	Heater of HO2S-1 (bank 2) (if equipped)	10 – 14 V	Ignition switch ON
		0 – 2 V	At specified idle speed after engine warmed up
C51-2-6	–	–	–
C51-2-7	Ground	–	–
C51-2-8	Fuel injector No.4	10 – 14 V	Ignition switch ON
C51-2-9	Fuel injector No.3		
C51-2-10	–	–	–
C51-2-11	–	–	–
C51-2-12	EGR valve (stepper motor coil 4) (if equipped)	0 – 1 V	Ignition switch ON
C51-2-13	EGR valve (stepper motor coil 3) (if equipped)	10 – 14 V	
C51-2-14	EGR valve (stepper motor coil 2) (if equipped)	10 – 14 V	
C51-2-15	EGR valve (stepper motor coil 1) (if equipped)	0 – 1 V	
C51-2-16	Heater of HO2S-2 (bank 1) (if equipped)	10 – 14 V	Ignition switch ON
		0 – 1 V	At specified idle speed after engine warmed up
C51-2-17	Heater of HO2S-2 (bank 2) (if equipped)	10 – 14 V	Ignition switch ON
		0 – 1 V	At specified idle speed after engine warmed up
C51-2-18	–	–	–
C51-2-19	Crankshaft position sensor (+) (if equipped)	–	–
C51-2-20	Crankshaft position sensor (–) (if equipped)	–	–
C51-2-21	Fuel injector No.6	10 – 14 V	Ignition switch ON
C51-2-22	Fuel injector No.5		
C51-2-23	Ignition coil assembly for No.6	–	–
C51-2-24	Ignition coil assembly for No.5	–	–
C51-2-25	Ignition coil assembly for No.4	–	–
C51-2-26	Ignition coil assembly for No.3	–	–
C51-2-27	Ignition coil assembly for No.2	–	–
C51-2-28	Ignition coil assembly for No.1	–	–
C51-2-29	–	–	–
C51-2-30	Ground for CKP sensor shield wire (if equipped)	–	–

RESISTANCE CHECK



1) Disconnect couplers (1) from ECM/PCM with ignition switch OFF.

> **CAUTION:**
> **Never touch terminals of ECM/PCM itself or connect voltmeter or ohmmeter (2).**

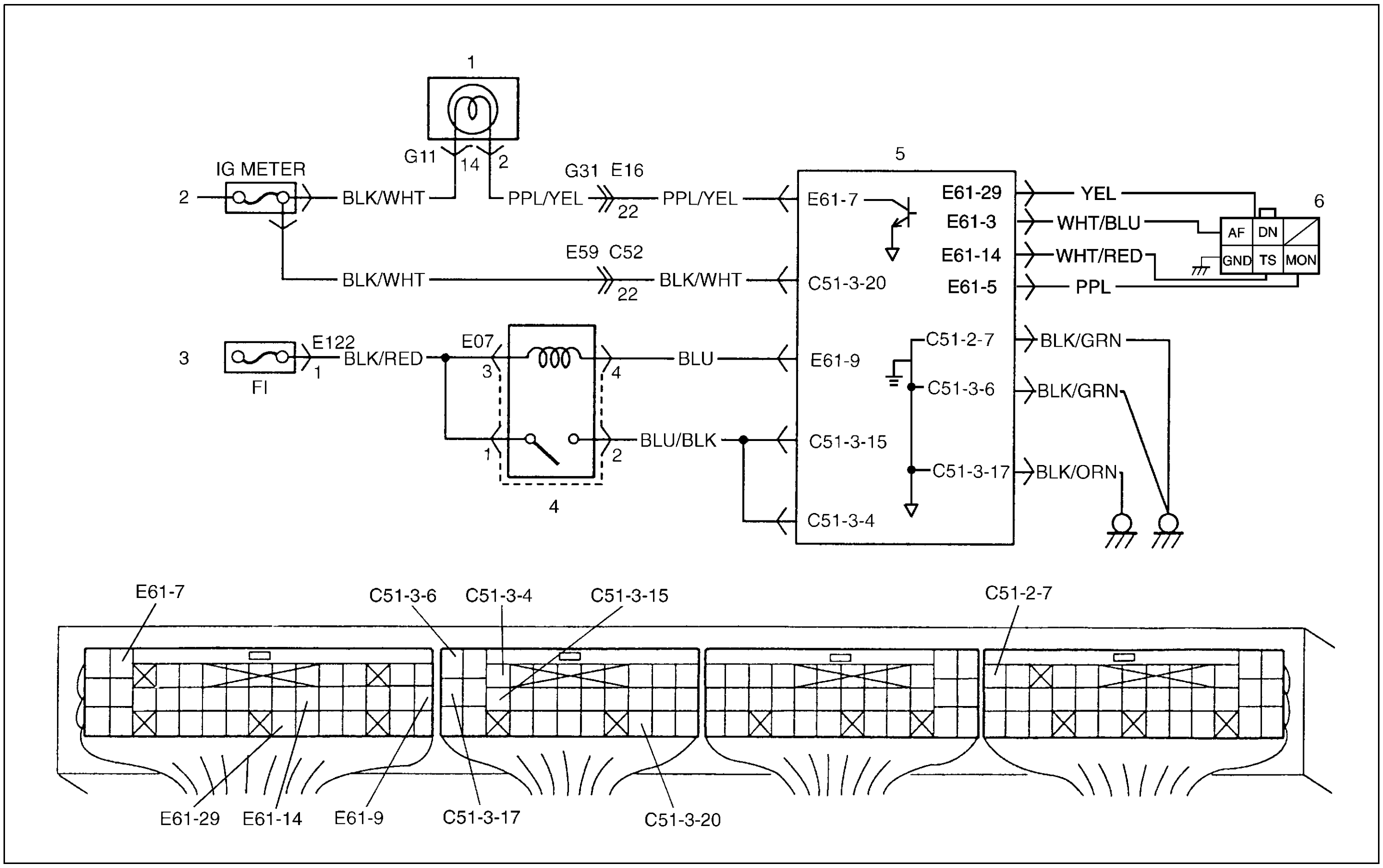
2) Check resistance between each pair of terminals of disconnected couplers (1) as listed in following table.

> **CAUTION:**
> - **Be sure to connect ohmmeter (2) 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).**

TERMINALS	CIRCUIT	STANDARD RESISTANCE	CONDITION
E61-9 and E61-2	Main relay	79 – 95 Ω	–
E61-22 and C51-3-20	A/C fan motor relay (if equipped)	75 – 110 Ω	Battery disconnected and ignition switch ON
E61-23 and C51-3-20	Fuel pump relay	79 – 95 Ω	–
C51-3-6 and Body ground	Ground	Continuity	–
C51-3-17 and Body ground	Ground	Continuity	–
C51-1-1 and Body ground	Shift solenoid B (A/T)	11 – 15 Ω	–
C51-1-2 and Body ground	Shift solenoid A (A/T)		
C51-1-4 and C51-3-4	IAC valve (stepper motor coil 2)	25.5 – 33.5 Ω	–
C51-1-5 and C51-3-4	IAC valve (stepper motor coil 1)		
C51-1-8 and Body ground	TCC solenoid (A/T)	11 – 15 Ω	–
C51-1-15 and C51-3-4	EVAP canister purge valve	28 – 35 Ω	–
C51-1-16 and C51-3-4	IAC valve (stepper motor coil 4)	25.5 – 33.5 Ω	–
C51-1-17 and C51-3-4	IAC valve (stepper motor coil 3)		
C51-2-1 and C51-3-4	Fuel injector No.2	13 – 16 Ω	–
C51-2-2 and C51-3-4	Fuel injector No.1		
C51-2-4, C51-2-5 and E61-9	Heater of HO2S-1	5.0 – 6.4 Ω	–
C51-2-7 and Body ground	Ground	Continuity	–
C51-2-8 and C51-3-4	Fuel injector No.4	13 – 16 Ω	–
C51-2-9 and C51-3-4	Fuel injector No.3		
C51-2-12 and C51-3-4	EGR valve (stepper motor coil 4)	20 – 24 Ω	–
C51-2-13 and C51-3-4	EGR valve (stepper motor coil 3)		
C51-2-14 and C51-3-4	EGR valve (stepper motor coil 2)		
C51-2-15 and C51-3-4	EGR valve (stepper motor coil 1)		
C51-2-16, C51- 2-17 and E61-9	Heater of HO2S-2	11.7 – 14.3 Ω	–
C51-2-21 and C51-3-4	Fuel injector No.6	13 – 16 Ω	–
C51-2-22 and C51-3-4	Fuel injector No.5		

Table A-1 Malfunction Indicator Lamp Circuit Check – Lamp Does Not Come “ON” or Dims at Ignition Switch ON (But Engine at Stop)

WIRING DIAGRAM



1.	MIL
2.	To ignition switch
3.	Main fuse
4.	Main relay
5.	ECM (PCM)
6.	Monitor connector (if equipped)

CIRCUIT DESCRIPTION

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

INSPECTION

Step	Action	Yes	No
1	MIL power supply check : 1) Turn ignition switch ON. Do other indicator/warning lights in combination meter comes ON?	Go to Step 2.	“IG METER” fuse blown, main fuse blown, Ignition switch malfunction, “BLK/WHT” circuit between “IG METER” fuse and combination meter or poor coupler connection at combination meter.

Step	Action	Yes	No
2	ECM power and ground circuit check : Does engine start?	Go to Step 3.	Go to "TABLE A-3 ECM (PCM) POWER AND GROUND CIRCUIT CHECK" in this section. If engine is not cranked, go to "DIAGNOSIS" in Section 6G.
3	MIL circuit check : 1) Turn ignition switch OFF and disconnect connectors from ECM. 2) Check for proper connection to ECM at terminal E61-7. 3) If OK, then using service wire, ground terminal E61-7 in connector disconnected. Does MIL turn on at ignition switch ON?	Substitute a known-good ECM (PCM) and recheck.	Bulb burned out or "PPL/YEL" wire circuit open.

Table A-2 Malfunction Indicator Lamp Circuit Check – Lamp Remains "ON" after Engine Starts

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Refer to TABLE A-1.

INSPECTION

Step	Action	Yes	No
1	DTC check : 1) With ignition switch OFF, install scan tool. 2) Start engine and check DTC. Is there any malfunction DTC (s).	Go to Step 2 of "ENGINE DIAG. FLOW TABLE" in this section.	Go to Step 2.
2	MIL circuit check : 1) With ignition switch OFF, disconnect couplers from ECM (PCM). Does MIL turn ON at ignition switch ON?	"PPL/YEL" wire shorted to ground circuit.	Substitute a known-good ECM (PCM) and recheck.

Table A-3 Malfunction Indicator Lamp Check – MIL Flashes at Ignition Switch ON (Vehicle with Monitor Connector)

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Refer to TABLE A-1.

TROUBLESHOOTING

Step	Action	Yes	No
1	MIL Flashing Pattern check: 1) Turn ignition switch ON. Does lamp flashing pattern indicate diagnostic trouble code?	Go to Step 2.	Go to “Diagnosis” in Section 8G.
2	Diag. Switch Circuit check: Is diag. switch terminal connected to ground via service wire?	System is in good condition.	“YEL” circuit shorted to ground. If circuit is OK substitute a known-good ECM (PCM) and recheck.

Table A-4 Malfunction Indicator Lamp Check – MIL Does Not Flash or Just Remains ON Even with Grounding Diagnosis Switch Terminal (Vehicle with Monitor Connector)

WIRING DIAGRAM/CIRCUIT DESCRIPTION

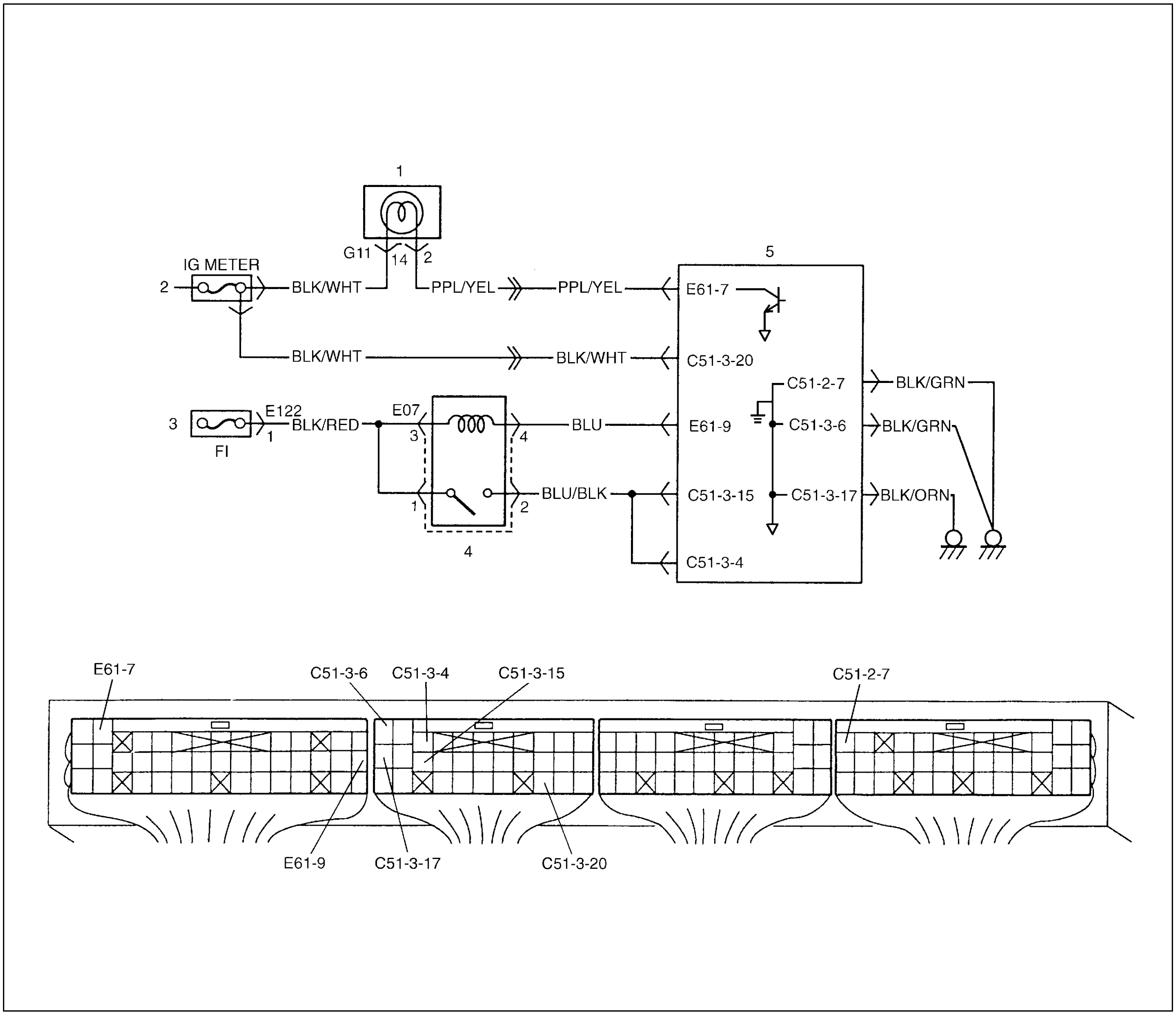
Refer to TABLE A-1.

TROUBLESHOOTING

Step	Action	Yes	No
1	MIL Circuit check: 1) Turn ignition switch OFF and disconnect connectors from ECM (PCM). Does MIL turn ON at ignition switch ON?	“PPL/YEL” circuit shorted to ground.	Go to Step 2.
2	ECM (PCM) Connection check: 1) Turn ignition switch OFF. Is connector (E61-29 connection) connected to ECM (PCM) properly?	Go to Step 3.	Poor connector connection.
3	Diag. switch Terminal Circuit check: 1) Connect connectors to ECM (PCM). 2) Using service wire, ground E61-29 terminal with connectors connected to ECM (PCM). 3) Turn ignition switch ON. Does MIL flash?	“YEL” or “BLK” circuit open.	Substitute a known-good ECM (PCM) and recheck.

Table A-5 ECM (PCM) Power and Ground Circuit Check – MIL Doesn't Light at Ignition Switch ON and Engine Doesn't Start Though It Is Cranked Up

WIRING DIAGRAM



1.	MIL
2.	To ignition switch
3.	Main fuse
4.	Main relay
5.	ECM (PCM)

CIRCUIT DESCRIPTION

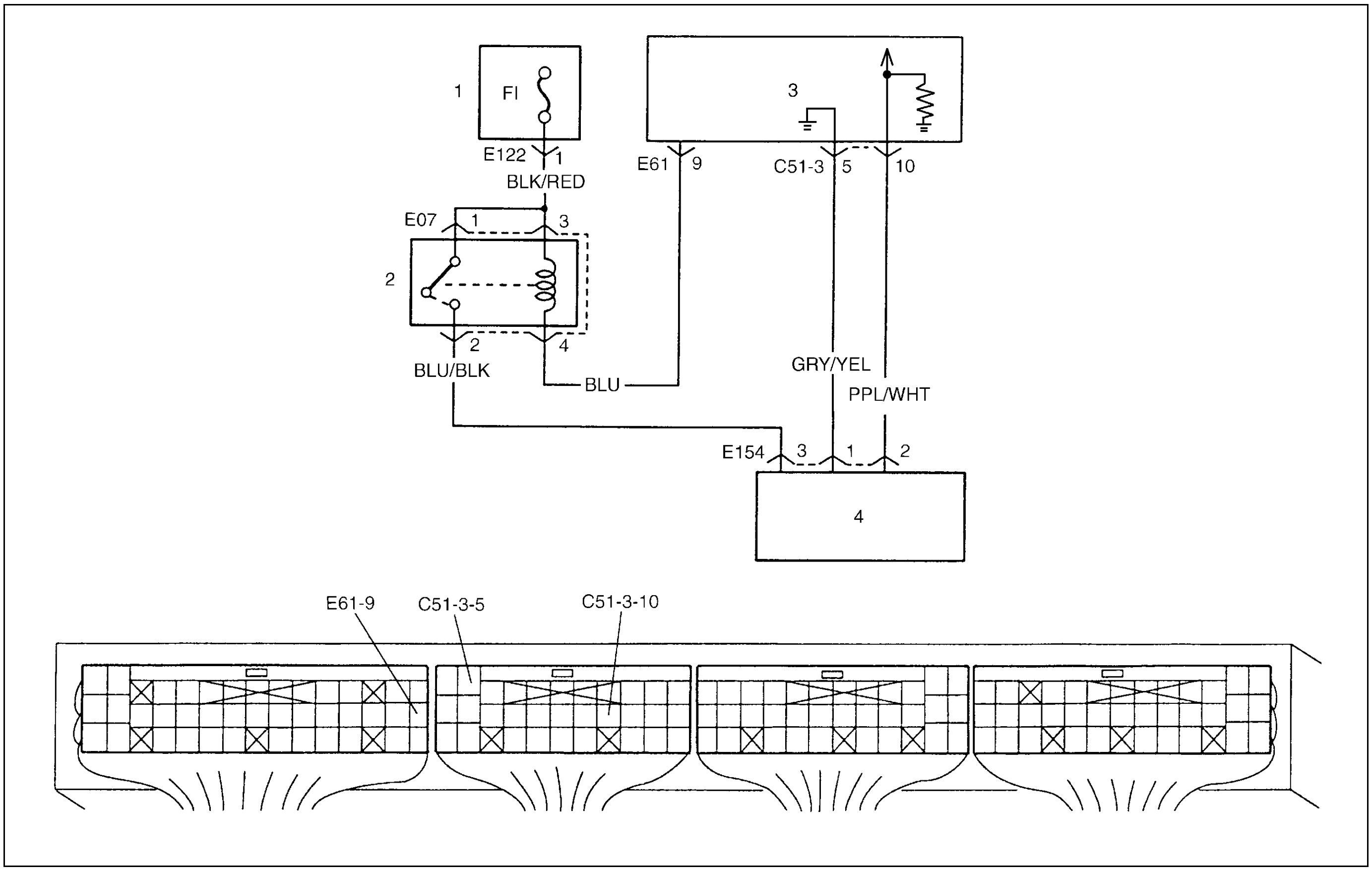
When the ignition switch is turned ON, the main relay turns ON (the contact point closes) and the main power is supplied to ECM (PCM).

INSPECTION

Step	Action	Yes	No
1	Main relay operating sound check : Is operating sound of main relay heard at ignition switch ON?	Go to Step 5.	Go to Step 2.
2	Fuse check : Is main “FI” fuse in good condition?	Go to Step 3.	Check for short in circuits connected to this fuse.
3	Main relay check : 1) Turn OFF ignition switch and remove main relay. 2) Check for proper connection to main relay at terminal 3 and 4. 3) If OK, check main relay for resistance and operation referring to “MAIN RELAY INSPECTION” in Section 6E2. Is check result satisfactory?	Go to Step 4.	Replace main relay.
4	ECM (PCM) power circuit check : 1) Turn OFF ignition switch, disconnect connectors from ECM (PCM) and install main relay. 2) Check for proper connection to ECM (PCM) at terminals C51-3-20, E61-9, C51-3-15 and C51-3-4. 3) If OK, then measure voltage between terminal C51-3-20 and ground, E61-9 and ground with ignition switch ON. Is each voltage 10 – 14 V?	Go to Step 5.	“BLK/WHT”, “BLU” or “BLK/RED” circuit open.
5	ECM power circuit check : 1) Using service wire, ground terminal E61-9 and measure voltage between terminal C51-3-15 and ground at ignition switch ON. Is it 10 – 14 V?	Check ground circuits “BLK/GRN” and “BLK/ORN” for open. If OK, then substitute a known-good ECM (PCM) and recheck.	Go to Step 6.
6	Is operating sound of main relay heard in Step 1?	Go to Step 7.	“BLK/RED” or “BLU/BLK” wire open.
7	Main relay check : 1) Check main relay according to procedure in Step 3. Is main relay in good condition?	“BLK/RED” or “BLU/BLK” wire open.	Replace main relay.

DTC P0100 (DTC No.33, 34) Mass Air Flow Circuit Malfunction

WIRING DIAGRAM



1.	Main fuse
2.	Main relay
3.	ECM/PCM
4.	Mass air flow sensor

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Any one of the following conditions are detected for 5 sec. continuously. • Engine running and more than 3 sec. after ignition switch ON and less than 0.64 mA MAF sensor output current continues for 100 msec. • Engine running and more than 3 sec. after ignition switch ON and more than 4.90 mA MAF sensor output current continues for 100 msec.	• MAF sensor circuit • MAF sensor • ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 person, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".
Intake air temp. : – 8°C (18°F) or higher
Engine coolant temp. : – 8 – 110°C (18 – 230°F)
Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)

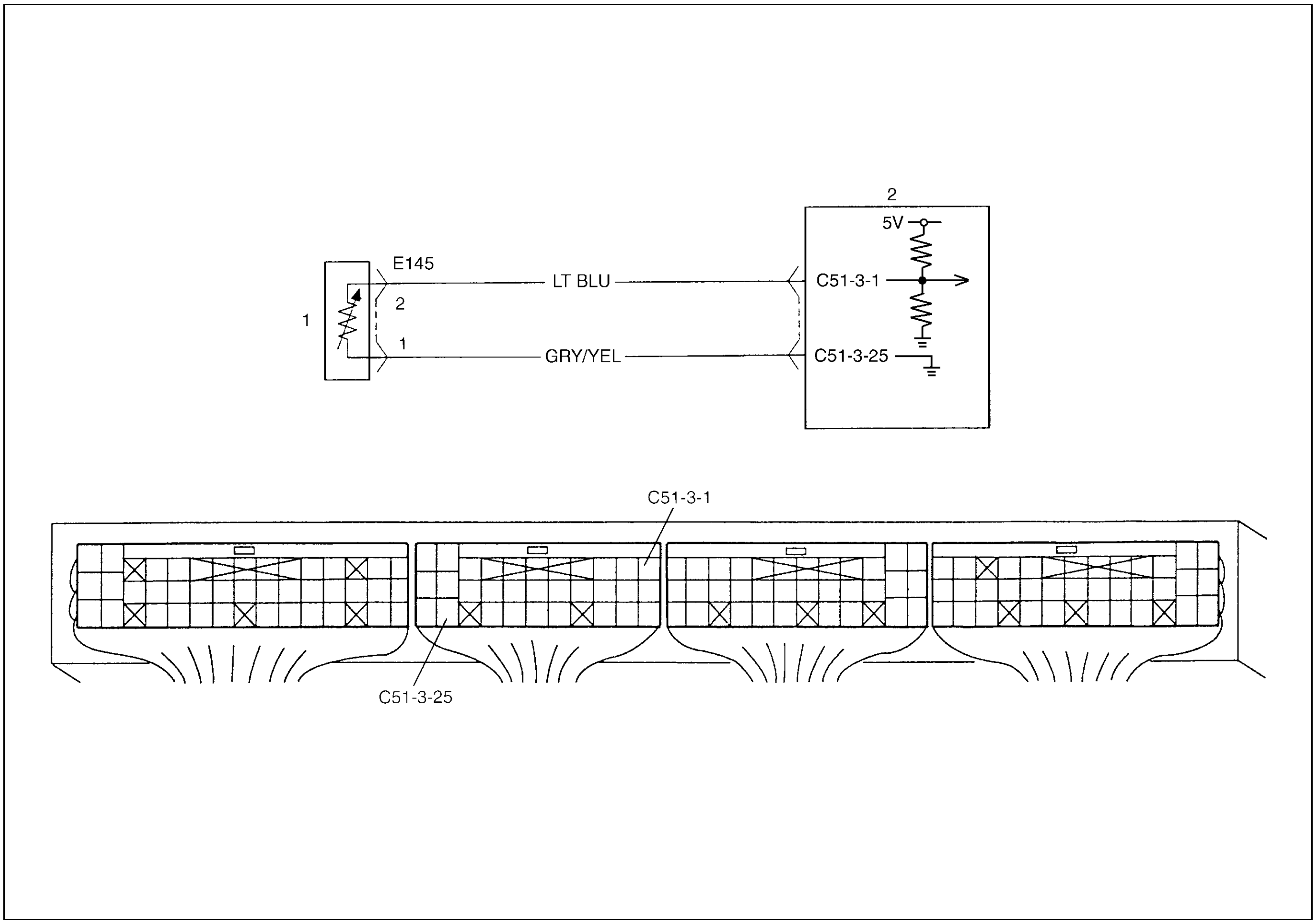
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine at idle speed for 20 sec. or more.
3) Check DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	MAF sensor check : 1) Connect scan tool to DLC with ignition switch OFF. 2) Start engine and check MAF value displayed on scan tool. (Refer to "SCAN TOOL DATA" in this section for normal value.) Is normal value indicated?	Intermittent trouble. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Go to Step 3.
3	MAF sensor power supply check : 1) With ignition switch OFF, disconnect MAF sensor coupler. 2) With ignition switch ON, check voltage between E154-3 of MAF sensor coupler and ground. Is voltage 10 – 14 V?	Go to Step 4.	Faulty "BLU/BLK" wire.
4	MAF sensor output voltage check : 1) With ignition switch OFF, connect MAF sensor coupler. 2) Remove ECM (PCM) cover. 3) With ignition switch ON leaving engine OFF, check voltage between C51-3-10 and C51-3-5 terminal. Is voltage 1.0 – 1.6 V?	Poor C51-3-10 or/C51-3-5 terminal connection. If OK, substitute a known-good ECM (PCM) and recheck.	Faulty "PPL/WHT" wire. Poor E154 coupler terminal connection. If wire and connection are OK, substitute a known-good MAF sensor and recheck.

DTC P0110 (DTC No.23, 25) Intake Air Temp. (IAT) Circuit Malfunction

WIRING DIAGRAM



1.	IAT sensor
2.	ECM (PCM)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Any one of the conditions are detected for 5 sec. continuously. • Low intake air temperature (high voltage-high resistance) • High intake air temperature (Low voltage-low resistance)	• IAT sensor circuit • IAT sensor • ECM (PCM) malfunction

DTC CONFIRMATION PROCEDURE

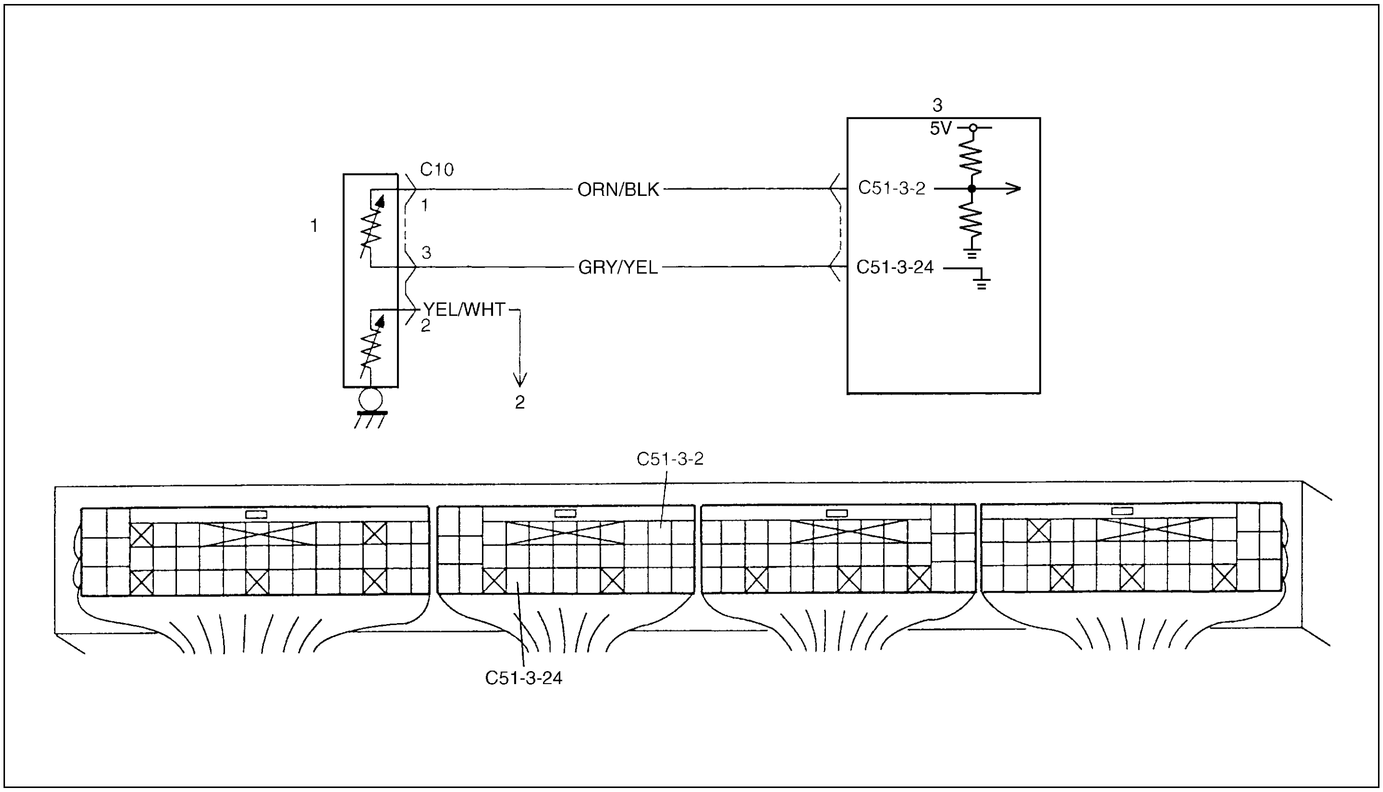
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine at idle speed and engine coolant temp. 110°C (230°F) or lower for 10 sec. or more.
3) Check DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Check IAT sensor and its circuit : 1) Connect scan tool with ignition switch OFF. 2) Turn ignition switch ON. 3) Check intake air temp. displayed on scan tool. Is – 40°C (– 40°F) or 165°C (329°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.
3	Check wire harness : 1) Disconnect IAT sensor connector with ignition switch OFF. 2) Check for proper connection to IAT sensor at “LT BLU” and “GRY/YEL” wire terminals. If OK, then with ignition switch ON, is voltage applied to “LT BLU” wire terminal about 4 – 6 V?	Go to Step 4.	“LT BLU” wire open or short, or poor C51-3-1 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.
4	Check wire harness : 1) Using service wire, connect IAT sensor connector terminals. 2) Turn ignition switch ON and check intake air temp. displayed on scan tool. Is 165°C (329°F) indicated?	Replace IAT sensor.	“GRY/YEL” wire open or poor C51-3-25 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.

DTC P0115 (DTC No.14, 15) Engine Coolant Temp. Circuit Malfunction

WIRING DIAGRAM



1.	ECT sensor
2.	To combination (ECT) meter
3.	ECM (PCM)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Any one of the conditions are detected for 5 sec. continuously. • Low engine coolant temperature (high voltage-high resistance) • High engine coolant temperature (low voltage-low resistance)	ECT sensor circuit ECT sensor ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following conditions are satisfied when using this “DTC CONFIRMATION PROCEDURE”.

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

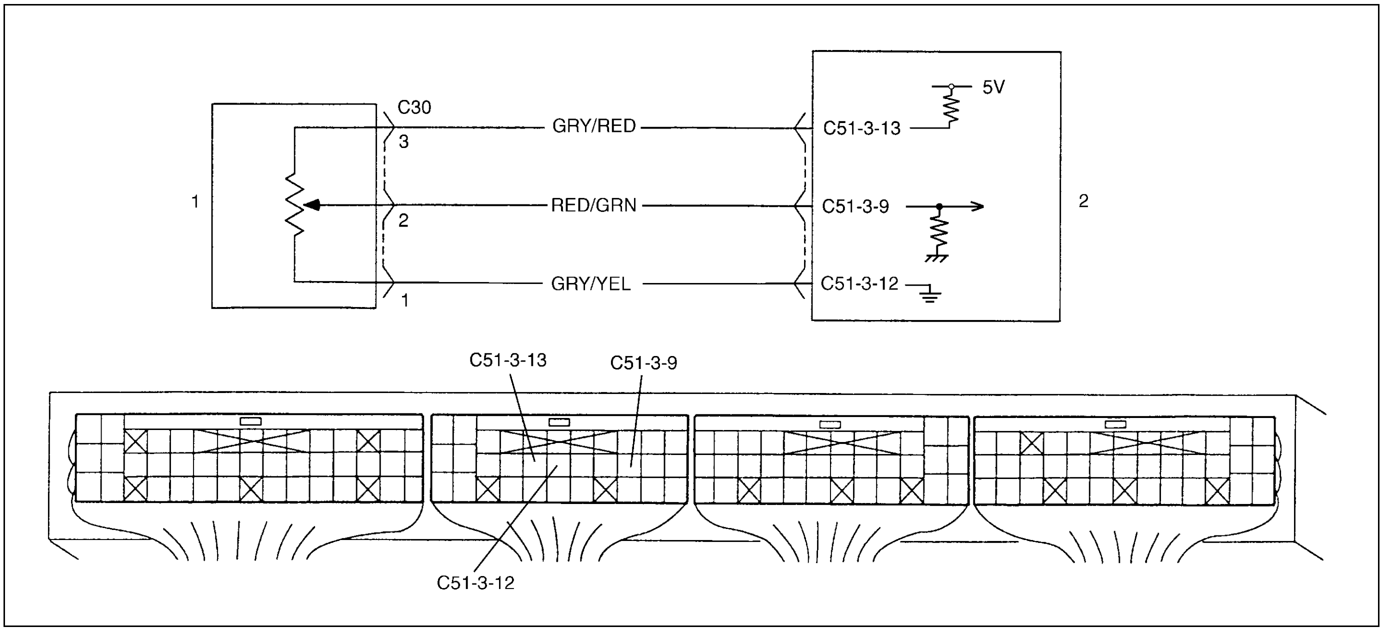
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine at idle speed for 10 sec. or more.
3) Check DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	Check ECT sensor and its circuit : 1) Connect scan tool with ignition switch OFF. 2) Turn ignition switch ON. 3) Check engine coolant temp. displayed on scan tool. Is – 40°C (– 40°F) or 164°C (327°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.
3	Check wire harness : 1) Disconnect ECT sensor connector with ignition switch OFF. 2) Check for proper connection to ECT sensor at "ORN/BLK" and "GRY/YEL" wire terminals. If OK, then with ignition switch ON, is voltage applied to "ORN/BLK" wire terminal about 4 – 6 V?	Go to Step 4.	"ORN/BLK" wire open or short, or poor C51-3-2 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.
4	Check wire harness : 1) Using service wire, connect ECT sensor connector terminals. 2) Turn ignition switch ON and check engine coolant temp. displayed on scan tool. Is 164°C (327°F) indicated?	Replace ECT sensor.	"GRY/YEL" wire open or poor C51-3-23 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.

DTC P0120 (DTC No.21, 22) Throttle Position Circuit Malfunction

WIRING DIAGRAM



1.	Throttle position sensor
2.	ECM (PCM)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Following conditions are detected for 5 sec. continuously. • Engine running • Signal voltage low or signal voltage high	• TP sensor circuit • TP sensor • ECM (PCM)

NOTE:

Check to make sure that following conditions are satisfied when using this “DTC CONFIRMATION PROCEDURE”.

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude barometric pressure : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

DTC CONFIRMATION PROCEDURE

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine at idle speed for 10 sec. or more.
3) Check DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Check TP sensor and its circuit. 1) Connect scan tool to DLC with ignition switch OFF and then turn ignition switch ON. 2) Check throttle valve opening percentage displayed on scan tool. Is it displayed 3% or less? 3) Check throttle valve opening percentage displayed on scan tool while opening throttle valve from idle position to full open position. Is it displayed 96% or higher?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.
3	Check wire harness. 1) Disconnect connector from TP sensor with ignition switch OFF. 2) Check for proper connection to TP sensor at "GRY/RED", "RED/GRN" and "GRY/YEL" wire terminal. 3) If OK, then with ignition switch ON, check voltage between each of "GRY/RED" or "RED/GRN" wire terminals and body ground. Is voltage about 4 – 6 V at each terminal?	Go to Step 4.	"GRY/RED" wire open, "GRY/RED" wire shorted to ground circuit or power circuit or "RED/GRN" wire, "GRY/YEL" wire open or shorted to ground circuit or poor C51-3-13 or C51-3-9 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
4	Check TP sensor. 1) Check resistance between terminals of TP sensor referring to "TP SENSOR" in Section 6E2. Are measured values within specifications?	"RED/GRN" wire shorted to power circuit. If wire is OK, substitute a known-good ECM (PCM) and recheck.	Replace TP sensor.

DTC P0121 Throttle Position Circuit Range/Performance Problem

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Refer to DTC P0120.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Throttle opening change is smaller than specification while intake air volume changes and engine is running at constant speed. (2 driving cycle detection logic)	• TP sensor • ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this “DTC CONFIRMATION PROCEDURE”.

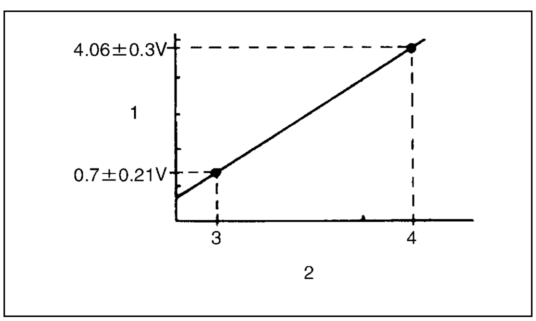
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude barometric pressure : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and start engine.
3) Increase vehicle speed to 60 km/h (40 mph).
4) Keep driving above vehicle speed for 5 min (Change of vehicle speed is permitted in this step).
5) Stop vehicle and run engine at idle speed for 1 min.
6) Increase vehicle speed till engine speed is reached 2,000 – 3,000 r/min in proper gear.
7) Keep driving at that engine speed for 30 sec or more (Engine speed is kept constant in this step).
8) Stop vehicle.
9) Repeat step 6) to 8).
10) Check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Is there a DTC related to TP sensor (DTC P0120)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	Do you have SUZUKI scan tool ?	Go to Step 4.	Go to Step 5.
4	Check TP sensor and its circuit (using SUZUKI scan tool) : 1) Turn ignition switch OFF and connect SUZUKI scan tool to DLC. 2) Turn ignition switch ON and check TP sensor output voltage when throttle valve is at idle position and fully opened. Does voltage vary within specified value linearly as shown in the figure?	Substitute a known-good ECM (PCM) and recheck.	Go to Step 6.
5	Check TP sensor and its circuit (not using SUZUKI scan tool) : 1) Turn ignition switch ON. 2) Check voltage at terminal C51-3-9 of ECM connector connected, when throttle valve is at idle position and fully opened. Does voltage vary within specified value linearly as shown in the figure?	If voltmeter was used, check terminal C51-3-9 for poor connection. If OK, substitute a known-good ECM (PCM) and recheck.	Go to Step 6.
6	Check TP sensor : 1) Turn ignition switch OFF. 2) Disconnect TP sensor connector. 3) Check for proper connection to TP sensor at each terminal. 4) If OK, check TP sensor for resistance referring to “TP SENSOR” in Section 6E2. Is check result satisfactory?	High resistance in “GRY/RED”, “RED/GRN” or “GRY/YEL” circuit. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace TP sensor.

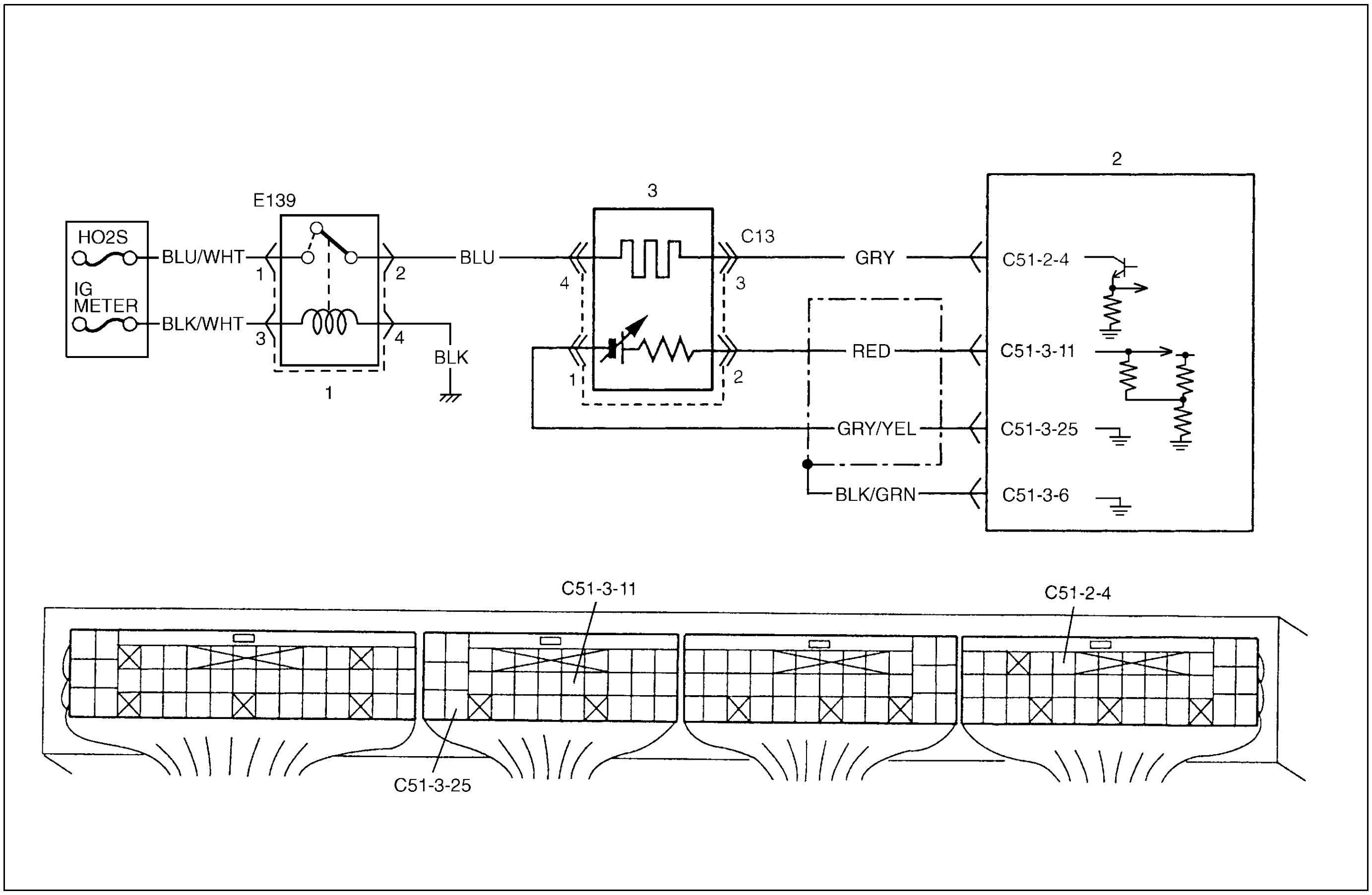
Fig. for Steps 4 and 5



1.	Voltage
2.	Throttle opening
3.	At idle position
4.	Fully open

DTC P0130 (DTC No.13) HO2S-1 (Bank 1) Circuit Malfunction or No Activity Detected

WIRING DIAGRAM



1.	HO2S heater relay
2.	ECM (PCM)
3.	HO2S-1 (Bank-1)

DTC DETECTING CONDITION AND TROUBLE AREA

NOTE:

For vehicle with monitor connector, DTC will set when following only (*) mark condition is detected.

DTC DETECTING CONDITION	TROUBLE AREA
Any one of the following conditions are detected in idle state while running under driving conditions described for “DTC CONFIRMATION PROCEDURE”. • 4.5 V or more HO2S circuit voltage is detected, when 5 V power is connected to HO2S circuit in ECM (PCM), or • Max. output voltage of HO2S is 0.6 V or lower on average and its minimum voltage on average is 0.3 V or lower. • Min. output voltage of HO2S is over 3.0 V or • Max. output voltage of HO2S is 0.74 V or higher on average and its min. voltage on average is 0.33 V or higher. • *Output voltage of HO2S-1 does not exceed 0.45 V for specified time. (2 driving cycle detection logic)	HO2S-1 or its circuit. Fuel system ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

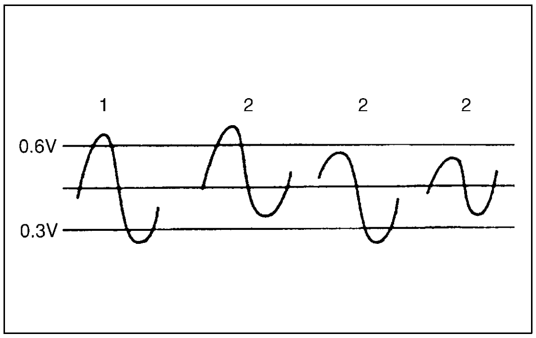
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and start engine.
3) Increase vehicle speed to 55 km/h (35 mph) or more.
4) Keep driving above vehicle speed for 2 min. or more (Change of vehicle speed is permitted in this step).
5) Stop vehicle, and run engine at idle speed for 1 min.
6) Check if pending DTC exists by using scan tool. If not, check if oxygen sensor monitoring test has completed by using scan tool. If not in both of above checks (i.e., no pending DTC and oxygen sensor monitoring test not completed), check vehicle condition (environmental) and repeat step 3) through 6).

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	HO2S-1 output voltage check : 1) Connect scan tool to DLC with ignition switch OFF. 2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec. 3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously to enrich A/F mixture and take foot off from pedal to enlean and check HO2S output voltage displayed on scan tool. See Fig. Is over 0.6 V and below 0.3 V indicated?	Go to Step 4.	Go to Step 3.
3	HO2S-1 check : 1) With ignition switch OFF, disconnect HO2S-1 connector. 2) Check for proper connection to HO2S-1 at each terminal. 3) If OK, connect voltmeter "1" and "2" terminal of HO2S-1 connector. 4) Start engine and check voltmeter while repeating racing engine. Is over 0.6 V and below 0.3 V indicated?	"RED" or "GRY/YEL" circuit open or short. If wire and connections are OK, substitute a known-good ECM (PCM) and recheck.	Replace HO2S-1.

Step	Action	Yes	No
4	Short term fuel trim check : 1) Run engine at 2000 r/min. for 60 sec. 2) With engine idling, check short term fuel trim displayed on scan tool. Is it within – 20 to +20 %?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to DTC P0171/ P0172 Diag. Flow Table.

Fig. for Step 2



1.	Normal
2.	NG

DTC P0133 HO2S-1 (Bank 1) Circuit Slow Response

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Refer to DTC P0130.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Following conditions are detected in idle state while running under driving conditions described for “DTC CONFIRMATION PROCEDURE”. Hi/Lo cycle (TRANS TIME displayed on scan tool) of HO2S-1 output voltage is longer than specification or response rates of Hi → Lo and Lo → Hi (TRANS TIME displayed as R → L threshold V or L → R threshold V on scan tool) are longer than specification. (2 driving cycle detection logic)	HO2S-1 ECM (PCM)

DTC CONFIRMATION PROCEDURE

Refer to DTC P0130.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	1) Replace HO2S-1 and recheck. Is DTC P0133 detected?	Substitute a known-good ECM (PCM) and recheck.	HO2S-1 malfunction.

DTC P0135 HO2S-1 (Bank 1) Heater Circuit Malfunction

WIRING DIAGRAM

Refer to DTC P0130.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Following condition is detected when HO2S heater is electrically live (2 driving cycle detection logic). • Current of HO2S heater is 5.3 A or more or less than 0.09 A, or • Voltage of HO2S heater is 14.0 V or higher or lower than 11.7 V.	HO2S-1 heater circuit HO2S-1 heater ECM (PCM) HO2S heater relay

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following conditions are satisfied when using this “DTC CONFIRMATION PROCEDURE”.

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

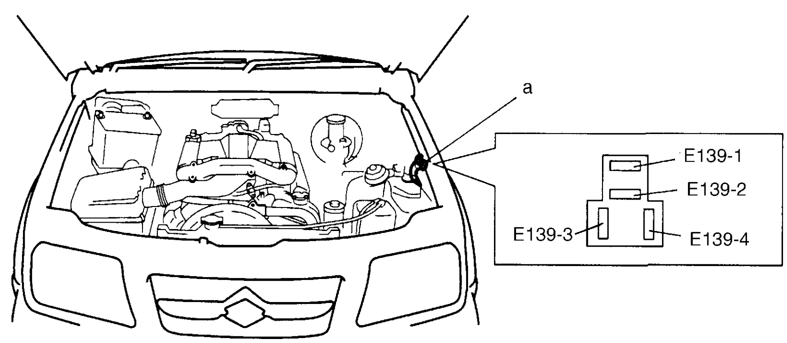
1) Connect scan tool with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine at idle speed for 5 min.
3) Check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	HO2S-1 heater check : 1) Disconnect HO2S-1 coupler with ignition switch OFF. 2) Check resistance between “3” and “4” terminal of HO2S-1 coupler. **HO2S-1 heater resistance :** **5.0 – 6.4 Ω (at 20°C (68°F))** Is it within above specification?	Go to Step 3.	Replace HO2S-1.
3	HO2S heater power supply check : 1) With ignition switch ON leaving engine OFF, check voltage between E139-3 and ground, E139-1 and ground. (See Fig.) Is each voltage 10 – 14 V?	Go to Step 4.	“HO2S”, and/or “IG METER” fuse blown. If OK, faulty “BLK/WHT” wire or “BLU/WHT” wire.

Step	Action	Yes	No
4	HO2S heater control circuit check : 1) With ignition switch OFF, install HO2S heater relay. 2) With ignition switch ON leaving engine OFF, check voltage between C51-2-4 and ground. Is the voltage 10 – 14 V?	Substitute a known-good ECM (PCM) and recheck.	Faulty HO2S heater relay or "BLK" wire open, "BLU" wire open or shorted to ground circuit or "GRY" wire open or shorted to ground circuit. If OK, substitute a known-good ECM (PCM) and recheck.

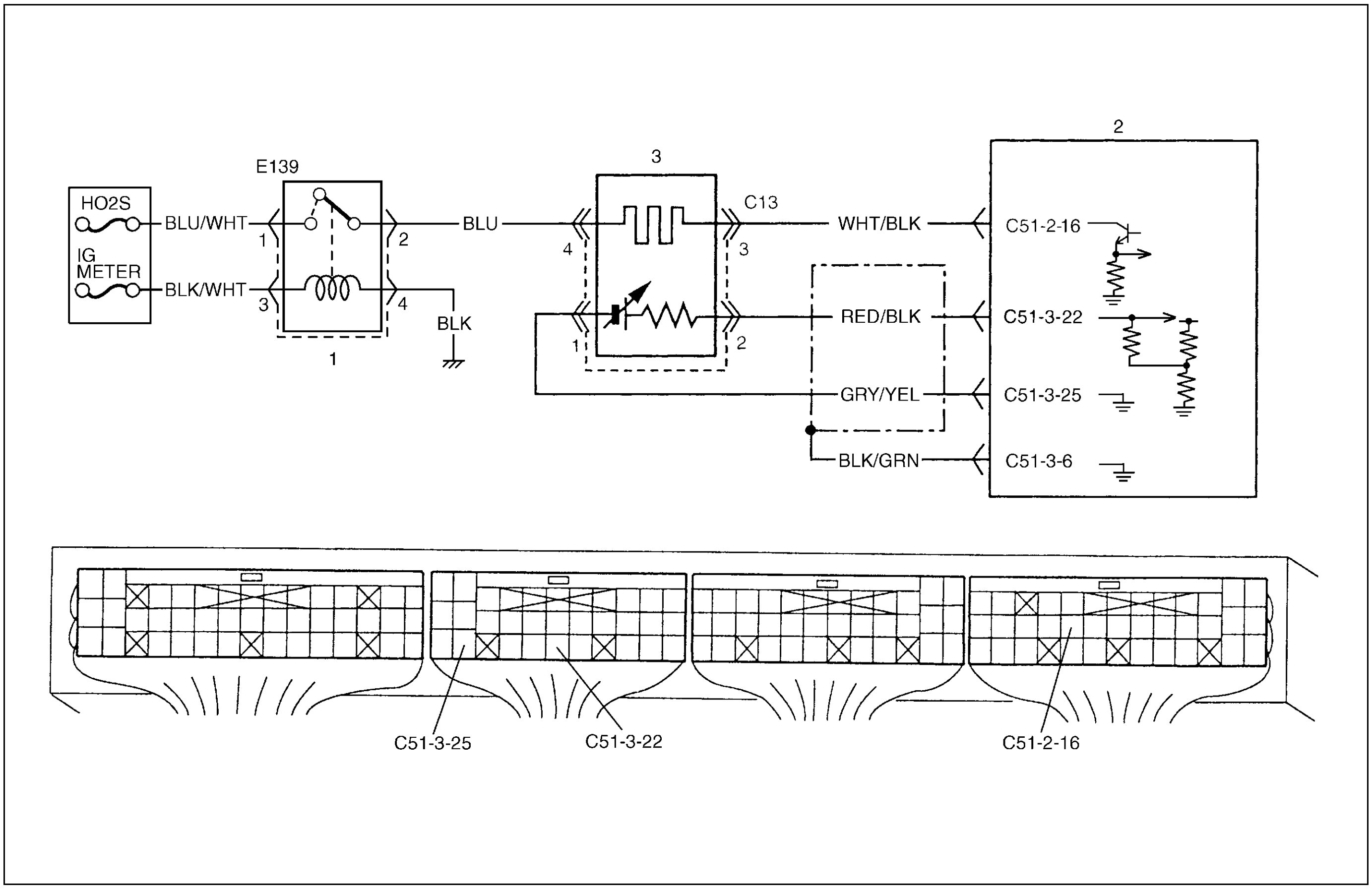
Fig. for STEP 3



a. HO2S heater relay

DTC P0136 HO2S-2 (Bank 1) Circuit Malfunction

WIRING DIAGRAM



1.	HO2S heater relay
2.	ECM (PCM)
3.	HO2S-2 (Bank-1)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
DTC will set when any one of following conditions is detected (2 driving cycle detection logic). • 4.5 V or more HO2S circuit voltage is detected when 5 V power is connected to HO2S circuit in ECM (PCM). • While running with A/F feed back, average output voltage during specified time is too high or too low. or • While running with A/F feed back, max output voltage during specified time is lower than specified value or min. output voltage during specified time is higher than specified value.	• HO2S-2 or its circuit • Fuel system • ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data in ECM memory by using scan tool and start engine.
3) Increase vehicle speed to 55 km/h (40 mph) or more.
4) Keep driving above vehicle speed till engine is warmed up completely (Changed of vehicle speed is permitted in this step).
5) Keep driving 50 – 60 km/h (30 – 40 mph) for 8 min. or more.
6) Stop vehicle and check if pending DTC exists by using scan tool. If not, check if oxygen sensor heater monitoring test has completed by using scan tool. If not in both of above checks (i.e., no pending DTC and oxygen sensor heater monitoring test not completed), check vehicle conditions (environmental) and repeat Steps 3) through 6).

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	HO2S-2 output voltage check : 1) Connect scan tool to DLC with ignition switch OFF. 2) Drive vehicle about 35 mph, 55 km/h for 2 min. or more. 3) Stop vehicle and check HO2S-2 output voltage displayed on scan tool while repeating racing engine. Is over and below 0.3 V indicated?	Go to Step 4.	Go to Step 3.
3	HO2S-2 check : 1) With ignition switch OFF, disconnect HO2S-2 coupler. 2) Connect voltmeter between "2" and "1" of HO2S-2 coupler. 3) Start engine and check voltmeter while repeating racing engine. Is over and below 0.3 V indicated?	"RED/BLK" or "GRY/YEL" circuit open/short. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace HO2S-2.
4	Short term fuel trim check : 1) Run engine at 2000 r/min. for 60 sec. 2) With engine idling, check short term fuel trim displayed on scan tool. Is it within – 20 to +20 %?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Go to DTC P0171/P0172 Diag. Flow Table.

DTC P0141 HO2S-2 (Bank 1) Heater Circuit Malfunction

WIRING DIAGRAM

Refer to DTC P0136.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Following condition is detected when HO2S-2 heater operates (2 driving cycle detection logic). • Current of HO2S-2 heater is more than 11.4 A or less than 0.32 A, or • Voltage of HO2S-2 heater is more than 13.8 V or less than 8.7 V.	HO2S-2 heater or its circuit ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".

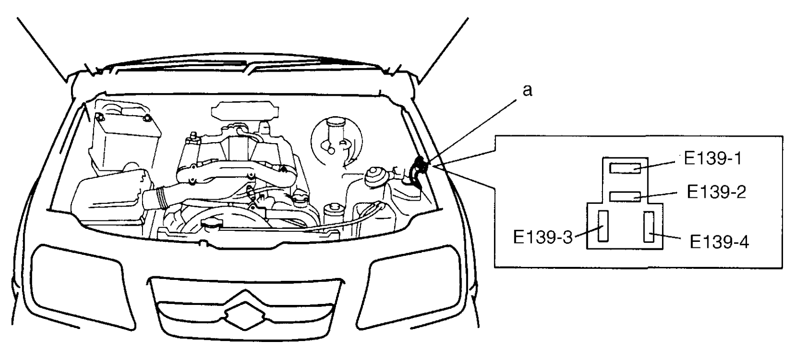
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data in ECM memory by using scan tool and start engine.
3) Increase vehicle speed to 50 – 60 km/h (30 – 40 mph).
4) Keep driving above vehicle speed for 5 min. (Change of vehicle speed is permitted in this step).
5) Stop vehicle and check if pending DTC exists by using scan tool. If not, check if oxygen sensor heater monitoring test has completed by using scan tool. If not in both of above checks (i.e., no pending DTC and oxygen sensor heater monitoring test not completed), check vehicle conditions (environmental) and repeat Steps 3) through 5).

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	HO2S-2 heater check : 1) Disconnect HO2S-2 coupler with ignition switch OFF. 2) Check resistance between "3" and "4" terminal of HO2S-2 connector. **HO2S -2 heater resistance :** **11.7 – 14.3 Ω (at 20°C (68°F))** Is it within above specification	Go to Step 3.	Replace HO2S-2.
3	HO2S heater power supply check : 1) With ignition switch ON leaving engine OFF, check voltage between E139-3 and ground, E139-1 and ground. (See Fig.) Is each voltage 10 – 14 V?	Go to Step 4.	Fuse "HO2S" and/or "IG METER" blown. If OK, faulty "BLK/WHT" wire or "BLU/WHT" wire.
4	HO2S heater control circuit check : 1) With ignition switch OFF, install HO2S heater relay. 2) With ignition switch ON leaving engine OFF, check voltage between C51-2-16 and ground. Is the voltage 10 – 14 V?	Substitute a known-good ECM (PCM) and recheck.	Faulty HO2S heater relay or "BLK" wire open, "BLU" wire open or shorted to ground circuit, "WHT/BLK" wire open or shorted to ground circuit. If OK, substitute a known-good ECM (PCM) and recheck.

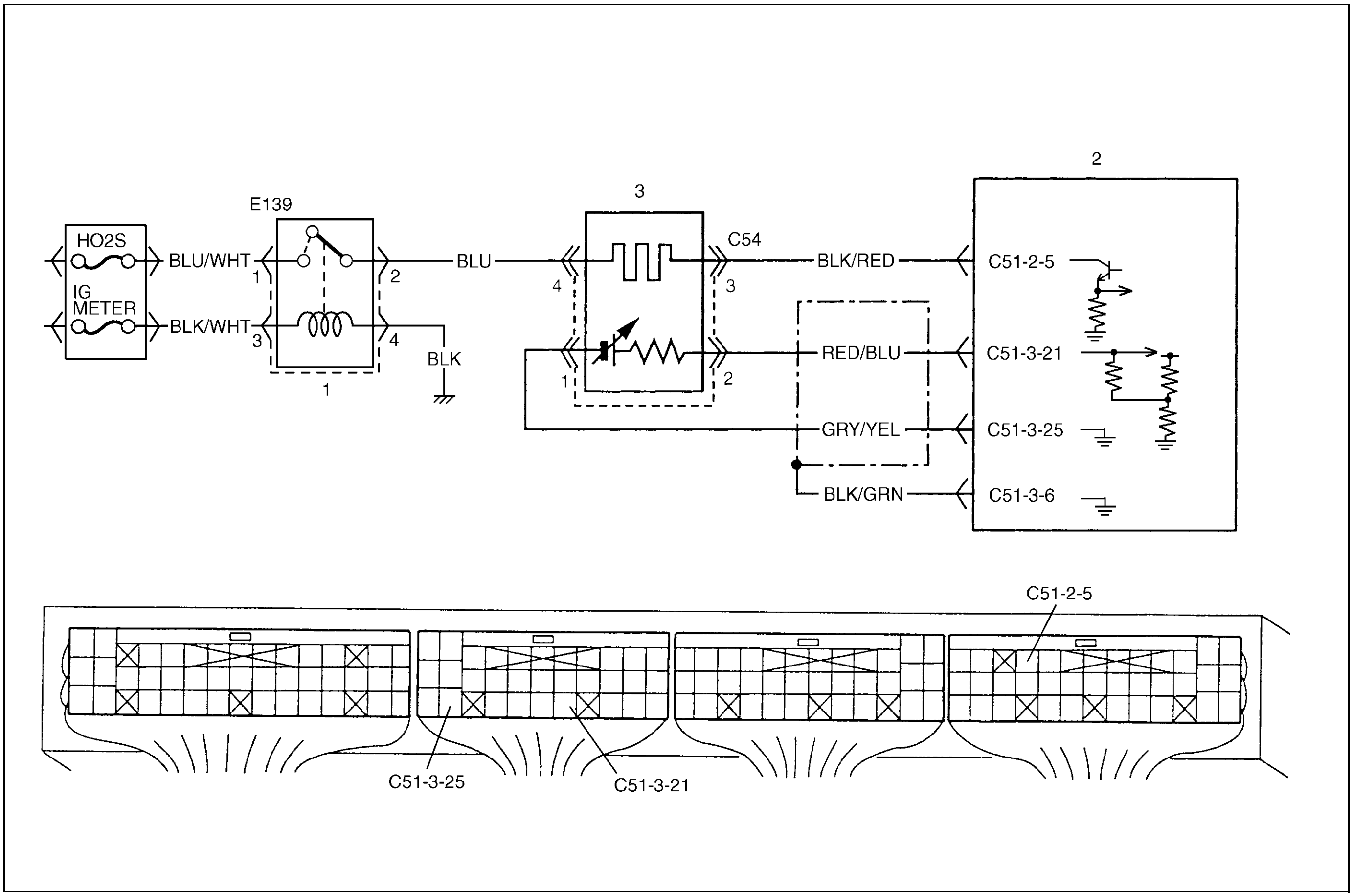
Fig. for STEP 2, 3



a. HO2S heater relay

DTC P0150 (DTC No.26) HO2S-1 (Bank 2) Circuit Malfunction or No Activity Detected

WIRING DIAGRAM



1.	HO2S heater relay
2.	ECM (PCM)
3.	HO2S-1 (Bank-2)

DTC DETECTING CONDITION AND TROUBLE AREA

NOTE:

For vehicle with monitor connector, DTC will set when following only (*) mark condition is detected.

DTC DETECTING CONDITION	TROUBLE AREA
Any one of the following conditions are detected in idle state while running under driving conditions described for “DTC CONFIRMATION PROCEDURE”. • 4.5 V or more HO2S circuit voltage is detected, when 5 V power is connected to HO2S circuit in ECM (PCM), or • Max. output voltage of HO2S is 0.6 V or lower on average and its minimum voltage on average is 0.3 V or lower. • Min. output voltage of HO2S is over 3.0 V or • Max. output voltage of HO2S is 0.74 V or higher on average and its min. voltage on average is 0.33 V or higher. • Output voltage of HO2S-1 does not exceed 0.45 V for specified time. (2 driving cycle detection logic)	HO2S-1 or its circuit. Fuel system ECM (PCM)

DTC CONFIRMATION PROCEDURE

> **WARNING:**
> - **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
> - **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

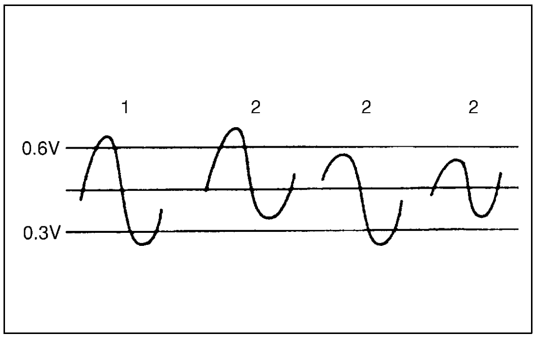
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and start engine.
3) Increase vehicle speed to 55 km/h (35 mph) or more.
4) Keep driving above vehicle speed for 2 min. or more (Change of vehicle speed is permitted in this step).
5) Stop vehicle, and run engine at idle speed for 1 min.
6) Check if pending DTC exists by using scan tool. If not, check if oxygen sensor monitoring test has completed by using scan tool. If not in both of above checks (i.e., no pending DTC and oxygen sensor monitoring test not completed), check vehicle condition (environmental) and repeat step 3) through 6).

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	HO2S-1 output voltage check : 1) Connect scan tool to DLC with ignition switch OFF. 2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec. 3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously to enrich A/F mixture and take foot off from pedal to enlean and check HO2S output voltage displayed on scan tool. See Fig. Is over 0.6 V and below 0.3 V indicated?	Go to Step 4.	Go to Step 3.
3	HO2S-1 check : 1) With ignition switch OFF, disconnect HO2S-1 connector. 2) Check for proper connection to HO2S-1 at each terminal. 3) If OK, connect voltmeter "1" and "2" terminal of HO2S-1 connector. 4) Start engine and check voltmeter while repeating racing engine. Is over 0.6 V and below 0.3 V indicated?	"RED/BLU" or "GRY/YEL" circuit open or short. If wire and connections are OK, substitute a known-good ECM (PCM) and recheck.	Replace HO2S-1.

Step	Action	Yes	No
4	Short term fuel trim check : 1) Run engine at 2000 r/min. for 60 sec. 2) With engine idling, check short term fuel trim displayed on scan tool. Is it within – 20 to +20 %?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Go to DTC P0174/ P0175 Diag. Flow Table.

Fig. for Step 2



1.	Normal
2.	NG

DTC P0153 HO2S-1 (Bank 2) Circuit Slow Response

WIRING DIAGRAM/CIRCUIT DESCRIPTION

Refer to DTC P0150.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Following conditions are detected in idle state while running under driving conditions described for "DTC CONFIRMATION PROCEDURE". Hi/Lo cycle (TRANS TIME displayed on scan tool) of HO2S-1 output voltage is longer than specification or response rates of Hi → Lo and Lo → Hi (TRANS TIME displayed as R → L threshold V or L → R threshold V on scan tool) are longer than specification. (2 driving cycle detection logic)	HO2S-1 ECM (PCM)

DTC CONFIRMATION PROCEDURE

Refer to DTC P0150.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	1) Replace HO2S-1 and recheck. Is DTC P0153 detected?	Substitute a known-good ECM (PCM) and recheck.	HO2S-1 malfunction.

DTC P0155 HO2S-1 (Bank 2) Heater Circuit Malfunction

WIRING DIAGRAM

Refer to DTC P0150.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Following condition is detected when HO2S heater is electrically live (2 driving cycle detection logic). • Current of HO2S heater is 5.3 A or more or less than 0.09 A, or • Voltage of HO2S heater is 14.0 V or higher or lower than 11.7 V.	HO2S-1 heater circuit HO2S-1 heater ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following conditions are satisfied when using this “DTC CONFIRMATION PROCEDURE”.

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

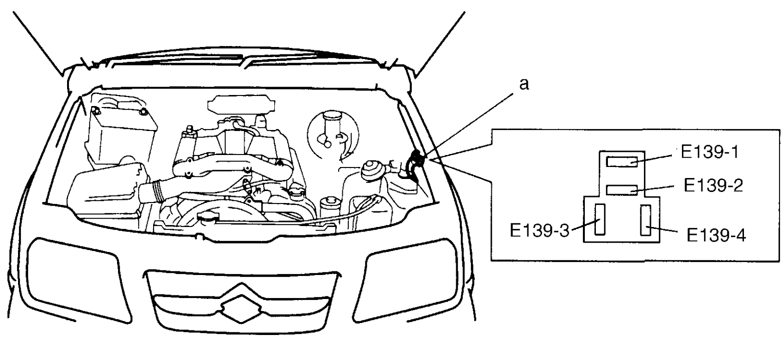
1) Connect scan tool with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine at idle speed for 5 min.
3) Check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	HO2S-1 heater check : 1) Disconnect HO2S-1 coupler with ignition switch OFF. 2) Check resistance between “3” and “4” terminal of HO2S-1 coupler. **HO2S-1 heater resistance :** **5.0 – 6.4 Ω (at 20°C (68°F))** Is it within above specification?	Go to Step 3.	Replace HO2S-1.
3	HO2S heater power supply check : 1) With ignition switch ON leaving engine OFF, check voltage between E139-3 and ground, E139-1 and ground. (See Fig.) Is each voltage 10 – 14 V?	Go to Step 4.	“HO2S”, and/or “IG METER” fuse blown. If OK, faulty “BLK/WHT” wire or “BLU/WHT” wire.

Step	Action	Yes	No
4	HO2S heater control circuit check : 1) With ignition switch OFF, install HO2S heater relay. 2) With ignition switch ON leaving engine OFF, check voltage between C51-2-4 and ground. Is the voltage 10 – 14 V?	Substitute a known-good ECM (PCM) and recheck.	Faulty HO2S heater relay or "BLK" wire open, "BLU" wire open or shorted to ground circuit, "BLK/RED" wire open or shorted to ground circuit. If OK, substitute a known-good ECM (PCM) and recheck.

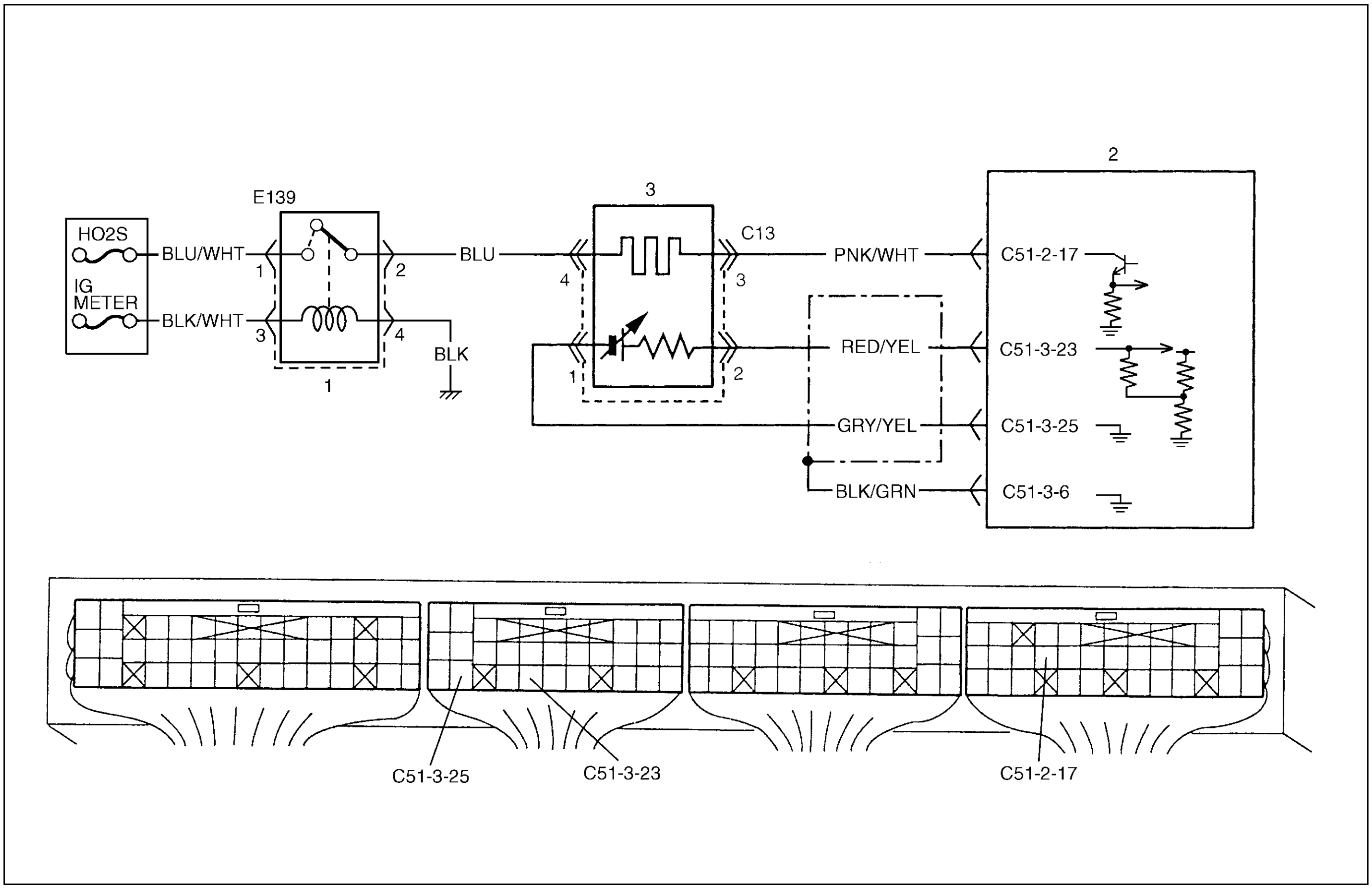
Fig. for STEP 2, 3



a. HO2S heater relay

DTC P0156 HO2S-2 (Bank 2) Circuit Malfunction

WIRING DIAGRAM



1.	HO2S heater relay
2.	ECM (PCM)
3.	HO2S-2 (Bank-2)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
DTC will set when any one of following conditions is detected (2 driving cycle detection logic). • 4.5 V or more HO2S circuit voltage is detected when 5 V power is connected to HO2S circuit in ECM (PCM). • While running with A/F feed back, average output voltage during specified time is too high or too low. or • While running with A/F feed back, max output voltage during specified time is lower than specified value or min. output voltage during specified time is higher than specified value.	• HO2S-2 or its circuit • Fuel system • ECM (PCM)

DTC CONFIRMATION PROCEDURE

> **WARNING:**
>
> - **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
> - **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data in ECM memory by using scan tool and start engine.
3) Increase vehicle speed to 55 km/h (40 mph) or more.
4) Keep driving above vehicle speed till engine is warmed up completely (Changed of vehicle speed is permitted in this step).
5) Keep driving 50 – 60 km/h (30 – 40 mph) for 8 min. or more.
6) Stop vehicle and check if pending DTC exists by using scan tool. If not, check if oxygen sensor heater monitoring test has completed by using scan tool. If not in both of above checks (i.e., no pending DTC and oxygen sensor heater monitoring test not completed), check vehicle conditions (environmental) and repeat Steps 3) through 6).

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	HO2S-2 output voltage check : 1) Connect scan tool to DLC with ignition switch OFF. 2) Drive vehicle about 35 mph, 55 km/h for 2 min. or more. 3) Stop vehicle and check HO2S-2 output voltage displayed on scan tool while repeating racing engine. Is over and below 0.3 V indicated?	Go to Step 4.	Go to Step 3.
3	HO2S-2 check : 1) With ignition switch OFF, disconnect HO2S-2 coupler. 2) Connect voltmeter between "2" and "1" of HO2S-2 coupler. 3) Start engine and check voltmeter while repeating racing engine. Is over and below 0.3 V indicated?	"RED/YEL" or "GRY/YEL" circuit open/short. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace HO2S-2.
4	Short term fuel trim check : 1) Run engine at 2000 r/min. for 60 sec. 2) With engine idling, check short term fuel trim displayed on scan tool. Is it within – 20 to +20 %?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Go to DTC P0174/P0175 Diag. Flow Table.

DTC P0161 HO2S-2 (Bank 2) Heater Circuit Malfunction

WIRING DIAGRAM

Refer to DTC P0156.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Following condition is detected when HO2S-2 heater operates (2 driving cycle detection logic). • Current of HO2S-2 heater is more than 11.4 A or less than 0.32 A, or • Voltage of HO2S-2 heater is more than 13.8 V or less than 8.7 V.	HO2S-2 heater or its circuit ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".

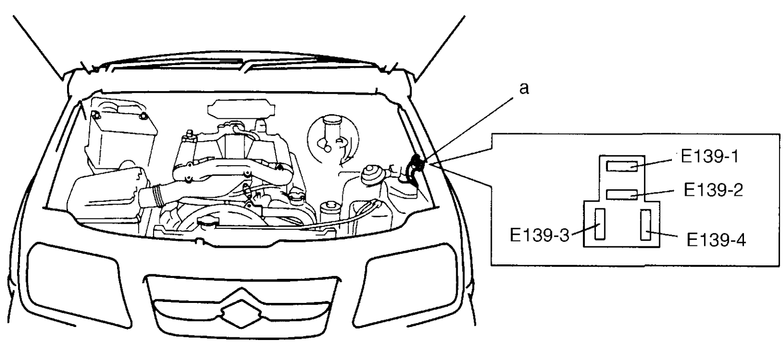
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data in ECM memory by using scan tool and start engine.
3) Increase vehicle speed to 50 – 60 km/h (30 – 40 mph).
4) Keep driving above vehicle speed for 5 min. (Change of vehicle speed is permitted in this step).
5) Stop vehicle and check if pending DTC exists by using scan tool. If not, check if oxygen sensor heater monitoring test has completed by using scan tool. If not in both of above checks (i.e., no pending DTC and oxygen sensor heater monitoring test not completed), check vehicle conditions (environmental) and repeat Steps 3) through 5).

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	HO2S-2 heater check : 1) Disconnect HO2S-2 coupler with ignition switch OFF. 2) Check resistance between “3” and “4” terminal of HO2S-2 connector. **HO2S -2 heater resistance :** **11.7 – 14.3 Ω (at 20°C (68°F))** Is it within above specification	Go to Step 3.	Replace HO2S-2.
3	HO2S heater power supply check : 1) With ignition switch ON leaving engine OFF, check voltage between E139-3 and ground, E139-1 and ground. (See Fig.) Is each voltage 10 – 14 V?	Go to Step 4.	Fuse “HO2S” and/or “IG METER” blown. If OK, faulty “BLK/WHT” wire or “BLU/WHT” wire.
4	HO2S heater control circuit check : 1) With ignition switch OFF, install HO2S heater relay. 2) With ignition switch ON leaving engine OFF, check voltage between C51-2-17 and ground. Is the voltage 10 – 14 V?	Substitute a known-good ECM (PCM) and recheck.	Faulty HO2S heater relay or “BLK” wire open, “BLU” wire open or shorted to ground circuit, “PNK/WHT” wire open or shorted to ground circuit. If OK, substitute a known-good ECM (PCM) and recheck.

Fig. for STEP 2, 3



a. HO2S heater relay

DTC P0171/P0172 Fuel System Too Lean/Rich (Bank 1)

DTC DETECTING CONDITION AND POSSIBLE CAUSE

DTC DETECTING CONDITION	TROUBLE AREA
When running after engine warmed (2 driving cycle detection logic). • Short term fuel trim exceeding 15 % or long term fuel trim exceeding 20 % and total trim exceeding 43 % is detected. – Fuel system too lean • Short term fuel trim less than – 11 % or long term fuel trim less than – 11 % and total trim less than – 30 % is detected. – Fuel trim too rich	• Vacuum leaks (air inhaling) • Exhaust gas leakage • Fuel pressure out of specification • Heated oxygen sensor malfunction • EGR system malfunction • MAF sensor poor performance • ECT sensor poor performance • Fuel level sensor.

DTC CONFIRMATION PROCEDURE

WARNING:

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this “DTC CONFIRMATION PROCEDURE”.

- **Intake air temp. at start : – 8 – 60°C (18 – 140°F)**
- **Engine coolant temp. at start : – 8 – 95°C (18 – 203°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : 110°C (230°F) or lower**

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and warm up engine completely.
3) Increase vehicle speed to 50 – 60 km/h (30 – 40 mph).
4) Keep driving above vehicle speed for 3 min. or more.
5) Stop vehicle and check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Is there DTC (s) other than “DTC P0171/ P0172”?	Go to applicable DTC FLOW TABLE.	Go to Step 3.
3	Check intake system and exhaust system for leakage. Are intake system and exhaust system in good condition?	Go to Step 4.	Repair or replace.
4	Check fuel pressure referring to “TABLE B-3” in this section. Is check result satisfactory?	Go to Step 5.	Repair or replace.
5	Check fuel injectors referring to “FUEL INJECTOR INSPECTION” in Section 6E2. Is check result satisfactory?	Go to Step 6.	Faulty injector (s).
6	Check fuel level sensor referring to “FUEL LEVEL SENSOR” in Section 6E2. Is check result satisfactory?	Go to Step 7.	Faulty fuel level sensor or its circuit.
7	Check MAF sensor for performance referring to “MASS AIR FLOW SENSOR” in Section 6E2. Is check result satisfactory?	Go to Step 8.	Faulty MAF sensor or its circuit.
8	Check ECT sensor referring to Section 6E2. Is check result satisfactory?	Go to Step 9.	Faulty ECT sensor.
9	Check HO2S-1 referring to “DTC P0130 DIAG. FLOW TABLE”. Is check result satisfactory?	Substitute a known-good ECM (PCM) and recheck.	Faulty HO2S-1.

DTC P0174/P0175 Fuel System Too Lean/Rich (Bank 2)

DTC DETECTING CONDITION AND POSSIBLE CAUSE

DTC DETECTING CONDITION	TROUBLE AREA
When running after engine warmed (2 driving cycle detection logic). • Short term fuel trim exceeding 15 % or long term fuel trim exceeding 20 % and total trim exceeding 43 % is detected. – Fuel system too lean • Short term fuel trim less than – 11 % or long term fuel trim less than – 11 % and total trim less than – 30 % is detected. – Fuel trim too rich	• Vacuum leaks (air inhaling) • Exhaust gas leakage • Fuel pressure out of specification • Heated oxygen sensor malfunction • EGR system malfunction • MAF sensor poor performance • ECT sensor poor performance • Fuel level sensor.

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:
Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".
- **Intake air temp. at start : – 8 – 60°C (18 – 140°F)**
- **Engine coolant temp. at start : – 8 – 95°C (18 – 203°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : 110°C (230°F) or lower**

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and warm up engine completely.
3) Increase vehicle speed to 50 – 60 km/h (30 – 40 mph).
4) Keep driving above vehicle speed for 3 min. or more.
5) Stop vehicle and check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Is there DTC (s) other than “DTC P0174/ P0175”?	Go to applicable DTC FLOW TABLE.	Go to Step 3.
3	Check intake system and exhaust system for leakage. Are intake system and exhaust system in good condition?	Go to Step 4.	Repair or replace.
4	Check fuel pressure referring to “TABLE B-3” in this section. Is check result satisfactory?	Go to Step 5.	Repair or replace.
5	Check fuel injectors referring to “FUEL INJECTOR INSPECTION” in Section 6E2. Is check result satisfactory?	Go to Step 6.	Faulty injector (s).
6	Check fuel level sensor referring to “FUEL LEVEL SENSOR” in Section 6E2. Is check result satisfactory?	Go to Step 7.	Faulty fuel level sensor or its circuit.
7	Check MAF sensor for performance referring to “MASS AIR FLOW SENSOR” in Section 6E2. Is check result satisfactory?	Go to Step 8.	Faulty MAF sensor or its circuit.
8	Check ECT sensor referring to Section 6E2. Is check result satisfactory?	Go to Step 9.	Faulty ECT sensor.
9	Check HO2S-1 referring to “DTC P0150 DIAG. FLOW TABLE”. Is check result satisfactory?	Substitute a known-good ECM (PCM) and recheck.	Faulty HO2S-1.

DTC P0300/P0301/P0302/P0303/P0304/P0305/P0306 Random Misfire/Cylinder 1 Misfire/Cylinder 2 Misfire/Cylinder 3 Misfire/Cylinder 4 Misfire Detected/Cylinder 5 Misfire Detected/Cylinder 6 Misfire Detected

SYSTEM DESCRIPTION

ECM (PCM) measures the angle speed of the crankshaft based on the pulse signal from the CKP sensor and CMP sensor for each cylinder. If it detects a large change in the angle speed of the crankshaft, it concludes occurrence of a misfire. When the number of misfire is counted by the ECM (PCM) beyond the DTC detecting condition, it determines the cylinder where the misfire occurred and outputs it as DTC.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
DTC P0300 : • Misfire which causes catalyst to overheat during 200 engine revolutions is detected at 2 or more cylinders. (MIL flashes as long as this misfire occurs continuously.) • Misfire which affects exhaust emission adversely during 1000 engine revolutions is detected at 2 or more cylinders (2 driving cycle detection logic)	• Ignition system • Fuel injector and its circuit • Fuel line pressure • Engine compression • Abnormal air drawn in • EGR system • Fuel level sensor • Valve lash adjuster • Valve timing
DTC P0301, P0302, P0303, P0304, P0305, P0306 : • Misfire which causes catalyst to overheat during 200 engine revolutions is detected at 1 cylinder. (MIL flashes as long as this misfire occurs continuously.) • Misfire which affects exhaust emission adversely during 1000 engine revolutions is detected at 1 cylinder (2 driving cycle detection logic)	

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:
Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".
- **Intake air temp. : – 8 – 70°C (18 – 158°F)**
- **Engine coolant temp. : – 8°C (18°F) or higher**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

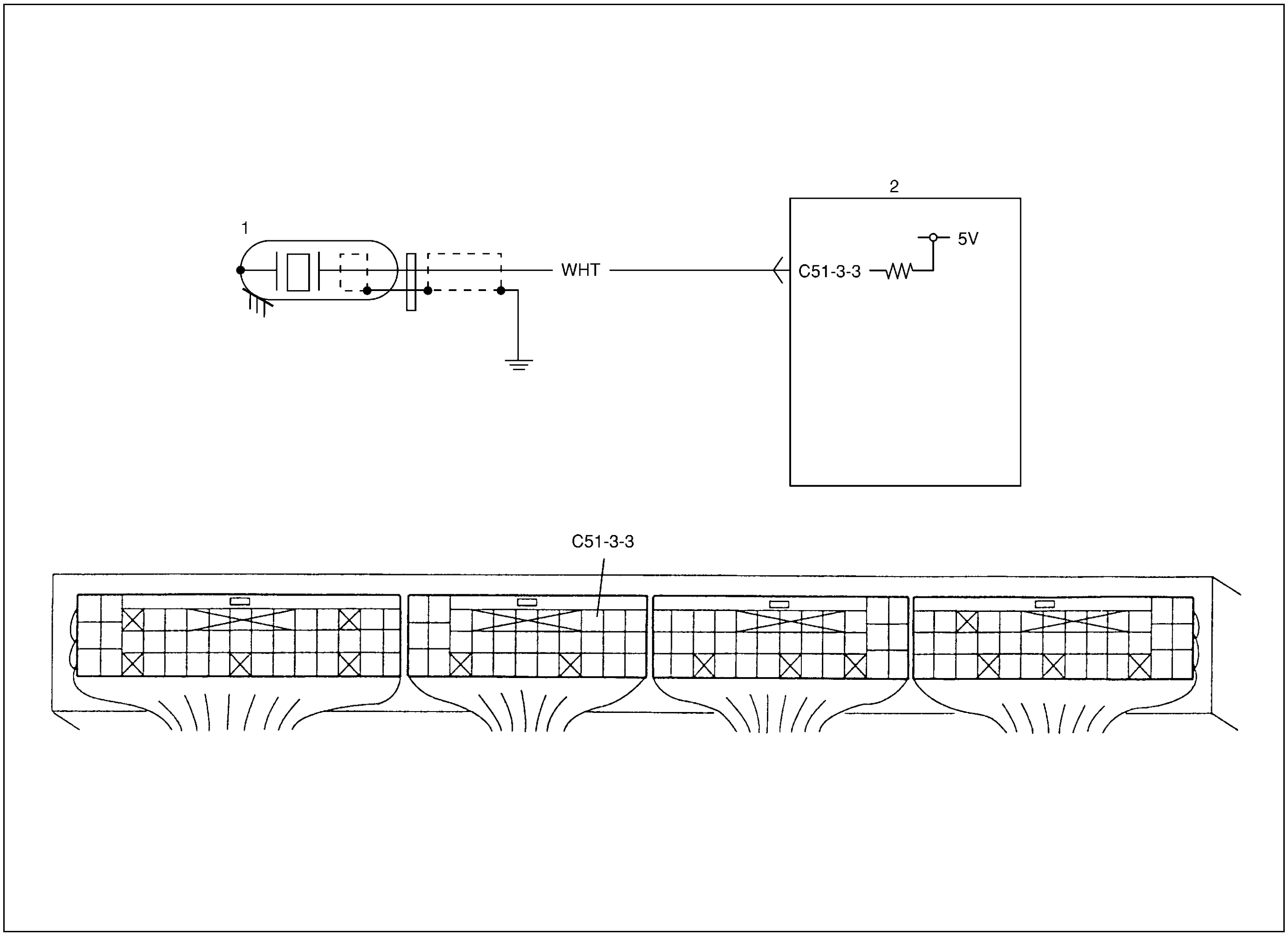
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and start engine.
3) Increase vehicle speed to speed recorded as freeze frame data (V) ± 5 km/h when detecting misfire.
4) Keep driving above vehicle speed for 5 min.
5) Stop vehicle and check DTC (or pending DTC) by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Ignition system inspection : 1) Check spark plug and ignition spark of cylinder where misfire occurs, referring to “IGNITION SYSTEM” section. Is it in good condition?	Go to Step 3.	Faulty ignition coil, wire harness, or other system parts.
3	Fuel injector circuit inspection : 1) Using sound scope, check each injector operating sound at engine cranking or idling. Do all injectors make operating sound?	Go to Step 4.	Check coupler connection and wire harness of injector not making operating sound and injector itself. If OK, substitute a known-good ECM (PCM) and recheck.
4	Fuel pressure inspection : 1) Check fuel pressure referring to “TABLE B-3” in this section. Is check result satisfactory?	Go to Step 5.	Repair or replace.
5	Fuel injector inspection : 1) Check fuel injector(s) referring to Section 6E2. Is check result satisfactory?	Go to Step 6.	Replace.
6	Ignition timing inspection : 1) Check ignition timing referring to Section 6F2. Is check result satisfactory?	Go to Step 7.	Adjust or check system related parts.
7	EGR system inspection : 1) Check EGR system referring to Section 6E2. Is check result satisfactory?	Go to Step 8.	Repair or replace.
8	Fuel level sensor inspection : 1) Check fuel level sensor referring to Section 6E2. Is check result satisfactory?	Go to Step 9.	Repair or replace.
9	Check engine mechanical parts or system which can cause engine rough idle or poor performance. • Engine compression (See Section 6A2). • Valve lash or lash adjuster (See Section 6A2). • Valve timing (Timing belt or chain installation. See Section 6A2). Are they in good condition?	Check wire harness and connection of ECM (PCM) ground, ignition system and fuel injector for intermittent open and short.	Repair or replace.

DTC P0325 (DTC No.43) Knock Sensor Circuit Malfunction

CIRCUIT DESCRIPTION



1. Knock sensor	
2. ECM (PCM)	

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
DTC will set when one of the following condition is detected. • KNOCK sensor voltage is 0.90 V or less, or • KNOCK sensor voltage is 3.98 V or more	• “WHT” circuit open or shorted to ground • KNOCK sensor malfunction • ECM malfunction

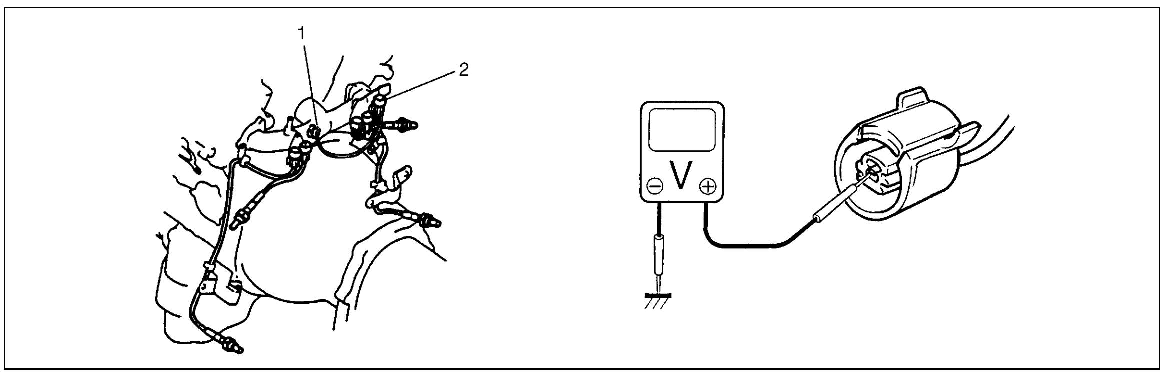
DTC CONFIRMATION PROCEDURE

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool.
3) Start engine and run it for 10 sec.
4) Check DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Knock sensor and its circuit check : 1) With engine running, check voltage from “C51-3-3” terminal of ECM connector to body ground. See Fig. Is voltage about 0.90 – 3.98 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 3.
3	Knock sensor power source circuit check : 1) Stop engine. 2) With ignition switch at OFF position, disconnect knock sensor connector. 3) With ignition switch at ON position, check voltage from “WHT” to body ground terminal of knock sensor connector. See Fig. Is it 4 – 5 V?	Substitute a known-good knock sensor and recheck.	“WHT” wire open, shorted to ground circuit or poor “C51-3-3” connection. If wire and connection are OK, substitute a known-good substitute a known-good ECM and recheck.

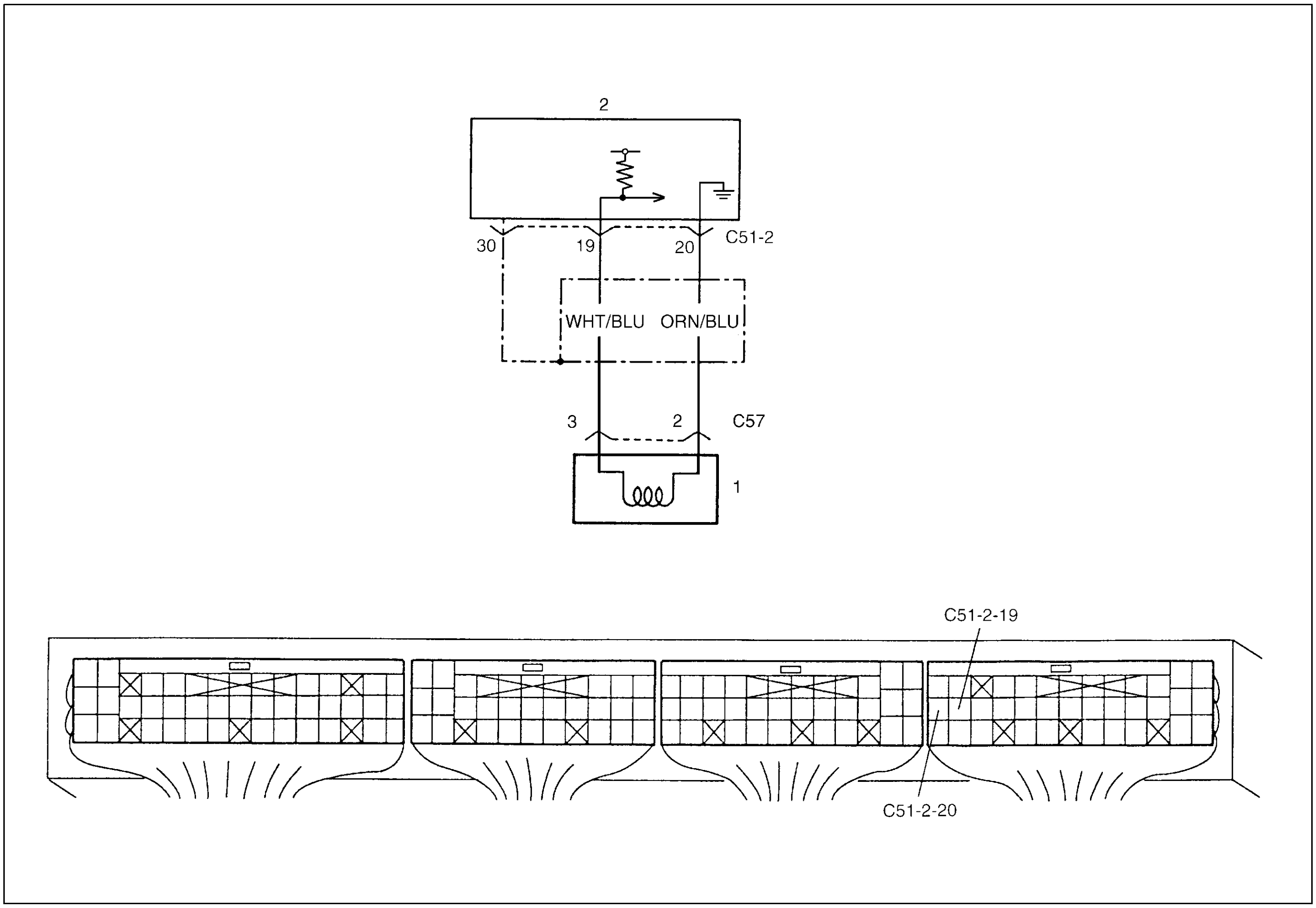
Fig. for Steps 2 and 3



1.	Knock sensor
2.	Knock sensor connector

DTC P0335 Crankshaft Position Sensor Circuit Malfunction

WIRING DIAGRAM



1.	CKP sensor
2.	ECM (PCM)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
CKP sensor signal is not input while 100 pulses of CMP sensor signal are input after engine start.	CKP sensor circuit CKP sensor ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following condition is satisfied when using this "DTC CONFIRMATION PROCEDURE".

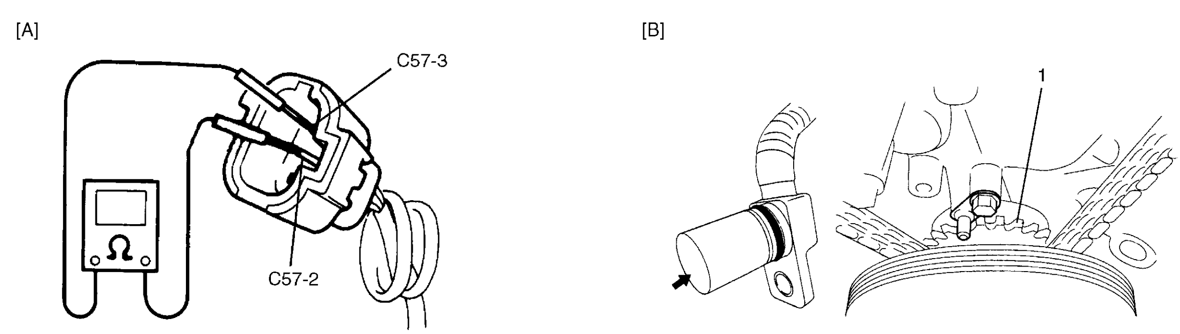
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine at idle speed for 10 sec.
3) Check DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	CKP sensor and its circuit resistance check : 1) With ignition switch OFF, disconnect ECM (PCM) coupler (C51-2). 2) Check for proper connection to ECM (PCM) at C51-2-19 and C51-2-20 terminals. 3) If OK, check resistance of followings. **CKP sensor resistance between C51-2-19 and C51-2-20 terminals :** **484 – 656 Ω at 20°C (68°F)** **CKP sensor resistance between each terminal and ground :** **1 MΩ or more** Is check result satisfactory?	Go to Step 4.	Go to Step 3.
3	CKP sensor resistance check : 1) With ignition switch OFF, disconnect CKP sensor coupler. 2) Check resistance between terminals of CKP sensor coupler. (See Fig.) Were measured resistance values as specified in Step 2?	Faulty “WHT/BLU” wire or “ORN/BLU” wire.	Faulty CKP sensor.
4	CKP sensor visual inspection : Check visually CKP sensor and signal rotor for the followings. (See Fig.) • Damage • No foreign material attached • Correct installation Are they in good condition?	Intermittent trouble or faulty ECM (PCM). Recheck for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Replace or reinstall.

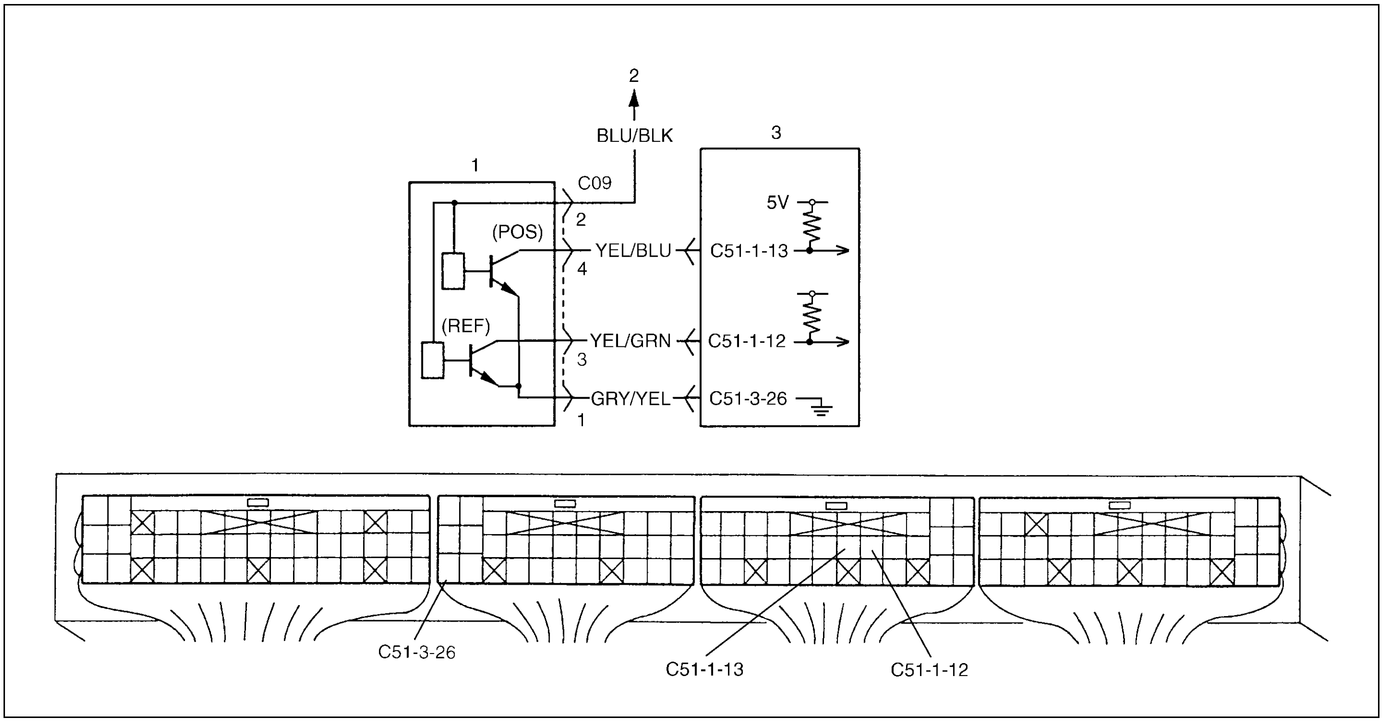
[A] Fig. for Step 3 / [B] Fig. for Step 4



1. Sensor plate

DTC P0340 (DTC No.42) Camshaft Position Sensor Circuit Malfunction

WIRING DIAGRAM



1.	CMP sensor
2.	To main relay
3.	ECM (PCM)

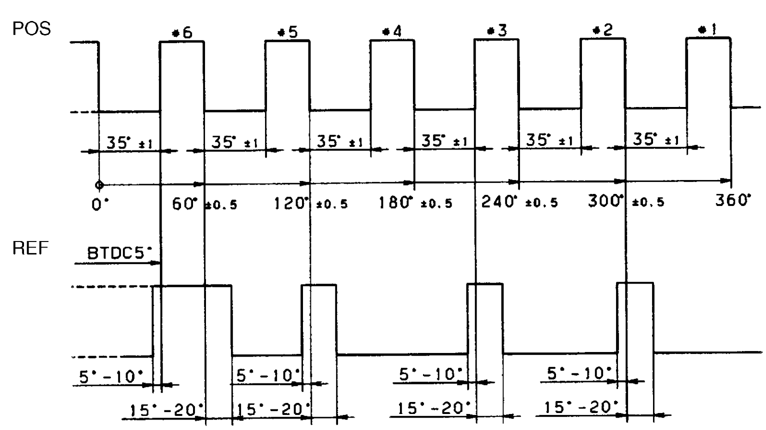
SYSTEM DESCRIPTION

CMP sensor detects REF signal and POS signal.

- REF signal : 4 pulses/1 revolution of camshaft. There are 2 different kinds of wavelength. Based on REF signal, ECM (PCM) judges which cylinder is at TDC.
- POS signal : 6 pulse/1 revolution of camshaft. Each of POS signals has equivalent wavelength. Based on POS signal, ECM (PCM) judges the wavelength of REF signals, engine speed and piston position.

REFERENCE

Connect oscilloscope between terminals C51-1-13 (POS) or C51-1-12 (REF) and C51-3-26 (ground) of ECM (PCM) connector connected to ECM (PCM) and check CMP sensor signal.



DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
CMP sensor signal is not inputted for 3 sec. even though engine start signal is being inputted. or REF signal pattern is incorrect while POS signal varies. or POS signal voltage too high or too low.	CMP sensor circuit CMP sensor Engine starter signal circuit ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following condition is satisfied when using this "DTC CONFIRMATION PROCEDURE".

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool.
3) Crank engine for 3 seconds or more and keep it at idle for 1 min.
4) Check DTC by using scan tool.

TROUBLESHOOTING

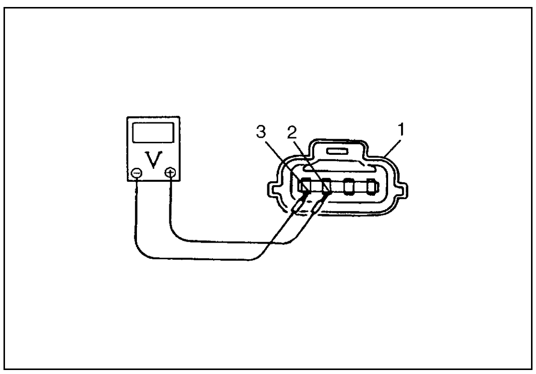
NOTE:

If starter circuit is open (i.e., starter signal circuit is OK but starter fails to run), this DTC is stored in memory at starter switch ON, even through CMP sensor is in good condition.
When starter motor fails to run and this DTC appears, check starter circuit first.

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	Is engine cranked?	Go to Step 3.	Go to Section 6G.
3	Is there DTC P1500 (Engine starter signal circuit)?	Go to DTC P1500 Diag. Flow Table.	Go to Step 4.
4	CMP sensor power supply voltage check : 1) With ignition switch OFF, disconnect CMP sensor coupler. 2) With ignition switch ON, check voltage between C09-2 and C09-1 terminal. (See Fig.) Is the voltage 10 – 14 V?	Go to Step 5.	Faulty "BLU/BLK" wire and/or "GRY/YEL" wire.

Step	Action	Yes	No
5	CMP sensor (REF) signal check : 1) With ignition switch OFF, connect CMP sensor coupler. 2) Disconnect couplers from ignition coil assembly and fuel injectors. 3) With ignition switch ON and crankshaft turned slowly, check voltage between C51-1-13 and C51-3-26 terminal. Does voltmeter indicator deflect between 0 – 1 V and 3 – 5.25 V 4 times while crankshaft turned two revolutions?	Go to Step 6.	Faulty “YEL/GRN” wire or CMP sensor. If OK, substitute a known-good ECM (PCM) and recheck.
6	CMP sensor (POS) signal check : 1) With ignition switch ON and crankshaft turned slowly, check voltage between C51-1-12 and C51-3-26 terminal. Does voltmeter indicator deflect between 0 – 1 V and 3 – 5.25 V 6 times while crankshaft turned two revolutions?	Poor C51-1-12 and/or C51-3-13 terminal of ECM (PCM) coupler connection. If OK, substitute a known-good ECM (PCM) and recheck.	Faulty “YEL/BLU” wire or CMP sensor. If OK, substitute a known-good ECM (PCM) and recheck.

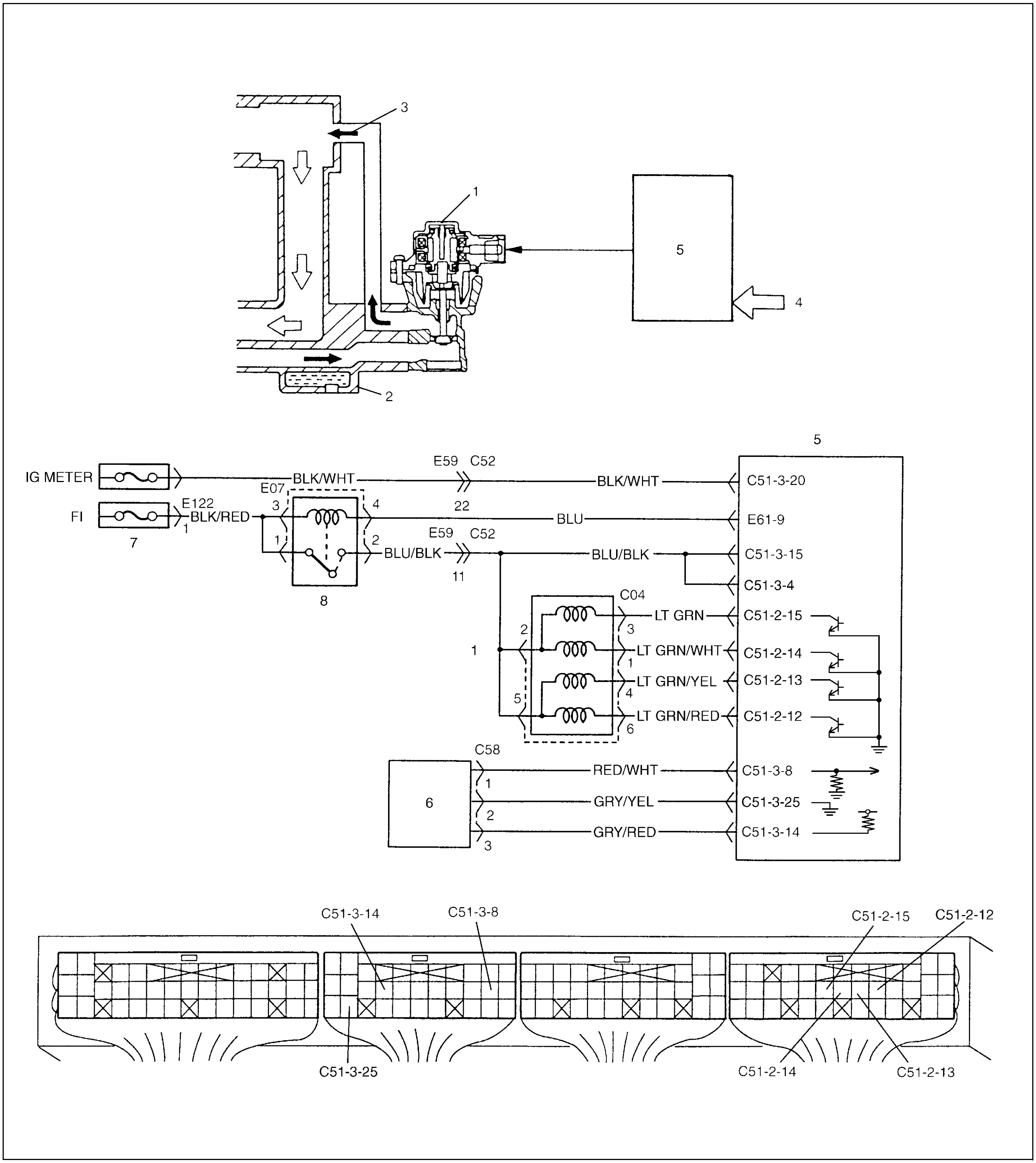
Fig. for Step 4



1.	Disconnected CMP sensor coupler
2.	“BLU/BLK” wire (C09-2) terminal
3.	“GRY/YEL” wire (C09-1) terminal

DTC P0400 Exhaust Gas Recirculation Flow Malfunction

SYSTEM/WIRING DIAGRAM



1. EGR valve	5. ECM (PC)
2. Intake manifold	6. MAP sensor
3. Exhaust gas	7. Main fuse
4. Sensed information	8. Main relay

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
During deceleration (engine speed high with closed throttle position) in which fuel cut is involved, difference in intake manifold pressure between when EGR valve is opened and when it is closed is smaller than specified value. (2 driving cycle detection logic)	• EGR valve • EGR passage • Manifold absolute pressure sensor • ECM (PCM)

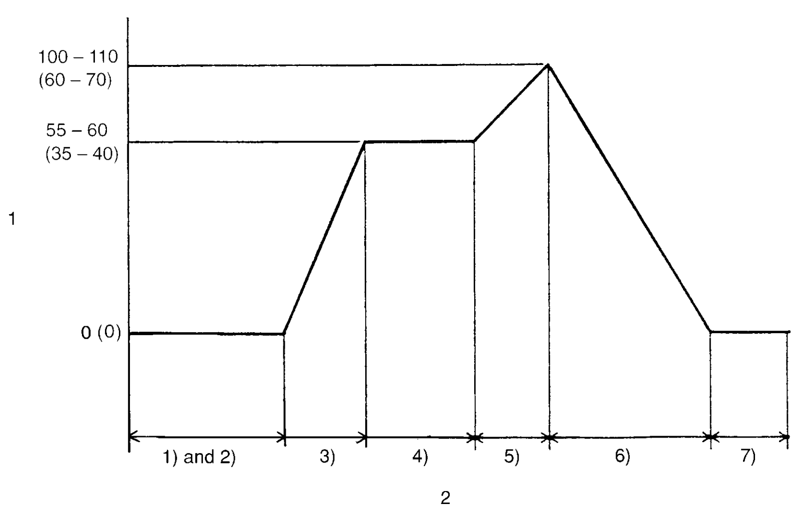
DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and warm up engine completely.
3) Increase vehicle speed to 55 – 60 km/h (35 – 40 mph).
4) Keep driving above vehicle speed for 7 min. or more.
5) Increase vehicle speed to 100 – 110 km/h (60 – 70 mph).
6) Release accelerator pedal and with engine brake applied, keep vehicle coasting and then stop vehicle.
7) Check if pending DTC exists by using scan tool. If not, check if EGR system monitoring test has completed by using scan tool. If not in both of above checks (i.e., no pending DTC and EGR system monitoring test not completed), check vehicle conditions (environmental) and repeat Steps 3) through 6).



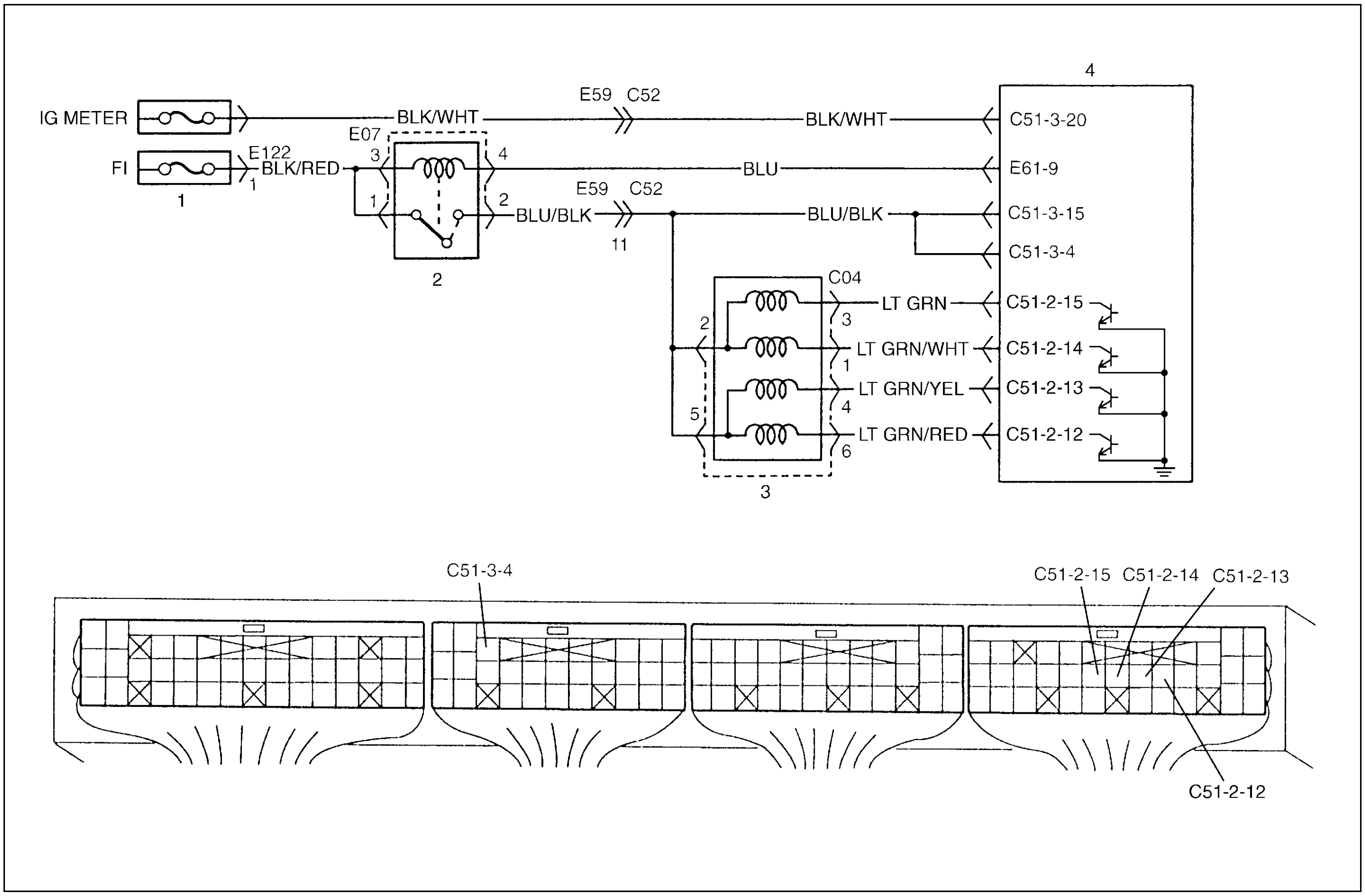
1. Vehicle speed km/h (mph)	
2. Step	

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	Is there DTC P0403 (EGR circuit malfunction)?	Go to DTC P0403 Diag. Flow Table.	Go to Step 3.
3	Do you have SUZUKI scan tool?	Go to Step 4.	Go to Step 6.
4	EGR valve operation check : 1) With ignition switch OFF, install SUZUKI scan tool. 2) Check EGR system referring to Section 6E2. Is it in good condition?	Go to Step 5.	Go to Step 6.
5	MAP sensor check : 1) Check MAP sensor for performance referring to Section 6E2. Is check result satisfactory?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Repair or replace.
6	EGR valve power supply circuit check : 1) With ignition switch OFF, disconnect EGR valve coupler. 2) With ignition switch ON, check voltage between C04-2 and ground, C04-5 and ground. Is each voltage 10 – 14 V?	Go to Step 7.	Faulty "BLU/BLK" wire.
7	EGR valve stepper motor coil circuit check : 1) With ignition switch OFF, connect EGR valve coupler and disconnect ECM (PCM) couplers. 2) Check resistance between C51-3-4 and C51-2-12, C51-2-13, C51-2-14, C51-2-15. Is each resistance 20 – 24 Ω at 20°C (68°F)?	Go to Step 8.	Faulty EGR valve.
8	MAP sensor check : 1) Check MAP sensor for performance referring to Section 6E2. Is check result satisfactory?	EGR passage clogged or EGR valve malfunction. If all above are OK, intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Repair or replace.

DTC P0403 (DTC No.51) Exhaust Gas Recirculation Circuit Malfunction

WIRING DIAGRAM



1. Main fuse	4. ECM (PCM)
2. Main relay	
3. EGR valve	

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
High voltage is detected at EGR valve stepping motor electrical circuit for specified time continuously. (Circuit open or short).	EGR valve (stepping motor) or its circuit ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following condition is satisfied when using this “DTC CONFIRMATION PROCEDURE”.
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

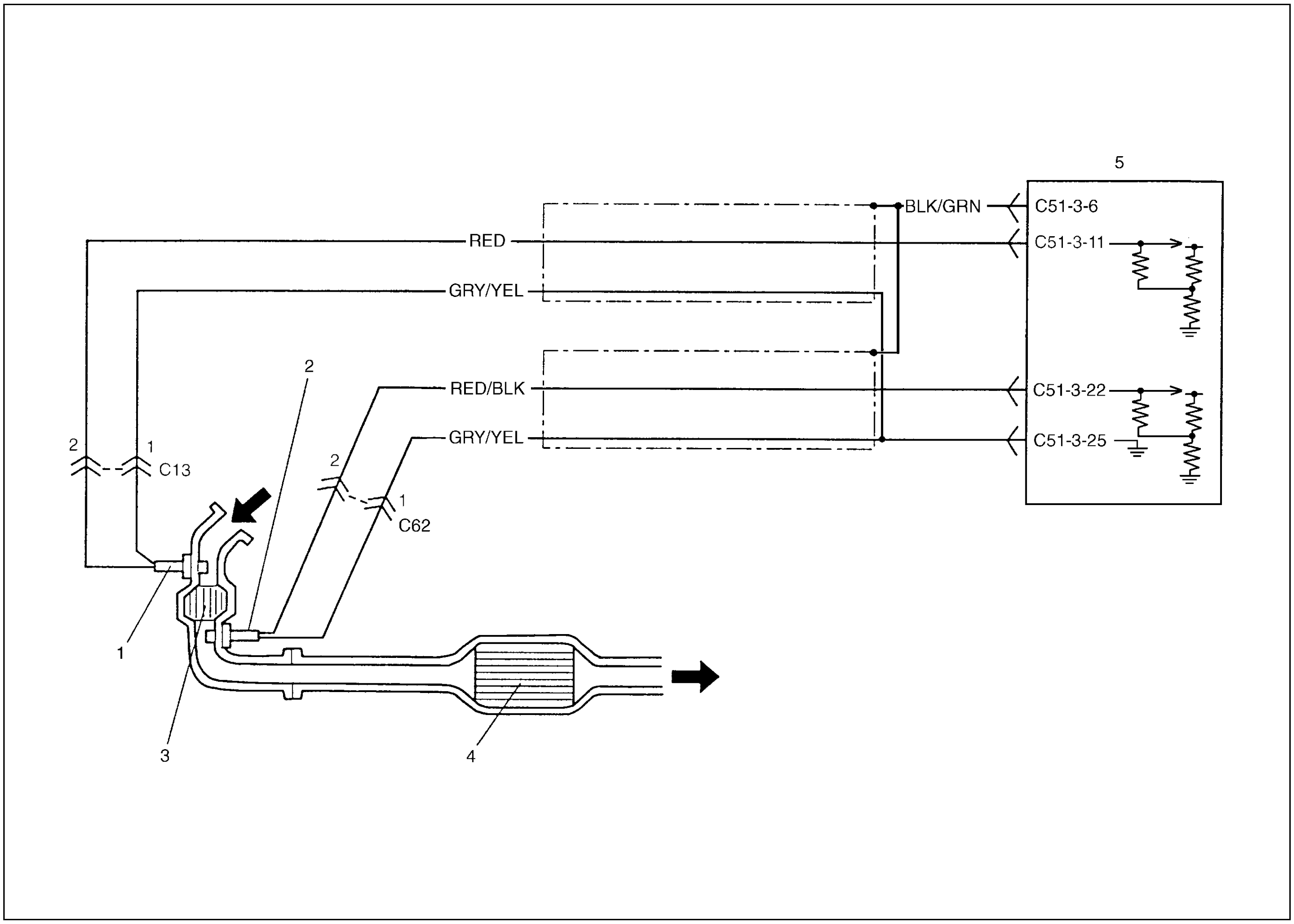
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool.
3) Start engine and run it for 10 sec.
4) Check DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	EGR valve check : 1) With ignition switch OFF, disconnect connector from EGR valve. 2) Check for proper connection to EGR valve at each terminal. 3) If OK, check EGR valve for resistance referring to "EGR VALVE INSPECTION" in Section 6E2. Is check result as specified?	Go to Step 3.	EGR valve malfunction.
3	Wire harness check : 1) Connect connector to EGR valve. 2) Remove ECM (PCM) cover and disconnect connector from ECM (PCM). 3) Check for proper connection to ECM (PCM) at system related terminals. 4) If OK, check for resistance between the following terminals of ECM (PCM) connector disconnected. **EGR valve resistance :** **C51-2-13 and C51-3-4, C51-2-14 and C51-3-4, C51-2-15 and C51-3-4, C51-2-12 and C51-3-4 : 20 – 24 Ω at 20°C (68°F)** **C51-2-13 and ground, C51-2-14 and ground, C51-2-15 and ground, C51-2-12 and ground : Infinity (∞)** Is check result as specified?	Intermittent trouble or faulty ECM (PCM). Recheck referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	"BLU/BLK", "LT GRN", "LT GRN/WHT" "LT GRN/YEL" or "LT GRN/RED" circuit open or shorted to ground.

DTC P0420 Catalyst System Efficiency Below Threshold (Bank 1)

SYSTEM DIAGRAM



1. HO2S-1 (Bank-1)	4. TWC
2. HO2S-2 (Bank-1)	5. ECM (PCM)
3. WU-TWC	

CIRCUIT DESCRIPTION

Exhaust oxygen concentration at the pre-catalyst and the post-catalyst of WU-TWC is detected from HO2S-1 and HO2S-2 respectively and accordingly ECM (PCM) controls the closed loop which then controls the fuel injection volume. (Refer to Section 6E2.) While the above control is going on and if WU-TWC is in good condition, the output voltage of HO2S-2 is maintained at specified level. As WU-TWC becomes deteriorated, even when the above control is going on, the exhaust gas which has passed WU-TWC then passes HO2S-2 at the exhaust oxygen concentration similar to that of the pre-catalyst without being oxygenated or converted. Thus, waveforms of HO2S-1 and HO2S-2 output voltages become alike. ECM (PCM) judges deterioration of WU-TWC by comparing waveforms of HO2S-1 and HO2S-2.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
While running under conditions described for DTC CONFIRMATION PROCEDURE, output waveform of HO2S-1 becomes similar to that of HO2S-2. (2 driving cycle detection logic)	• Exhaust gas leakage • Warm up three way catalytic converter • Heated oxygen sensor – 2 or its circuit • ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

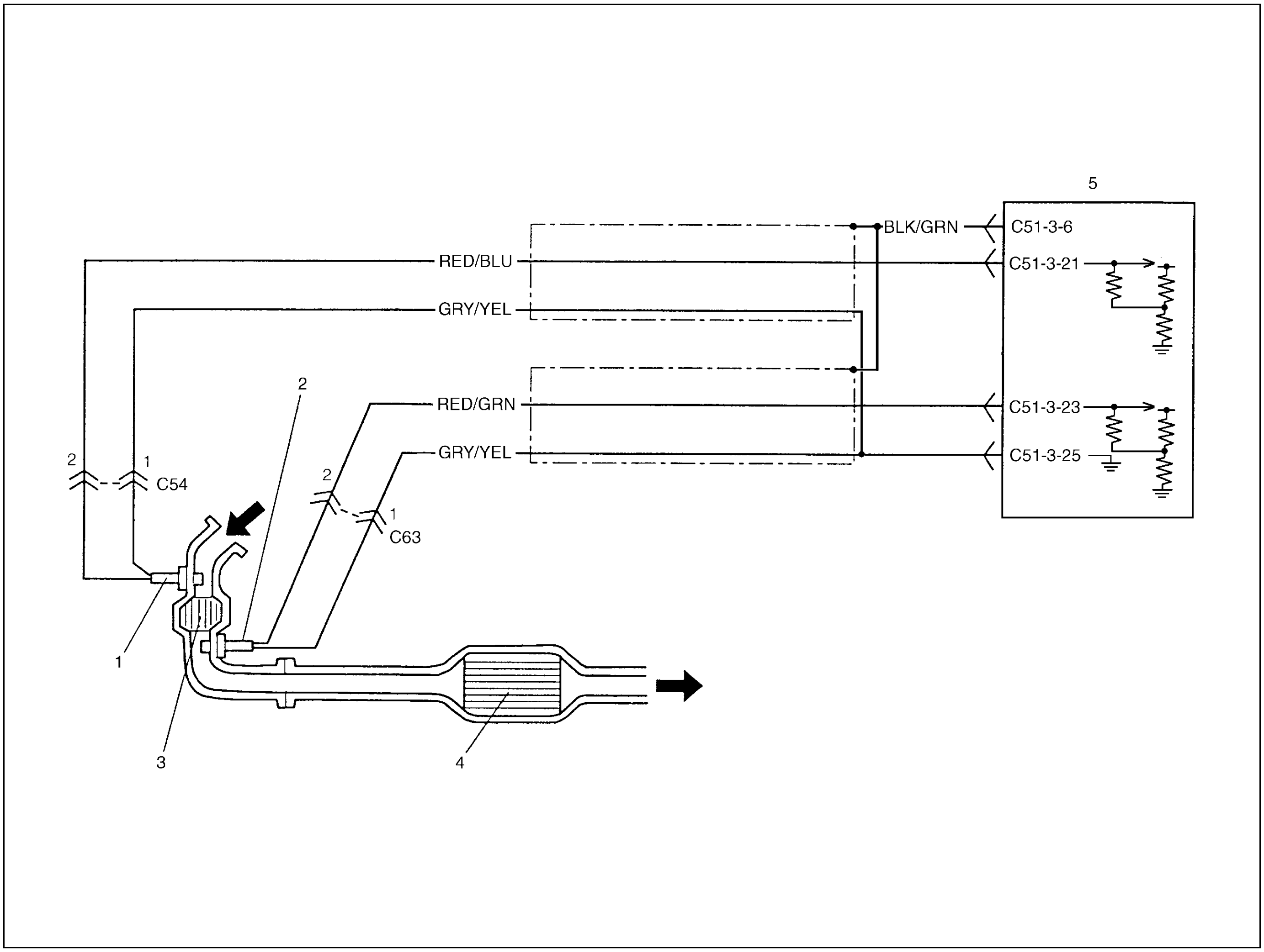
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool.
3) Increase vehicle speed to 80 – 90 km/h (50 – 56 mph).
4) Keep above vehicle speed for 5 min. or more (Throttle valve opening is kept constant in this step).
5) Stop vehicle and check if pending DTC exists by using scan tool. If not, check if catalyst monitoring test has completed by using scan tool. If not in both of above checks (i.e., no pending DTC and catalyst monitoring test not completed), check vehicle condition (environmental) and repeat Step 3) through 5).

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	Exhaust system visual inspection : 1) Check exhaust system for leaks, damage and loose connection. Is it in good condition?	Go to Step 3.	Repair or replace.
3	HO2S-2 output voltage check : 1) Check output voltage of HO2S-2 referring Step 2 of DTC P0136 Diag. Flow Table. Is check result satisfactory?	Replace warm up three way catalytic converter.	Check "RED/BLK" and "GRY/YEL" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-2.

DTC P0430 Catalyst System Efficiency Below Threshold (Bank 2)

SYSTEM DIAGRAM



1. HO2S-1 (Bank-2)	4. TWC
2. HO2S-2 (Bank-2)	5. ECM (PCM)
3. WU-TWC	

CIRCUIT DESCRIPTION

Exhaust oxygen concentration at the pre-catalyst and the post-catalyst of WU-TWC is detected from HO2S-1 and HO2S-2 respectively and accordingly ECM (PCM) controls the closed loop which then controls the fuel injection volume. (Refer to Section 6E2.) While the above control is going on and if WU-TWC is in good condition, the output voltage of HO2S-2 is maintained at specified level. As WU-TWC becomes deteriorated, even when the above control is going on, the exhaust gas which has passed TWC then passes HO2S-2 at the exhaust oxygen concentration similar to that of the pre-catalyst without being oxygenated or converted. Thus, waveforms of HO2S-1 and HO2S-2 output voltages become alike. ECM (PCM) judges deterioration of WU-TWC by comparing waveforms of HO2S-1 and HO2S-2.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
While running under conditions described for DTC CONFIRMATION PROCEDURE, output waveform of HO2S-1 becomes similar to that of HO2S-2. (2 driving cycle detection logic)	• Exhaust gas leakage • Warm up three way catalytic converter • Heated oxygen sensor – 2 or its circuit • ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:
Check to make sure that following conditions are satisfied when using this "DTC CONFIRMATION PROCEDURE".
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

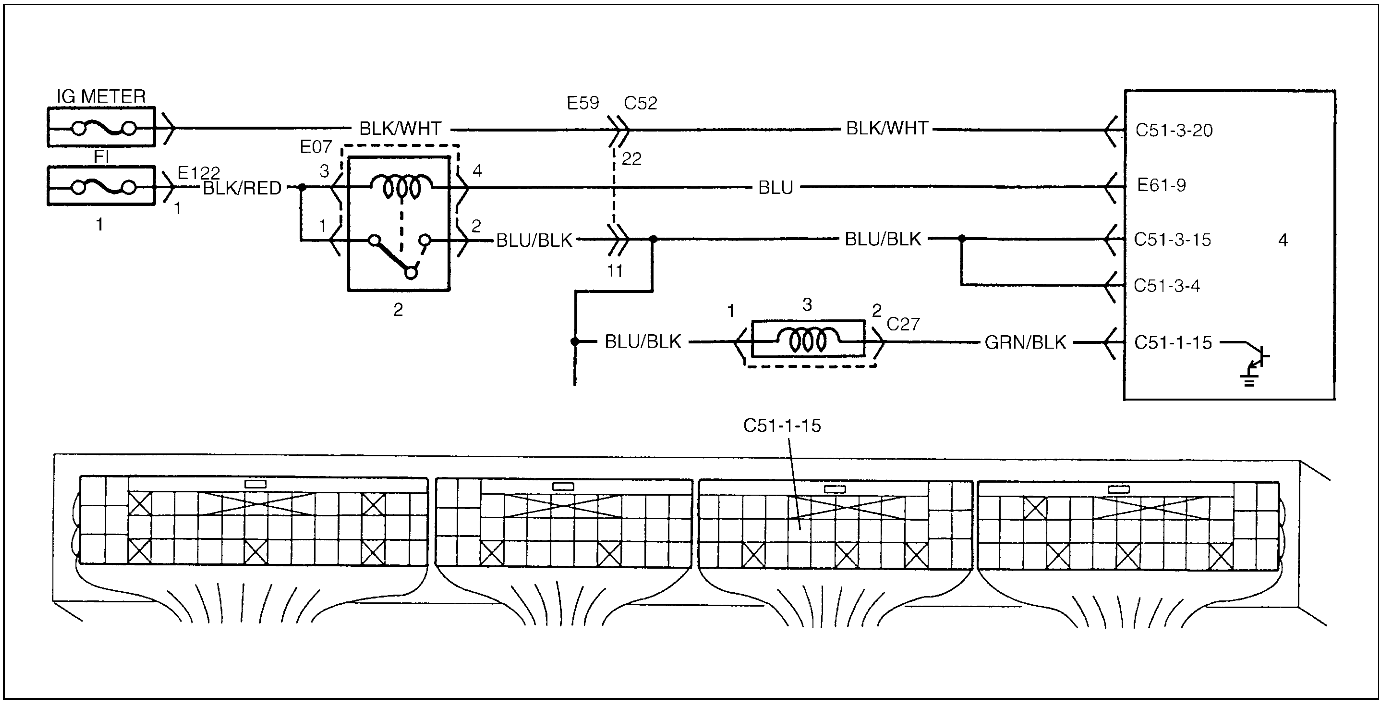
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool.
3) Increase vehicle speed to 80 – 90 km/h (50 – 56 mph).
4) Keep above vehicle speed for 5 min. or more (Throttle valve opening is kept constant in this step).
5) Stop vehicle and check if pending DTC exists by using scan tool. If not, check if catalyst monitoring test has completed by using scan tool. If not in both of above checks (i.e., no pending DTC and catalyst monitoring test not completed), check vehicle condition (environmental) and repeat Step 3) through 5).

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	Exhaust system visual inspection : 1) Check exhaust system for leaks, damage and loose connection. Is it in good condition?	Go to Step 3.	Repair or replace.
3	HO2S-2 output voltage check : 1) Check output voltage of HO2S-2 referring Step 2 of DTC P0156 Diag. Flow Table. Is check result satisfactory?	Replace warm up three way catalytic converter.	Check "RED/YEL" and "GRY/YEL" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-2.

DTC P0443 Evap Control System Purge Control Valve Circuit Malfunction

SYSTEM/WIRING DIAGRAM



1. Main fuse	3. EVAP canister purge valve
2. Main relay	4. ECM (PCM)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Monitor signal of EVAP canister purge valve is different from command signal. (Circuit open or short) (2 driving cycle detection logic)	• EVAP canister purge valve and its circuit • ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following condition is satisfied when using the "DTC Confirmation Procedure."

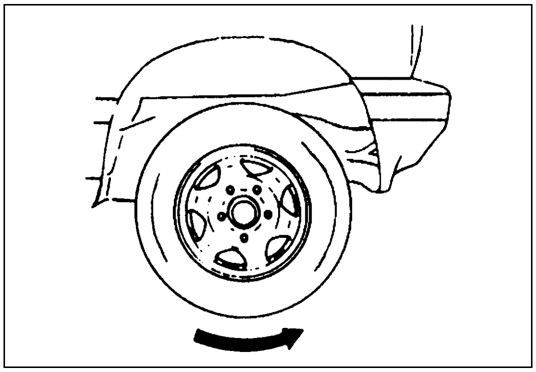
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool.
3) Start engine and warm up it completely.
4) Increase vehicle speed to 55 km/h (35 mph) or more.
5) Keep driving above vehicle speed for 20 min or more (Change of vehicle speed is permitted in this step).
6) Release accelerator pedal, stop vehicle and run engine at speed for 2 min.
7) Check DTC and pending DTC by using scan tool.

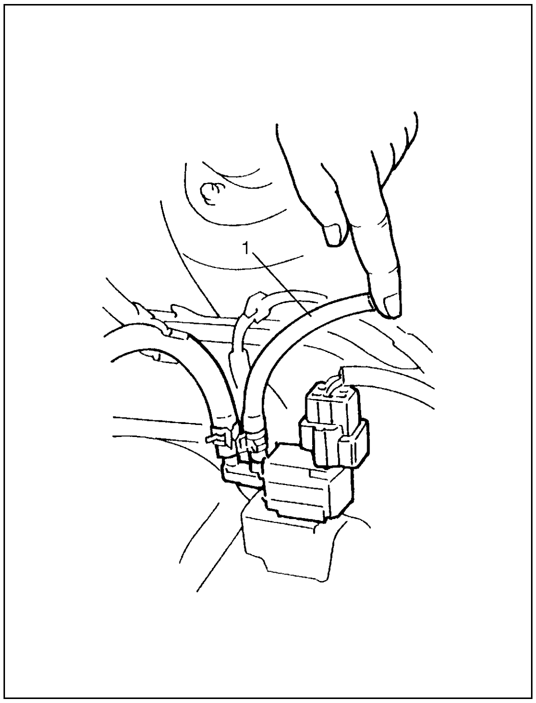
TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Check EVAP canister purge system for operation referring to “EVAP CANISTER PURGE SYSTEM INSPECTION” in this section. Is check result satisfactory?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 3.
3	Check EVAP canister purge valve for resistance referring to “EVAP CANISTER PURGE VALVE INSPECTION” in this section. Is resistance as specified?	“GRN/BLK” or “BLU/BLK” circuit open or short. If wire and connections are OK, substitute a known-good ECM (PCM) and recheck.	Replace EVAP canister purge valve.

Evap canister purge system inspection



1) Warm up engine to normal operating temperature.
2) Hoist vehicle so that all wheels rotate freely.
3) Set M/T in “Neutral” or A/T in “P” position and parking brake.

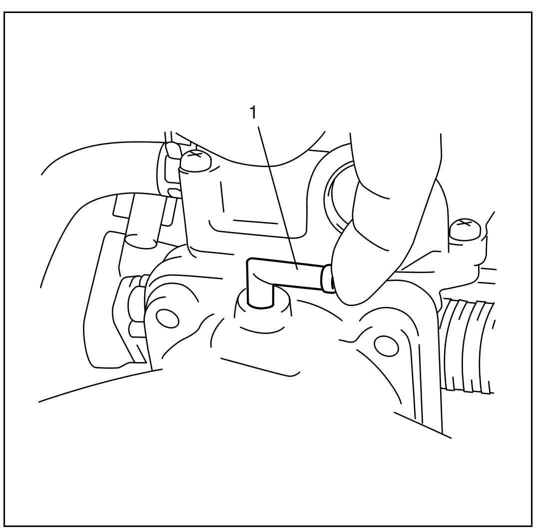


4) Disconnect purge hose (1) from EVAP canister.
5) Place finger against the end of disconnected hose (1) and check that vacuum is not felt there when engine is running at idle speed.
6) Release parking brake lever, set transfer in “2H” and M/T in “1st” or A/T in “L”.

WARNING:
Make sure that transfer is set to “2H” range position for this check. If it is set to “4H” or “4L” position, front and rear wheels turn at high speed and a very dangerous situation may occur.

7) Also check that vacuum is felt when engine speed is increased to higher than about 1,500 r/min. and keep it for 3 min. or more. If check result is not described in steps 5) and 7), check EVAP canister purge valve, wire harness and vacuum passage.

Vacuum passage inspection

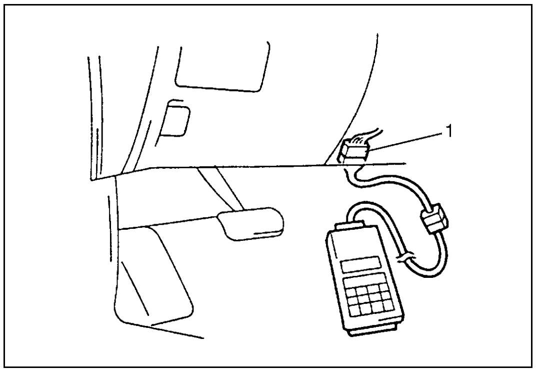


Start engine and run it at idle speed. With finger placed against vacuum nozzle (1), check that vacuum is applied.
If it is not applied, clean vacuum passage by blowing compressed air.

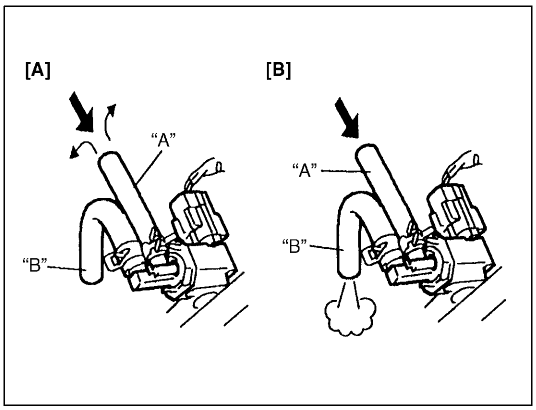
Vacuum hose inspection

Check hoses for connection, leakage, clog and deterioration. Replace as necessary.

Evap canister purge valve and its circuit inspection



1) Connect SUZUKI scan tool to DLC (1) with ignition switch OFF and disconnect vacuum hoses from each pipe.
2) Turn ignition switch ON, clear DTC and select “MISC TEST” mode on SUZUKI scan tool.

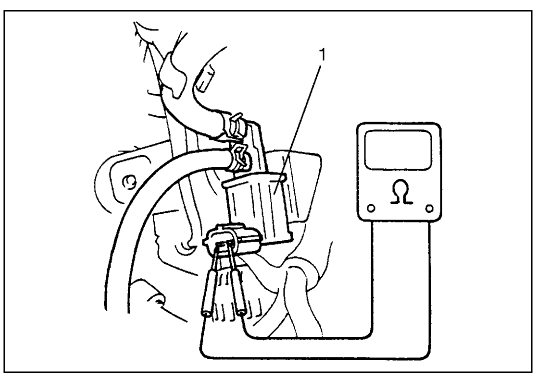


3) Check purge valve for operation and vacuum passage for clog when valve is switched ON and OFF by using SUZUKI scan tool.
   If check result is not described, check vacuum hoses, purge valve, wire harness and connections.

EVAP canister purge valve :
Valve OFF [A] : When blowing into hose “A”, air should not come out of hose “B”.
Valve ON [B] : When blowing into hose “A”, air should come out of hose “B”.

Evap canister purge valve inspection

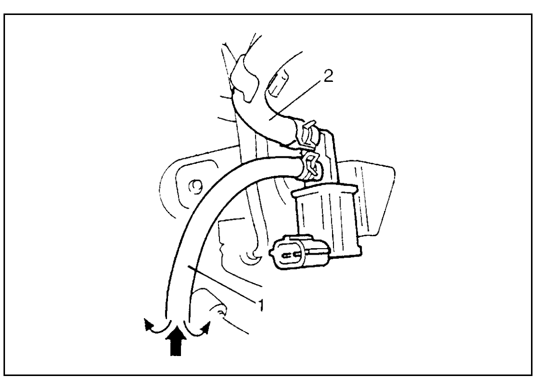
1) With ignition switch OFF, disconnect coupler from canister purge valve.



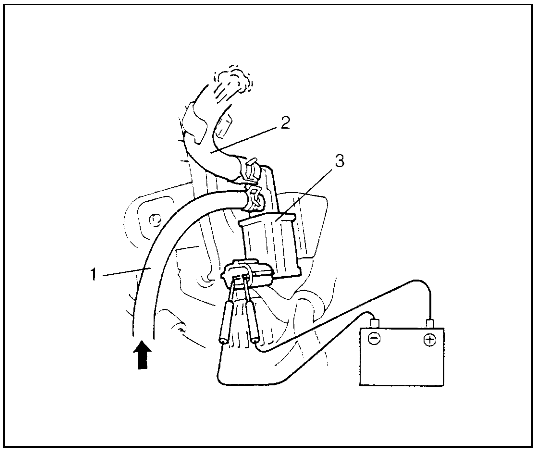
2) Check resistance between two terminals of EVAP canister purge valve (1).
   If resistance is as specified, proceed to next operation check.
   If not, replace.

Resistance of EVAP canister purge valve :
28 – 35 Ω at 20°C (68°F)

3) Disconnect vacuum hoses from intake manifold and its EVAP canister.



4) With coupler disconnected, blow into hose “A” (1). Air should not come out of hose “B” (2).



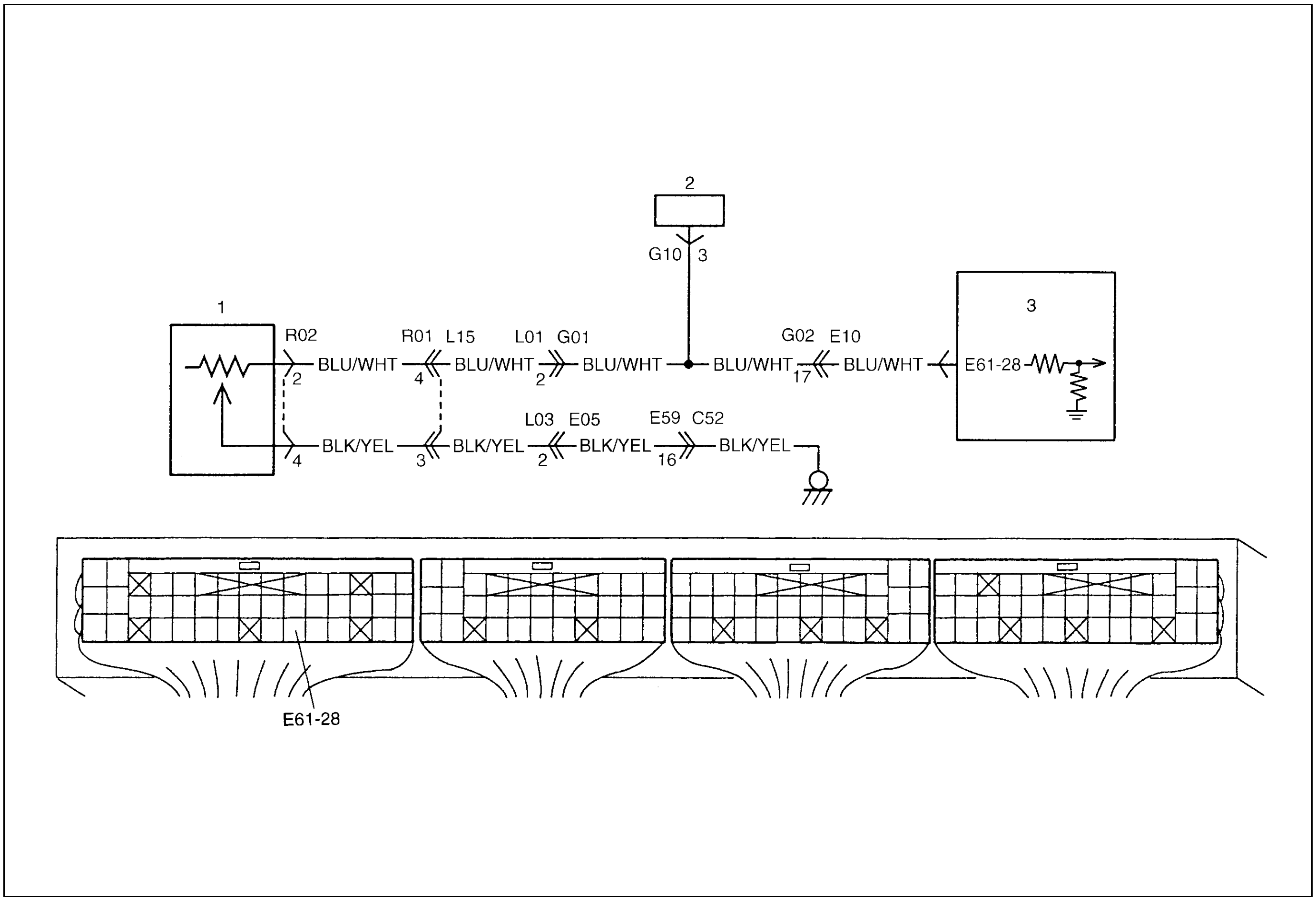
5) Connect 12 V-battery to EVAP canister purge valve (3) terminals. In this state, blow hose “A” (1).
   Air should come out of hose “B” (2).
   If check result is not as described, replace EVAP canister purge valve.

WARNING:
Do not suck the air through valve. Fuel vapor inside valve is harmful.

6) Connect vacuum hoses.
7) Connect EVAP canister purge valve coupler securely.

DTC P0460 Fuel Level Sensor Circuit High Input

WIRING DIAGRAM/CIRCUIT DESCRIPTION



1.	Fuel level sensor
2.	Fuel meter in combination meter
3.	ECM (PCM)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Fuel level sensor output voltage higher than specified value is detected for specified time. (2 driving cycle detection logic)	• Fuel level gauge or its circuit • Fuel level sensor or its circuit • ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following condition is satisfied when using this "DTC CONFIRMATION PROCEDURE".

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

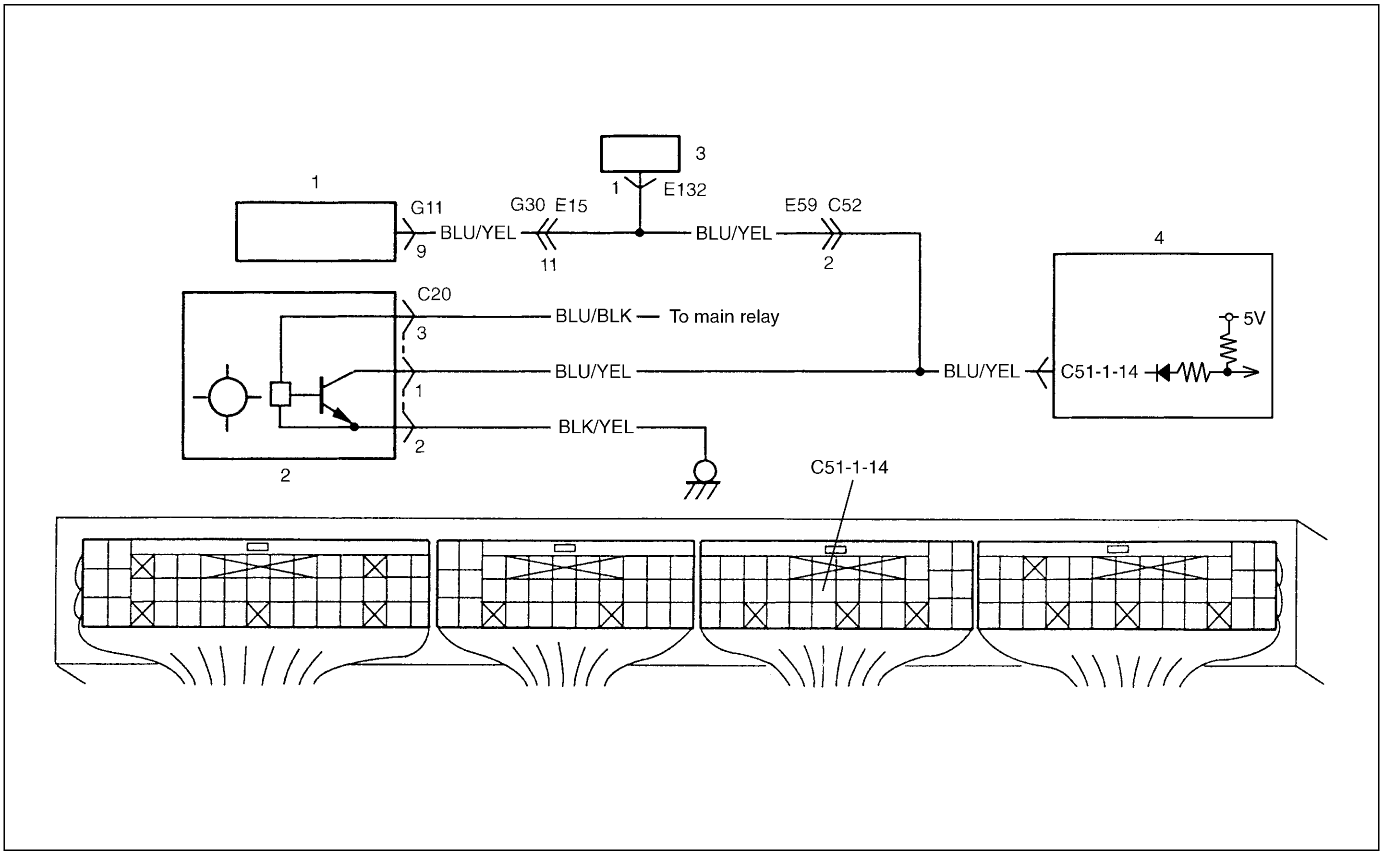
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine for 1 min.
3) Check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Does fuel level meter in combination meter indicate “E” (Empty)?	Replenish fuel tank with fuel and go to Step 3.	Go to Step 3.
3	Check fuel level sensor and its circuit: 1) Check voltage between terminal E61-28 and ground with ignition switch ON. Is it about 7.1 V or more?	Go to Step 4.	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.
4	Is voltage in Step 3 “9 – 14 V”?	“BLU/WHT” wire shorted to power circuit or fuel level meter malfunction.	Go to Step 5.
5	Check Fuel Level Sensor: 1) Turn ignition switch OFF and disconnect fuel level sensor connector (L15 – R01). 2) Check for proper connection to fuel level sensor at L15-4 and L15-3 terminals. 3) If OK, then check resistance between R01-4 and R01-3 terminals. (Refer to “FUEL LEVEL GAUGE (SENDER GAUGE)” in Section 8C.) Is value close to one of above values indicated?	“BLU/WHT” or “BLK/YEL” circuit open. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Check “BLU/WHT” and “BLK/YEL” wires between R01 and R02 connections. If OK, replace fuel level sensor.

DTC P0500 (DTC No.24) Vehicle Speed Sensor Malfunction

WIRING DIAGRAM



1.	Speedometer
2.	Vehicle speed sensor
3.	Cruise control module (if equipped)
4.	ECM (PCM)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Vehicle speed signal not inputted although fuel is kept cut for longer than 5 seconds (2 driving cycle detection logic)	• Vehicle speed sensor circuit open or short • Vehicle speed sensor • Vehicle speed sensor drive gear or driven gear • Speedometer malfunction • Cruise control module malfunction (if equipped) • ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:
Check to make sure that following condition is satisfied when using this "DTC CONFIRMATION PROCEDURE".
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

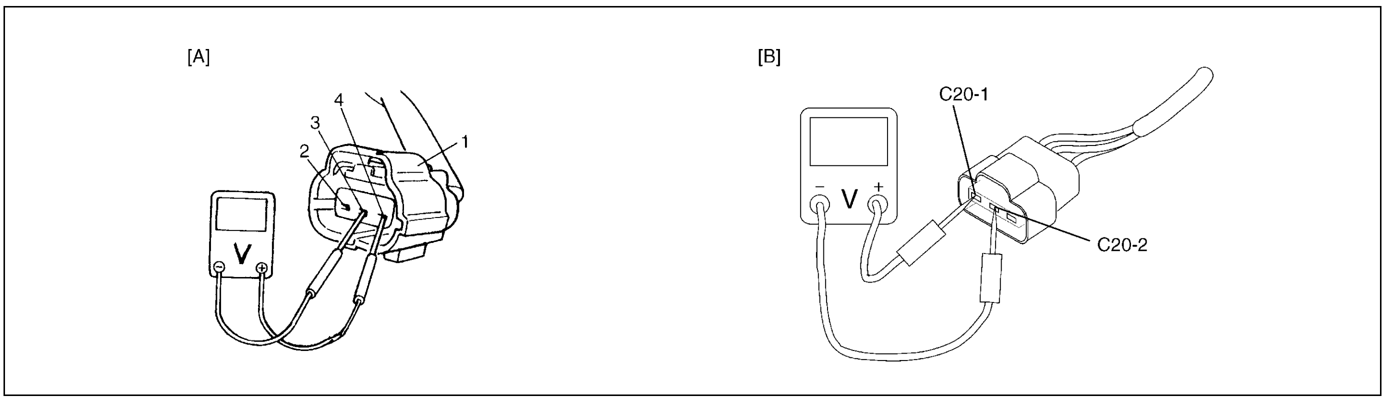
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and warm up engine completely.
3) Increase vehicle speed to 100 – 110 km/h (60 – 70 mph).
4) Release accelerator pedal and with engine brake applied, keep vehicle coasting for 5 seconds or more and then stop vehicle.
5) Check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	Does speedometer indicate vehicle speed?	Faulty "BLU/YEL" wire or poor C51-1-14 connection. If wire and connection are OK, intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Go to Step 3.
3	VSS power supply voltage check: 1) With ignition switch OFF, remove VSS coupler. 2) With ignition switch ON leaving engine OFF, check voltage between C20-3 and C20-2 terminal of VSS coupler. Is voltage 10 – 14 V?	Go to Step 4.	"BLK/BLU" or "BLK/YEL" wire open/short.
4	VSS signal harness check: 1) With ignition switch ON leaving engine OFF, check voltage between C20-1 and C20-2 terminal of VSS coupler. Is voltage 4 V or more?	Go to Step 5.	Go to Step 6.

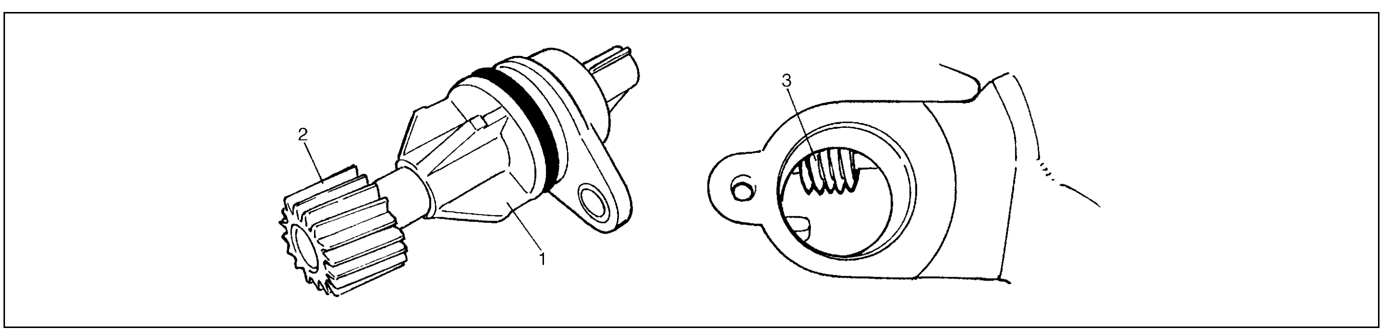
Step	Action	Yes	No
5	VSS visual inspection: 1) Remove VSS referring to “TRANSFER” section. 2) Check VSS drive and driven gears for damage and excessive wear. Are they in good condition?	Poor VSS connection or VSS malfunction. If connection is OK, substitute a known-good VSS and recheck.	Replace VSS.
6	Speedometer circuit check: 1) With ignition switch OFF, disconnect G11 coupler from combination meter. 2) With ignition switch ON leaving engine OFF, check voltage between C20-1 and C20-2 terminal of VSS coupler. Is voltage 4 V or more?	Substitute a known-good combination meter and recheck.	Go to Step 7.
7	Cruise control module circuit check (if equipped): 1) With ignition switch OFF, disconnect E132 coupler from cruise control module. 2) With ignition switch ON leaving engine OFF, check voltage between C20-1 and C20-2 terminal of VSS coupler. Is voltage 4 V or more?	Substitute a known-good cruise control module and recheck.	“BLU/YEL” wire open/ short or faulty ECM (PCM). If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.

[A] Fig. for Step 3 / [B] Fig. for Step 4, 6, 7



1.	VSS coupler
2.	“BLU/YEL” (C20-1) terminal
3.	“BLK/YEL” (C20-2) terminal
4.	“BLU/BLK” (C20-3) terminal

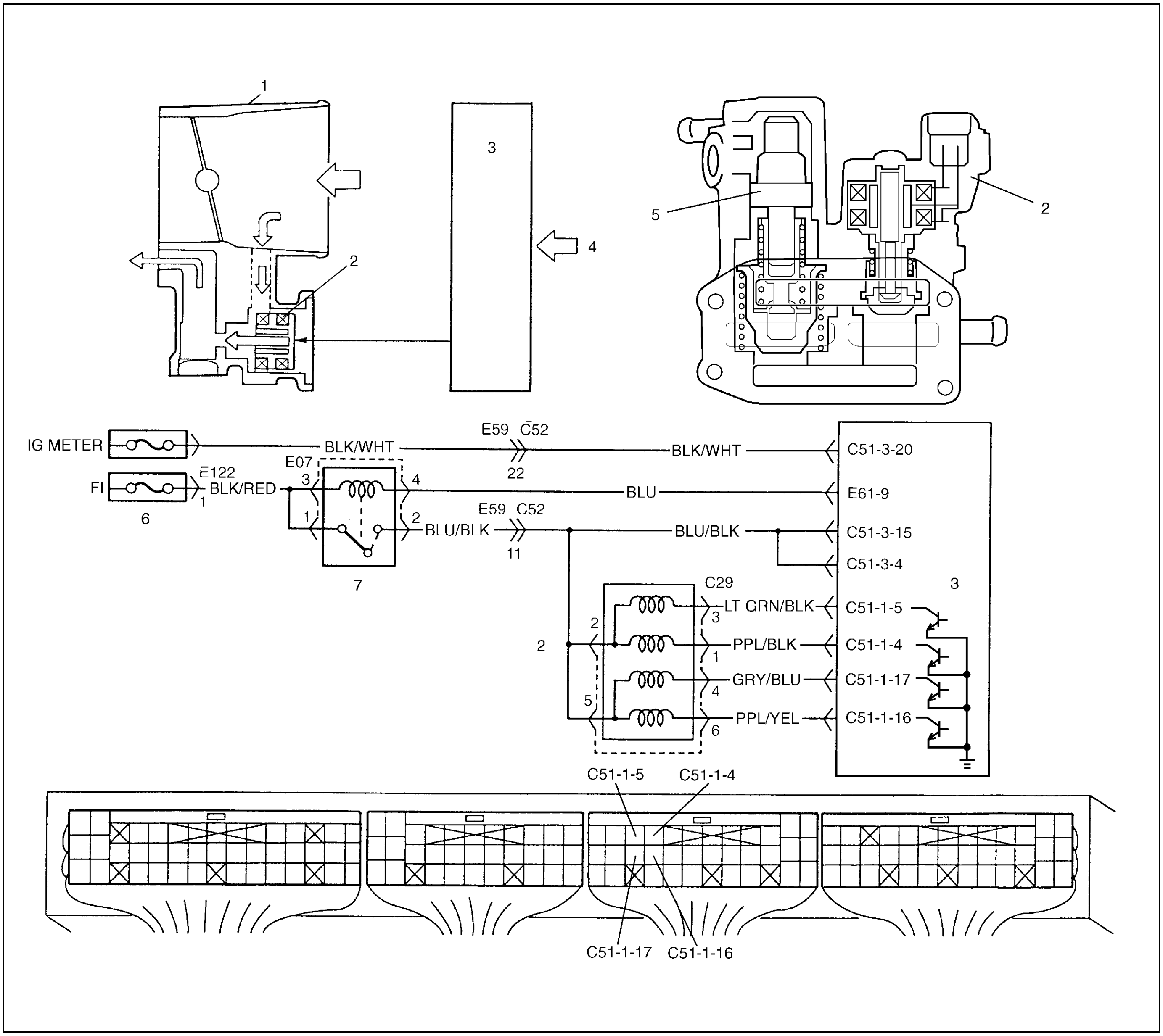
Fig. for Step 5



1.	VSS coupler
2.	VSS driven gear
3.	VSS drive gear

DTC P0505 Idle Air Control System Malfunction

SYSTEM/WIRING DIAGRAM



1. Throttle body	3. ECM (PCM)	5. FIA valve	7. Main relay
2. Idle air control valve	4. Sensed information	6. Main fuse	

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
• Engine idle speed is 100 r/min. or more lower than target idle speed for longer than 20 sec. continuously. or • Engine idle speed is 200 r/min or more higher than target idle speed for longer than 20 sec. continuously. (2 driving cycle detection logic)	• IAC valve or its circuit • Abnormal air drawn in air intake system • FIA (fast idle air) valve

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following condition is satisfied when using this "DTC CONFIRMATION PROCEDURE".
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and warm up engine completely.
3) Run engine at idle speed for 1 min.
4) Check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	Idle speed check: 1) Check engine idle speed referring to "IDLE SPEED/IDLE AIR CONTROL DUTY INSPECTION" in Section 6E2. Is engine idle speed within specification?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Go to Step 3.
3	IAC valve check: 1) Check IAC valve referring to "IAC VALVE INSPECTION" in Section 6E2. Is check result as specified?	Go to Step 6.	Go to Step 4.
4	IAC valve circuit check: 1) With ignition switch OFF, disconnect ECM (PCM) couplers. 2) Check for proper connection to IAC valve at C51-1-4, C51-1-5, C51-1-16 and C51-1-17 terminals. 3) If OK, check resistance between C51-1-4 and C51-1-5, C51-1-16 and C51-1-17. Is each resistance 51 – 67 Ω?	Go to Step 5.	"LT GRN/BLK", "PPL/BLK", "GRY/BLU" or "PPL/YEL" wire open or short. If wire and connections are OK, replace IAC valve.
5	IAC valve power supply voltage check: 1) Connect ECM (PCM) couplers. 2) With ignition switch OFF, disconnect C29 coupler of IAC valve. 3) With ignition switch ON, check voltage between C29-2 and ground, C29-5 and ground. Is each voltage 10 – 14 V?	IAC valve or ECM (PCM) malfunction.	Open "BLU/BLK" wire.

Step	Action	Yes	No
6	Was idle speed higher than specification in Step 2?	Check FIA valve for malfunction. Check abnormal air inhaling from intake manifold, throttle body, PCV valve and EVAP canister purge control system.	Check parts or system which can cause engine low idle. Check FIA valve for stuck. Air inhaling from between throttle body and MAF sensor, EGR valve malfunction (leakage from valve seat), accessory engine load, clog of idle air passage, engine mechanical, engine overheat and etc.

DTC P0601 (DTC No.71) Internal Control Module Memory Check Sum Error

SYSTEM DESCRIPTION

Internal control module is installed in ECM (PCM).

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Data write error or check sum error	ECM (PCM)

DTC CONFIRMATION PROCEDURE

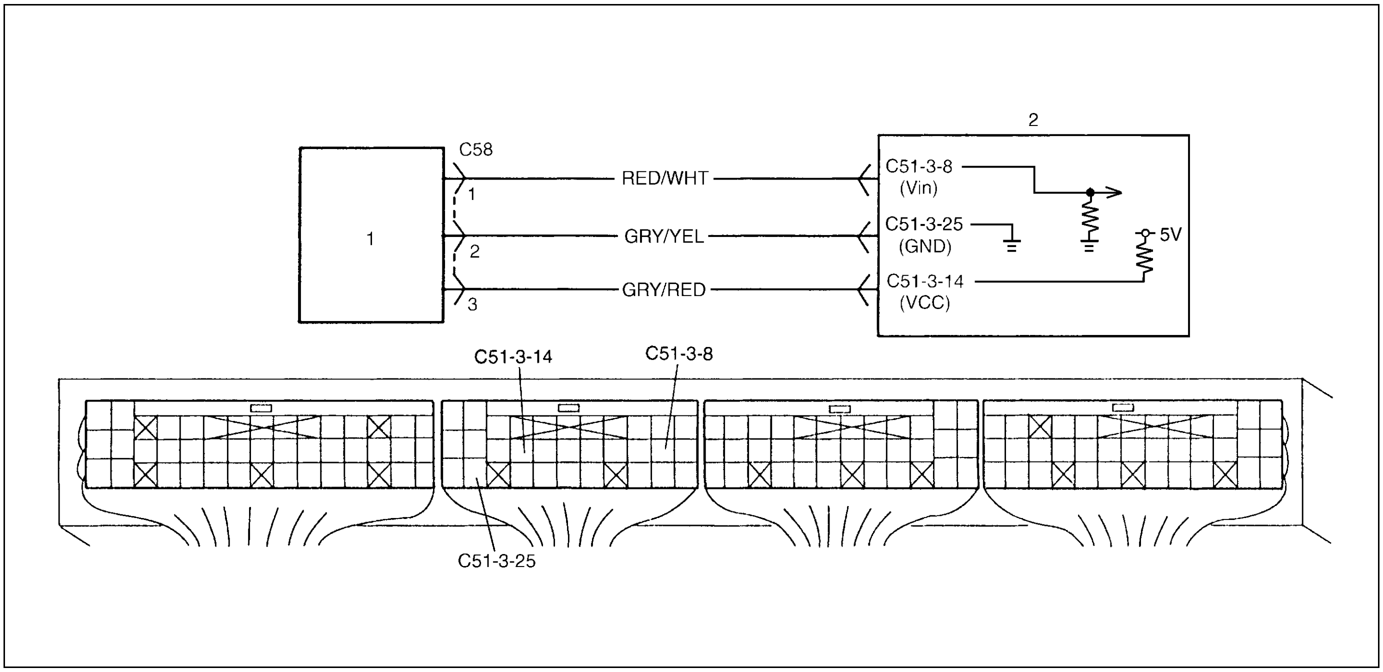
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool.
3) Start engine and run it at idle if possible.
4) Check DTC by using scan tool.

TROUBLESHOOTING

Substitute a known-good ECM (PCM) and recheck.

DTC P1408 Manifold Absolute Pressure Sensor Circuit Malfunction

WIRING DIAGRAM



1.	MAP sensor
2.	ECM (PCM)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
• While engine is running after being warmed up and with throttle opening smaller than specification, higher than 4.6 V manifold absolute pressure sensor output voltage is detected for specified time or with throttle opening larger than specification, lower than 0.2 V manifold absolute pressure output voltage is detected for specified time. (2 driving cycle detection logic)	• Manifold absolute pressure sensor • Manifold absolute pressure sensor vacuum passage • ECM (PCM)

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

NOTE:

Check to make sure that following condition is satisfied when using this “DTC CONFIRMATION PROCEDURE”.
- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and warm up engine completely.
3) Run engine at idle speed for 1 min. (engine coolant temp. becomes 76°C (169°F) or more).
4) Increase vehicle speed to 80 km/h (50 mph).
5) Keep driving above vehicle speed for 1 min (Change of vehicle speed is permitted in this step).
6) Stop vehicle and check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	MAP sensor signal check : 1) Remove ECM (PCM) cover. 2) Check voltage between C51-3-8 and C51-3-25 under following conditions. • With ignition switch ON leaving engine OFF : 0.2 V or higher • At idling : 4.6 V or lower Is check result as specified?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Go to Step 3.
3	MAP sensor check : 1) Disconnect connector from MAP sensor. 2) Check for proper connection to MAP sensor at each terminal. 3) If OK, check MAP sensor for performance referring to “MAP SENSOR INSPECTION” in Section 6E2. Is check result satisfactory?	“RED/WHT”, “GRY/YEL” or “GRY/RED” circuit open/short. If wire and connections are OK, substitute a known-good ECM (PCM) and recheck.	Replace MAP sensor.

DTC P1450/P1451 Barometric Pressure Sensor Circuit Malfunction/Performance Problem

SYSTEM DESCRIPTION

Barometric pressure sensor is installed in ECM (PCM).

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
DTC P1450 : Barometric pressure out of specification is detected.	• Barometric pressure sensor in ECM (PCM)
DTC P1451 : While running under conditions described for “DTC CONFIRMATION PROCEDURE”, barometric pressure value compared with intake manifold vacuum value in fuel cut state is not as specified. (2 driving cycle detection logic)	• Manifold absolute pressure sensor performance problem • Barometric pressure sensor in ECM (PCM)

DTC CONFIRMATION PROCEDURE

For DTC P1450

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC by using scan tool and run engine for 1 min.
3) Check DTC by using scan tool.

For DTC P1451

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

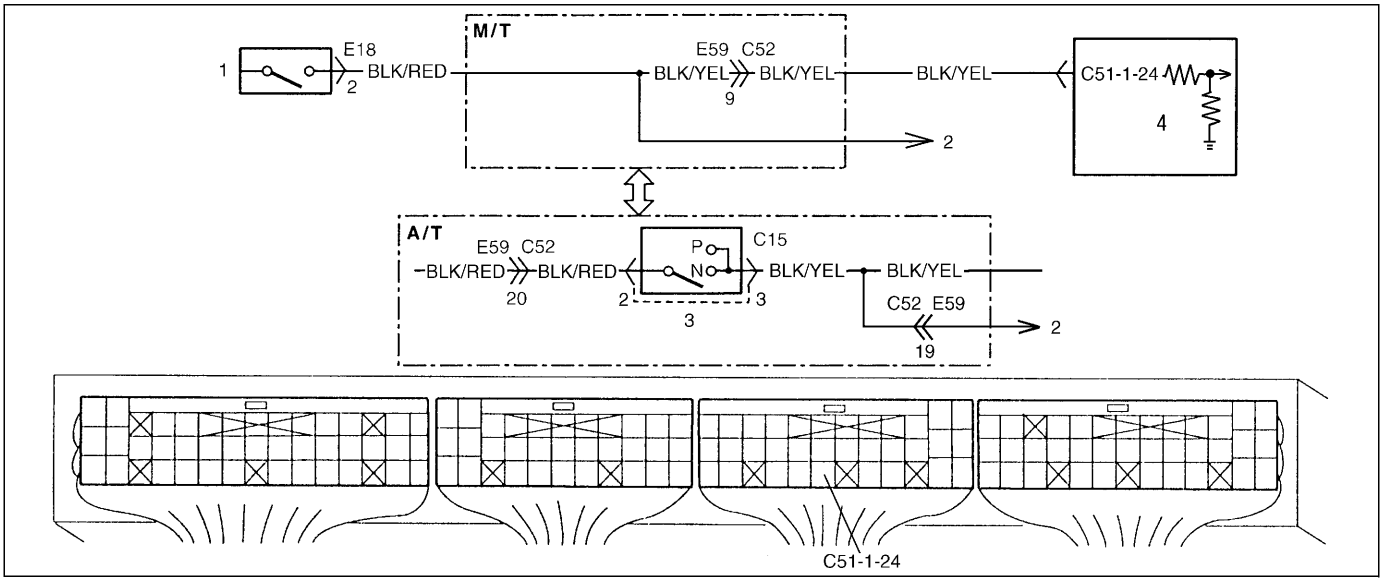
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and warm up engine to normal operating temperature.
3) Increase engine speed to 3,000 r/min. in 3rd gear in case of M/T and “2” range in case of A/T.
4) Release accelerator pedal and with engine brake applied, keep vehicle coasting for 5 sec. or more (keep fuel cut condition for 5 sec. or more). If fuel cut condition is not kept for 5 sec. or more, coast down a slope in engine speed 1600 – 3000 r/min for 5 sec. or more.
5) Stop vehicle and run engine at idle.
6) Repeat steps 3) – 5) 2 times.
7) Check pending DTC by using scan tool.

TROUBLESHOOTING (DTC P1450/P1451)

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Is DTC P1451 set?	Go to Step 3.	Substitute a known-good ECM (PCM) and recheck.
3	MAP sensor check : 1) Check MAP sensor and its circuit referring to Steps 2 and 3 of “DTC P1408 Diag. Flow Table”. Is check result satisfactory?	Substitute a known-good ECM (PCM) and recheck.	MAP sensor or its circuit malfunction.

DTC P1500 Engine Starter Signal Circuit Malfunction

WIRING DIAGRAM



1. Engine start switch in ignition (main) switch	2. Starting motor	3. Transmission range sensor (switch)	4. ECM (PCM)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
• Engine starts even though vehicle is at stop and engine start signal is not inputted. or • Engine start signal is inputted continuously for specified time while engine is running. (2 driving cycle detection logic)	• Engine start signal circuit • ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following condition is satisfied when using this "DTC CONFIRMATION PROCEDURE".

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

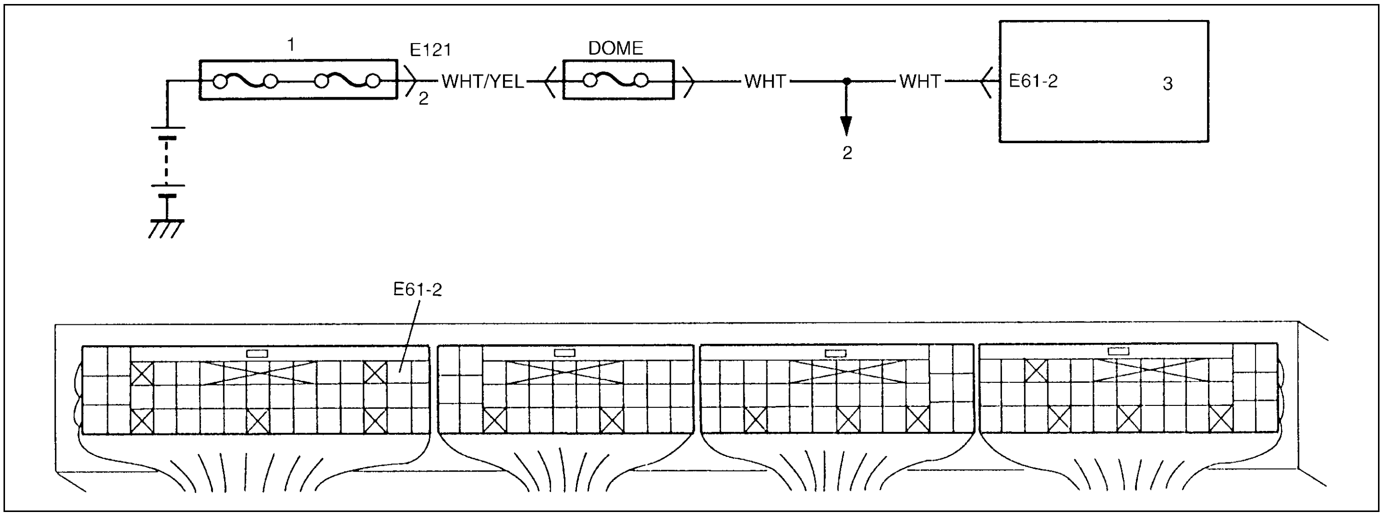
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC by using scan tool, then start engine and run it for 3 min. or more.
3) Check pending DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE" in this section.
2	Check for voltage at terminal C51-1-24 of ECM (PCM) connector connected, under following condition. **Engine starter signal specification :** **While engine cranking : 6 – 14 V** **After starting engine : 0 – 1 V** Is voltage as specified?	Poor C51-1-24 connection or intermittent trouble. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A. If wire and connections are OK, substitute a known-good ECM (PCM) and recheck.	"BLK/YEL" circuit open.

DTC P1510 Ecm Back-Up Power Supply Malfunction

WIRING DIAGRAM



1. Main fuse box	3. ECM (PCM)
2. To DLC	

CIRCUIT DESCRIPTION

Battery voltage is supplied to keep DTC memory, values that ECM has learned to control engine, etc. in ECM even when ignition switch is turned OFF.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Back-up circuit voltage lower than specification is detected while engine is running.	• ECM (PCM) back-up circuit • ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following condition is satisfied when using this “DTC CONFIRMATION PROCEDURE”.

- **Intake air temp. : – 8°C (18°F) or higher**
- **Engine coolant temp. : – 8 – 110°C (18 – 230°F)**
- **Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg (75 kPa) or more)**

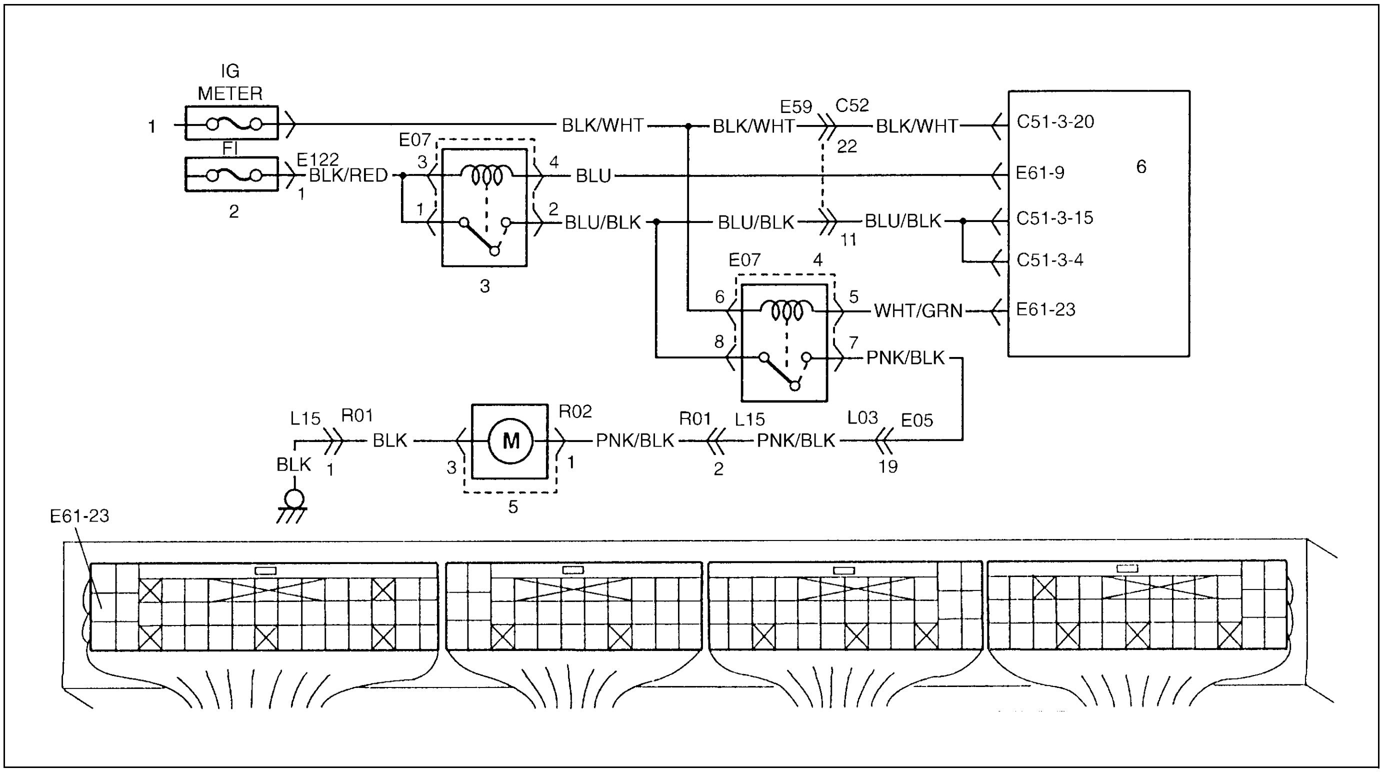
1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine at idle speed for 1min.
3) Check DTC by using scan tool.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE” in this section.
2	Battery voltage supply circuit check : 1) Remove ECM (PCM) cover. 2) While engine running, check voltage between E61-2 and ground. Is voltage 10 – 14 V?	Poor E61-2 connection or intermittent trouble. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A. If wire and connections are OK, substitute a known-good ECM (PCM) and recheck.	“WHT” circuit open or short.

Table B-1 Fuel Pump Circuit Inspection

WIRING DIAGRAM



1. To ignition switch	4. Fuel pump relay
2. Main fuse	5. Fuel pump
3. Main relay	6. ECM (PCM)

INSPECTION

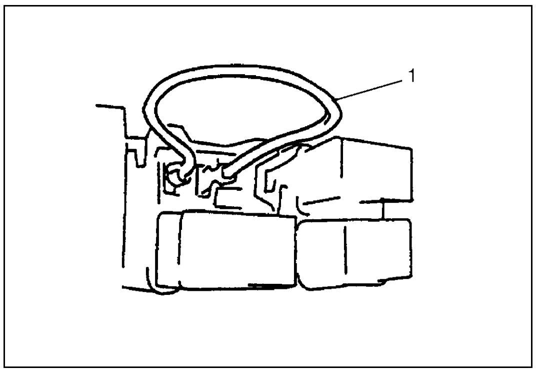
CAUTION:

Check to make sure that connection is made between correct terminals.
Wrong connection can cause damage to ECM, wire harness etc.

Step	Action	Yes	No
1	Fuel pump operation check : 1) Remove fuel filler cap. 2) Turn ON ignition switch. Is fuel pump operation sound heard for 3 sec. after ignition switch ON?	Fuel pump circuit is in good condition.	Go to Step 2.
2	Fuel pump circuit check : 1) With ignition switch OFF, remove fuel pump relay from connector. 2) Check for proper connection to relay at each terminal. 3) If OK, using service wire, connect terminals E07-7 and E07-8 of relay connector. (See Fig.) Is fuel pump heard to operate at ignition switch ON?	Go to Step 3.	“BLU/BLK”, “PNK/BLK” or “BLK” circuit open or fuel pump malfunction.

Step	Action	Yes	No
3	Fuel pump relay check : 1) Check fuel pump relay referring to "FUEL PUMP RELAY INSPECTION" in Section 6E2. Is it in good condition?	"BLK/WHT" or "WHT/GRN" circuit open or poor E61-23 connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.	Replace fuel pump relay.

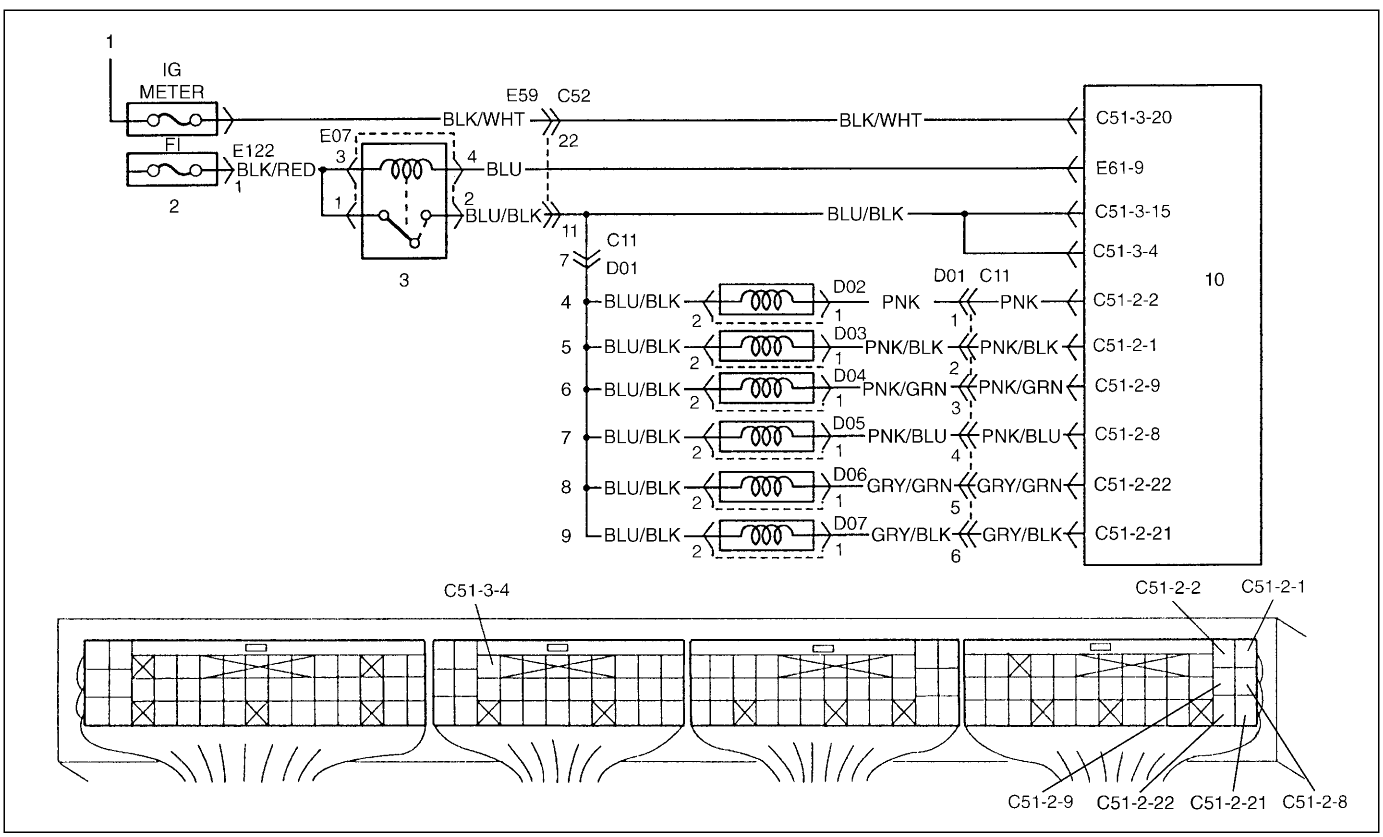
Fig. for Step 2



1. Fuel pump relay connector

Table B-2 Fuel Injectors and Circuit Inspection

WIRING DIAGRAM



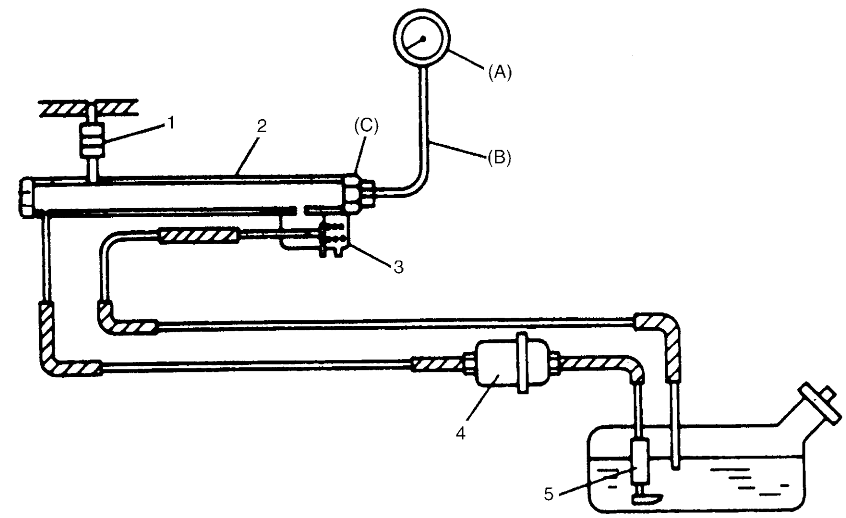
1. To ignition switch	4. Injector No.1	7. Injector No.4	10. ECM (PCM)
2. Main fuse	5. Injector No.2	8. Injector No.5	
3. Main relay	6. Injector No.3	9. Injector No.6	

INSPECTION

Step	Action	Yes	No
1	Check injector for operating sound : Using sound scope, check each injector for operating sound at engine cranking. Do all 6 injectors make operating sound?	Go to Step 2.	Go to Step 3.
2	Wire harness check : 1) Remove ECM (PCM) cover and disconnect connectors from ECM (PCM). 2) Check for resistance between following terminals of ECM (PCM) connector disconnected. **Fuel injector and its circuit resistance (C51-2-1 – C51-3-4, C51-2-2 – C51-3-4, C51-2-8 – C51-3-4, C51-2-9 – C51-3-4, C51-2-21 – C51-3-4 and C51-2-22 – C51-3-4) :** **14.2 – 14.8 Ω at 20°C (68°F)** Is check result as specified?	Fuel injector circuit is in good condition.	"PNK", "PNK/BLK", "PNK/GRN", "PNK/BLU", "GRY/GRN" and "GRY/BLK" shorted each other.
3	Does none of 6 injectors make operating sound at Step 1?	Go to Step 4.	Check coupler connection and wire harness of injector not making operating sound and injector itself (Refer to "FUEL INJECTOR INSPECTION" in Section 6E2).
4	Check power circuit of injectors for open and short. Is it normal?	Check all 6 injectors for resistance respectively. It resistance is OK, substitute a known-good ECM (PCM) and recheck.	Power circuit open or short.

Table B-3 Fuel Pressure Inspection

SYSTEM DIAGRAM



1. Injector	4. Fuel filter
2. Delivery pipe	5. Fuel pump
3. Fuel pressure regulator	

Special tool
(A) : 09912-58441
(B) : 09912-58431
(C) : 09919-58421

INSPECTION

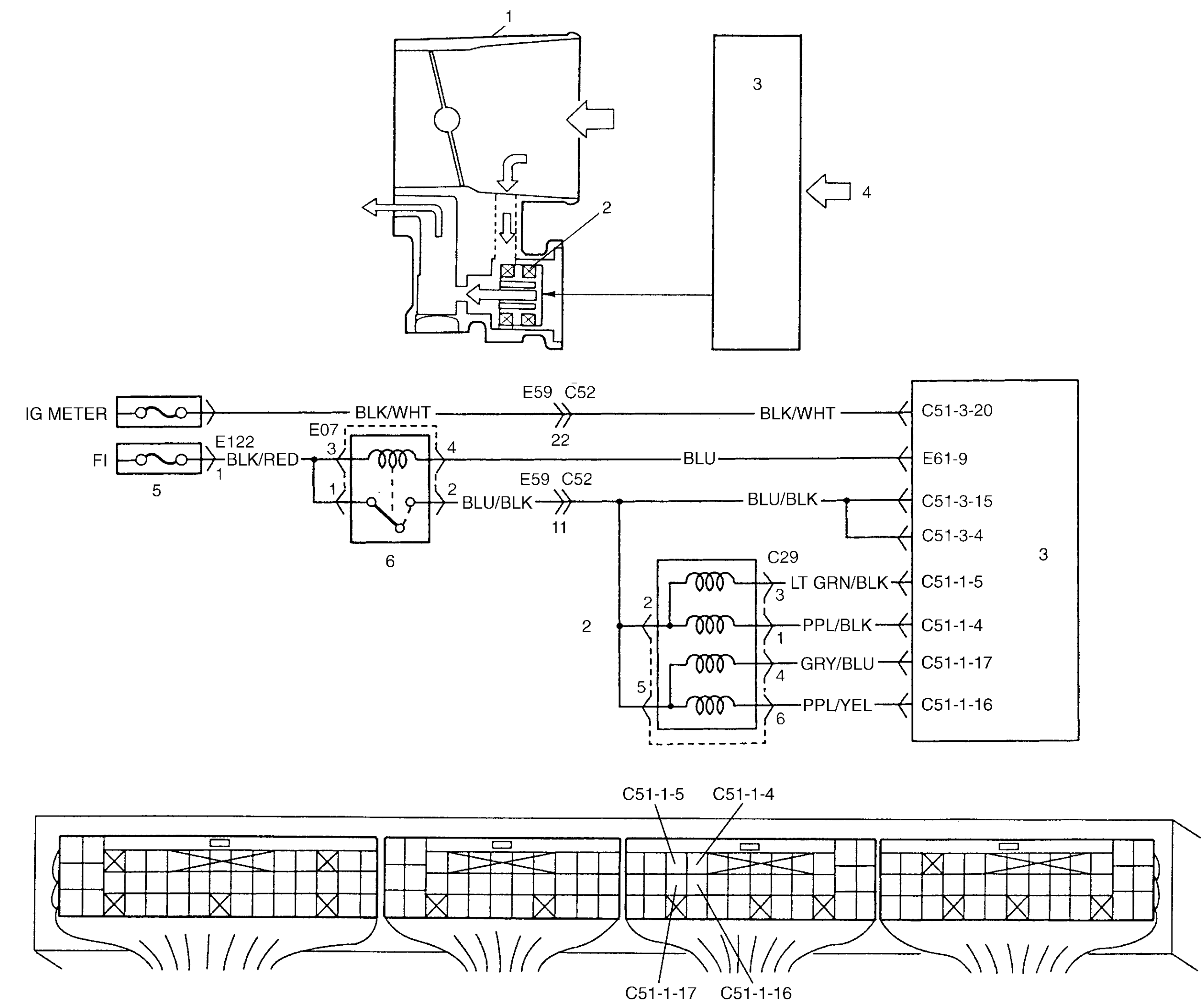
NOTE:
Before using the following flow table, check to make sure that battery voltage is higher than 11 V. If battery voltage is low, pressure becomes lower than specification even if fuel pump and line are in good condition.

Step	Action	Yes	No
1	1) Install fuel pressure gauge, referring to "FUEL PRESSURE INSPECTION" in Section 6E2. 2) Operate fuel pump. Is fuel pressure then 270 – 310 kPa (2.7 – 3.1 kg/cm^2, 38.4 – 44.0 psi)?	Go to Step 2.	Go to Step 5.
2	Is 200 kPa (2.0 kg/cm^2, 28.4 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.

Step	Action	Yes	No
3	1) Start engine and warm it up to normal operating temperature. 2) Keep it running at specified idle speed. Is fuel pressure then within 210 – 260 kPa (2.1 – 2.6 kg/cm^2, 29.8 – 37.0 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.
5	Was fuel pressure higher than spec. in 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. Is specified fuel pressure obtained then?	Restricted fuel return hose or pipe.	Faulty fuel pressure regulator.
7	Was no fuel pressure applied in Step 1?	Go to Step 8.	Go to Step 9. (Low pressure is measured.)
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”).
9	1) Operate fuel pump. 2) With fuel return hose blocked by pinching it, check fuel pressure. Is it 450 kPa (4.5 kg/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) Check again 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 diaphragm.

Table B-4 Idle Air Control System Inspection

WIRING DIAGRAM



1. Throttle body	3. ECM (PCM)	5. Main fuse
2. Idle air control valve	4. Sensed information	6. Main relay

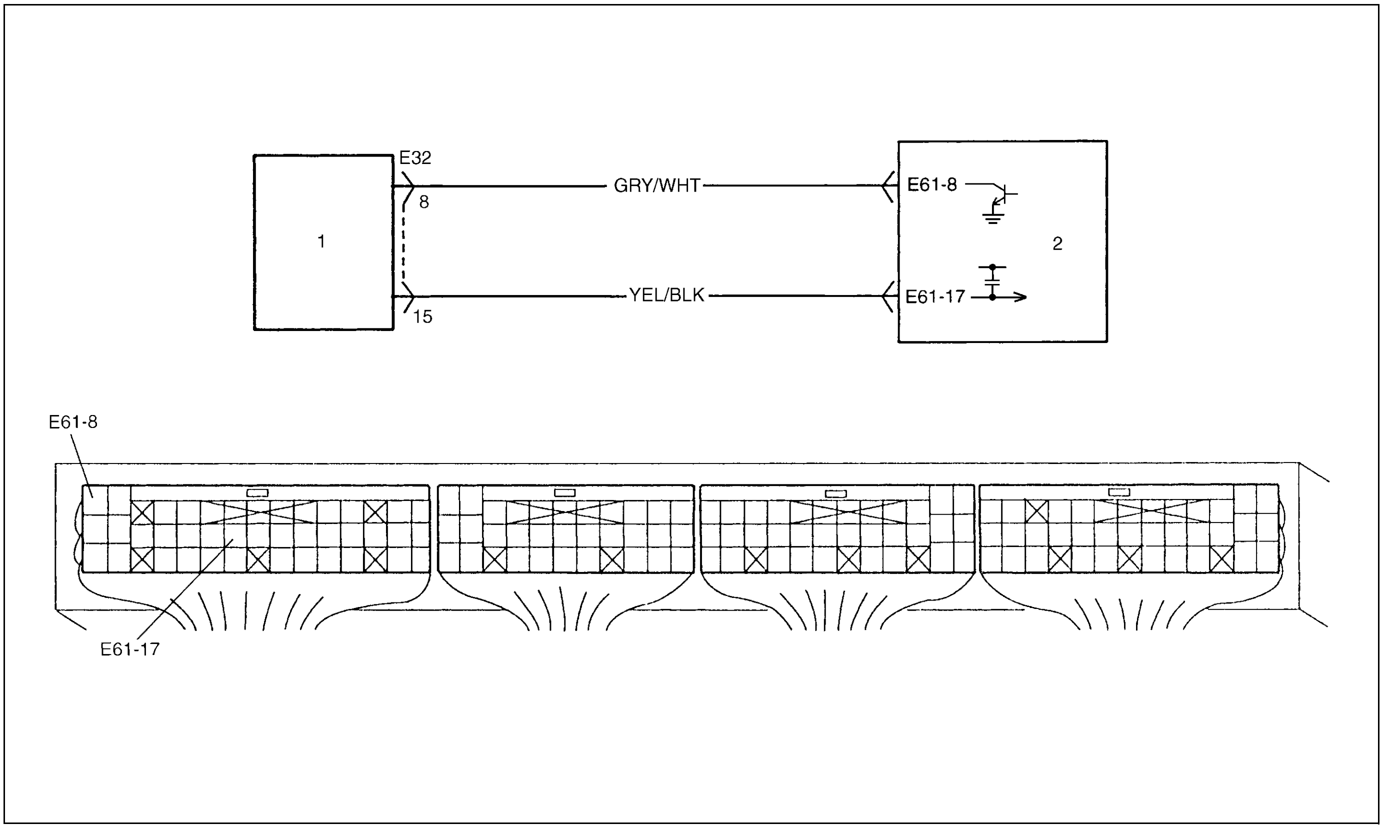
INSPECTION

Step	Action	Yes	No
1	Check engine idle speed and IAC duty referring to “IDLE SPEED/IAC DUTY INSPECTION” in Section 6E2. Is idle speed/IAC duty within specification?	Go to Step 2.	Go to Step 3.
2	Is engine idle speed kept specified speed even with headlights turned ON?	System is in good condition.	Go to Step 3.

Step	Action	Yes	No
3	Check IAC valve referring to “IAC VALVE INSPECTION” in Section 6E2. Is check result as specified?	Go to Step 4.	IAC valve malfunction, “BLU/BLK”, “LT GRN/BLK”, “PPL/BLK”, “GRY/BLU” or “PPL/YEL” wire open or short or poor coupler connection. If all above are OK, substitute a known-good ECM (PCM) and recheck.
4	Was idle speed within specification in Step 1?	Check for following : FIA valve, Vacuum leaks, air inhaling, EVAP canister purge control system, accessory engine load, stuck of PCV valve, clog of idle air passage, MAF sensor, TP sensor, ECT sensor, EGR valve malfunction (leakage from valve seat), A/C signal, transmission range switch signal and power steering switch signal.	Go to Step 5.
5	Was idle speed higher than specification in Step 1?	Go to Step 6.	Go to Step 8.
6	Check A/C (input) signal circuit referring to Step 1 of “Table B-5”. (A/C signal can be also checked by using SUZUKI scan tool.) Is it in good condition?	Go to Step 7.	A/C signal circuit open or short, or A/C system malfunction.
7	Was IAC duty less than about 2% in Step 1 of this table?	Check FIA valve. Check abnormal air inhaling from intake manifold, throttle body, PCV valve and EVAP canister purge control system.	Check TP sensor (closed throttle position) and ECT sensor for performance. If sensors are OK, substitute a known-good ECM (PCM) and recheck.
8	Check transmission range switch signal referring to “INSPECTION OF ECM (PCM) AND ITS CIRCUIT” in this section. Is check result satisfactory?	Go to Step 9.	Transmission range switch malfunction or its circuits open or short.
9	Was IAC duty more than about 30% in Step 1 of this table?	Check parts or system which can cause engine low idle. Check FIA valve. Air inhaling from between throttle body and MAF sensor, EGR valve malfunction (leakage from valve seat), accessory engine load, clog of idle air passage and etc.	Substitute a known-good ECM (PCM) and recheck.

Table B-5 A/C Signal Circuits Inspection (If Equipped)

WIRING DIAGRAM



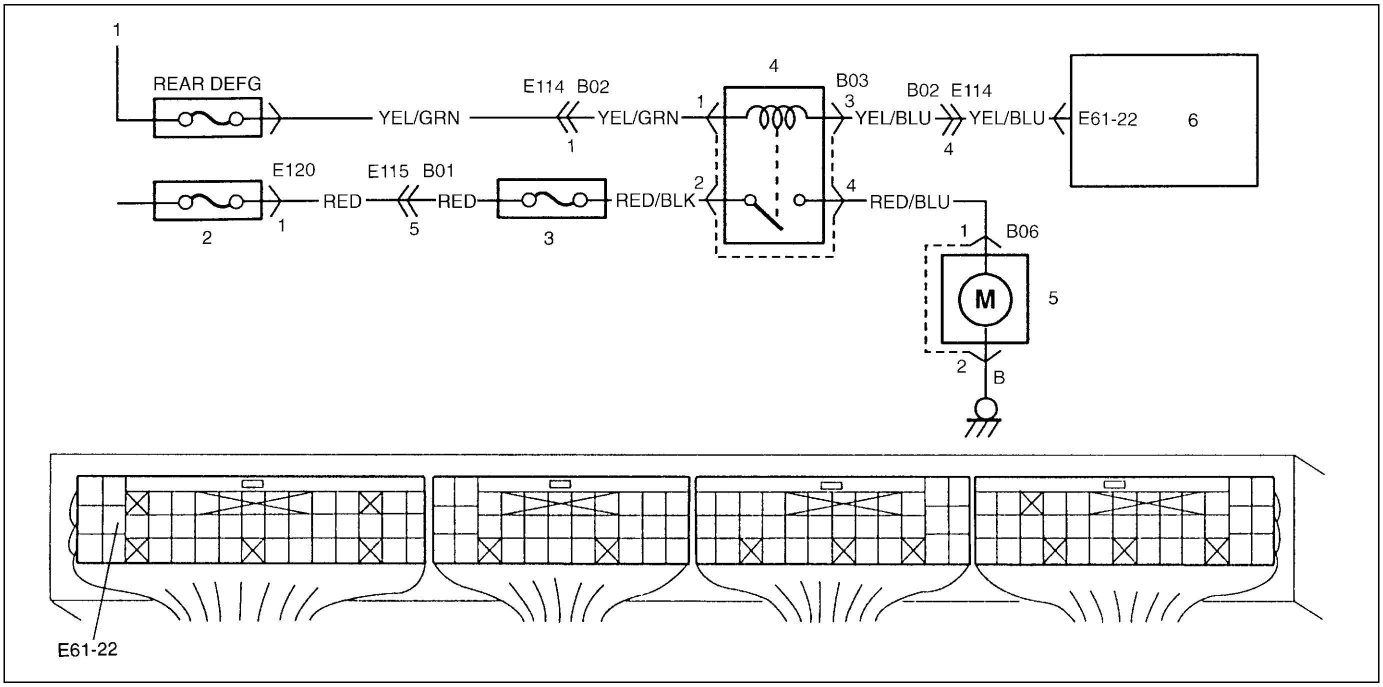
1.	A/C control module (amplifier)
2.	ECM (PCM)

INSPECTION

Step	Action	Yes	No
1	Check A/C Signal Circuit. 1) Check voltage at terminal E61-17 with ignition switch ON. **A/C signal circuit specification :** **A/C switch and/or heater blower switch OFF (A/C is not operating) : 10 – 14 V** **Both A/C switch and heater blower switch ON : 0 – 1.5 V** Are check result as specified?	Go to Step 2.	"YEL/BLK" circuit open or short, Evaporative temperature is below 1°C (34°F) or faulty A/C system.
2	Check A/C Cut Signal Circuit. 1) Check voltage at terminal E61-8. **A/C cut signal specification :** **While engine running and A/C switch and/or heater blower switch OFF** **(A/C is not operating) : 0 – 1.5 V** **While engine running at idle speed and both A/C switch and heater blower switch ON** **(A/C is operating) : 10 – 14 V** Are check result as specified?	A/C control signal circuits are in good condition.	"GRY/WHT" circuit open or short, Poor performance of ECT sensor, TP sensor, Engine start signal inputted or A/C amplifier malfunction. If none of the above exists, substitute a known-good ECM (PCM) and recheck.

Table B-6 A/C Condenser Fan Motor Relay Control System Inspection (If Equipped)

WIRING DIAGRAM



1. To ignition switch	3. A/C fuse	5. A/C condenser fan motor
2. Main fuse	4. A/C condenser fan motor relay	6. ECM (PCM)

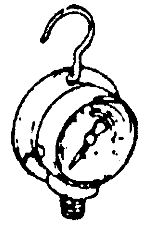
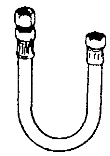
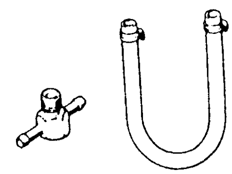
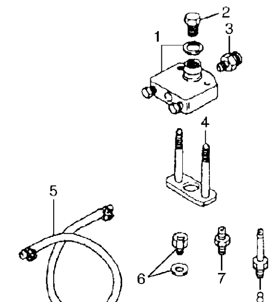
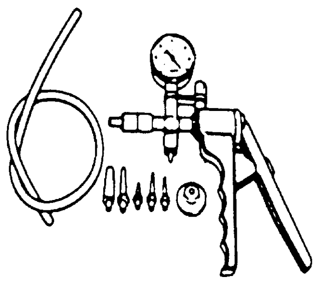
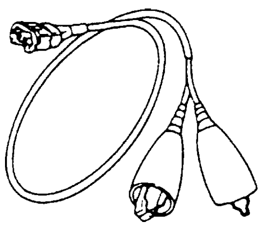
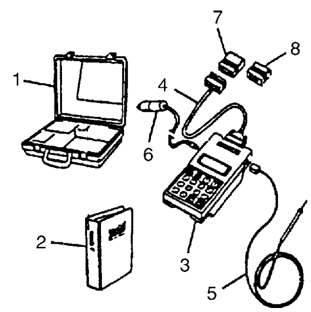
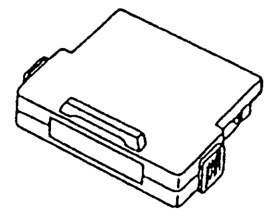
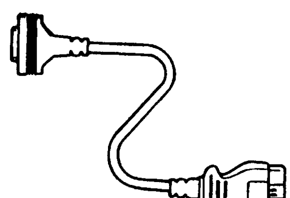
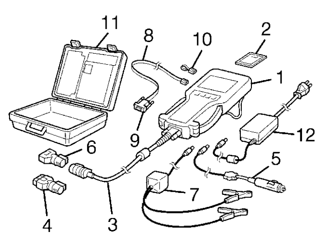
INSPECTION

WARNING:

Keep hands, tools, and clothing away from A/C condenser 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.

Step	Action	Yes	No
1	1) Check DTC referring to “DTC CHECK” in this section. Is there any malfunction DTC?	Go to applicable DTC Diag. Flow Table.	Go to Step 2.
2	1) Check A/C condenser fan for operation. A/C condenser fan should be operated under following condition A or B only. A : When engine is running and A/C is operating. B : When engine coolant temp. is 113°C (235°F) or more with ignition switch ON. Is check result as specified?	This system is in good condition.	Go to Step 3.
3	1) Remove ECM (PCM) cover. 2) Check voltage between E61-22 terminal of ECM (PCM) connected coupler and ground. Other than conditions A and B in Step 2 : 10 – 14 V Under condition A or B in Step 2 : 0 – 1 V Is check result as specified?	Fuse blown, “RED”, “RED/BLK” or “RED/BLU” circuit open, malfunction of condenser fan motor or relay.	“YEL/GRN” circuit open, “YEL/BLU” circuit open or short, or relay malfunction. If above are OK, substitute a known-good ECM (PCM) and recheck.

Special Tool

 09912-58441 Pressure gauge	 09912-58431 Pressure hose	 09912-58490 3-way joint & hose	 09912-58421 Checking tool set (See NOTE “A”.)
 09917-47011 Vacuum pump gauge	 09930-88521 Injector test lead	 09931-76011 Tech 1A kit (SUZUKI scan tool) (See NOTE “B”.)	 Mass storage cartridge for Tech 1A
 09931-76030 14/16 pin DLC cable for Tech 1A	 Tech 2 kit (SUZUKI scan tool) (See NOTE “C”.)		

NOTE:

- **“A”: This kit includes the following items.**
  1. Tool body & washer, 2. Body plug, 3. Body attachment-1, 4. Holder, 5. Return hose & clamp, 6. Body attachment-2 & washer, 7. Hose attachment-1, 8. Hose attachment-2
- **“B”: This kit includes the following items and substitutes for the Tech 2 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
- **“C”: This kit includes the following items and substitutes for the Tech 1A kit.**
  1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 6A2

ENGINE MECHANICAL (H27 ENGINE)

WARNING:

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

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

NOTE:

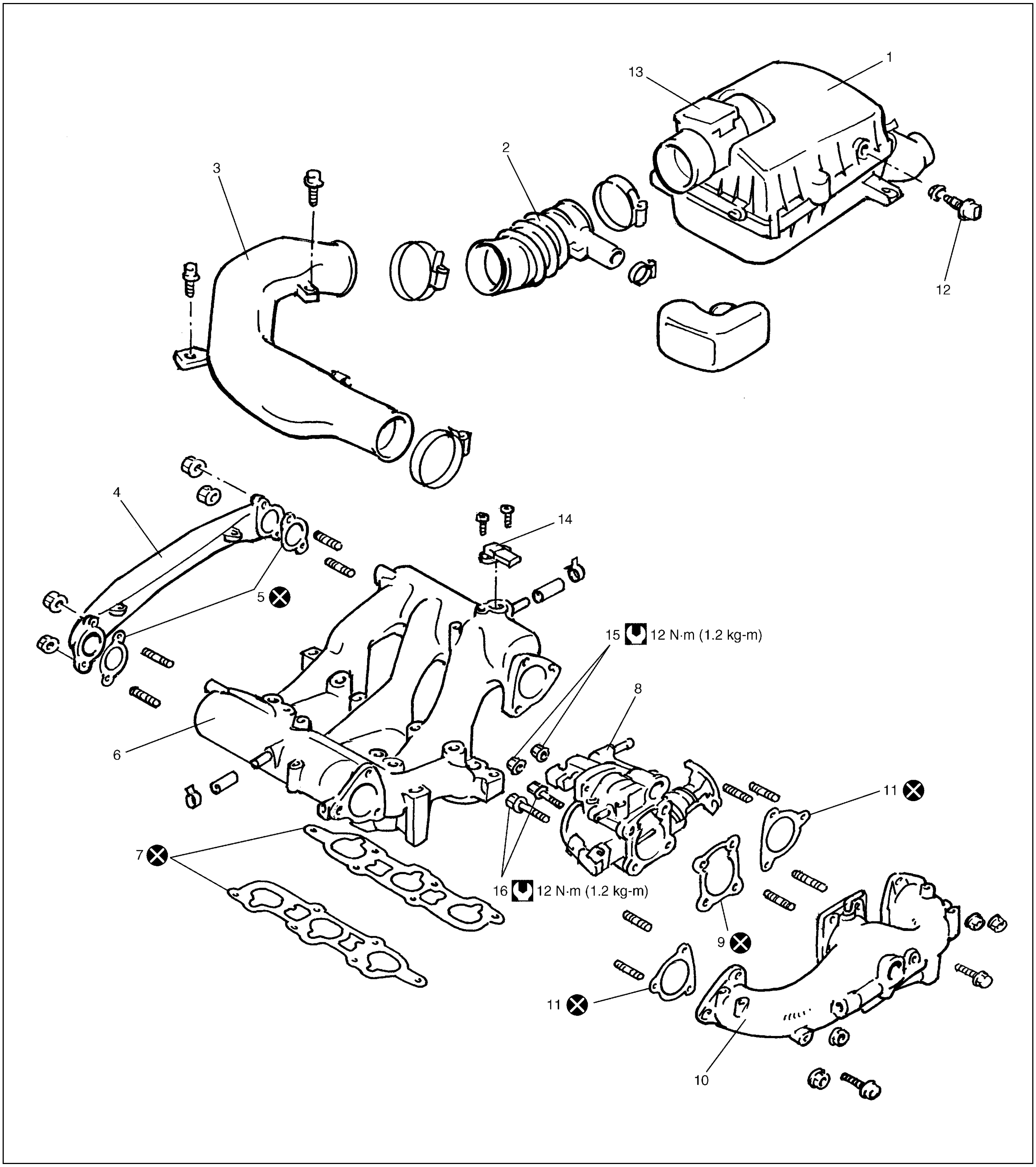
- **For the descriptions (items) not found in this section, refer to the same section of service manual mentioned in the FOREWORD of this manual.**
- **Whether following systems (parts) are used in the particular vehicle or not depends on specifications. Be sure to bear this in mind when performing service work.**
  - **EGR valve**
  - **Warm up three way catalytic converter**
  - **Heated oxygen sensor(s)**
  - **Three way catalytic converter**
  - **CKP sensor**
  - **MAP sensor**

6A2

CONTENTS

On-Vehicle Service

Throttle Body and Intake Manifold



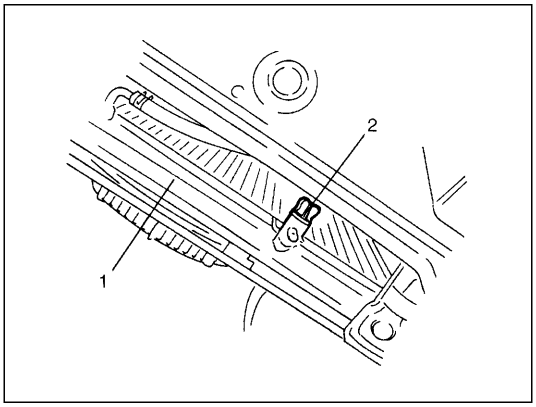
1. Air cleaner box	6. Intake manifold	11. Gasket	16. Throttle body bolt
2. Intake air hose	7. Intake manifold gasket	12. IAT sensor	Tightening Torque
3. Intake air pipe	8. Throttle body assembly	13. MAF sensor	Do not reuse
4. Surge tank pipe	9. Throttle body gasket	14. MAP sensor	
5. Gasket	10. Intake collector	15. Throttle body nut	

REMOVAL

1) Release fuel pressure in fuel feed line by referring to Section 6.

CAUTION:
This work must not be done when engine is hot. If done so, it may cause adverse effect to catalyst.

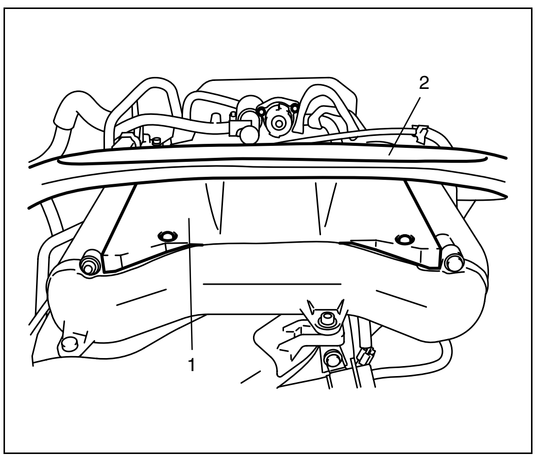
2) Disconnect negative (–) cable at battery.



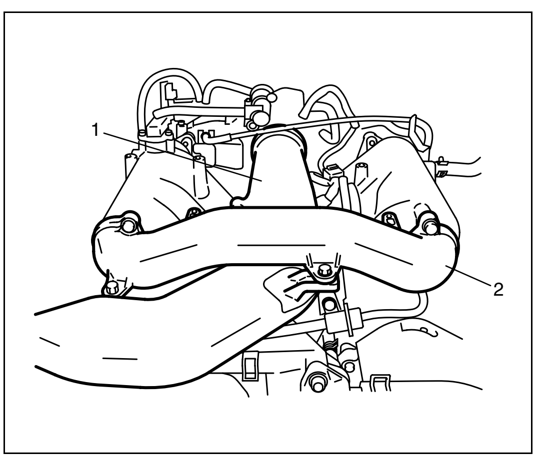
3) Drain coolant.

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.

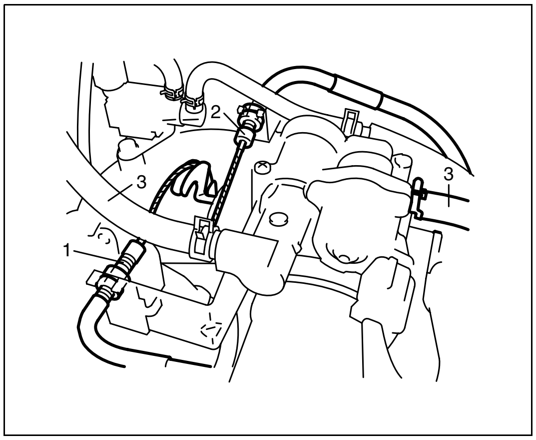
1.	Radiator
2.	Radiator drain plug



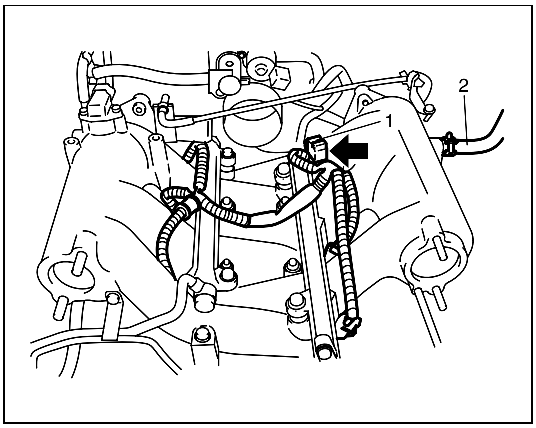
4) Remove strut tower bar (2).
5) Disconnect coupler from intake air temp. sensor, and MAF sensor.
6) Remove surge tank cover (1).



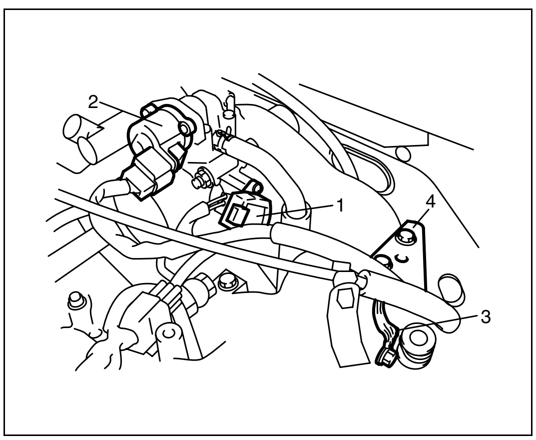
7) Remove air cleaner upper case, intake air hose, intake air pipe (1) and surge tank pipe (2) as one component. Do not disassemble them, when removing and reinstalling.



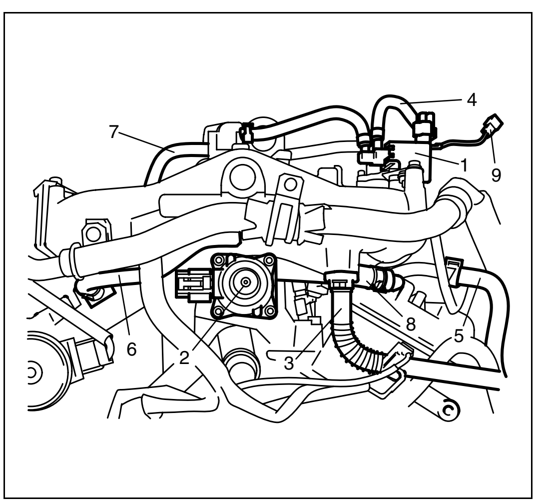
8) Disconnect accelerator cable (1) and A/T throttle cable (2) (for A/T vehicle) from throttle body.
9) Disconnect water hoses (3) from throttle body.



10) Disconnect injector wire (1) coupler.
11) Disconnect brake booster hose (2) from intake manifold.

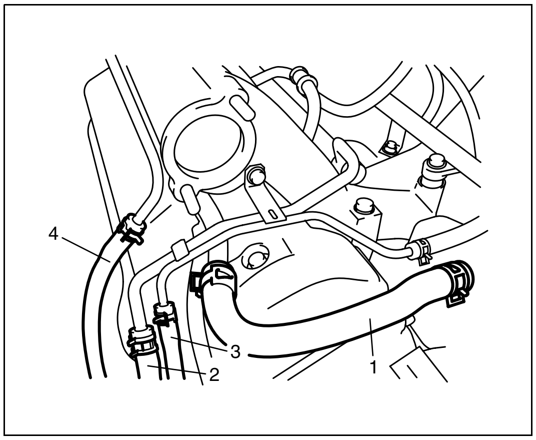


12) Disconnect couplers of TP sensor (1) and IAC valve (2).
13) Disconnect earth terminal (3) from intake collector.
14) Remove clamp bracket (4) from intake collector.



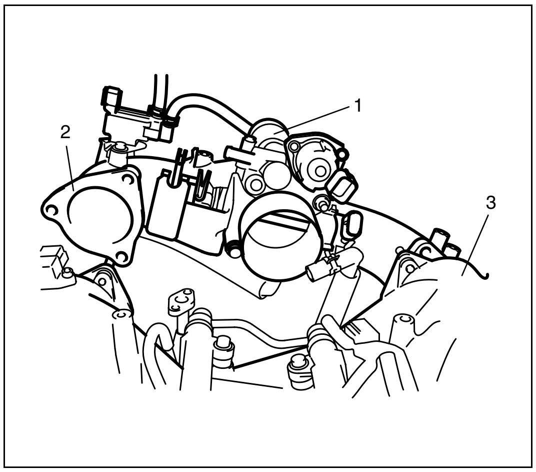
15) Disconnect couplers from manifold absolute pressure (MAP) sensor, EVAP canister purge valve, earth terminal and EGR valve.
16) Disconnect PCV hose from cylinder head cover.
    Disconnect breather hoses from throttle body or cylinder head cover.
17) Disconnect hoses of EVAP canister purge valve and heater.
18) Remove EGR pipe.

1. EVAP canister purge valve	6. PCV hose
2. EGR valve	7. Water hose
3. EGR pipe	8. Breather hose
4. EVAP canister purge valve hose	9. Earth terminal coupler
5. Heater hose	

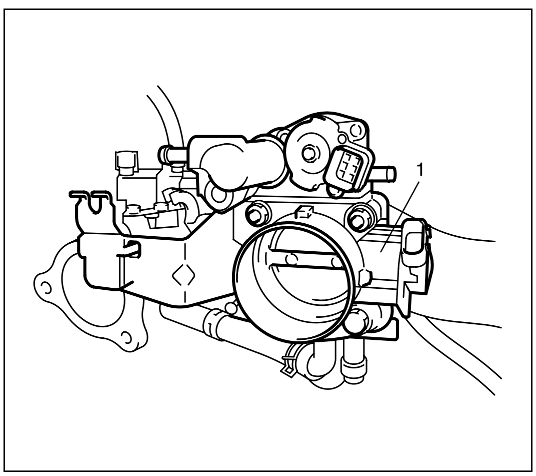


19) Disconnect hoses of heater, EVAP canister, fuel feed and fuel return.

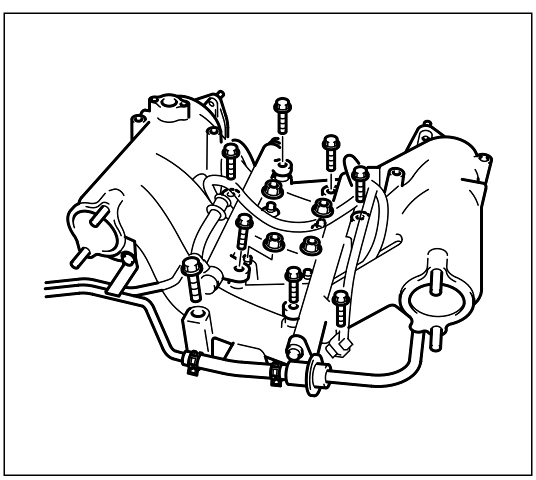
1.	Heater hose
2.	Fuel feed hose
3.	Fuel return hose
4.	EVAP canister hose



20) Remove throttle body (1) and intake collector (2) from intake manifold (3).

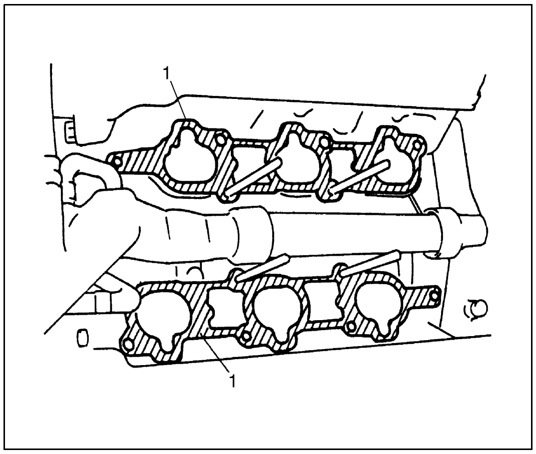


21) Disconnect hoses of PCV valve and EVAP canister purge valve from intake collector.
22) Remove throttle body (1) from intake collector.
23) Remove EGR valve and EVAP canister purge valve from intake collector.

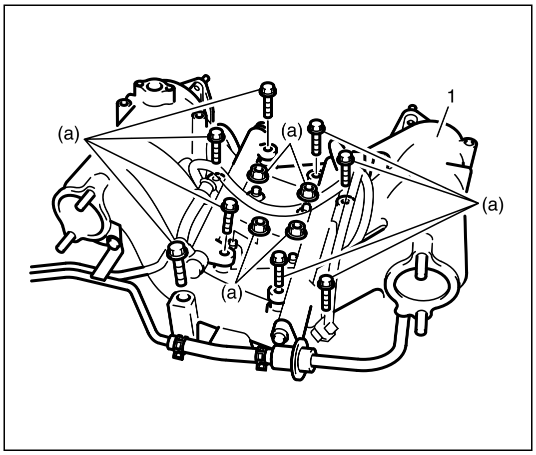


24) Remove intake manifold bolts (8 pc.) and nuts (4 pc.).
25) Remove intake manifold.

INSTALLATION

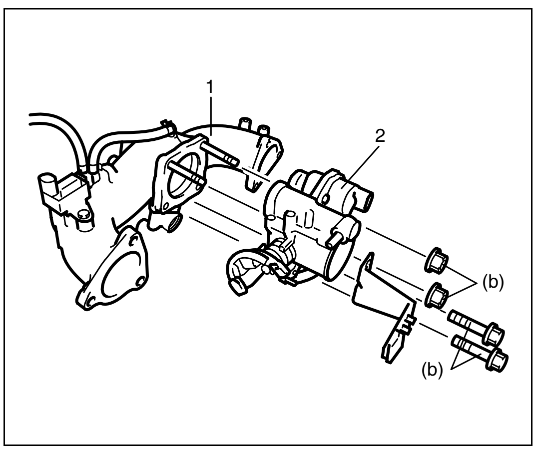


1) Install new intake manifold gaskets (1) to cylinder heads.



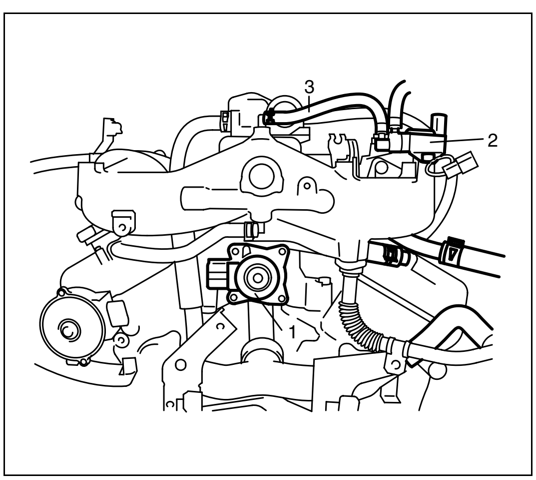
2) Install intake manifold (1).
   Tighten bolts and nuts to specified torque.

Tightening torque
Intake manifold bolt and nut (a) :
23 N·m (2.3 kg-m, 16.5 lb-ft)



3) Install throttle body (2) to intake collector (1) with new throttle body gasket.
   Tighten bolts and nuts to specified torque.

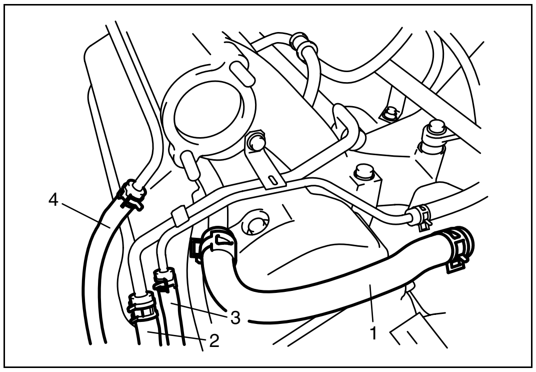
Tightening torque
Throttle body bolt and nut (b) :
23 N·m (2.3 kg-m, 16.5 lb-ft)



4) Install EGR valve (1), EVAP canister purge valve (2), manifold absolute pressure (MAP) sensor and each hoses to intake collector and throttle body if removed.
   Use new gasket, when installing IAC valve and EGR valve.

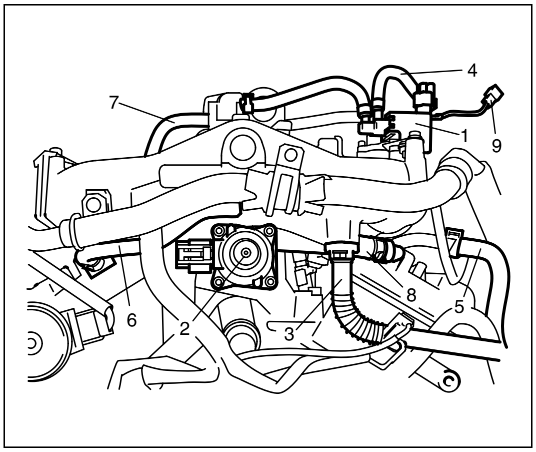
3. EVAP canister purge valve hose

5) Install throttle body and intake collector assembly to intake manifold with new intake collector gaskets.



6) Connect hoses of heater, EVAP canister, fuel feed and fuel return.

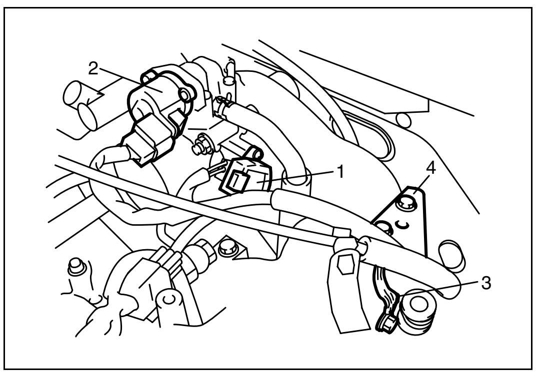
1.	Heater hose
2.	Fuel feed hose
3.	Fuel return hose
4.	EVAP canister hose



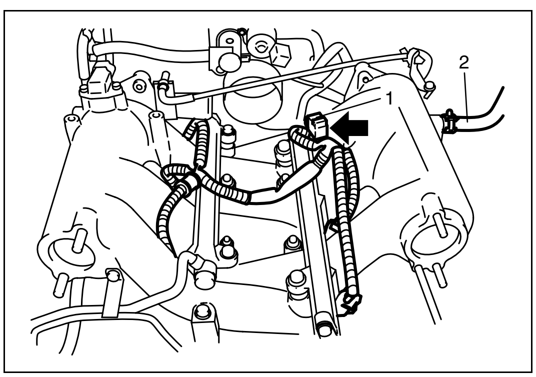
7) Install EGR pipe with new gaskets.
8) Connect hoses of EVAP canister purge valve and heater.
9) Connect hoses of PCV, breather and water.

1.	EVAP canister purge valve	6.	PCV hose
2.	EGR valve	7.	Water hose
3.	EGR pipe	8.	Breather hose
4.	EVAP canister purge valve hose	9.	Earth terminal coupler
5.	Heater hose		

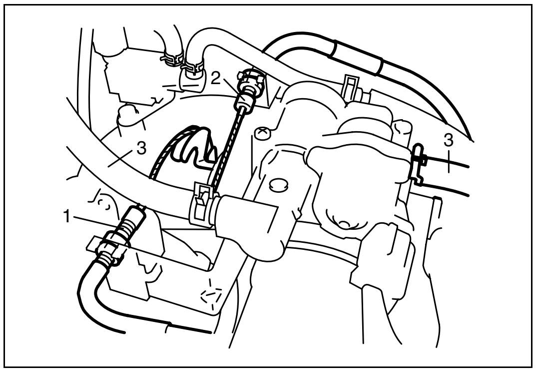
10) Connect couplers of manifold absolute pressure (MAP) sensor, EVAP canister purge valve and EGR valve.
Fix wire harness with clamps.



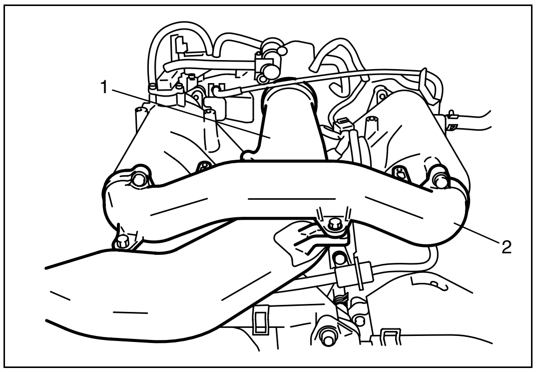
11) Install clamp bracket (4) to intake collector.
12) Connect earth terminal (3) to intake collector.
13) Connect couplers of TP sensor (1) and IAC valve (2).



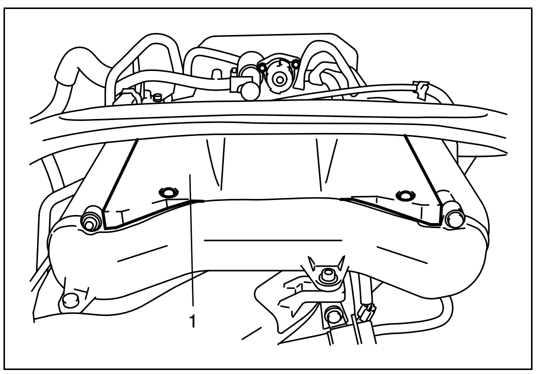
14) Connect brake booster hose (2) to intake manifold.
15) Connect injector wire (1) coupler.



16) Connect water hoses (3) to throttle body.
17) Connect accelerator cable (1) and A/T throttle cable (2) (for A/T vehicle) to throttle body.

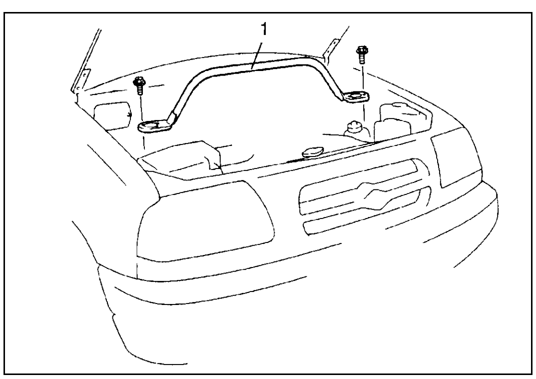


18) Install surge tank pipe (2) to intake manifold with new gaskets and intake air pipe (1) to throttle body.



19) Install surge tank cover (1).

20) Install air cleaner upper case.
21) Connect coupler to intake air temp. sensor and MAF sensor.

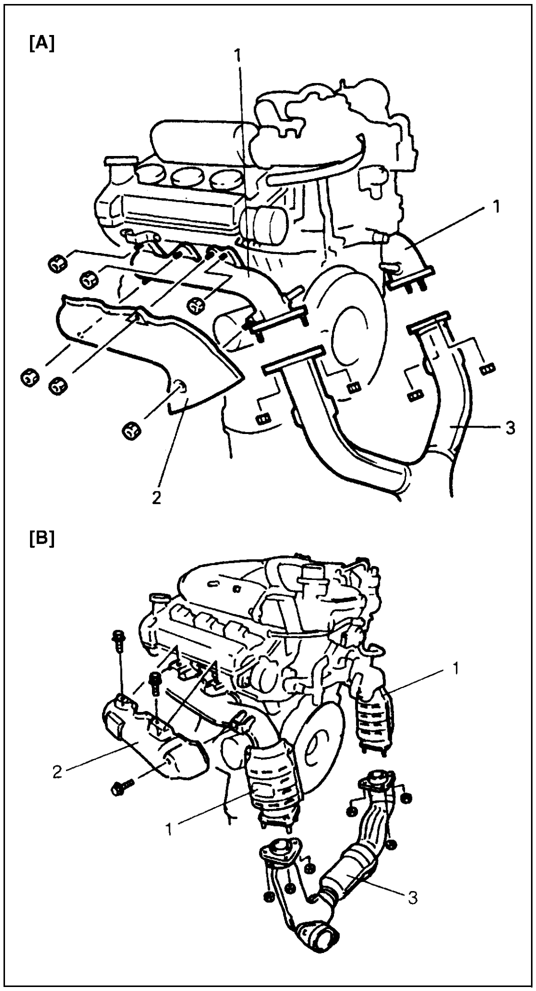


22) Install strut tower bar (1).

23) Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
24) Refill cooling system referring to “COOLING SYSTEM FLUSH AND REFILL” in Section 6B.
25) Connect negative cable at battery.

26) Upon completion of installation, verify that there is no fuel leakage at each connection according to procedure described in Section 6.

Exhaust Manifold



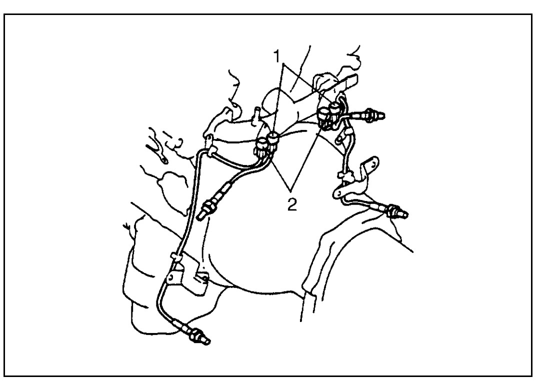
WARNING:

To avoid danger of being burned, do not service exhaust system while it is still hot. Service should be performed after system has cooled off.

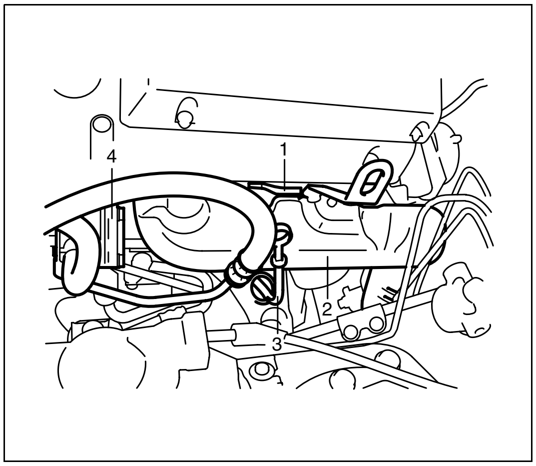
1.	Left (No.1) exhaust manifold Right (No.2) exhaust manifold
2.	Exhaust manifold cover
3.	Exhaust No.1 pipe
A.	Without WU-TWC
B.	With WU-TWC

REMOVAL

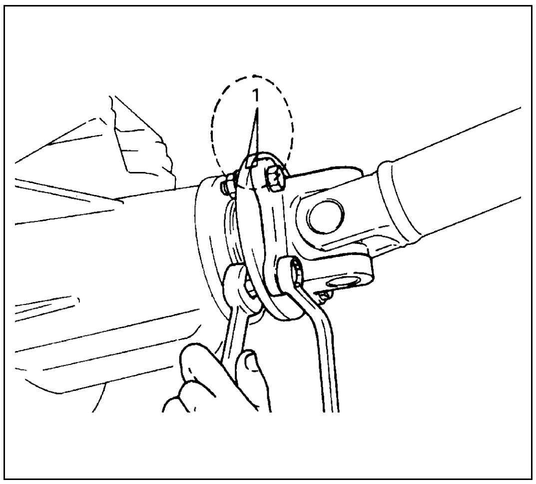
1) Disconnect negative (–) cable at battery.
2) Remove air cleaner upper case and intake air hose if right side exhaust manifold is removed.
3) Detach couplers from their bracket and disconnect oxygen sensor lead wires at couplers.



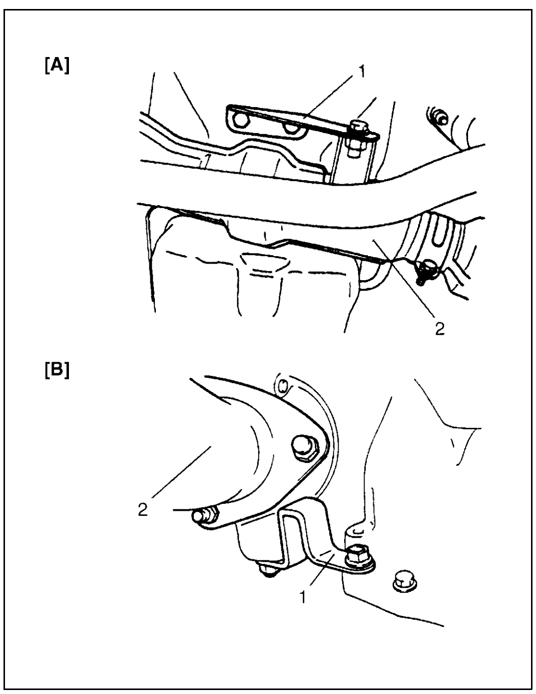
1.	HO2S-1 (Green connector)
2.	HO2S-2 (Black connector)



4) Disconnect EGR pipe from right (No.2) bank exhaust manifold if right side exhaust manifold is removed.
5) Remove oil level gauge guide (3) if left side exhaust manifold is removed.
6) Detach P/S pump assembly as following, if left side exhaust manifold is removed.
   a) Loosen P/S pump drive belt by loosening tensioner bolt.
   b) Remove P/S pump mounting bolts.
   c) Detach P/S pump assembly (4) with its hoses from cylinder block.
7) Remove exhaust manifold covers (2) from exhaust manifolds (1).
8) Hoist vehicle.



9) For 4WD vehicle, before disconnecting front propeller shaft, put match mark (1) on joint flange and propeller shaft to facilitate their installation as shown in the figure.
10) For 4WD vehicle, disconnect propeller shaft from front differential.



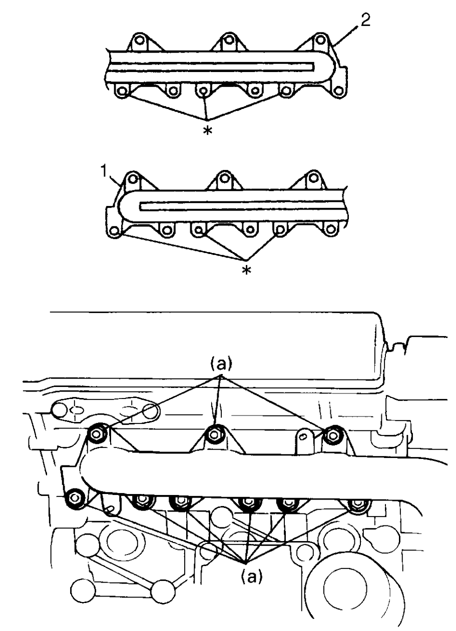
11) Remove exhaust manifold stiffeners (1).

2.	Exhaust No.1 pipe
A.	Without WU-TWC
B.	With WU-TWC

12) Remove stabilizer bar mounting bolt and pull down stabilizer bar if right side exhaust manifold is removed.
13) Remove exhaust manifolds and their gaskets from cylinder heads.

INSTALLATION

1) Install new manifold gaskets to cylinder heads and No.1 pipe gasket to exhaust No.1 pipe.

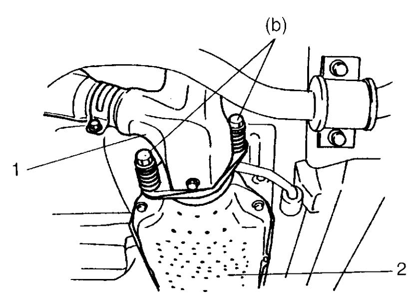


2) Install exhaust manifolds.
   - Always install new bolts with pre-coated adhesive to the locations with ✱ mark.
   - Tighten both manifold nuts and bolts to specified torque.

Tightening torque
Exhaust manifold bolt and nut (a) :
30 N·m (3.0 kg-m, 21.5 lb-ft)

1.	Left (No.1) exhaust manifold
2.	Right (No.2) exhaust manifold

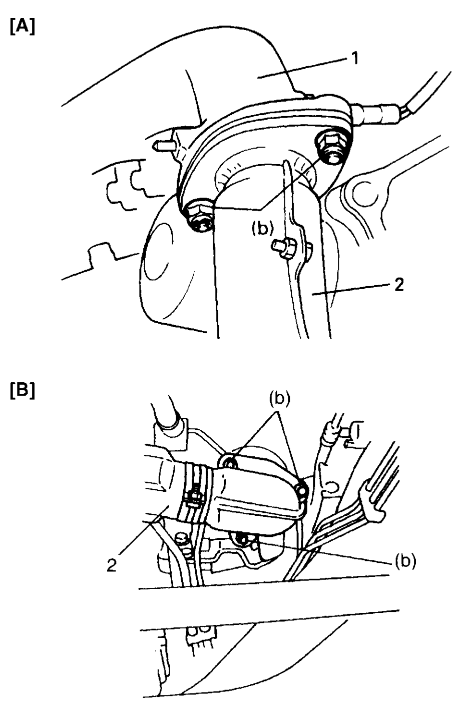
3) Install stabilizer bar if it was removed. Refer to “STABILIZER BAR / BUSHINGS” in Section 3D.
4) Install exhaust manifold stiffeners (if removed).



5) Install exhaust No.1 pipe (1).
   Tighten exhaust No.1 pipe bolts to specified torque.

Tightening torque
Exhaust No.1 pipe bolt (b) :
50 N·m (5.0 kg-m, 36.5 lb-ft)

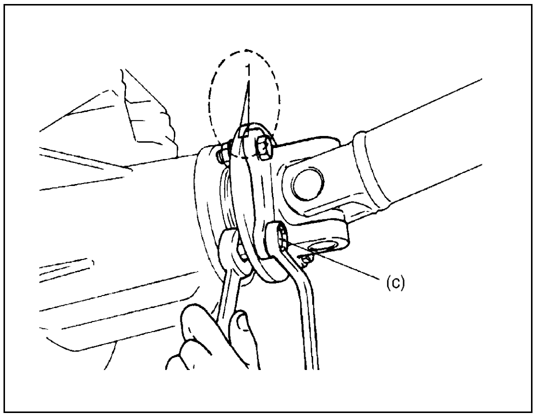
2.	Exhaust No. 2 pipe



6) Tighten exhaust No.1 pipe nuts to specified torque.

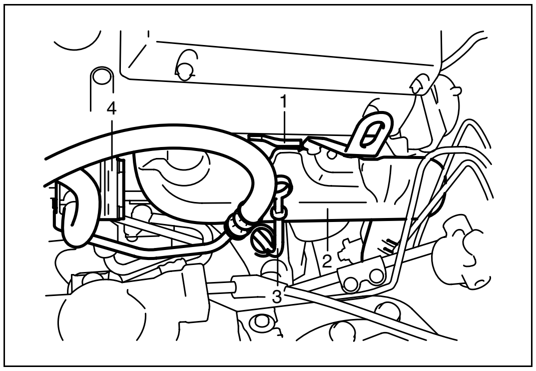
Tightening torque
Exhaust No.1 pipe nut (b) :
50 N·m (5.0 kg-m, 36-5 lb-ft)

1.	Exhaust No.1 pipe
2.	Exhaust manifold
A.	Without WU-TWC
B.	With WU-TWC

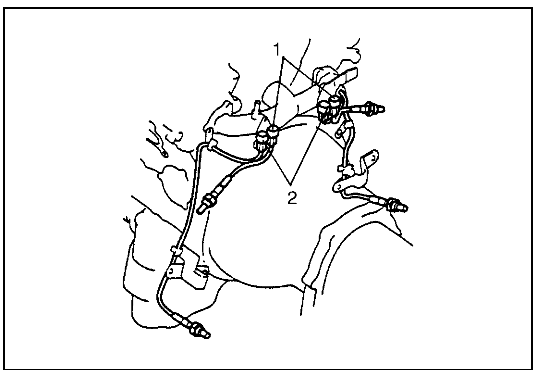


7) Reverse removal procedure to install front propeller shaft if removed.
   When installing propeller shaft, align match mark (1).
   Use following specification to torque universal joint flange.

Tighting torque
Universal joint flange bolt (c) :
55 N·m (5.5 kg-m, 40.0 lb-ft)



8) Connect EGR pipe to left (No.1) bank exhaust manifold (1).
9) Install exhaust manifold covers (2).
10) Install oil level gauge guide (3) using new O-ring.
11) Install P/S pump assembly (4) if it was removed. Refer to “POWER STEERING PUMP” in Section 3B1.
12) Adjust P/S pump drive belt tension, refer to “POWER STEERING BELT CHECK AND ADJUSTMENT” in Section 3B1.

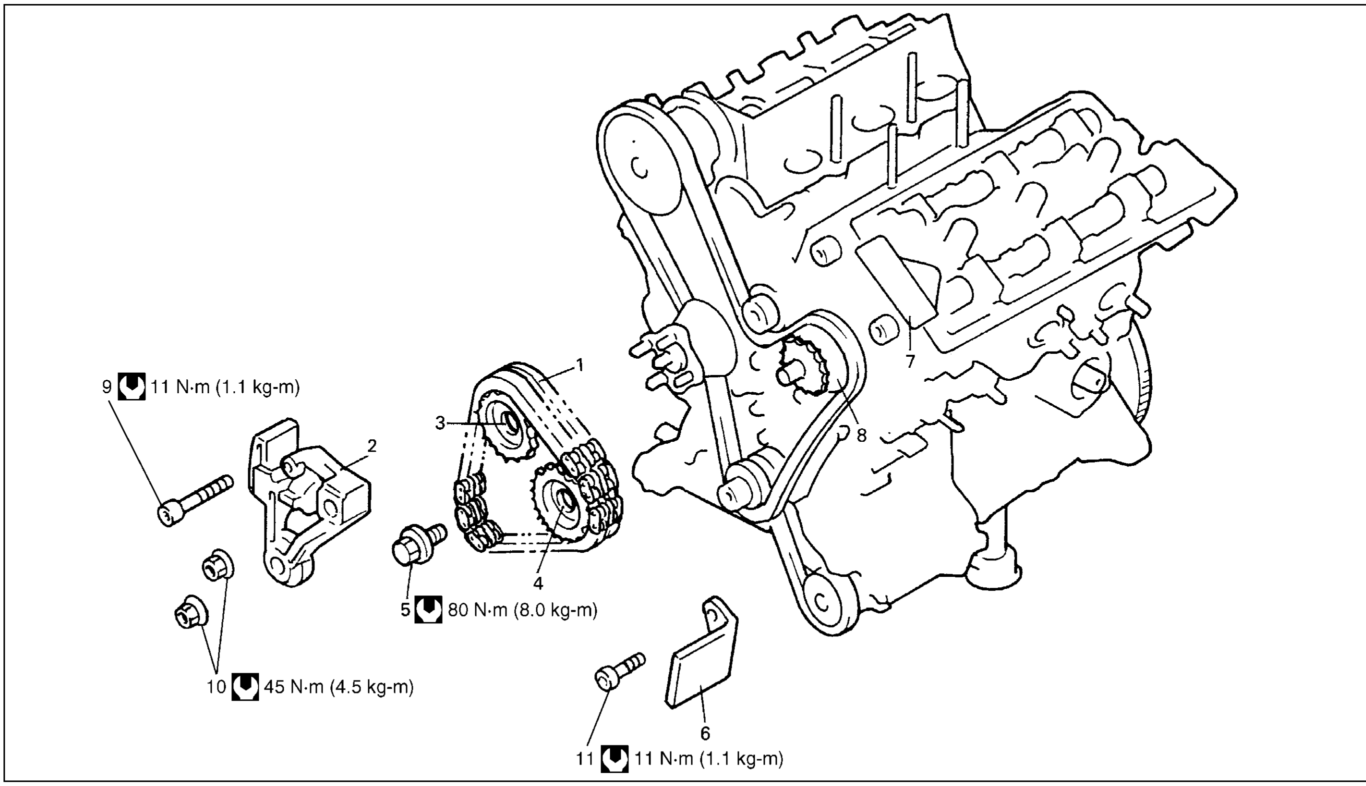


13) Connect oxygen sensor lead wire couplers.
    Be sure to clamp its lead wires.

1.	HO2S-1 (Green connector)
2.	HO2S-2 (Black connector)

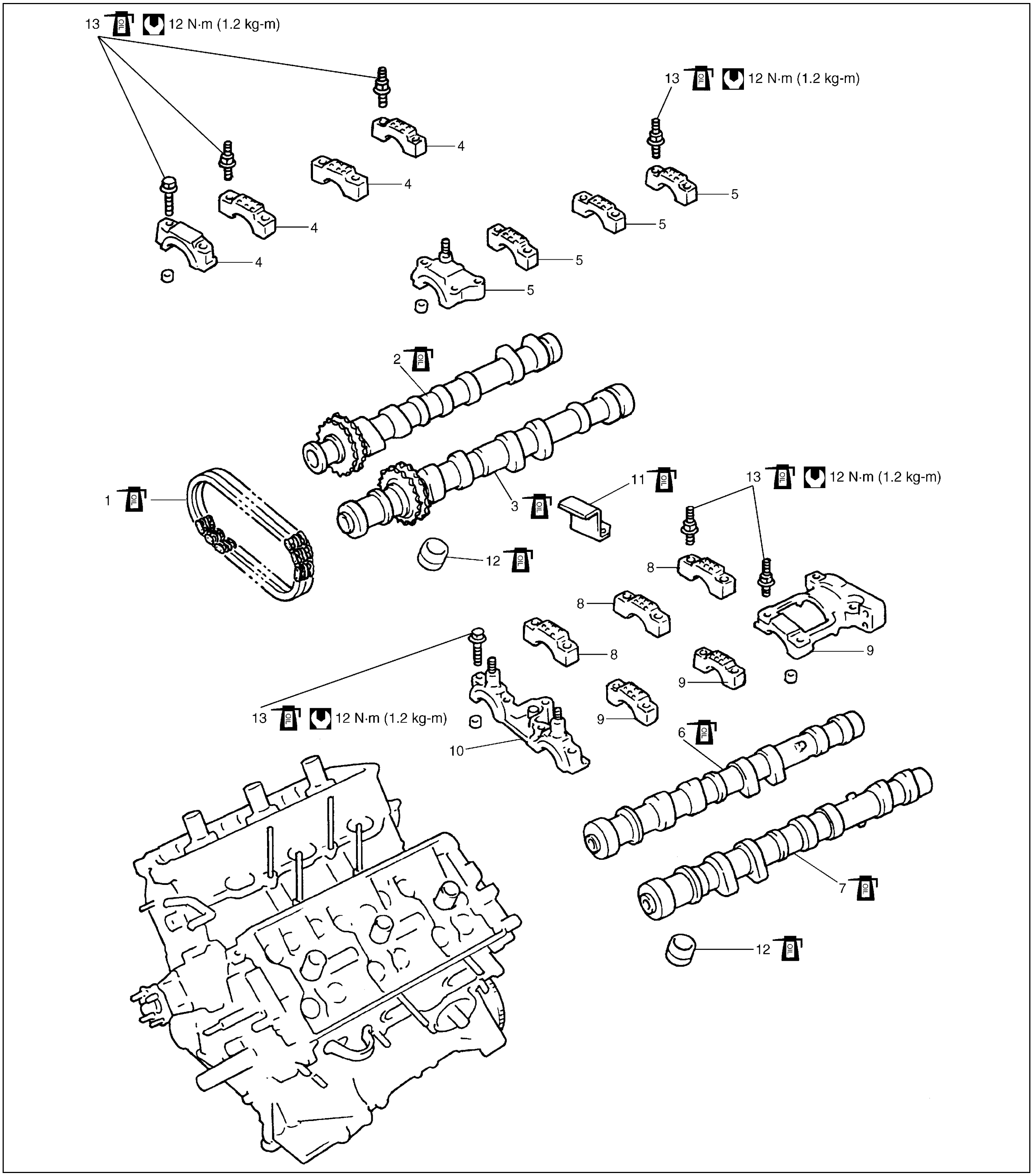
14) Connect negative (–) cable to battery.
    Upon completion of installation, start engine and check that no exhaust gas leakage exists.

LH (No.1) Bank 2nd Timing Chain and Chain Tensioner



1. LH bank 2nd timing chain	5. Camshaft sprocket bolt	9. Timing chain tensioner adjuster No. 3 bolt
2. Timing chain tensioner adjuster No.3	6. Timing chain guide No.4	10. Timing chain tensioner adjuster No. 3 nut
3. LH bank intake camshaft sprocket	7. Timing chain guide No.5	11. Timing chain guide No. 4 bolt
4. LH bank exhaust camshaft sprocket	8. Idler sprocket No.2	Tightening Torque

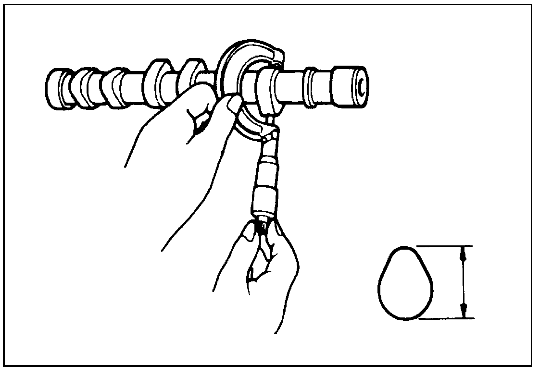
Camshaft and Valve Lash Adjuster



1. RH bank 2nd timing chain	6. LH bank intake camshaft	11. Timing chain guide No.5
2. RH bank exhaust camshaft	7. LH bank exhaust camshaft	12. Valve lash adjuster
3. RH bank intake camshaft	8. LH bank intake camshaft holder	13. Camshaft housing bolt
4. RH bank exhaust camshaft holder	9. LH bank exhaust camshaft holder	Tightening Torque
5. RH bank intake camshaft holder	10. LH bank camshaft holder	Apply engine oil to sliding surface of each parts.

INSPECTION

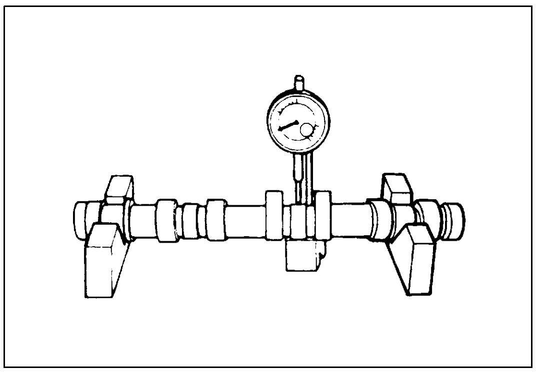
Cam wear



Using a micrometer, measure cam height. If measured height is below its limit, replace camshaft.

Intake cam height :
Standard : 40.402 – 40.562 mm (1.5906 – 1.5969 in.)
Limit : 40.300 mm (1.3581 in.)
Exhaust cam height :
Standard : 39.428 – 39.588 mm (1.5523 – 1.586 in.)
Limit : 39.400 mm (1.5512 in.)

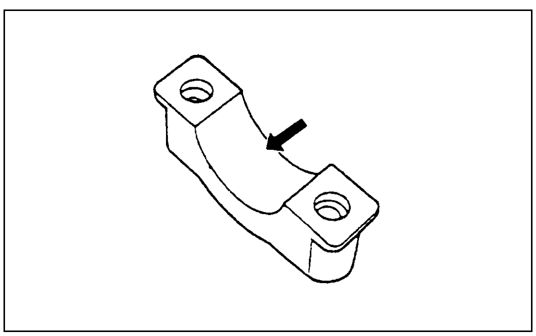
Camshaft runout



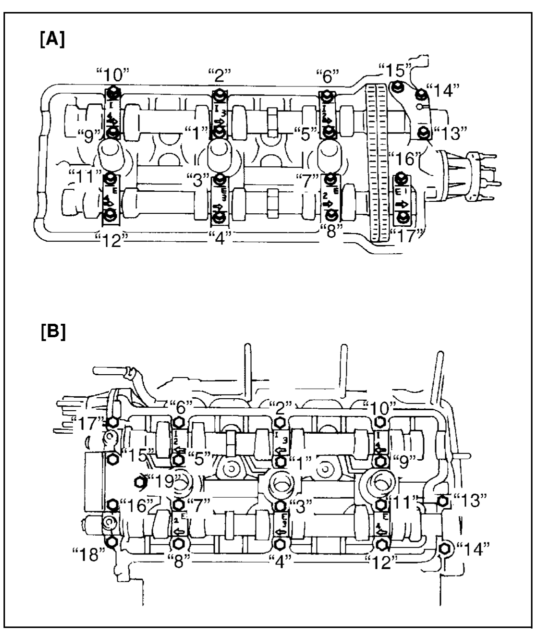
Set camshaft between two “V” blocks, and measure its runout by using a dial gauge.
If measured runout exceeds below specified limit, replace camshaft.

Camshaft runout limit :
0.04 mm (0.002 in.)

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.

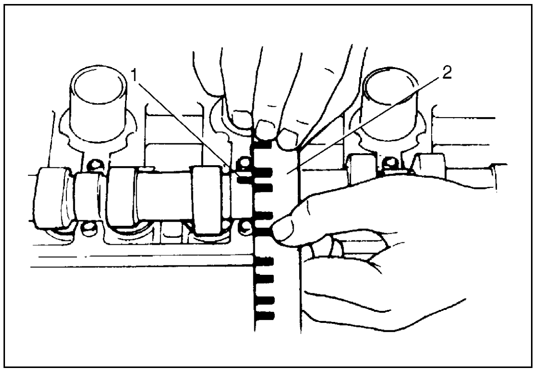


Check clearance by using gaging plastic. The procedure is as follows.

1) Clean housings and camshaft journals.
2) Make sure that all valve lash adjusters are removed and install camshaft to cylinder head.
3) Place a piece of gaging plastic the full width of journal of camshaft (parallel to camshaft).
4) Install camshaft housing.
5) Tighten camshaft housing bolts in such order ([A] : “1” → “17”, [B] : “1” → “19”) as shown in the figure a little at a time till they are tightened to specified torque.

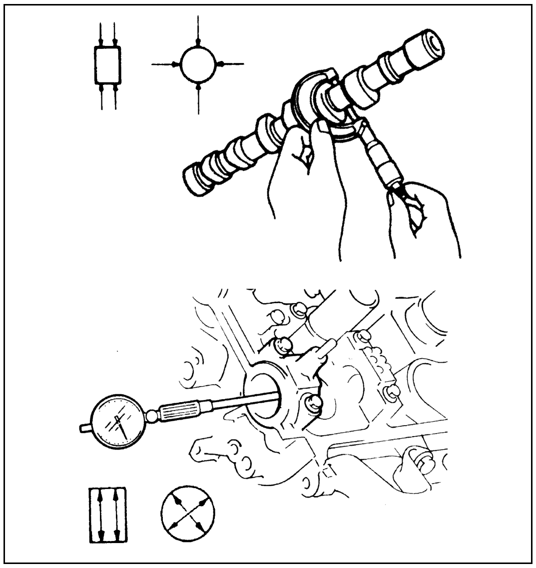
NOTE:
Do not rotate camshaft while gaging plastic is installed.

[A] :	RH bank
[B] :	LH bank



6) Remove housing, and using scale (2) on gaging plastic (1) envelop, measure gaging plastic (1) width at its widest point.

Camshaft journal clearance :
Standard : 0.045 – 0.099 mm (0.0018 – 0.0039 in.)
Limit : 0.12 mm (0.0047 in.)

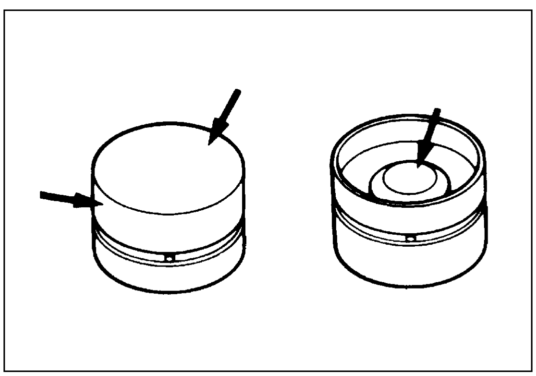


If measured camshaft journal clearance exceeds limit, measure journal (housing) bore and outside diameter of camshaft journal. Replace camshaft or cylinder head assembly whichever the difference from specification is greater.

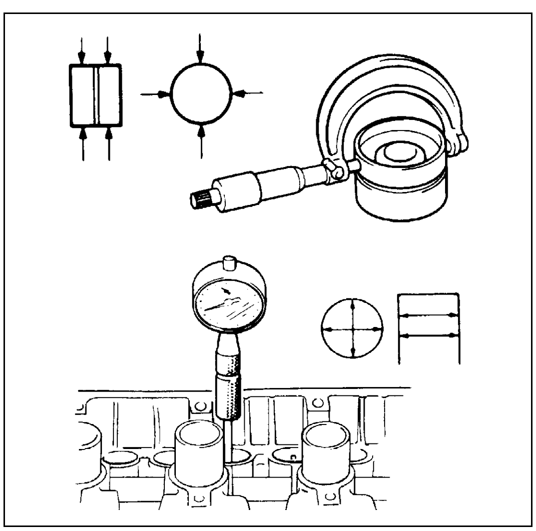
Camshaft journal bore dia. (IN & EX) :
Standard : 26.000 – 26.033 mm (1.0236 – 1.0249 in.)

Camshaft journal O.D. (IN & EX) :
Standard : 25.934 – 25.955 mm (1.0210 – 1.0218 in.)

Wear of hydraulic valve lash adjuster



Check adjuster for pitting, scratches, or damage.
If any malcondition is found, replace.



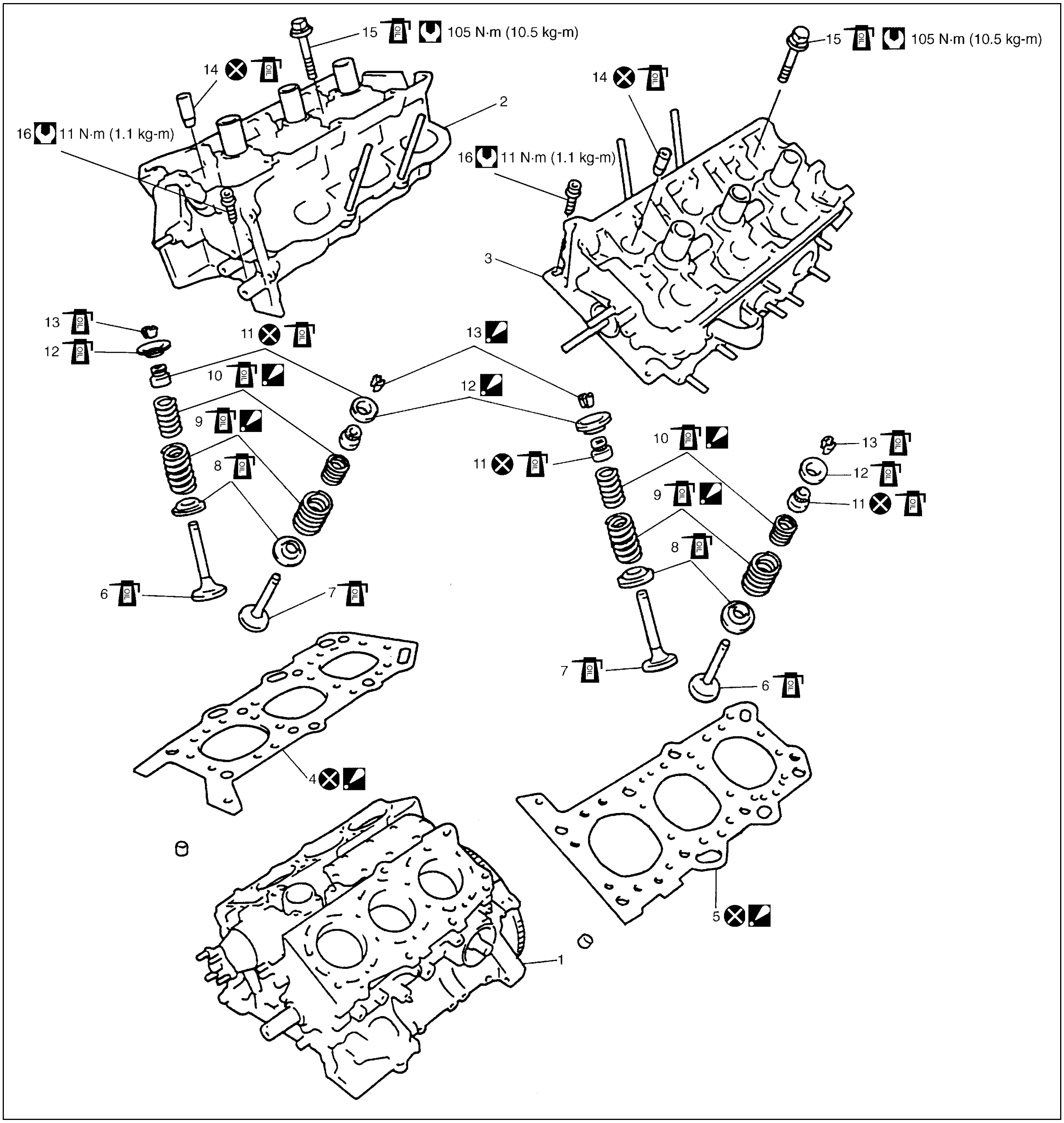
Measure cylinder head bore and adjuster outside diameter to determine cylinder head-to-adjuster clearance. If clearance exceeds limit, replace adjuster or cylinder head.

Hydraulic valve lash adjuster O.D. :
Standard : 30.959 – 30.975 mm (1.2188 – 1.2194 in.)

Cylinder head bore :
Standard : 31.000 – 31.025 mm (1.2205 – 1.2214 in.)

Cylinder head to adjuster clearance :
Standard : 0.025 – 0.066 mm (0.0010 – 0.0025 in.)
Limit : 0.15 mm (0.0059 in.)

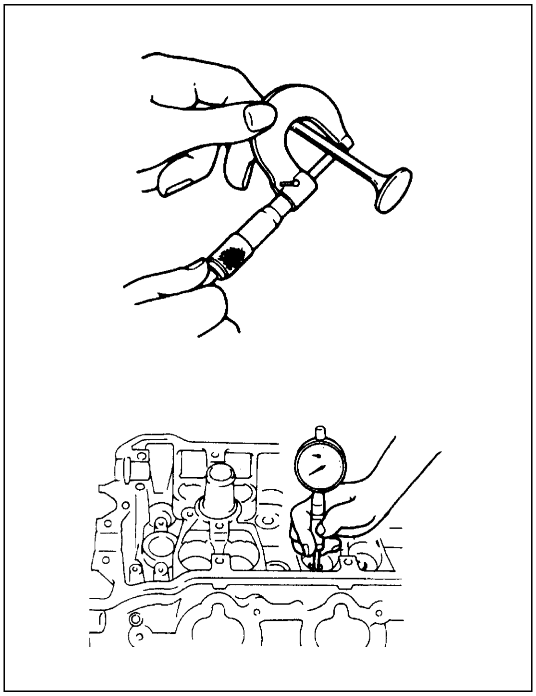
Valves and Cylinder Heads



1. Cylinder block	6. Exhaust valve	11. Valve stem oil seal	16. Cylinder head bolt (hex hole bolt)
2. RH bank cylinder head	7. Intake valve	12. Valve spring retainer	Tightening Torque
3. LH bank cylinder head	8. Valve spring seat	13. Valve cotter	Do not reuse
4. RH bank cylinder head gasket : Carved lot number on cylinder head gasket should face up (toward cylinder head side).	9. Outer valve spring : Be sure to position spring in place with its bottom end (small-pitch end) facing the bottom (valve spring seat side).	14. Valve guide	Apply engine oil to sliding surface of each parts.
5. LH bank cylinder head gasket : Carved lot number on cylinder head gasket should face up (toward cylinder head side).	10. Inner valve spring : Be sure to position spring in place with its bottom end (small-pitch end) facing the bottom (valve spring seat side).	15. Cylinder head bolt	

INSPECTION

Valve guides

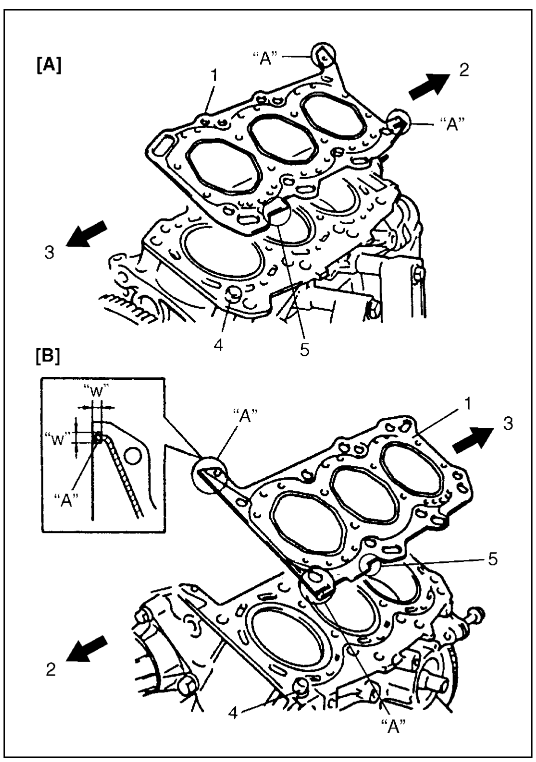


Using a micrometer and bore gauge, take diameter readings on valve stems and guides to check stem-to-guide clearance. Be sure to take reading at more than one place along the length of each stem and guide.
If clearance exceeds limit, replace valve and valve guide.

Valve stem-to-guide clearance :

		Standard	Limit
Valve stem diameter	**Intake**	**5.965 – 5.980 mm (0.2348 – 0.2354 in.)**	**–**
	Exhaust	**5.940 – 5.955 mm (0.2339 – 0.2344 in.)**	**–**
Valve guide I.D.	**In & Ex**	**5.985 – 6.010 mm (0.2356 – 0.2366 in.)**	**–**
Stem-to-guide clearance	**Intake**	**0.035 – 0.045 mm) (0.0014 – 0.0018 in.)**	**0.07 mm (0.0027 in.)**
	Exhaust	**0.060 – 0.070 mm (0.0024 – 0.0028 in.)**	**0.09 mm (0.0035 in.)**

INSTALLATION



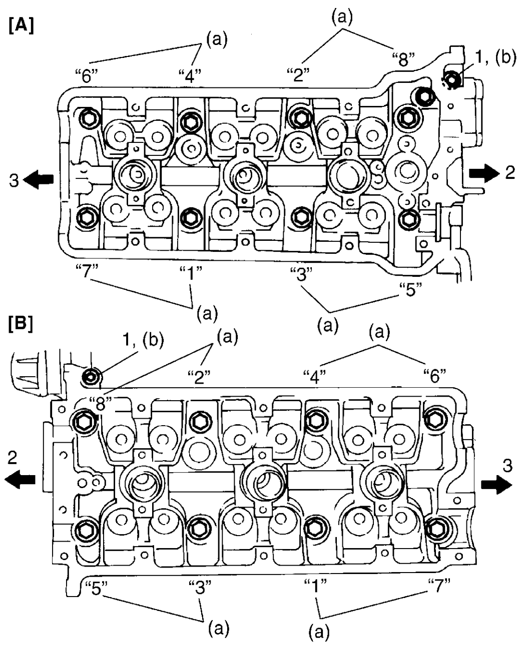
1) Clean mating surface on cylinder head and cylinder block. Remove oil, old gasket and dust from mating surface.
2) Install knock pin (4) to cylinder block.
3) Apply sealant "A" to cylinder head gasket (1) as shown in the figure.

"A" : Sealant 99000-31150

Sealant amount (Width "w") :
4 mm (0.158 in.)

4) Install new cylinder head gasket (1) to cylinder block as shown in the figure. carved lot number (5) on cylinder head gasket (1) should face up (toward cylinder head side).

[A] :	RH (No.2) bank
[B] :	LH (No.1) bank
2.	Crankshaft pulley side
3.	Flywheel side



5) Install cylinder head to block.
   After applying oil to cylinder head bolts, tighten them gradually as follows.
   a) Tighten all bolts to 53 N·m (5.3 kg-m, 38.5 lb-ft) according to numerical order in the figure.
   b) In the same manner as in a), tighten them to 84 N·m (8.4 kg-m, 61.0 lb-ft).
   c) Loosen all bolts until tightening torque is reduced to 0 in reverse order of tightening.
   d) In the same manner as in a), tighten them to 53 N·m (5.3 kg-m, 38.5 lb-ft).
   e) In the same manner as in a) again, tighten them to specified torque.

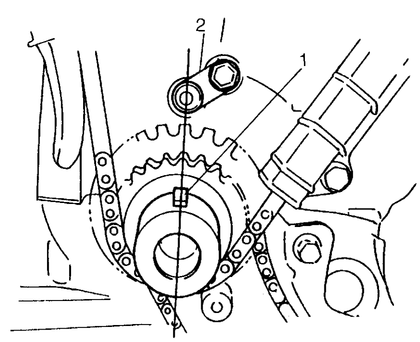
Tightening torque
Cylinder head bolt (a) : 105 N·m (10.5 kg-m, 76.0 lb-ft)
Cylinder head bolt (hex hole bolt) (b) :
11 N·m (1.1 kg-m, 7.5 lb-ft)

NOTE:

Don't forget to install (b) bolts as shown in the figure.

1.	Hex hole bolt
2.	Crankshaft pulley side
3.	Flywheel side
[A]	RH bank
[B]	LH bank

6) Install water outlet cap.



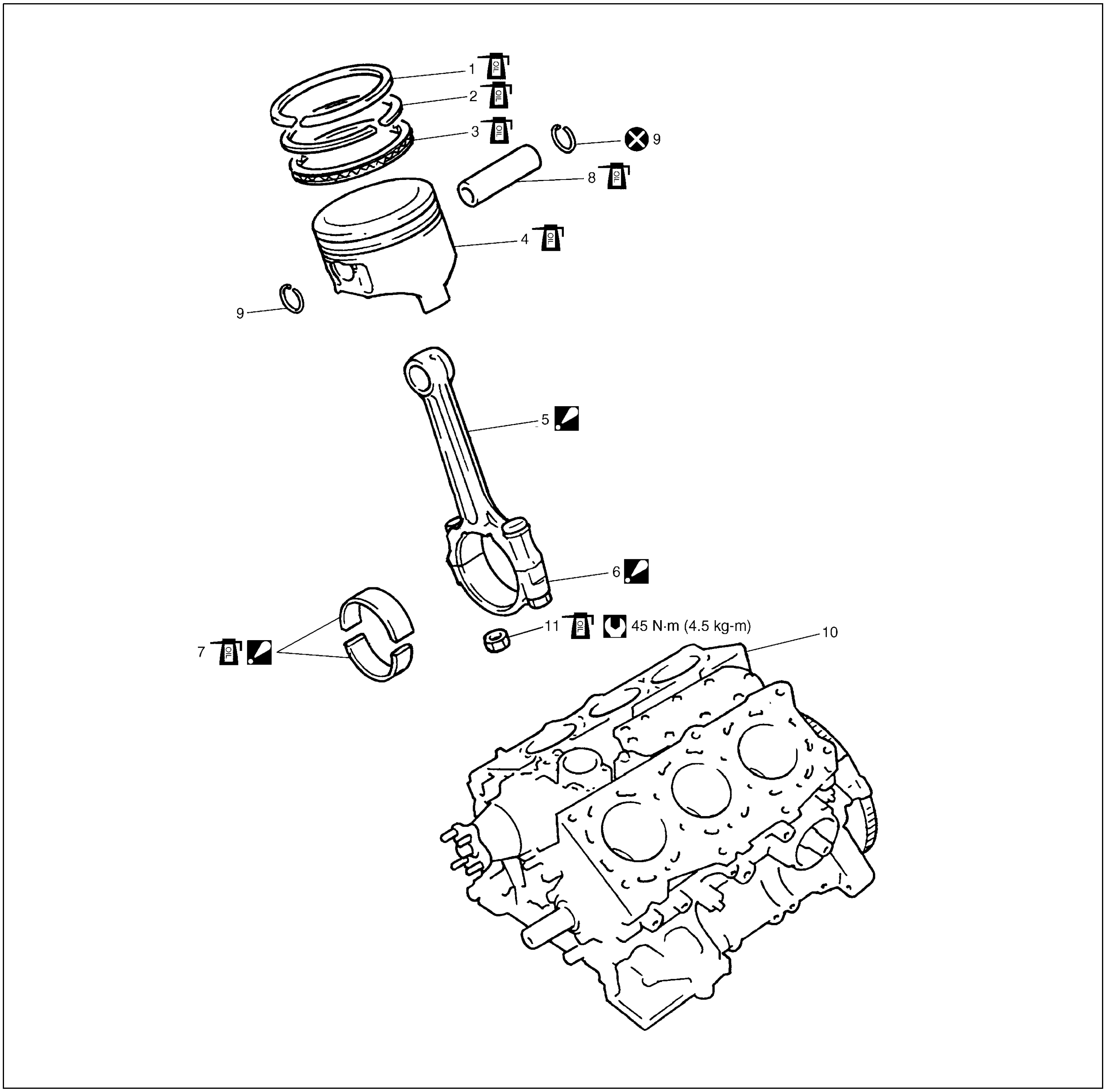
7) Check timing mark on crankshaft as shown in the figure.

1.	Crank timing pulley key
2.	Oil jet

8) Install valve lash adjuster, camshaft, CMP sensor and RH bank 2nd timing chain.
   Refer to "CAMSHAFT AND VALVE LASH ADJUSTER" and "RH (NO.2) BANK 2ND TIMING CHAIN AND CHAIN TENSIONER" in this section. For CMP sensor, refer to "CMP SENSOR" in Section 6F2.
9) Install 1st timing chain.
   Refer to "1ST TIMING CHAIN AND CHAIN TENSIONER" in this section.
10) Install LH bank 2nd timing chain.
   Refer to "LH (NO.1) BANK 2ND TIMING CHAIN AND CHAIN TENSIONER" in this section.
11) Install timing chain cover.
   Refer to "TIMING CHAIN COVER" in this section.

12) Install oil pan and oil pump strainer.
    Refer to “OIL PAN AND OIL PUMP STRAINER” in this section.
13) Install cylinder head cover.
    Refer to “CYLINDER HEAD COVER” in this section.
14) Install exhaust manifold.
    Refer to “EXHAUST MANIFOLD” in this section.
15) Install radiator outlet pipe, radiator, cooling fan and water hose.
    Refer to “COOLING WATER PIPES OR HOSES”, “RADIATOR” and “COOLING FAN AND FAN CLUTCH” in Section 6B.
16) Install throttle body and intake manifold.
    Refer to “THROTTLE BODY AND INTAKE MANIFOLD” in this section.
17) Adjust water pump drive belt tension.
    Refer to “COOLING FAN BELT TENSION CHECK AND ADJUSTMENT” in Section 6B.
18) Adjust power steering pump drive belt tension.
    Refer to “POWER STEERING PUMP DRIVE BELT” in Section 3B1.
19) Adjust accelerator cable play and A/T throttle cable play. Refer to “ACCELERATOR CABLE ADJUSTMENT” and “A/T THROTTLE CABLE ADJUSTMENT (A/T VEHICLE)” in Section 6E2.
20) Check to ensure that all removed parts are back in place. Reinstall any necessary parts which have not been reinstalled.
21) Refill engine with engine oil, referring to “ENGINE OIL CHANGE” in Section 0B.
22) Refill cooling system referring to “COOLING SYSTEM FLUSH AND REFILL” in Section 6B.
23) Refill front differential housing with gear oil if drained, referring to “MAINTENANCE SERVICE” in Section 7E.
24) Connect negative cable at battery.
25) Check ignition timing and adjust as necessary, referring to “IGNITION TIMING CHECK AND ADJUSTMENT” in Section 6F2.
26) Verify that there is no fuel leakage, water leakage, oil leakage and exhaust gas leakage at each connection.
27) Check wheel alignment, referring to “STEERING ANGLE” in Section 3A.

Piston, Piston Rings, Connecting Rods and Cylinders

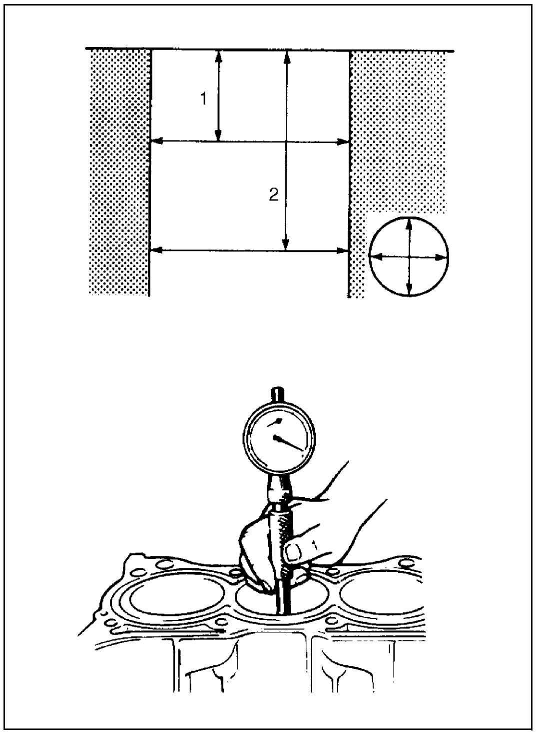


1. Top ring	5. Connecting rod : Clean bearing installing surface when install.	9. Piston pin circlip	Tightening Torque
2. 2nd ring	6. Connecting rod bearing cap : Clean bearing installing surface when install.	10. Cylinder block	Do not reuse
3. Oil ring	7. Connecting rod bearing : Clean outer surface when install.	11. Bearing cap nut	Apply engine oil to sliding surface of each parts.
4. Piston	8. Piston pin		

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 over size piston.



- Using a cylinder gauge, measure cylinder bore in thrust and axial directions at 2 positions (1, 2) as shown in the figure.
  If any of the following conditions is noted, rebore cylinder.
  – Cylinder bore dia. exceeds limit.
  – Difference of measurements at 2 positions exceeds taper limit.
  – Difference between thrust and axial measurements exceeds out-of-round limit.

Cylinder bore dia. limit :
88.050 mm (3.4665 in.)
Taper and out-of-round limit :
0.10 mm (0.004 in.)

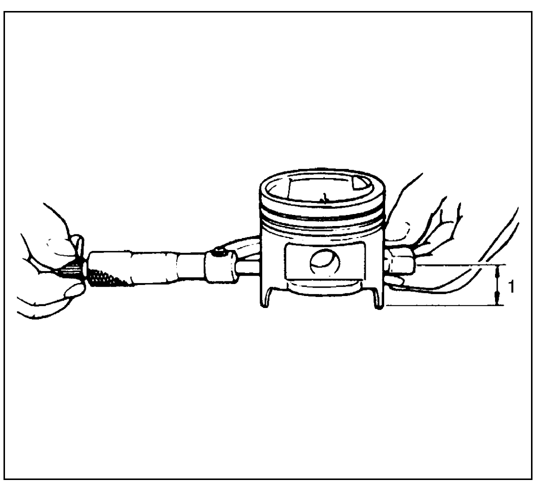
NOTE:

If any one of six cylinders has to be rebored, rebore all six to the same next oversize. This is necessary for the sake of uniformity and balance.

1. 50 mm (1.96 in.)
2. 95 mm (3.74 in.)

Pistons

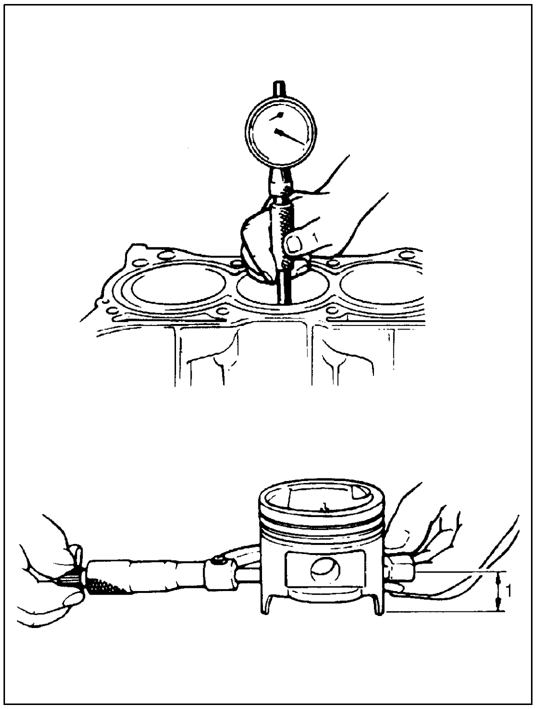
- Inspect piston for faults, cracks or other damages.
  Damaged or faulty piston should be replaced.



- Piston diameter :
  As shown in the figure, piston diameter should be measured at a position 26.5 mm (1.04 in.) (1) from piston skirt end in the direction perpendicular to piston pin.

Piston diameter :

Standard	**87.970 – 87.990 mm (3.4634 – 3.4642 in.)**
Oversize : 0.50 mm (0.0196 in.)	**88.470 – 88.490 mm (3.4831 – 3.4839 in.)**



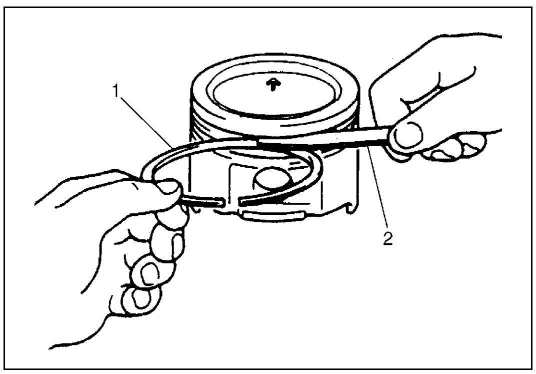
- Piston clearance :
  Measure cylinder bore diameter and piston diameter to find their difference which is piston clearance. Piston clearance should be within specification as given below. If it is out of specification, rebore cylinder and use oversize piston.

Piston clearance :
0.02 – 0.04 mm (0.0008 – 0.0015 in.)

NOTE:

Cylinder bore diameters used here are measured in thrust direction at 2 positions.

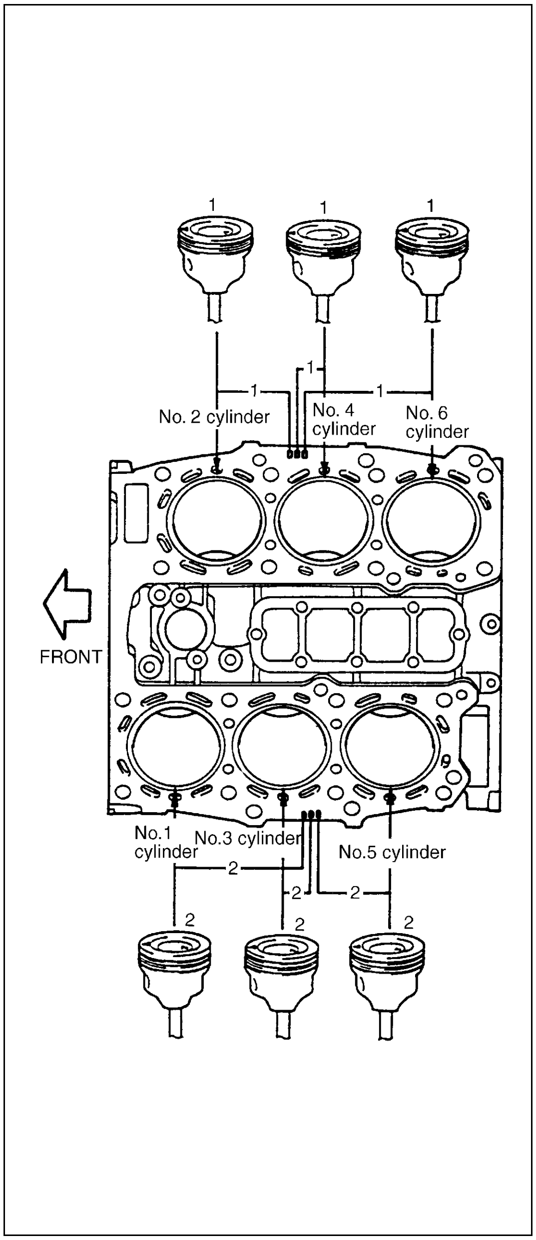
1. 26.5 mm (1.04 in.)



- Ring groove clearance :
  Before checking, piston grooves must be clean, dry and free of carbon.
  Fit new piston ring (1) into piston groove, and measure clearance between ring and ring land by using thickness gauge (2). If clearance is out of specification, replace piston.

Ring groove clearance :
Top : 0.03 – 0.07 mm (0.0012 – 0.0027 in.)
2nd : 0.02 – 0.06 mm (0.0008 – 0.0023 in.)

ASSEMBLY



1) 2 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.
   a) Each piston has stamped number (1 or 2) on its piston head. It represents outer diameter of piston.
   b) There are also stamped numbers of 1 and 2 on the cylinder block as shown in the figure.
   c) Stamped number on piston and cylinder block must correspond. That is, install number "2" stamped piston to cylinder which is stamped also number "2" and a number "1" piston to cylinder with number "1".
      Also, a letter A, B or C is stamped on piston head but ordinarily it is not necessary to distinguish each piston by this letter.

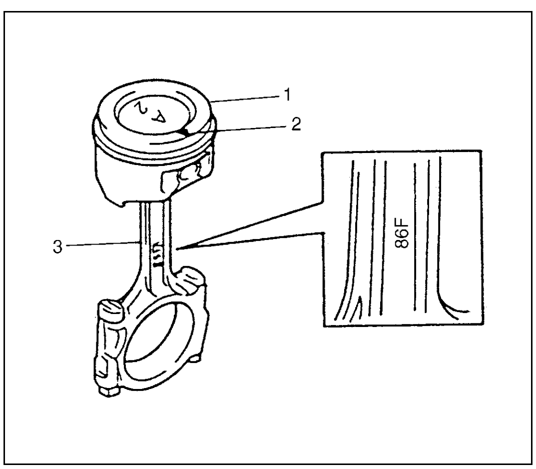
Piston-to-cylinder clearance
Piston :

Number at the top (mark)	Outer diameter
1	**87.98 – 87.99 mm (3.4638 – 3.4642 in.)**
2	**87.97 – 87.98 mm (3.4634 – 3.4638 in.)**

Cylinder :

Number on cylinder block (mark)	Outer diameter
1	**88.01 – 88.02 mm (3.4650 – 3.4653 in.)**
2	**88.00 – 88.01 mm (3.4646 – 3.4650 in.)**

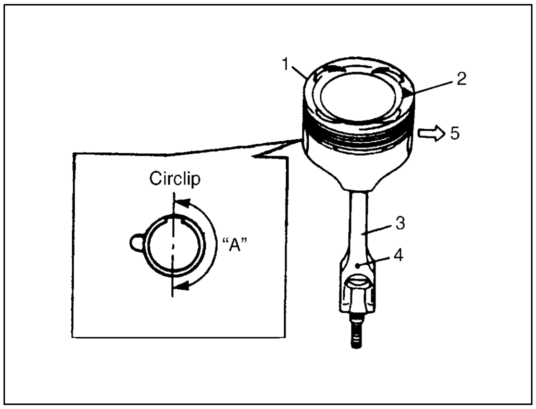
Piston-to-cylinder clearance :
0.02 – 0.04 mm (0.0008 – 0.0015 in.)



2) 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 the figure and insert piston pin to piston and connecting rod, and install piston pin circlips.

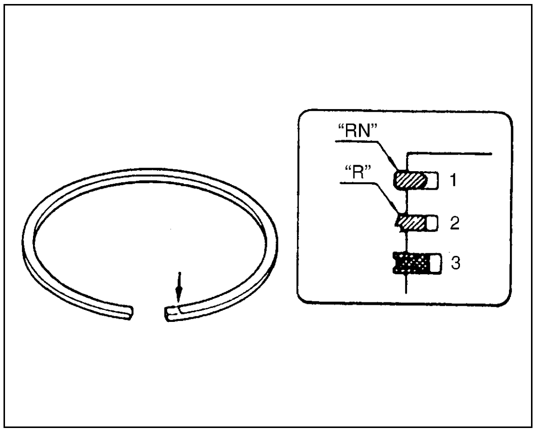
NOTE:
"86F" mark on connecting rod must face toward crankshaft pulley side.

1.	Piston
2.	Arrow mark
3.	Connecting rod



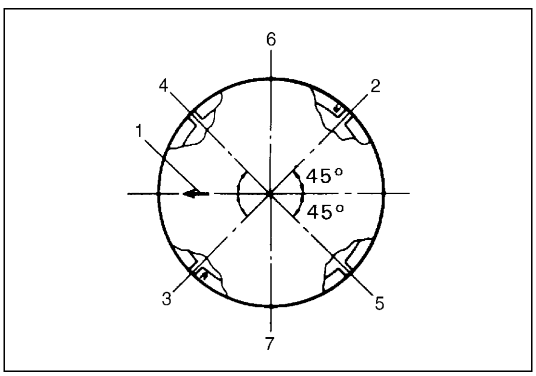
NOTE:
- **Install circlip with its cut part facing as shown in the figure.**
- **Install so that circlip end gap comes within such range as indicated by arrow "A".**

1.	Piston
2.	Arrow mark
3.	Connecting rod
4.	Oil hole
5.	Crankshaft pulley side



3) Install piston rings to piston :
   - As shown in the figure, 1st and 2nd rings have "RN" or "R" mark respectively. When installing these piston rings to piston, direct marked side of each ring toward top of piston.
   - 1st rings differs from 2nd ring in thickness, shape and color of surface contacting cylinder wall.
     Distinguish 1st ring from 2nd ring by referring to the figure.
   - When installing oil ring, install spacer first and then 2 rails.

1.	1st ring
2.	2nd ring
3.	Oil ring



4) After installing three rings (1st, 2nd and oil rings), distribute their end gaps as shown in the figure.

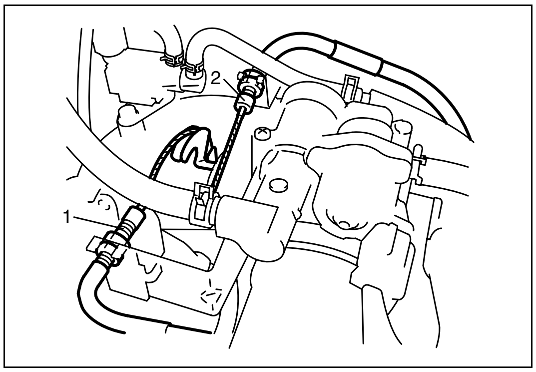
1.	Arrow mark
2.	1st ring end gap
3.	2nd ring end gap and oil ring spacer gap
4.	Oil ring upper rail gap
5.	Oil ring lower rail gap
6.	Intake side
7.	Exhaust side

Unit Repair Overhaul

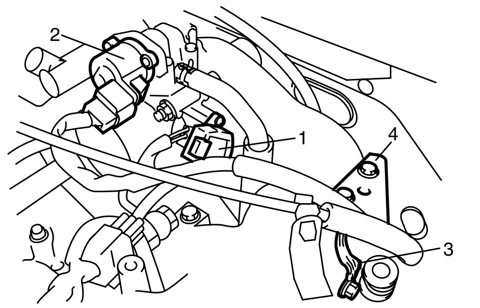
Engine Assembly

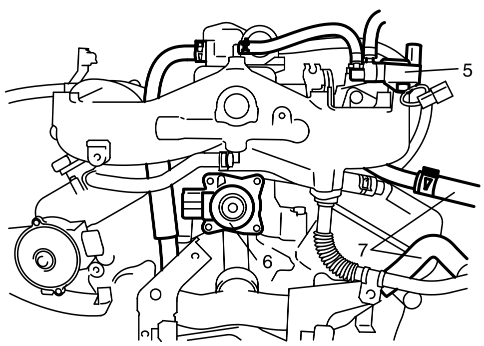
REMOVAL

1) Release fuel pressure in fuel feed line. Refer to "FUEL PRESSURE RELIEF PROCEDURE" in Section 6.
2) Disconnect negative (–) cable at battery.
3) Remove engine hood.
4) Drain engine oil.
5) Drain coolant.
6) Remove radiator, radiator fan shroud, cooling fan and radiator reservoir. Refer to "COOLING FAN AND FAN CLUTCH" and "RADIATOR" in Section 6B.



7) Disconnect accelerator cable (1) and A/T throttle cable (for A/T vehicle) (2) from throttle body.
8) Remove strut tower bar and surge tank cover.
9) Disconnect IAT sensor coupler and MAF sensor coupler then remove air cleaner upper case, intake air hose, intake air pipe and surge tank pipe as a component.
10) Remove engine oil level gauge guide and A/T fluid level gauge guide (for A/T vehicle).
11) Remove ignition coil covers.



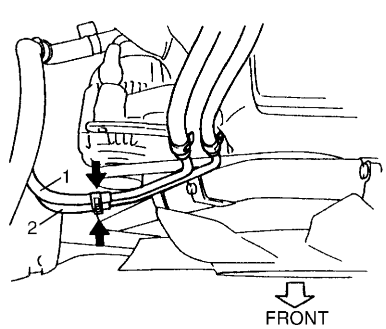


12) Disconnect the following electric lead wires :
- Injector wire coupler
- CMP sensor coupler
- Ignition coil couplers
- CKP sensor coupler
- MAP sensor coupler
- TP sensor (1) coupler
- IAC valve (2) coupler
- Earth wire (3) from surge tank
- EVAP canister purge valve coupler
- EGR valve coupler
- Oxygen sensor -1 and -2 couplers referring to “Exhaust Manifold” in this section
- Coolant temperature sensor coupler
- Knock sensor coupler
- Generator wires
- Starter wires
- Oil pressure wire
- P/S pump wire
- Earth wire from generator bracket
- Engine block heater (if equipped)

13) Remove clamps and brackets.
14) Disconnect the following hoses :
- Heater hose from heater water pipe
- Heater hose from water outlet cap
- EVAP canister hose from canister pipe
- Brake booster vacuum hose

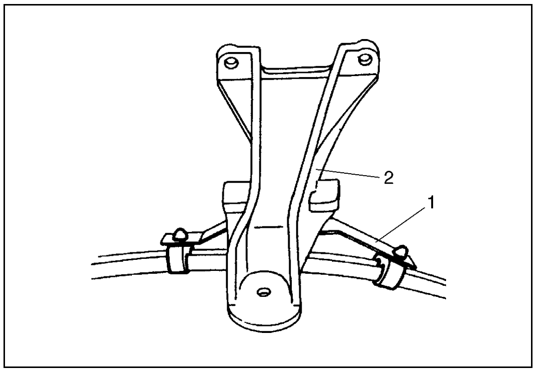
15) Remove EVAP canister purge valve (5).

4.	Clamp bracket
6.	EGR valve
7.	Heater hose

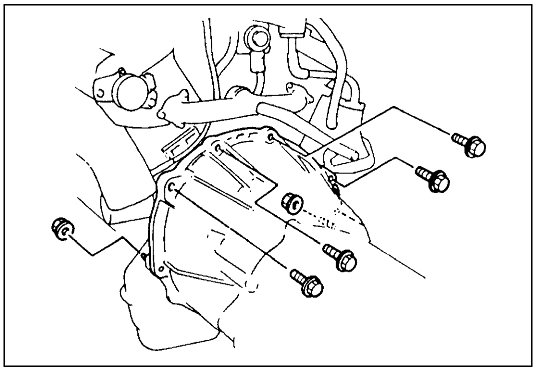


16) Disconnect the following hoses at the location shown in the figure :
- Fuel feed hose (1) from fuel feed pipe
- Fuel return hose from (2) fuel return pipe

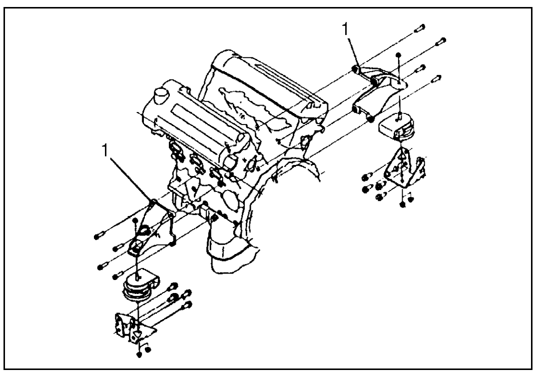
17) Remove P/S pump assembly. Refer to “POWER STEERING PUMP” in Section 3B1.
18) Remove A/C compressor assembly. Refer to “COMPRESSOR ASSEMBLY” in Section 1B.
19) Remove steering shaft lower assembly. Refer to “STEERING LOWER SHAFT ASSEMBLY” in Section 3C1.
20) Raise vehicle.
21) Remove front differential housing with differential from chassis if equipped. Refer to “DISMOUNTING” in Section 7E.
22) Remove exhaust No.1 pipe. Refer to “EXHAUST MANIFOLD” in this section.
23) Remove exhaust manifold stiffener from transmission.



24) Remove A/T fluid hose clamps (1) from engine mounting bracket (2). (for A/T vehicle)
25) Remove clutch housing lower plate.
26) Remove torque converter bolts (for A/T vehicle).
27) Remove starter motor.
28) Lower vehicle.
29) Support transmission. For A/T vehicle, don't jack under A/T oil pan to support transmission.



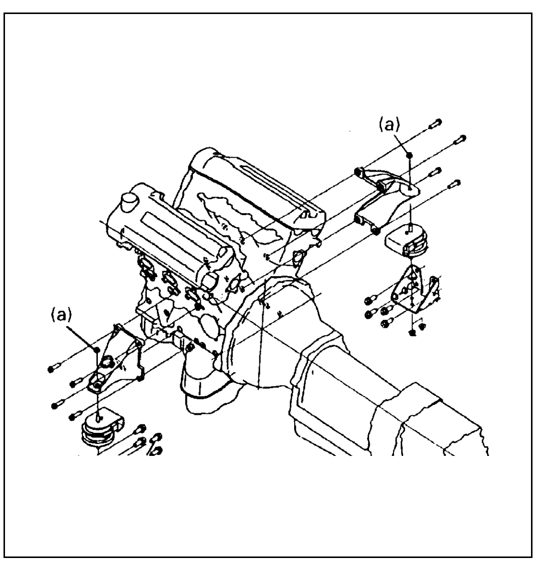
30) Remove bolts and nuts fastening cylinder block and transmission.



31) Install lifting device.
32) Disconnect engine side mounting brackets (1) to engine mountings.
33) Before lifting engine, check to ensure all hoses, wires and cables are disconnected from engine.
34) Remove engine assembly from chassis and transmission by sliding toward front, and then, carefully hoist engine assembly.

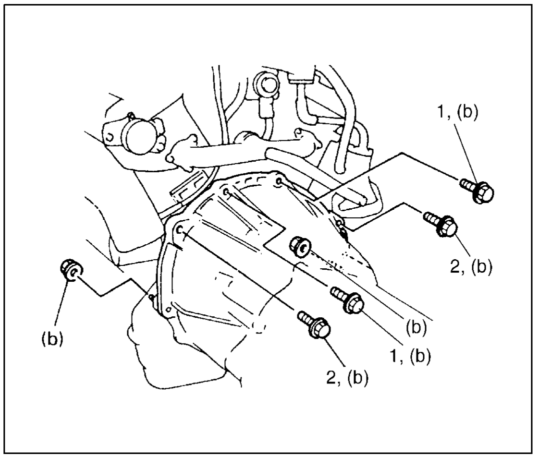
INSTALLATION

Reverse removal procedure for installation, noting the following points.



1) Lower engine assembly into engine compartment. Connect engine to transmission and engine side mounting brackets to engine mountings.
2) Tighten nuts fastening engine side mounting brackets and engine mountings.

Tightening torque
Engine side mounting bracket nut (a) :
50 N·m (5.0 kg-m, 36.5 lb-ft)

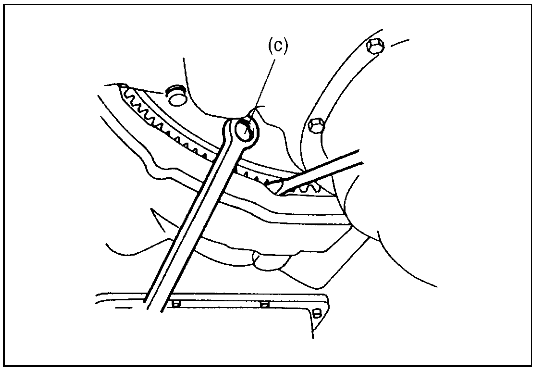


3) Tighten bolts and nuts fastening cylinder block and transmission to specified torque.

Tighting torque
Transmission to cylinder block bolt and nut (b) :
85 N·m (8.5 kg-m, 61.5 lb-ft)

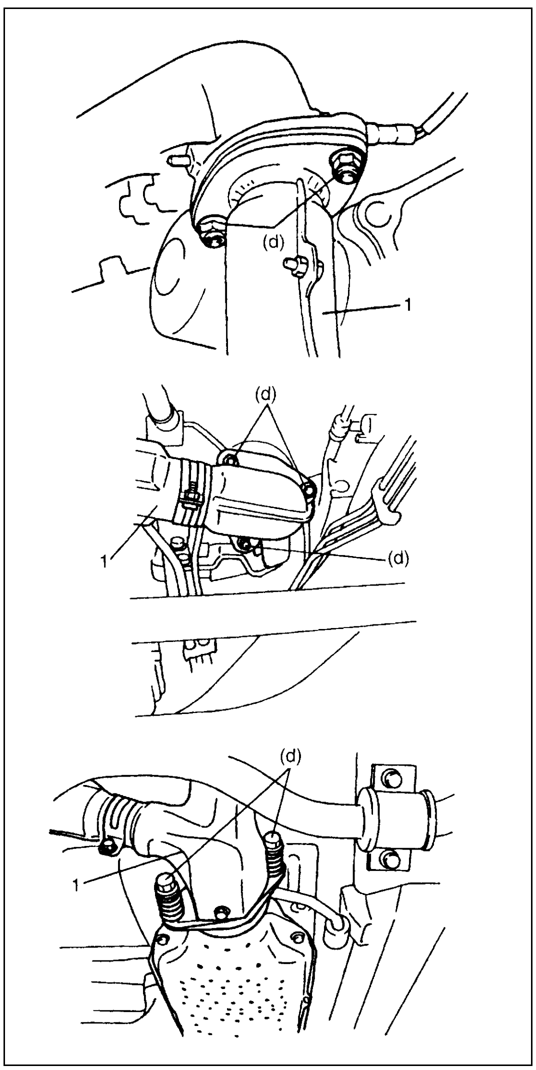
1.	Bolt (short)
2.	Bolt (Long)

4) Remove lifting device



5) Tighten torque converter bolts to specified torque (for A/T vehicle).

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

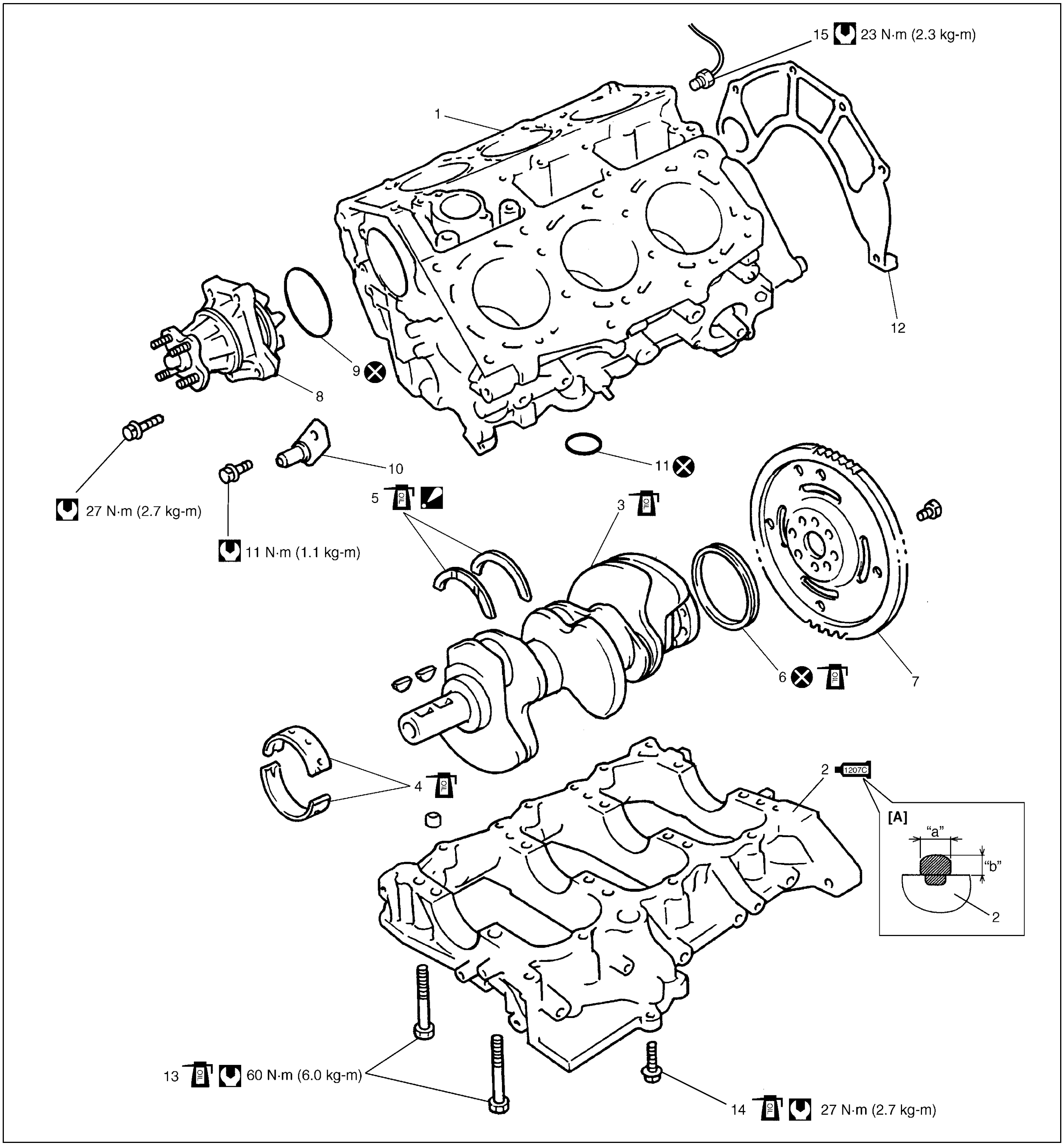


6) Tighten bolts and nuts of exhaust No.1 pipe (1) to specified torque.

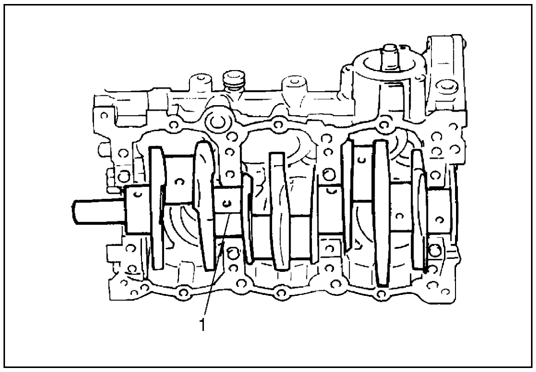
Tightening torque
Exhaust No.1 pipe bolt and nut (d) :
50 N·m (5.0 kg-m, 36.5 lb-ft)

7) Install front differential housing with differential to chassis if removed. Refer to “REMOUNTING” in Section 7E.
8) Install steering shaft lower assembly. Refer to “STEERING LOWER SHAFT ASSEMBLY” in Section 3C1.
9) Install A/C compressor assembly. Refer to “COMPRESSOR ASSEMBLY” in Section 1B.
10) Install P/S pump assembly. Refer to “POWER STEERING PUMP” in Section 3B1.
11) Connect hoses, cables and electric wires.
12) Adjust accelerator cable play and A/T throttle cable play (for A/T vehicle). Refer to “ACCELERATOR CABLE ADJUSTMENT” and “A/T THROTTLE CABLE ADJUSTMENT (A/T VEHICLE)” in Section 6E2.
13) Refill engine with engine oil referring to “ENGINE OIL CHANGE” in Section 0B.
14) Refill cooling system, referring to “COOLING SYSTEM FLUSH AND REFILL” in Section 6B.
15) Check to ensure that all fasteners and clamps are tightened.
16) Upon completion of installation, verify that there is no fuel leakage, coolant leakage, P/S fluid leakage or exhaust gas leakage at each connection.

Main Bearings, Crankshaft and Cylinder Block



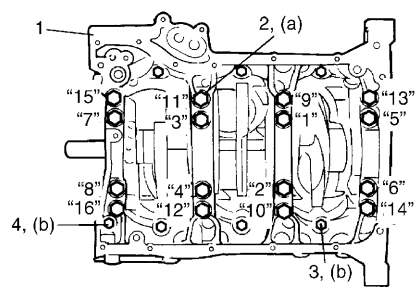
1. Cylinder block	6. Rear oil seal	11. O-ring	[A]: Sealant application amount
1207C 2. Lower crankcase : Apply sealant 99000-31150 to lower crankcase mating surface.	7. Flywheel (M/T) Drive plate (A/T)	12. Clutch housing plate	Tightening Torque
3. Crankshaft	8. Water pump	13. Cap bolt	Do not reuse
4. Main bearing	9. O-ring	14. Lower crankcase bolt	Apply engine oil to sliding surface of each parts.
5. Thrust bearing : Set bearing facing grooved side to crank weds.	10. Timing chain oil jet	15. Knock sensor	"a": Width 3 mm (0.12 in.)
			"b": Height 2 mm (0.08 in.)



Main bearing clearance

Check clearance by using gaging plastic (1) according to the following procedure.

1) Remove 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 crankcase to cylinder block.
   Tighten crankcase bolts, following sequence in the figure. Tighten crankcase bolts to specified torque.

NOTE:

Tighten 10 mm thread diameter bolts first (following the order shown in the figure) then tighten 8 mm thread diameter bolts.

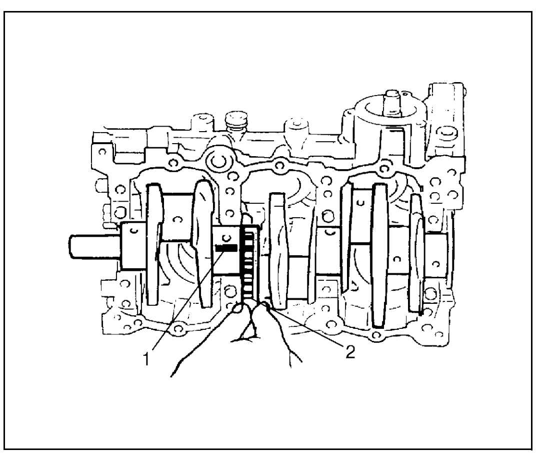
Tightening torque

Thrust and journal bearing cap bolt (8 mm thread diameter) (a) :
60 N·m (6.0 kg-m, 43.5 lb-ft)
Thrust and journal bearing cap bolt (10 mm thread diameter) (b) :
27 N·m (2.7 kg-m, 19.5 lb-ft)

NOTE:

Do not rotate crankshaft while gaging plastic is installed.

1.	Lower crankcase
2.	Bolt (10 mm thread diameter)
3.	Bolt (8 mm thread diameter)
4.	Long bolt (8 mm thread diameter)

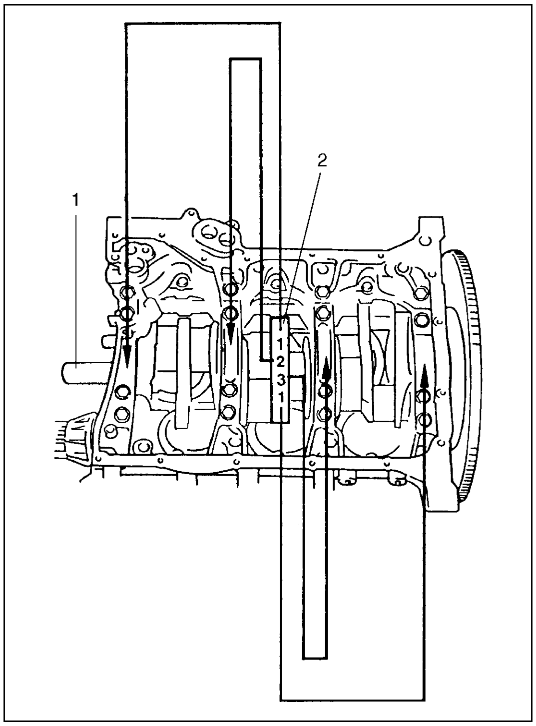


5) Remove crankcase and using scale (2) on gaging plastic (1) envelop, measure gaging plastic (1) width at its widest point.
   If clearance exceeds its limit, replace bearing. Always replace both upper and lower inserts as a unit.
   A new standard bearing may produce proper clearance. If not, it will be necessary to regrind crankshaft journal for use of 0.25 mm undersize bearing.
   After selecting new bearing, recheck clearance.

Main Bearing Clearance
Standard : 0.024 – 0.044 mm (0.0009 – 0.0017 in.)
Limit : 0.060 mm (0.0023 in.)

Selection of main bearings

- STANDARD BEARING :
  If bearing is in malcondition, or bearing clearance is out of specification, select a new standard bearing according to the following procedure and install it.

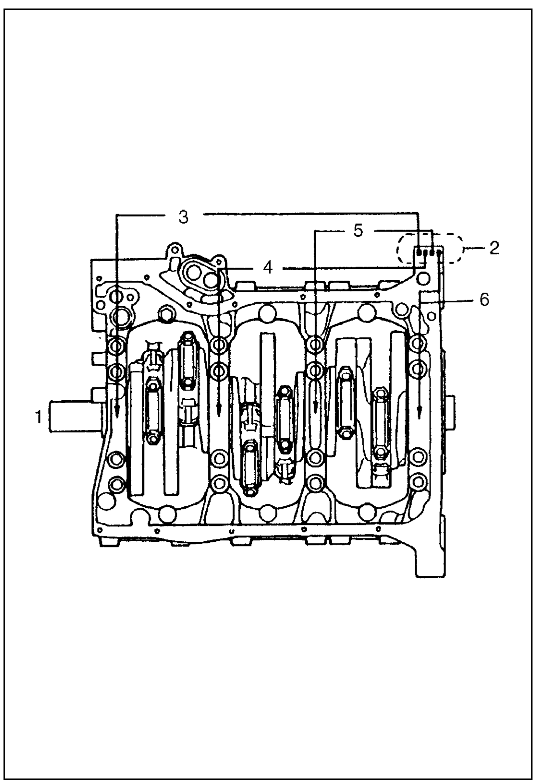


1) First check journal diameter. As shown in the figure, crank web has stamped numbers and alphabet at the center.
   3 kinds of numbers (“1”, “2” and “3”) represent the following journal diameters.

Journal diameter :

Stamped numbers	Journal diameter
1	**65.000 – 65.006 mm (2.5590 – 2.5593 in.)**
2	**64.994 – 65.000 mm (2.5588 – 2.5590 in.)**
3	**64.988 – 64.994 mm (2.5586 – 2.5588 in.)**

1.	Crankshaft
2.	Crank web

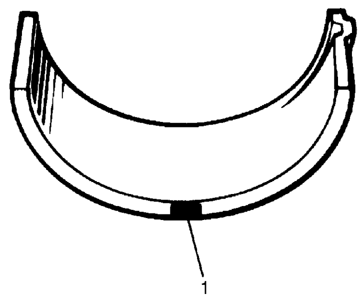


2) Next, check crankcase (bearing cap) bore diameter without bearing. On lower surface of lower crankcase 4 alphabets are stamped as shown in the figure.
   3 kinds of alphabets (A, B and C) represent the following cap bore diameters.

Main bearing cap bore diameter :

Stamped numbers	Bearing cap bore diameter (without bearing)
A	**70.000 – 70.006 mm (2.7559 – 2.7561 in.)**
B	**70.006 – 70.012 mm (2.7561 – 2.7563 in.)**
C	**70.012 – 70.018 mm (2.7563 – 2.7566 in.)**

1.	Crankshaft pulley side
2.	Stamped alphabets
3.	No.1 bearing
4.	No.2 bearing
5.	No.3 bearing
6.	No.4 bearing



3) There are 5 kinds of standard bearings differing in thickness. To distinguish them, they are painted in following colors at the position as shown in the figure.
   Each color indicates the following thickness at the center of bearing.

Standard size Main bearing thickness :

Color painted	Bearing thickness
Black	2.496 – 2.500 mm (0.0983 – 0.0984 in.)
Colorless (no paint)	2.499 – 2.503 mm (0.0984 – 0.0985 in.)
Yellow	2.502 – 2.506 mm (0.0985 – 0.0986 in.)
Blue	2.505 – 2.509 mm (0.0986 – 0.0987 in.)
Pink	2.508 – 2.512 mm (0.0987 – 0.0988 in.)

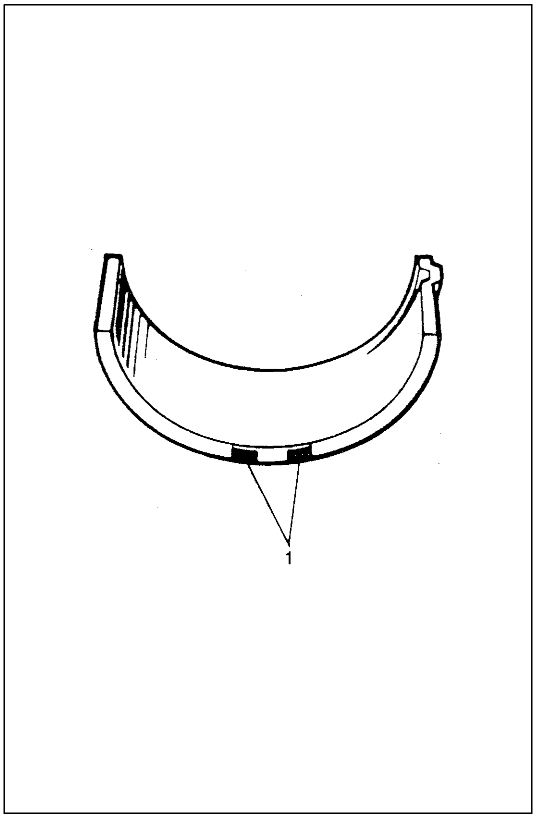
1. Paint

4) From number stamped on crank webs at its center and alphabets stamped on crankcase lower side, determine new standard bearing to be installed to journal, by referring to table shown below.
   For example, if number stamped on crank webs is “1” and alphabet stamped on crankcase is “B”, install a new standard bearing painted in “Black” to its journal.

New standard size bearing specification :

		Number stamped on crank web (Journal diameter)		
		1	2	3
Alphabet stamped on lower crankcase (Cap bore dia.)	A	Black	Colorless	Yellow
	B	Colorless	Yellow	Blue
	C	Yellow	Blue	Pink

5) Using gaging plastic, check bearing clearance with newly selected standard bearing.
   If clearance still exceeds its limit, use next thicker bearing and recheck clearance.
6) When replacing crankshaft or cylinder block and crank case due to any reason, select new standard bearings to be installed by referring to number stamped on new crankshaft or alphabets stamped on new crankcase lower side.



1. Paint

- UNDERSIZE BEARING (0.25 mm) :
  0.25 mm undersize bearing is available, in 5 kinds varying in thickness.
  To distinguish them, each bearing is painted in the following colors at such position as shown in the figure.
  Each color represents the following thickness at the center of bearing.

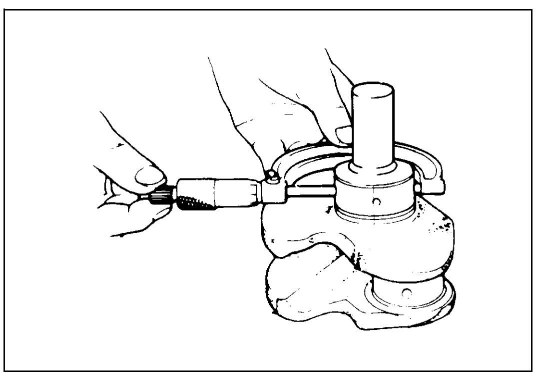
Under size main bearing thickness

Color painted	Bearing thickness
Black & Red	2.621 – 2.625 mm (0.1032 – 0.1033 in.)
Red	2.624 – 2.628 mm (0.1033 – 0.1034 in.)
Red & Yellow	2.627 – 2.631 mm (0.1034 – 0.1035 in.)
Red & Blue	2.630 – 2.634 mm (0.1035 – 0.1036 in.)
Red & Pink	2.633 – 2.637 mm (0.1036 – 0.1037 in.)

- If necessary, regrind crankshaft journal and select undersize bearing to use with it as follows.

1) Regrind journal to the following finished diameter.

Finished journal diameter :
64.738 – 64.756 mm (2.5487 – 2.5494 in.)

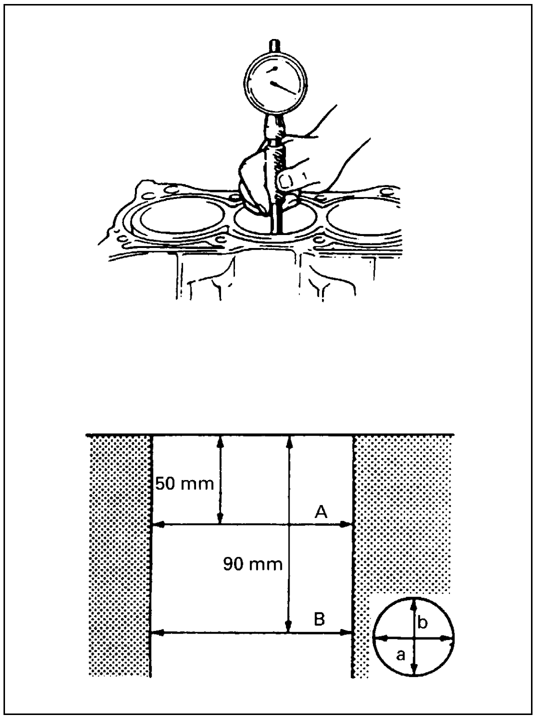


2) Using micrometer, measure reground journal diameter. Measurement should be taken in 2 directions perpendicular to each other in order to check for out-of-round.
3) Using journal diameter measured above and alphabets stamped on lower crankcase, select an undersize bearing by referring to table given below.
   Check bearing clearance with newly selected undersize bearing.

Under size bearing specification :

		Measured journal diameter		
		64.750 – 64.756 mm (2.5492 – 2.5494 in.)	64.744 – 64.750 mm (2.5489 – 2.5492 in.)	64.738 – 64.744 mm (2.5487– 2.5489 in.)
Alphabets stamped on lower crankcase	A	Black & Red	Red	Red & Yellow
	B	Red	Red & Yellow	Red & Blue
	C	Red & Yellow	Red & Blue	Red & Pink

INSPECTION



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.

Oversize piston specification :

Size	Piston diameter
Standard	**87.970 – 87.990 mm (3.4634 – 3.4642 in.)**
Oversize 0.25	**88.220 – 88.240 mm (3.4732 – 3.4740 in.)**
Oversize 0.50	**88.470 – 88.490 mm (3.4831 – 3.4839 in.)**

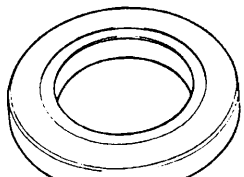
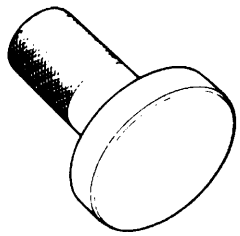
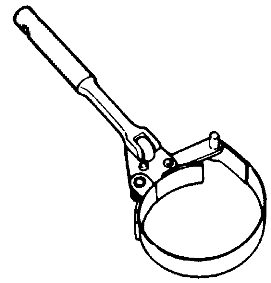
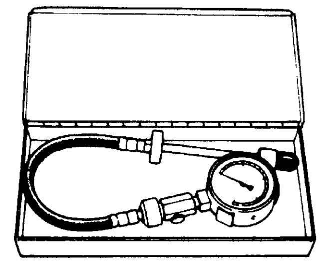
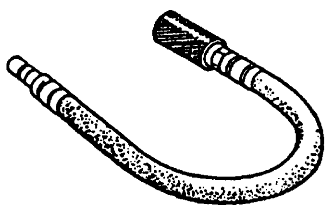
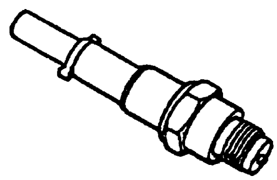
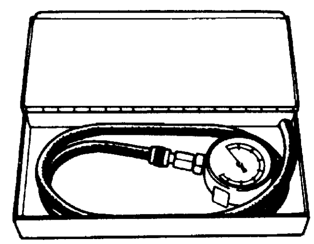
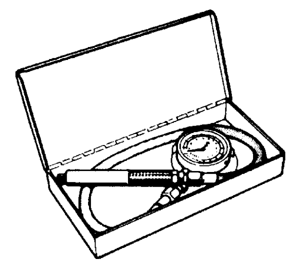
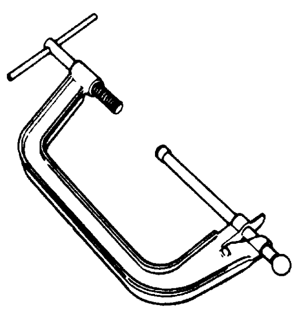
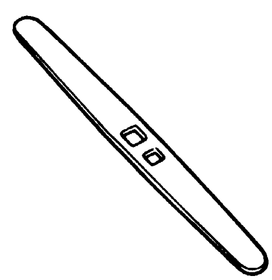
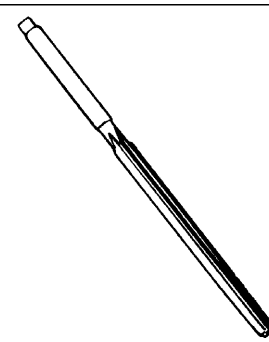
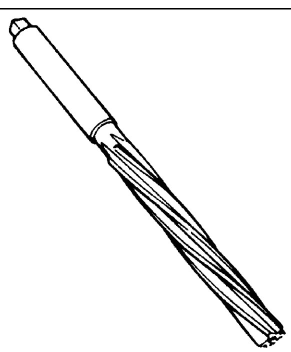
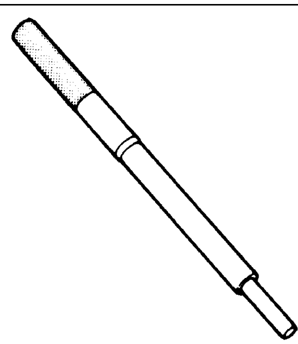
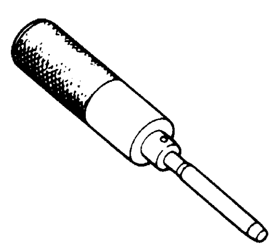
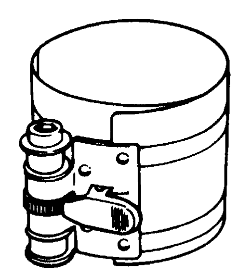
3) Using micrometer, measure piston diameter.
4) Calculate cylinder bore diameter to be rebored as follows.
   D = A + B – C
   Cylinder bore diameter to be rebored
   A : Piston diameter as measured
   B : Piston clearance = 0.02 – 0.04 mm (0.0008 – 0.0015 in.)
   C : Allowance for honing = 0.02 mm (0.0008 in.)
5) Rebore and hone cylinder to calculated dimension.

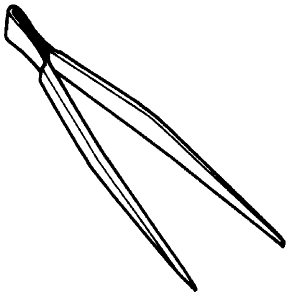
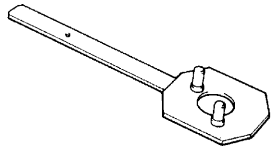
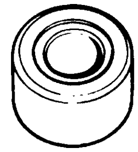
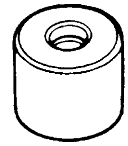
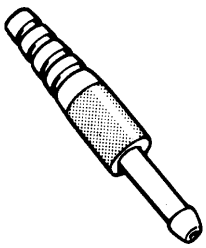
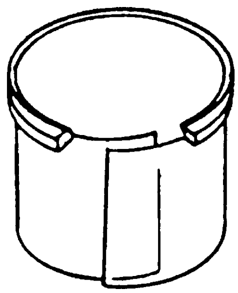
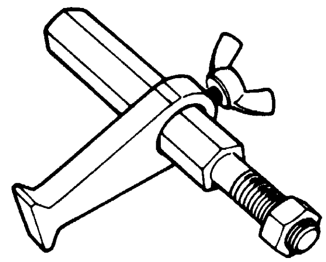
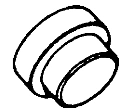
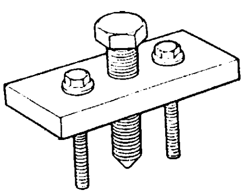
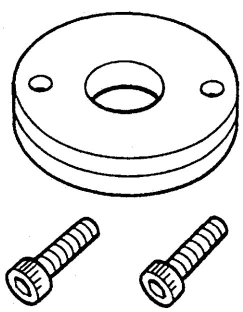
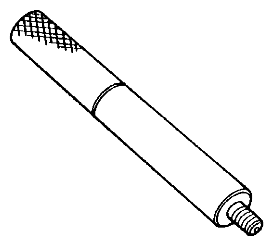
NOTE:

Before reboring, install all main bearing caps in place and tighten to specification to avoid distortion of bearing bores.

6) Measure piston clearance after honing.

Special Tool

 09911-97810 Oil seal installer	 09913-75510 Bearing installer	 09915-47310 Oil filter wrench	 09915-64510 Compression gauge
 09915-64530 Compression gauge hose	 09915-67010 Compression gauge attachment (c)	 09915-67310 Vacuum gauge	 09915-77310 Oil pressure gauge
 09916-14510 Valve lifter	 09916-14910 Valve lifter attachment	 09916-34541 Reamer handle	 09916-37810 Reamer (6 mm)
 09916-38210 Reamer (11 mm)	 09916-44910 Valve guide remover	 09916-58210 Valve guide installer handle	 09916-77310 Piston ring compressor

 09916-84511 Forceps	 09917-68221 Camshaft lock holder	 09917-87810 Valve guide installer	 09917-98221 Valve stem seal installer
 09918-08210 Vacuum gauge hose joint	 09919-28610 Protective sleeve	 09924-17810 Flywheel holder	 09926-58010 Bearing puller attachment
 09944-36011 Steering wheel remover	 09911-97710 Oil seal guide	 09915-76510 Oil pressure gauge attachment	

SECTION 6B

ENGINE COOLING

NOTE:

- **For the descriptions (items) not found in this section, refer to the descriptions of H25 engine in the same section of service manual mentioned in the FOREWORD of this manual.**

CONTENTS

Maintenance

Coolant

Anti-freeze proportioning chart :

Freezing temperature	**°C**	**–16**	**–36**
	°F	**3**	**–33**
Antifreeze/Anticorrosion coolant concentration	**%**	**30**	**50**
Ratio of compound to cooling water	**ltr.**	**2.7/6.4**	**4.6/4.6**
	US pt	**5.8/13.7**	**9.8/9.8**
	Imp. pt.	**4.8/11.3**	**8.1/8.1**

Coolant capacity :

	Engine, radiator and heater	Reservoir	Total
ltr. (US/Imp. pt.)	**8.2 (17.5 / 14.4)**	**0.9 (1.9 / 1.6)**	**9.1 (19.4 / 16.0)**

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.**
- **"Hard water", if used, will foul up the cooling circuit by scale formation. Tap water available from city water supply is the best available water, in a practical sense, for the cooling system. Distilled water is ideal but is a luxury in most cases.**

SECTION 6C

ENGINE FUEL

NOTE:

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

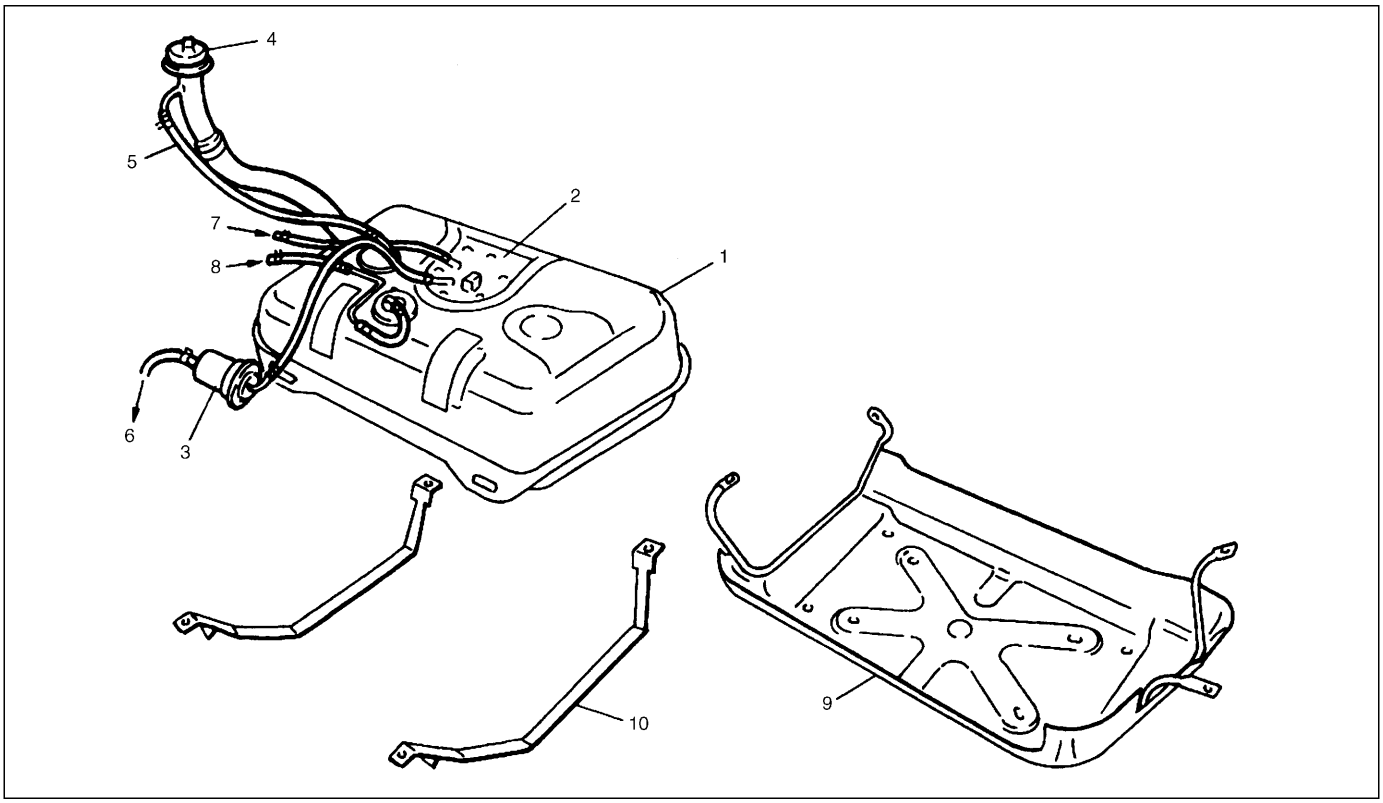
CONTENTS

6C

General Description

Fuel System

The main components of the fuel system are fuel tank, fuel pump, fuel filter and fuel level gauge and it includes three lines, fuel feed line, fuel return line and fuel vapor line.
For the details of fuel flow and fuel vapor flow, refer to Section 6E2.



1. Fuel tank	6. Fuel feed line (to delivery pipe)
2. Fuel pump (with fuel level gauge)	7. Fuel return line (from delivery pipe)
3. Fuel filter	8. Fuel vapor line (to EVAP canister)
4. Fuel filter cap	9. Fuel tank protector
5. Breather hose	10. Belt

On-Vehicle Service

Fuel Tank

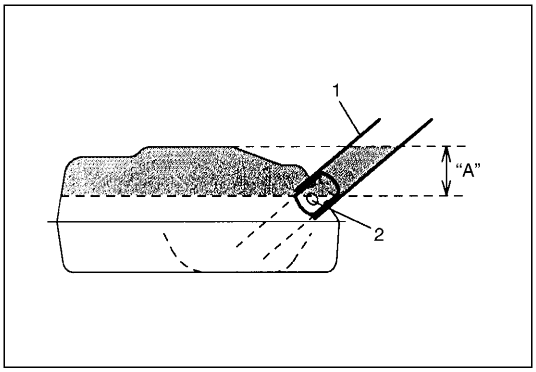
REMOVAL

1) Relieve fuel pressure in fuel feed line referring to Section 6 or Section 6-1.

CAUTION:

This work must not be done when engine is hot. If done so, it may cause adverse effect to catalyst.

2) Disconnect negative (–) cable at battery.
3) Before disconnecting fuel filler hose, give match marks on fuel filler hose and fuel filler neck.
4) Disconnect fuel filler hose from fuel filler neck.

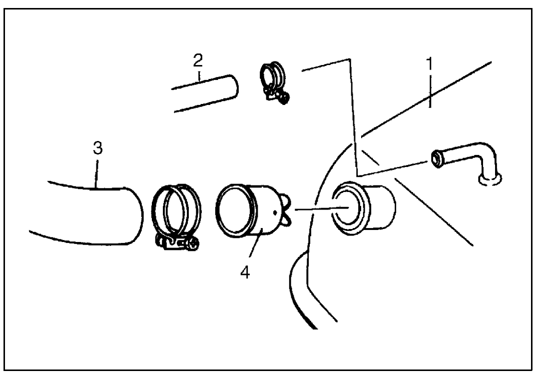


5) Insert hose of a hand operated pump into fuel filler hose and drain fuel in space "A" in the figure (drain fuel through it till fuel stops).

CAUTION:

Do not force hose of a hand operated pump into fuel tank. Doing so can damage inlet valve.

1.	Fuel filler hose
2.	Fuel tank inlet (check) valve



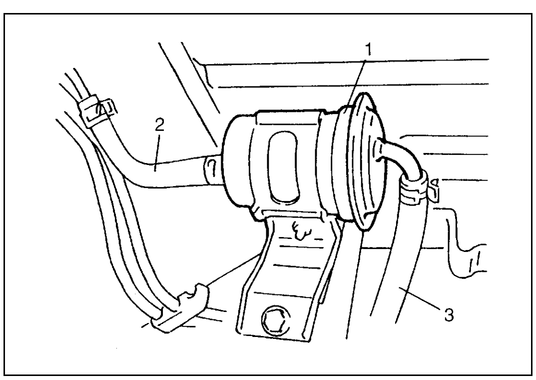
6) Remove fuel tank filler hose protector.
   Disconnect filler hose from fuel tank and breather hose from fuel filler neck.
7) Remove fuel tank inlet valve. Use care not to damage inlet valve when removing.

1.	Tank
2.	Breather hose
3.	Filler hose
4.	Inlet valve

8) Drain fuel tank by pumping fuel out through fuel tank filler.
   Use hand operated pump device to drain fuel tank.

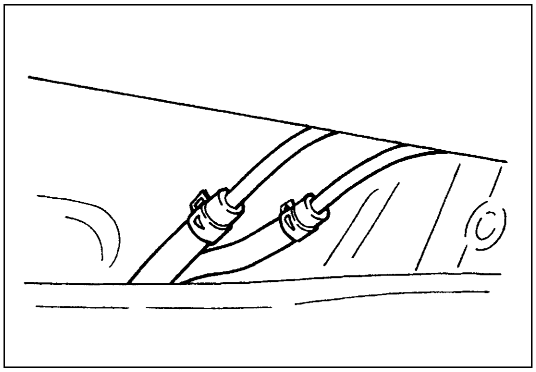
CAUTION:

Never drain or store fuel in an open container due to possibility of fire or explosion.

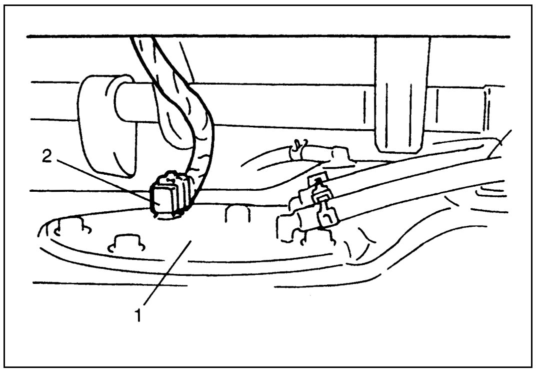


9) Disconnect fuel filter inlet hose from filter.

1.	Fuel filter
2.	Fuel filter outlet hose
3.	Fuel filter inlet hose



10) Disconnect fuel vapor hose and return hose from pipes.
11) Remove fuel tank protector (if equipped) from vehicle.



12) Lower fuel tank gradually while holding it horizontally and pull out coupler at fuel pump.

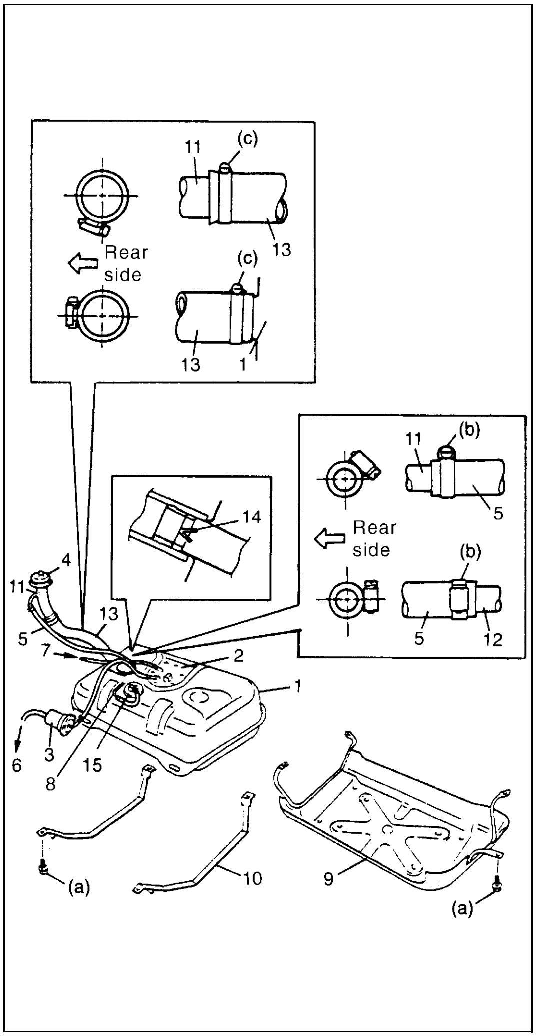
1.	Fuel pump
2.	Coupler

INSPECTION

After removing fuel tank, check hoses and pipes connected to fuel tank for leaks, loose connections, deterioration or damage. Also check fuel pump and level gauge gaskets for leaks, visually inspect fuel tank for leaks and damage.
Replace any damaged or malconditioned parts.

INSTALLATION

1) Install fuel pump assembly, fuel cut valve and vapor control valve to fuel tank. Refer to “FUEL PUMP” in this section.



2) Connect fuel hoses to fuel tank, fuel cut valve, and vapor control valve, check valve and fuel pump assembly.
   After connecting, clamp hoses securely.
3) Install inlet valve to fuel tank. If deformed or damaged in any other way, replace with a new one.
4) Install fuel tank by using fuel tank belts and then install protector to vehicle.

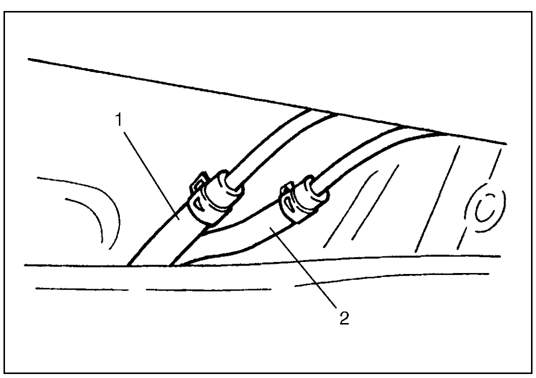
Tightening torque
Fuel tank bolt (a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)
Fuel tank protector bolt (a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

5) Connect fuel filler hose to fuel filler neck with match the match marks. And then clamp the securely.
6) Connect fuel filler hose to fuel tank and breather hose to fuel filler neck. Clamp them securely.

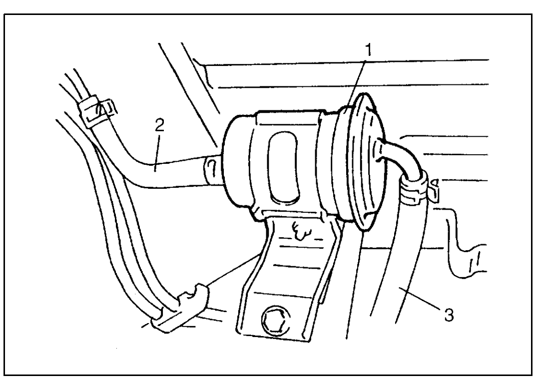
Tightening torque
Breather hose clamp (b) : 2.0 N·m (0.2 kg-m, 2.0 lb-ft)
Fuel filler hose clamp (c) : 4.0 N·m (0.4 kg-m, 3.0 lb-ft)

7) Install fuel filler hose protector.

1. Fuel tank	9. Fuel tank protector
2. Fuel pump (with fuel level gauge)	10. Belt
3. Fuel filter	11. Filler neck
4. Fuel filler cap	12. Breather pipe
5. Breather hose	13. Filler hose
6. Fuel feed line (to delivery pipe)	14. Tank inlet valve
7. Fuel return line (from delivery pipe)	15. Fuel cut valve
8. Fuel vapor line (to EVAP canister)	



8) Connect fuel vapor hose (1) and return hose (2) to fuel pipe and clamp them securely.

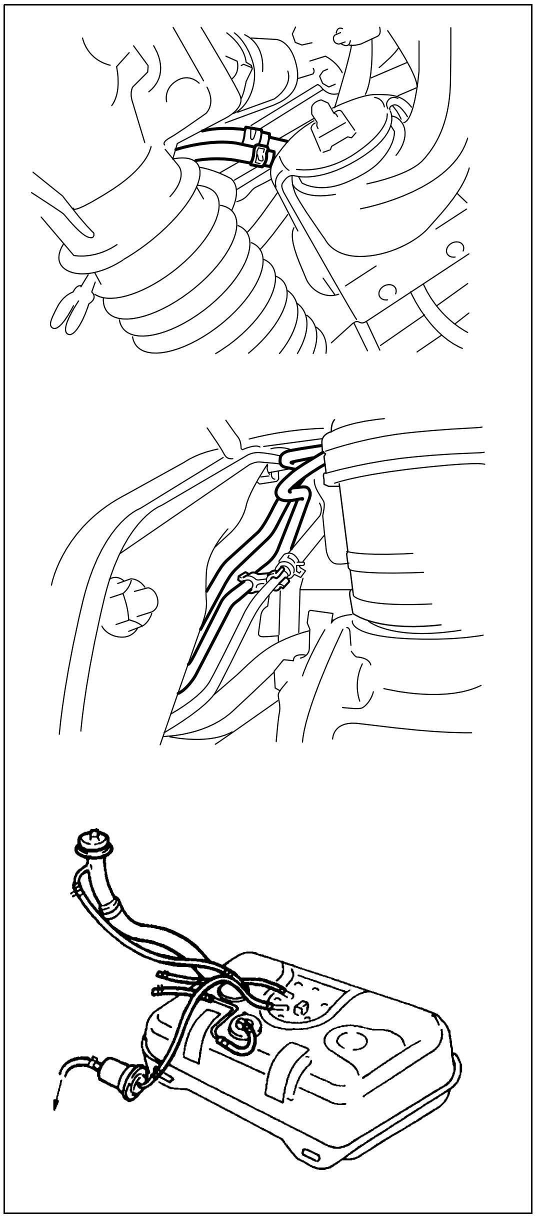


9) Connect fuel filter inlet hose to fuel filter.

1. Fuel filter
2. Fuel filter outlet hose
3. Fuel filter inlet hose

10) Connect coupler to fuel pump assembly.
11) Connect negative (–) cable to battery.
12) Upon completion of installation, check fuel system for leakage.

Fuel Lines



Due to the fact that fuel feed line is under high pressure, this system requires special consideration for service.
The feed pipe uses screw couplings and hose clamps.

INSPECTION

Visually inspect fuel lines for evidence of fuel leakage, hose cracking and deterioration, or damage. Make sure all clamps are secure. Replace parts as needed.

SECTION 6E2

ENGINE AND EMISSION CONTROL SYSTEM (SEQUENTIAL MULTIPORT FUEL INJECTION FOR H27 ENGINE)

WARNING:

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

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

NOTE:

Whether following systems (parts) are used in the particular vehicle or not depends on specifications. Be sure to bear this in mind when performing service work.

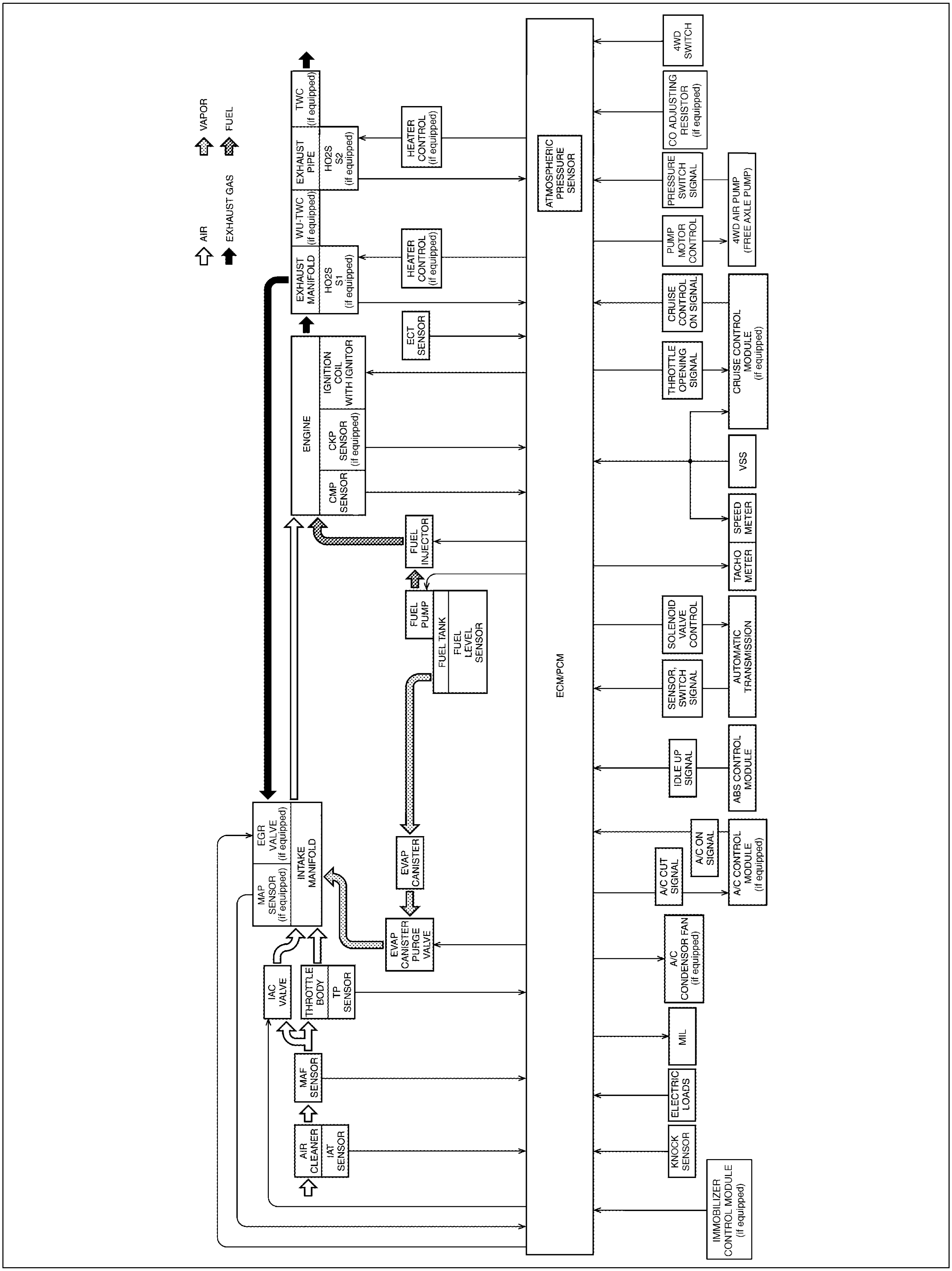
- **Monitor connector**
- **CKP sensor**
- **MAP sensor**
- **EGR valve**
- **Heated oxygen sensor or CO adjusting resistor**
- **Three way catalytic converter, Warm-up three way catalytic converter**

CONTENTS

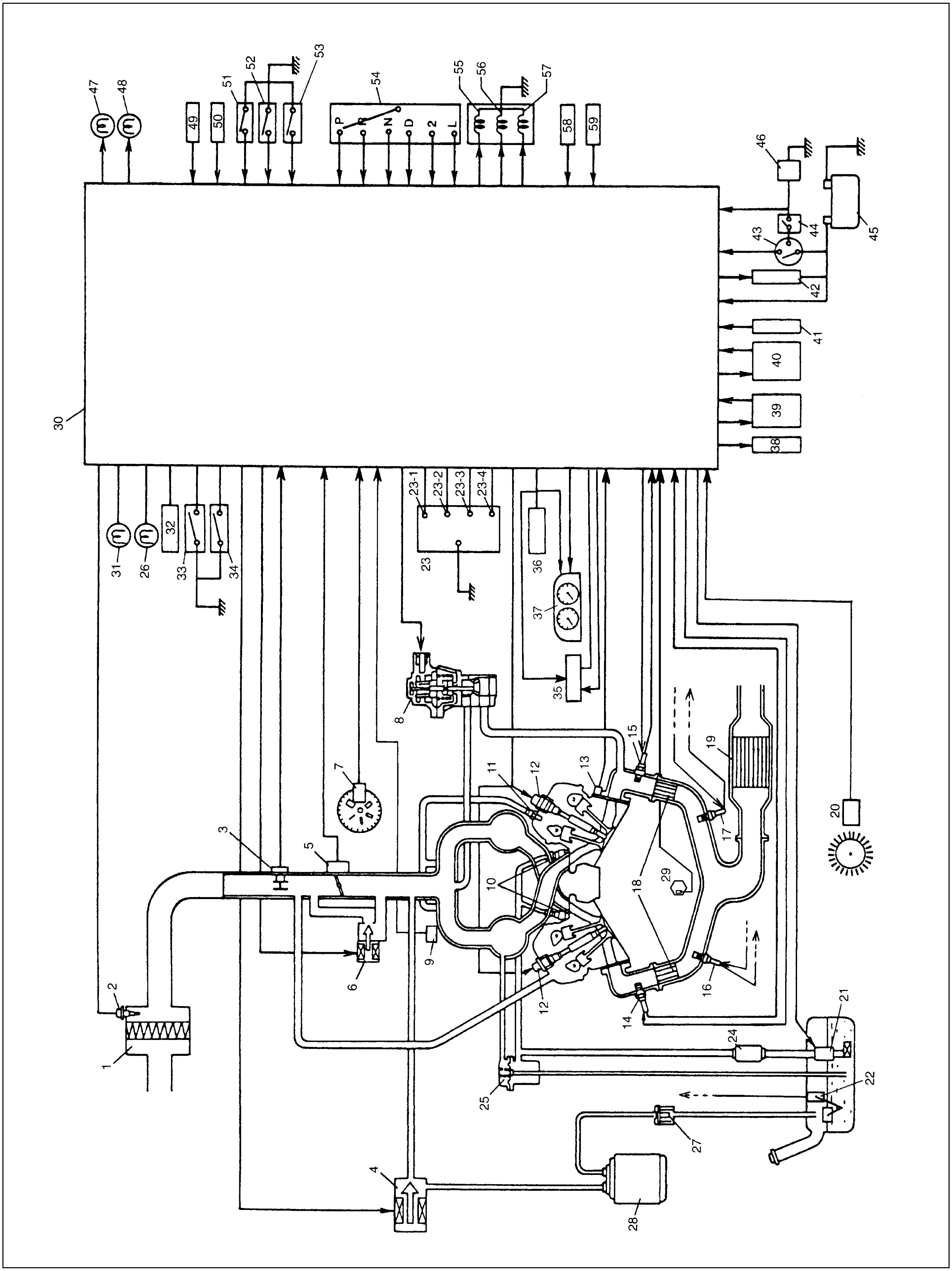
General Description

The engine and emission control system has 4 major sub-systems: air intake system, fuel delivery system, electronic control system and emission control system.
Air intake system includes air cleaner, mass air flow sensor, throttle body, idle air control valve and intake manifold.
Fuel delivery system includes fuel pump, delivery pipe, fuel pressure regulator, fuel injectors, etc.
Electronic control system includes ECM (PCM), various sensors and controlled devices.
Emission control system includes EGR, EVAP and PCV systems.

System Flow


AIR
EXHAUST GAS
VAPOR
FUEL
TWC (if equipped)
EXHAUST PIPE
HO2S S2 (if equipped)
WU-TWC (if equipped)
EXHAUST MANIFOLD
HO2S S1 (if equipped)
HEATER CONTROL (if equipped)
HEATER CONTROL (if equipped)
ECT SENSOR
ENGINE
IGNITION COIL WITH IGNITOR
CKP SENSOR (if equipped)
CMP SENSOR
FUEL INJECTOR
FUEL PUMP
FUEL TANK
FUEL LEVEL SENSOR
EVAP CANISTER
EVAP CANISTER PURGE VALVE
EGR VALVE (if equipped)
MAP SENSOR (if equipped)
INTAKE MANIFOLD
IAC VALVE
THROTTLE BODY
TP SENSOR
MAF SENSOR
AIR CLEANER
IAT SENSOR
ECM/PCM
ATMOSPHERIC PRESSURE SENSOR
4WD SWITCH
CO ADJUSTING RESISTOR (if equipped)
PRESSURE SWITCH SIGNAL
PUMP MOTOR CONTROL
4WD AIR PUMP (FREE AXLE PUMP)
CRUISE CONTROL ON SIGNAL
THROTTLE OPENING SIGNAL
CRUISE CONTROL MODULE (if equipped)
VSS
SPEED METER
TACHO METER
SOLENOID VALVE CONTROL
SENSOR, SWITCH SIGNAL
AUTOMATIC TRANSMISSION
IDLE UP SIGNAL
ABS CONTROL MODULE
A/C ON SIGNAL
A/C CUT SIGNAL
A/C CONTROL MODULE (if equipped)
A/C CONDENSOR FAN (if equipped)
MIL
ELECTRIC LOADS
KNOCK SENSOR
IMMOBILIZER CONTROL MODULE (if equipped)

System Diagram



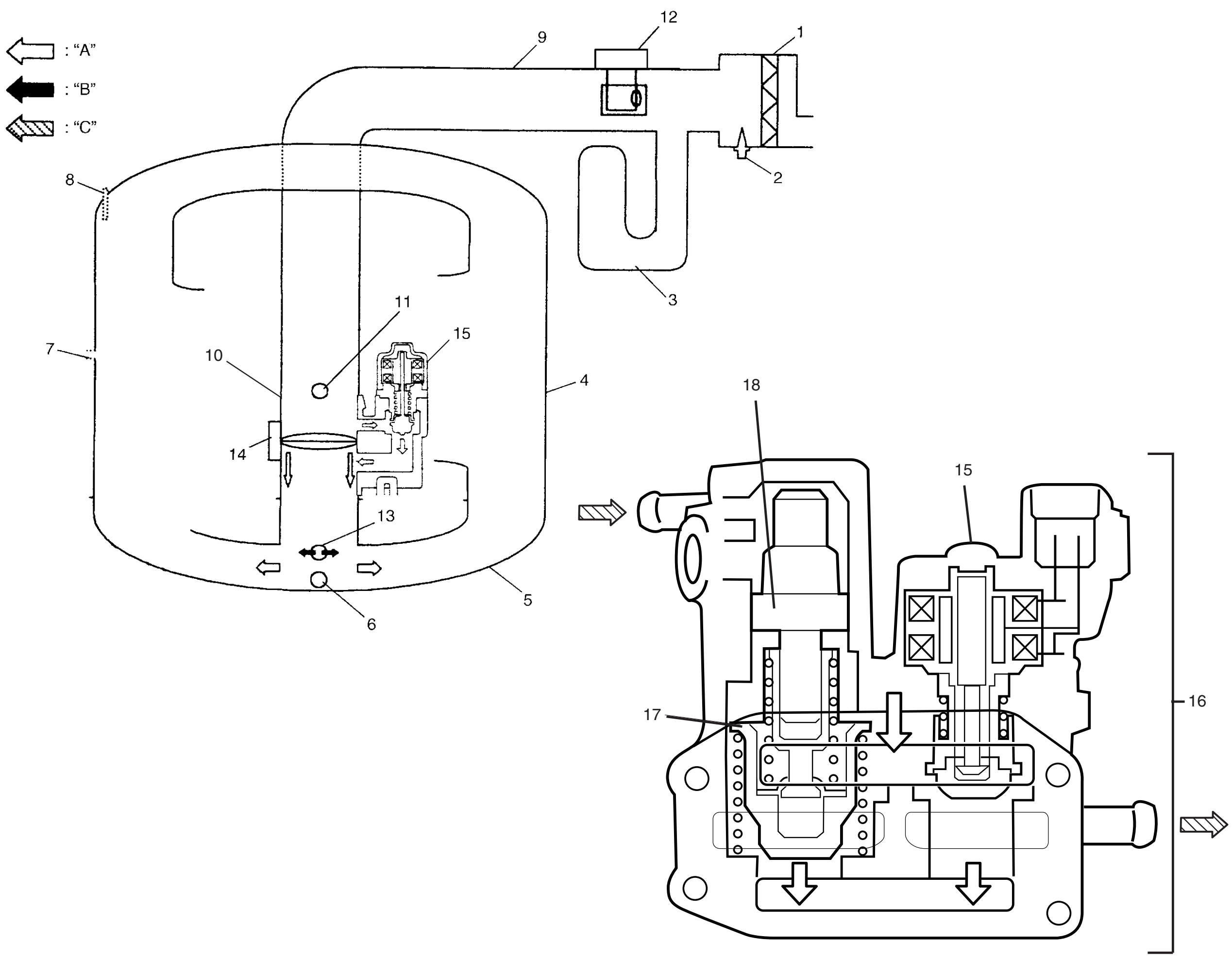
1. Air cleaner	22. Fuel level sensor	39. A/C controller (if equipped)
2. Intake air temp. sensor	23. Monitor connector (if equipped)	40. Data link connector/Immobilizer control module (if equipped)
3. Mass air flow sensor	23-1. Diag. switch terminal	41. ABS control module
4. EVAP canister purge valve	23-2. Test switch terminal	42. Main relay
5. Throttle position sensor	23-3. Output duty select switch terminal	43. Ignition switch
6. Idle air control valve	23-4. Duty output terminal	44. Park/Neutral position switch in TR switch (A/T)
7. Camshaft position sensor	24. Fuel filter	45. Battery
8. EGR valve	25. Fuel pressure regulator	46. Starter magnetic switch
9. Manifold absolute pressure sensor (if equipped)	26. Immobilizer indicator lamp (if equipped)	47. “O/D OFF” lamp (A/T)
10. Fuel injector	27. Tank pressure control valve	48. “POWER” lamp (A/T)
11. PCV valve	28. EVAP canister	49. Lighting switch (A/T)
12. Ignition coil assembly	29. Knock sensor	50. Stop lamp switch (A/T)
13. Engine coolant temperature sensor	30. ECM/PCM (Engine control module/Powertrain control module)	51. O/D cut switch (A/T)
14. Heated oxygen sensor (bank 1 sensor 1) (if equipped)	31. Malfunction indicator lamp	52. POWER/NORMAL change switch (A/T)
15. Heated oxygen sensor (bank 2 sensor 1) (if equipped)	32. Electric loads (rear defogger (if equipped), lighting)	53. 4WD low switch (A/T)
16. Heated oxygen sensor (bank 1 sensor 2) (if equipped)	33. Power steering pressure switch	54. Transmission range switch (A/T)
17. Heated oxygen sensor (bank 2 sensor 2) (if equipped)	34. Heater blower fan switch	55. Solenoid valve A (A/T)
18. Warm-up three way catalytic converter (if equipped)	35. Cruise control module	56. Solenoid valve B (A/T)
19. Three way catalytic converter (if equipped)	36. Vehicle speed sensor	57. TCC solenoid valve (A/T)
20. Crankshaft position sensor (if equipped)	37. Combination meter	58. A/T input speed sensor (A/T)
21. Fuel pump	38. A/C condenser fan relay (if equipped)	59. A/T vehicle (output) speed sensor (A/T)

Air Intake System

The main components of the air intake system are air cleaner, mass air flow sensor, air cleaner, intake air pipe, throttle body, intake collector, idle air control valve 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 idle air control valve is opened according to the signal from ECM (PCM), the air bypasses the throttle valve through bypass passage and is finally drawn into the intake manifold.



"A" : Air	1. Air cleaner	6. PCV hose	11. Breather hose	16. IAC valve and fast idle control system
"B" : EGR	2. IAT sensor	7. Brake booster	12. MAF sensor	17. FIA valve
"C" : Engine coolant	3. Resonator	8. Fuel pressure regulator hose	13. EGR valve	18. Thermo - WAX
	4. Intake manifold	9. Intake air pipe	14. TP sensor	
	5. Intake collector	10. Throttle body	15. IAC valve	

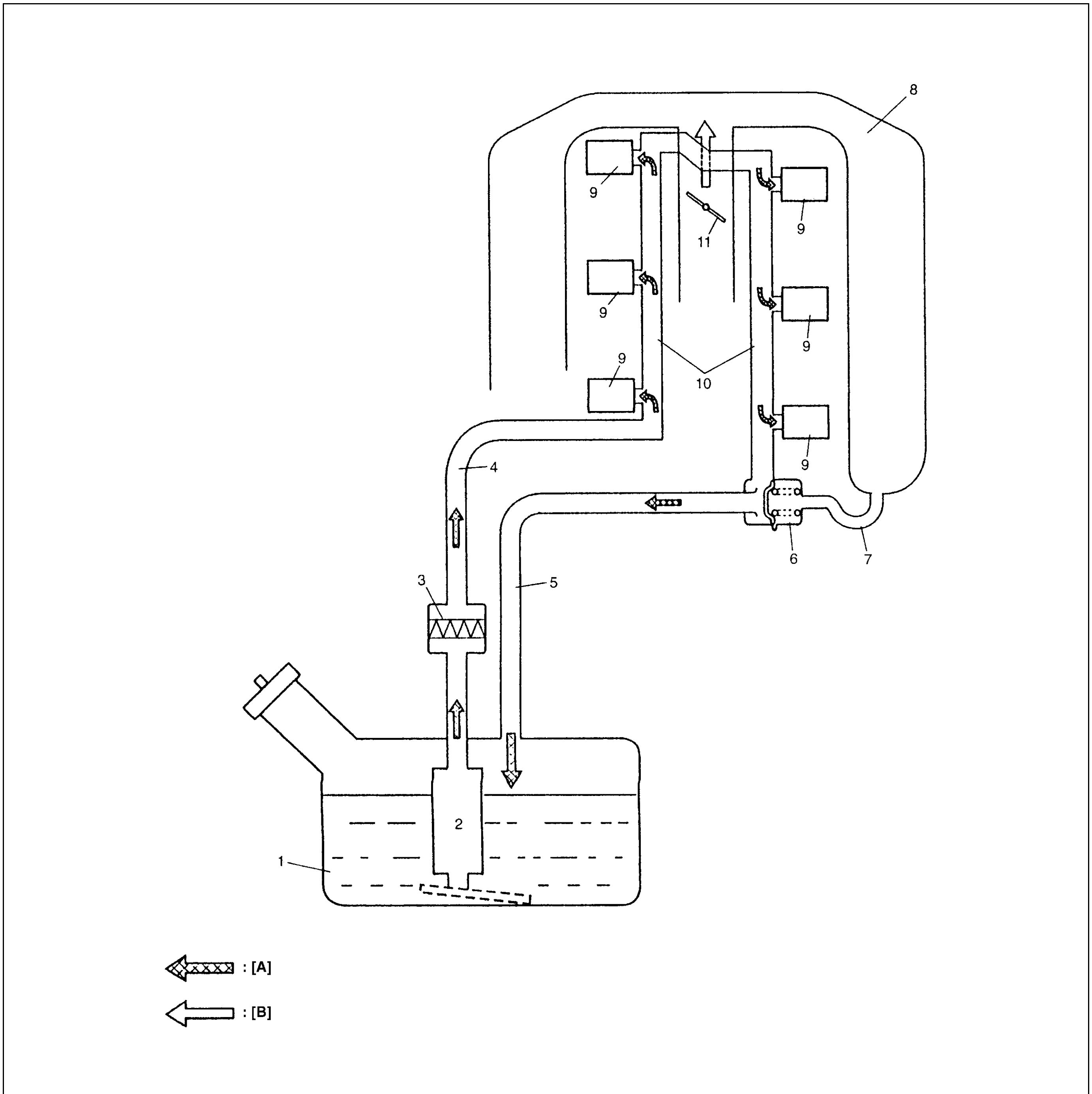
Fuel Delivery System

The fuel delivery system consists of the fuel tank, fuel pump, fuel filter, fuel pressure regulator, delivery pipe and fuel injectors.

The fuel in the fuel tank is pumped up by the fuel pump, filtered by the fuel filter and fed under pressure to each injector through the delivery pipe.

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 (PCM).

The fuel relieved by the fuel pressure regulator returns through the fuel return line to the fuel tank.



[A] : Fuel	1. Fuel tank	5. Fuel return line	9. Fuel injector
[B] : Air	2. Fuel pump	6. Fuel pressure regulator	10. Fuel delivery pipe
	3. Fuel filter	7. Vacuum hose for fuel pressure regulator	11. Throttle valve
	4. Fuel feed line	8. Intake manifold surge tank	

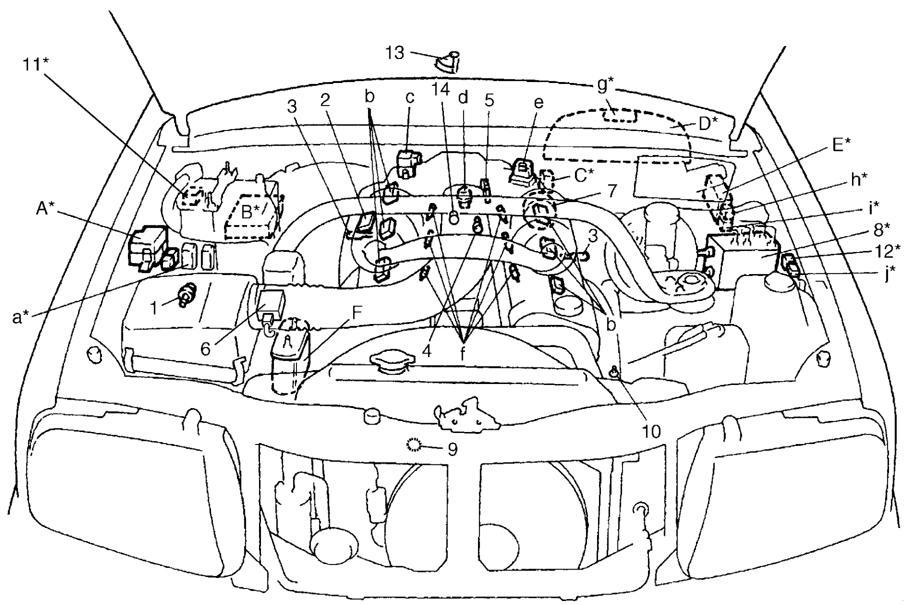
Electronic Control System

The electronic control system consists of 1) various sensors which detect the state of engine and driving conditions, 2) ECM (PCM) which controls various devices according to the signals from the sensors and 3) various controlled devices.

Functionally, it is divided into the following sub systems:

- Fuel injection control system
- Heated oxygen sensor heater control system (if equipped)
- Idle air control system
- Fuel pump control system
- Evaporative emission control system
- Ignition control system
- EGR system (if equipped)

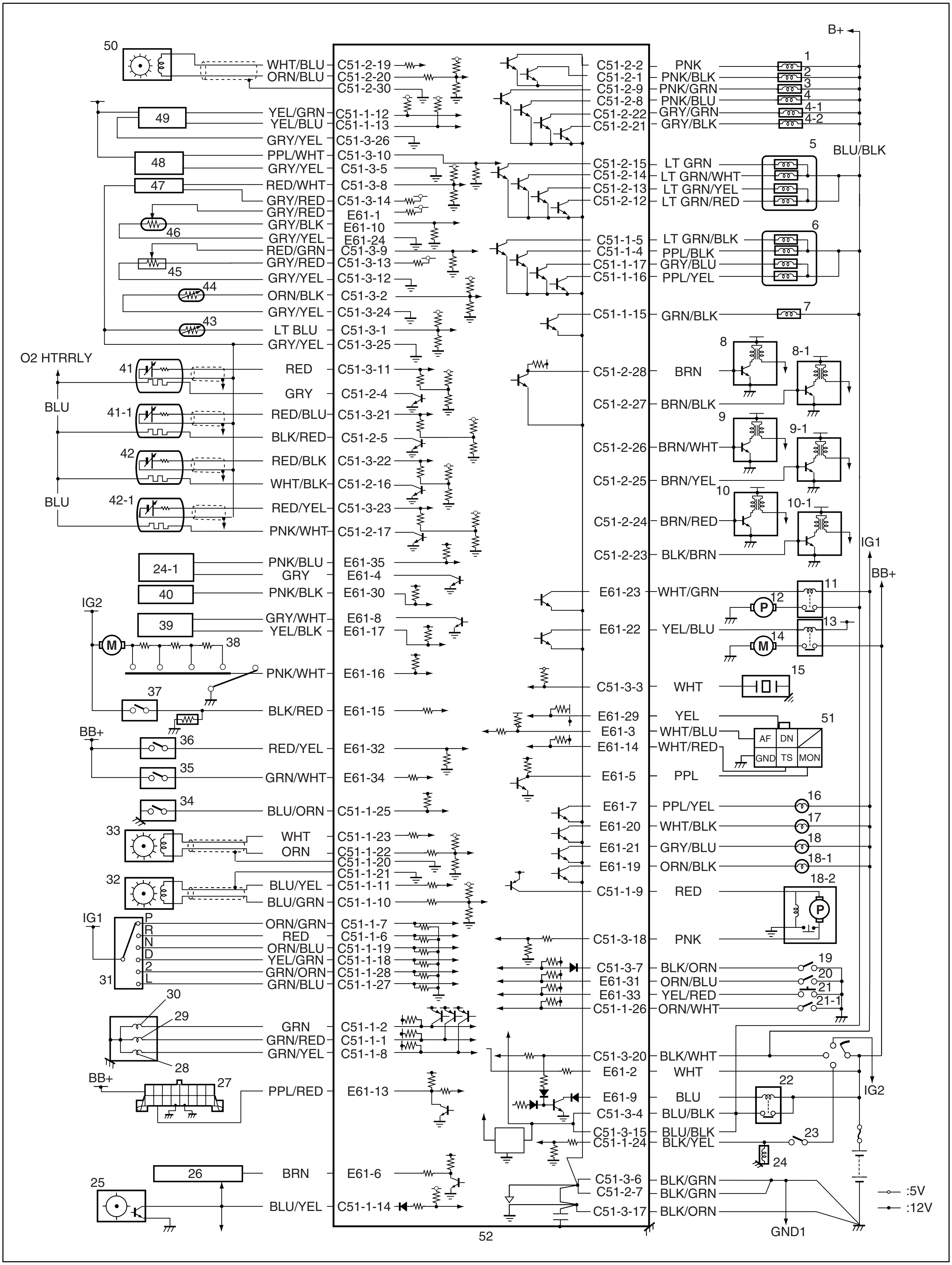
  Also, with A/T model, PCM controls A/T.



INFORMATION SENSORS	CONTROLLED DEVICES	OTHERS
1. IAT sensor	a : A/C condenser fan motor relay (if equipped)	A : Main fuse box
2. MAP sensor (if equipped)	b : Ignition coil assemblies	B : ECM (PCM)
3. Heated oxygen sensor (sensor 1) (if equipped)	c : EVAP canister purge valve	C : Data link connector
4. ECT sensor	d : EGR valve (if equipped)	D : Combination meter
5. TP sensor	e : Idle air control valve	E : Fuse box
6. MAF sensor	f : Injectors	F : EVAP canister
7. Camshaft position sensor (CMP sensor)	g : Malfunction indicator lamp	
8. ABS control module	h : Fuel pump relay	
9. Crankshaft position sensor (CKP sensor) (if equipped)	i : Main relay	
10. Power steering pressure switch (PSP switch)	j : Oxygen sensor heater relay (if equipped)	
11. CO adjusting resistor (if equipped)		
12. Monitor connector (if equipped)		
13. Transmission range switch (A/T)		
14. Knock sensor		

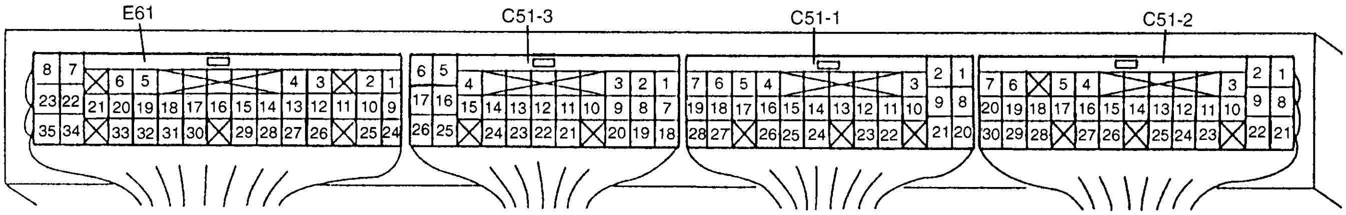
NOTE:

Above figure shows left-hand steering vehicle. For right-hand steering vehicle, parts with (*) are installed at the side of symmetry.



B+
50
WHT/BLU C51-2-19
ORN/BLU C51-2-20
C51-2-30
49
YEL/GRN C51-1-12
YEL/BLU C51-1-13
GRY/YEL C51-3-26
48
PPL/WHT C51-3-10
GRY/YEL C51-3-5
47
RED/WHT C51-3-8
GRY/RED C51-3-14
GRY/RED E61-1
GRY/BLK E61-10
46
GRY/YEL E61-24
RED/GRN C51-3-9
GRY/RED C51-3-13
45
GRY/YEL C51-3-12
44
ORN/BLK C51-3-2
GRY/YEL C51-3-24
43
LT BLU C51-3-1
GRY/YEL C51-3-25
O2 HTRRLY
41
RED C51-3-11
GRY C51-2-4
BLU
41-1
RED/BLU C51-3-21
BLK/RED C51-2-5
42
RED/BLK C51-3-22
WHT/BLK C51-2-16
BLU
42-1
RED/YEL C51-3-23
PNK/WHT C51-2-17
24-1
PNK/BLU E61-35
GRY E61-4
40
PNK/BLK E61-30
IG2
39
GRY/WHT E61-8
YEL/BLK E61-17
38
PNK/WHT E61-16
37
BLK/RED E61-15
BB+
36
RED/YEL E61-32
35
GRN/WHT E61-34
34
BLU/ORN C51-1-25
33
WHT C51-1-23
ORN C51-1-22
C51-1-20
C51-1-21
32
BLU/YEL C51-1-11
BLU/GRN C51-1-10
IG1
P
R
N
D
2
L
31
ORN/GRN C51-1-7
RED C51-1-6
ORN/BLU C51-1-19
YEL/GRN C51-1-18
GRN/ORN C51-1-28
GRN/BLU C51-1-27
30
29
GRN C51-1-2
GRN/RED C51-1-1
GRN/YEL C51-1-8
28
BB+
27
PPL/RED E61-13
26
BRN E61-6
25
BLU/YEL C51-1-14
52
C51-2-2 PNK 1
C51-2-1 PNK/BLK 2
C51-2-9 PNK/GRN 3
C51-2-8 PNK/BLU 4
C51-2-22 GRY/GRN 4-1
C51-2-21 GRY/BLK 4-2
5
BLU/BLK
C51-2-15 LT GRN
C51-2-14 LT GRN/WHT
C51-2-13 LT GRN/YEL
C51-2-12 LT GRN/RED
6
C51-1-5 LT GRN/BLK
C51-1-4 PPL/BLK
C51-1-17 GRY/BLU
C51-1-16 PPL/YEL
C51-1-15 GRN/BLK 7
8
8-1
C51-2-28 BRN
C51-2-27 BRN/BLK
9
9-1
C51-2-26 BRN/WHT
C51-2-25 BRN/YEL
10
10-1
C51-2-24 BRN/RED
C51-2-23 BLK/BRN
IG1
BB+
E61-23 WHT/GRN 11
12
E61-22 YEL/BLU 13
14
C51-3-3 WHT 15
E61-29 YEL
E61-3 WHT/BLU
E61-14 WHT/RED
51
AF DN
GND TS MON
E61-5 PPL
E61-7 PPL/YEL 16
E61-20 WHT/BLK 17
E61-21 GRY/BLU 18
E61-19 ORN/BLK 18-1
C51-1-9 RED 18-2
C51-3-18 PNK
C51-3-7 BLK/ORN 19
E61-31 ORN/BLU 20
E61-33 YEL/RED 21
C51-1-26 ORN/WHT 21-1
C51-3-20 BLK/WHT
E61-2 WHT
E61-9 BLU 22
C51-3-4 BLU/BLK
IG2
C51-3-15 BLU/BLK 23
C51-1-24 BLK/YEL
24
C51-3-6 BLK/GRN
C51-2-7 BLK/GRN
C51-3-17 BLK/ORN
GND1
:5V
:12V

TERMINAL ARRANGEMENT OF ECM (PCM) CONNECTOR (VIEWED FROM HARNESS SIDE)



1.	Fuel injector No.1	17.	"O/D OFF" lamp (A/T)	34.	Power steering pressure switch
2.	Fuel injector No.2	18.	"POWER" lamp (A/T)	35.	Stop lamp switch (Brake pedal switch)
3.	Fuel injector No.3	18-1.	"4WD" lamp (4WD)	36.	Lighting switch
4.	Fuel injector No.4	18-2.	4WD air pump assembly (4WD)	37.	Rear defogger switch (if equipped)
4-1.	Fuel injector No.5	19.	4WD switch (4WD)	38.	Heater blower motor (if equipped)
4-2.	Fuel injector No.6	20.	Power/Normal change switch (A/T)	39.	A/C control module (amplifier)
5.	EGR valve (if equipped)	21.	O/D cut switch (A/T)	40.	ABS control module
6.	Idle air control	21-1.	4WD low switch (4WD)	41.	Heated oxygen sensor-1 (Bank1) (if equipped)
7.	EVAP canister purge valve	22.	Main relay	41-1.	Heated oxygen sensor-1 (Bank2) (if equipped)
8.	Ignition coil for No.1	23.	Transmission range switch (Park/Neutral Position Switch) or clutch pedal position switch	42.	Heater oxygen sensor-2 (Bank1) (if equipped)
8-1.	Ignition coil for No.2	24.	Starter magnetic switch	42-1.	Heater oxygen sensor-2 (Bank2) (if equipped)
9.	Ignition coil for No.3	24-1.	Cruise control module (if equipped)	43.	Intake air temp. sensor
9-1.	Ignition coil for No.4	25.	Vehicle speed sensor	44.	Engine coolant temp. sensor
10.	Ignition coil for No.5	26.	Combination meter	45.	Throttle position sensor
10-1.	Ignition coil for No.6	27.	Data link connector	46.	CO adjusting resistor (if equipped)
11.	Fuel pump relay	28.	TCC solenoid (A/T)	47.	Manifold absolute pressure sensor (if equipped)
12.	Fuel pump	29.	Shift solenoid-B (A/T)	48.	Mass air flow sensor
13.	A/C condenser fan relay (if equipped)	30.	Shift solenoid-A (A/T)	49.	Camshaft position sensor
14.	A/C condenser fan motor (if equipped)	31.	Transmission range switch (sensor) (A/T)	50.	Crankshaft position sensor (if equipped)
15.	Knock sensor	32.	A/T input speed sensor (A/T)	51.	Monitor connector (if equipped)
16.	Malfunction indicator lamp	33.	A/T vehicle (output) speed sensor (A/T)	52.	Engine control module (Powertrain control module)

TERMINAL	CIRCUIT	TERMINAL	CIRCUIT	TERMINAL	CIRCUIT
E61-1	Power source for CO adjusting resistor (if equipped)	E61-13	Data link connector	E61-25	—
E61-2	Power source for back up	E61-14	Test switch terminal (if equipped)	E61-26	—
E61-3	—	E61-15	Rear defogger switch (if equipped)	E61-27	—
E61-4	Cruise control module (Throttle opening signal)	E61-16	Heater blower switch	E61-28	—
E61-5	Duty output terminal (if equipped)	E61-17	A/C signal (if equipped)	E61-29	Diag. switch terminal (if equipped)
E61-6	Tachometer	E61-18	—	E61-30	ABS control module (if equipped)
E61-7	MIL ("SERVICE INGINE SOON" lamp)	E61-19	"4WD" lamp	E61-31	Power/Normal change switch (A/T)
E61-8	A/C cut signal (if equipped)	E61-20	"O/D OFF" lamp (A/T)	E61-32	Lighting switch
E61-9	Main relay	E61-21	"POWER" lamp (A/T)	E61-33	O/D cut switch (A/T)
E61-10	CO adjusting resistor (if equipped)	E61-22	A/C fan motor relay (if equipped)	E61-34	Stop lamp switch (Brake pedal switch)
E61-11	—	E61-23	Fuel pump relay	E61-35	Cruise control module (if equipped)
E61-12	—	E61-24	Ground for CO adjusting resistor (if equipped)		

TERMINAL	CIRCUIT	TERMINAL	CIRCUIT	TERMINAL	CIRCUIT
C51-3-1	Intake air temp. (IAT) sensor	C51-3-13	Power source for TP sensor	C51-3-25	Ground for IAT sensor, MAP sensor and oxygen sensor (if equipped)
C51-3-2	Engine coolant temp. (ECT) sensor	C51-3-14	Power source for MAP sensor (if equipped)	C51-3-26	Ground for CMP sensor
C51-3-3	Knock sensor	C51-3-15	Power source		
C51-3-4	Power source	C51-3-16	—		
C51-3-5	Ground for MAF sensor	C51-3-17	Ground		
C51-3-6	Ground	C51-3-18	Pressure switch in 4WD air pump assembly		
C51-3-7	4WD switch	C51-3-19	—		
C51-3-8	Manifold absolute pressure (MAP) sensor (if equipped)	C51-3-20	Ignition switch		
C51-3-9	Throttle position (TP) sensor	C51-3-21	Heated oxygen sensor-1 (Bank2) (if equipped)		
C51-3-10	Mass air flow (MAF) sensor	C51-3-22	Heated oxygen sensor-2 (Bank1) (if equipped)		
C51-3-11	Heated oxygen sensor-1 (Bank1) (if equipped)	C51-3-23	Heated oxygen sensor-2 (Bank2) (if equipped)		
C51-3-12	Ground for TP sensor	C51-3-24	Ground for ECT sensor		

TERMINAL	CIRCUIT	TERMINAL	CIRCUIT	TERMINAL	CIRCUIT
C51-1-1	Shift solenoid-B (A/T)	C51-1-13	CMP sensor	C51-1-25	Power steering pressure switch
C51-1-2	Shift solenoid-A (A/T)	C51-1-14	Vehicle speed sensor	C51-1-26	4WD Low switch
C51-1-3	—	C51-1-15	EVAP canister purge valve	C51-1-27	Transmission range switch “L” (A/T)
C51-1-4	IAC valve (stepper motor coil 2)	C51-1-16	IAC valve (stepper motor coil 4)	C51-1-28	Transmission range switch “2” (A/T)
C51-1-5	IAC valve (stepper motor coil 1)	C51-1-17	IAC valve (stepper motor coil 3)		
C51-1-6	Transmission range switch “R” (A/T)	C51-1-18	Transmission range switch “D” (A/T)		
C51-1-7	Transmission range switch “P” (A/T)	C51-1-19	Transmission range switch “N” (A/T)		
C51-1-8	TCC solenoid (A/T)	C51-1-20	Shield wire ground for A/T output speed sensor		
C51-1-9	4WD air pump assembly	C51-1-21	Shield wire ground for A/T input speed sensor		
C51-1-10	A/T input speed sensor (–)	C51-1-22	A/T output speed sensor (–)		
C51-1-11	A/T input speed sensor (+)	C51-1-23	A/T output speed sensor (+)		
C51-1-12	CMP sensor	C51-1-24	Engine start signal		

TERMINAL	CIRCUIT	TERMINAL	CIRCUIT	TERMINAL	CIRCUIT
C51-2-1	Fuel injector No.2	C51-2-13	EGR valve (stepper motor coil 3) (if equipped)	C51-2-25	Ignition coil assembly for No.4
C51-2-2	Fuel injector No.1	C51-2-14	EGR valve (stepper motor coil 2) (if equipped)	C51-2-26	Ignition coil assembly for No.3
C51-2-3	—	C51-2-15	EGR valve (stepper motor coil 1) (if equipped)	C51-2-27	Ignition coil assembly for No.2
C51-2-4	Heater of HO2S-1 (Bank1) (if equipped)	C51-2-16	Heater of HO2S-2 (Bank1) (if equipped)	C51-2-28	Ignition coil assembly for No.1
C51-2-5	Heater of HO2S-1 (Bank2) (if equipped)	C51-2-17	Heater of HO2S-2 (Bank2) (if equipped)	C51-2-29	—
C51-2-6	—	C51-2-18	—	C51-2-30	Ground for CKP sensor shield wire (if equipped)
C51-2-7	Ground	C51-2-19	CKP sensor (+) (if equipped)		
C51-2-8	Fuel injector No.4	C51-2-20	CKP sensor (–) (if equipped)		
C51-2-9	Fuel injector No.3	C51-2-21	Fuel injector No.6		
C51-2-10	—	C51-2-22	Fuel injector No.5		
C51-2-11	—	C51-2-23	Ignition coil assembly for No.6		
C51-2-12	EGR valve (stepper motor coil 4) (if equipped)	C51-2-24	Ignition coil assembly for No.5		

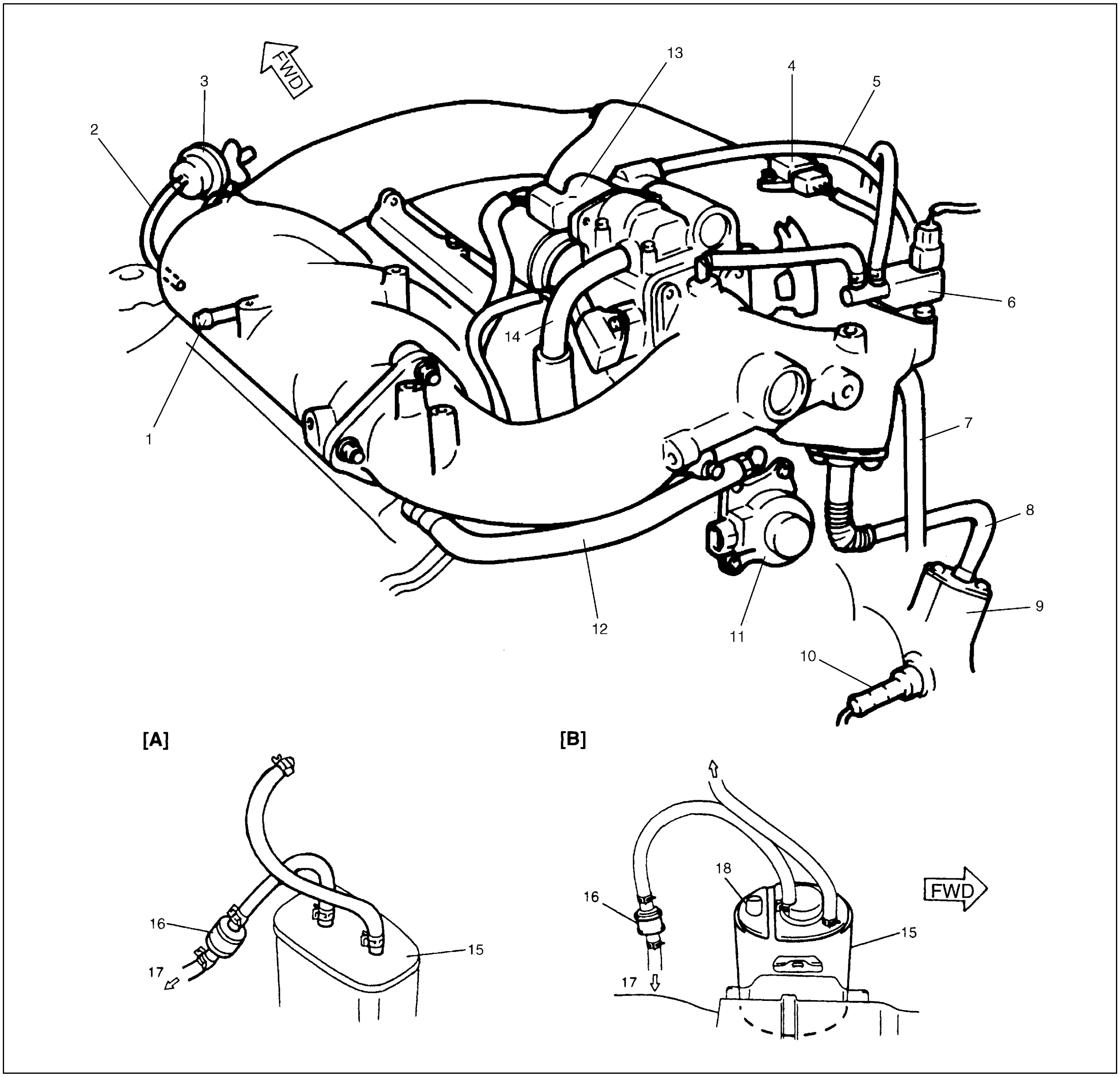
Engine and Emission Control Input/Output Table

Function	Output \ Input	CMP sensor	MAF sensor	TP sensor	ECT sensor	IAT sensor	HO2S (sensor 1)(if equipped)	VSS	Blower fan switch	Rear defogger switch	PSP switch	Ignition switch	Starter switch	A/C amplifier (if equipped)	TR switch (A/T VEHICLE)	Light switch	Knock sensor	CO adjusting resistor (if equipped)	Test swich terminal (Vehicle with monitor connector)	Diag. swich terminal (Vehicle with monitor connector)	Brake switch (A/T VEHICLE)	ABS control module
Main relay control	Main relay											○										
Fuel pump control	Fuel pump relay	○										○	○									
Injection control	Injectors	○	○	○	○		○						○					○			○	
Idle air control	IAC valve	○	○	○	○	○		○	○	○	○			○	○	○						○
Ignition control	Ignition coil with igniter	○	○		○	○							○				○		○			
MIL control	MIL	○	○	○	○	○	○	○					○				○			○		
EVAP purge control	EVAP canister purge valve	○	○	○	○			○														
EGR control	EGR valve (if equipped)	○	○	○	○	○		○														
HO2S heater control	HO2S (if equipped)	○	○																			
A/C control	A/C amplifier (if equipped)	○		○	○								○	○								
A/C condensor fan control	A/C condensor fan relay (if equipped)				○									○								

Diagnosis

Refer to Section 6-1.

On-Vehicle Service

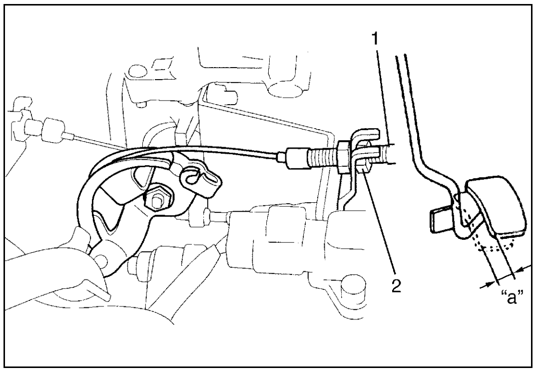


1. Brake booster hose pipe	8. EGR pipe (if equipped)	15. EVAP canister
2. Vacuum hose for fuel pressure regulator	9. Exhaust manifold	16. Tank pressure control valve
3. Fuel pressure regulator	10. Heated oxygen sensor	17. To fuel tank
4. MAP sensor (if equipped)	11. EGR valve (if equipped)	18. Cap
5. Engine coolant hose	12. PCV hose	[A]: Vehicle without monitor connector
6. EVAP canister purge valve	13. IAC valve	[B]: Vehicle with monitor connector
7. Breather hose	14. IAC hose	

General

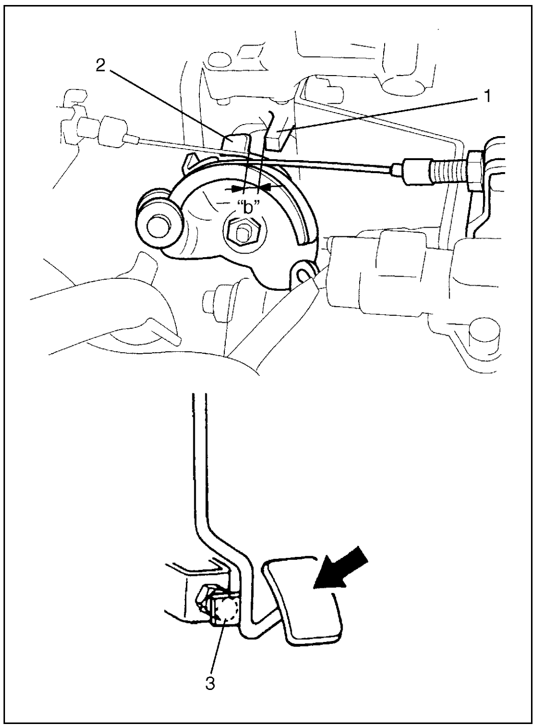
When hoses are disconnected and system components are removed for service, reinstall components properly, and route and connect hoses correctly after service. Refer to figure on previous page for proper routing of hoses.

Accelerator Cable Adjustment



1) With throttle valve closed, check accelerator pedal play which should be within following specification.
   If measured value is out of specification, adjust accelerator cable (1) to specification with cable adjusting nut (2).

Accelerator pedal play "a":
2 – 5 mm (0.08 – 0.20 in.)

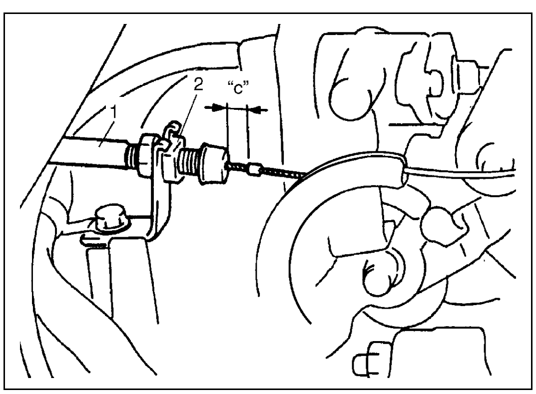


2) With accelerator pedal depressed fully, check clearance between throttle lever (2) and lever stopper (1) (throttle body) which should be within following specification.
   If measured value is out of specification, adjust it to specification by changing height of pedal stopper bolt (3).

Clearance "b" between throttle lever and lever stopper (throttle body) (with accelerator pedal depressed fully):
0.5 – 2.0 mm (0.02 – 0.07 in.)

A/T Throttle Cable Adjustment (A/T Vehicle)

1) Make sure that accelerator cable is adjusted as specified.



2) With throttle valve closed, check clearance "c" which should be within the following specification.
   If it is out of specification, adjust A/T throttle cable (1) by turning cable adjusting nut (2).

A/T throttle cable installing position specification clearance "c":
0.8 – 1.5 mm (0.03 – 0.06 in.)

Idle Speed/Idle Air Control (IAC) Duty Inspection

Before idle speed/IAC duty check, make sure of the following.

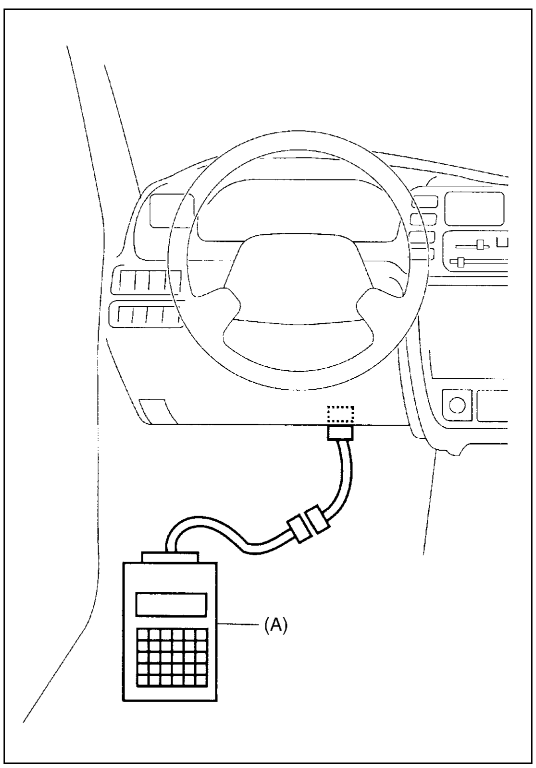
- Lead wires and hoses of engine/emission control systems are connected securely.
- Accelerator cable is adjusted.
- Ignition timing is within specification.
- All accessories (wipers, heater, lights, A/C, etc.) are out of service.
- Air cleaner has been properly installed and is in good condition.
- ECM (PCM) does not detect any malfunction DTC.

After above items are all confirmed, check idle speed and IAC duty as follows.

NOTE:

Before starting engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T vehicle), and set parking brake and block drive wheels.

[Using SUZUKI scan tool]



1) Connect SUZUKI scan tool to DLC with ignition switch OFF.

Special tool
(A) : SUZUKI scan tool

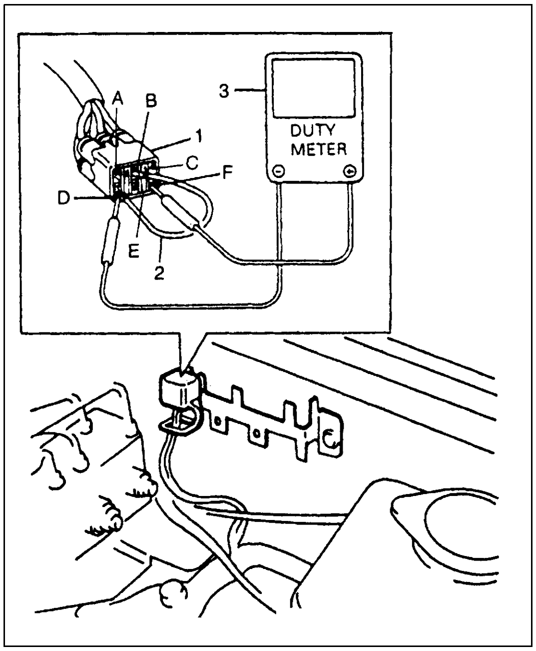
2) Warm up engine to normal operating temperature.
3) Check IAC duty and idle speed by using "Data List" mode of SUZUKI scan tool.

Engine idle speed:
A/C OFF: 700 ± 50 r/min.
A/C ON: 750 ± 50 r/min.

IAC duty at specified idle speed:
5 – 40 % (at A/C OFF)

4) If duty and/or idle speed is out of specifications, check idle air control system referring to "DIAG. FLOW TABLE B-4" in Section 6-1.
5) Check that specified engine idle speed is obtained with A/C ON if vehicle is equipped with A/C. If not, check A/C ON signal circuit and idle air control system.

[Not using SUZUKI scan tool] (vehicle with monitor connector)



1) Disconnect scan tool from DLC if connected.
2) Warm up engine to normal operating temperature.
3) Stop engine and connect duty meter (3) between duty output terminal and ground terminal of monitor connector (1).
4) Using service wire (2), ground diagnosis switch terminal in monitor connector.
5) Set tachometer.
6) Start engine and warm it up completely.
7) Check IAC duty and idle air control system referring to Diagnostic Flow Table B-4 “IDLE AIR CONTROL SYSTEM CHECK” in this section.

A:	Output duty select switch terminal
B:	Diagnosis switch terminal
C:	Blank
D:	Ground terminal
E:	Test switch terminal
F:	Duty output terminal

	A/C OFF	A/C ON
Engine idle speed:	700 ± 50 r/min.	750 ± 50 r/min.
IAC duty at specified idle speed:	5 – 40 % (0.7 – 5.6 V when battery voltage is 14 V)	–

NOTE:

IAC duty can be checked roughly by using voltmeter. I AC duty to voltage relation is as follows.

ON DUTY METER INDICATION (%)	OFF DUTY INDICATION (%)	VOLT METER INDICATION (V)
0	10	0
50	50	0.5 x VB
100	0	VB

- “OFF DUTY METER” is such duty meter that indicates approx. 100% when terminal voltage is approx. “0 V”.
- “VB” represents battery voltage while engine of vehicle being checked is running.

8) Remove service wire from monitor connector.
9) Install cap to monitor connector.
10) Check that specified engine idle speed is obtained with A/C ON if vehicle is equipped with A/C.
    If not, check A/C ON signal circuit and idle air control system.

Idle mixture inspection/adjustment (vehicle without heated oxygen sensor)

All vehicles not equipped with heated oxygen sensor are shipped with their CO % factory adjusted as follows.

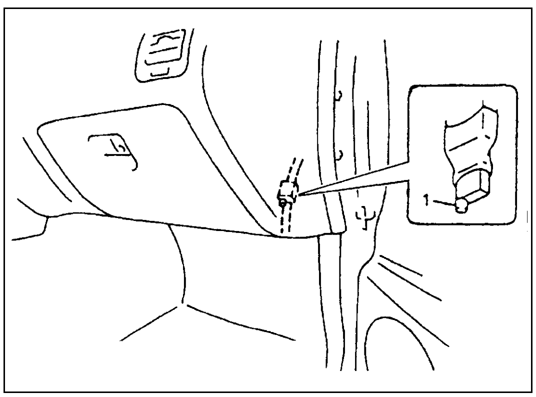
Engine idle mixture (CO %)
0.8 – 1.3 % at specified idle speed

Idle mixture adjustment should never be changed from the original factory setting. However, if during diagnosis, the check indicates idle mixture to be the cause of a driver performance complaint or emission failure, the idle mixture can be adjusted using the following procedures.

NOTE:

For this inspection and adjustment, exhaust gas tester (CO meter) and engine tachometer are necessary.

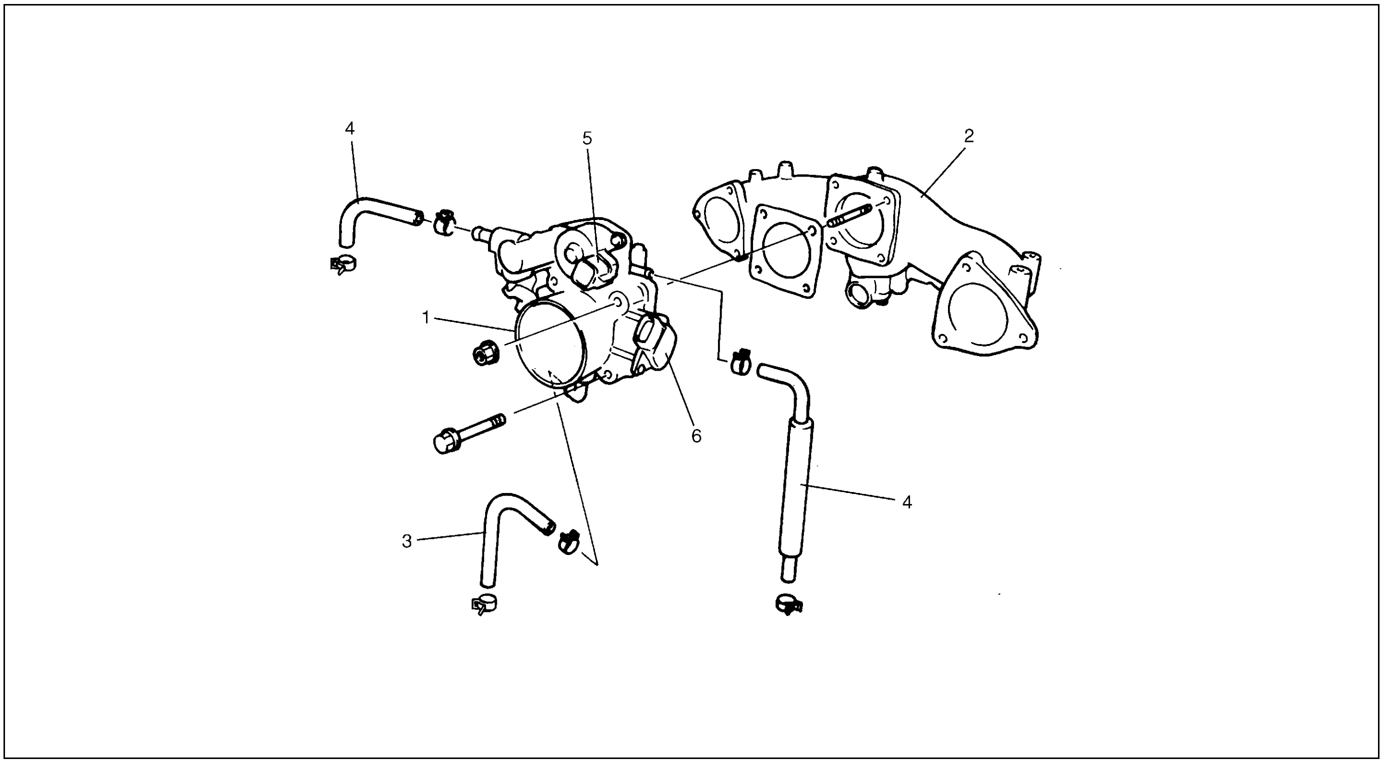
1) Check idle speed according to “Idle Speed/Idle Air Control Duty Inspection” in this section.
2) Using exhaust gas tester, check that idle mixture CO % is within above specification. If it is out of specification, adjust it to specification by turning resistor knob (1).



3) If idle mixture has been adjusted, confirm that idle speed is within specification.

Air Intake System

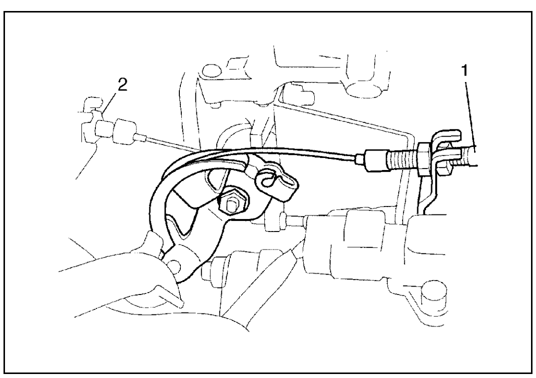
Throttle body



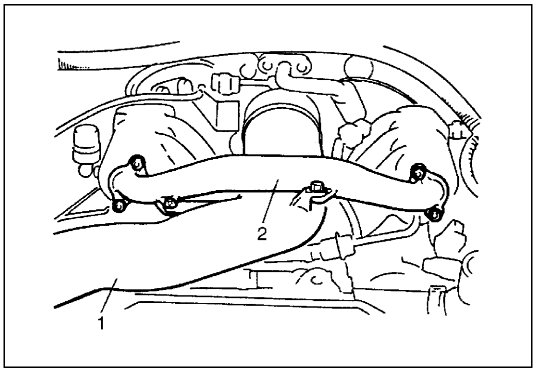
1. Throttle body	4. Water hose
2. Intake collector	5. MAF sensor
3. Breather hose	6. TP sensor

REMOVAL

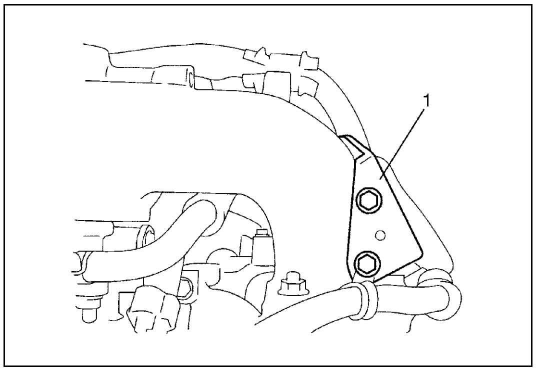
1) Disconnect negative (–) cable at battery.
2) Drain cooling system.
3) Remove strut tower bar.



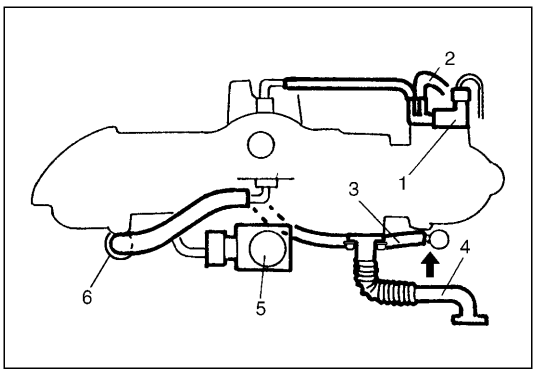
4) Disconnect accelerator cable (1) and or A/T throttle cable (2) from throttle body.
5) Disconnect water hoses from throttle body.



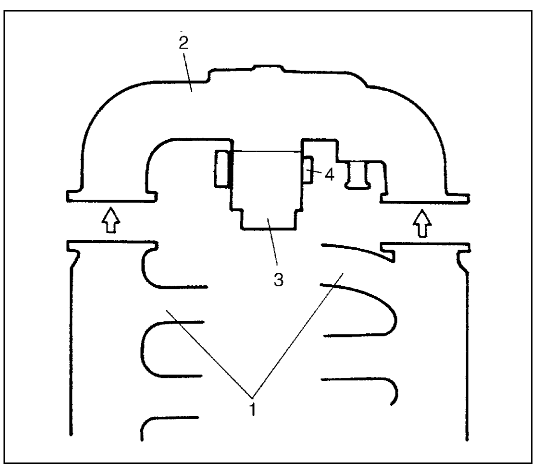
6) Remove surge tank cover.
   Remove intake air pipe (1) and surge tank pipe (2).



7) Disconnect connectors of TP sensor and IAC valve.
8) Disconnect ground wire at connector.
9) Remove clamp bracket (1) and harness clamps from intake collector.



10) Disconnect connectors of EVAP canister purge valve (1), MAP sensor and EGR valve (5).
11) Disconnect PCV valve (6) from cylinder head with hose connected, breather hose (3) from cylinder head and EVAP canister purge valve hose (2).
12) Detach EGR pipe (4) from intake air collector.



13) Remove throttle body (3) and intake collector (2) from intake manifold (1).
14) Disconnect hoses of PCV from throttle body.
15) Remove throttle body from intake collector.

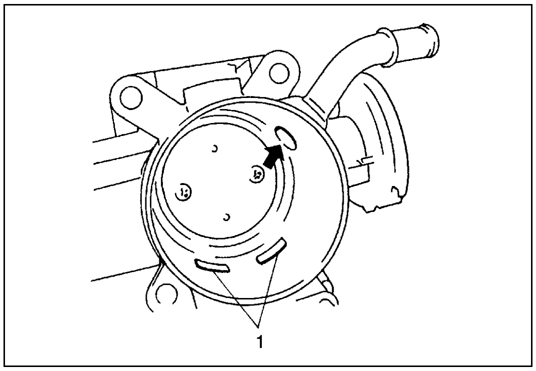
NOTE:

- **TP sensor (4), or other components containing rubber must not be placed in a solvent or cleaner bath. 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.**

CLEANING

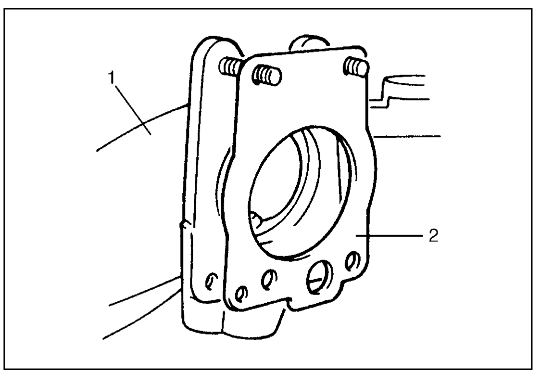
CAUTION:

- **Do not blow compressed air through bypass air passage with IAC valve installed to throttle body. This will cause IAC valve to malfunction.**
- **TP sensor, idle air control valve or other components containing rubber must not be places in a solvent or cleaner bath.**
  A chemical reaction will cause these parts to swell, harden or get distorted.

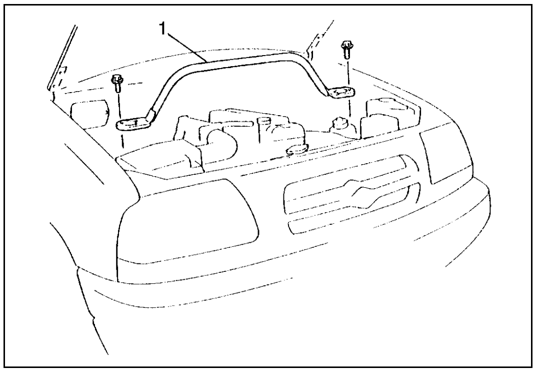


Clean throttle body bore and bypass air passages (1) by blowing compressed air.

INSTALLATION



1) Clean mating surfaces and install throttle body gasket to intake collector (1) with new gasket (2).
2) Install throttle body to intake collector and tighten bolts.
3) Connect PCV hose.
4) Install throttle body and intake collector to intake manifold with new intake collector gaskets.
5) Install EGR pipe with new gaskets.
6) Connect breather hose and EVAP canister purge valve hose and install PCV valve to cylinder head.
7) Connect connectors of EVAP canister purge valve, MAP sensor and EGR valve.
   Fix wire harness with clamps.
8) Install clamp bracket to intake collector.
9) Connect ground wire connector.
10) Connect connectors of TP sensor, ground and IAC valve.
11) Install surge tank pipe to intake manifold with new gaskets and intake air pipe to throttle body. Install surge tank cover.
12) Connect engine coolant hoses to throttle body.
13) Connect accelerator cable and A/T throttle cable (A/T).



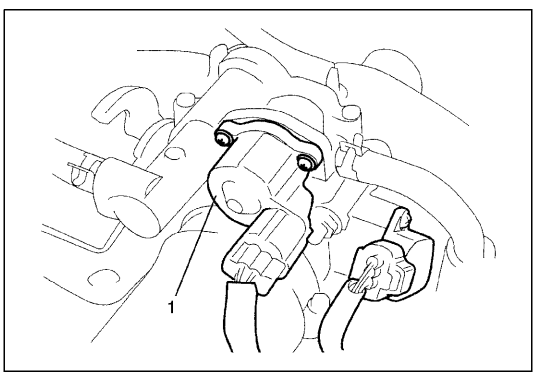
14) Install strut tower bar (1) and tighten bolts.

15) Refill cooling system.
16) Connect negative (–) cable at battery.
17) Adjust accelerator cable and A/T throttle cable, refer to "ACCELERATOR CABLE ADJUSTMENT" and "A/T THROTTLE CABLE ADJUSTMENT" in this section.

Idle air control valve (IAC valve)

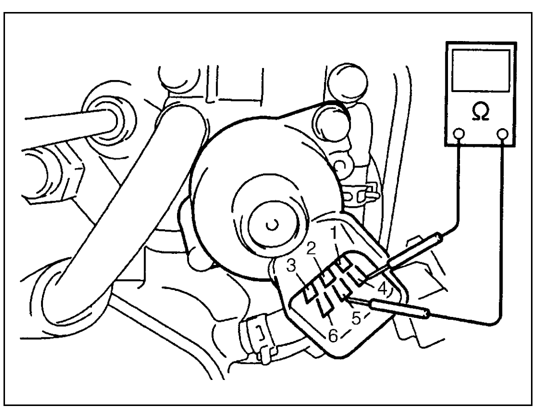
REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disconnect IAC valve connector.



3) Remove IAC valve (1) from throttle body.

INSPECTION

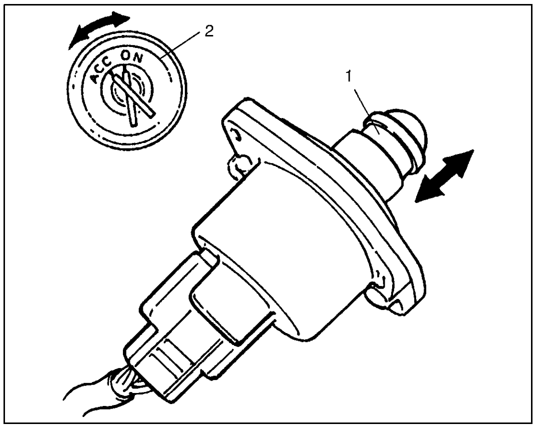


1) Disconnect connector from IAC valve.
2) Check each coil of IAC valve for resistance.
   If resistances is out of specification, replace.

IAC valve resistance:

Terminals	Resistance
Between "1" and "2"	25.5 - 33.5 Ω
Between "3" and "2"	
Between "4" and "5"	
Between "6" and "5"	

3) Remove air cleaner outlet hose and remove IAC valve from throttle body.
4) Connect connector to IAC valve.

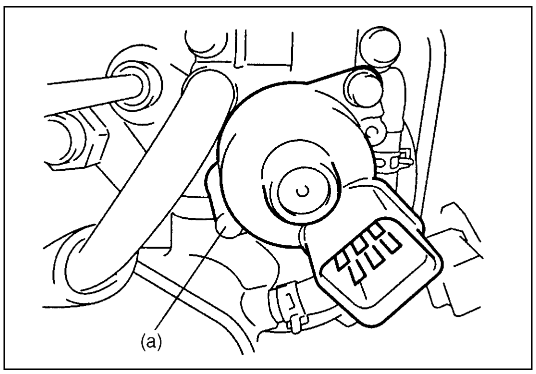


5) Check that plunger (1) of IAC valve moves once and then stops as soon as ignition switch (2) is turned OFF after cranking engine for 2 sec.
   If plunger (1) of IAC valve does not operate at all, check wire harnesses for open and short. If wire harnesses are in good condition, replace IAC valve and recheck.

NOTE:

This check should be performed by two people, one person operates ignition switch while the other checks plunger operation.

INSTALLATION



1) Install new O-ring to throttle body.
2) Install IAC valve to throttle body.
3) Tighten IAC valve screws to specified torque.

Tightening torque
IAC valve screw (a) : 3.5N·m (0.35 kg-m, 2.5 lb-ft)

4) Connect IAC valve connector securely.
5) Connect negative (–) cable to battery.

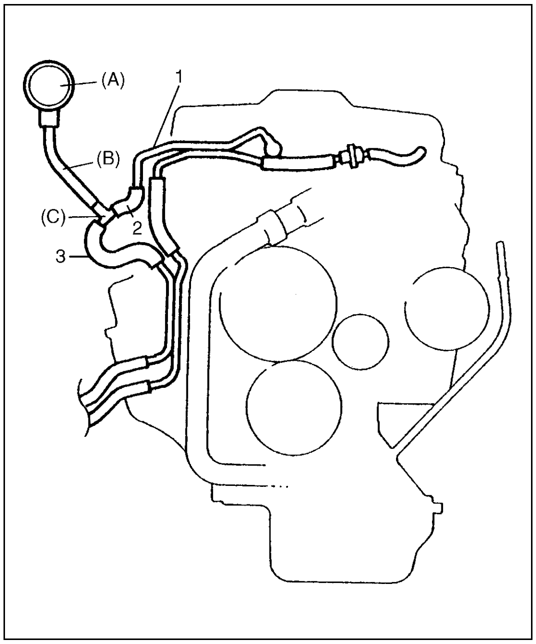
Fast idle air valve

1) Disconnect IAC valve coupler with ignition switch OFF.
2) Check that with cold engine started, as cooling water temperature rises, engine idle speed reduces gradually.
   If check result is as described above, fast idle air valve is in good condition.
   If not, fast idle air valve, air passage or coolant passage is faulty.

Fuel Delivery System

Fuel pressure inspection

1) Relieve fuel pressure in fuel feed line referring to “FUEL PRESSURE RELIEF PROCEDURE” in Section 6-1.
2) Disconnect fuel feed hose from (3) delivery fuel feed pipe (1).



CAUTION:
A small amount of fuel may be released when fuel feed hose is removed. 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.

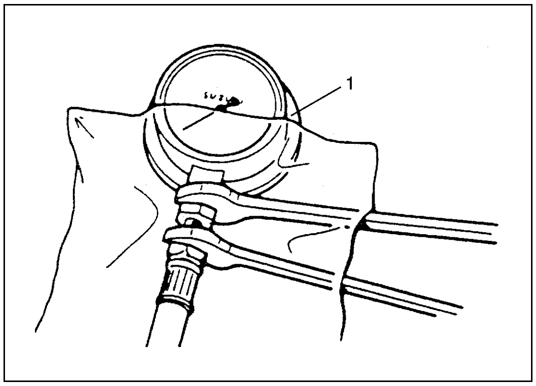
3) Connect special tools and hose (2) between fuel feed hose and fuel feed pipe as shown in figure, and clamp hose securely to ensure no leaks occur during checking.

Special tool
(A) : 09912-58441
(B) : 09912-58431
(C) : 09912-58490

4) Check that battery voltage is above 11 V.
5) 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.
6) Start engine.
7) Measure fuel pressure at idling.
If measure pressure doesn’t satisfy specification, refer to “Diagnostic Flow Table B-3” in Section 6-1 and check each possibly defective part. Replace if found defective.

Fuel pressure specification:

CONDITION	FUEL PRESSURE
With fuel pump operating and engine stopped	**270 – 310 kPa 2.7 – 3.1 kg/cm^2 38.4 – 44.0 psi**
At specified idle speed	**210 – 260 kPa 2.1 – 2.6 kg/cm^2 29.8 – 37.0 psi**
With 1 min. after engine (fuel pump) stop (Pressure reduces as time passes)	**over 200 kPa 2.0 kg cm^2 28.4 psi**



8) After checking fuel pressure, remove fuel pressure gauge (1).

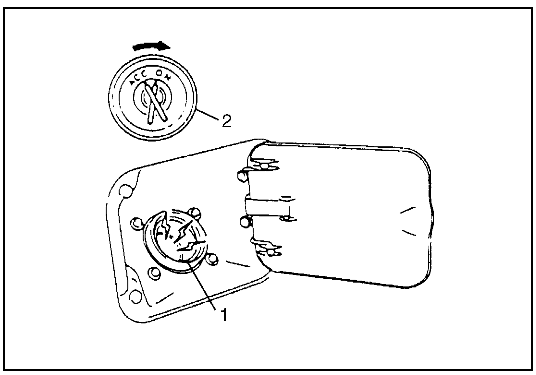
CAUTION:
As fuel feed line is still under high fuel pressure, make sure to release fuel pressure according to following procedures.
- **Place fuel container under joint.**
- **Cover joint with rag and loosen joint nut slowly to release fuel pressure gradually.**

9) Remove fuel pressure gauge, hose and 3-way joint.
10) Connect fuel feed hose and clamp it securely.
11) With engine "OFF" and ignition switch "ON", check for fuel leaks.

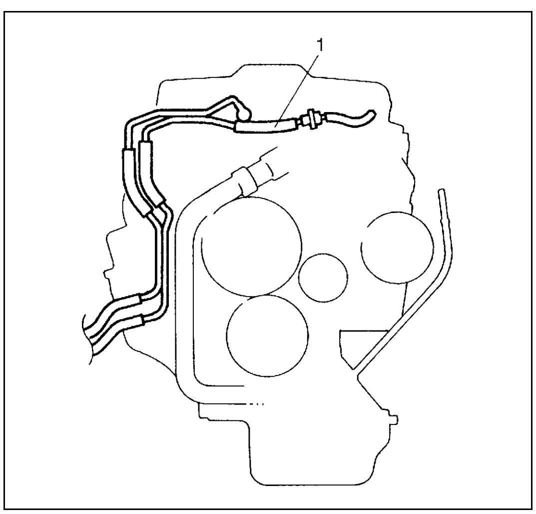
Fuel pump

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.



1) Remove filler cap and turn ON ignition switch (2). Then fuel pump operating sound should be heard from fuel filler (1) 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 Section 6-1



2) Fuel pressure should be felt at fuel return hose (1) for 3 seconds after ignition switch ON.
If fuel pressure is not felt, advance to "DIAGNOSTIC FLOW TABLE B-3" in Section 6-1.

REMOVAL

Remove fuel tank from body according to procedure described in Section 6C and remove fuel pump from fuel tank.

INSPECTION

Check fuel pump filter for evidence of dirt and contamination. If present, clean and check for presence of dirt in fuel tank.

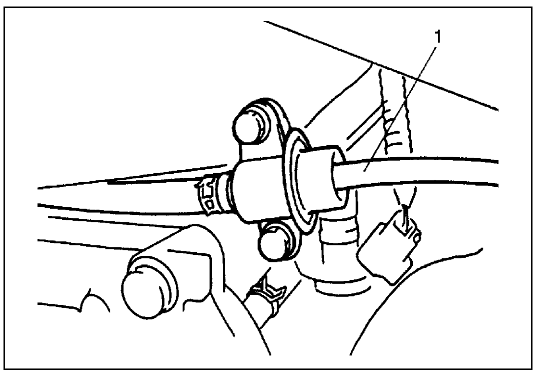
INSTALLATION

Install fuel pump to fuel tank and then install fuel tank to body according to procedure described in "Section 6C".

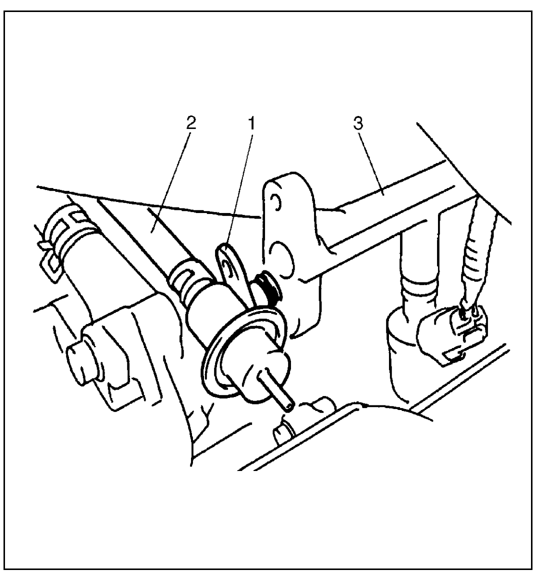
Fuel pressure regulator

REMOVAL

1) Relieve fuel pressure in fuel feed line referring to "FUEL PRESSURE RELIEF PROCEDURE" in Section 6-1.
2) Disconnect negative (–) cable from battery.



3) Disconnect vacuum hose (1) from fuel pressure regulator.



4) Remove fuel pressure regulator (1) from fuel delivery pipe (3).

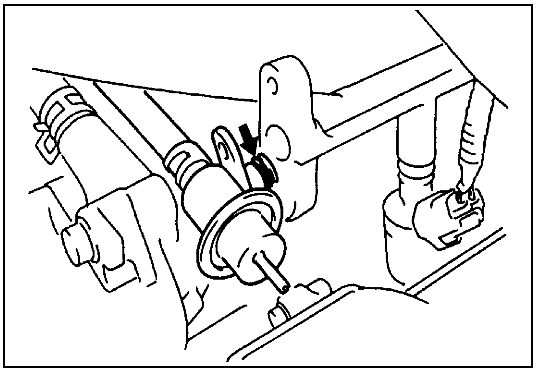
CAUTION:
A small amount of fuel may be released when it is from delivery pipe.
Place a shop cloth under delivery pipe so that released fuel is absorbed in it.

5) Disconnect fuel return hose (2) from fuel pressure regulator.

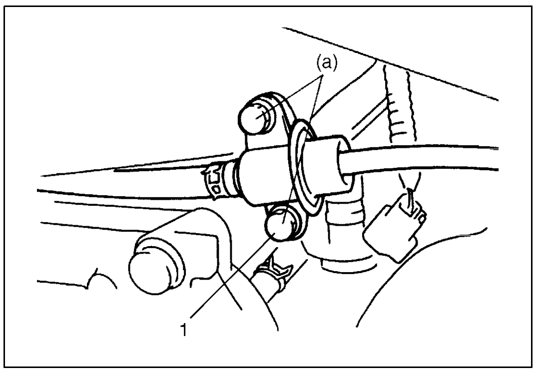
CAUTION:
A small amount of fuel may be released when hose is disconnected. Cover hose to be disconnected with a shop cloth.

INSTALLATION

For installation, reverse removal procedure and note the followings.



- Use new O-ring.
- Apply thin coat of gasoline to O-ring to facilitate installation.



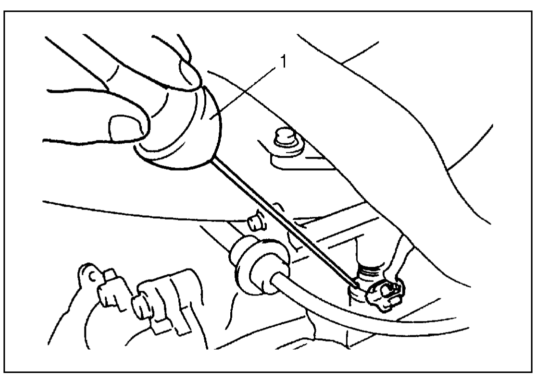
- Tighten fuel pressure regulator (1) bolts to specified torque.

Tightening torque
Fuel pressure regulator bolt
(a) : 10 N·m (1.0 kg-m, 7.5 lb-ft)

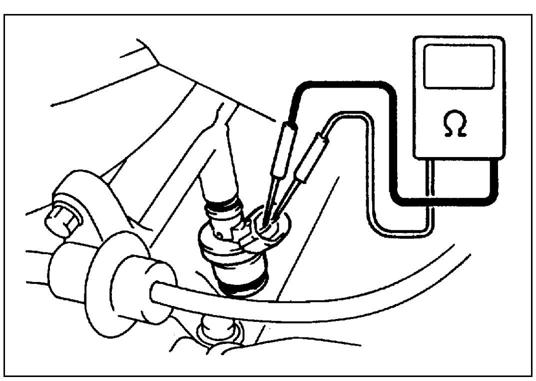
- With engine “OFF” and ignition switch “ON”, check for fuel leaks around fuel line connection.

Fuel injector

ON-VEHICLE INSPECTION



1) Using sound scope (1) 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.



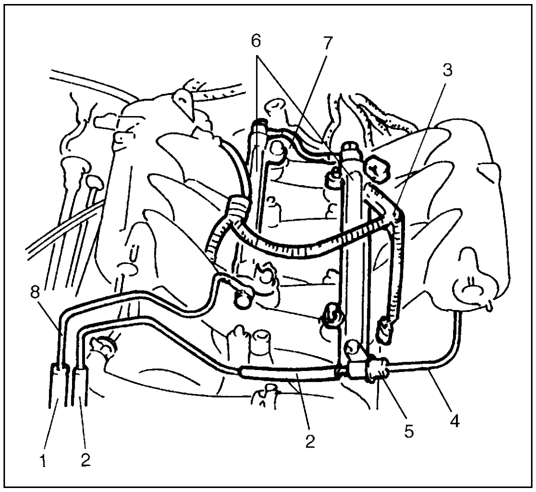
2) Disconnect connector from injector, connect ohmmeter between terminals of injector and check resistance.
   If resistance is out of specification, replace.

Fuel injector resistance:
14.2 – 14.8 Ω (at 20°C, 68°F)

3) Connect connector to injector securely.

REMOVAL

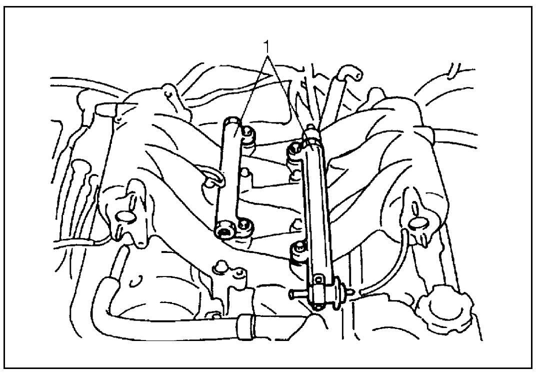
1) Relieve fuel pressure in fuel feed line referring to "FUEL PRESSURE RELIEF PROCEDURE" in Section 6-1.
2) Remove throttle body intake collector, refer to "THROTTLE BODY" in this section.



3) Disconnect fuel feed hose (1) and fuel return hose (2).
4) Disconnect vacuum hose (4) and fuel return hose from fuel pressure regulator (5).
5) Remove fuel feed pipe (8) and fuel connect pipe (7) from delivery pipes (6) (right and left).

> **CAUTION:**
> **A small amount of fuel may be released when it is from delivery pipe.**
> **Place a shop cloth under delivery pipe so that released fuel is absorbed in it.**

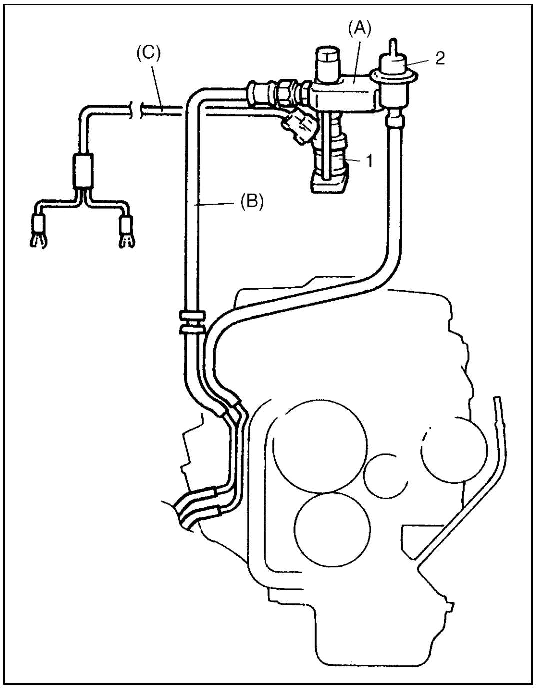
6) Disconnect connector (3) from each injector.



7) Remove delivery pipes (1) (right and left) from intake manifold.
8) Remove fuel injector(s).

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.**



1) Install injector (1) and fuel pressure regulator (2) to special tool (injector checking tool).

NOTE:

Remove grommet from injector, then install injector to special tool and tighten bolts by hand.

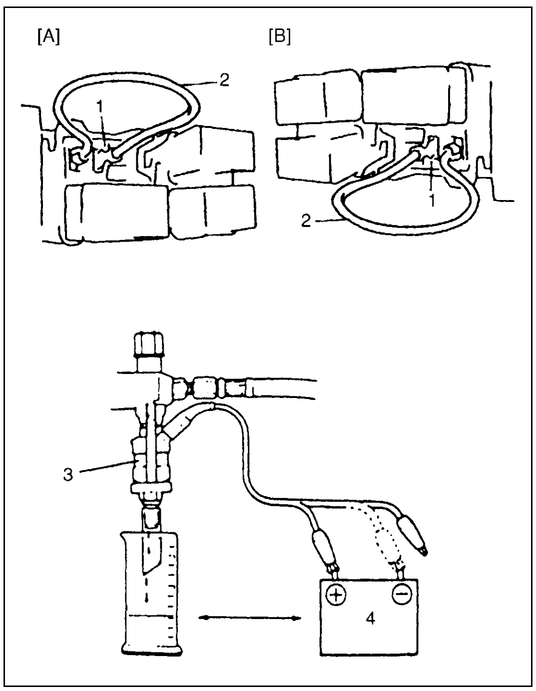
Special tool
(A) : 09912-58421

2) Connect special tools (hoses and attachment) to pipes of vehicle.

Special tool
(B) : 09912-58431

3) Connect special tool (test lead) to injector.

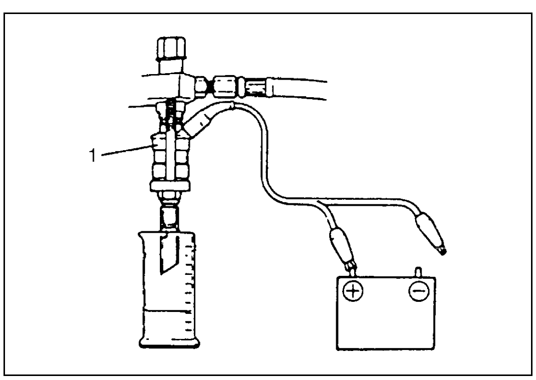
Special tool
(C) : 09930-88521



4) Install suitable vinyl tube onto injector (3) nozzle to prevent fuel from splashing out when injecting.
5) Put graduated cylinder under injector as far apart as possible.
6) Disconnect fuel pump relay.
7) To operate fuel pump and apply fuel pressure to injector, using wire harness (2) as thick as the one used for fuel pump circuit, connect two terminals of relay connector (1) as shown in the figure.
8) Apply battery (4) 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:
56 – 60 cc/15 sec. (1.89/1.97 – 2.02/2.11 US/Imp. oz/15 sec.)

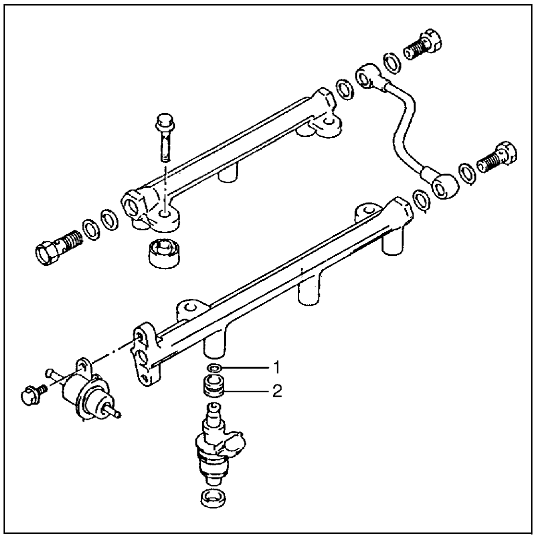
[A]:	Left-hand steering vehicle
[B]:	Right-hand steering vehicle



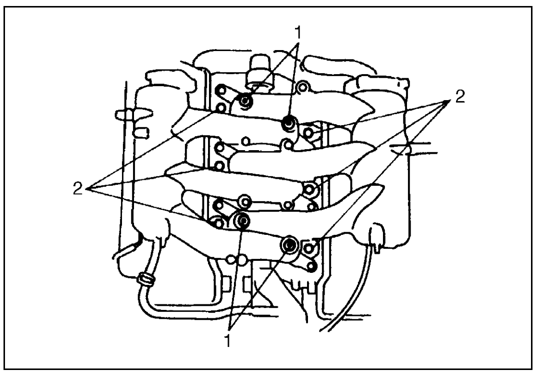
9) Check fuel leakage from injector (1) nozzle. Do not operate injector for this check (but fuel pump should be at work). If fuel leaks more than following specifications, replace.

Fuel leakage:
Less than 1 drop/min.

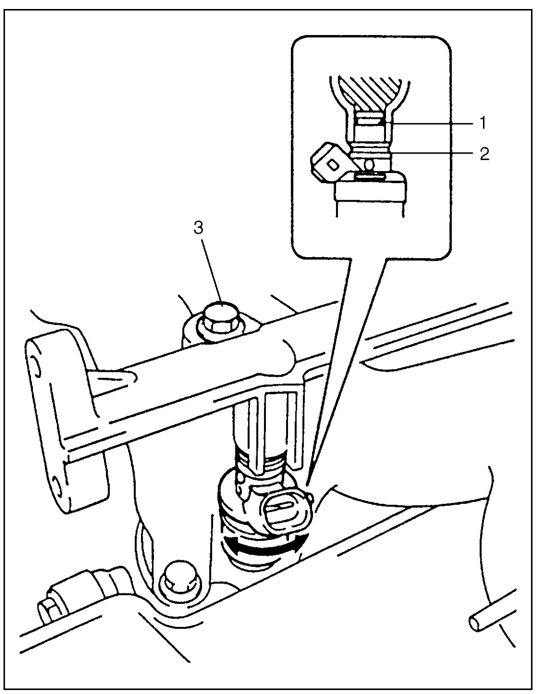
INSTALLATION



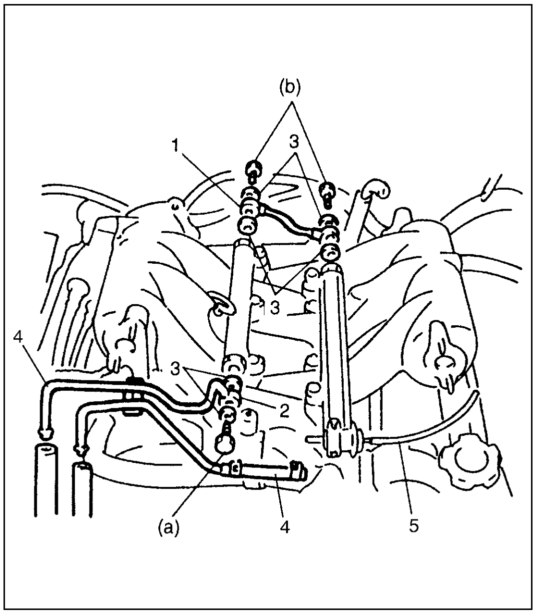
1) Replace injector O-ring (1) with new one using care not to damage it. Install grommet (2) to injector.



2) Check if insulator (1) is scored or damaged. If it is, replace with new one.
   Install insulators and cushions (2) to intake manifold.



3) Apply thin coat of fuel to O-rings (1) and then install injectors into delivery pipes (right and left) and intake manifold.
   Make sure that injectors rotate smoothly. If not, probable cause is incorrect installation of O-ring or grommet (2). Replace O-ring with new one.
4) Tighten delivery pipe bolts (3) and make sure that injectors rotate smoothly.



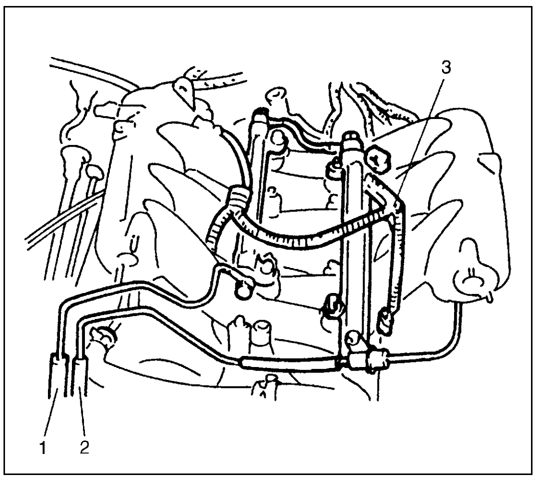
5) Install fuel connect pipe (1) and tighten union bolts to specified torque with new gaskets (3).

Tightening torque
Fuel connect pipe union bolt
(b) : 30 N·m (3.0 kg-m, 22.0 lb-ft)

6) Install fuel feed pipe (2) and tighten union bolt to specified torque with new gaskets.

Tightening torque
Fuel feed pipe union bolt
(a) : 30 N·m (3.0 kg-m, 22.0 lb-ft)

7) Connect vacuum hose (5) and fuel return hose (4) to fuel pressure regulator.



8) Connect fuel feed hose (1) and fuel return hose (2).
9) Connect connectors of injector wire (3) to injectors.
10) Install throttle body and intake collector, refer to “THROTTLE BODY” in this section.
11) With engine “OFF” and ignition switch “ON”, check for fuel leaks around fuel line connection.

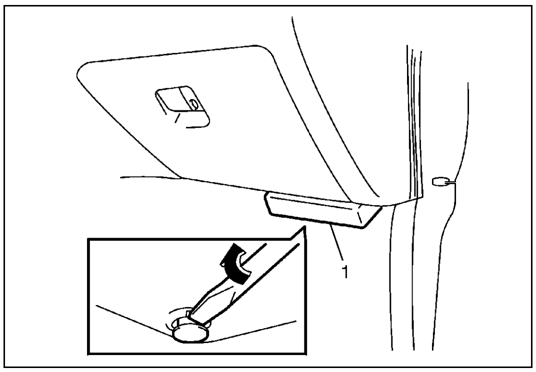
Electronic Control System

Engine control module (ECM)/powertrain control module (PCM)

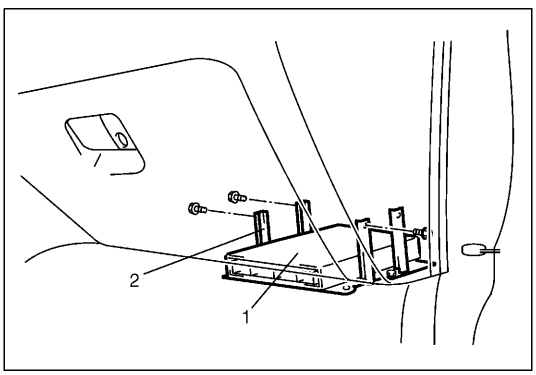
CAUTION:
As ECM (PCM) consists of precision parts, be careful not to expose it to excessive shock.

REMOVAL

1) Disconnect negative (–) cable from battery.
2) Disable air bag system (if equipped) referring to “DISABLING THE AIR BAG SYSTEM” in Section 10B.



3) Remove ECM (PCM) cover (1) from bracket.



4) Disconnect connectors from ECM (PCM) (1).
5) Remove ECM (PCM) (1) with bracket (2).

INSTALLATION

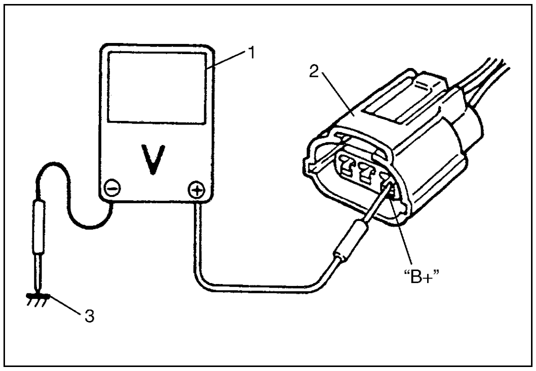
1) Install ECM (PCM) with bracket to vehicle.
2) Connect connectors to ECM (PCM) securely.
3) Install ECM (PCM) cover to bracket.
4) Enable air bag system (if equipped) referring to “ENABLING AIR BAG SYSTEM” in Section 10B.
5) Connect negative (–) cable to battery.

Mass air flow sensor (MAF sensor)

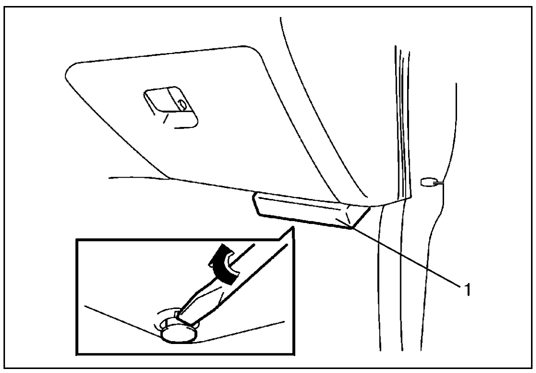
INSPECTION

NOTE:

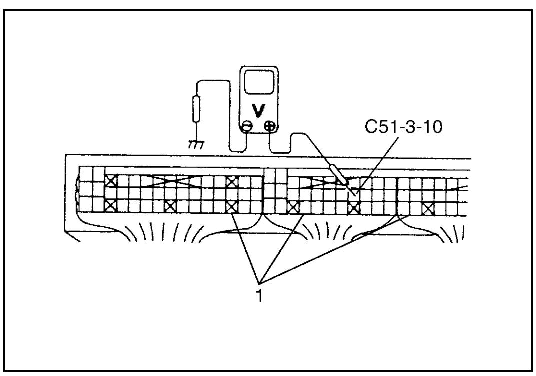
Use voltmeter with high-impedance (10 kΩ/V minimum) or digital type voltmeter.



1) Connect voltmeter (1) to "B+" terminal of MAF sensor (2) coupler disconnected and ground (3).
2) Turn ignition switch ON and check that voltage is battery voltage.If not, check if wire harness is open or connection is poor.



3) Turn ignition switch OFF and remove ECM/PCM cover (1) from bracket.

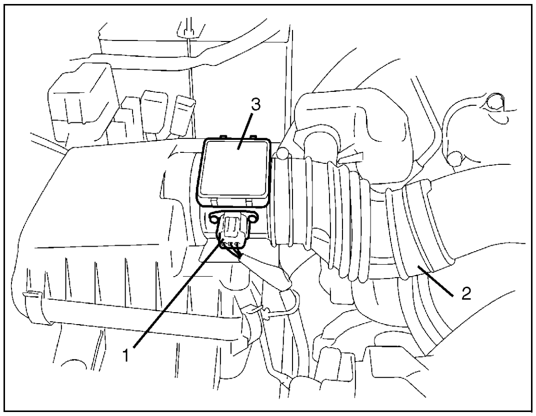


4) Connect MAF sensor coupler to MAF sensor.
5) Turn ignition switch ON and check voltage at MAF sensor output terminal of ECM/PCM connector (1).

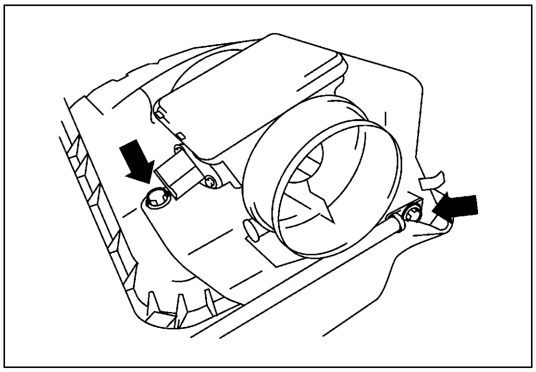
MAF sensor output voltage
Voltage: 1.0 - 1.6 V

6) Start engine and check that voltage is lower than 5 V and it rises as engine speed increases.
   (Reference data: 1.7 – 2.0 V at specified idle speed)
   If check result is not as specified above, cause may lie in wire harness, coupler connection, MAF sensor or ECM/PCM.

REMOVAL



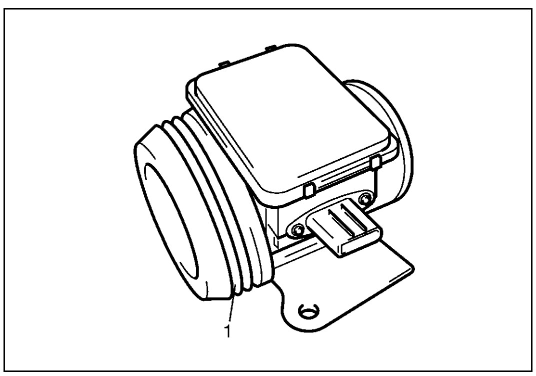
1) Disconnect negative (–) cable at battery and coupler (1) from MAF sensor (3).
2) Remove air cleaner outlet hose (2) from throttle body and MAF sensor (3).



3) Remove MAF sensor from air cleaner case.

CAUTION:
- **Don't disassemble MAF sensor.**
- **Do not expose MAF sensor to any shock.**
- **Do not blow compressed air by using air gun or the like.**
- **Do not put finger or any other object into MAF sensor. Malfunction may occur.**

INSTALLATION



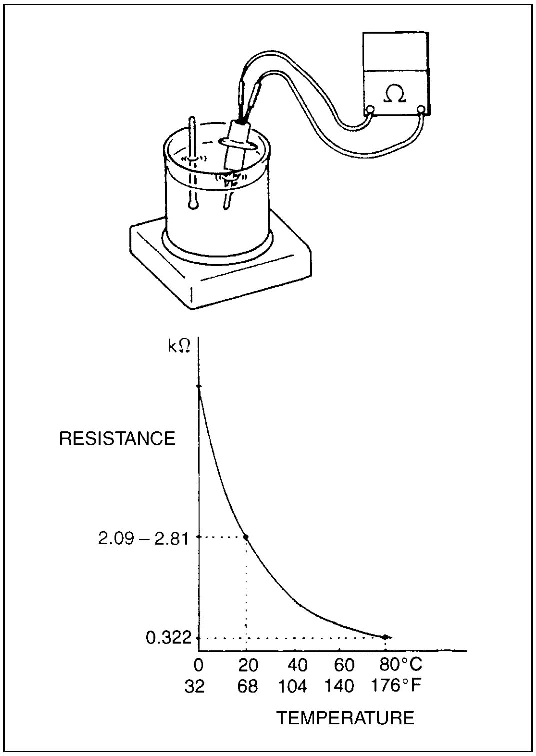
1) Check MAF sensor seal (1) for deterioration and damage.
2) Install MAF sensor to air cleaner case.
3) Install air cleaner outlet hose.
4) Connect MAF sensor coupler securely.
5) Connect negative (–) cable to battery.

Intake air temperature (IAT) sensor

REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disconnect IAT sensor coupler.
3) Remove IAT sensor from air cleaner case.

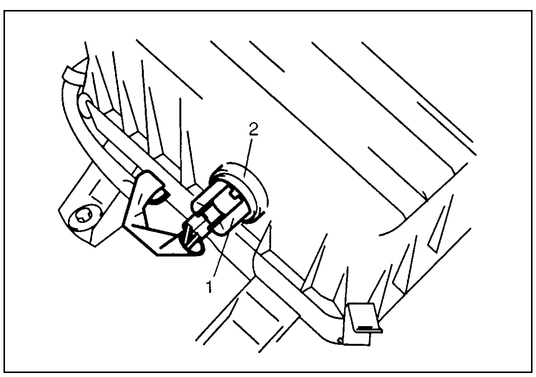
INSPECTION



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

If measured resistance doesn't show such characteristic as shown in the figure, replace IAT sensor.

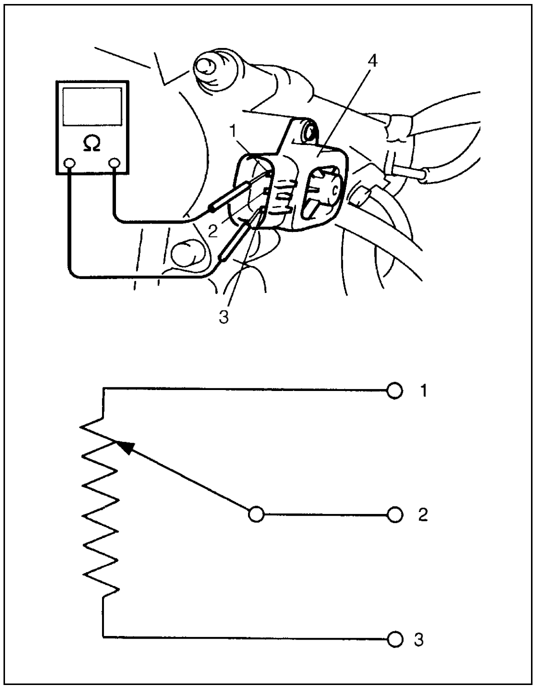
INSTALLATION



1) Clean mating surface of sensor and seal (2) on air cleaner case.
2) Install IAT sensor (1) into seal.
3) Connect connector to IAT sensor securely.

Throttle position sensor (TP sensor)

INSPECTION



1) Disconnect negative (–) cable at battery and coupler from TP sensor (4).
2) Using ohmmeter, check resistance between terminals under each condition given in table below.
   If check result is not satisfactory, replace TP sensor.

TP sensor specification:

TERMINALS	RESISTANCE
Between 1 and 3 terminals	**4.0 – 6.0 kΩ**
Between 1 and 2 terminals	**0.02 – 6.0 kΩ varying linearly according to throttle valve opening**

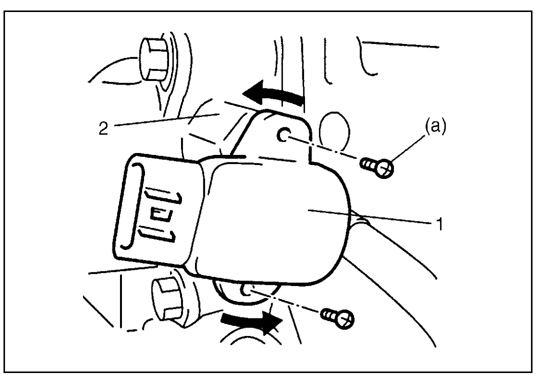
1.	Ground terminal
2.	Output voltage terminal
3.	Reference voltage terminal

3) Connect TP sensor coupler securely.
4) Connect negative cable to battery.

REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disconnect coupler from TP sensor.
3) Remove TP sensor from throttle body.

INSTALLATION



1) Install TP sensor (1) to throttle body (2).
   Fit TP sensor (1) to throttle body (2) in such way that its holes are a little away from TP sensor screw holes as shown in the figure and turn TP sensor (1) clockwise so that those holes align.

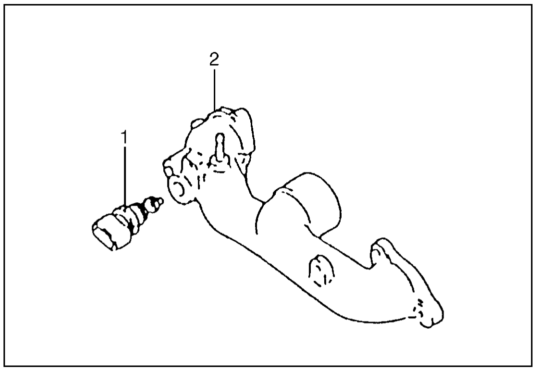
Tightening torque
TP sensor screw
(a) : 3.5 N·m (0.35 kg-m, 2.5 lb-ft)

2) Connect coupler to TP sensor securely.
3) Connect battery negative (–) cable to battery.

Engine coolant temperature sensor (ECT sensor)

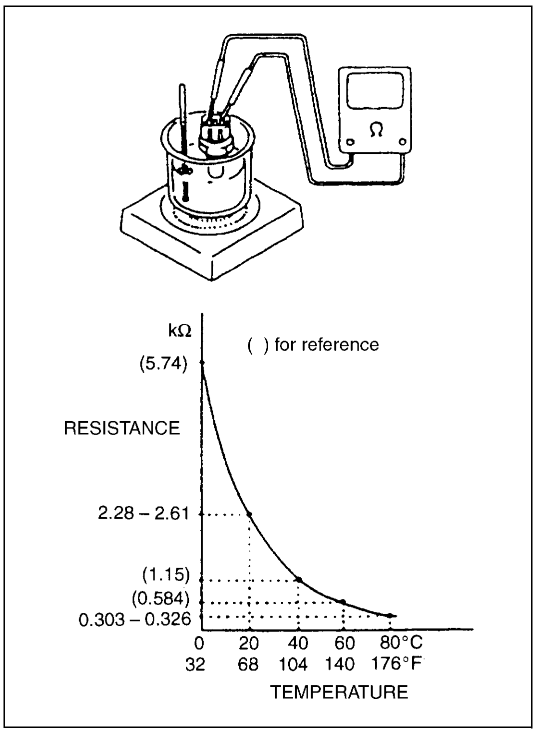
REMOVAL

1) Disconnect negative (–) cable from battery.
2) Drain cooling system.



3) Disconnect coupler from ECT sensor (1).
4) Remove ECT sensor from water outlet cap (2).

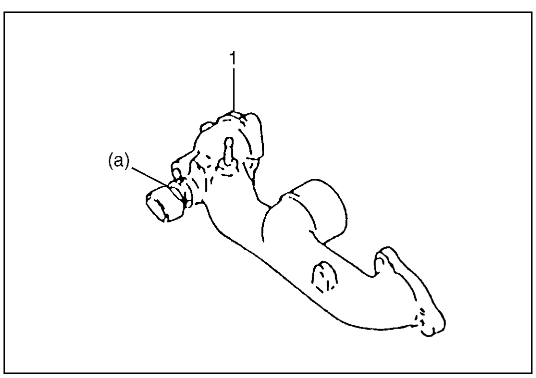
INSPECTION



Immerse temperature sensing part of ECT sensor in water and measure resistance between sensor terminals while heating water gradually.
If measured resistance doesn't shown such characteristic as shown in the figure, replace ECT sensor.

INSTALLATION

Reverse removal procedure noting the followings.



- Clean mating surfaces of sensor and water outlet cap (1).
- Use new O-ring.
- Tighten ECT sensor to specified torque.

Tightening torque
ECT sensor (a) : 15 N·m (1.5 kg-m, 11.0 lb-ft)

- Connect coupler to sensor securely.
- Refill cooling system.

Heated oxygen sensor (sensor 1)

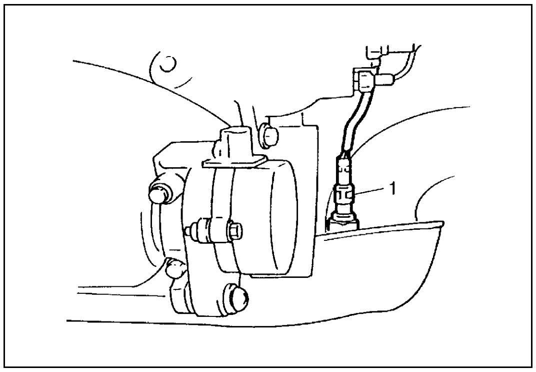
REMOVAL

> **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 (s).
3) Remove oxygen sensor (s) from exhaust manifold (s).

NOTE:

Be careful not to expose it to excessive shock.



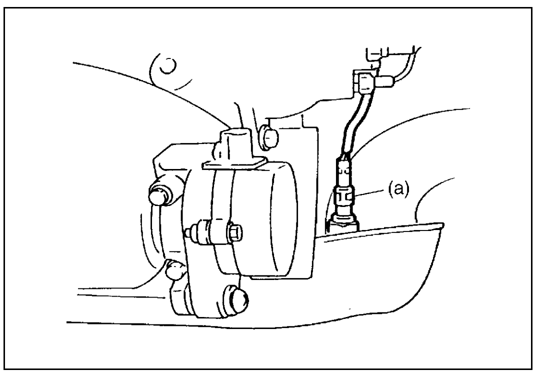
1. Left (No.1) bank oxygen sensor (sensor 1)

INSTALLATION

Reverse removal procedure noting the followings.

- Tighten oxygen sensor (s) to specified torque.

Tightening torque
Heated oxygen sensor 1
(a) : 45 N·m (4.5 kg-m, 32.5 lb-ft)

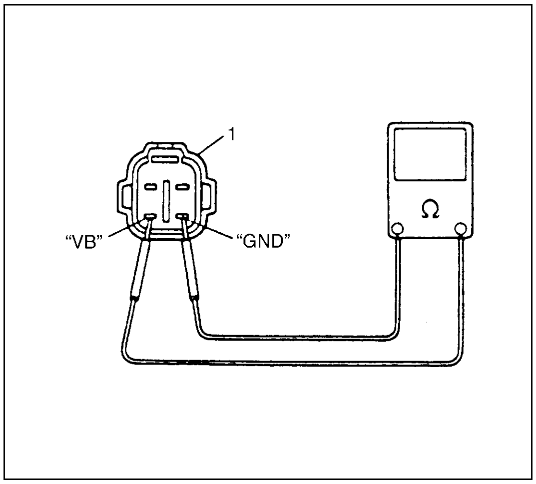


- Connect connector of oxygen sensor (s) and clamp wire harness securely.
- After installing oxygen sensor (s), start engine and check that no exhaust gas leakage exists.

INSPECTION

Inspect HO2S-1 and its circuit referring to “DTC P0130 or P0150 Diag. Flow Table” in Section 6-1. If malfunction is found, replace.

HEATER INSPECTION



1) Disconnect HO2S-1 or -2 coupler.
2) Using ohmmeter, measure resistance between terminals "VB" and "GND" of HO2S coupler (1).
   If found faulty, replace HO2S.

NOTE:

Temperature of HO2S affects resistance value largely. Make sure that HO2S heater is at correct temperature.

Resistance of HO2S heater:
11.7 – 14.3 Ω (at 20 °C (68 °F)) for HO2S-2
5.0 – 6.4 Ω (at 20 °C (68 °F)) for HO2S-1

3) Connect HO2S coupler securely.

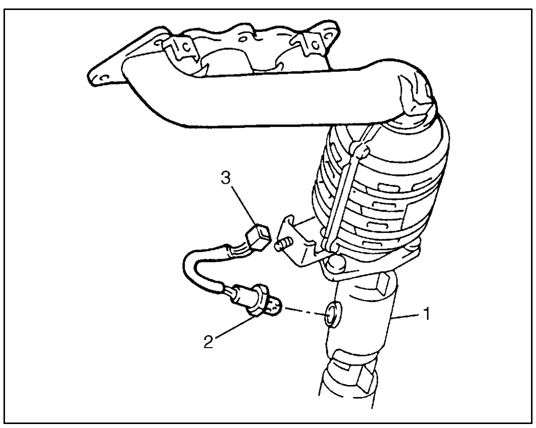
Heated oxygen sensor (sensor 2)

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.



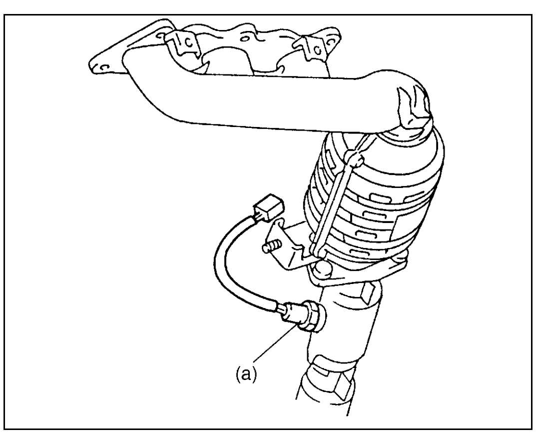
2) Disconnect coupler (3) of oxygen sensor(s).
3) Remove oxygen sensor(s) (2) from exhaust manifold(s) (1).

NOTE:

Be careful not to expose it to excessive shock.

INSTALLATION

Reverse removal procedure noting the followings.



- Tighten oxygen sensor(s) to specified torque.

Tightening torque
Heated oxygen sensor 2 (a) : 45 N·m (4.5 kg-m, 32.5 lb-ft)

- Connect connector of oxygen sensor(s) and clamp wire harness securely.
- After installing oxygen sensor(s), start engine and check that no exhaust gas leakage exists.

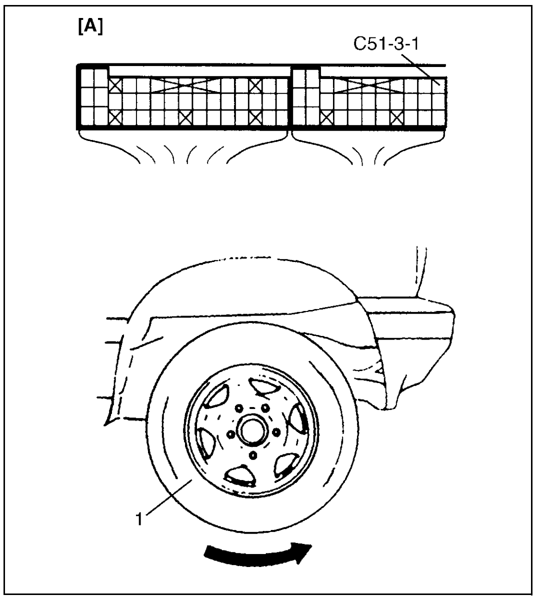
HEATER INSPECTION

Refer to “HEATED OXYGEN SENSOR (SENSOR 1) HEATER INSPECTION”

Vehicle speed sensor (VSS)

ON-VEHICLE INSPECTION

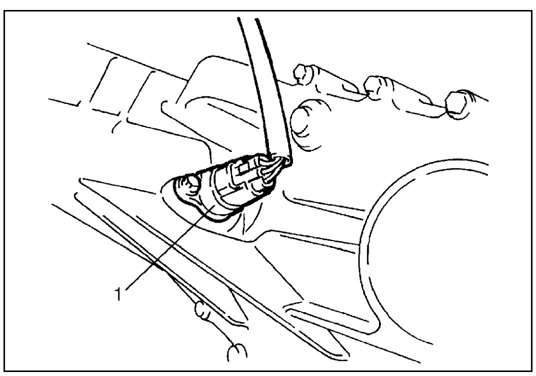
1) Hoist vehicle.
2) Release parking brake lever, set transmission in neutral and transfer in “2H”.
3) Remove ECM (PCM) cover.



4) Connector voltmeter between VSS terminal C51-3-1 of ECM (PCM) connector and body ground.
5) Turn ignition switch ON and turn rear right tire slowly with rear left tire locked.
   Voltmeter should indicate deflection between 0 – 1 V and 8 – 14 V a few times while tire (1) is turned one revolution.
   If check result is not satisfactory, proceed to flow table of “DTC P0500” in Section 6-1.

[A]: Terminal arrangement of ECM (PCM) coupler (viewed from harness side)

REMOVAL, INSPECTION AND INSTALLATION



Refer to “VSS Removal, Inspection or Installation” in Section 7D.

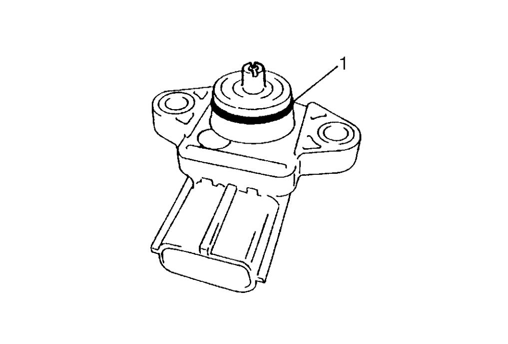
1. VSS

Manifold absolute pressure sensor

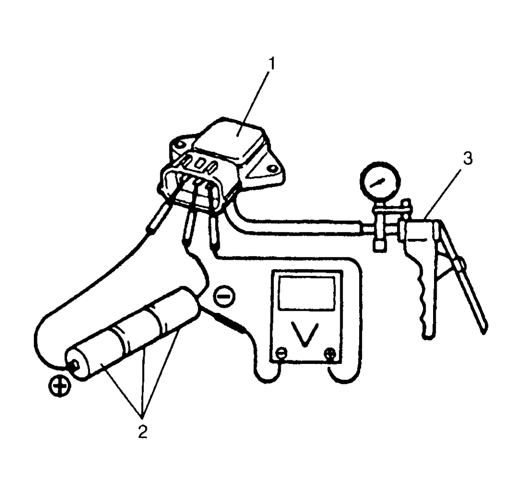
REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disconnect connector from manifold absolute pressure sensor.
3) Remove manifold absolute pressure sensor from intake manifold.

INSPECTION



1) Check sensor O-ring (1) for damage and deterioration. Replace as necessary.



2) Arrange 3 new 1.5 V batteries (2) in series and connect its positive terminal to “Vin” terminal of MAP sensor (1) and negative terminal to “Ground” terminal. Then check voltage between “Vout” and “Ground”.
   Also, check if voltage reduces when vacuum is slowly applied up to 400 mmHg by using vacuum pump (3).
   If check result is not satisfactory, replace manifold absolute pressure sensor.

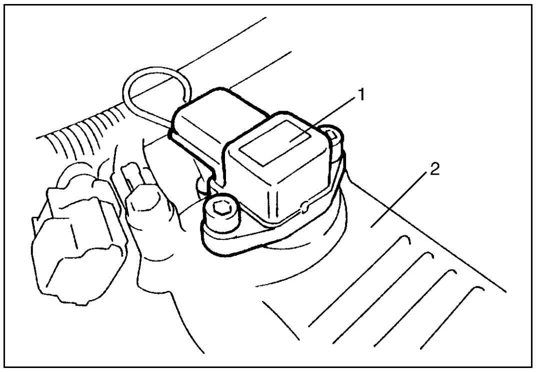
CAUTION:
As connection to wrong terminal will cause damage to manifold absolute pressure sensor, make absolutely sure to connect properly as shown in the figure.

MAP sensor output voltage (Vin voltage 4.5 – 5.5 V, ambient temp. 20 – 30°C (68 – 86°F))

ALTITUDE (Reference)		BAROMETRIC PRESSURE		OUTPUT VOLTAGE
(ft)	(m)	(mmHg)	(kPa)	(V)
0 – 2000	0 – 610	760 – 707	100 – 94	3.3 – 4.3
2001 – 5000	611 – 1524	Under 707 over 634	94 – 85	3.0 – 4.1
5001 – 8000	1525 – 2438	Under 634 over 567	85 – 76	2.7 – 3.7
8001 – 10000	2439 – 3048	Under 567 over 526	76 – 70	2.5 – 3.3

INSTALLATION

1) Confirm that vacuum passage on intake manifold is free from clog.
2) Apply engine oil to O-ring of sensor.
3) Install sensor (1) to intake manifold (2).
4) Connect connector to sensor (1) securely.



Fuel level sensor (sender gauge)

Refer to Section 8C.

Crankshaft position sensor

REMOVAL AND INSTALLATION

Refer to Section 6A4.

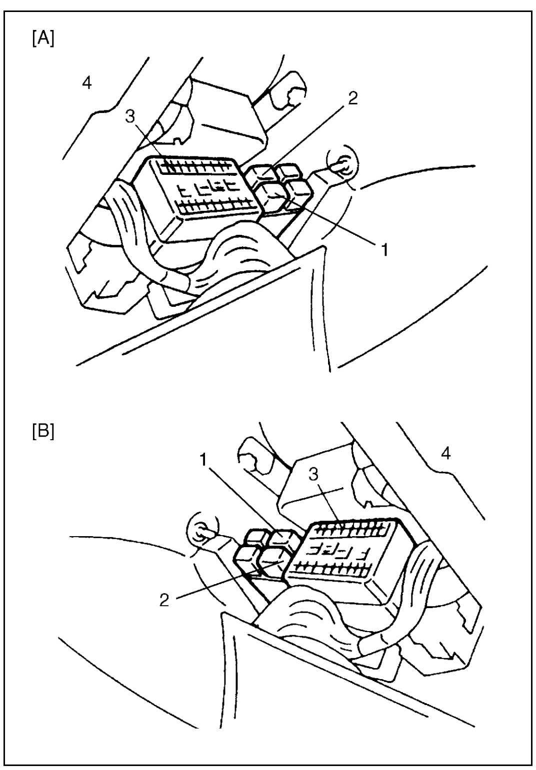
INSPECTION

Refer to Section 6-1.

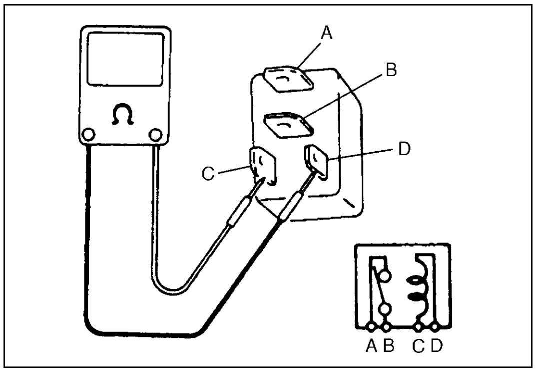
Main relay

INSPECTION

1) Disconnect negative (–) cable at battery.
2) Remove main relay (1) from its connector.



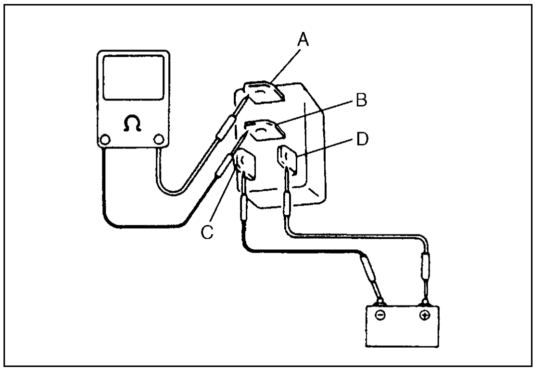
2.	Fuel pump relay
3.	Fuse box
4.	Instrument panel
[A]:	Left-hand steering vehicle
[B]:	Right-hand steering vehicle



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.

Main relay resistance:

TERMINALS	RESISTANCE
Between "A" and "B"	∞ (Infinity)
Between "C" and "D"	79 – 95 Ω (at 20°C (68°F))

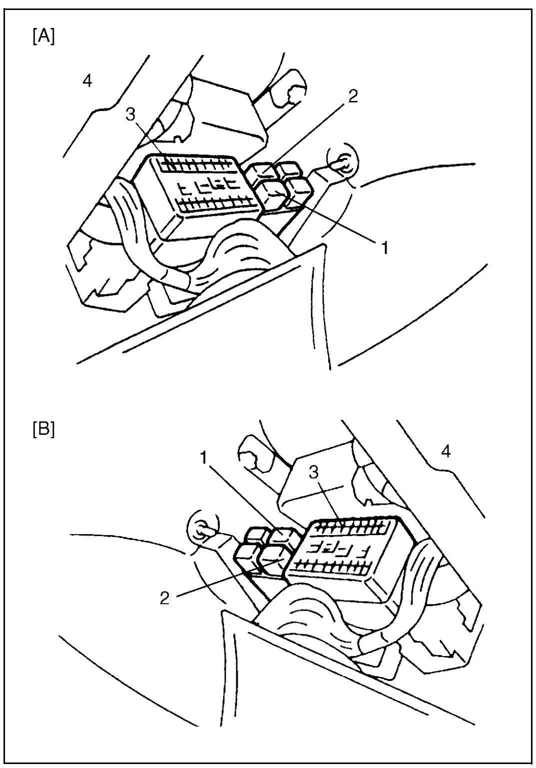


4) Check that there is continuity between terminals "A" and "B" when battery is connected to terminals "C" and "D".
   If malfunction is found, replace.

Fuel pump relay

INSPECTION

1) Disconnect negative (–) cable at battery.
2) Remove fuel pump relay (2) from connector.
3) Structure of fuel pump relay is the same as that of main relay.
   Check its resistance and operation using the same procedure as that for main relay.
   If malfunction is found, replace.



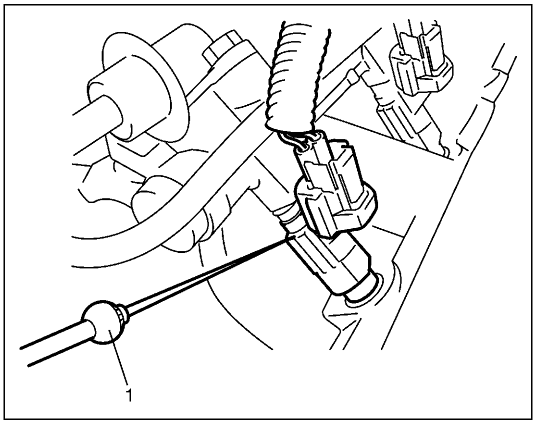
1.	Main relay
3.	Fuse box
4.	Instrument panel
[A]:	Left-hand steering vehicle
[B]:	Right-hand steering vehicle

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.

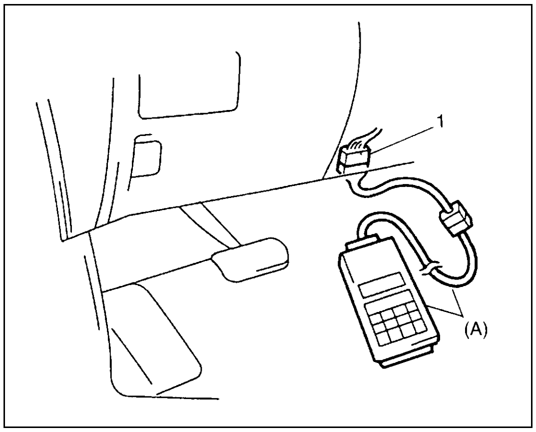


1) Warm up engine to normal operating temperature.
2) While listening to sound of injector by using sound scope (1) or such, increase engine speed to higher than 3,000 r/min.
3) Check to make sure that sound to indicate operation of injector stops when throttle valve is closed instantly and it is heard again when engine speed is reduced to less than about 2,000 r/min.

Emission Control System

EGR system (if equipped)

EGR SYSTEM INSPECTION (USING SUZUKI SCAN TOOL)



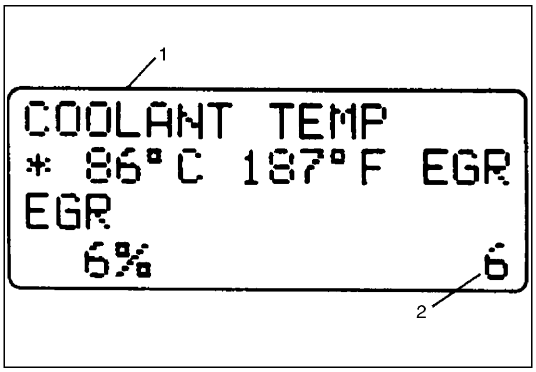
1) Connect SUZUKI scan tool to data link connector (DLC) (1) with ignition switch OFF.

Special tool
(A) : SUZUKI scan tool

NOTE:

For operation procedure of cartridge, refer to its cartridge operator's manual.

2) Start engine and warm up it to normal operating temperature.

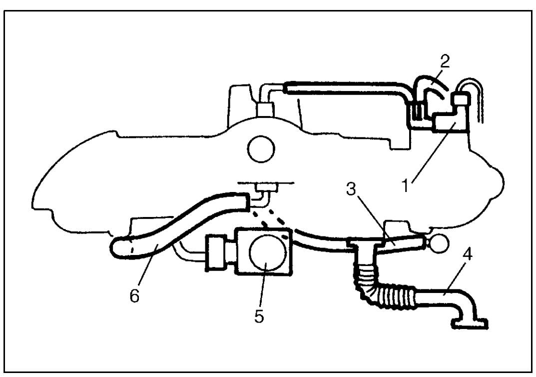


3) With engine idling (without depressing accelerator pedal), open EGR valve by using "MISC. TEST" mode.
   In this state, according as EGR valve opening increases engine idle speed drops. If not, possible cause is clogged EGR gas passage, stuck or faulty EGR valve.

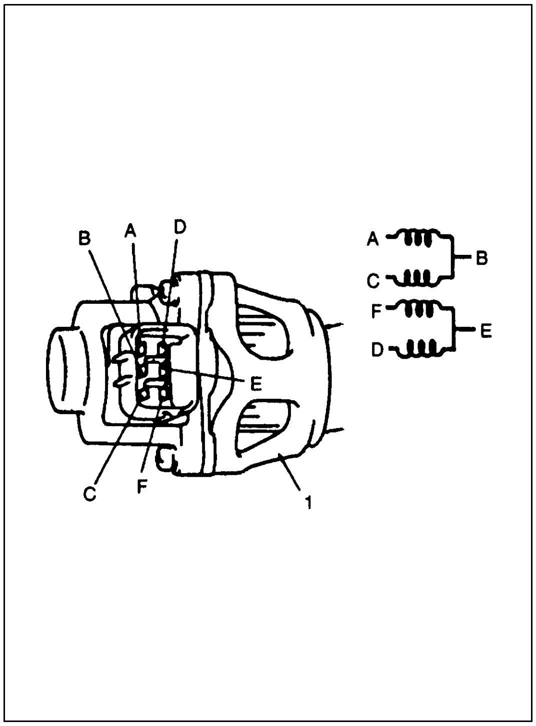
1. SUZUKI scan tool display
2. EGR valve opening (0: Close, 100: Full Open)

REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disconnect EGR valve coupler.
3) Remove wire harness bracket from intake collector.
4) Remove EGR valve (5) and gasket from intake collector.



1. EVAP canister purge valve	4. EGR pipe
2. EVAP canister purge valve hose	6. PCV hose
3. Breather hose	



INSPECTION

1) Check resistance between following terminals of EGR valve (1) in each pair.
   If found faulty, replace EGR valve assembly.

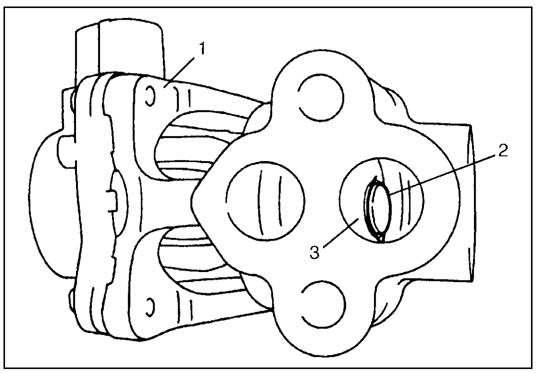
EGR valve resistance:

Terminals	Standard resistance
A – B **C – B** **F – E** **D – E**	**20 – 24 Ω at 20°C (68°F)**
B - valve body **E - valve body**	**infinity (∞)**

2) Remove carbon from EGR valve gas passage.

NOTE:

Do not use any sharp-edged tool to remove carbon.
Be careful not to damage or bend EGR valve, valve seat and rod.



3) Inspect valve (2), valve seat (3) and rod for fault, cracks, bend or other damage.
   If found faulty, replace EGR valve (1) assembly.

INSTALLATION

Reverse removal procedure noting the followings.

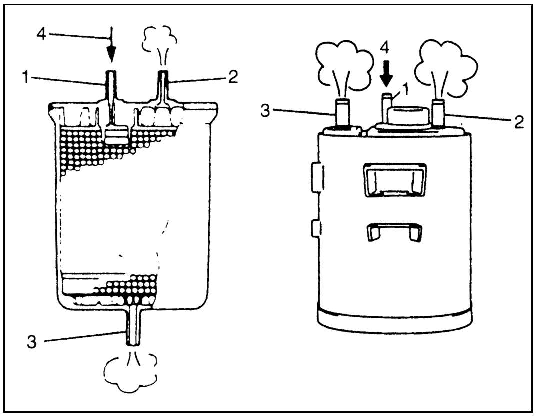
- Clean mating surface of valve and intake manifold.
- Use new gasket.

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 and remove EVAP canister.
2) When air is blown into tank pipe, there should be no restriction of flow through purge pipe and air pipe.
   If operation differs from above description, EVAP canister must be replaced.
3) Install EVAP canister and connect hoses to canister.

1. Tank pipe
2. Purge pipe
3. Air pipe
4. Blow air

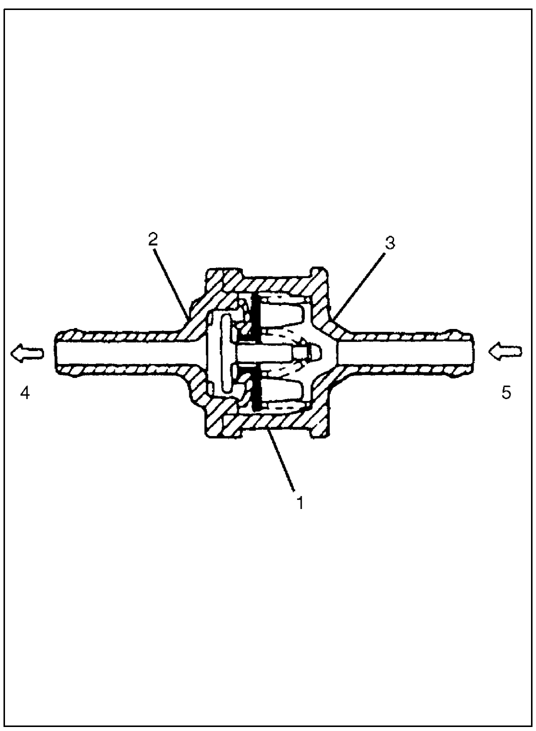
Vacuum passage

INSPECTION

Start engine and run it at idle speed. Disconnect vacuum hose from EVAP canister purge valve. With finger placed against hose disconnected, check that vacuum is applied.
If it is not applied, clean vacuum passage by blowing compressed air.

TANK PRESSURE CONTROL VALVE INSPECTION

1) Remove tank pressure control valve installed around EVAP canister.



2) Air should pass through valve smoothly from black side (3) of tank pressure control valve (1) to orange side (2) when blown hard.
3) From orange side, even when blown softly, air should come out of black side.
4) If air doesn't pass through valve in Step 2) or hard blow is required in Step 3), replace tank pressure control valve.

WARNING:
DO NOT SUCK air through tank pressure control valve. Fuel vapor inside the valve is harmful.

5) Plug orange nozzle and apply 26 kPa (20 cmHg) vacuum to black nozzle. Check that vacuum is held at that level (there is no leakage).
   If vacuum leaks, replace.
6) Install tank pressure control valve.

4. To canister
5. From fuel tank

PCV System

NOTE:

Be sure to check that there is no obstruction in PCV valve or its hoses before checking engine idle speed/IAC duty for obstructed PCV valve or hose hampers its accurate checking.

PCV hose

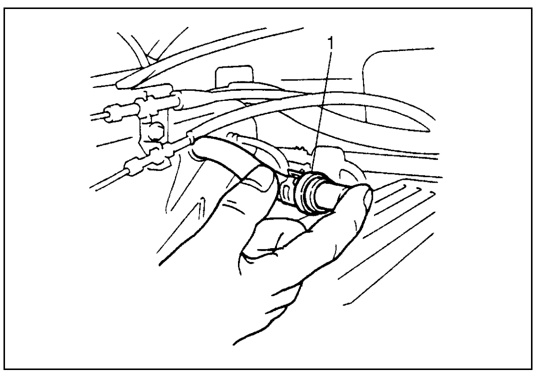
INSPECTION

Check hoses for connection, leakage, clog, and deterioration. Replace as necessary.

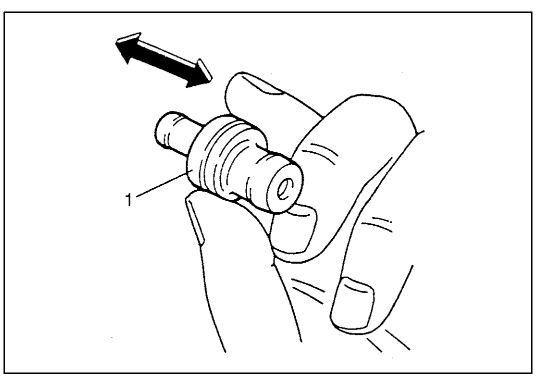
PCV valve

ON-VEHICLE INSPECTION

1) Disconnect PCV valve from cylinder head cover and plug head cover hole.
2) Run engine at idle.

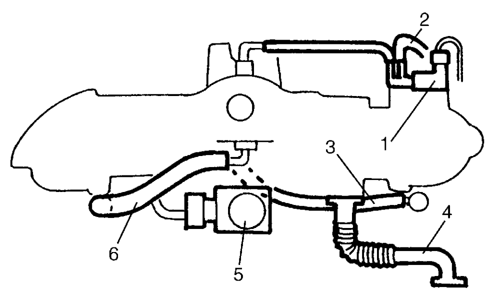


3) Place your finger over end of PCV valve (1) to check for vacuum. If there is no vacuum, check for clogged valve. Replace as necessary.



4) After checking vacuum, stop engine and remove PCV valve (1). Shake valve and listen for the rattle of check needle inside the valve (1). If valve does not rattle, replace.
5) After checking, connect PCV valve (1), PCV hose and clamp securely.

PCV system



NOTE:

Be sure to check that there is no obstruction in PCV valve or its hoses (6) before checking engine idle speed/ IAC duty for obstructed PCV valve or hose hampers its accurate checking.

PCV HOSE

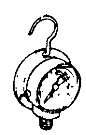
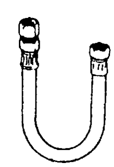
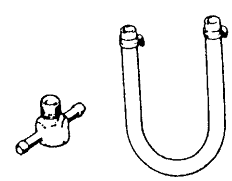
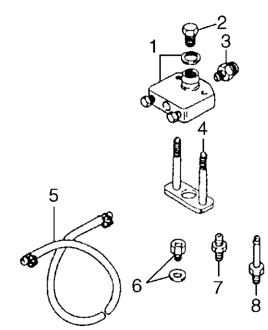
Check hoses for connection, leakage, clog, and deterioration. Replace as necessary.

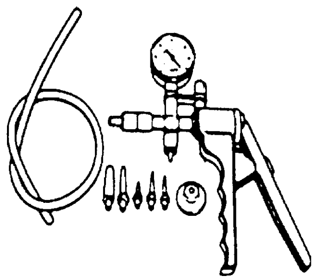
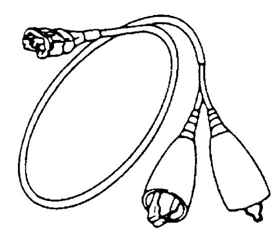
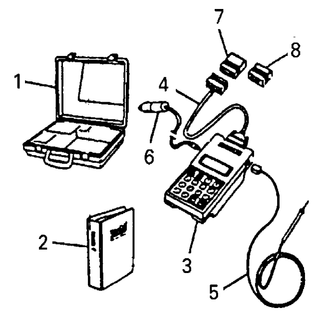
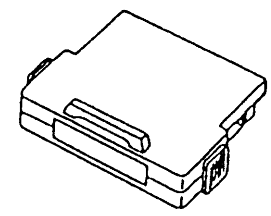
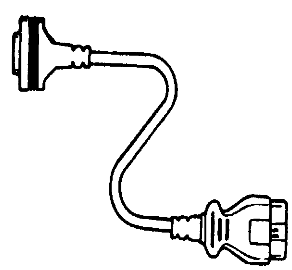
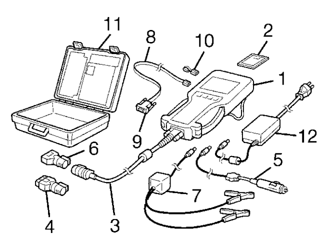
1. EVAP canister purge valve	4. EGR pipe
2. EVAP canister purge valve hose	5. EGR valve
3. Breather hose	6. PCV hose

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Heated oxygen sensor	45	4.5	32.5
Fuel pressure regulator bolts	10	1.0	7.5
Fuel pipe union bolts	30	3.0	22.0
Engine coolant temp. sensor	15	1.5	11.0

Special Tool

			
09912-58441 Pressure gauge	09912-58431 Pressure hose	09912-58490 3-way joint & hose	09912-58421 Checking tool set (See NOTE "A".)

 09917-47010 Vacuum pump gauge	 09930-88521 Injector test lead	 09931-76011 Tech 1A kit (SUZUKI scan tool) (See NOTE “B”.)	 Mass storage cartridge for Tech 1A
 09931-76030 14/16 pin DLC cable for Tech 1A	 Tech 2 kit (SUZUKI scan tool) (See NOTE “C”.)		

NOTE:

- **“A”: This kit includes the following items.**
  1. Tool body & washer, 2. Body plug, 3. Body attachment-1, 4. Holder
  5. Return hose & clamp, 6. Body attachment-2 & washer, 7. Hose attachment-1
  8.Hose attachment-2
- **“B”: This kit includes the following items and substitutes for the Tech 2 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
- **“C”: This kit includes the following items and substitutes for the Tech 1A kit.**
  1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable,
  6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter,
  10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 6F2

IGNITION SYSTEM (FOR H27 ENGINE)

WARNING:

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

CONTENTS

General Description

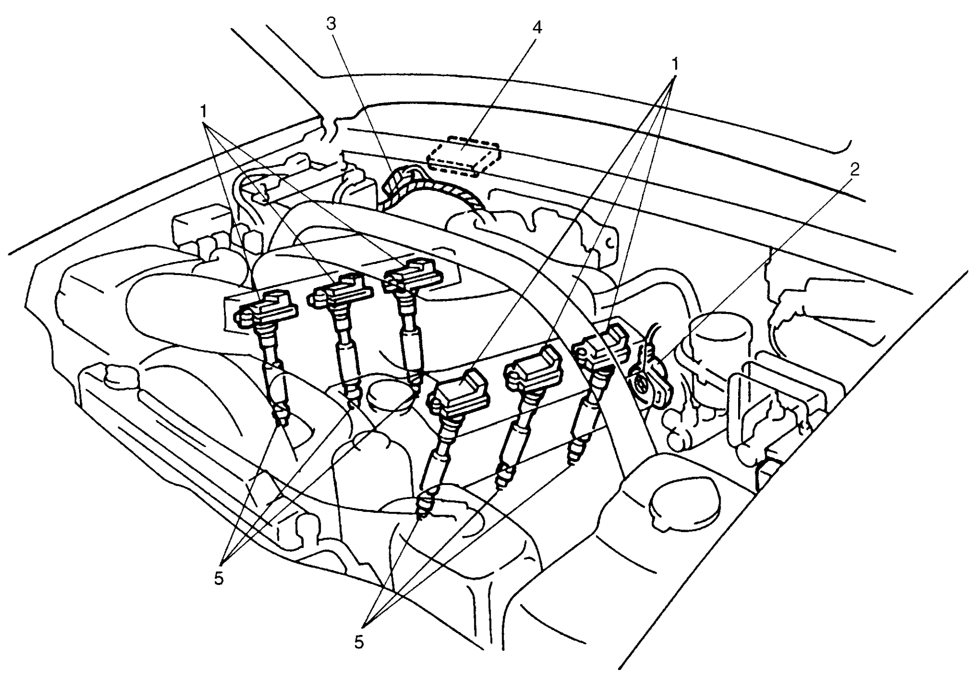
The ignition system is a direct ignition system. It consists of the parts as described below and has an electronic ignition control system.

- ECM (or PCM)
  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 igniter (in ignition coil assembly).
- Ignition coil assembly (including an igniter and an ignition coil)
  The ignition coil assembly has a built-in igniter and ignition coil which turns ON and OFF the primary current of the ignition coil according to the signal from ECM (or PCM). When the ignition coil primary current is turned OFF, a high voltage is induced in the secondary wiring. One ignition coil is in charge of ignition of one cylinder only.
- Spark plug and noise suppressor
- CMP sensor, TP sensor, ECT sensor, IAT sensor, VSS, knock sensor and MAF sensor
  For their details, refer to Section 6E2.

This ignition system does not have a distributor and high-tension cords but each cylinder has an ignition coil assembly (igniter and ignition coil) and the secondary voltage which occurred in the ignition coil is sent to the spark plug directly. Also, the signal(s) are sent from the CMP sensor to ECM (or PCM) so as to control each ignition coil independently through the igniter (in ignition coil assembly).

Components

NOTE:
For other components not found in this figure, refer to Section 6E2.

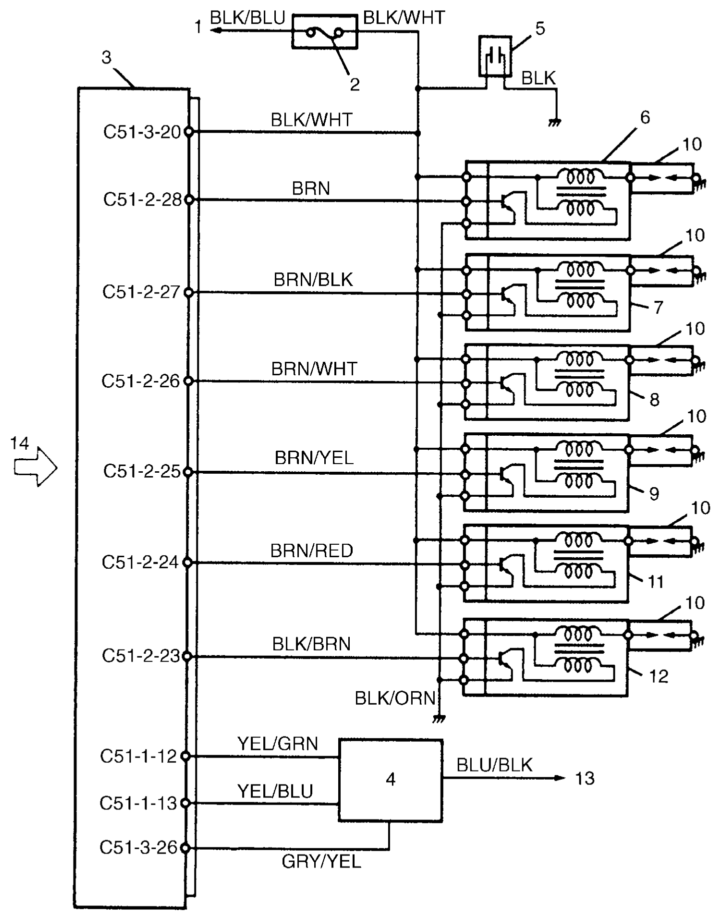


1.	Ignition coil assembly (igniter and ignition coil)
2.	CMP sensor
3.	Noise suppressor
4.	ECM (or PCM)
5.	Spark plug

System Wiring

NOTE:

For ECM (PCM) terminal assignment, refer to Section 6E2.



1. To ignition switch	8. Ignition coil assembly (For No.3 cylinder)
2. "IG COIL METER" fuse	9. Ignition coil assembly (For No.4 cylinder)
3. ECM (or PCM)	10. Spark plug
4. CMP sensor	11. Ignition coil assembly (For No.5 cylinder)
5. Noise suppressor	12. Ignition coil assembly (For No.6 cylinder)
6. Ignition coil assembly (For No.1 cylinder)	13. To main relay
7. Ignition coil assembly (For No.2 cylinder)	14. Sensed information

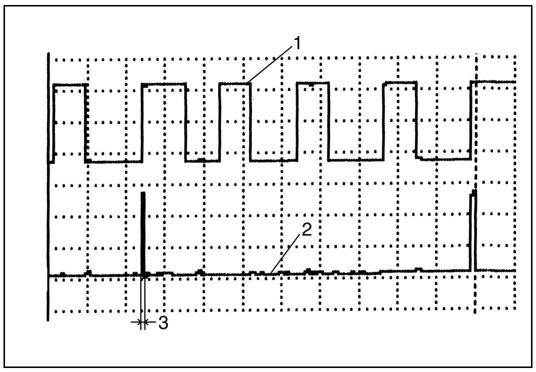
Diagnosis

Condition	Possible Cause	Correction
Engine cranks, but will not start or hard to start (No spark)	Blown fuse for ignition coil assembly	Replace.
	Loose connection or disconnection of lead wire	Connect securely.
	Faulty spark plug (s)	Replace.
	Faulty ignition coil assembly (s)	Replace.
	Faulty CMP sensor	Replace.
	Faulty ECM (or PCM)	Replace.
	Maladjusted ignition timing	Adjust.
Poor fuel economy or engine performance	Incorrect ignition timing	Adjust.
	Faulty spark plug(s)	Replace.
	Faulty ignition coil assembly (s)	Replace.
	Faulty CMP sensor	Replace.
	Faulty ECM (or PCM)	Replace.
	Faulty knock sensor	Replace.

Diagnostic Flow Table

Step	Action	Yes	No
1	Was “ENGINE DIAGNOSTIC FLOW TABLE” in Section 6-1 performed?	Go to Step 2.	Go to “ENGINE DIAGNOSTIC FLOW TABLE” in Section 6-1.
2	Ignition Spark Test 1) Check all spark plug for condition and type, referring to “SPARK PLUG” in this section. 2) If OK, perform ignition spark test, referring to “IGNITION SPARK CHECK” in this section. Is spark emitted from all spark plugs?	Go to Step 8.	Go to Step 3.
3	Diagnostic Trouble Code (DTC) Check 1) Check DTC stored in ECM (or PCM), referring to “DIAGNOSTIC TROUBLE CODE (DTC) CHECK” in Section 6E2. Is DTC stored?	Go to applicable flow table corresponding to that code No. in Section 6E2.	Go to Step 4.
4	Electrical Connection Check 1) Check ignition coil assemblies for electrical connection. Are they connected securely?	Go to Step 5.	Connect securely.
5	Ignition Coil Assembly Power Supply, Ground and Trigger Signal Circuits Check 1) Check these circuits for open and short. Are circuits in good condition?	Go to Step 6.	Repair or replace.
6	Ignition Coil Assembly Check 1) Substitute a known-good ignition coil assembly and then repeat Step 2. Is check result of Step 2 satisfactory?	Malfunction of ignition coil assembly.	Go to Step 7.

Step	Action	Yes	No
7	CMP Sensor Check 1) Check CMP sensor. Refer to Step 6 or 7 of "DTC P0340 DIAG. FLOW TABLE" in Section 6-1. Is check result satisfactory?	Substitute a known-good ECM (or PCM) and then repeat Step 2.	Tighten CMP sensor bolt or replace CMP sensor.
8	Ignition Timing Check 1) Check initial ignition timing and ignition timing advance, referring to "IGNITION TIMING CHECK AND ADJUSTMENT" in this section. Is check result satisfactory?	System is in good condition.	Adjust ignition timing or check ECM (PCM) input signals related to this system.



REFERENCE

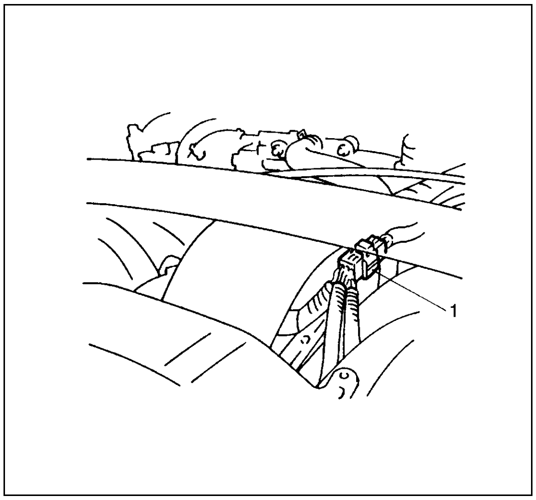
Oscilloscope waveforms of CMP sensor REF signal and No.1 ignition trigger signal are as shown in figure when connecting oscilloscope between terminal C51-1-13 of ECM (PCM) connector connected to ECM (PCM) and ground, and between terminal C51-2-28 and ground.

1.	REF signal of CMP sensor
2.	No.1 ignition trigger signal
3.	Primary coil current flow time

Ignition Spark Check

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.

1) Remove surge tank cover.

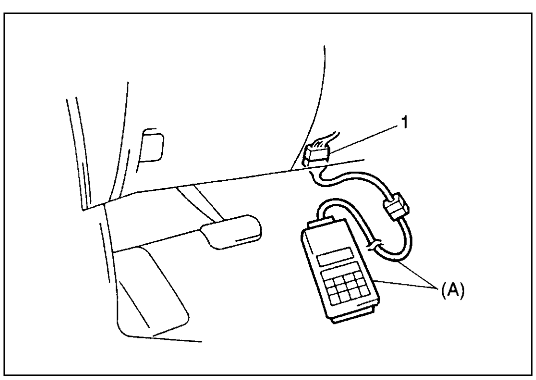


2) Disconnect injector coupler (1).
3) Remove spark plug and check it for condition and type, referring to “SPARK PLUG” in this section.
4) If OK, connect ignition coil coupler to ignition coil assembly and connect spark plug to ignition coil assembly. Ground spark plug.
5) Crank engine and check if each spark plug sparks.
   If no spark is emitted, inspect the related parts as described under “DIAGNOSIS” in this section.
6) After checking, install spark plug, referring to “SPARK PLUG” in this section.
7) Connect injector coupler (1).
8) Install surge tank cover.

Ignition Timing Check and Adjustment

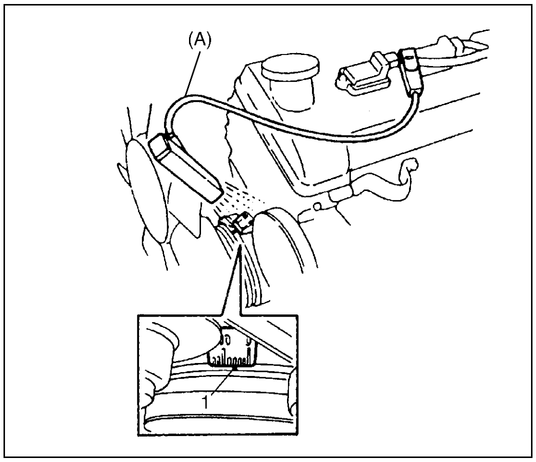
NOTE:
Before starting engine, place transmission gear shift lever in “Neutral” (shift selector lever to “P” range for A/T model), and set parking brake.

1) Start engine and warm it up to normal operating temperature.
2) Make sure that all of electrical loads except ignition are switched off.
3) Check to be sure that idle speed is within specification.
   Refer to Section 6E2.



4) Connect SUZUKI scan tool to DLC (1) with ignition switch OFF, restart engine and fix ignition timing by using fixed spark mode of SUZUKI scan tool.

Special tool
(A) : SUZUKI scan tool



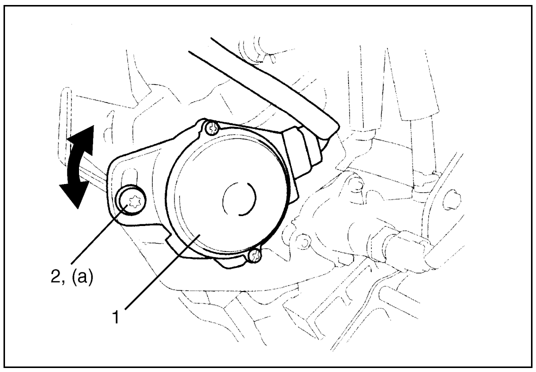
5) Set timing light to ignition harness for No.1 cylinder.
6) Using timing light, check that timing observed from viewpoint is within specification.

Initial ignition timing of viewpoint
(when it is fixed by SUZUKI scan tool) :
5 ± 1° BTDC

Ignition order :
1-6-5-4-3-2

Special tool
(A) : 09930-76420

1. Timing mark on crankshaft pulley



7) If ignition timing is out of specification, loosen flange bolt, adjust timing by turning CMP sensor (1) while engine is running, and then tighten bolt (2).

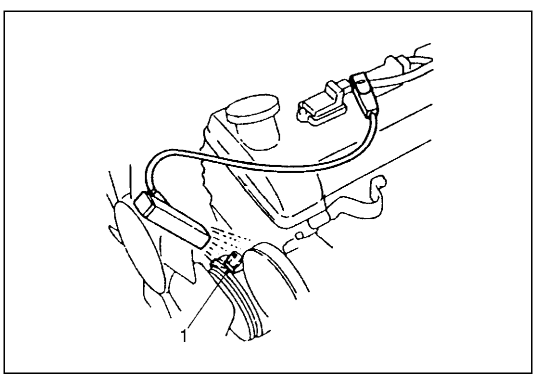
Tightening torque
CMP sensor bolt (a) : 15 N·m (1.5 kg-m, 11.0 lb-ft)

8) After tightening bolt (2), recheck that ignition timing is within specification.

9) After checking and/or adjusting, end fixed spark mode of SUZUKI scan tool.

NOTE:

In this state, ignition timing may vary more or less of initial ignition timing but it is nothing abnormal.



10) With engine idling (closed throttle position and vehicle stopped), check that ignition timing is about BTDC 12-16° (shown in the figure). Also, check that increasing engine speed advances ignition timing.
If above check results are not satisfactory, check input signals related to this system.

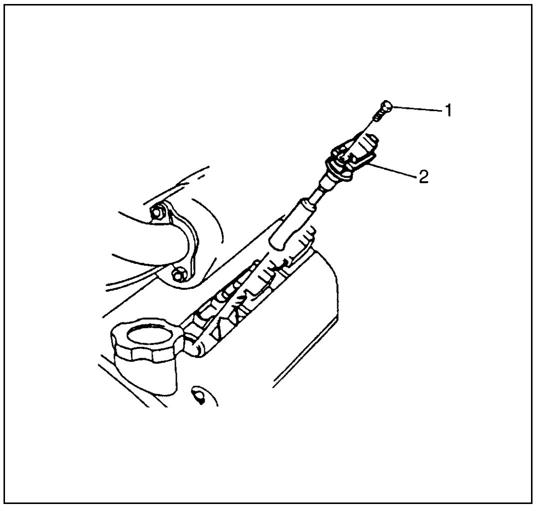
1. Timing mark on crankshaft pulley

On-Vehicle Service

Ignition Coil Assembly (Igniter and Ignition Coil)

REMOVAL

1) Remove ignition coil cover.
2) Disconnect ignition coil coupler.



3) Remove ignition coil bolt (1), and then pull out ignition coil assembly (2).

INSPECTION

Check ignition coil assembly for the following :

- Damage
- Deterioration
- Terminal for corrosion

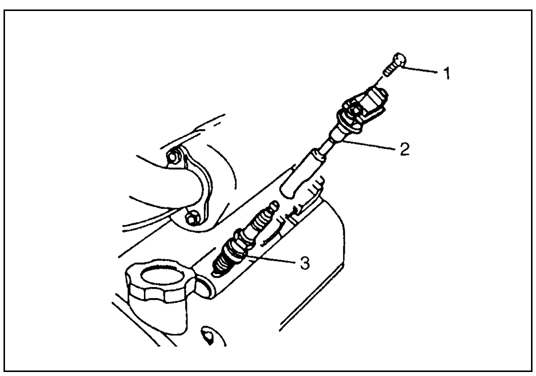
INSTALLATION

Install in reverse order of removal.

Spark Plug

REMOVAL

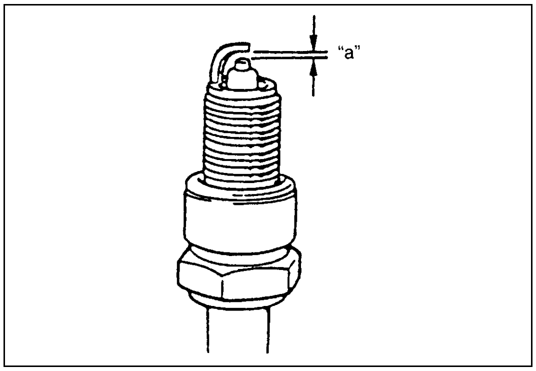
1) Remove ignition coil cover.
2) Disconnect ignition coil coupler.



3) Remove ignition coil bolt (1), and then pull out ignition coil assembly (2).
4) Remove spark plug (3).

INSPECTION

> **CAUTION:**
> **When servicing the iridium/platinum spark plugs (slender center electrode type plugs), do not touch the center electrode to avoid damage to it. The electrode is not strong enough against mechanical force as it is slender and its material is not mechanically tough.**



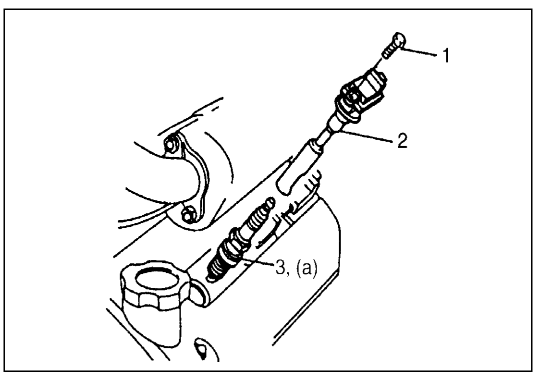
Inspect them for electrode wear, carbon deposits and Insulator damage.
If any abnormality is found, replace them with specified new plug.

Spark plug air gap "a" :
1.0 – 1.1 mm (0.039 – 0.043 in.)

Spark plug type :
DENSO K20PR-U11/SK16PR11
NGK BKR6E-11/*IFR5J11

NOTE:
Under –25°C (–13°F), it is highly recommended to use the spark plugs with an asterisk (*) for better engine starting performance.

INSTALLATION



1) Install spark plug (3) and tighten them to specified torque.

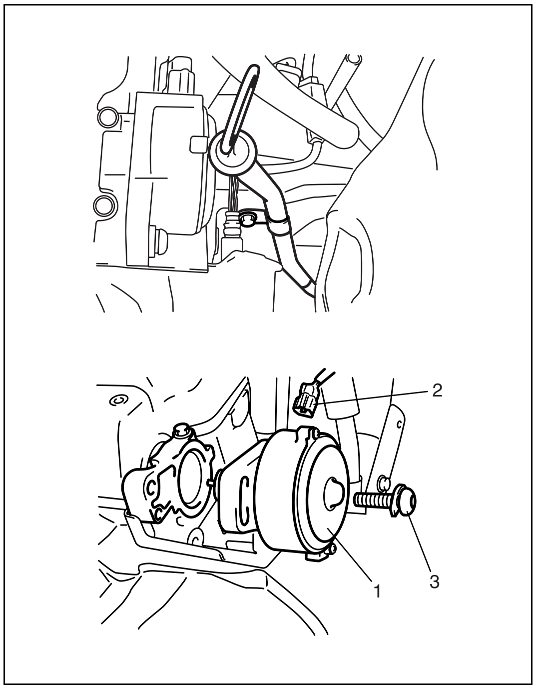
Tightening torque
Spark plug (a) : 25 N·m (2.5 kg-m, 18.0 lb-ft)

2) Install ignition coil assembly (2) securely.
3) Tighten ignition coil bolt (1), and then connect ignition coil coupler.
4) Install ignition coil cover.

CMP Sensor

CAUTION:
Disassembly is prohibited. If anything faulty is found, replace as an assembly unit.

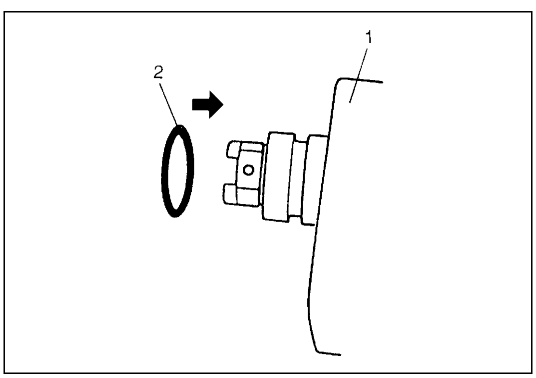
REMOVAL



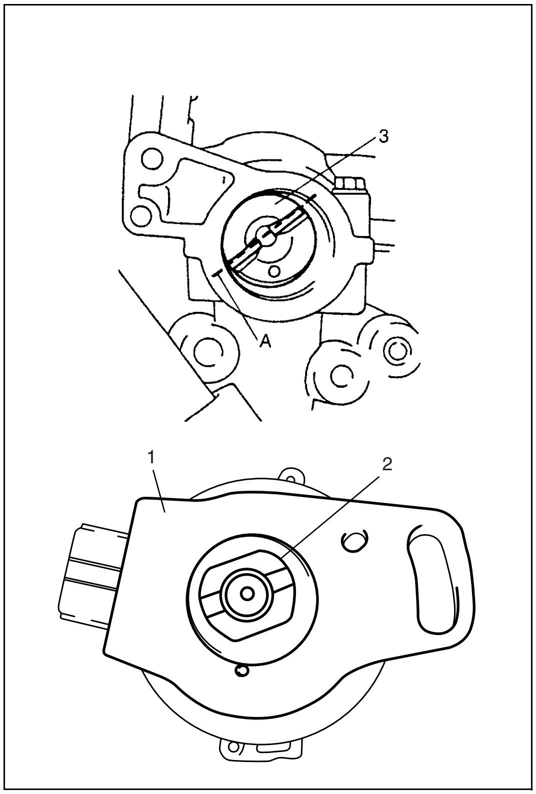
1) Disconnect CMP sensor coupler (2).
2) Remove A/T fluid level gauge and filler tube.
3) Remove CMP sensor (1) by removing bolt (3).

INSTALLATION

NOTE:
After installing CMP sensor, adjust ignition timing. (Refer to "IGNITION TIMING CHECK AND ADJUSTMENT" in this section).

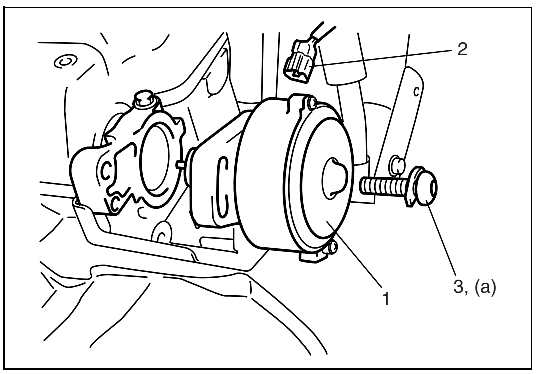


1) Install a new O-ring (2) with engine oil applied to CMP sensor (1).



2) Install CMP sensor to camshaft.
   Fit the dog of CMP sensor coupling into the slots of camshaft, when installing. The dogs of CMP sensor coupling are offset. Therefore, if the dogs can not be fitted into the slots, turn the CMP sensor shaft by 180 degree and try again.

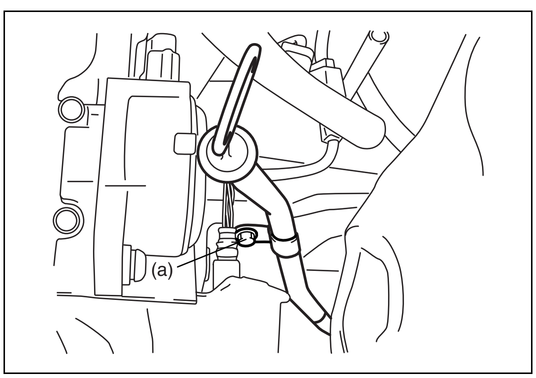
1.	CMP sensor
2.	CMP sensor coupling
3.	Camshaft
A :	Slot offset



3) Tighten CMP sensor bolt (3).

Tightening torque
CMP sensor bolt (a) : 15 N·m (1.5 kg-m, 11.0 lb-ft)

4) Connect CMP sensor coupler (2) to CMP sensor (1).

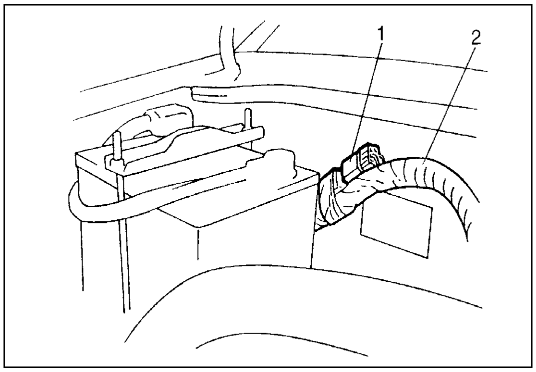


5) Install A/T fluid level gauge and filler tube.

Tightening torque
A/T filler tube bolt (a) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

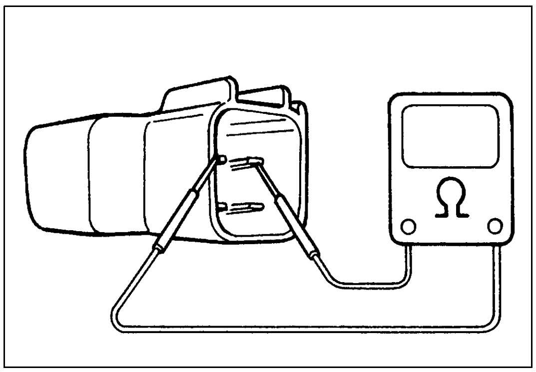
Noise Suppressor

REMOVAL



1) Disconnect coupler of noise suppressor (1).
2) Remove noise suppressor (1) from harness (2).

INSPECTION

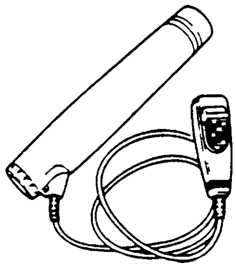
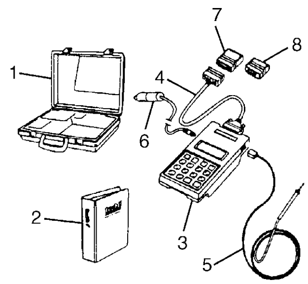
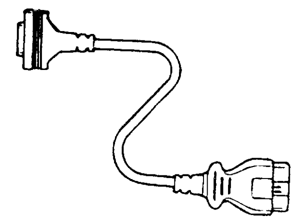
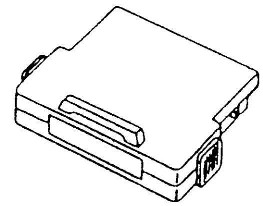
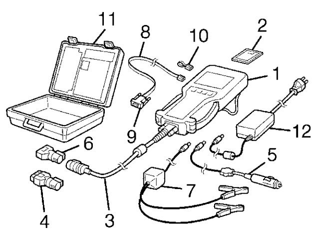


Using ohmmeter, check to be sure that capacitor (condenser) in noise suppressor is not conductive.
If check result is not satisfactory, replace noise suppressor.

INSTALLATION

For installation, reverse removal procedure.

Special Tool

 09930-76420 Timing light (Dry cell type)	 09931-76011 Tech 1A kit (SUZUKI scan tool) (See NOTE “A”.)	 09931-76030 16/14 pin DLC cable for Tech 1A	 Mass storage cartridge for Tech 1A
 Tech 2 kit (SUZUKI scan tool) (See NOTE “B”.)			

NOTE:

“A”: This kit includes the following items and substitutes for the Tech 2 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

“B”: This kit includes the following items and substitutes for the Tech 1A kit.

1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loop-back connector, 11. Storage case, 12. Power supply

SECTION 6H

CHARGING SYSTEM

WARNING:

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

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in Section 10B in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in Section 10B before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**

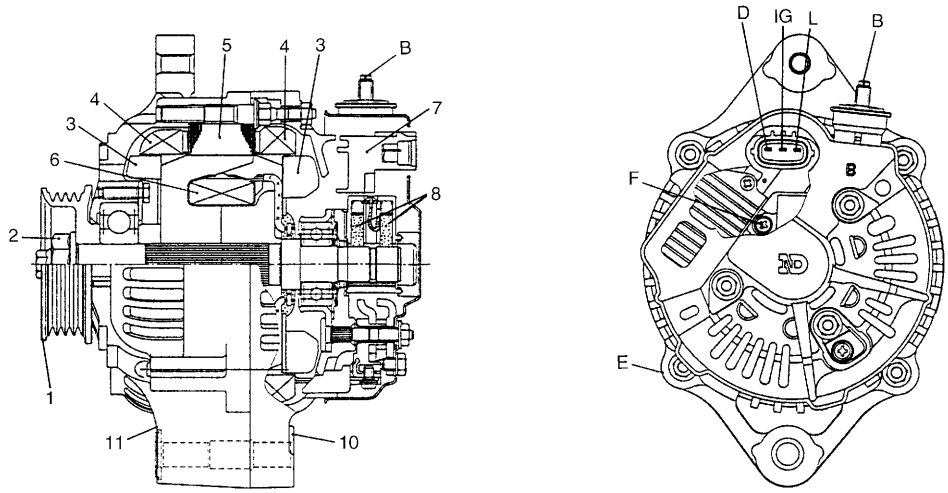
NOTE:

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

CONTENTS

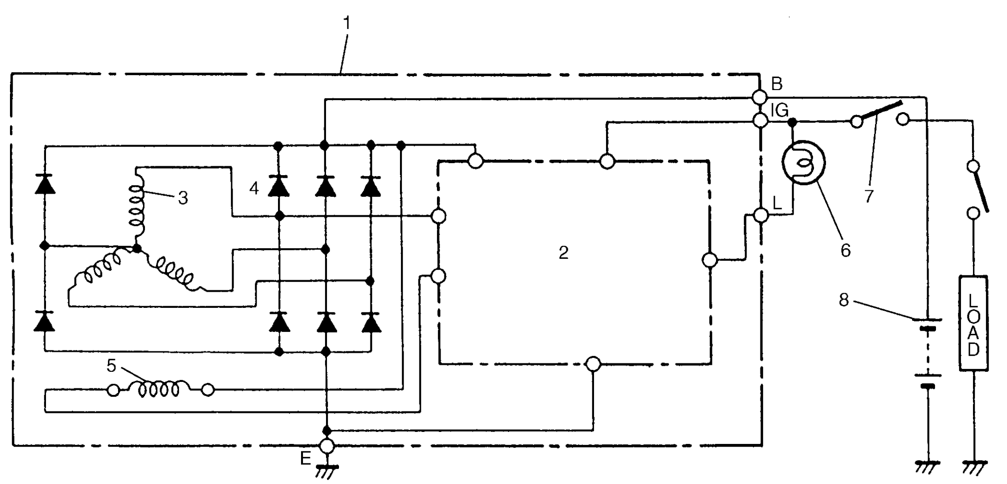
General Description

Generator



B :	Generator output (Battery terminal)	L :	Lamp terminal	5.	Stator core	10.	Rear end frame
D :	Dummy terminal	1.	Pulley	6.	Field coil	11.	Drive end frame
E :	Ground	2.	Pulley nut	7.	Rectifier		
F :	Field coil terminal	3.	Rotor fan	8.	Brush		
IG :	Ignition terminal	4.	Stator coil	9.	Regulator		

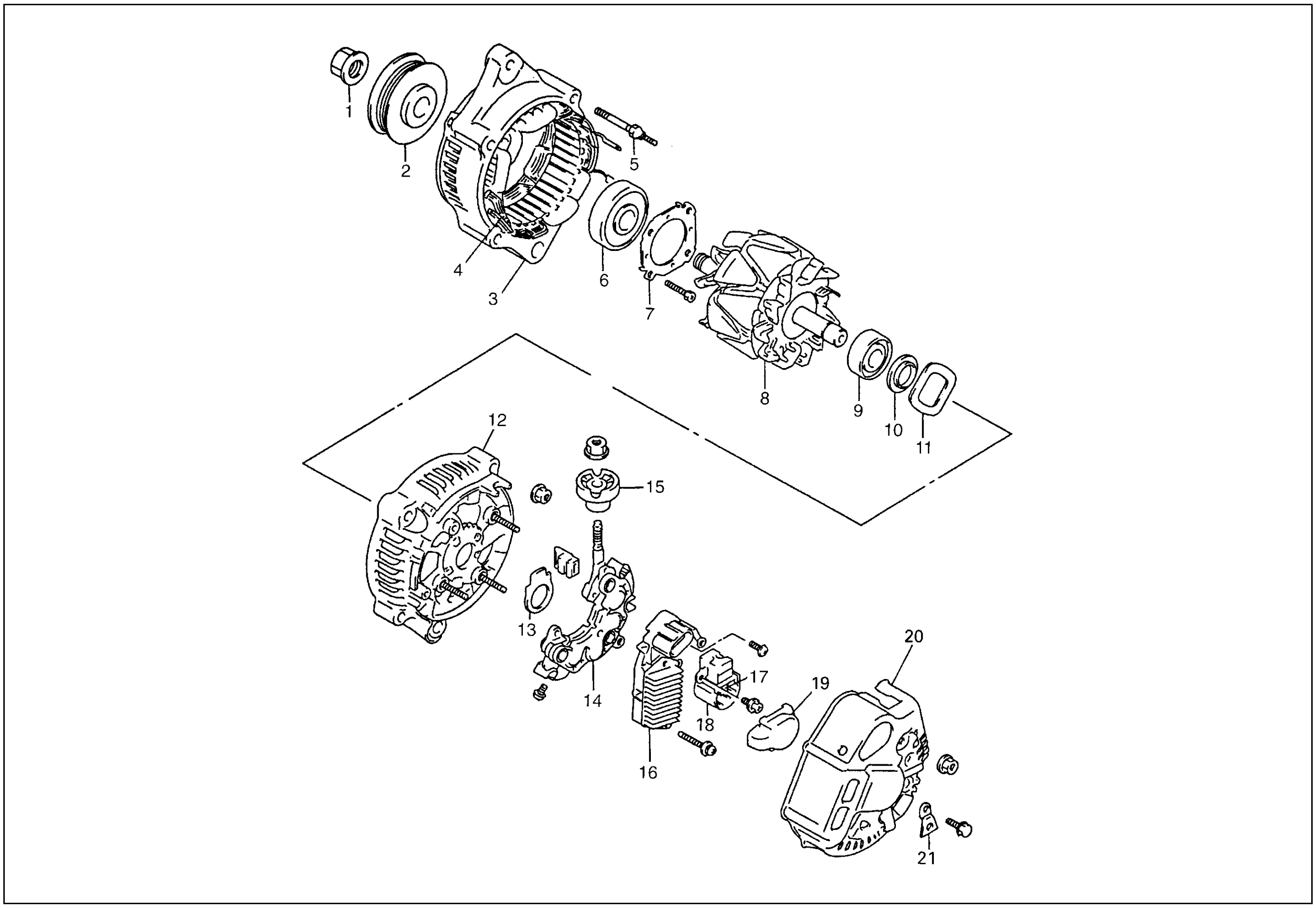
WIRING CIRCUIT



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

Unit Repair Overhaul

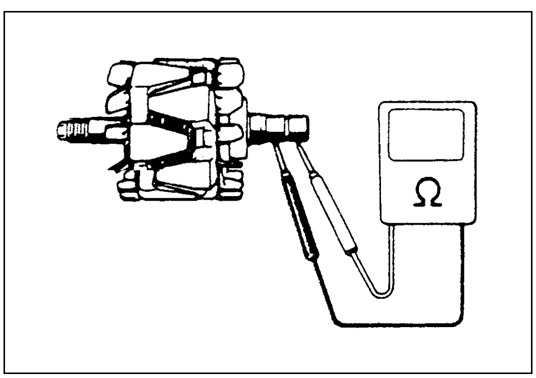
Generator Assembly



1. Pulley nut	6. Driver end bearing	11. Wave washer	16. Regulator	21. Terminal plate
2. Pulley	7. Bearing retainer	12. Rear end frame	17. Brush	
3. Drive end bearing	8. Rotor	13. Seal plate	18. Brush holder	
4. Stator	9. End housing bearing	14. Rectifier	19. Brush holder cover	
5. Stud bolt	10. Bearing cover	15. Insulator	20. Rear end cover	

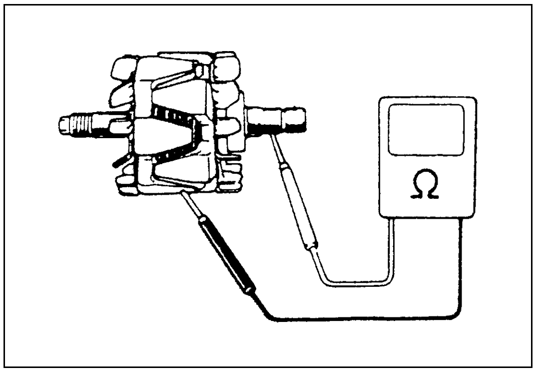
Inspection

Rotor

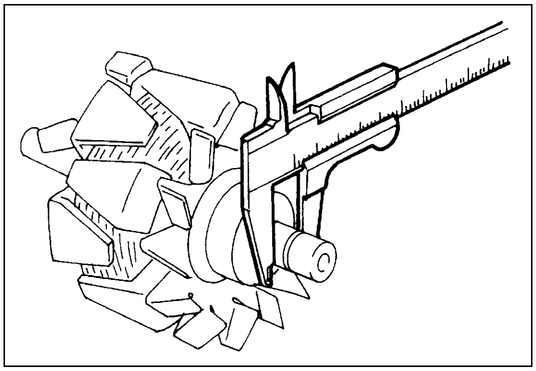


- Using ohmmeter, check for continuity between slip rings of rotor. If there is no continuity, replace rotor.

Standard resistance between slip rings of rotor
: 1.6 – 2.0 Ω at 20°C (68°F)



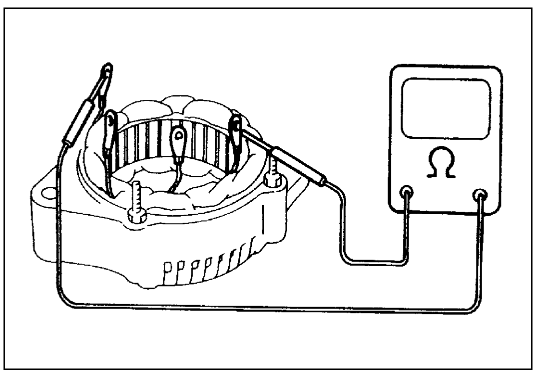
- Using ohmmeter, check that there is no continuity between slip ring and rotor. If there is continuity, replace rotor.



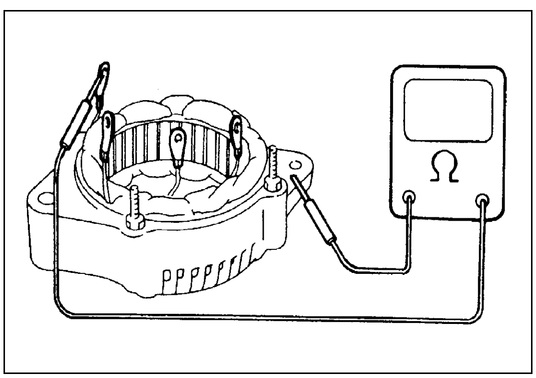
- Check slip rings for roughness or scoring. If rough or scored, replace rotor.
  Using a vernier caliper, measure the slip ring diameter.
  If the diameter is less than minimum, replace the rotor.

Standard diameter of slip ring
: 14.2 – 14.4 mm (0.557 – 0.567 in.)
Minimum diameter of slip ring
: 12.8 mm (0.504 in.)

Stator

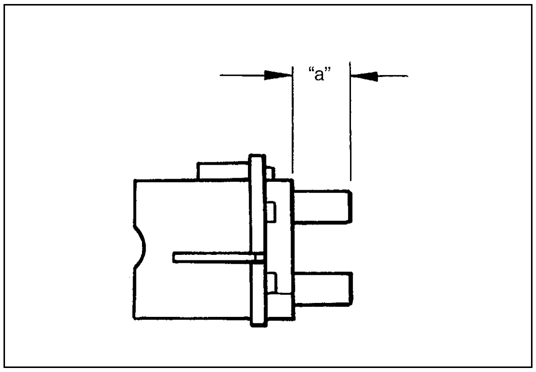


- Using ohmmeter, check all leads for continuity. If there is no continuity, replace stator.



- Using ohmmeter, check that there is no continuity between coil leads and stator core. If there is continuity, replace stator.

Brush and brush holder

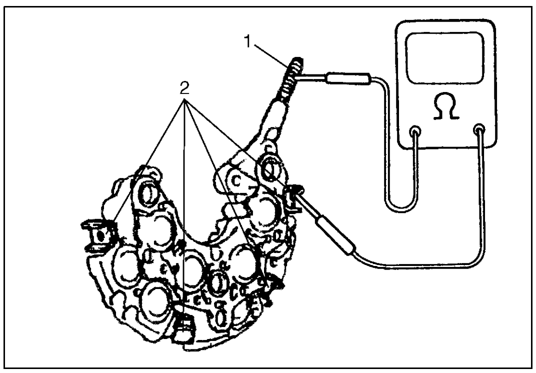


Check each brush for wear by measuring its length as shown. If brush is found worn down to service limit, replace brush.

Exposed brush length "a"
Standard : 10.5 mm (0.413 in.)
Limit : 1.5 mm (0.059 in.)

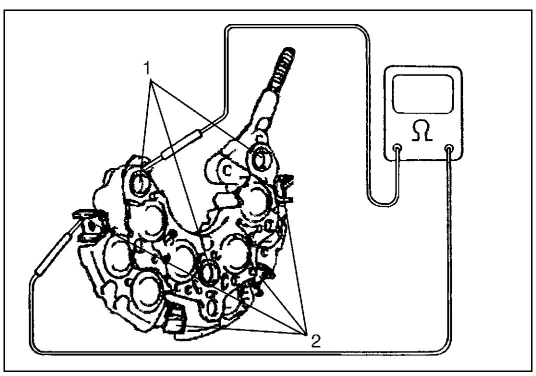
Rectifier

- Positive Rectifier



a) Using an ohmmeter, connect one tester probe to the "B" terminal (1) and the other to each rectifier terminal (2).
b) Reverse the polarity of the tester probes and repeat step a).
c) Check that one shows continuity and the other shows no continuity. If there is continuity, replace the rectifier.

- Negative Rectifier



a) Using an ohmmeter, connect one tester probe to each negative terminal (1) and the other to each rectifier terminal (2).
b) Reverse the polarity of the tester probes and repeat step a).
c) Check that one shows continuity and the other shows no continuity. If there is continuity, replace the rectifier.

Specifications

Battery

Battery type	55D23L	75D23L	95D26L
Rated capacity AH/5HR, 12 Volts	48	52	66
Electrolyte L (US/Imp.pt)	3.9 (8.24/6.86)	3.9 (8.24/6.86)	4.0 (8.53/7.04)
Electrolyte S.G.	1.28 when fully charged at 20°C (68°F)		

Generator

Type	105 A type
Rated voltage	12 V
Nominal output	105 A
Permissible max. speed	18000 r/min.
No-load speed	1150 r/min (rpm)
Setting voltage	14.2 to 14.8 V
Permissible ambient temperature	–30 to 90 °C (–22 to 194 °F)
Polarity	Negative ground
Rotation	Clockwise viewed from pulley side

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	**kg-m**	**lb-ft**
Body ground bolt	8	0.8	6.0
Generator mounting bolts and nut	23	2.3	16.5
“B” terminal inner nut	3.6	0.37	3.0
“B” terminal outer nut	8	0.8	6.0
Generator pulley nut	111	11.2	81.5
Rear end frame nuts	4.5	0.45	3.5
Rear end cover nuts	4.5	0.45	3.5
Stator stud bolts	9.8	1.0	7.0
Drive end bearing plate screws	3.0	0.30	2.2
Rectifier screws	3.0	0.30	2.2
Regulator and brush holder screws	2.0	0.20	1.5
Terminal plate bolt	3.9	0.39	3.0

SECTION 6K

EXHAUST SYSTEM

CAUTION:

Be sure to use UNLEADED FUEL for the catalytic converter equipped vehicle. Use of LEADED FUEL will affect performance of the catalytic converter adversely to a great extent.

NOTE:

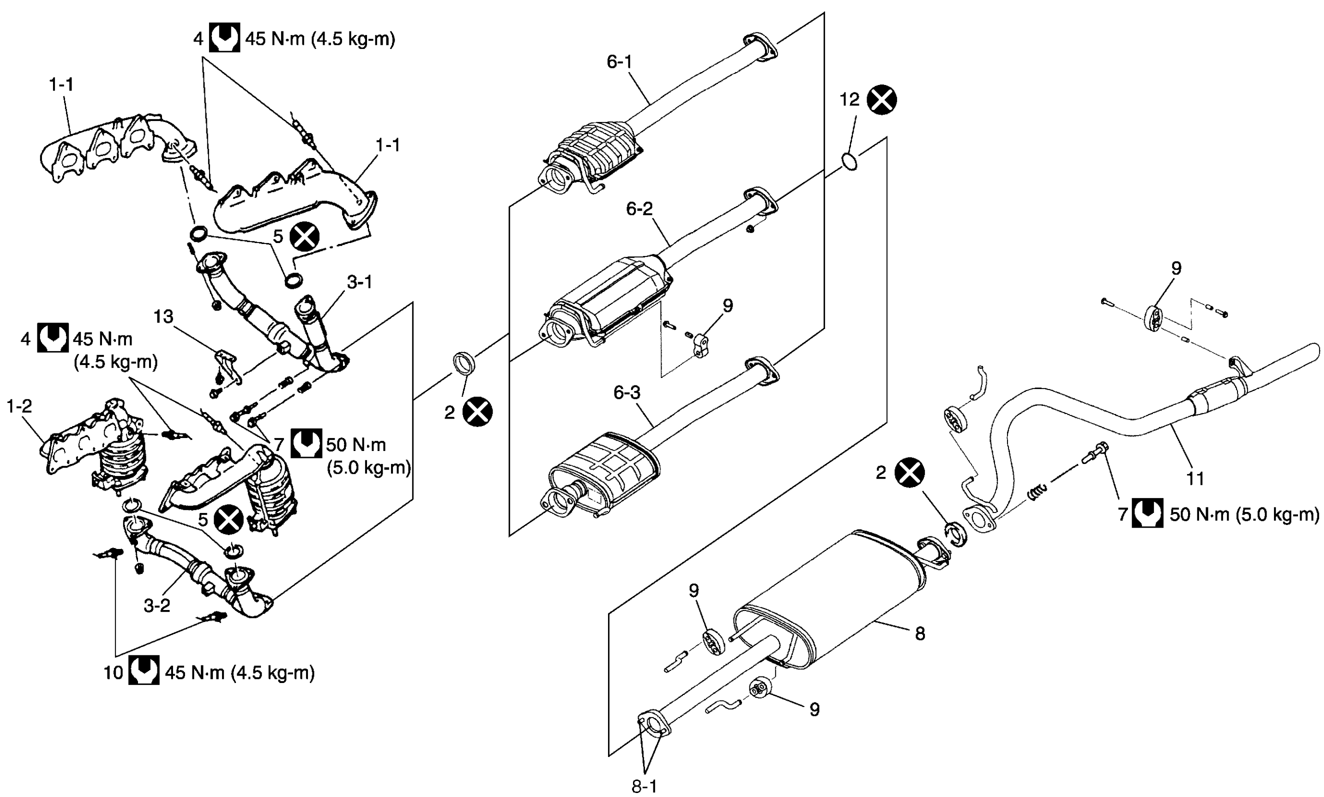
- **For the descriptions (items) not found in this section, refer to the same section of service manual mentioned in the FOREWORD of this manual.**

CONTENTS

On-Vehicle Service

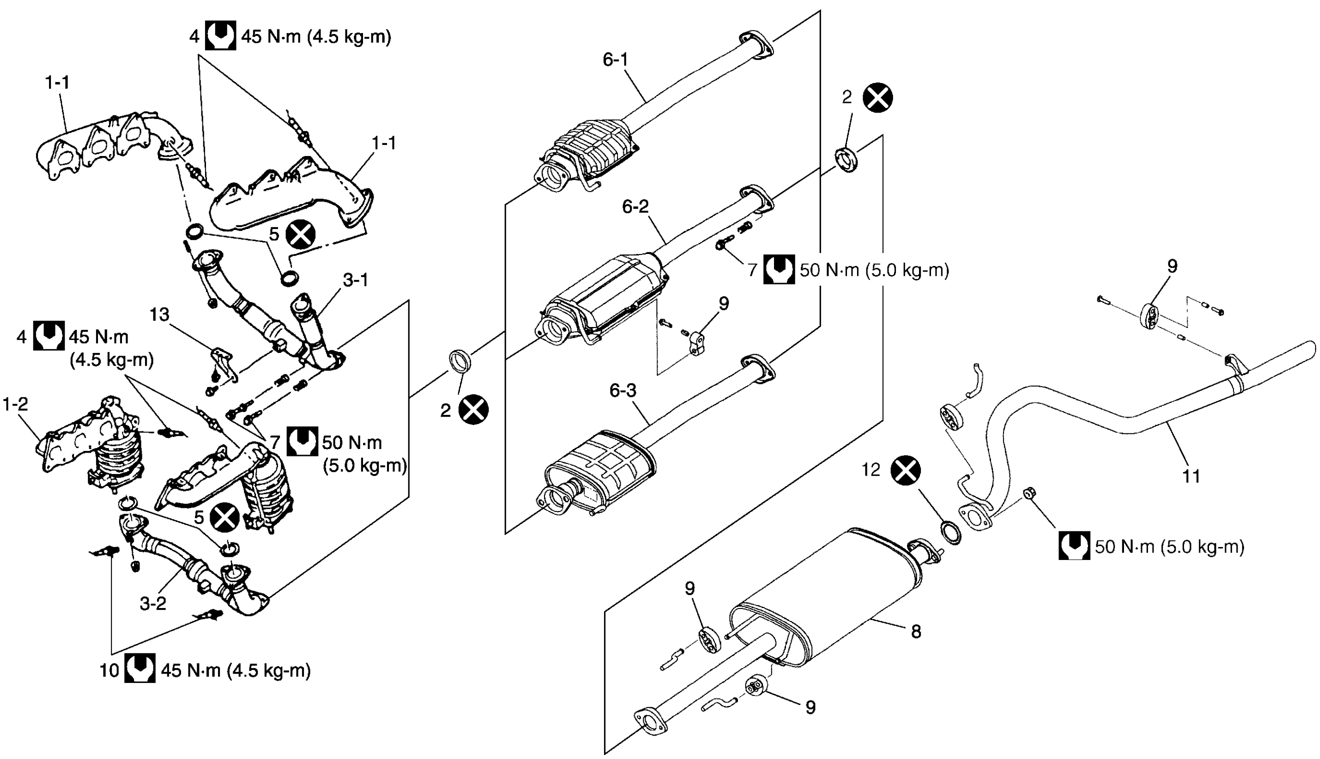
Components

TYPE WITH WELD BOLT AT MUFFLER FRONT FLANGE



1-1 Exhaust manifold (without WU-TWC)	4. Heated oxygen sensor-1 (if equipped)	7. Exhaust pipe bolt	11. Muffler tail pipe
1-2 Exhaust manifold (with WU-TWC)	5. Exhaust pipe gasket	8. Muffler	12. Muffler gasket
2. Seal ring	6-1 Exhaust No.2 pipe (without WU-TWC)	8-1. Weld bolt	13. No.1 Exhaust pipe stiffener
3-1 Exhaust No.1 pipe (without WU-TWC)	6-2 Exhaust No.2 pipe (with WU-TWC)	9. Muffler mounting	Tightening Torque
3-2 Exhaust No.1 pipe (with WU-TWC)	6-3 Exhaust No.2 pipe (without TWC)	10. Heated oxygen sensor-2 (if equipped)	Do not reuse

TYPE WITHOUT WELD BOLT AT MUFFLER FRONT FLANGE



1-1 Exhaust manifold (without WU-TWC)	4. Heated oxygen sensor-1 (if equipped)	7. Exhaust pipe bolt	12. Muffler gasket
1-2 Exhaust manifold (with WU-TWC)	5. Exhaust pipe gasket	8. Muffler	13. No.1 Exhaust pipe stiffener
2. Seal ring	6-1 Exhaust No.2 pipe (without WU-TWC)	9. Muffler mounting	Tightening Torque
3-1 Exhaust No.1 pipe (without WU-TWC)	6-2 Exhaust No.2 pipe (with WU-TWC)	10. Heated oxygen sensor-2 (if equipped)	Do not reuse
3-2 Exhaust No.1 pipe (with WU-TWC)	6-3 Exhaust No.2 pipe (without TWC)	11. Muffler tail pipe	

SECTION 7A1

MANUAL TRANSMISSION

NOTE:

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

CONTENTS

Unit Repair

NOTE:

This manual transmission (for H27 engine) is not equipped with C-ring of countershaft rear bearing. Therefore it is not necessary to disassemble or reassemble this C-ring from or to countershaft rear bearing. For the descriptions (items) other than mentioned above, refer to the same section of "UNIT REPAIR MANUAL" mentioned in the FOREWORD of this manual.

SECTION 7B1

AUTOMATIC TRANSMISSION (4 A/T)

WARNING:

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

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

NOTE:

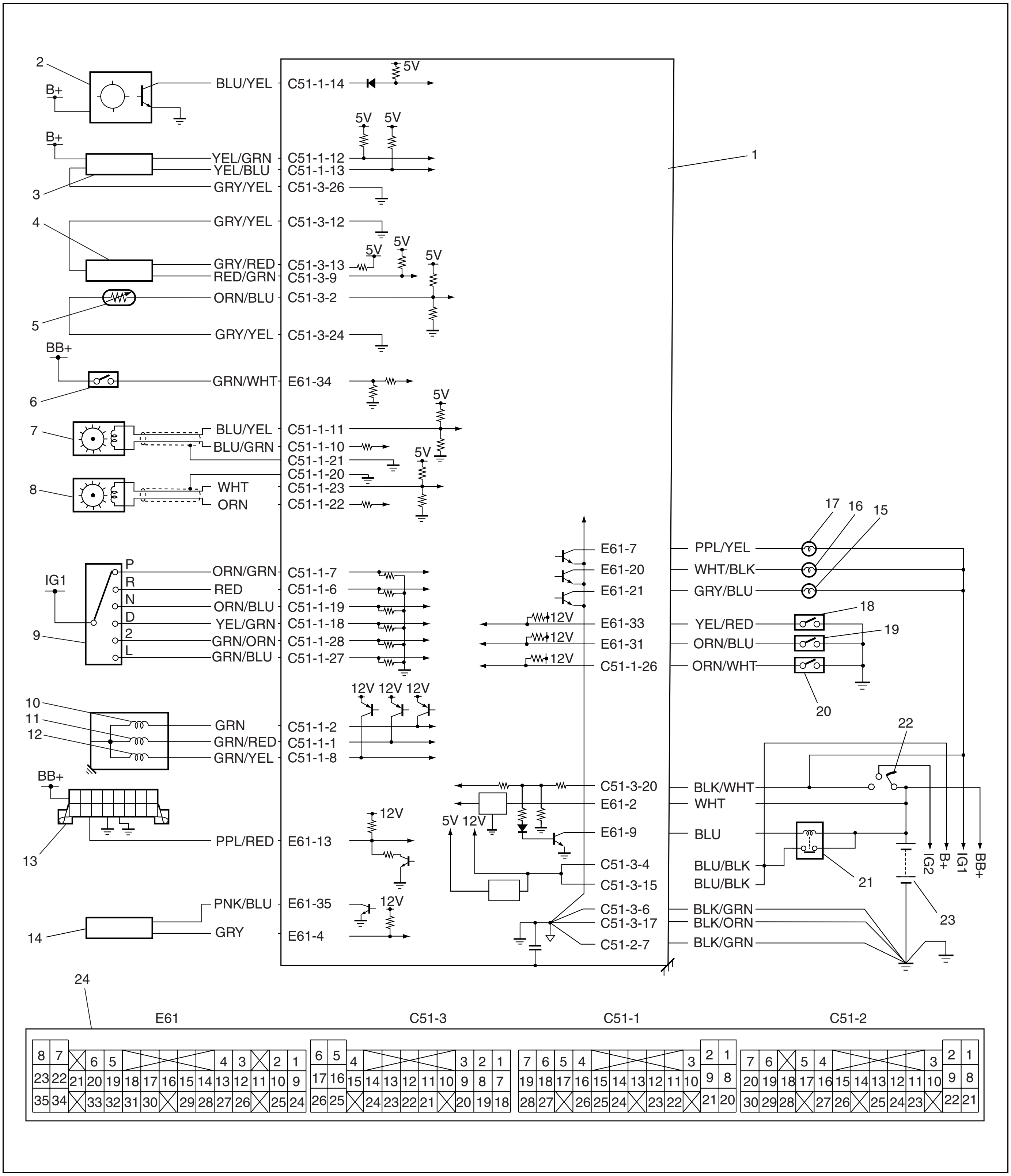
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

General Description

Item			Specifications	
Torque converter	Type		3-element, 1-step, 2-phase type (with TCC (lock-up) mechanism)	
	Stall torque ratio		2.0	
Oil pump	Type		Trochoid type oil pump	
	Drive system		Engine driven	
Gear change device	Type		Forward 4-step, reverse 1-step planetary gear type	
	Shift position		“P” range	Gear in neutral, output shaft fixed, engine start
			“R” range	Reverse
			“N” range	Gear in neutral, engine start
			“D” range (O/D ON)	Forward 1st ↔ 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change
			“D” range (O/D OFF)	Forward 1st ↔ 2nd ↔ 3rd automatic gear change
			“2” range	(Normal mode) Forward 1st ↔ 2nd ← 3rd automatic gear change (Power mode) Forward 2nd ← 3rd automatic gear change and fixed at 2nd gear
			“L” range	Forward 1st ← 2nd ← 3rd reduction, and fixed at 1st gear
	Gear ratio	1st (low gear)	2.826	
		2nd (second gear)	1.493	
		3rd (top gear)	1.000	
		4th (overdrive gear)	0.689	
		Reverse (reverse gear	2.703	
	Control elements		Wet type multi-disc clutch ... 3 sets Wet type multi-disc brake ... 4 sets One-way clutch ... 3 sets	
	Transfer		Hi : 1.000 Lo : 1.816 (4WD model only)	
	Final gear reduction ratio (Differential)		5.125	
Lubrication	Lubrication system		Force feed system by oil pump	
Cooling	Cooling system		Radiator assisted cooling (water-cooled)	
Fluid used			An equivalent of DEXRON®III	

Electronic Shift Control System



1.	PCM (ECM)	9.	Transmission range sensor	17.	MIL (“SERVICE ENGINE SOON” lamp)
2.	VSS	10.	Shift solenoid-A	18.	O/D off switch
3.	CMP sensor	11.	Shift solenoid-B	19.	P/N change switch
4.	TP sensor	12.	TCC solenoid	20.	4WD low switch
5.	ECT sensor	13.	Data link connector	21.	Main relay
6.	Stop lamp switch	14.	Cruise control module	22.	Ignition switch
7.	Input shaft speed sensor	15.	“POWER” lamp	23.	Battery
8.	Output shaft speed sensor	16.	“O/D OFF” lamp	24.	PCM (ECM) connector terminal (viewed from harness side)

Automatic gear shift diagram

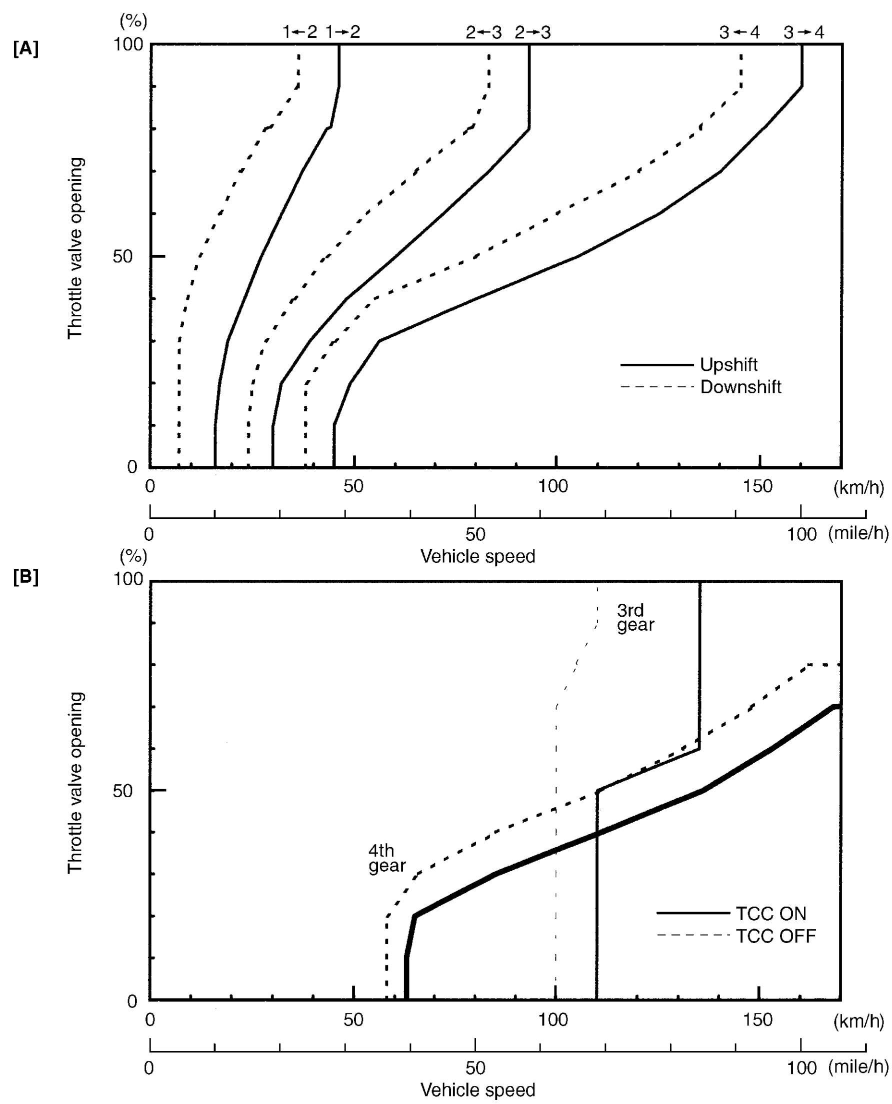
Automatic shift schedule as a result of shift control is shown below. In case that select lever is shifted to L at a higher than 55 km/h or 34 mile/h speed, 2nd or 3rd gear is operated and then down shifts to 1st at a speed lower than that. No up shift is available in L.

The same as, the select lever is shifted to 2 at a higher than 105 km/h (65 mile/h) speed, 3rd gear is operated and then down shifts to 2nd at a speed lower than that.

[POWER MODE]

		Shift					
		1 → 2	2 → 3	3 → 4	4 → 3	3 → 2	2 → 1
Throttle opening	Full throttle km/h (mile/h)	46 (29)	93 (58)	160 (100)	150 (94)	83 (52)	36 (23)
	Closed throttle km/h (mile/h)	16 (10)	30 (19)	45 (28)	38 (16)	24 (11)	7 (4)

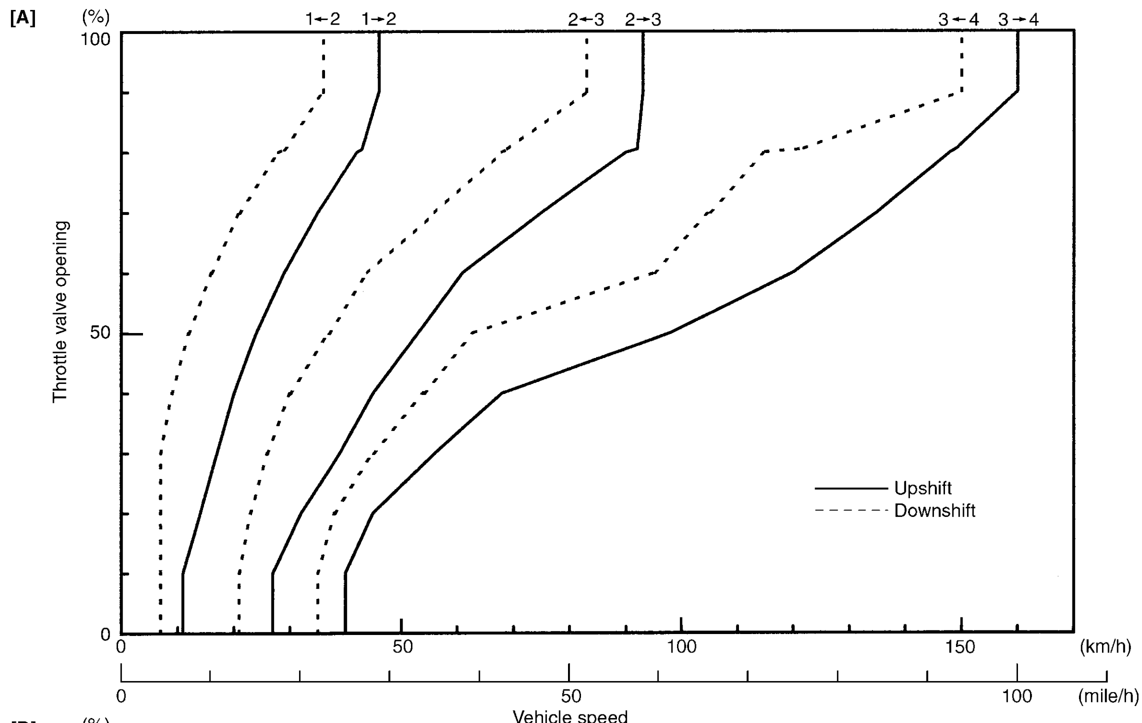
GEAR SHIFT DIAGRAM [A] AND TCC LOCK-UP DIAGRAM [B]

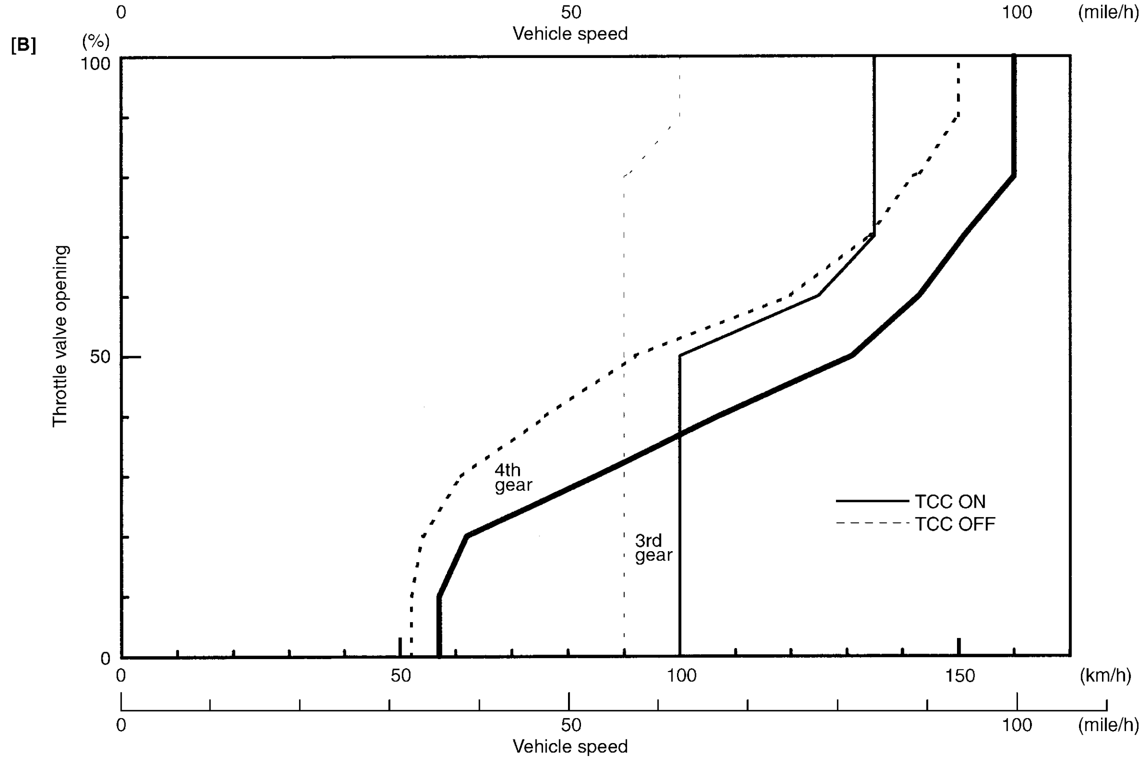


[NORMAL MODE]

		Shift					
		1 → 2	2 → 3	3 → 4	4 → 3	3 → 2	2 → 1
Throttle opening	Full throttle km/h (mile/h)	46 (29)	93 (58)	160 (100)	150 (94)	83 (52)	36 (23)
	Closed throttle km/h (mile/h)	11 (7)	27 (17)	40 (25)	35 (22)	21 (13)	7 (4)

GEAR SHIFT DIAGRAM [A] AND TCC LOCK-UP DIAGRAM [B]

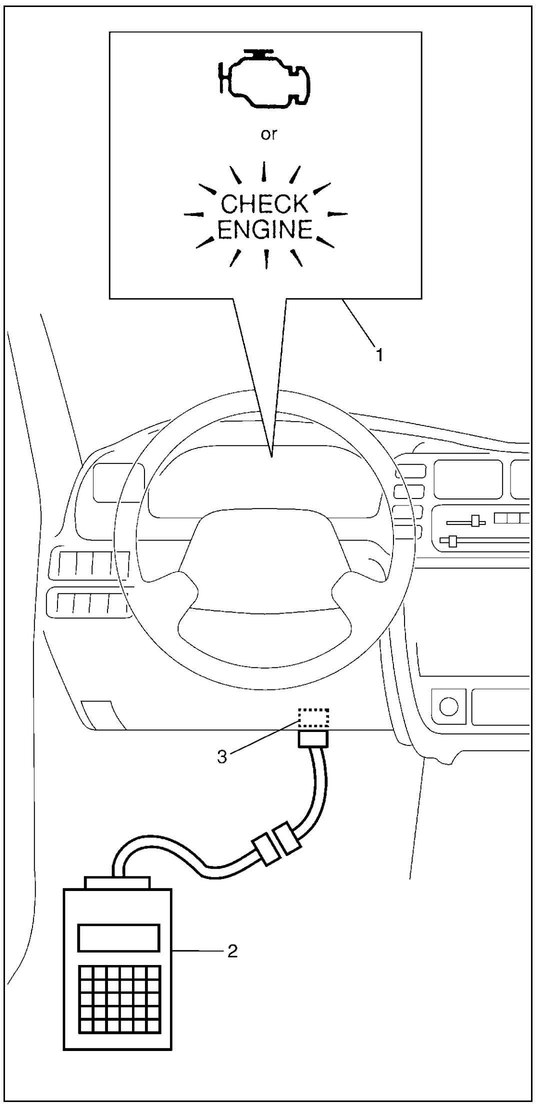




Diagnosis

This vehicle is equipped with an electronic transmission control system, which control the automatic shift up and shift down timing, TCC operation, etc. suitably to vehicle driving conditions.
PCM (ECM) has an On-Board Diagnosis system which detects a malfunction in this system and abnormality of those parts that influence the engine exhaust emission.
When diagnosing a trouble in the transmission including this system, be sure to have full understanding of the outline of “ON-BOARD DIAGNOSTIC SYSTEM” and each item in “PRECAUTION IN DIAGNOSING TROUBLE” and execute diagnosis according to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” to obtain correct result smoothly.

On-Board Diagnostic System (Vehicle without monitor connector)



For automatic transmission control system, PCM (ECM) has following functions. Refer to Section 6-1 for details.

- When the ignition switch is turned ON with the engine at a stop, malfunction indicator lamp (MIL) (1) turns ON to check the bulb of the MIL.
- When PCM detects a malfunction in A/T control system (and/or a malfunction which gives an adverse effect to vehicle emission) while the engine is running, it makes the malfunction indicator lamp in the meter cluster of the instrument panel turn ON and stores the malfunction area.
  (If it detects that continuously 3 driving cycles are normal after detecting a malfunction, however, it makes MIL (1) turn OFF although DTC stored in its memory will remain.)
- It is possible to communicate through DLC (3) by using not only SUZUKI scan tool (2). (Diagnostic information can be accessed by using a scan tool (2).)

2 DRIVING CYCLE DETECTION LOGIC

Refer to Section 6-1 for details.

PENDING DTC

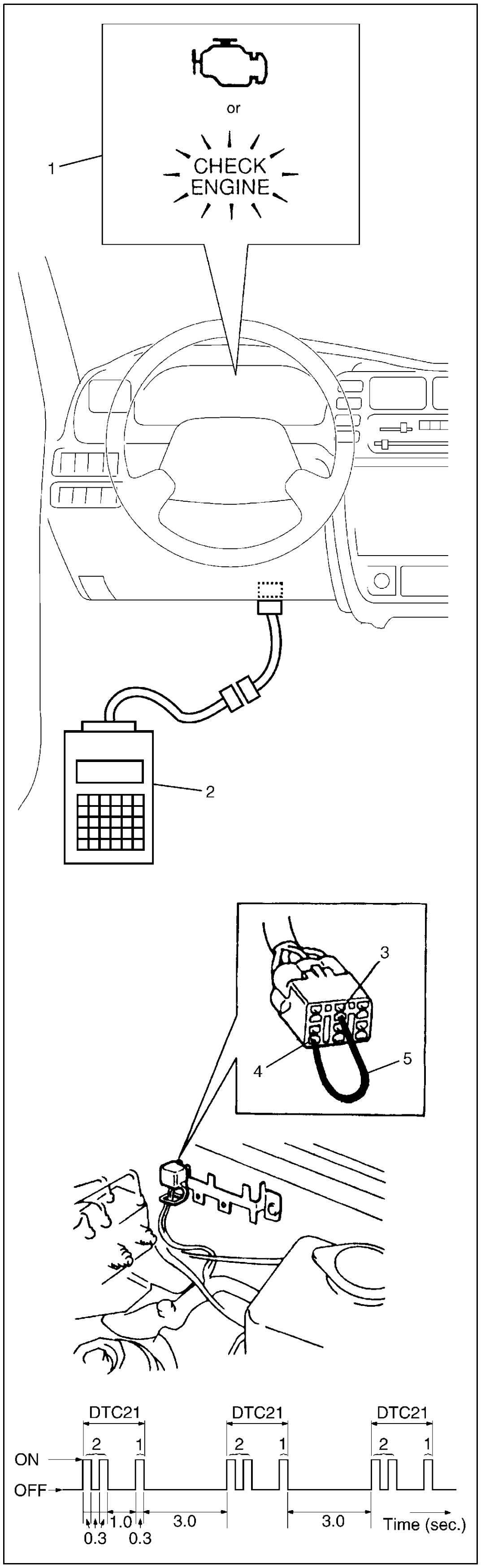
Refer to Section 6-1 for details.

FREEZE FRAME DATA

Refer to Section 6-1 for details.

On-Board Diagnostic System (Vehicle with monitor connector)

For automatic transmission control system, PCM (ECM) has following functions. Refer to Section 6/6-1 for details.



- When the ignition switch is turned ON with the engine at a stop, malfunction indicator lamp (MIL) turns ON to check the bulb of the MIL.
- When PCM detects a trouble in electronic shift control system, it stores its trouble code 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 PCM is shut off for 30 seconds or longer.)
- It is possible to communicate through DLC by using not only SUZUKI scan tool (2) but also generic scan tool. (Diagnostic information can be accessed by using a scan tool.)
- ECM also indicates trouble area in memory by means of flashing of malfunction indicator lamp (1) at the time of inspection. (i.e. when diagnosis switch terminal (3) is connected to ground terminal (4) with a service wire (5) and ignition switch is turned ON.)

Precaution in Diagnosing Trouble

- Don't disconnect couplers from PCM (ECM), battery cable from battery, PCM ground wire harness from engine or main fuse before checking the diagnosis information (DTC, freeze frame data, etc.) stored in PCM memory. Such disconnection will clear memorized information in PCM memory.
- Using SUZUKI scan tool or also generic scan tool for vehicle without monitor connector, the diagnostic information stored in PCM memory can be checked and cleared as well. Before its use, be sure to read Operator's (Instruction) Manual supplied with it carefully to have good understanding of its functions and usage.
- Priorities for diagnosing troubles
  If two or more diagnostic trouble codes (DTCs) are stored, proceed to the flow table of the DTC which was detected earliest in the order and follow the instruction in that table.
  If no instructions are given, troubleshoot diagnostic trouble codes according to the following priorities.
  – Diagnostic trouble codes (DTCs) other than DTC P0171/P0172/P0174/P0175 (Fuel system too lean/too rich), DTC P0300/P0301/P0302/P0303/P0304/P0305/P0306 (Misfire detected) and DTC P0400 (EGR flow malfunction)
  – DTC P0171/P0172/P0174/P0175 (Fuel system too lean/too rich) and DTC P0400 (EGR flow malfunction)
  – DTC P0300/P0301/P0302/P0303/P0304/P0305/P0306 (Misfire detected)
- Be sure to read "PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE" in Section 0A before inspection and observe what is written there.
- PCM replacement
  When substituting a known-good PCM, check for following conditions.
  Neglecting this check may result in damage to a good PCM.
  – All relays and actuators have resistance of specified value.
  – MAF sensor, MDP sensor, TP sensor and fuel tank pressure sensor are in good condition. Also, the power circuit of these sensors is not shorted to the ground.

Automatic Transmission Diagnostic Flow Table

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

Step	Action	Yes	No
1	Customer Complaint Analysis 1) Perform customer complaint analysis referring to the next page. Was customer complaint analysis performed according to instruction?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC) and Freeze Frame Data Check, Record and Clearance 1) Check for DTC (including pending DTC) Is there any DTC(s)?	Print DTC and freeze frame data or write them down and clear them by referring to “DTC CLEARANCE” in this section Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?	Repair or replace malfunction part. Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?		Go to Step 8.
5	Trouble Symptom Confirmation 1) Confirm trouble symptom referring to the next page. Is trouble symptom identified?	Go to Step 6.	Go to Step 7.
6	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to “DTC Check” in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 8.
7	Rechecking and Record of DTC/Freeze Frame Data 1) Recheck for DTC and freeze frame data referring to “DTC Check” in this section. Is there any DTC(s)?	Go to Step 9.	Go to Step 10.
8	Automatic Transmission Basic Inspection and Trouble Diagnosis Table 1) Check and repair according to “A/T Basic Check” and “Trouble Diagnosis Table” in this section. Are check and repair complete?	Go to Step 11.	Check and repair malfunction part(s). Go to Step 11.
9	Troubleshooting for DTC 1) Check and repair according to applicable DTC diag. flow Table. Are check and repair complete?		
10	Check for Intermittent Problems 1) Check for intermittent problems referring to the next page. Is there any faulty condition?	Repair or replace malfunction part(s). Go to Step 11.	Go to Step 11.

Step	Action	Yes	No
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to the next page. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

STEP 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 inspection form will facilitate collecting information to the point required for proper analysis and diagnosis.

STEP 2. DIAGNOSTIC TROUBLE CODE (DTC)/FREEZE FRAME DATA CHECK, RECORD AND CLEARANCE

First, referring to DTC check section, check DTC (including pending DTC). If DTC exists, print or write down DTC and freeze frame data and then clear them by referring to DTC clearance section. DTC indicates malfunction in the system but it is not possible to know from it whether the malfunction is occurring now or it occurred in the past and normal condition has been restored. In order to know that, check symptom in question according to Step 5 and then recheck DTC according to Step 6.
Diagnosing a trouble based on the DTC in this step only or failure to clear the DTC in this step may result in an faulty diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting which is otherwise unnecessary.

STEP 3 and STEP 4. VISUAL INSPECTION

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

STEP 5. TROUBLE SYMPTOM CONFIRMATION

Check trouble symptoms based on information obtained in Step 1 “CUSTOMER COMPLAINT ANALYSIS” and Step 2 “DTC/FREEZE FRAME DATA CHECK”.
Also, recheck DTC according to “DTC CONFIRMATION PROCEDURE” described in each “DTC FLOW TABLE”.

STEP 6 and STEP 7. RECHECKING AND RECORD OF DTC/FREEZE FRAME DATA

Refer to “DTC CHECK” in this section for checking procedure.

STEP 8. A/T BASIC CHECK AND TROUBLE DIAGNOSIS TABLE

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

STEP 9. DIAGNOSTIC TROUBLE CODE FLOW TABLE

Based on the DTC indicated in Step 6 and 7 and referring to “DIAGNOSTIC TROUBLE CODE FLOW TABLE” in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, PCM or other part and repair or replace faulty parts.

STEP 10. CHECK FOR INTERMITTENT PROBLEM

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

STEP 11. FINAL CONFIRMATION TEST

Confirm that the problem symptom has gone and the A/T is free from any abnormal conditions.
If what has been repaired is related to the malfunction DTC, clear the DTC once, set conditions under which DTC was detected and A/T and/or vehicle was repaired and confirm that no DTC is indicated.

CUSTOMER PROBLEM INSPECTION FORM (EXAMPLE)

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

PROBLEM SYMPTOMS	
☐Engine does not start	☐Engine stops
☐Vehicle does not move (forward, rearward)	☐Transmission does not shift (1st, 2nd, 3rd, 4th, Rev) gear
☐No lock-up (TCC clutch operation)	☐Automatic shift does not occur
☐Shift point too high or too low	☐Transmission slipping in (1st, 2nd, 3rd, 4th, Rev) gear
☐Excessive gear change shock	☐Other:

VEHICLE/ ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS

Environmental Condition	
Weather	☐Fair/☐Cloudy/☐Rain/☐Snow/☐Always/☐Other ( )
Temperature	☐Hot/☐Warm/☐Cool/☐Cold/☐(°C °F)/☐Always
Frequency	☐Always/☐Sometimes/☐(times/ day, month)/☐Only Once
Road	☐Urban/☐Suburb/☐Highway/☐Mountainous (uphill/downhill)/☐Paved road/☐Gravel/ ☐Other( )

Vehicle Condition	
Transmission range	☐(P,R,N,D,2,L) range/☐(→) range
Transmission temp.	☐Cold/☐Warming up phase/☐Warmed up
Vehicle	☐At stop/☐During driving (constant speed/accelerating/decelerating/ right hand corner/left hand corner)/☐Other ( )/☐Speed (km/h mile/h)
Engine	☐Speed(r/min)/☐Throttle opening(idle/about %/full)
Brake	☐Apply/☐Not apply
O/D off switch	☐ON/☐OFF
P/N change switch	☐Power/☐Normal

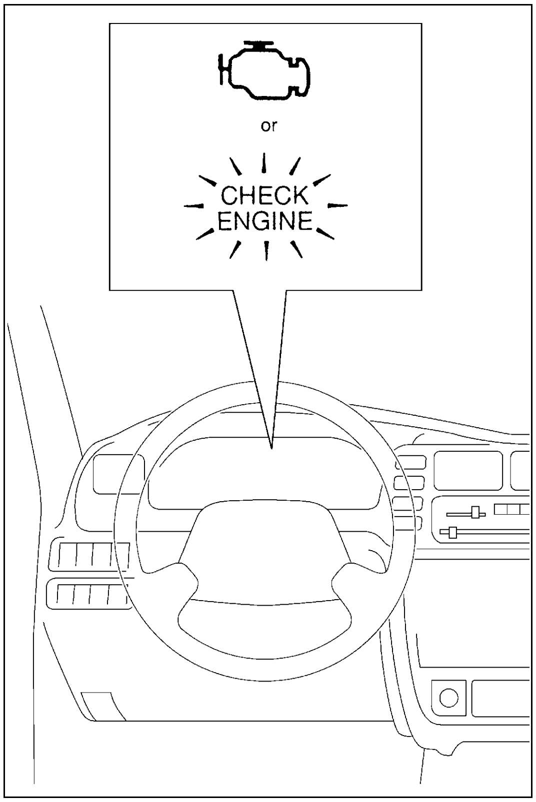
Malfunction indicator lamp("SERVICE ENGINE SOON" light) condition
☐Always ON ☐Sometimes ON ☐Always OFF ☐Good condition

Diagnostic trouble code			
	First check	: ☐No code	☐Malfunction code( )
	Second check	: ☐No code	☐Malfunction code( )

NOTE:

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

Malfunction Indicator Lamp (MIL) Check



Refer to the same item in Section 6-1 for checking procedure.

"O/D OFF" Lamp Check

1) Check that O/D off switch button is at OFF position (pushed).
2) Turn ignition switch ON.
3) Check that "O/D OFF" lamp lights for about 2 – 4 sec. and then goes OFF.
   If anything faulty is found, advance "DIAGNOSTIC FLOW TABLE B-1 or B-2 "O/D OFF" LAMP CIRCUIT CHECK".

"POWER" Lamp Check

1) Check that Power/Normal change switch button is at Normal position.
2) Turn ignition switch ON.
3) Check that "POWER" lamp lights for about 2 – 4 sec. and then goes OFF.
   If anything faulty is found, advance "DIAGNOSTIC FLOW TABLE B-3 or B-4 "POWER" LAMP CIRCUIT CHECK".

Diagnostic Trouble Code (DTC) Check

Refer to the same item in Section 6-1 for checking procedure.

Diagnostic Trouble Code Clearance

Refer to the same item in Section 6-1 for clearance procedure.

Diagnostic Trouble Code Table

Refer to the same item in Section 6-1.

Fail Safe Table

Refer to the same item in Section 6-1.

Visual Inspection

Visually check following parts and systems.

INSPECTION ITEM	REFERRING SECTION
• A/T fluid - - - - - level, leakage, color	SECTION 0B
• A/T fluid hoses - - - - - disconnection, looseness, deterioration	SECTION 7B1
• Throttle (accelerator) cable - - - - - play, installation	SECTION 6E2
• A/T throttle cable - - - - - play, installation	SECTION 7B1
• A/T select cable - - - - - installation, operation	SECTION 7B1
• Engine oil - - - - - level, leakage	SECTION 0B
• Engine coolant - - - - - level, leakage	SECTION 0B
• Battery - - - - - fluid level, corrosion of terminal	
• Connectors of electric wire harness - - - - - disconnection, friction	Section 6-1 or 7B1
• Fuses - - - - - burning	SECTION 8
• Parts - - - - - installation, damage	
• bolt - - - - - looseness	
• Other parts that can be checked visually	
• Also check following items at engine start, if possible.	
– “O/D OFF” lamp - - - - - Operation	SECTION 7B1
– “POWER” lamp - - - - - Operation	SECTION 7B1
– Malfunction indicator lamp (“SERVICE ENGINE SOON” lamp) - - - - - Operation	Section 6-1
– Charge warning lamp - - - - - Operation	SECTION 6H
– Engine oil pressure warning lamp - - - - - Operation	SECTION 8C (SECTION 6A2 for pressure check)
– Engine coolant temp. meter - - - - - Operation	
– Other parts that can be checked visually	

A/T Basic Check

This inspection is important for troubleshooting when PCM (ECM) has detected no DTC and no abnormality has been noted in visual inspection. Follow flow table carefully.

Step	Action	Yes	No
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE”.
2	Perform “MANUAL ROAD TEST” in this section. Is it OK?	Go to Step 3.	Go to Step 4.
3	Proceed to “TROUBLE DIAGNOSIS TABLE 1” in this section. Is trouble identified?	Repair or replace defective parts.	Go to Step 5.

Step	Action	Yes	No
4	Perform stall test, time rag test, line pressure test, engine brake test and “P” range test referring to “STALL TEST”, “LINE PRESSURE TEST”, “ENGINE BRAKE TEST” and ““P” RANGE TEST” in this section. Are the test results satisfactory?	Go to Step 5.	Proceed to “TROUBLE DIAGNOSIS TABLE 3” in this section.
5	Proceed to “TROUBLE DIAGNOSIS TABLE 2” in this section. Is trouble identified?	Repair or replace defective parts.	Proceed to “TROUBLE DIAGNOSIS TABLE 3” in this section.

Trouble Diagnosis Table 1

Condition	Possible Cause	Correction
TCC does not operate	Brake pedal (stop lamp) switch or its circuit faulty (H25 engine only)	Refer to “DIAGNOSTIC FLOW TABLE A-1” in this section.
	4WD low switch or its circuit faulty	
	Engine coolant temp. sensor or its circuit faulty	
	Cruise control signal circuit faulty (if equipped)	
Gear does not change to 4th	O/D off switch or its circuit faulty	Refer to “DIAGNOSTIC FLOW TABLE A-2” in this section.
	4WD low switch or its circuit faulty	
	Engine coolant temp. sensor or its circuit faulty	
	Cruise control signal circuit faulty (if equipped)	

Trouble Diagnosis Table 2

TRANSMISSION FLUID

Condition	Possible Cause	Correction
Low fluid pressure	Clogged oil pump strainer	Wash strainer.
	Malfunction of pressure regulator valve	Overhaul valve body.
High fluid pressure	Pressure regulator valve	Overhaul valve body.

RUNNING CONDITION

Condition	Possible Cause	Correction
Unable to run in all range	Regulator valve stick	Replace.
	Clogged oil strainer	Wash strainer.
	Seized or broken planetary gear	Repair or replace.
	Faulty manual valve	Replace.
Poor 1st speed running or excessive slippage in “D” or “2”	Faulty 1–2 shift valve	Replace.

GEAR SHIFT

Condition	Possible Cause	Correction
Poor 1–2 shift, excessive slippage	Regulator valve sticking	Replace.
	1–2 shift valve sticking	Replace.
	Shift solenoid valve-B sticking	Replace.
	Intermediate coast modulator valve sticking	Replace.
Poor 2–3 shift, excessive slippage	2–3 shift valve sticking	Replace.
	Shift solenoid valve-A sticking	Replace.
Poor start or surging in “D” range	Regulator valve sticking	Replace.
Poor 3-4 shift, excessive slippage	3–4 shift valve sticking	Replace.
	Shift solenoid valve-B sticking	Replace.
Excessive shock on 1–2 shift	Regulator valve sticking	Replace.
	Faulty accumulator, second brake piston	Replace.
Excessive shock on 2–3 shift	Regulator valve sticking	Replace.
	Faulty accumulator, direct clutch piston	Replace.
Excessive shock on 3–4 shift	Regulator valve sticking	Replace.
Non operate lock-up system	TCC (Lock-up) control valve sticking	Replace.
	Solenoid valve No.2 (TCC solenoid valve) sticking	Replace.

Trouble Diagnosis Table 3

TRANSMISSION FLUID

Condition	Possible Cause	Correction
Low fluid pressure	Leakage from oil pressure circuit	Overhaul.

RUNNING CONDITION

Condition	Possible Cause	Correction
Unable to run in all range	Wear in oil pump	Replace.
	Seizure in oil pump	Replace.
	Fluid pressure leakage to over drive clutch due to wear of oil pump bushing	Replace.
	Faulty in torque converter	Replace.
Poor 1st speed running or excessive slippage in “D” or “2”	Fluid pressure leakage from forward clutch due to wear or breakage of O/D case seal ring	Replace.
	Overdrive clutch slipping	Replace.
Unable to run or excessive slippage in “L” range	Fluid pressure leakage of forward clutch due to wear or breakage of O/D case seal ring	Replace.
	Reverse brake disc slipping	Replace.
	Broken brake piston O-ring	Replace.
Unable to run or excessive slippage in “R” range	Fluid pressure leakage to direct clutch due to wear or breakage of center support seal ring	Replace.
	Worn direct clutch	Replace.

GEAR SHIFT

Condition	Possible Cause	Correction
Poor 1–2 shift, excessive slippage	Fluid pressure leakage to overdrive clutch due to wear or breakage of O/D case seal ring	Replace.
	Faulty second brake	Replace.
	Broken O-ring of second brake piston	Replace.
	Faulty second coast brake (in “2” range)	Replace.
Poor 2–3 shift, excessive slippage	Fluid pressure leakage to overdrive clutch due to wear or breakage of O/D case seal ring	Replace.
	Worn direct clutch bushing	Replace.
	Direct clutch slipping	Replace.
	Foreign material caught in direct clutch piston check ball	Replace.
Poor start or surging in “D” range	Fluid pressure leakage of forward clutch due to wear or breakage of O/D case seal ring	Replace.
	Malfunction of forward clutch	Replace.
Poor 3–4 shift, excessive slippage	Faulty overdrive brake	Replace.
	Faulty overdrive clutch	Replace.
Poor start or juddering in “R” range	Fluid pressure leakage of direct clutch due to wear or breakage of oil center support seal ring	Replace.
	Worn direct clutch	Replace.
Excessive shock on 1– 2 shift	Faulty one-way clutch	Replace.
Non operate lock-up system	Faulty torque converter	Replace.

ABNORMAL NOISE

Condition	Possible Cause	Correction
Abnormal noise in “P” or “N” range	Worn oil pump	Replace.

Scan Tool Data

Refer to Section 6-1.

Inspection of PCM and Its Circuit

Refer to Section 6-1.

Wire Harness and Connectors

Refer to Section 6-1.

Table A-1 : No TCC Lock-Up Occurs

SYSTEM DESCRIPTION

PCM turns TCC solenoid OFF under any of the following conditions.

- Brake pedal switch : ON
- 4WD LOW switch : ON
- Cruise control module : TCC OFF command signal is output (if equipped).
- ECT : ECT < 30 °C (86 °F)

TROUBLESHOOTING

WARNING:

- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 person, a driver and tester, on a level road.**

Step	Action	Yes	No
1	Was “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” performed?	Go to Step 2.	Go to “AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE” in this section.
2	ECT check : 1) Warm up engine to normal operating temperature. 2) Check ECT using scan tool. Is ECT more than 30 °C (86 °F)?	Go to Step 3.	Faulty ECT sensor, its circuit or engine cooling system. If OK, substitute a known-good PCM and recheck.
3	Perform running test under the following conditions and check voltage between C51-1-8 terminal of PCM coupler and ground. • Normal mode in “D” range. • Transfer “2H” position. • Cruise control is not operated (if equipped). • Brake pedal released. • Drive vehicle with TCC ON condition referring to “TCC LOCK-UP DIAGRAM” in this section. Is it battery voltage?	Faulty TCC solenoid valve, its circuit or transmission.	Go to Step 4.
4	Brake switch signal inspection : With ignition switch ON, check voltage between E61-34 terminal of PCM coupler terminal and ground. **Brake switch specification** **Brake pedal released : 0 V** **Brake pedal depressed : Battery voltage** Is the result as specified?	Go to Step 5.	Faulty brake pedal switch or its circuit. If OK, substitute a known-good PCM and recheck.

Step	Action	Yes	No
5	"4WD LOW" switch signal inspection : With ignition switch ON, check voltage between C51-1-26 terminal of PCM coupler and ground. **"4WD LOW" switch specification** **Transfer gear position "4L" or "N" : 0 V** **Transfer gear position "4H" or "2H" :** **Battery voltage** Is the result as specified?	Go to Step 6.	Faulty "4WD LOW" switch or its circuit. If OK, substitute a known-good PCM and recheck.
6	Is vehicle equipped with cruise control system?	Go to Step 7.	Substitute a know-good PCM and recheck.
7	Cruise control signal inspection : With ignition switch ON, check voltage between E61-35 terminal of PCM coupler and ground. Is it battery voltage?	Substitute a known-good PCM and recheck.	Faulty cruise control module or its circuit. If OK, substitute a known-good PCM and recheck.

Table A-2 : No Gear Shift to O/D

SYSTEM DESCRIPTION

PCM does not shift to O/D gear under any of the following conditions.

- O/D off switch : ON
- 4WD LOW switch : ON
- Cruise control module : O/D OFF command signal is output (if equipped).
- ECT : ECT < 30 °C (86 °F)

TROUBLESHOOTING

WARNING:

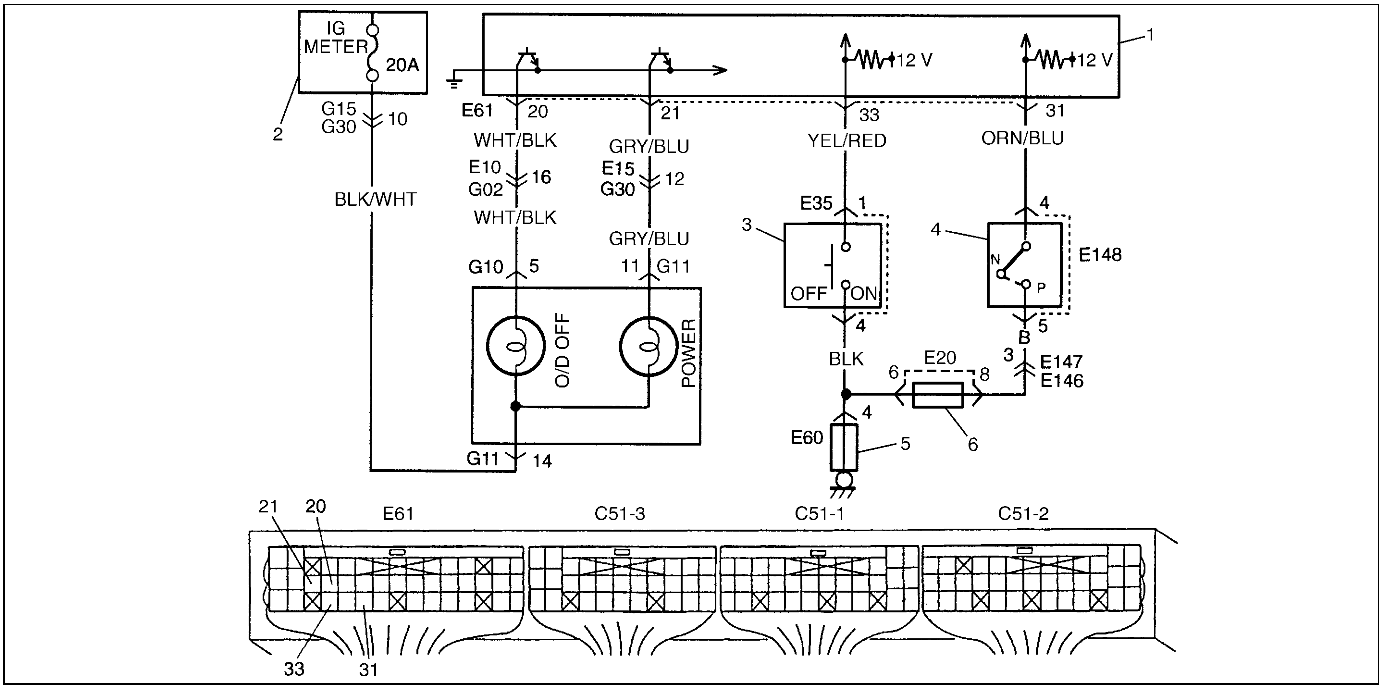
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 person, a driver and tester, on a level road.**

Step	Action	Yes	No
1	Was "AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE" performed?	Go to Step 2.	Go to "AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE" in this section.
2	ECT check : 1) Warm up engine to normal operating temperature. 2) Check ECT using scan tool. Is ECT more than 30 °C (86 °F)?	Go to Step 3.	Faulty ECT sensor, its circuit or engine cooling system. If OK, substitute a known-good PCM and recheck.
3	Perform running test under the following conditions and check voltage between C51-1-2 terminal of PCM coupler and ground, C51-1-1 terminal of PCM coupler and ground. • O/D off switch OFF ("O/D OFF" lamp OFF). • Normal mode in "D" range. • Transfer "2H" position. • Cruise control is not operated (if equipped). • Drive vehicle with 4th gear condition referring to "Gear shift diagram" in this section. Is each voltage about 0 V?	Faulty shift solenoid valve, its circuit or transmission	"GRN" wire or "GRN/RED" wire shorted to power circuit. If OK, go to Step 4.
4	O/D off switch signal inspection : With ignition switch ON, check voltage between E61-33 terminal of PCM coupler and ground. **"O/D" cut switch specification** **"O/D" cut switch OFF : Battery voltage** **"O/D" cut switch ON : 0 V** Is the result as specified?	Go to Step 5.	Faulty O/D off switch or its circuit. If OK, substitute a known-good PCM and recheck.

Step	Action	Yes	No
5	"4WD LOW" switch signal inspection : With ignition switch ON, check voltage between C51-1-26 terminal of PCM coupler and ground. **"4WD LOW" switch specification** **Transfer gear position "4L" or "N" : 0 V** **Transfer gear position "4H" or "2H" : Battery voltage** Is the result as specified?	Go to Step 6.	Faulty "4WD LOW" switch or its circuit. If OK, substitute a known-good PCM and recheck.
6	Is vehicle equipped with cruise control system?	Go to Step 7.	Substitute a known-good PCM and recheck.
7	Cruise control signal inspection : With ignition switch ON, check voltage between E61-35 terminal of PCM coupler and ground. Is it battery voltage?	Substitute a known-good PCM and recheck.	Faulty cruise control module or its circuit. If OK, substitute a known-good PCM and recheck.

Table B-1 : "O/D OFF" Light Circuit Check ("O/D OFF" Light Doesn't Light at Ignition Switch ON But Engine Starts Up)

WIRING DIAGRAM



1. PCM	4. P/N change switch
2. Fuse	5. J/C
3. O/D off switch	6. J/C

TROUBLESHOOTING

Step	Action	Yes	No
1	"O/D OFF" light circuit check: 1) With ignition switch OFF, disconnect couplers from PCM. 2) Using service wire, connect E61-20 terminal of disconnected PCM coupler and ground. Does "O/D OFF" light turn ON at ignition switch ON?	Poor E61-20 terminal connection. If OK, substitute a know-good PCM and recheck.	Bulb burned out or faulty "WHT/BLK", "BLK/WHT" wire.

Table B-2 : “O/D OFF” Light Circuit Check (“O/D OFF” Light Comes ON Steadily)

WIRING DIAGRAM

Refer to “TABLE B-1” in this section.

TROUBLESHOOTING

Step	Action	Yes	No
1	Check O/D off switch status. Press O/D off switch button (1). Does “O/D OFF” lamp come ON steadily?	Go to Step 2.	System is OK.
2	Check lamp circuit for short. 1) Turn ignition switch OFF and disconnect PCM connectors. 2) Turn ignition switch ON. Does “O/D OFF” lamp come ON steadily?	“WHT/BLK” circuit shorted to ground.	Go to Step 3.
3	Check O/D off switch circuit. 1) Check resistance between terminal E61-33 of disconnected PCM connector and body ground with O/D off switch button (1) released. Is continuity indicated?	Go to Step 4.	Check PCM ground circuit for open. If ground circuit is OK, substitute a known-good PCM and recheck.
4	Check O/D off switch for operation. 1) Remove console box. 2) Disconnect O/D off switch connector. 3) Check continuity between switch terminals under each condition below. **O/D switch operation** **With O/D off switch button (1) released : No continuity** **With O/D off switch button (1) pressed : Continuity** Is check result satisfactory?	“YEL/RED” circuit shorted to ground.	Replace O/D off switch.

[A] for Step 1/[B] for Step 4

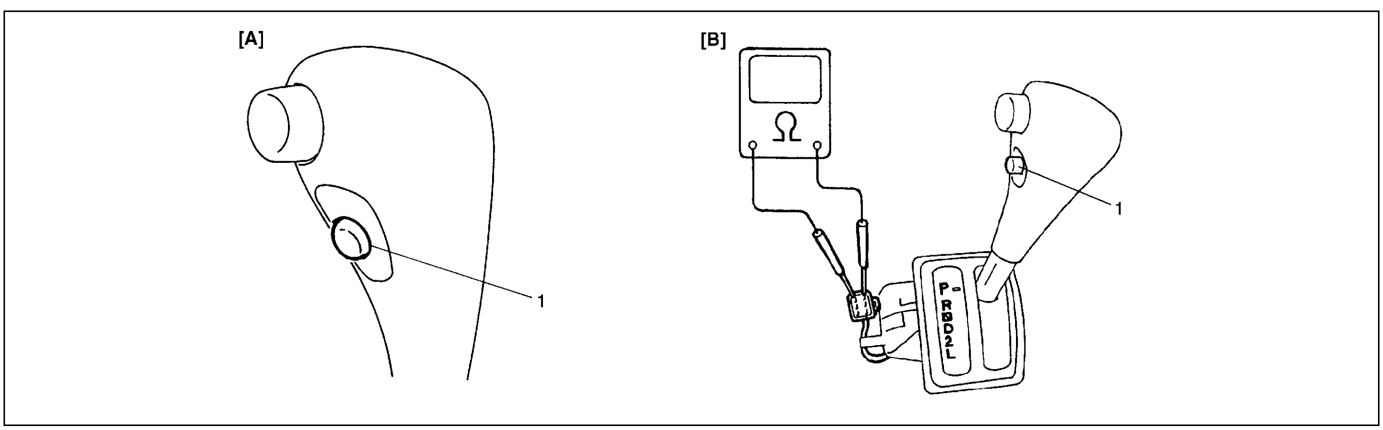
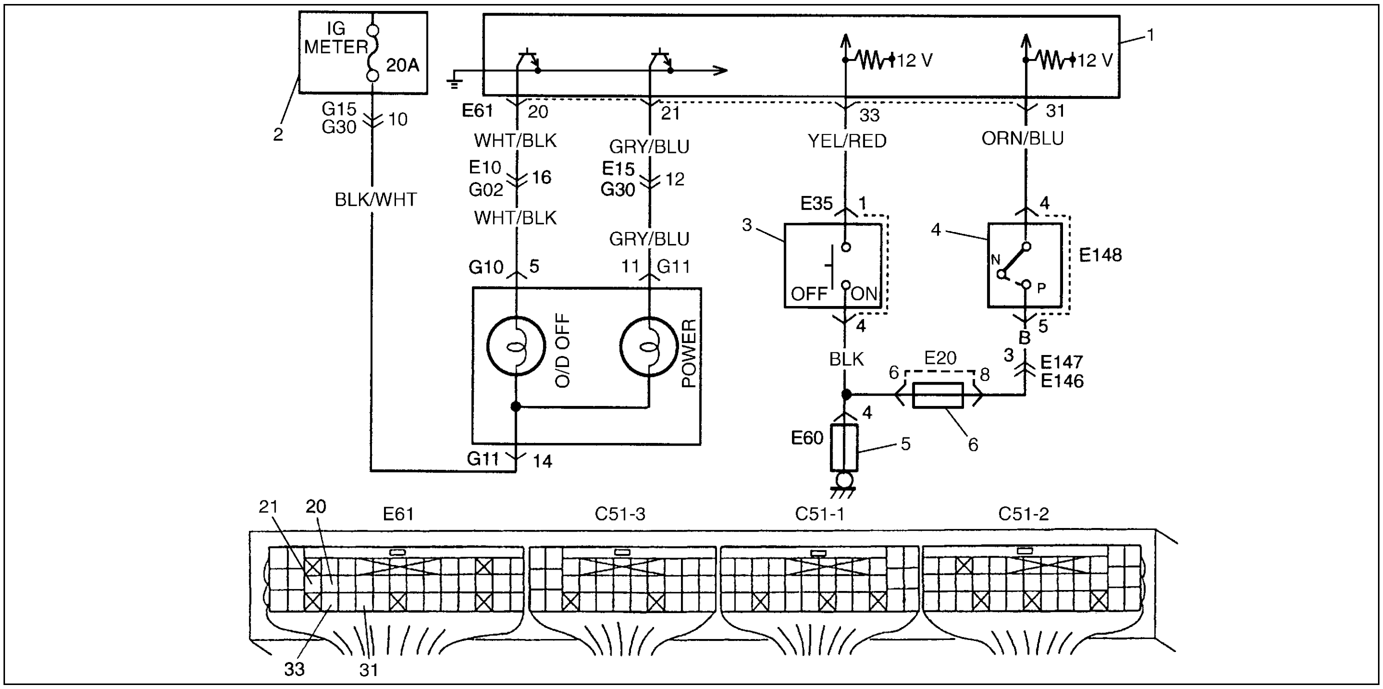


Table B-3 : "POWER" Light Circuit Check ("POWER" Light Doesn't Light at Ignition Switch ON But Engine Starts Up)

WIRING DIAGRAM



1. PCM	4. P/N change switch
2. Fuse	5. J/C
3. O/D off switch	

TROUBLESHOOTING

Step	Action	Yes	No
1	"POWER" light circuit check : 1) With ignition switch OFF, disconnect couplers from PCM. 2) Using service wire, connect E61-21 terminal of disconnected PCM coupler and ground. Does "POWER" light turn ON at ignition switch ON?	Poor E61-21 terminal connection. If OK, substitute a known-good PCM and recheck.	Bulb burned out or faulty "GRY/BLU", "BLK/WHT" wire.

Table B-4 : “POWER” Light Circuit Check (“POWER” Light Comes ON Steadily)

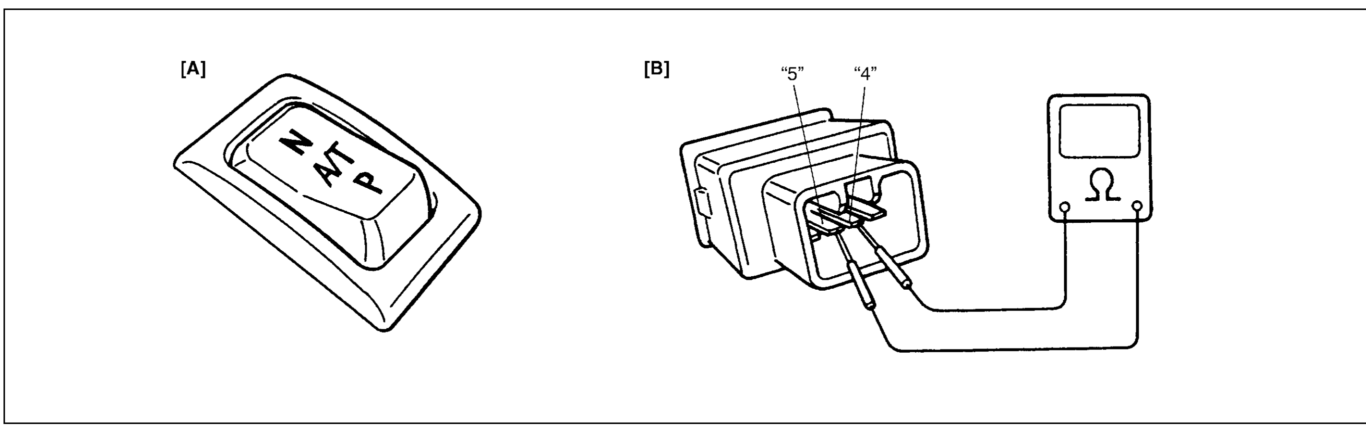
WIRING DIAGRAM

Refer to “TABLE B-3” in this section.

TROUBLESHOOTING

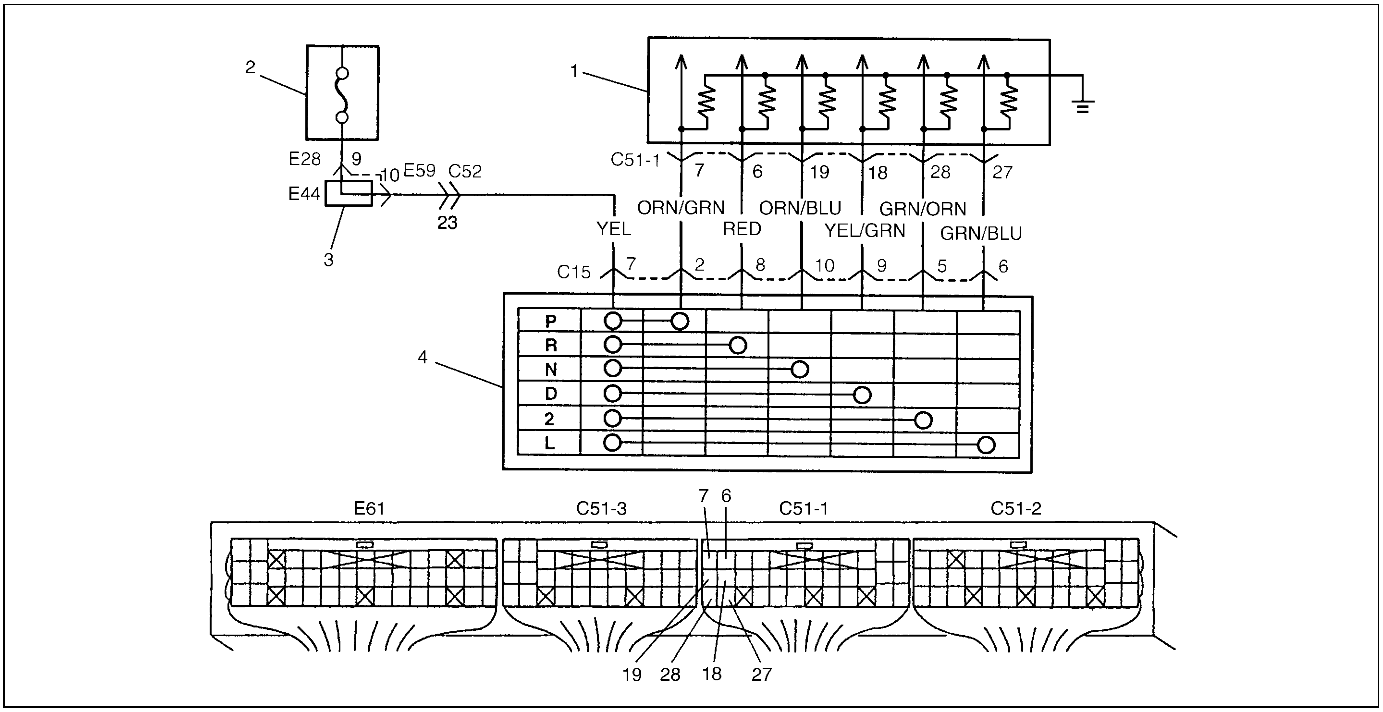
Step	Action	Yes	No
1	Check Power/Normal change switch position. Is switch button at Normal position?	Go to Step 2.	Set Power/Normal change switch at Normal position.
2	Check lamp circuit for short. 1) Turn ignition switch OFF and disconnect PCM connectors. 2) Turn ignition switch ON. Does “POWER” lamp come ON steadily?	“GRY/BLU” circuit shorted to ground.	Go to Step 3.
3	Check Power/Normal change switch circuit. 1) Check resistance between terminal E61-31 of disconnected PCM connector and body ground with P/N change switch OFF. Is continuity indicated?	Go to Step 4.	Check PCM ground circuit for open. If ground circuit is OK, substitute a known-good PCM and recheck.
4	Check Power/Normal change switch for operation. 1) Remove Power/Normal change switch. 2) Check continuity between switch terminals “4” and “5” under each condition below. Normal position: No continuity Power position: Continuity. Is check result satisfactory?	“ORN/BLU” circuit shorted to ground.	Replace Power/Normal change switch.

[A] for Step 1/[B] for Step 4



DTC P0705 (DTC NO.72) - Transmission Range Sensor (Switch) Circuit Malfunction

WIRING DIAGRAM



1. PCM	3. J/C
2. Fuse	4. Transmission range sensor (switch)

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
• Transmission range switch signal (P, R, N, D, 2 or L) is not inputted for 25 sec, at 60 km/h (38 mile/h) or higher vehicle speed. or • Multiple signals are inputted simultaneously for 25 sec. (2 driving cycle detection logic)	• Transmission range sensor (switch) maladjusted. • Transmission range sensor (switch) or its circuit malfunction. • PCM

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

1) Connect scan tool to DLC with ignition switch OFF, if available.
2) Clear DTC, pending DTC and freeze frame data in PCM memory by using scan tool and start engine.
3) Shift A/T selector lever to each of L, 2, D, N, R and P ranges for 30 seconds each.
4) Increase vehicle speed to about 70 km/h (45 mile/h) in D range.
5) Keep driving above vehicle speed for 30 seconds.
6) Release accelerator pedal, decrease vehicle speed and stop vehicle.
7) Check DTC and/or pending DTC.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was "A/T DIAGNOSTIC FLOW TABLE" in this section performed?	Go to Step 2.	Go to "A/T DIAGNOSTIC FLOW TABLE" in this section.
2	Do you have SUZUKI scan tool?	Go to Step 3.	Go to Step 4.
3	Check Transmission range switch (sensor) circuit for operation. Check by using SUZUKI scan tool : 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check transmission range signal (P, R, N, D, 2 or L) on display when shifting select lever to each range. Is applicable range indicated? Are check results satisfactory?	Intermittent trouble. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Go to Step 5.
4	Check Transmission range switch (sensor) circuit for operation. Check by not using SUZUKI scan tool : 1) Turn ignition switch ON. 2) Check voltage at terminals C51-1-6, C51-1-7, C51-1-18, C51-1-19, C51-1-27 and C51-1-28 respectively with select lever shifted to each range. Taking terminal C51-1-28 as an example, is battery voltage indicated only when select lever is shifted to "2" range and 0 V for other ranges as shown in figure? Check voltage at other terminals likewise, referring to figure. Are check results satisfactory?	Intermittent trouble. Check for intermittent referring to "INTERMITTENT AND POOR CONNECTION" in Section 0A.	Go to Step 5.
5	Check select cable for adjustment referring to "SELECT CABLE ADJUSTMENT" in this section. Is it adjusted correctly?	Go to Step 6.	Adjust.

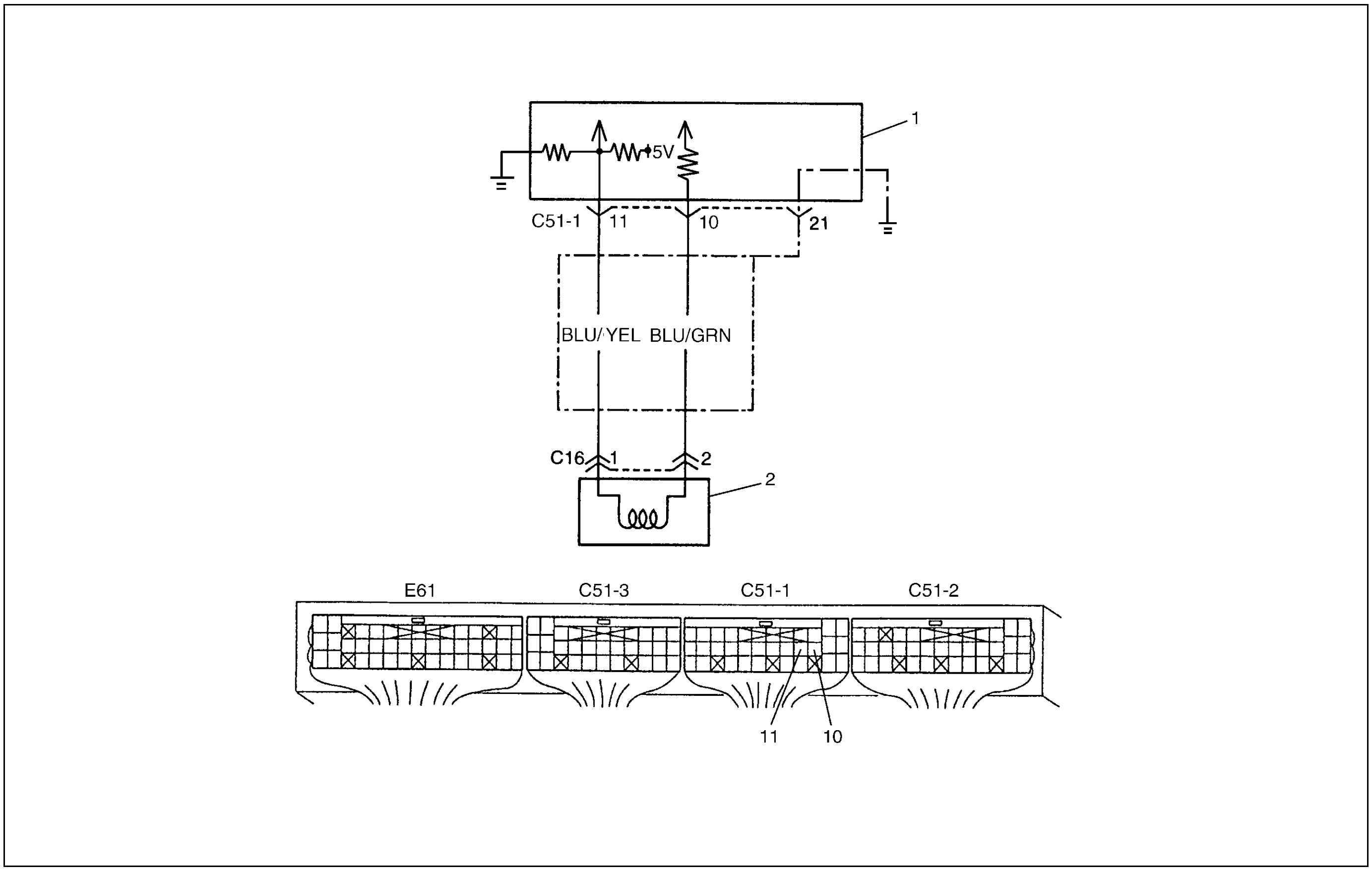
Step	Action	Yes	No
6	Check transmission range switch for installation position. 1) Shift select lever to “N” range. 2) Check that “N” reference line on switch and center line on shaft are aligned. Are they aligned?	Go to Step 7.	Adjust.
7	Check transmission range switch (sensor) referring to “TRANSMISSION RANGE SWITCH” in this section. Are check results satisfactory?	“YEL”, “ORN/GRN”, “RED”, “ORN/BLU”, “YEL/GRN”, “GRN/ORN” or “GRN/BLU” circuit open or short. If wires and connections are OK, substitute a known-good PCM and recheck.	Replace Transmission range switch.

Fig. for Step 2.

		Terminal					
		C51-1-7	C51-1-6	C51-1-19	C51-1-18	C51-1-28	C51-1-27
Select lever position	P	B + V	0 V	0 V	0 V	0 V	0 V
	R	0 V	B + V	0 V	0 V	0 V	0 V
	N	0 V	0 V	B + V	0 V	0 V	0 V
	D	0 V	0 V	0 V	B + V	0 V	0 V
	2	0 V	0 V	0 V	0 V	B + V	0 V
	L	0 V	0 V	0 V	0 V	0 V	B + V

DTC P0715 (DTC NO.76) - Input/Turbine Speed Sensor Circuit Malfunction

WIRING DIAGRAM



1. PCM	
2. Input shaft speed sensor	

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Input speed sensor detected speed is lower than specification while vehicle running under all of the following conditions : • at higher than 10 km/h (7 mile/h) with 1st gear in D range for 1 sec. or more. • at higher than 20 km/h (13 mile/h) with 2nd gear in D range for 2 sec. or more. • at higher than 30 km/h (20 mile/h) with 3rd gear in D range for 2 sec. or more. (2 driving cycle detection logic)	Input speed sensor and its circuit PCM

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

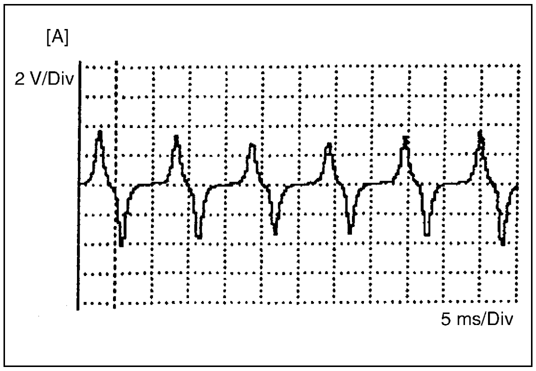
1) Connect scan tool to DLC with ignition switch OFF, if available.
2) Clear DTC, pending DTC and freeze frame data by using scan tool.
3) Start engine and turn O/D cut switch ON.
4) Shift select lever to D range and start vehicle.
5) Keep vehicle speed at higher than 10 km/h (7 mile/h) with 1st gear in D range for 2 sec. or more.
6) Increase vehicle speed and keep it at higher than 20 km/h (13 mile/h) with 2nd gear in D range for 2 sec. or more.
7) Increase vehicle speed and keep it at higher than 30 km/h (20 mile/h) with 3rd gear in D range for 2 sec. or more.
8) Stop vehicle.
9) Check DTC and/or pending DTC.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “A/T DIAGNOSTIC FLOW TABLE” in this section performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE” in this section.
2	Input shaft speed sensor circuit check : 1) Remove PCM cover. 2) With ignition switch OFF, disconnect PCM connectors. 3) Check for proper connection to input shaft speed sensor at C51-1-10 and C51-1-11 terminals. 4) If OK, check resistance of sensor circuit. **Input shaft speed sensor resistance :** **Resistance between C51-1-10 and C51-1-11** **530 – 650 Ω (at 20 °C (68 °F))** **Resistance between C51-1-10/C51-1-11 and ground :** **1 MΩ or more** Are check results satisfactory?	Go to Step 4.	Go to Step 3.
3	Input shaft speed sensor check : 1) With ignition switch OFF, disconnect input shaft speed sensor connector. 2) Check for proper connection to input shaft speed sensor at each terminals. 3) If OK, then check resistance of input shaft speed sensor. Are measured values as specified in Step 2?	“BLU/GRN” or “BLU/YEL” wire open or shorted to ground.	Replace input shaft speed sensor.

Step	Action	Yes	No
4	Check visually input speed sensor and over-drive clutch drum for the followings. • No damage • No foreign material attached • Correct installation Are they in good condition?	Intermittent trouble or faulty PCM. Check for intermittent referring to “INTERMIT-TENT AND POOR CON-NECTION” in Section 0A.	Clean, repair or replace.

REFERENCE

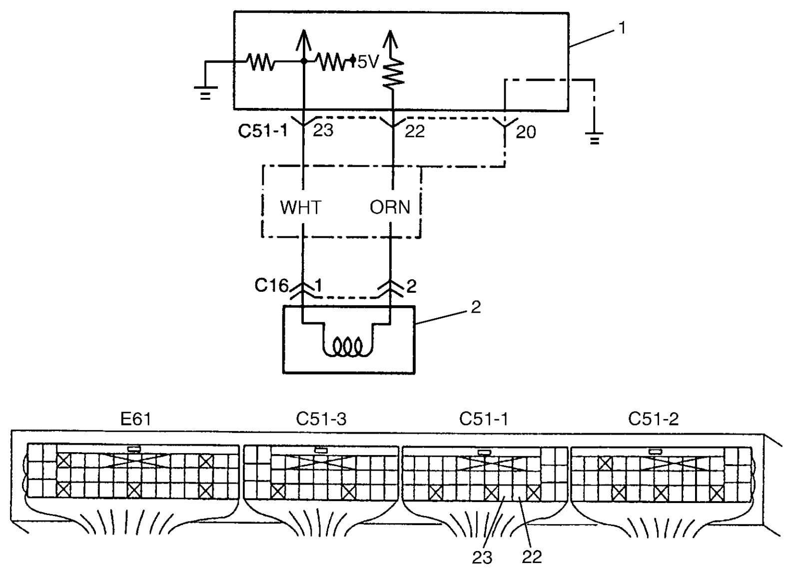


Connect oscilloscope between C51-1-11 (+) and C51-1-10 (–) of PCM connector connected to PCM and check input speed sensor signal.

[A] : Oscilloscope waveforms at specified idle speed in “p” range

DTC P0720 (DTC NO.75) Output Speed Sensor Circuit Malfunction

WIRING DIAGRAM



1. PCM	
2. Output shaft speed sensor	

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
• With 4WD LOW switch OFF, no output shaft speed sensor signal is inputted while vehicle speed sensor signal are inputted, or • With 4WD LOW switch OFF, no output shaft speed sensor signal is inputted while engine running at higher than specified engine speed with “D” range. (2 driving cycle detection logic)	• Output speed sensor or its circuit • PCM

DTC CONFIRMATION PROCEDURE

WARNING:

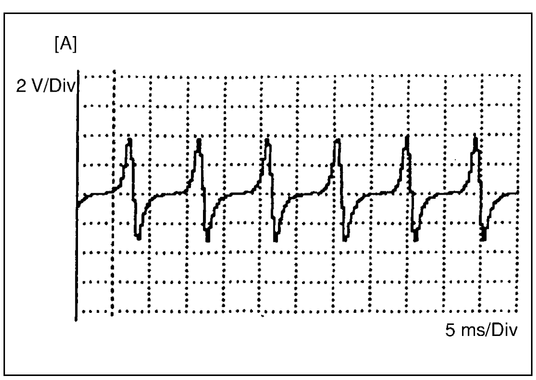
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

1) Connect scan tool to DLC with ignition switch OFF, if available.
2) Clear DTC, pending DTC and freeze frame data in PCM memory by using scan tool.
3) Start engine and shift transfer lever to “2H” or “4H” range.
4) Drive vehicle at 40 km/h (25 mile/h) or more for longer than 10 sec. (or higher than 3500 r/min engine speed with “D” range for longer than 10 sec.)
5) Stop vehicle and check DTC and/or pending DTC.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “A/T DIAGNOSTIC FLOW TABLE” in this section performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE” in this section.
2	Output shaft speed sensor circuit check : 1) Remove PCM cover. 2) With ignition switch OFF, disconnect PCM connectors. 3) Check for proper connection to output speed sensor at C51-1-22 and C51-1-23 terminals. 4) If OK, check resistance of sensor circuit. **Resistance between C51-1-22 and C51-1-23 : 387 – 473 Ω (at 20 °C (68 °F))** **Resistance between C51-1-22/C51-1-23 and ground : 1 MΩ or more** Are check results satisfactory?	Go to Step 4.	Go to Step 3.
3	Output shaft speed sensor check : 1) With ignition switch OFF, disconnect output shaft speed sensor connector. 2) Check for proper connection to output shaft speed sensor at each terminals. 3) If OK, then check resistance of output shaft speed sensor. Are measured values as specified in Step 2?	“ORN” or “WHT” wire open or shorted to ground.	Replace output shaft speed sensor.
4	Check visually output shaft speed sensor and sensor rotor for the followings. • No damage • No foreign material attached • Correct installation Are they in good condition?	Intermittent trouble or faulty PCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	Clean, repair or replace.

REFERENCE

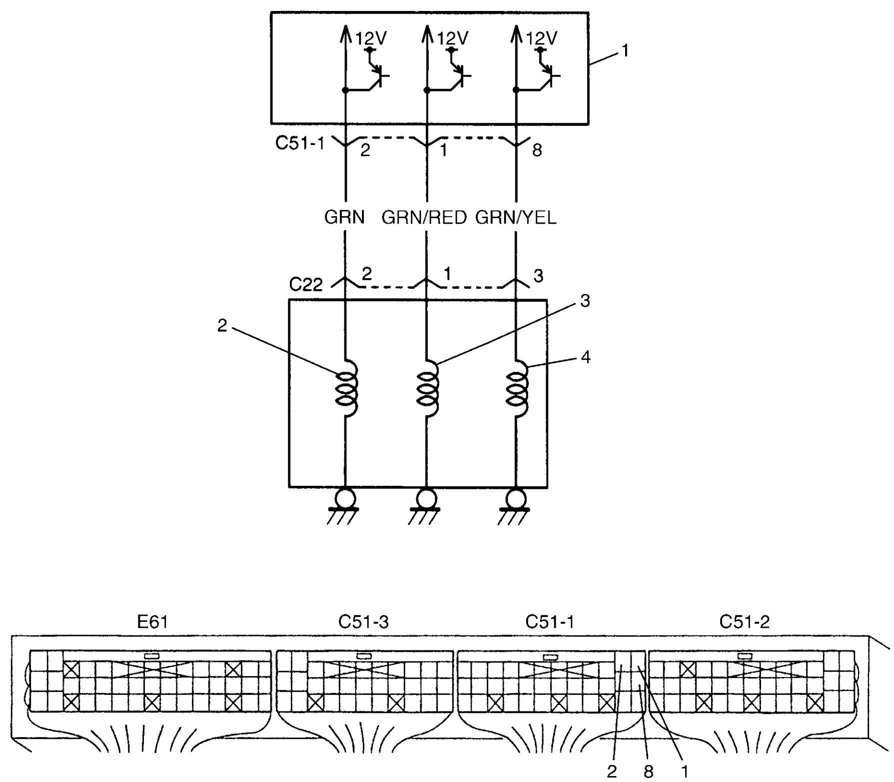


Connect oscilloscope between C51-1-23 (+) and C51-1-22 (–) of PCM connector connected to PCM and check output speed sensor signal.

[A] : Oscilloscope waveforms at about 40 km/h (25 mile/h)

DTC P0743 (DTC NO.65/66) - TCC (Lock-Up) Solenoid Electrical

WIRING DIAGRAM



1.	PCM
2.	Shift solenoid-A
3.	Shift solenoid-B
4.	TCC solenoid

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Voltage at terminal C51-1-8 of PCM is high while TCC solenoid OFF is commanded or low while TCC solenoid ON is commanded.	• TCC (lock-up) solenoid valve • TCC (lock-up) solenoid valve circuit • PCM

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

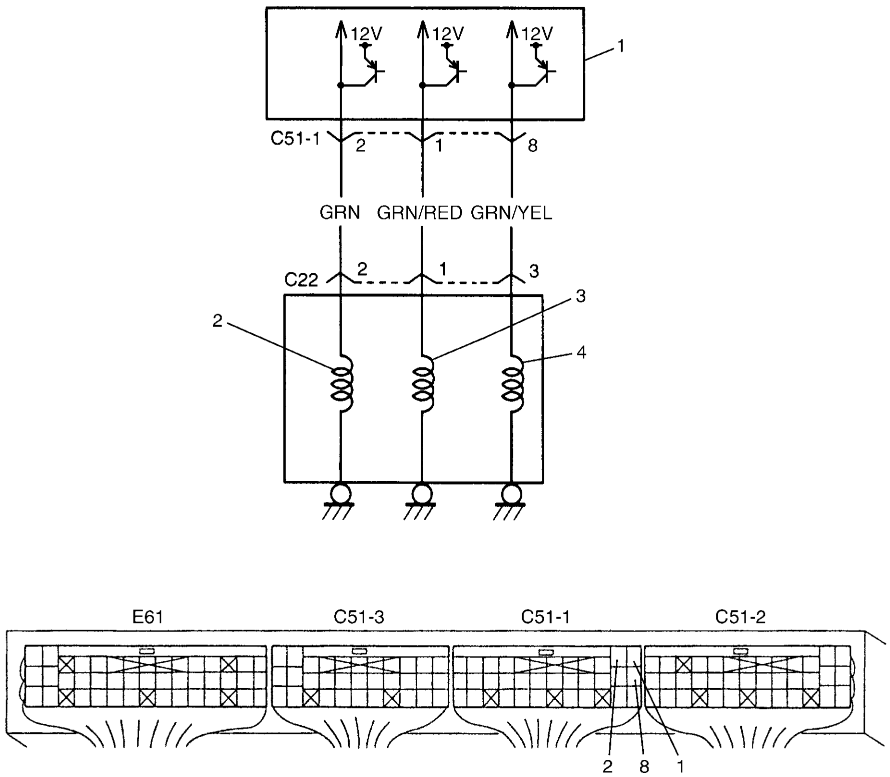
1) Connect scan tool to DLC with ignition switch OFF, if available.
2) Clear DTC, pending DTC and freeze frame data in PCM memory by using scan tool.
3) Start engine, warm it up to normal operating temperature and shift transfer lever to “2H” or “4H” range.
4) Shift selector lever in D range and keep it there for 10 seconds.
5) Increase vehicle speed to about 80 km/h (50 mile/h) in 4th gear and in D range.
6) Keep driving at above speed for 20 seconds.
7) Release accelerator pedal, decrease vehicle speed and stop vehicle.
8) Check DTC and/or pending DTC.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “A/T DIAGNOSTIC FLOW TABLE” in this section performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE” in this section.
2	Check TCC solenoid circuit for short. 1) Turn ignition switch OFF and disconnect PCM connectors. 2) Check for proper connection to PCM at terminal C51-1-8. 3) If OK, then turn ignition switch ON and measure voltage between terminal C51-1-8 of disconnected PCM connector and ground. Is it about 0 V?	Go to Step 3.	“GRN/YEL” circuit shorted to power circuit.
3	Check TCC solenoid circuit for open or short. 1) Turn ignition switch OFF. 2) Measure resistance between terminal C51-1-8 of disconnected PCM connector and ground. Is it 11 – 15 Ω (at 20 °C (68 °F))?	Intermittent trouble or faulty PCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	“GRN/YEL” circuit open or shorted to ground. If wire and connections are OK, replace TCC solenoid.

DTC P0753 (DTC NO.61/62) Shift Solenoid-A (#1) Electrical
DTC P0758 (DTC NO.63/64) Shift Solenoid-B (#2) Electrical

WIRING DIAGRAM



1.	PCM
2.	Shift solenoid-A
3.	Shift solenoid-B
4.	TCC solenoid

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
DTC P0753 (DTC NO.61/62): Voltage detected at C51-1-2 terminal is specified voltage or lower when shift solenoid valve-A is ON or specified voltage or higher when it is OFF.	• Shift solenoid valve-A • Shift solenoid valve-A circuit • PCM
DTC P0758 (DTC NO.63/64): Voltage detected at C51-1-1 terminal is specified voltage or lower when shift solenoid valve-B is ON or specified voltage or higher when it is OFF.	• Shift solenoid valve-B • Shift solenoid valve-B circuit • PCM

DTC CONFIRMATION PROCEDURE

WARNING:
- **When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.**
- **Road test should be carried out with 2 persons, a driver and a tester, on a level road.**

1) Connect scan tool to DLC with ignition switch OFF, if available.
2) Clear DTC, pending DTC and freeze frame data in PCM memory by using scan tool.
3) Start engine and shift transfer lever to “2H” or “4H” range.
4) Shift selector lever in D range and keep it for 10 seconds.
5) Drive vehicle about 30 km/h (20 mile/h) with 2nd gear in “D” range for 10 seconds.
6) Increase vehicle speed to about 80 km/h (50 mile/h) with 4th gear in D range and keep it for 10 seconds.
7) Release accelerator pedal, decrease vehicle speed and stop vehicle.
8) Check DTC and/or pending DTC.

TROUBLESHOOTING

Step	Action	Yes	No
1	Was “A/T DIAGNOSTIC FLOW TABLE” in this section performed?	Go to Step 2.	Go to “A/T DIAGNOSTIC FLOW TABLE” in this section.
2	Check shift solenoid circuit for short. 1) Turn ignition switch OFF and disconnect PCM connectors. 2) Check for proper connection to PCM at terminals C51-1-2 or C51-1-1. 3) If OK, then turn ignition switch ON and measure voltage between terminal C51-1-2 or C51-1-1 of disconnected PCM connector and ground. Is it about 0 V?	Go to Step 3.	“GRN” or “GRN/RED“ circuit shorted to power circuit.
3	Check shift solenoid circuit for open or short. 1) Turn ignition switch OFF. 2) Measure resistance between terminal C51-1-2 or C51-1-1 of disconnected PCM connector and ground. Is it 11 – 15 Ω (at 20 °C (68 °F))?	Intermittent trouble or faulty PCM. Check for intermittent referring to “INTERMITTENT AND POOR CONNECTION” in Section 0A.	“GRN” or “GRN/RED“ circuit open or shorted to ground. If wire and connections are OK, replace malfunction shift solenoid.

Stall Test

This test is to check overall performance of automatic transmission and engine by measuring stall speed at “D” and “R” ranges. Be sure to perform this test only when transmission fluid is at normal operating temperature and its level is between FULL and LOW marks.

CAUTION:
- **Do not run engine at stall more than 5 seconds continuously, for fluid temperature may rise excessively high.**
- **After performing stall test, be sure to leave engine running at idle for longer than 30 seconds before another stall test.**

1) Apply parking brake and block wheels.
2) Install tachometer.
3) Start engine with select lever shifted to “P”.
4) Depress brake pedal fully.
5) Shift select lever to “D” and depress accelerator pedal fully while watching tachometer. Read engine rpm quickly when it has become constant (stall speed).
6) Release accelerator pedal immediately after stall speed is checked.
7) In the same way, check stall speed in “R” range.
8) Stall speed should be within the following specification.

Stall speed :
2,460 – 2,760 r/min.

TROUBLESHOOTING

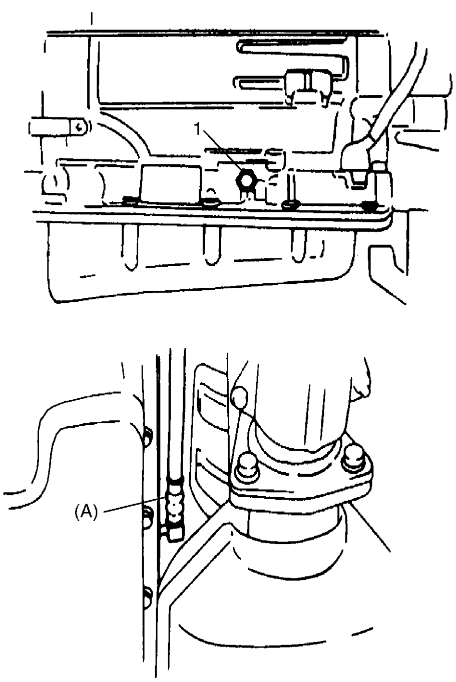
Condition	Possible cause
Lower than standard level	• Faulty engine output • Defective torque converter
Higher than standard level in “D” range	• Slippery O/D clutch • Slippery forward clutch • Malfunctioning O/D one-way clutch • Malfunctioning one-way clutch No. 2 • Low line pressure
Higher than standard level in “R” range	• Slippery direct clutch • Slippery reverse brake • Low fluid pressure • Slippery O/D clutch • Defective O/D one-way clutch

Line Pressure Test

Purpose of this test is to check operating conditions of each part by measuring fluid pressure in fluid pressure line. Line pressure test requires following conditions.

- Automatic fluid is at normal operating temperature (70 to 80 ° C/158 – 176 °F).
- Fluid is filled to proper level (between FULL HOT and LOW HOT on dipstick).

1) Apply parking brake securely and place checks against wheels.



2) Attach oil pressure gauge to fluid pressure check hole (1) in transmission case.

Special tool
(A) : 09925-37811-001

> **CAUTION:**
> **After attaching oil pressure gauge, check that not fluid leakage exists.**

3) Depress foot brake fully, run engine at idle and stall.
4) Check fluid pressure in “D” or “R” range within the following specification.

> **CAUTION:**
> **Do not continue running engine at stall speed longer than 5 seconds.**

Line pressure :

	“D” range	“R” range
Idle speed	4.1 – 4.6 kg/cm^2 58 – 65 psi	5.4 – 6.0 kg/cm^2 77 – 85 psi
Stall speed	12.0 – 13.5 kg/cm^2 171 – 192 psi	14.6 – 17.1 kg/cm^2 208 – 243 psi

5) If check result is OK, disconnect special tool, then tighten transmission case plug to specified torque.

Tightening torque
Transmission case plug : 17 N·m (1.7 kg-m, 12.0 lb-ft)

TROUBLESHOOTING

Condition	Possible cause
Line pressure higher than standard level in each range	• Malfunctioning regulator valve • Malfunctioning throttle valve • Maladjusted A/T throttle cable
Line pressure lower than standard level in each range	• Defective O/D clutch • Defective oil pump • Malfunctioning throttle valve • Malfunctioning regulator value • Maladjusted A/T throttle cable
Line pressure lower than standard level only in "D" range	• Fluid leakage from forward clutch • Defective O/D clutch • Leakage from "D" range fluid pressure circuit
Line pressure lower than standard level only in "R" range	• Fluid leakage from direct clutch • Defective O/D clutch • Fluid leakage from reverse brake • Fluid leakage from "R" range fluid circuit

Road Test

This test is to check if upshift and downshift take place at specified speed while actually driving vehicle on a level road.

> **WARNING:**
> - **Carry out test in very little traffic area to prevent an accident.**
> - **Test requires 2 persons, a driver and a tester.**

1) Warm up engine.
2) With engine running at idle, shift select lever "D".
3) Accelerate vehicle speed by depressing accelerator pedal gradually.
4) While driving in "D" range, check if gear shift occurs properly as shown in "GEAR SHIFT DIAGRAM" in this section.

TROUBLESHOOTING

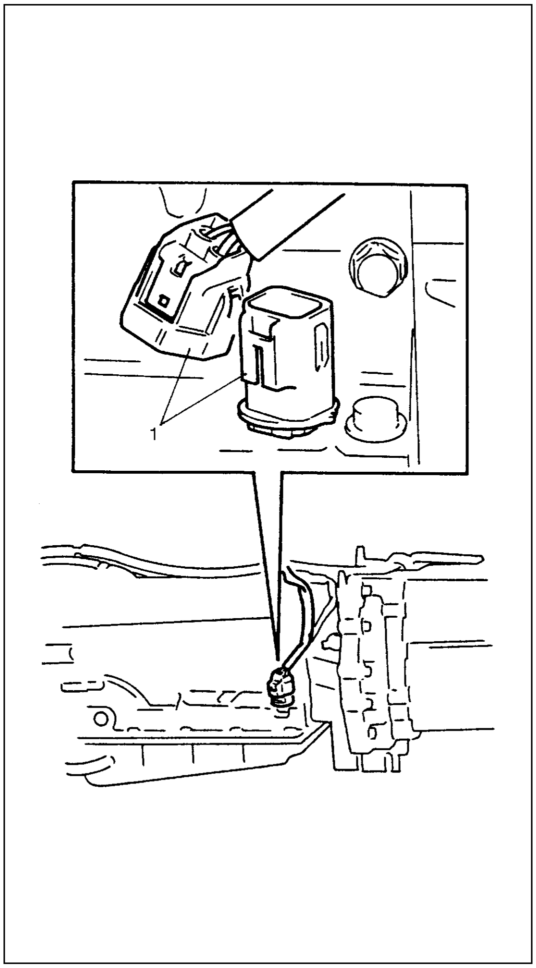
Condition	Possible cause
When 1 → 2 upshift fails to occur	1–2 shift valve stuck
When 2 → 3 upshift fails to occur	2–3 shift valve stuck
When 3 → O/D upshift fails to occur	3–4 shift valve stuck
When gear shift point is incorrect	• Maladjusted throttle cable • Defective shift solenoid valve -A or -B • 1–2, 2–3 or 3–4 shift valve not operating properly

Manual Road Test

This test check the gear being used in “L”, “2” or “D” range when driven with unoperated gear shift control system. Test drive vehicle on a level road.

NOTE:

Before this test, check diagnostic trouble code (DTC).



1) Disconnect shift solenoid coupler (1) valves on transmission.

WARNING:

To avoid the danger of being burned, do not touch the hot exhaust system when disconnecting shift solenoid coupler (1).

2) With select lever in “P”, start engine and warm it up.
3) With select lever in “L” range, start vehicle and accelerate to 20 km/h (12.5 mile/h). Check in this state that 1st gear is being used.
4) At 20 km/h (12.5 mile/h), shift select lever to “2” range and accelerate to 40 km/h (25 mile/h). Check in this state that 3rd gear is being used.
5) At 40 km/h (25 mile/h), shift select lever to “D” range and check that O/D gear is used when speed is higher than 40 km/h (25 mile/h).
6) After above checks, stop vehicle then engine, and connect shift solenoids coupler (1) with ignition switch OFF.

WARNING:

To avoid the danger of being burned, do not touch the hot exhaust system when connecting shift solenoid coupler (1).

7) Clear DTC with scan tool.

Time Lag Test

This test is to check conditions of clutch, reverse brake and fluid pressure. “Time lag” means time elapsed since select lever is shifted with engine idling till shock is felt.

1) With chocks placed before and behind front and rear wheels respectively, depress brake pedal.
2) Start engine.
3) With stop watch ready, shift select lever from “N” to “D” range and measure time from that moment till shock is felt.
4) Similarly measure time lag by shifting select lever from “N“ to “R” range.

Specification for time lag :

“N” → “D”	**Less than 1.2 sec.**
“N” → “R”	**Less than 1.5 sec.**

NOTE:
- **When repeating this test, be sure to wait at least minute after select lever is shifted back to “N” range.**
- **Engine should be warmed up fully for this test.**

TROUBLESHOOTING

Condition	Possible cause
When “N” → “D” time lag exceeds specification	• Low line pressure • Worn forward clutch
When “N” → “R” time lag exceeds specification	• Low line pressure • Worn direct clutch • Worn reverse brake

Engine Brake Test

WARNING:
Before test, make sure that there is no vehicle behind so as to prevent rear-end collision.

1) While driving vehicle in 3rd gear of “D” range, shift select lever down to “2” range and check if engine brake operates.
2) In the same way as in step 1, check engine brake for operation when select lever is shifted down to “L” range.
3) If engine brake fails to operate in above tests, possible causes for such failure are as follows. Check each part which is suspected to be the cause.

TROUBLESHOOTING

Condition	Possible cause
Fails to operate when shifted down to “2” range	Second coast brake defective
Fails to operate when shifted down to “L” range	Reverse brake defective

“P” Range Test

1) Stop vehicle on a slope, shift select lever to “P” range and at the same time apply parking brake.
2) After stopping engine, depress brake pedal and release paring brake.
3) Then, release brake pedal gradually and check that vehicle remains stationary.
4) Depress brake pedal and shift select lever to “N” range.
5) Then, release brake pedal gradually and check that vehicle moves.

WARNING:
Before test, check to make sure no one is around vehicle or down on a slope and keep watchful for safety during test.

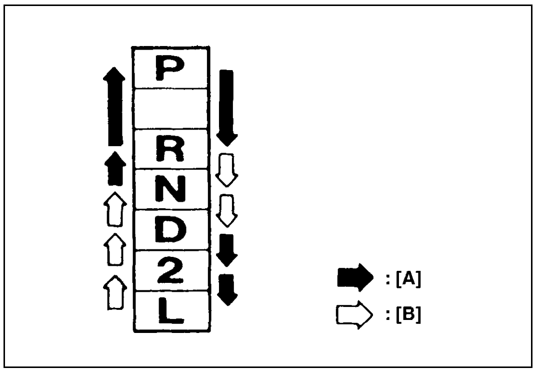
On-Vehicle Service

Maintenance Service

Fluid level

LEVEL CHECK AT NORMAL OPERATING TEMPERATURE

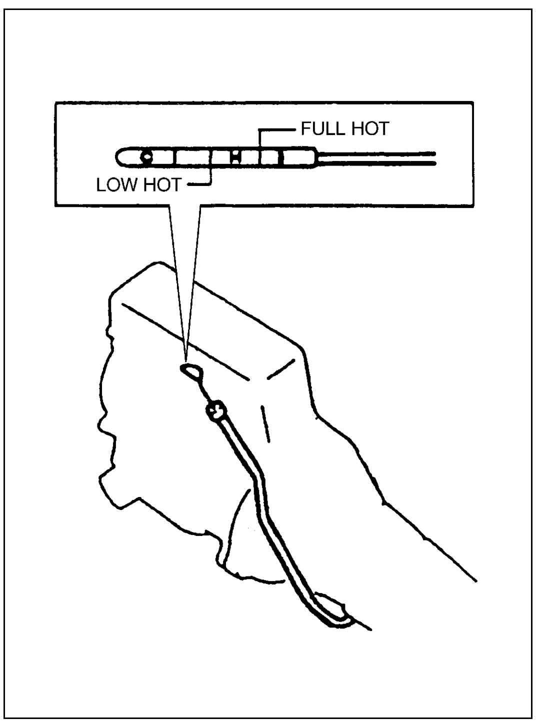
1) Stop vehicle and place it level.
2) Apply parking brake and place chocks against wheels.
3) With selector at P position, start engine.
4) Warm up engine till fluid temperature reaches normal operating temperature (70 – 80 °C (158 – 176 °F)). As a guide to check fluid temperature, warm up engine till engine coolant temperature meter indicated around 1 unit above “C” point.



5) Keep engine idling and shift selector slowly to “L” and back to “P” position.

[A] :	Shift the select lever with its button pushed in.
[B] :	Shift the select lever without pushing its button.

6) With engine idling, pull out dipstick, wipe it off with a clean cloth and put it back into place.



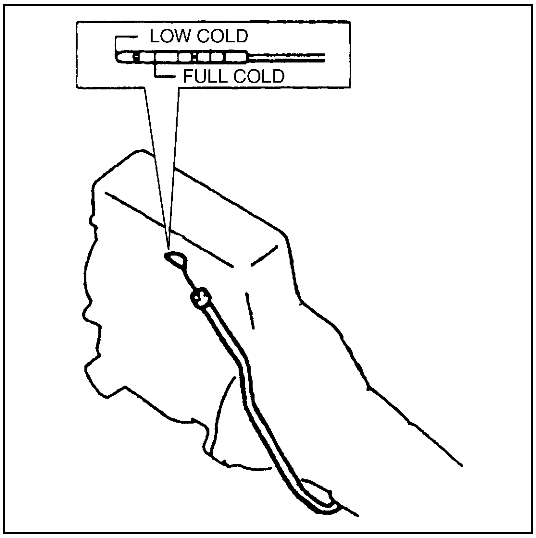
7) Pull out dipstick again and check fluid level indicated on it. Fluid level should be between FULL HOT and LOW HOT. if it is below LOW HOT, add an equivalent of DEXRON®-III up to FULL HOT.

Fluid specification :

An equivalent of DEXRON®-III

NOTE:

- **DO NOT RACE ENGINE while checking fluid level, even after the engine start.**
- **DO NOT OVERFILL. Overfilling can causes foaming and loss of fluid through breather. Then slippage and transmission failure can result.**
- **Bringing the level from LOW HOT to FULL HOT requires 0.3 liters (0.64/0.53 US/Imp.pt).**
- **If vehicle was driven under high load such as pulling a trailer, fluid level should be checked about half an hour after it is stopped.**

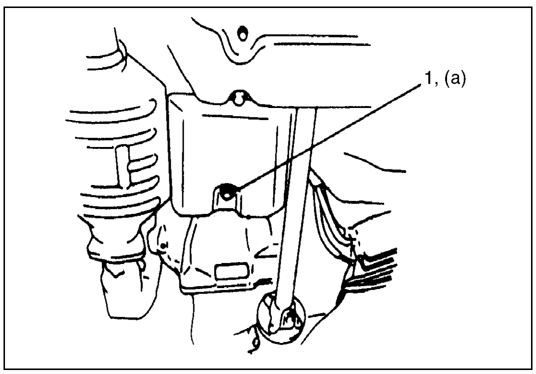


LEVEL CHECK AT ROOM TEMPERATURE

The fluid level check at room temperature (20 – 30 °C (68 – 86 °F)) performed after repair or fluid change before test driving is just preparation for level check of normal operating temperature. The checking procedure itself is the same as that described previously. If the fluid level is between FULL COLD and LOW COLD, proceed to test drive. And when the fluid temperature has reached the normal operating temperature, check fluid level again and adjust it as necessary.

Fluid change

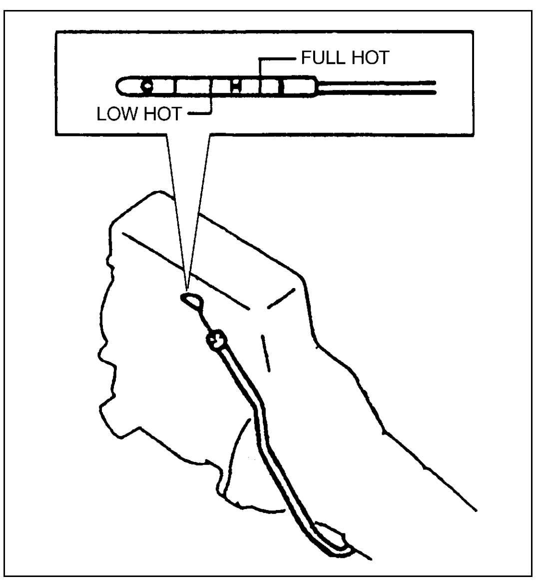
1) Lift up vehicle.



2) With engine is cool, remove drain plug (1) from oil pan and drain A/T fluid.
3) Install drain plug (1).

Tightening torque
A/T fluid drain plug (a) :
23 N·m (2.3 kg-m, 17.0 lb-ft)

4) Lower vehicle and fill proper amount of an equivalent of DEXRON®-III.



5) Check fluid level referring to “LEVEL CHECK NORMAL OPERATING TEMPERATURE” of “FLUID LEVEL” in this section.

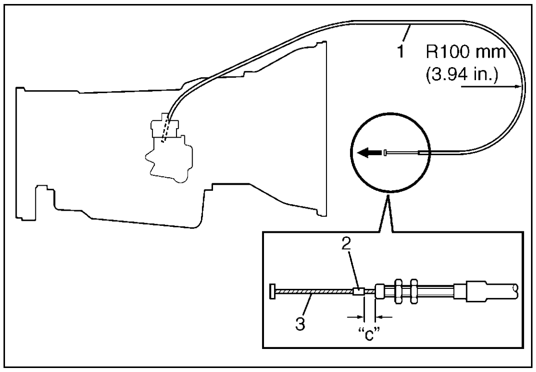
Fluid specification :
An equivalent of DEXRON®-III

Fluid capacity
When draining from drain plug hole:
2.5 liters (5.28/4.40 US/Imp.pt.)

When overhauling:
6.8 liters (14.37/11.97 US/Imp.pt.)

A/T Throttle Cable

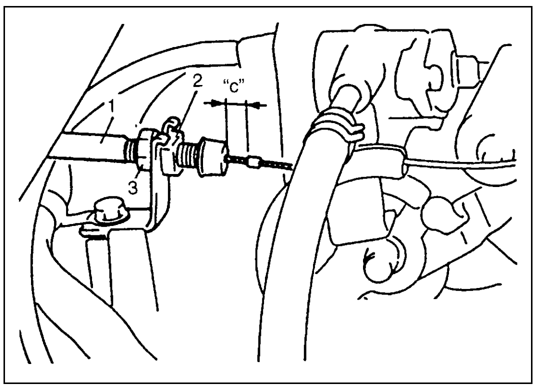
ADJUSTMENT



1) Pull inner cable (3) by force of 2 N (0.2 kg, 0.45 lb) or less to be no slack of inner cable with A/T throttle cable (1) curved as shown in the figure.
2) Fix stopper (2) to inner cable (3) with clearance "c".

A/T throttle cable adjusting position (clearance "c") :
0.8 – 1.5 mm (0.03 – 0.06 in.)

3) Warm up engine and transmission to normal operating temperature.
4) Make sure that accelerator cable is adjusted as specified.



5) With throttle valve closed, check clearance "c", which should be within the following specification, of A/T throttle cable (1). If it is out of specification, adjust it by turning cable adjusting nut (2).

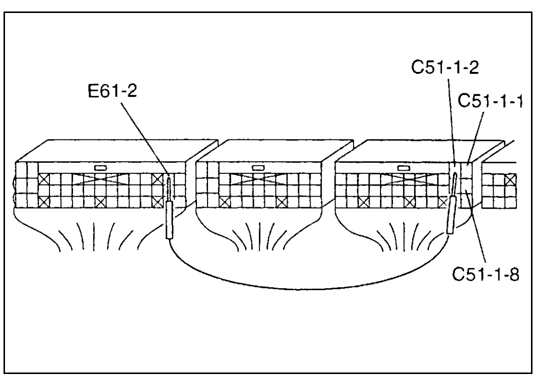
A/T throttle cable adjusting position (clearance "c") :
0.8 – 1.5 mm (0.03 – 0.06 in.)

6) Tighten lock nut (3) securely.

Solenoid Valves (Shift Solenoid Valves and TCC Solenoid Valve)

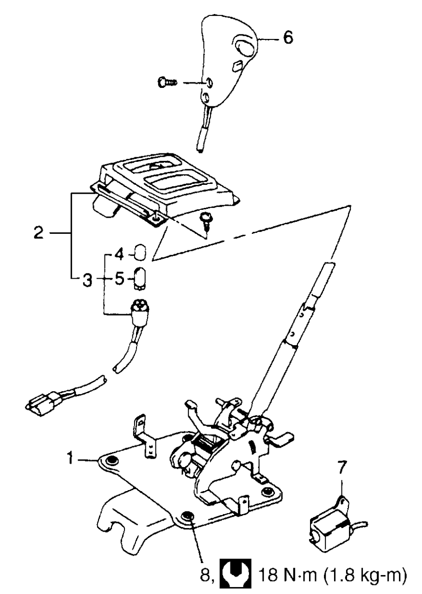
INSPECTION

With PCM couplers disconnected and using service wire as shown in the figure, check each solenoid valve for clicking sound.



Shift solenoid valve - A (#1)	C51-1-2
Shift solenoid valve - B (#2)	C51-1-1
TCC (Lock-up) solenoid valve	C51-1-8

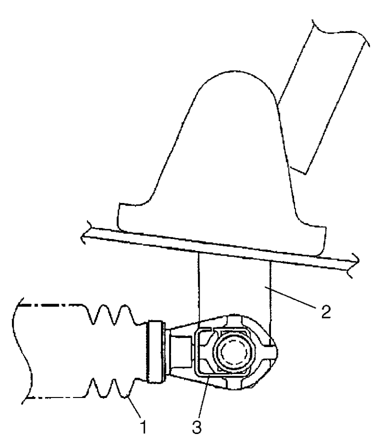
MANUAL SELECTOR ASSEMBLY



1. Manual lever assembly	4. Bulb filter	7. Shift lock solenoid (if equipped)
2. Select indicator assembly	5. Bulb	8. Manual selector assembly mounting bolt
3. Illumination assembly	6. knob assembly	Tightening torque

REMOVAL

1) Disconnect negative (–) cable at battery.
2) Remove console box.
3) Disconnect connector for illumination lamp, shift lock solenoid (if equipped) and overdrive OFF switch (if equipped).
4) Remove selector assembly mounting bolts.



5) Disconnect selector cable (1) from manual selector assembly (2) expanding selector cable clip (3).

INSTALLATION

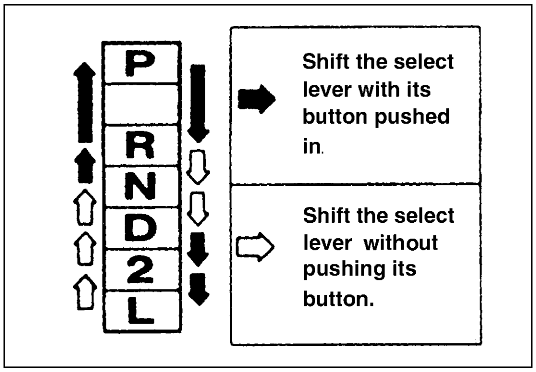
Reverse removal procedure to install manual selector assembly noting the following instructions.

- Make sure that selector cable clip (3) hold selector cable (1) on manual selector assembly (2) securely.
- Tighten manual selector assembly mounting bolts as specified torque.

Tightening Torque
Manual selector assembly mounting bolts :
18 N·m (1.8 kg-m, 13.5 lb-ft)

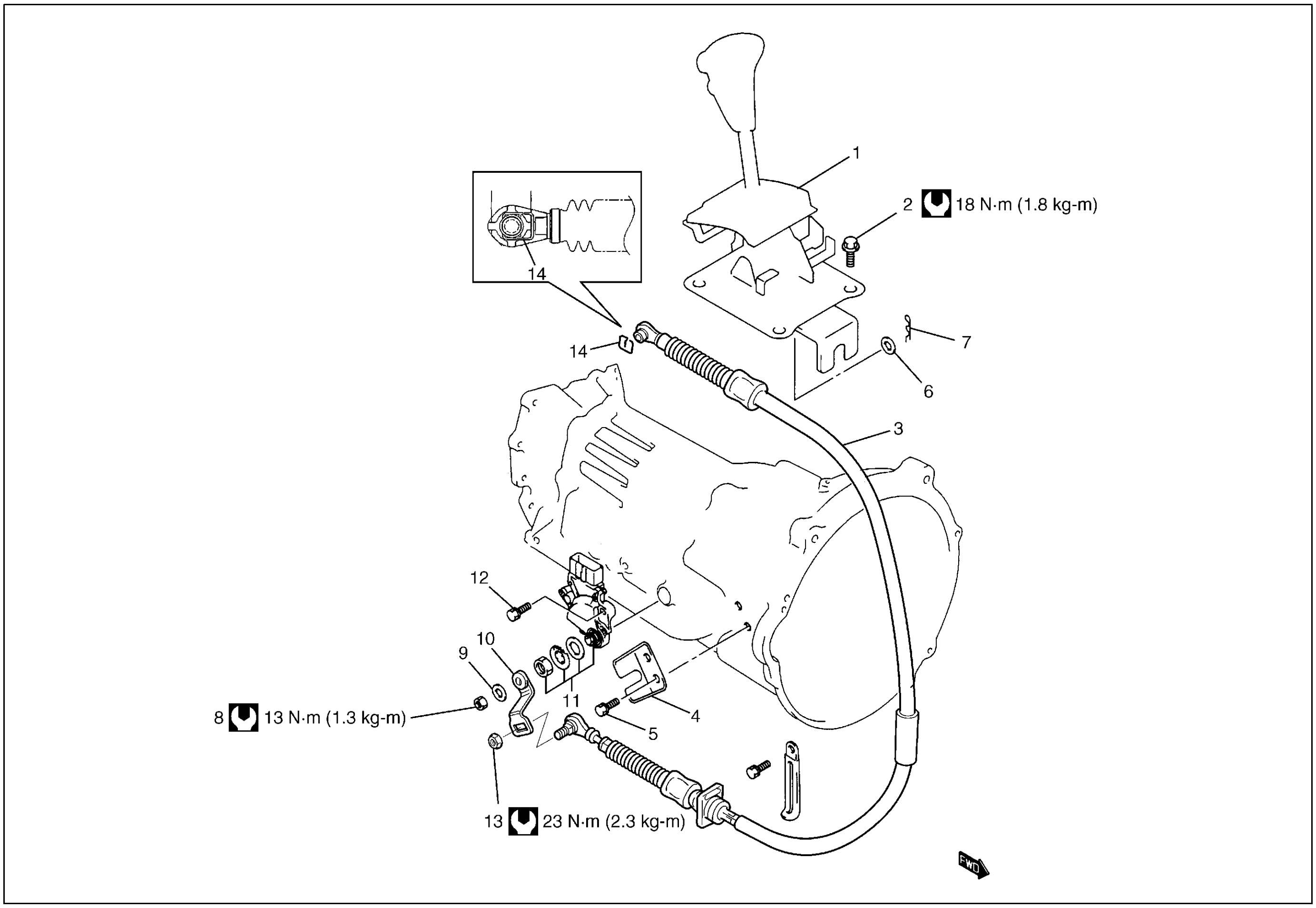
- Connect interlock cable end to cam referring to step 2) to 8) of “Interlock cable installation” of the service manual mentioned in FOREWORD of this manual, if necessary.
- Confirm that brake (key) interlock system operates properly (if equipped).

INSPECTION



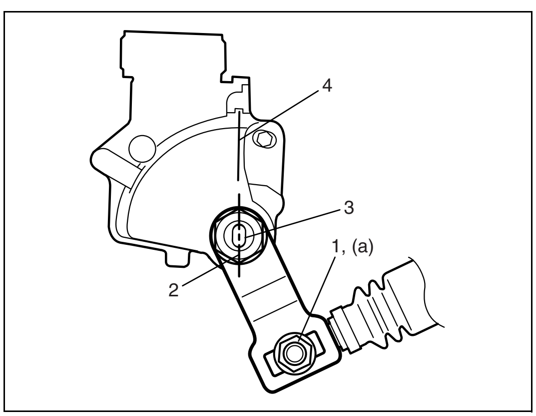
- Check select lever for smooth and clear-cut movement and position indicator for correct indication.
  For operation of select lever, refer to left figure.

SELECT CABLE



1. Selector lever assembly	6. Washer	11. Transmission range switch assembly
2. Selector lever assembly mounting bolt	7. Clip	12. Transmission range switch mounting bolt
3. Selector cable	8. Manual select lever nut (transmission range switch side)	13. Manual select lever nut (selector cable side)
4. Cable bracket	9. Lock washer	14. Selector cable clip
5. Cable bracket mounting bolt	10. Manual select lever	Tightening Torque

ADJUSTMENT



1) Loosen manual shift lever (select cable side) nut (1).
2) Shift select lever to “N” range.
3) Align center line (2) on manual valve shaft (3) to “N” reference line (4) as shown.
4) Tighten manual shift lever nut (selector cable side) (1) as specified torque.

Tightening torque
Manual shift lever nut (a) :
23 N·m (2.3 kg-m, 17.0 lb-ft)

5) After select cable was installed, check for the following.
- Push vehicle with selector lever shifted to “P” range. Vehicle should not move.
- Vehicle can not be driven in “N” range.
- Vehicle can be driven in “D”, “2” and “L” ranges.
- Vehicle can be backed in “R” range.

Unit Repair

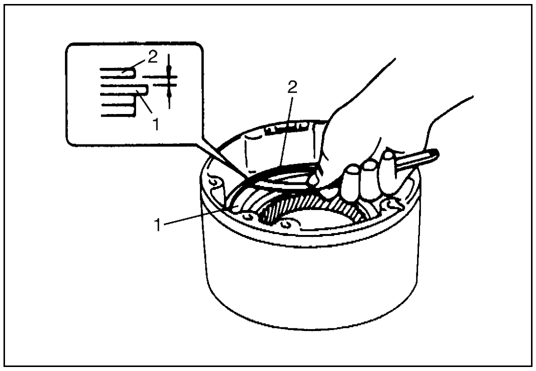
NOTE:

The service procedure to be described in this item is the same as that of H25 engine model except the following description.
Refer to the same section of the Unit Repair Manual mentioned in FOREWORD of this manual for the description not found in this item.

Sub-Assembly Repair

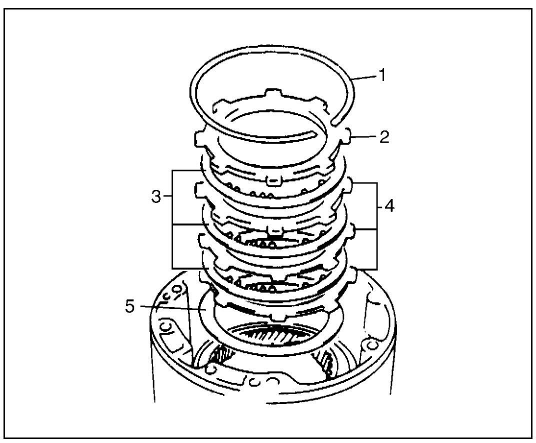
Overdrive (case side)

DISASSEMBLY

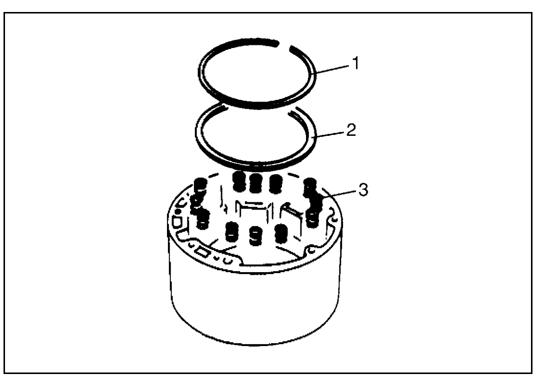


1) Measure clearance between retaining ring (1) and brake backing plate (2) with thickness gauge.
   If it is not within standard range, replace brake disc or brake plate.

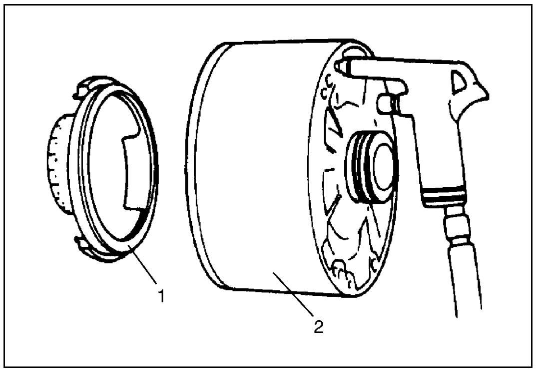
   Clearance between retaining ring and brake backing plate
   Standard :
   0.40 – 0.90 mm (0.016 – 0.035 in.)



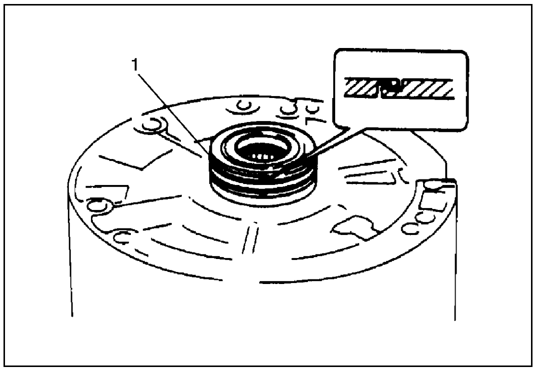
2) Remove retaining ring (1), brake backing plate (2), brake disc (3), brake plate (4), cushion brake plate (5) in that order. Then remove planetary ring gear, thrust bearing race and thrust rear bearing.



3) Remove retaining ring (1), retainer (2) and piston return spring (3).



4) Blow air into fluid hole in O/D case (2) and remove brake piston (1).
5) Remove brake piston inner ring and brake piston outer ring from brake piston.

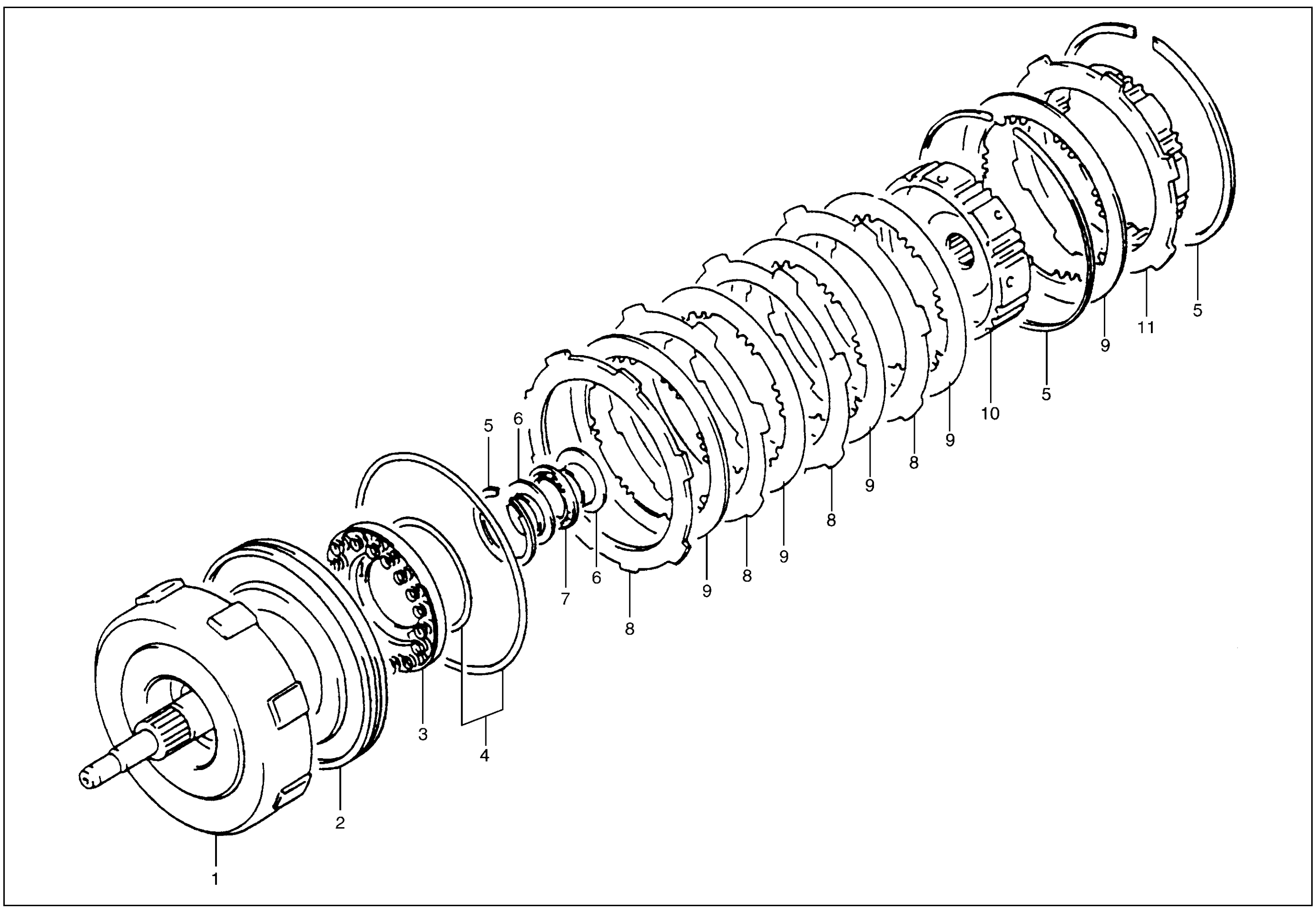


6) Unsnap seal ring (1).
7) Remove 2 seal rings (1).

NOTE:

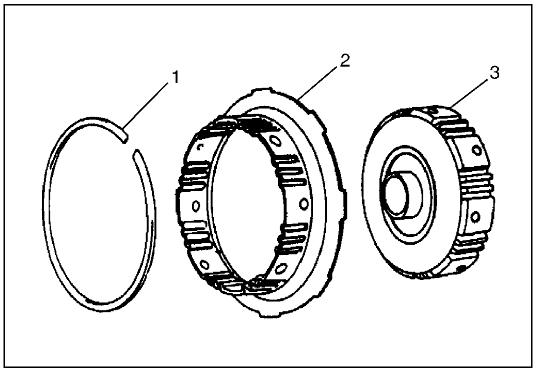
Be careful not to open seal ring more than necessary.

Forward clutch

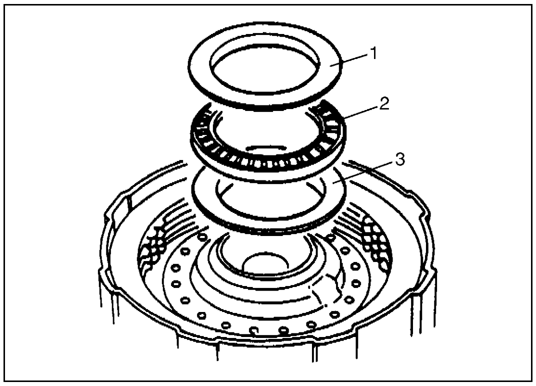


1. Input shaft	5. Retaining ring	9. Clutch disc
2. Piston	6. Bearing race	10. Froward clutch hub
3. Return spring	7. Bearing	11. Direct clutch input hub
4. O-ring	8. Clutch plate	

DISASSEMBLY

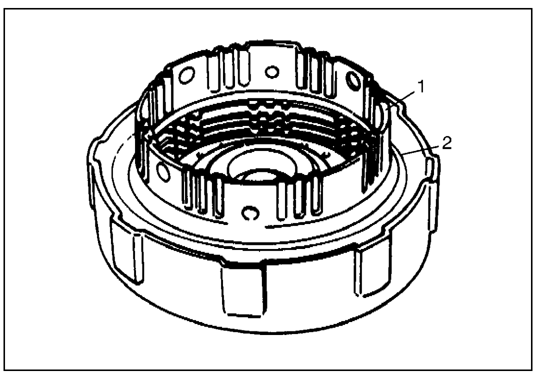


1) After removing retaining ring (1), remove direct clutch input hub (2) and forward clutch hub (3).

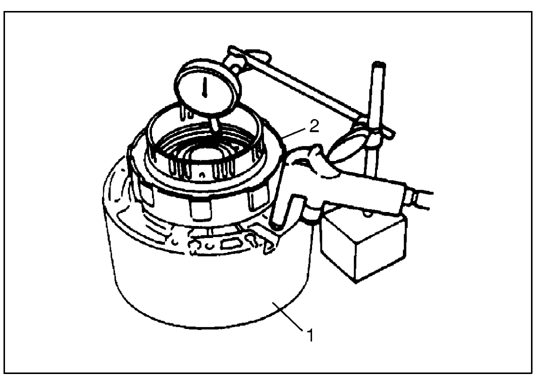


2) Remove bearing race and thrust bearing.

1.	Thrust bearing No. 2
2.	Thrust forward clutch bearing
3.	Thrust rear race

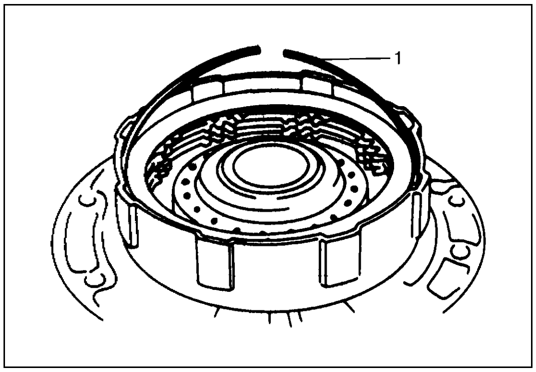


3) Install direct clutch input hub (1) and retaining ring (2).

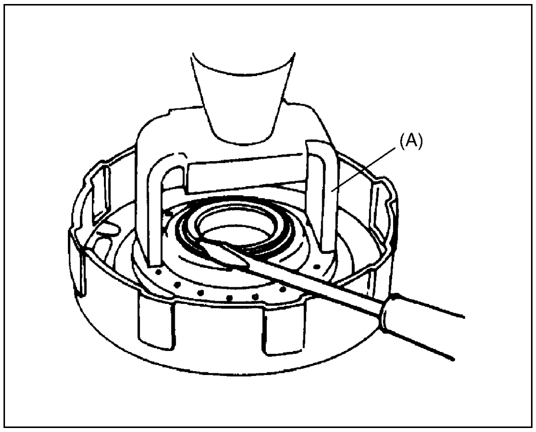


4) Install forward clutch (2) to O/D case (1). Apply 4 – 8 kg/cm^2 air pressure into fluid hole at the right of cut in O/D case and measure movement of forward clutch piston.
If measured value is not within standard range, use either 1.8 mm (0.071 in.) or 2.0 mm (0.079 in.) clutch disc to adjust it to standard value.

Standard forward clutch piston movement :
1.40 – 1.70 mm (0.056 – 0.067 in.)



5) Remove retaining ring (1) and then remove direct clutch input hub.
6) Remove retaining ring and then remove all clutch discs.

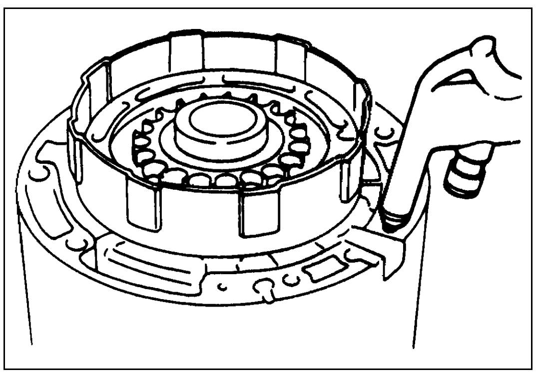


7) Using special tool and hydraulic press, compress forward clutch piston return spring and remove retaining return spring.

Special tool
(A) : 09926-98310

CAUTION:
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

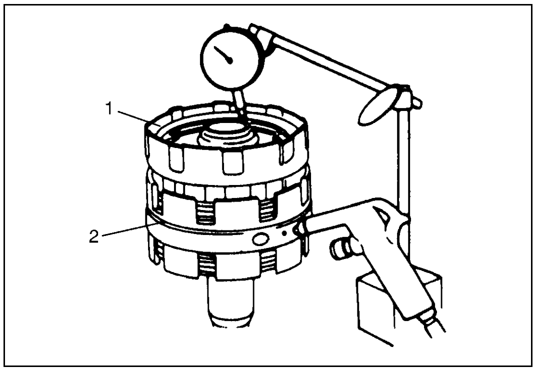
8) Remove forward clutch piston return spring.



9) Install forward clutch to O/D case. Blow low pressure air into fluid hole at the right of cut in O/D case to remove forward clutch piston.

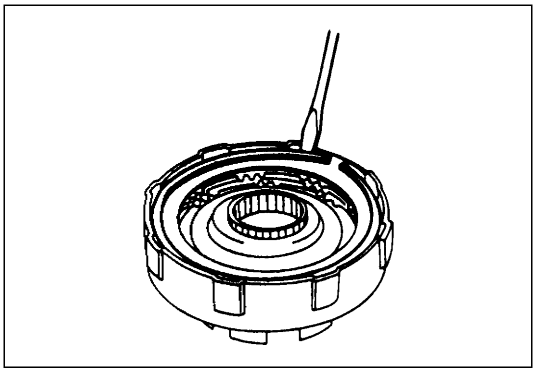
DIRECT CLUTCH

DISASSEMBLY

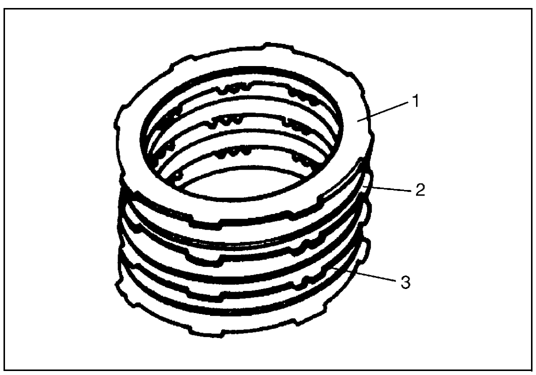


1) Install direct clutch assembly (1) to center support (2) and with 4 – 8 kg/cm^2 air pressure applied to second fluid hole from the left, measure stroke of direct clutch piston as shown in figure.
   If it is not within standard range, use 3.55 mm, 3.75 mm or 4.0 mm (0.140 in., 0.147 in. or 0.157 in.) clutch backing plate to adjust it to standard stroke.

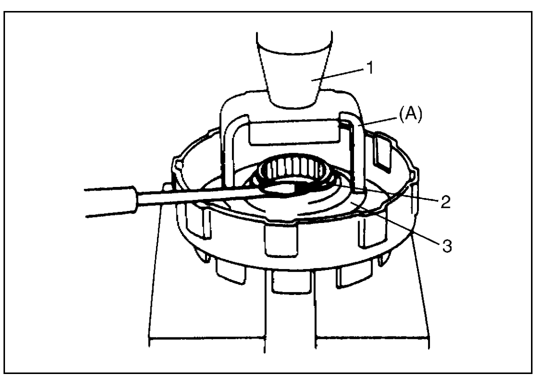
Standard direct clutch piston stroke :
0.90 – 1.30 mm (0.035 – 0.051 in.)



2) Remove direct clutch assembly from center support and then remove retaining ring.



3) Remove clutch backing plate (1) and then remove clutch disc (3) and clutch plate (2).

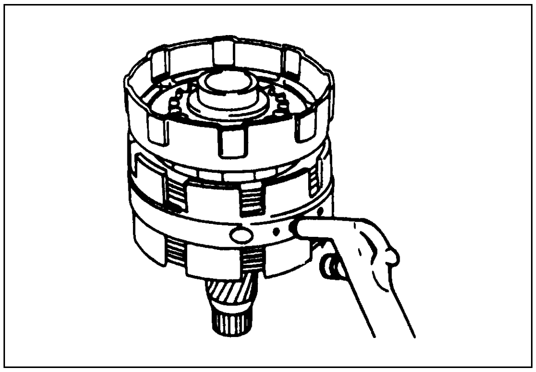


4) Using special tool and hydraulic press (1), compress direct clutch piston return spring (3) and remove retaining return spring ring (2).

Special tool
(A) : 09926-98310

CAUTION:
Be careful when applying pressure, for overpressure will cause plate section of piston return spring to deform.

5) Remove direct clutch piston return spring.

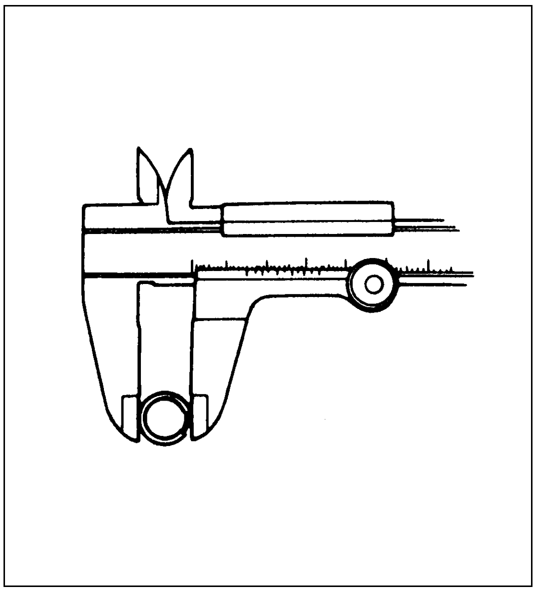


6) Install direct clutch cylinder to center support.
Remove direct clutch piston by blowing air into the second hole from the left as shown in the figure. Also, remove direct clutch inner piston by blowing air into hole at the extreme right. And then remove O-rings from pistons.

Front upper valve body

ASSEMBLY

Assemble each component by reversing disassembly procedure and noting the following points.

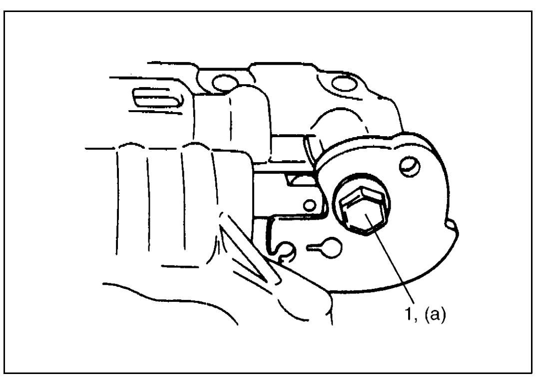


- Coil outer diameter and free length of each valve spring should be as listed below. Be sure to use each one of correct size.

Coil outer diameter and free length of each valve spring

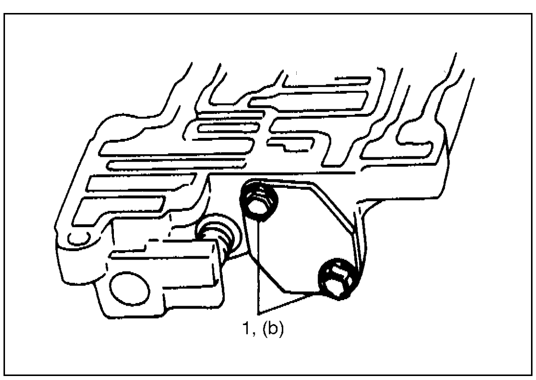
Name of spring	Outer diameter	Free length
Secondary regulator valve spring	**17.43 mm (0.681 in.)**	**71.27 mm (2.806 in.)**
Cut back valve spring	**6.85 mm (0.259 in.)**	**23.0 mm (0.906 in.)**
Throttle valve secondary spring	**8.56 mm (0.337 in.)**	**18.86 mm (0.743 in.)**
Throttle valve primary spring	**10.90 mm (0.429 in.)**	**39.55 mm (1.557 in.)**

- Install as many throttle valve compensating rings as written down when disassembled.



- Tighten throttle cam bolt (1) to specified torque.

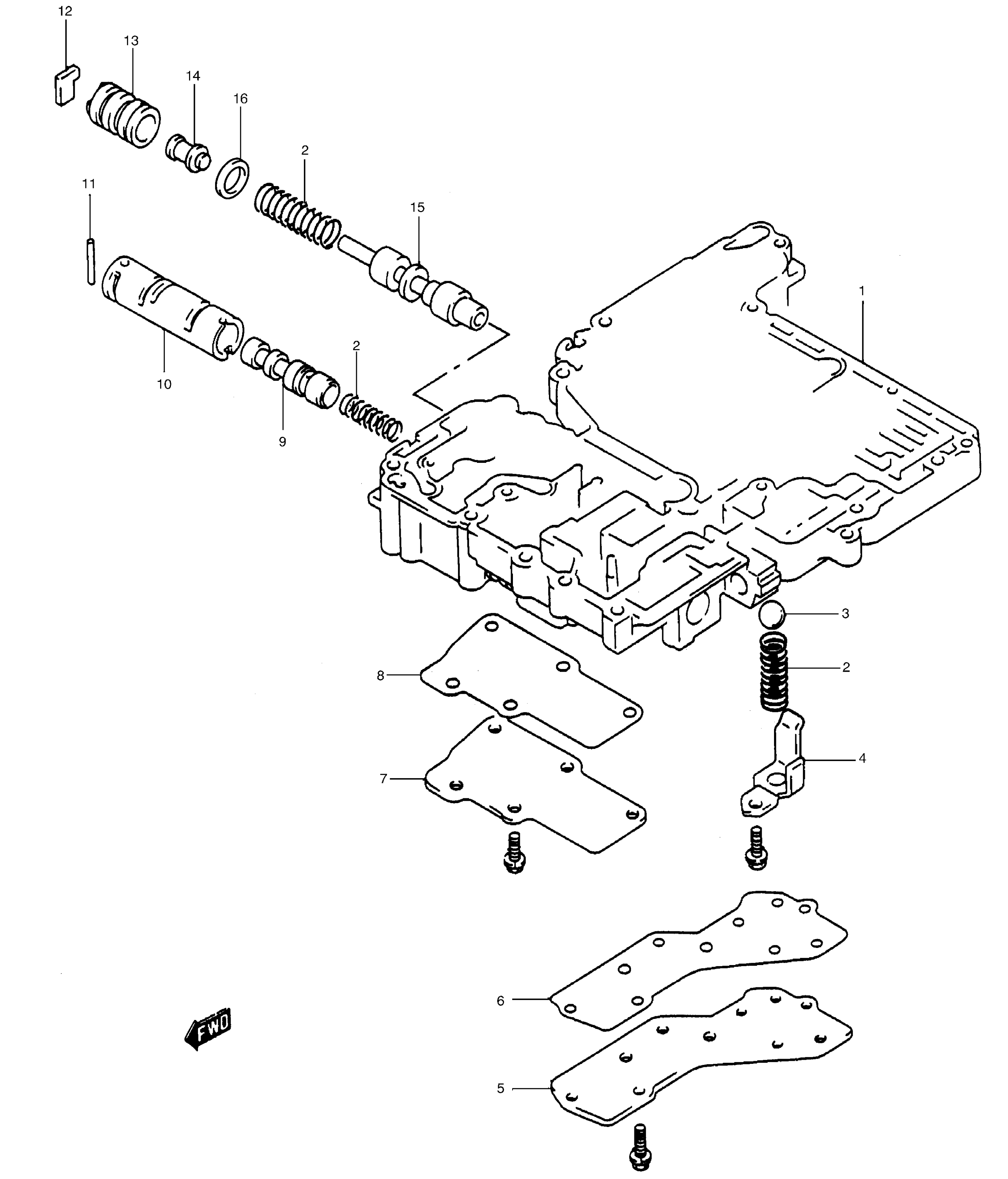
Tightening torque
Throttle cam bolt (a) : 7.5 N·m (0.75 kg-m, 5.5 lb-ft)



- Tighten pressure relief valve bolts (1) to specified torque.

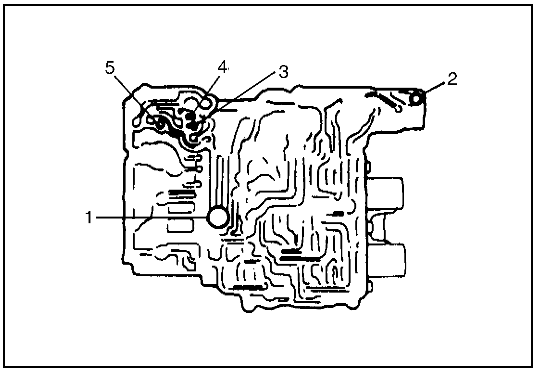
Tightening torque
Pressure relief valve bolt (b) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

LOWER VALVE BODY



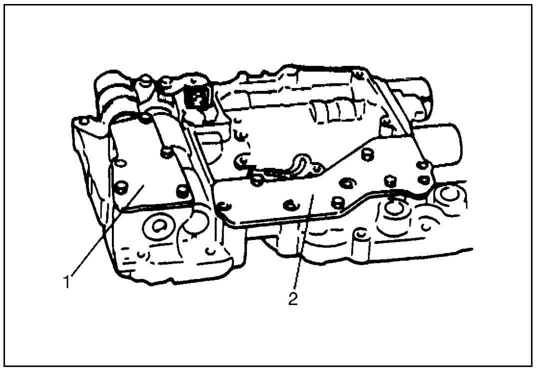
1. Lower valve body	7. TCC (Lock-up) control valve plate	13. Primary regulator valve sleeve
2. Spring	8. TCC (Lock-up) control valve gasket	14. Primary regulator valve plunger
3. Pressure relief valve ball	9. TCC (Lock-up) control sleeve	15. Primary regulator valve
4. Pressure relief valve retainer	10. TCC (Lock-up) control valve	16. Spacer
5. Lower valve body plate	11. Pin	
6. Lower valve body gasket	12. Retainer	

DISASSEMBLY

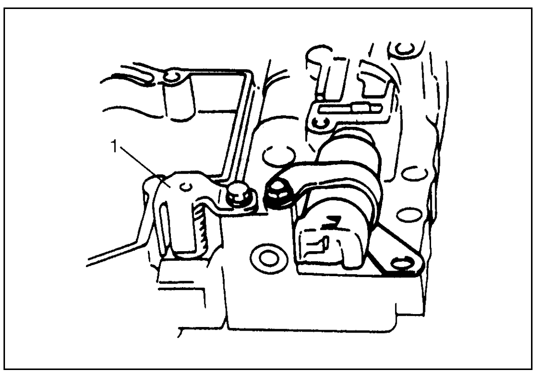


1) Remove bypass valve (1), bypass valve spring, check ball valve damping spring, valve body ball (2) and ball valve spring.

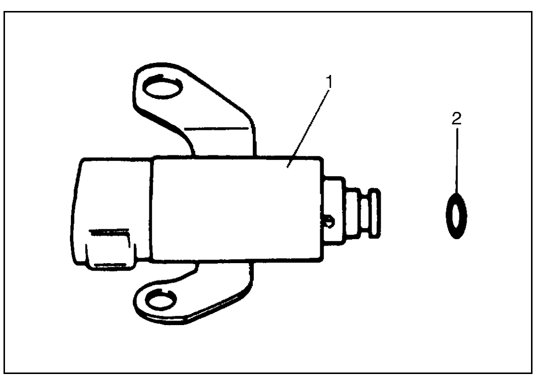
3.	Check ball
4.	Primary regulator valve sleeve retainer
5.	Locating pin



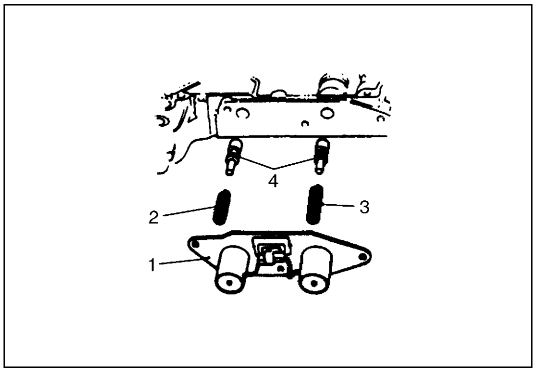
2) Remove lower valve body plate (1) and lower valve body plate gasket.
3) Remove TCC (lock-up) control valve plate (2) and TCC (lock-up) control valve gasket.



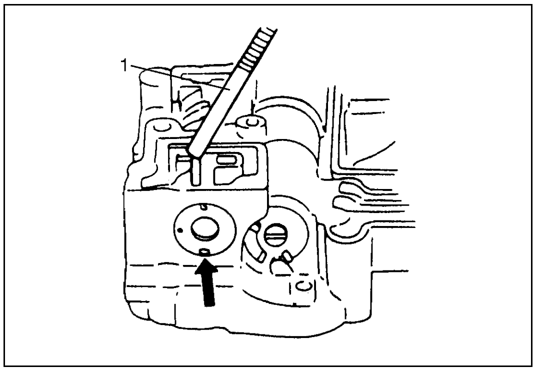
4) With pressure relief valve retainer (1) pressed with finger, remove pressure relief valve bolt and then remove pressure relief valve retainer (1), pressure relief valve spring and pressure relief valve ball.



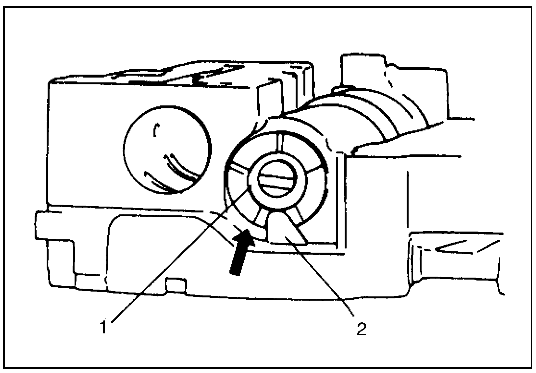
5) Remove TCC (lock-up) solenoid valve (1) and Then remove O-ring (2) from TCC solenoid valve (1).



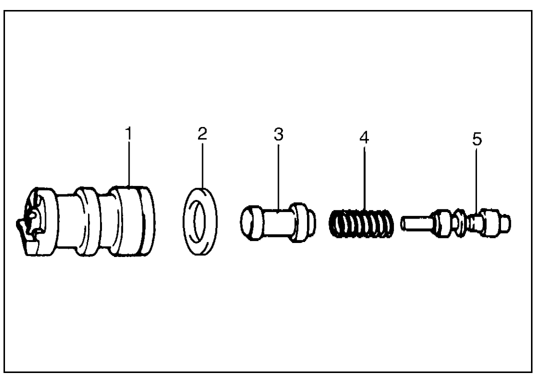
6) After removing shift solenoid valve (A & B) (1), remove solenoid valve gasket, low coast modulator valve spring (2), inter coast modulator valve spring (3) and 2 intermediate coast modulator valves (4).



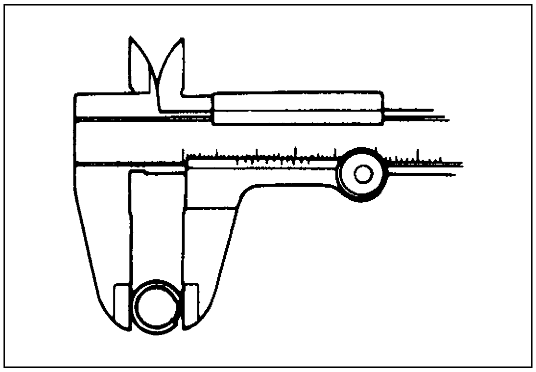
7) Pressing TCC (lock-up) control sleeve with finger and using magnet (1), remove locating pin and then remove TCC (lock-up) control sleeve, TCC (lock-up) control valve and TCC (lock-up) control valve spring.



8) Check which step of primary regulator valve sleeve (1) (how many steps down from its tip) contacts primary regulator valve sleeve retainer (2).



9) Pressing primary regulator valve sleeve (1) with finger and using magnet, remove primary regulator valve sleeve retainer and then remove primary regulator valve sleeve (1), spacer (2), primary regulator valve plunger (3), primary regulator valve spring (4) and primary regulator valve (5).



ASSEMBLY

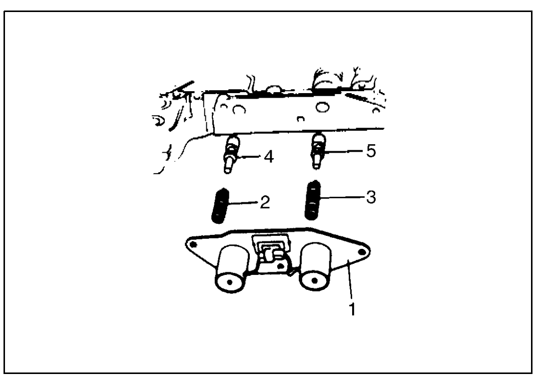
Assemble each component by reversing disassembly procedure and noting the following points.

- Coil outer diameter and free length of each valve spring should be as listed below. Be sure to use each one of correct size.

Coil outer diameter and free length of each valve spring :

Name of spring	Outer diameter	Free length
Pressure relief valve spring	13.14 mm (0.517 in.)	32.14 mm (1.265 in.)
TCC (Lock-up) control valve spring	11.40 mm (0.449 in.)	32.60 mm (1.283 in.)
Valve damping spring	4.95 mm (0.195 in.)	20.00 mm (0.787 in.)
Low coast modulator valve spring	10.00 mm (0.394 in.)	42.35 mm (1.667 in.)
Inter coast modulator valve spring	9.04 mm (0.356 in.) (G16 and J20 engines)	27.26 mm (1.073 in.) (G16 and J20 engines)
	10.00 mm (0.394 in.) (H25 and H27 engine)	25.60 mm (1.008 in.) (H25 and H27 engine)
Ball valve spring	10.5 mm (0.413 in.)	13.7 mm (0.539 in.)
Bypass valve spring	13.82 mm (0.544 in.)	28.90 mm (1.138 in.)
Primary regulator valve spring	17.02 mm (0.670 in.)	50.28 mm (1.980 in.)

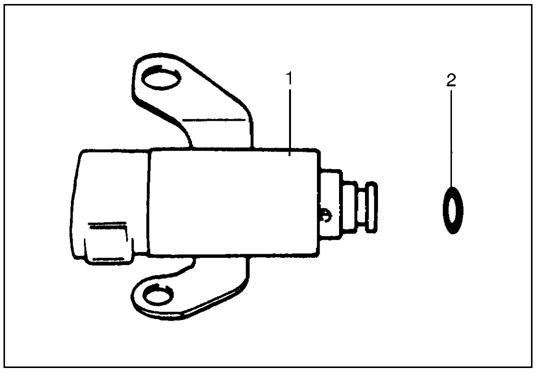
- Install primary regulator valve sleeve so that its tip is positioned as it was before disassembly.
- Use new TCC (lock-up) control valve gasket, solenoid gasket and lower valve body plate gasket.



- Tighten shift solenoid valve bolt to specified torque.

Tightening torque
Shift solenoid valve bolt : 10 N·m (1.0 kg-m, 7.5 lb-ft)

1.	Solenoid valve No. 1 (Shift solenoid valve)
2.	Low coast modulator valve spring
3.	Inter coast modulator valve spring
4.	Intermediate coast modulator valve
5.	Low coast modulator valve



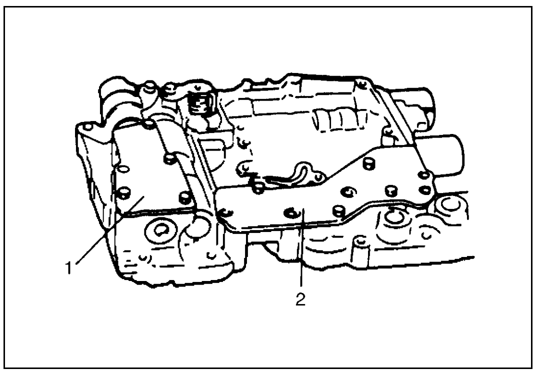
- Tighten TCC (lock-up) solenoid valve bolt to specified torque.

Tightening torque
TCC solenoid valve bolt :
5.5 N·m (0.55 kg-m, 4.0 lb-ft)

1.	Solenoid valve No. 2 (TCC solenoid valve)
2.	O-ring

- Tighten pressure relief valve bolt to specified torque.

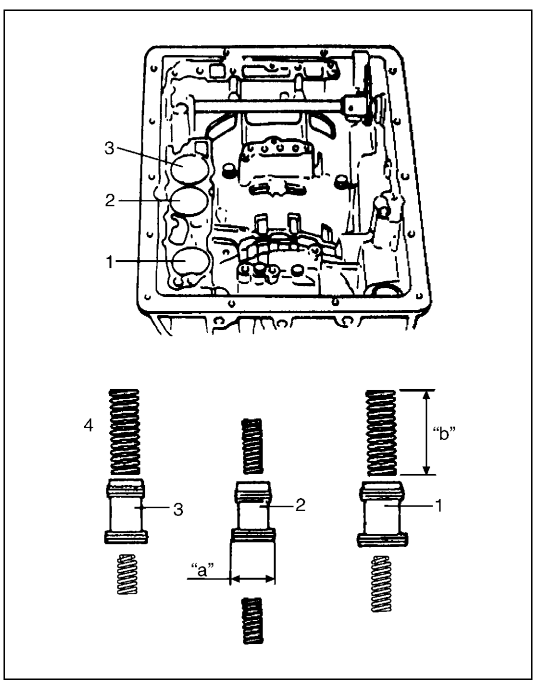
Tightening torque
Pressure relief valve bolt :
5.5 N·m (0.55 kg-m, 4.0 lb-ft)



- Tighten lower valve body plate (1), TCC (lock-up) control valve plate (2) flange bolt to specified torque.

Tightening torque
Lower valve body and TCC control valve Plate bolts :
5.5 N·m (0.55 kg-m, 4.0 lb-ft)

Unit Assembly



1) Apply A/T fluid to new O-ring and spring and install them to accumulator piston and install accumulator piston to transmission case.

4.	Upper spring

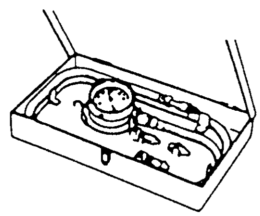
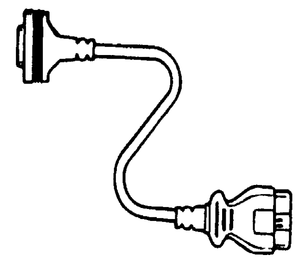
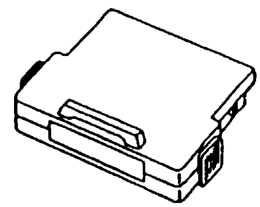
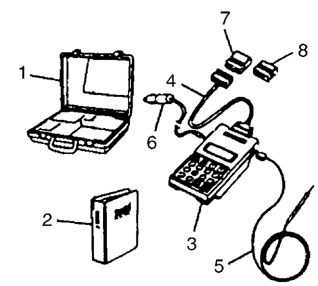
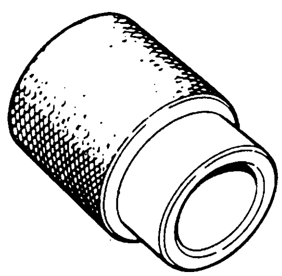
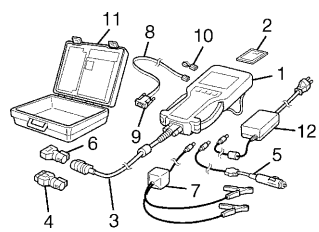
Accumulator piston and spring specification :

Used for	Piston outer diameter “a”	Spring free length “b”	
Direct clutch accumulator (2)	31.80 – 31.85 mm (1.252 – 1.254 in.)	Upper spring	43.56 mm (1.715 in.)
		Lower spring	30.00 mm (1.181 in.)
Forward clutch accumulator (1)	31.80 – 31.85 mm (1.252 – 1.254 in.)	Upper spring	57.18 mm (2.251 in.)
		Lower spring	30.50 mm (1.201 in.)
Second brake accumulator (3)	34.80 – 34.85 mm (1.370 – 1.372 in.)	Upper spring	56.16 mm (2.211 in.)
		Lower spring	18.5 mm (0.728 in.)

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Automatic transmission fluid drain plug	23	2.3	17.0
Transfer oil level/filler and drain plugs	23	2.3	17.0
Transmission case plug	17	1.7	12.5
Manual select lever nut	13	1.3	9.5
Manual select cable nut	7	0.7	5.5
Manual selector assembly bolts	18	1.8	13.5
Transmission to engine bolts and nuts	85	8.5	61.5
Engine rear mounting bolts Engine rear mounting member bolts	50	5.0	36.5
Universal joint flange bolts and nuts	50	5.0	36.5
Torque converter mounting bolts	65	6.5	47.0
Adapter case or extension case bolts	42	4.2	30.0
Transmission range switch lock bolt	5.5	0.55	4.0
Oil pipe union bolts	35	3.5	22.5
Drive plate bolts	78	7.8	56.5
Interlock cable clamp screw	2.2	0.22	1.5
Interlock cable outer mounting nut	13	1.3	9.5

Special Tool

 09925-37811-001 Oil pressure gauge	 09931-76030 16/14 pin DLC cable for Tech 1A	 Mass storage cartridge for Tech 1A	 09931-76011 Tech 1A kit (SUZUKI scan tool) (See NOTE “A”.)
 09940-53111 Bearing installer	 Tech 2 kit (SUZUKI scan tool) (See NOTE “B”.)		

NOTE:

- **“A”: This kit includes the following items and substitutes for the Tech 2 kit.**
  1. Storage case, 2. Operator’s manual, 3. Suzuki scan tool, 4. DLC cable, 5. Test lead/probe, 6. Power source cable, 7. DLC cable adapter, 8. Self-test adapter
- **“B”: This kit includes the following items and substitutes for the Tech 1A kit.**
  1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

SECTION 7C1

CLUTCH

NOTE:

The clutch of this model is the same as that of H25 engine in the construction and operation.
Refer to the same section of the Service Manual mentioned in the FOREWORD of this manual for service procedure.

SECTION 7E

DIFFERENTIAL (FRONT)

NOTE:

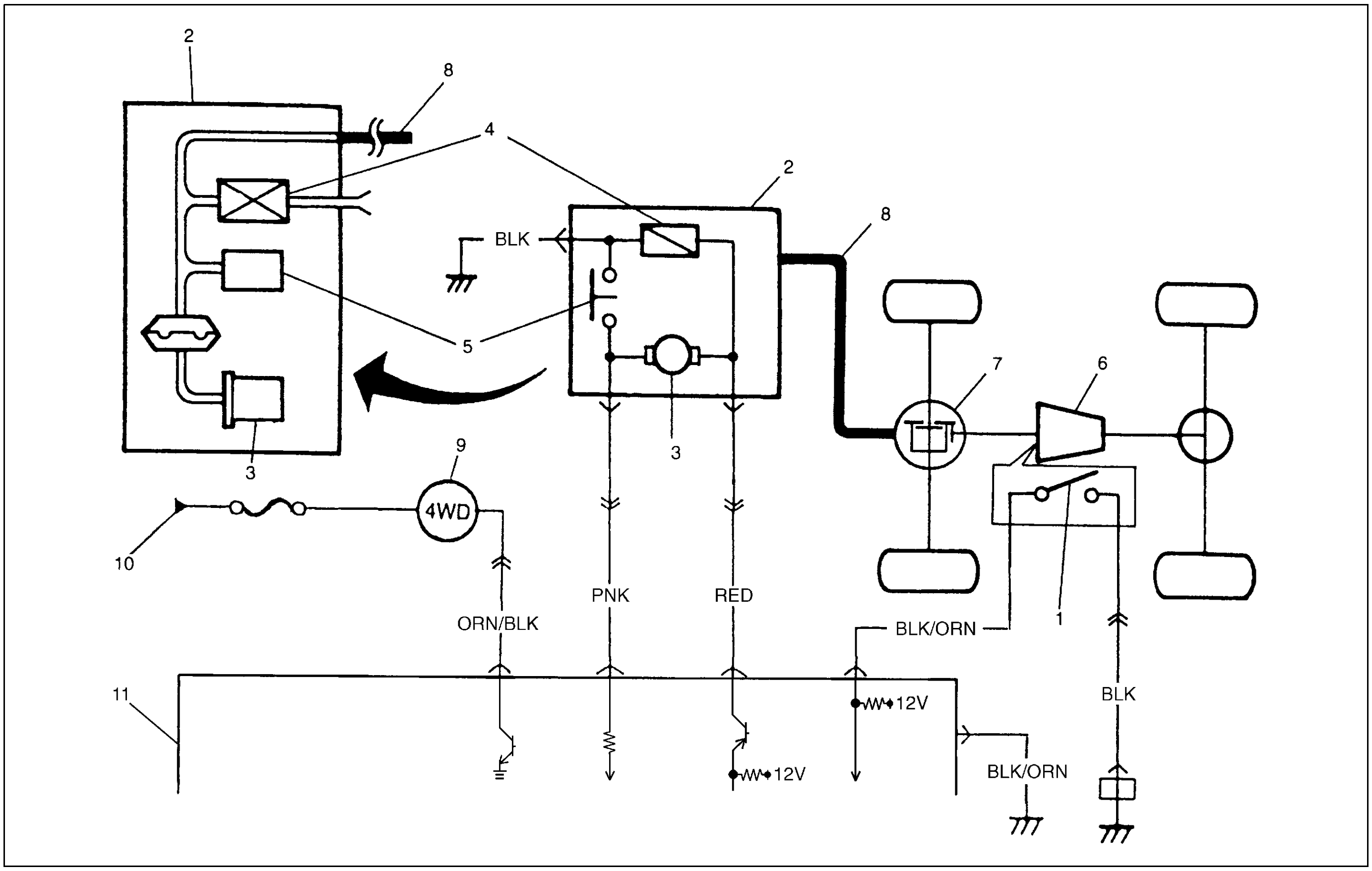
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.

CONTENTS

General Description

4WD Control System

System circuit



1. 4WD switch	4. Release valve	7. Front differential	10. To ignition switch
2. Air pump assembly	5. Pressure switch	8. Air hose and pipe	11. ECM or PCM
3. Pump motor	6. Transfer	9. 4WD indicator lamp	

Diagnosis

Differential Assembly Diagnosis Table

Condition	Possible Cause	Correction
Gear noise	Deteriorated or water mixed lubricant	Repair and replenish.
	Inadequate or insufficient lubricant	Repair and replenish.
	Maladjusted backlash between bevel pinion and gear	Adjust.
	Improper tooth contact in the mesh between bevel pinion and gear	Adjust or replace.
	Loose bevel gear securing bolts	Replace or retighten.
	Damaged side gear(s) or side pinion(s)	Replace.
Bearing noise	(Constant noise) Deteriorated or water mixed lubricant	Repair and replenish.
	(Constant noise) Inadequate or insufficientlubricant	Repair and replenish.
	(Noise while coasting) Damaged bearing(s) of bevel pinion	Replace.
	(Noise while turning) Damaged differential side bearing(s) or axle bearing(s)	Replace.
Oil leakage	Worn or damaged oil seal	Replace.
	Excessive oil	Adjust oil level.
	Loose differential carrier bolts	Replace or retighten.
2WD/4WD switching error	Defective actuator	Replace.
	Abnormality in 4WD control system	Inspect referring to “4WD CONTROL SYSTEM DIAG-NOSTIC FLOW TABLE”.

4WD Control System Diagnostic Flow Table

Before performing the trouble diagnosis, check that the transfer and front differential are in good condition and there is no air leakage from air hoses and the actuator. Refer to “4WD CONTROL SYSTEM INSPECTION” in this section for air leakage.

Notes on system circuit inspection

- Be sure to read “PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE” in Section 0A before circuit inspection and observe what is written there.
- For system circuit, refer to the figure of “GENERAL DESCRIPTION” in this section.
- For terminal arrangement, refer to “4WD CONTROL CIRCUIT INSPECTION” in this section.

Flow table

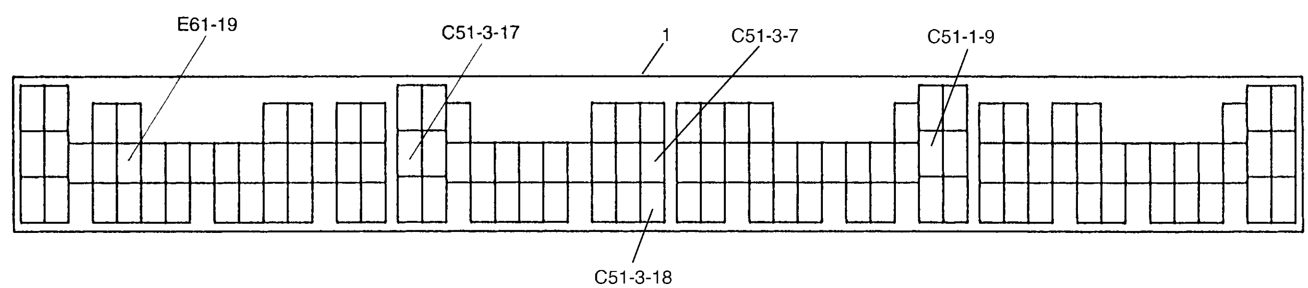
Step	Action	Yes	No
1	Turn ON ignition switch (but engine at stop) and check malfunction indicator lamp. Does lamp light up?	Go to step 2.	A trouble has occurred at some place. Repair it referring to MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LAMP) CHECK in DIAGNOSIS of Section 6.
2	Check 4WD switch circuit. Turn ignition switch ON and check that voltage between terminal C51-3-7 and terminal C51-3-17 (ground) is as follows. • When transfer shift lever is in N or 2H : 10 – 14 V • When transfer shift lever is in 4L or 4H : 0 – 1 V Is the check result satisfactory?	Go to step 3.	Check 4WD switch (refer to Section 7A), "BLK/ORN" and "BLK" circuits of 4WD switch. If OK, substitute a known-good ECM (PCM) and recheck.
3	Check power supply. 1) Turn ignition switch ON. 2) Check voltage between C51-1-9 and C51-3-17 (ground). The check results should be as follows. • When transfer shift lever is in N or 2H : 0 – 1 V • When transfer shift lever is in 4L or 4H : 10 – 14 V Is the check result satisfactory?	Go to step 4.	Check "RED" circuit. If it is OK, substitute a known-good ECM (PCM) and recheck.
4	Check air pump assembly circuit. 1) Check for proper connection to air pump assembly at all terminals. 2) Turn ignition switch ON. 3) Check voltage between C51-3-18 and C51-3-17 (ground). The check result should be as follows. • When transfer shift lever is in 2H or N : 0 – 1 V • When transfer shift lever is in 4L or 4H (more than 4 seconds after shifted to 4L or 4H) : 10 – 14 V Is the check result satisfactory?	Go to step 5.	Check air pump assembly referring to "ON-VEHICLE SERVICE", and then "PNK" circuit. If OK, substitute a known-good ECM (PCM) and recheck.
5	Check 4WD indicator lamp circuit. 1) Turn ignition switch ON. 2) Check voltage between E61-19 and C51-3-17 (ground). The check result should be as follows. • When transfer shift lever is in 2H or N : 10 – 14 V • When transfer shift lever is in 4L or 4H : 0 – 1 V Is the check result satisfactory?	4WD control system is in good condition.	Check "ORN/BLK" circuit (including indicator lamp and combination meter). If OK, substitute a known-good ECM (PCM) and recheck.

4WD Control System Circuit Inspection

Voltage check

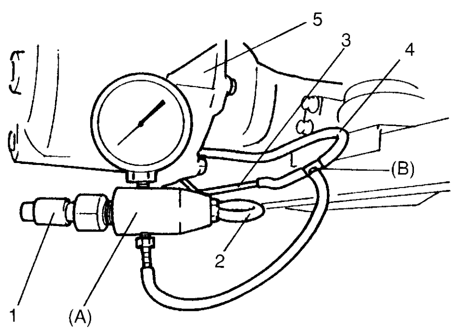
Check for input or output voltage (voltage between each circuit and body ground) of ECM (PCM) with ECM (PCM) connector connected and ignition switch turned ON.

TERMINAL	CIRCUIT	WIRE COLOR	NORMAL VOLTAGE	CONDITION
E61-19	4WD Indicator lamp	ORN/BLK	10 –14 V	Transfer shift lever : 2H or N
			0 – 1 V	4 seconds after transfer shift lever shifted to 4H or 4L
C51-1-9	Air pump assembly (Pump motor and release valve)	RED	0 – 1 V	Transfer shift lever : 2H or N
			10 – 14 V	1 seconds after transfer shift lever shifted to 4H or 4L
C51-3-7	4WD switch	BLK/ORN	10 – 14 V	Transfer shift lever : 2H or N
			0 – 1 V	Transfer shift lever : 4H or 4L
C51-3-17	Ground	BLK/ORN	0 – 1 V	–
C51-3-18	Air pump assembly (pressure switch)	PNK	0 – 1 V	Transfer shift lever : 2H or N
			10 – 14 V	4 seconds after transfer shift lever shifted to 4H or 4L



1. ECM (PCM) connector terminal arrangement ; viewed from harness side

4WD Control System Inspection



1) Install special tool to air hose connecting between air pump assembly and differential (actuator) as shown in figure. Tighten adjusting screw (2) of special tool as far as it stops. Close air check side opening by using fuel hose (1) as blind plug.

Special tool
(A) : 09918-18110
SUZUKI GENUINE PARTS
(B) : 09367-04002

NOTE:

Use care not to bend any part of hose.

2) Turn ON ignition switch and shift transfer lever from 2H to 4H range.
3) Check that motor starts running (a sound can be heard) within 1 second and it stops when gauge of special tool indicates specified pressure value.
   Check also for air leakage.

Air pressure specification
(for 4WD control system inspection) :
30.0 – 45.0 kPa (0.30 – 0.45 kg/cm^2, 4.25 - 6.40 psi)

4) Check that pressure value indicated on gauge of special tool drops as soon as transfer lever is shifted to 2H position.
5) Start motor by shifting transfer lever to 4H position again. Loosen adjusting screw (2) to lower pressure value on gauge. Motor should start to run again and stop in about 4 seconds.
6) With the adjusting screw (2) of special tool loosened, shift transfer shift lever to N or 2H position and then 4L or 4H position.
   Pump motor should stop about 10 seconds after motor starts to run.

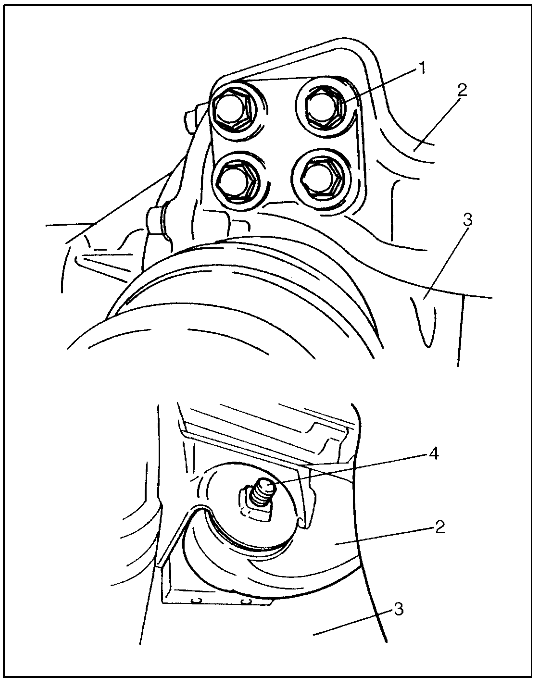
3.	pipe (to air pump assembly)
4.	Hose (to differential carrier)
5.	Differential housing

On-Vehicle Service

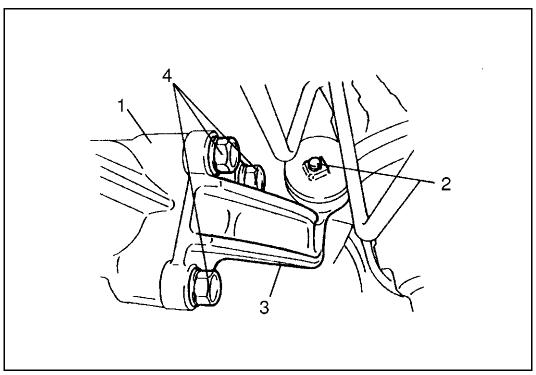
Differential Mountings

REMOVAL AND INSTALLATION

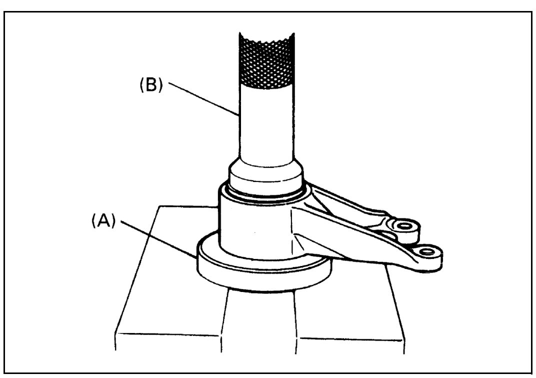
1) Lift up vehicle and turn steering wheel all way to the right.



2) Separate front mounting bracket R (2) from differential housing (3) by removing bolts (1) from its lower part.
3) Remove front mounting bracket R (2) by removing mounting front bolt (4) from its upper part.

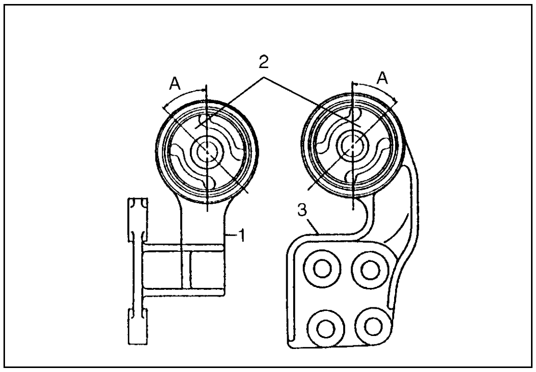


4) Remove front mounting bracket L (3) from differential housing (1) by removing upper and lower fastening bolts (2, 4).



5) Check conditions of each bush. If it is damaged or deteriorated, drive it out with special tools and press for replacement.

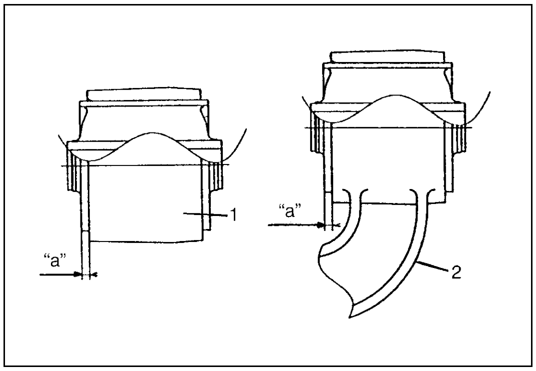
Special tool
(A) : 09951-26010
(B) : 09951-16080



6) Position slit in each bush (2) as shown when press-fitting it.

Bush instillation position (angle “A”) :
45° (slit alignment)

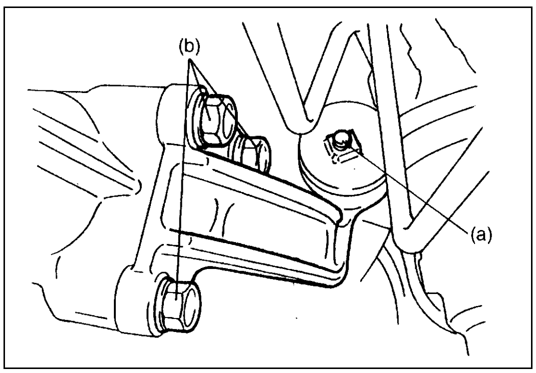
1.	Front mounting bracket L
3.	Front mounting bracket R



7) Position each bush to bracket as shown in the figure

Bush installation position (length “a”) :
3.0 mm (0.12 in.)

1.	Front mounting bracket R
2.	Front mounting bracket L

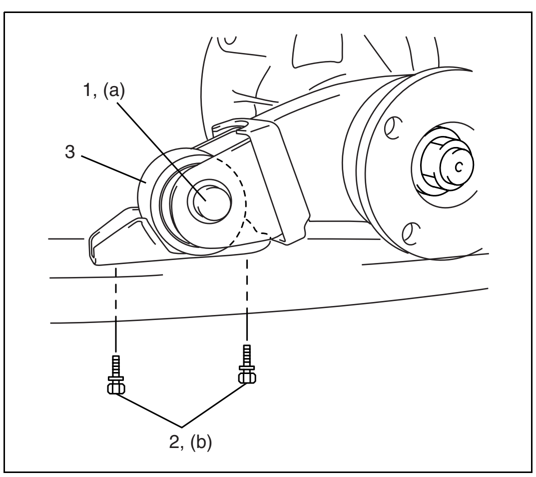


8) Tighten differential front mounting and bracket bolt to specified torque for reinstallation.

Tightening torque
Front mounting bolt (a) :
85 N·m (8.5 kg-m, 61.5 lb-ft)
Front mounting bracket bolt (b) :
50 N·m (5.0 kg-m, 36.5 lb-ft)

Rear Mounting for Front Differential Carrier

REMOVAL AND INSTALLATION



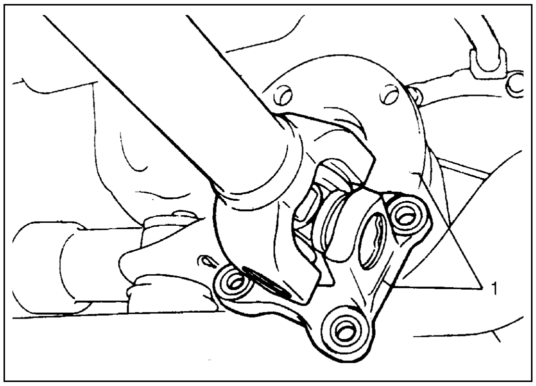
1) Lift up vehicle and remove rear mounting bracket (3) by removing rear mounting bolt (1) and rear mounting bracket bolts (2).
2) Check mounting rubber for damage or deterioration and replace as necessary.
3) Tighten rear mounting bolts (1) and rear mounting bracket bolts (2) to specified torque for reinstallation.

Tightening torque
Rear mounting bolt (a) :
85 N·m (8.5 kg-m, 61.5 lb-ft)
Rear mounting bracket bolts (b) :
50 N·m (5.0 kg-m, 36.5 lb-ft)

Front Differential Assembly

DISMOUNTING

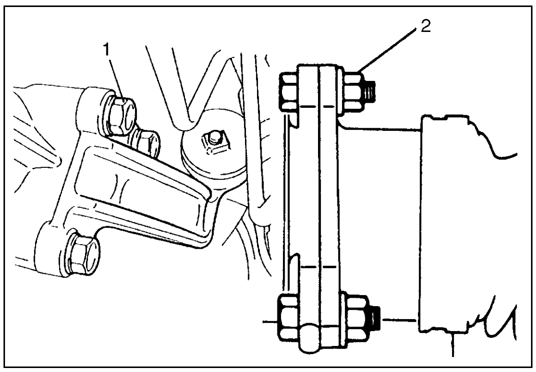
1) Lift up vehicle and drain oil.
2) Disconnect air hose and breather hose from differential housing.



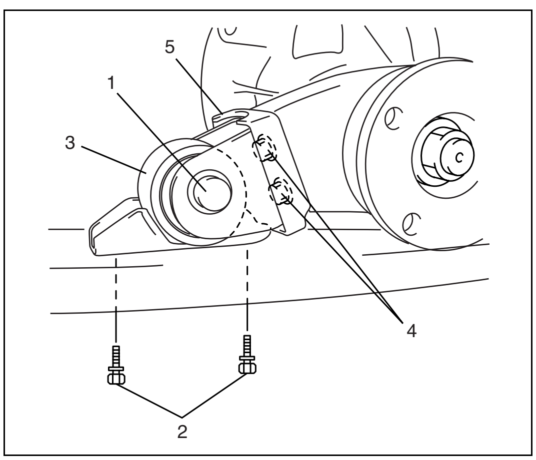
3) Before removing propeller shaft, give match marks (1) on joint flange and propeller shaft as shown in the figure.
4) Remove propeller shaft flange by removing its 4 bolts and suspend it with cord or the like.

NOTE:

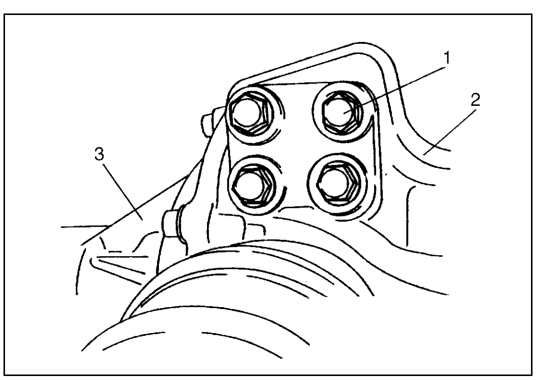
If pull out propeller shaft, transfer oil must be drained before pulling out.



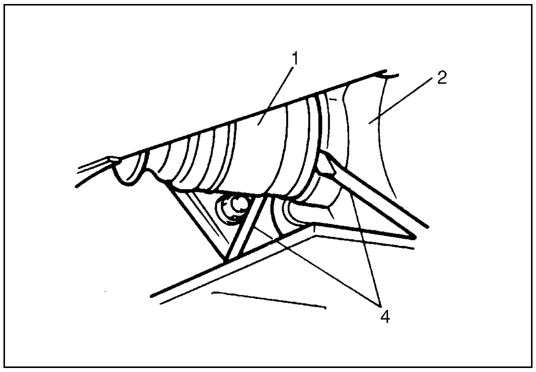
5) Remove bolts (1) for left mounting bracket and bolts and nuts (2) for drive shaft flange to set left side of differential free.



6) Remove bolts (1, 2) and rear mounting bracket (3).
7) Remove bolts (4) and rear mounting bracket No.2 (5).

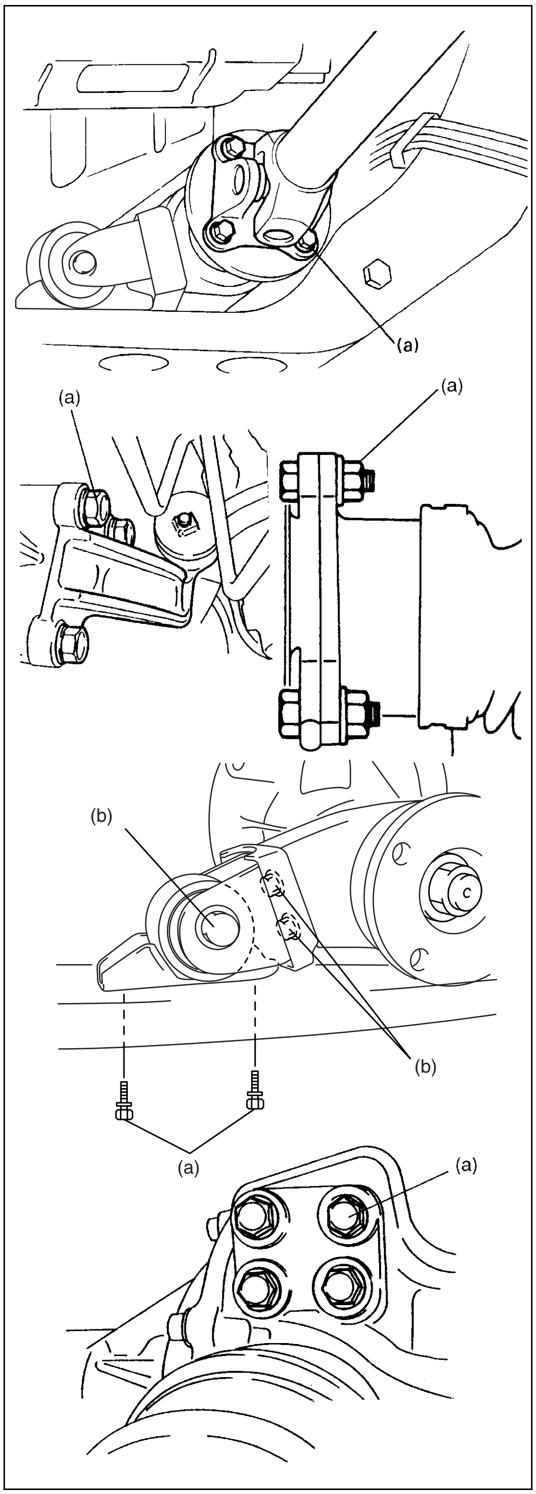


8) With differential housing assembly held with transmission jack, remove front mounting bracket (2) bolts (1) on right end of housing (3).



9) Using 2 large screwdrivers (4) as levers, pull out right side drive shaft joint (1) from differential (2) and dismount housing assembly from vehicle.

CAUTION:
During above work, use care not to cause damage to drive shaft boot.



REMOUNTING

For remounting, reverse dismounting procedure and use the following tightening torque.

Tightening torque
Front drive shaft flange bolts (a) :
50 N·m (5.0 kg-m, 36.5 lb-ft)
Propeller shaft flange bolts (a) :
50 N·m (5.0 kg-m, 36.5 lb-ft)
Front mounting bracket bolts (a) :
50 N·m (5.0 kg-m, 36.5 lb-ft)
Rear mounting bracket bolts(a) :
50 N·m (5.0 kg-m, 36.5 lb-ft)
Rear mounting bolt (b) :
85 N·m (8.5 kg-m, 61.5 lb-ft)
Rear mounting bracket No.2 bolts (b) :
85 N·m (8.5 kg-m, 61.5 lb-ft)

After tightening all fasteners properly, fill hypoid gear oil as specified and check tightening of plugs with specification.

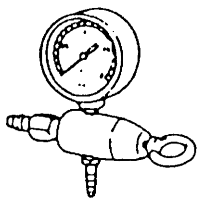
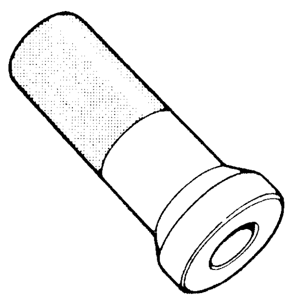
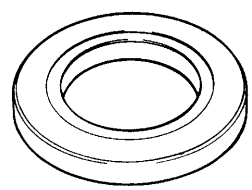
Unit Repair

Refer to the same section of “UNIT REPAIR MANUAL” mentioned in “FOREWORD” of this manual.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Front mounting bolts	85	8.5	61.5
Front mounting bracket bolts	50	5.0	36.5
Front drive shaft flange bolts	50	5.0	36.5
Propeller shaft flange bolts	50	5.0	36.5
Rear mounting bolt	85	8.5	61.5
Rear mounting bracket bolts	50	5.0	36.5
Rear mounting bracket No.2 bolts	85	8.5	61.5

Special Tool

 09918-18110 Air pressure regulator	 09951-16080 Bearing installer	 09951-26010 Bush remover plate

SECTION 7F

DIFFERENTIAL (REAR)

CONTENTS

General Description

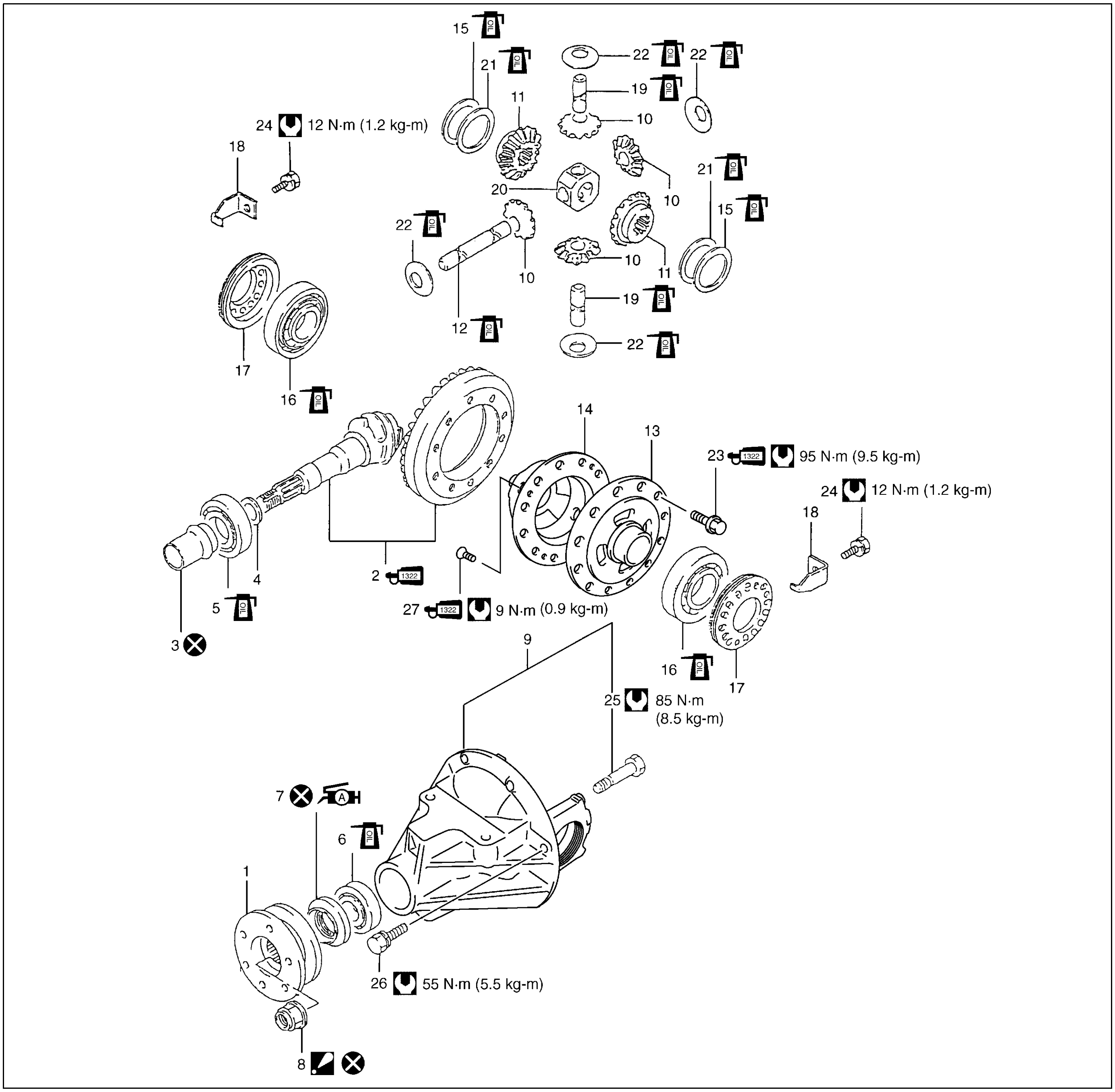
The differential assembly using a hypoid bevel pinion and gear is installed to the rear axle. It is set in the conventional type axle housing.
The differential assembly is decisive in that the drive power is concentrated there. Therefore, use of genuine parts and specified torque is compulsory. Further, because of sliding tooth meshing with high pressure between bevel pinion and gear, it is mandatory to lubricate them by hypoid gear oil.

Diagnosis

Diagnosis Table

Condition	Possible Cause	Correction
Gear noise	Deteriorated or water mixed lubricant	Repair and replenish.
	Inadequate or insufficient lubricant	Repair and replenish.
	Maladjusted backlash between drive bevel pinion and gear	Adjust as prescribed.
	Improper tooth contact in the mesh between drive bevel pinion and gear	Adjust or replace.
	Loose drive bevel gear securing bolts	Replace or retighten.
	Damaged differential gear(s) or differential pinion(s)	Replace.
Bearing noise	(Constant noise) Deteriorated or water mixed lubricant	Repair and replenish.
	(Constant noise) Inadequate or insufficient lubricant	Repair and replenish.
	(Noise while coasting) Damaged bearing(s) of drive bevel pinion	Replace.
	(Noise while turning) Damaged differential side bearing(s) or axle bearing(s)	Replace.
Oil leakage	Clogged breather plug	Clean.
	Worn or damaged oil seal	Replace.
	Excessive oil	Adjust oil level.

On-Vehicle Service



	1. Universal joint flange		9. Differential carrier assembly		17. Bearing adjuster		25. Bolt
	2. Hypoid gear set		10. Differential pinion		18. Lock plate		26. Bolt
1322	3. Bevel pinion spacer Apply thread lock cement 99000-32110 referring to "DIFFERENTIAL CASE" in this section.		11. Differential gear		19. Pinion shaft No.2	1322	27. Differential case screw : Apply thread lock cement 99000-32110 to thread part of bolt.
	4. Shim		12. Pinion shaft No.1		20. Pinion joint		Do not reuse.
	5. Rear bearing		13. Differential left case		21. Spring washer		Tightening torque
	6. Front bearing		14. Differential right case		22. Washer	OIL	Apply differential oil.
A	7. Oil seal : Apply grease 99000-25010 to oil seal lip.		15. Thrust washer	1322	23. Bevel gear bolt : Apply thread lock cement 99000-32110 to thread part of bolt.		
	8. Flange nut : After tightening nut so as rotation torque of bevel pinion shaft to be in specified value, caulk nut securely.		16. Differential side bearing		24. Bolt		

Precaution for Maintenance Service

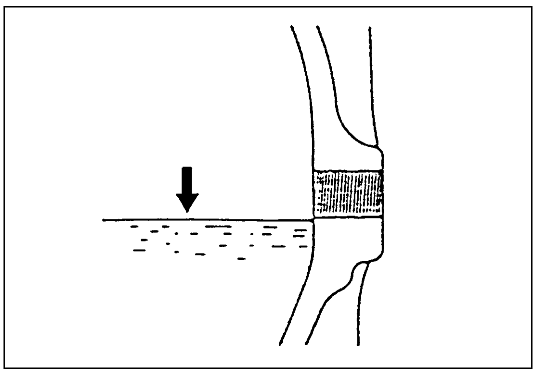
- When having driven through water, check immediately if water has entered (if so, oil is cloudy). Water mixed oil must be changed at once.
- Whenever vehicle is hoisted for any other service work than oil change, also be sure to check for oil leakage and status of breather hoses.

Differential Gear Oil Change

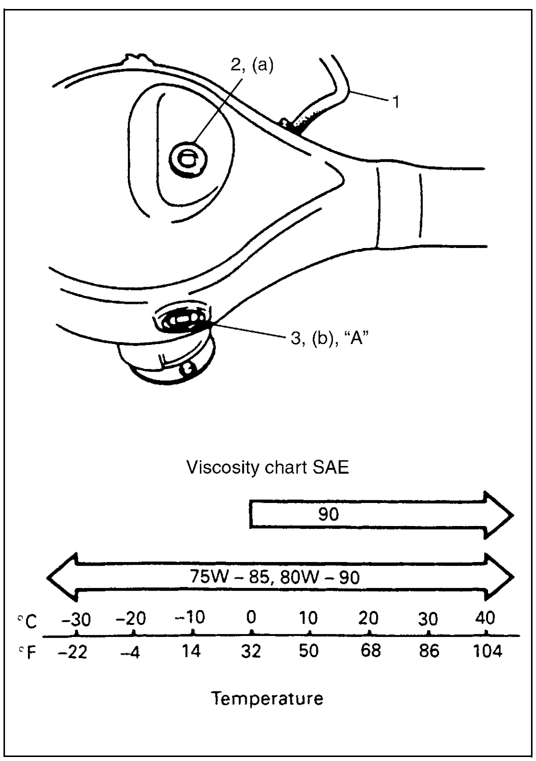
NOTE:

- **Hypoid gear oil must be used for differential.**
- **It is highly recommended to use SAE 80W-90 viscosity.**

1) Before oil change or inspection, be sure to stop engine and lift up vehicle horizontally.
2) Check oil level and existence of leakage. If leakage is found, correct its cause.



3) Drain old oil and pour proper amount of gear oil as specified (roughly up to level hole).



4) Torque drain plug (3) and level/filler plugs (2) to specification.

"A" : Sealant 99000-31110

Tightening torque
Differential oil level/filler plug (a) :
50 N·m (5.0 kg-m, 36.5 lb-ft)
Differential oil drain plug (b) :
28 N·m (2.8 kg-m, 20.5 lb-ft)

Hypoid gear oil :
API GL-5, SAE 75W-85, 80W-90 or 90

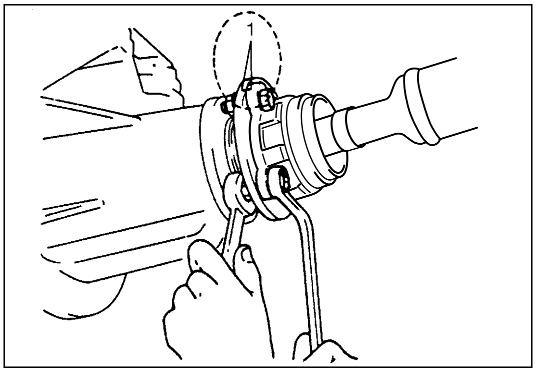
Oil capacity :
2.5 liters (5.3/4.4 US/Imp. pt.)

1. Breather hose

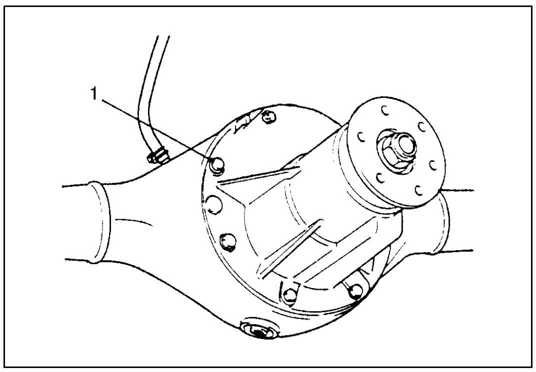
Rear Differential Assembly

Dismounting

1) Lift up vehicle and drain oil from rear differential housing.
2) Remove rear brake drums and pull out right and left rear axle shafts. (Refer to “REAR AXLE SHAFT REMOVAL” of Section 3E.)

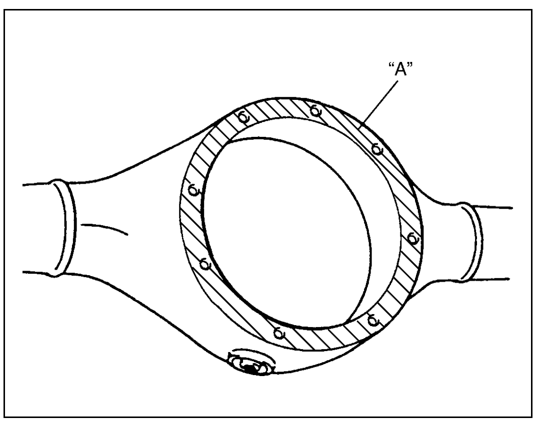


3) Before removing propeller shaft, give match marks (1) on joint flange and propeller shaft as shown.
4) Remove propeller shaft by removing its flange bolts and nuts.



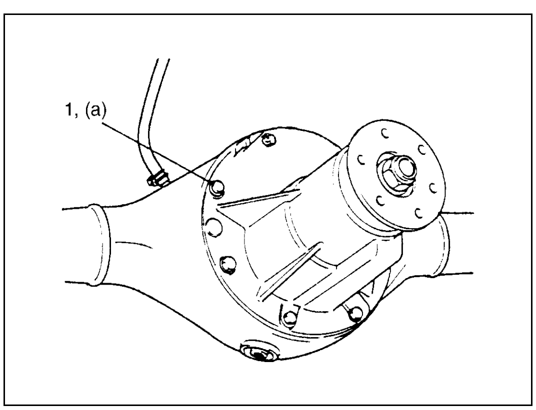
5) Remove differential assembly by removing its 8 fastening bolts (1).

Remounting



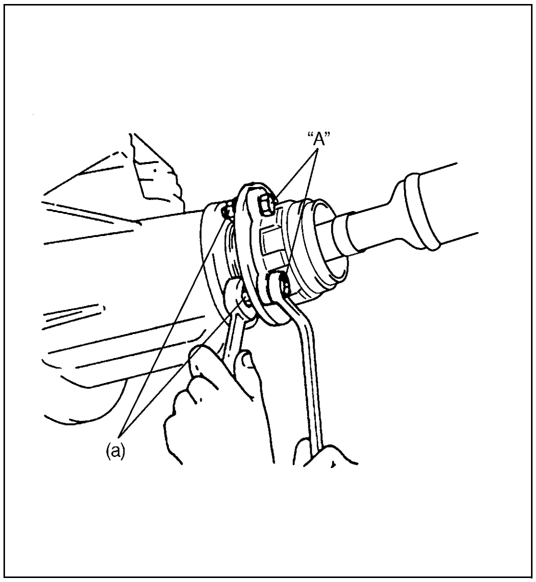
1) Clean mating surfaces of rear axle and differential assembly and apply sealant to axle side evenly.

“A” : Sealant 99000-31110



2) Install differential assembly to axle and fix it with bolts (1) tightened to specified torque.

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



3) Install propeller shaft to joint flange aligning match marks and torque flange nuts to specification. Apply thread lock cement to thread part of bolt if reused.

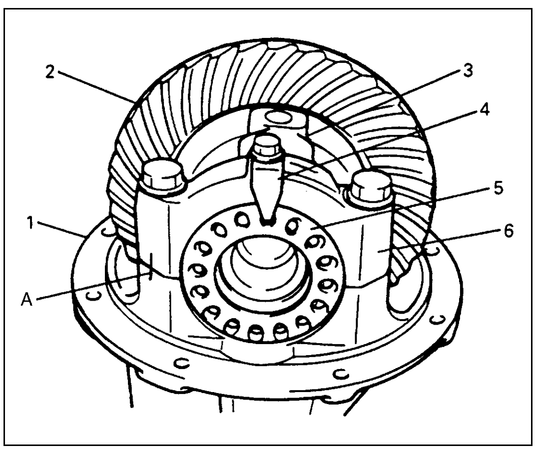
"A" : Cement 99000-32110

Tightening torque
Propeller shaft flange nuts (a) :
60 N·m (6.0 kg-m, 43.5 lb-ft)

4) Install right and left rear axle shafts and drums.
(Refer to "REAR AXLE INSTALLATION" of Section 3E and rear brake drum installation of Section 5.)
5) Install wheels.
6) Fill hypoid gear oil as specified and tighten plug to specification.
7) Lower lift.

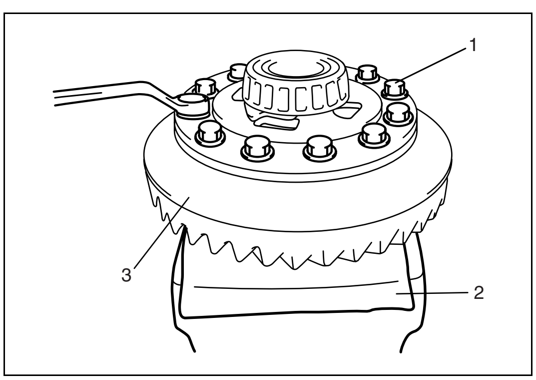
Unit Repair

Disassembling Unit



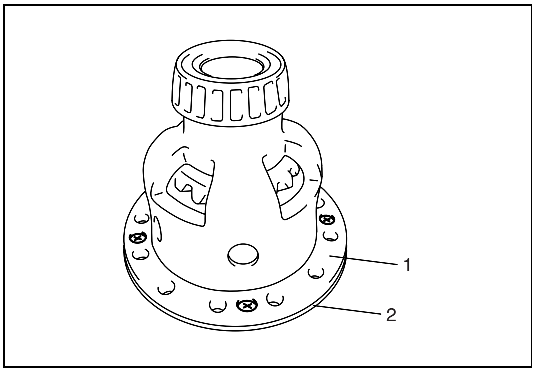
1) Hold differential assembly securely and put identification marks on differential side bearing caps (6).
2) Take off differential side bearing lock plates (4) and differential side bearing caps (6) by removing their bolts and then take out bearing adjusters (5), side bearing outer races and drive bevel gear with differential case.

1.	Differential carrier
2.	Drive bevel gear assembly
3.	Differential case
A:	Identification mark

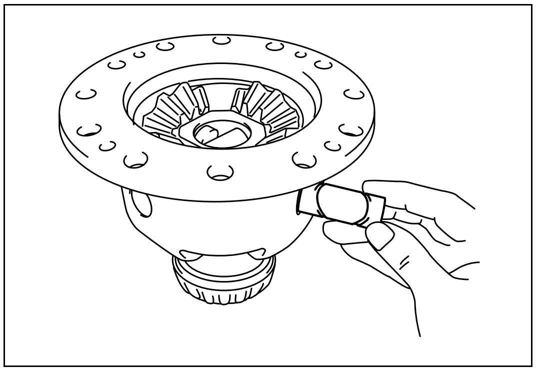


3) Remove drive bevel gear (hypoid gear), differential gears, differential pinions and pinion shafts.

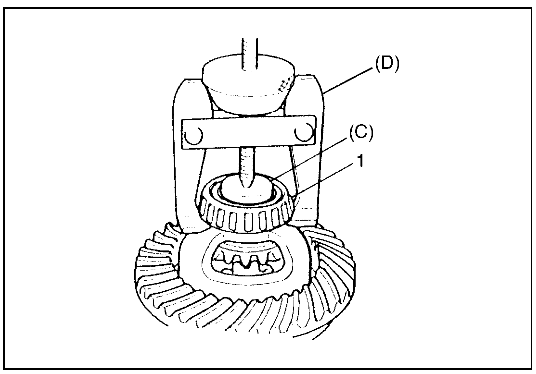
a) With aluminum plates (2) placed on vise first, grip differential case with it and remove drive bevel gear (hypoid gear) (3) by removing its bolts (1).



b) Remove differential left case (2) from differential right case (1).



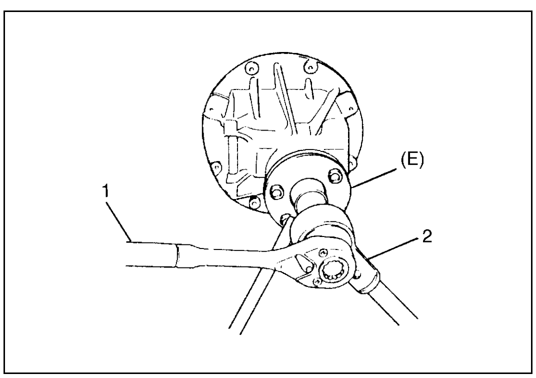
c) Remove pinion shafts, differential gears, washers, differential pinions, spring washers, thrust washers.



4) Using special tools, pull out differential side bearings (1).

Special tool
(C) : 09913-85230
(D) : 09913-61510

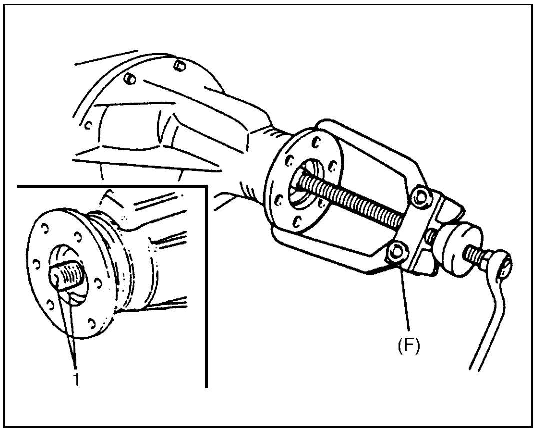
5) Remove drive bevel pinion (hypoid gear) assembly.



a) Hold universal joint flange with special tool and then remove flange nut by using power wrench (4 - 10 magnification) (2).

Special tool
(E) : 09922-66021

1. Socket wrench

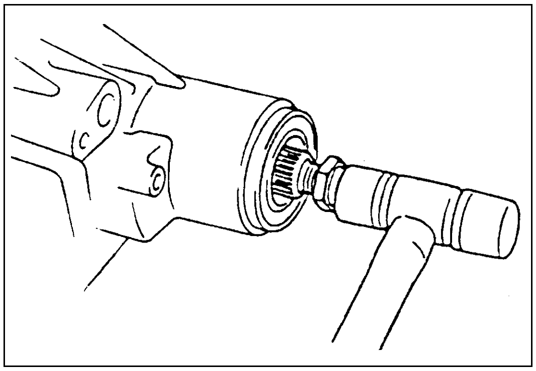


b) Make mating marks (1) on drive bevel pinion and companion flange.

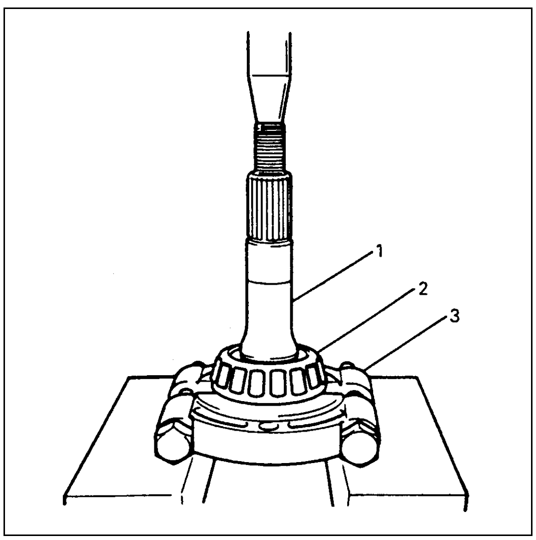
CAUTION:
Don't make mating mark on the coupling surface of the flange.

c) Remove companion flange from drive bevel pinion. Use special tool if it is hard to remove.

Special tool
(F) : 09913-65135

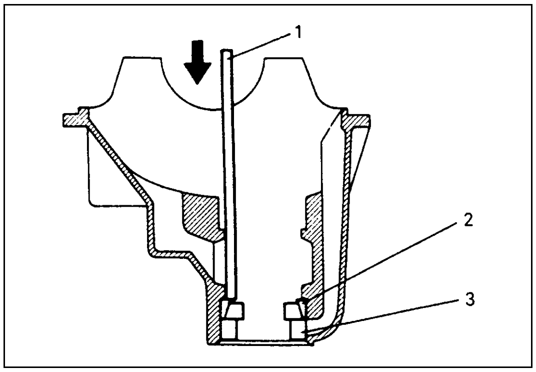


d) Remove drive bevel pinion with rear bearing, shim and spacer from carrier.
If it is hard to remove, screw an used nut into drive bevel pinion and hammer on that nut with a plastic hammer but never directly on drive bevel pinion.

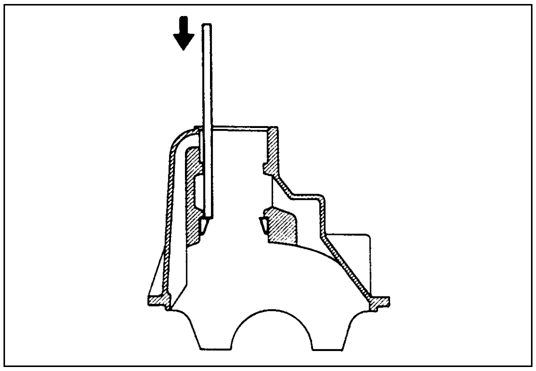


e) Remove drive bevel pinion rear bearing (2) by using bearing puller (3) and press.

1. Drive bevel pinion



6) Using a hammer and brass bar (1), drive out front bearing outer race with bearing (2) and oil seal (3).



7) Drive out rear bearing outer race in the same way as in the step 6).

Component Inspection

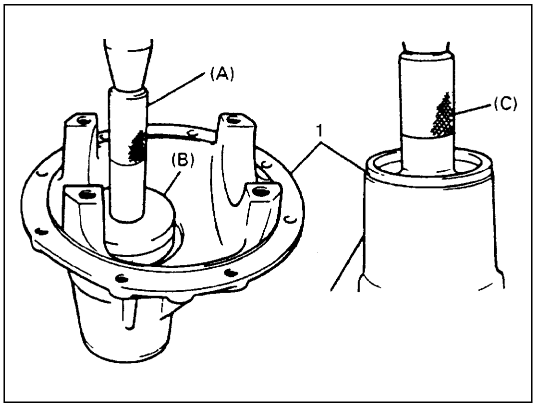
- Check companion flange for wear or damage.
- Check bearings for wear or discoloration.
- Check differential carrier for cracks.
- Check drive bevel pinion and drive bevel gear for wear or cracks.
- Check differential gears, pinions and pinion shafts for wear or damage.
- Check differential gear spline for wear or damage.

Sub-Assembly Adjustment and Reassembly

Judging from faulty conditions noted before disassembly and what is found through visual check of bearing and gear tooth etc. after disassembly, prepare replacing parts and proceed to reassembly according to procedures as described below.

CAUTION:
- **Drive bevel gear and pinion must be replaced as a set when either replacement becomes necessary.**
- **When replacing taper roller bearing, replace as inner race & outer race assembly.**

Differential carrier

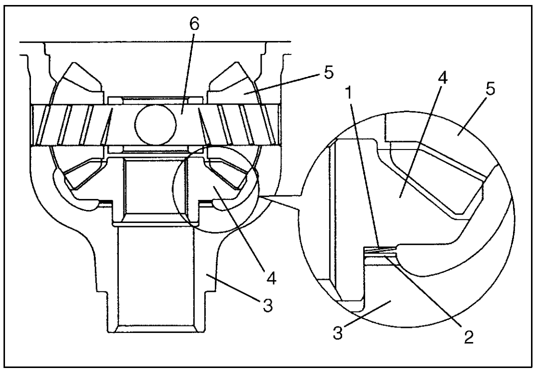


For press-fitting drive bevel pinion bearing outer races, use special tools as shown in the figure.

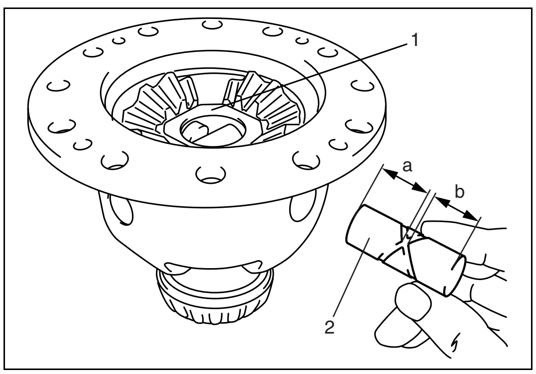
Special tool
(A) : 09924-74510
(B) : 09926-68310
(C) : 09913-75510

1. Differential carrier

Differential case

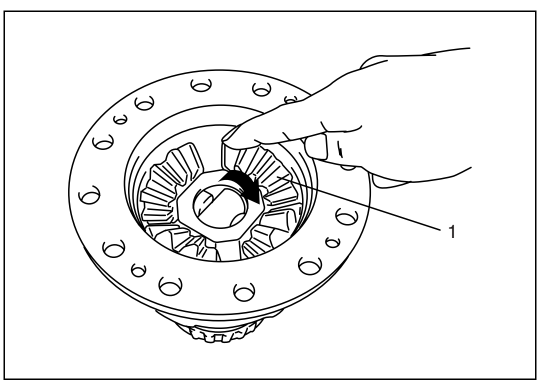


1) After applying differential oil to differential gear (4), pinions (5), pinion shafts (6), thrust washer (2) and spring washer (1), install them in differential right case (3).
   For correct installing direction of thrust washer (2) and spring washer (1), refer to the figure.

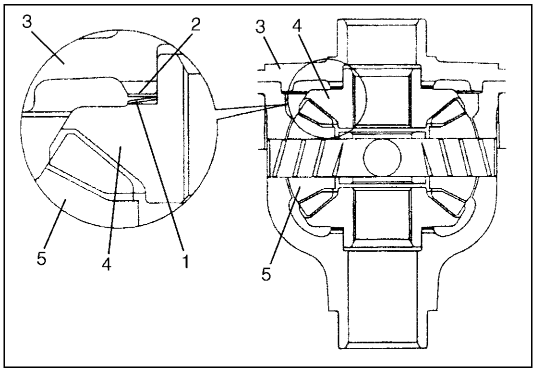


2) When installing pinion shaft No.2 (2) (shorter) into differential case and pinion, insert its “a” side into pinion joint (1).

NOTE:
“a” is longer than “b”. (“a” > “b”)

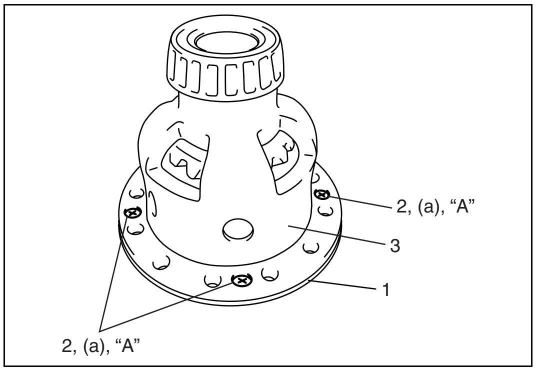


3) Check differential pinion gear (1) for smooth rotation.



4) In the same manner as described in Step 1), install thrust washer (2), spring washer (1) and differential gear (4).

3.	Differential left case
5.	Differential pinion

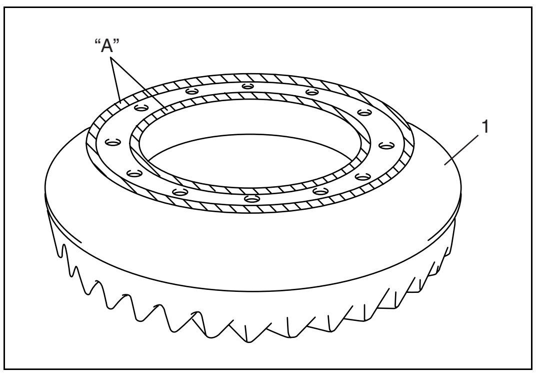


5) Install differential left case (1) and then tighten screws to specified torque.

“A” : Cement 99000-32110

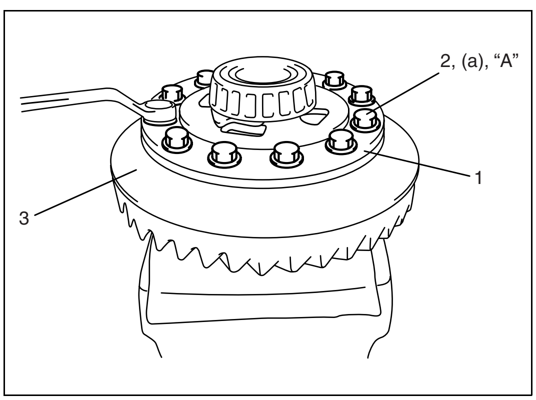
Tightening torque
Differential case screw (a) :
9 N·m (0.9 kg-m, 6.5 lb-ft)

3	Differential right case



6) Clean and degrease mating surface of drive bevel gear (hypoid gear) (1).
7) Apply thread lock cement to hatched part of drive bevel gear (1) as shown in the figure.

“A” : Cement 99000-32110

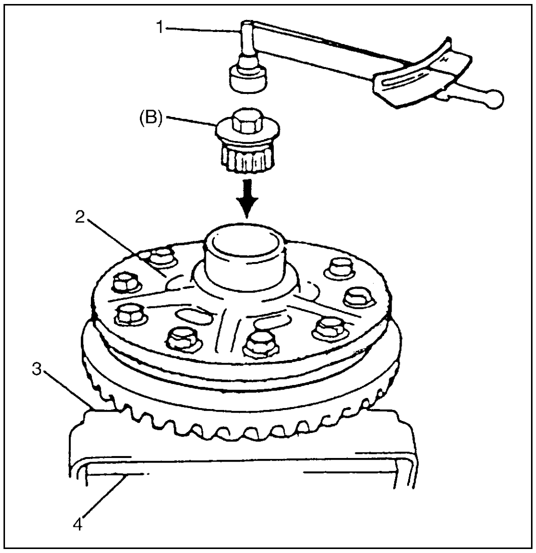


8) Put drive bevel gear (3) on differential case (1) and fasten them with bolts (2) by tightening them to specified torque. Use thread lock cement for bolts (2).

CAUTION:
Use of any other bolts than that specified is prohibited.

“A” : Cement 99000-32110

Tightening torque
Bevel gear bolts (a) : 105 N·m (10.5 kg-m, 76.0 lb-ft)



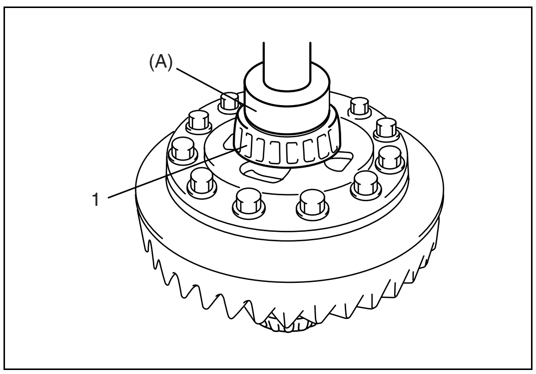
9) Install special tool to differential case assembly and check that preload is within specification below. If preload exceeds specified value, check if foreign matter is caught or gear is damaged.

Special tool
(B) : 09928-06510

Side gear preload
: Max. 2.5 N·m (0.25 kg-m, 1.8 lb-ft)

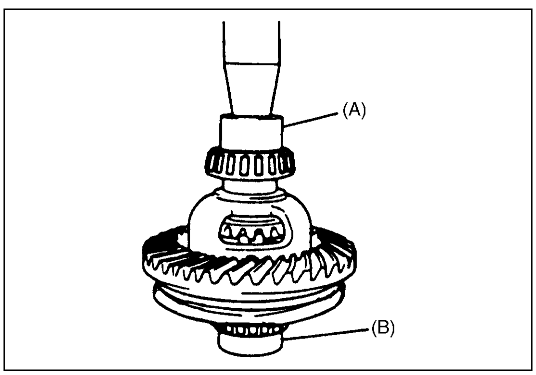
1.	Torque wrench
2.	Differential case assembly
3.	Aluminum plate
4.	Vise

Differential side bearing



1) Press-fit side bearing (1) with special tool and press.

Special tool
(A) : 09944-66020



2) Hold bearing press-fitted in Step 1) with holder and press-fit side bearing on the other side.

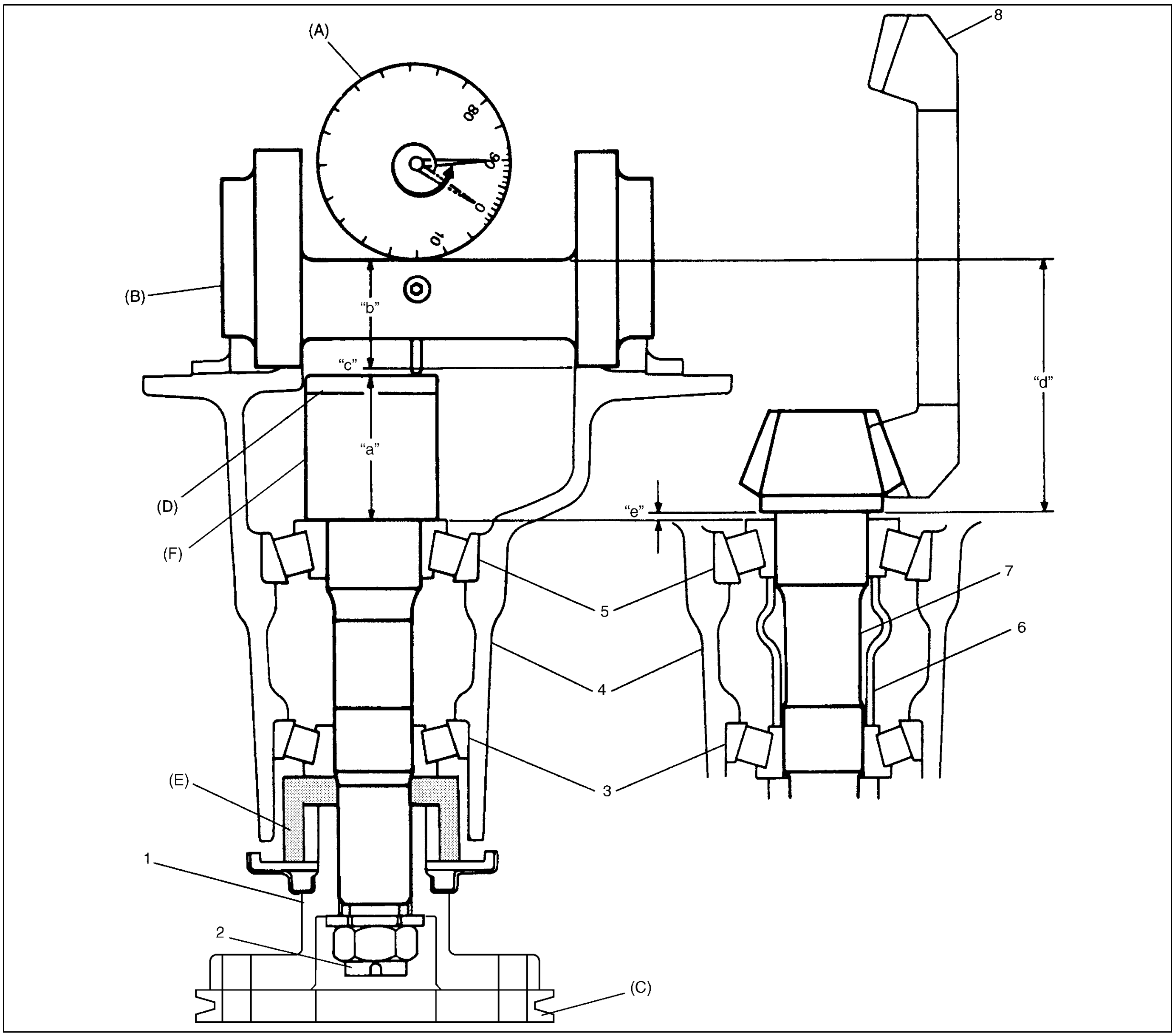
NOTE:
Be sure to use bearing holder for the purpose of protecting lower bearing.

Special tool
(A) : 09944-66020
(B) : 09951-16060

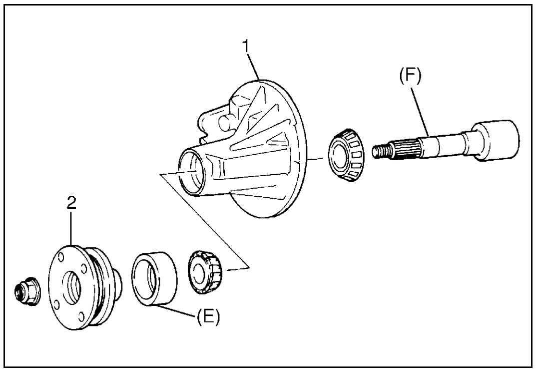
Drive bevel pinion

To engage drive bevel pinion and gear correctly, it is pre-required to install drive bevel pinion to differential carrier properly by using adjusting shim as described on the followings. Shown below is relative positions of drive bevel pinion, differential carrier and mounting dummy.

Special tool
(A) : 09900-20606
(B) : 09926-78320
(C) : 09922-75222
(D) : 09922-76570
(E) : 09951-46010
(F) : 09926-78311-002



1.	Universal Joint flange (P/No. 27110-60A00)	"a":	Pinion dummy height + Attachment height
2.	Nut	"b":	Axle dummy radius
3.	Front bearing	"a" + "b"	Mounting dummy size 110.00 mm/4.3307 in.
4.	Differential carrier	"c":	Measured dimension
5.	Rear bearing	"d":	Drive bevel pinion mounting distance 110.00 mm/4.3307 in.
6.	Spacer	"e":	Shim size for mounting distance adjustment (= "c")
7.	Drive bevel pinion		
8.	Drive bevel gear		

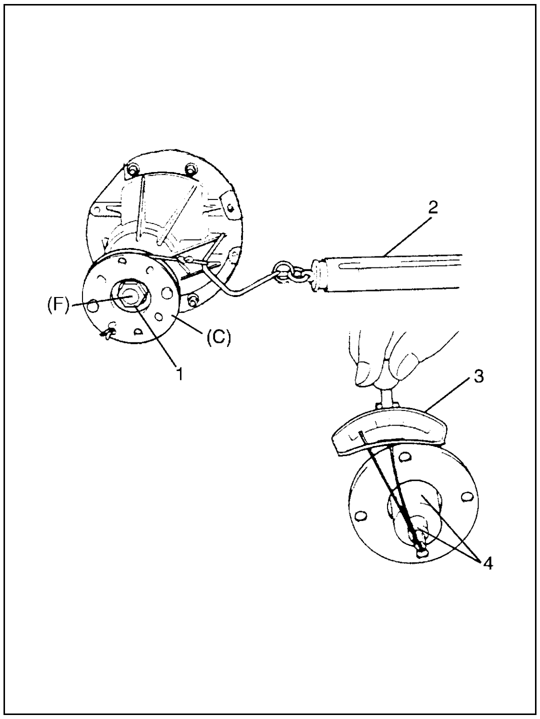


1) Install special tools with bearings and universal joint flange (2) to differential carrier (1).

NOTE:

This installation requires no spacer or oil seal.

Special tool
(E) : 09951-46010
(F) : 09926-78311-002



2) Tighten flange nut (1) so that specified bearing preload is obtained.

NOTE:

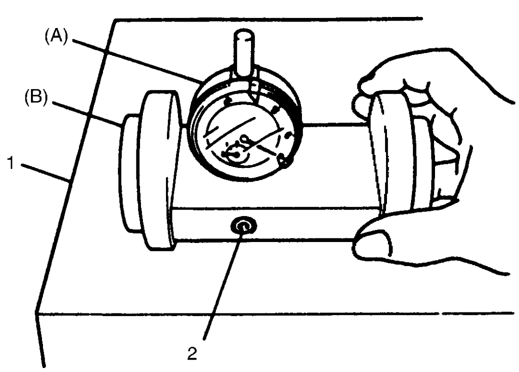
- **Before taking measurement with spring balance (2) or torque wrench (3), check for rotation by hand and apply small amount of differential oil to bearings.**
- **On measuring preload, rotate the drive bevel pinion about 1 rotation per 2 seconds.**

Special tool
(C) : 09922-75222
(F) : 09926-78311-002

Pinion bearing preload
: 0.9 – 1.7 N·m (9.0 – 17.0 kg-cm, 7.8 – 14.7 lb-in.)

Spring measure reading with special tool
: 18N – 34N (1.8 – 3.4 kg, 4.0 – 7.5 lb)

4. Socket with adapter



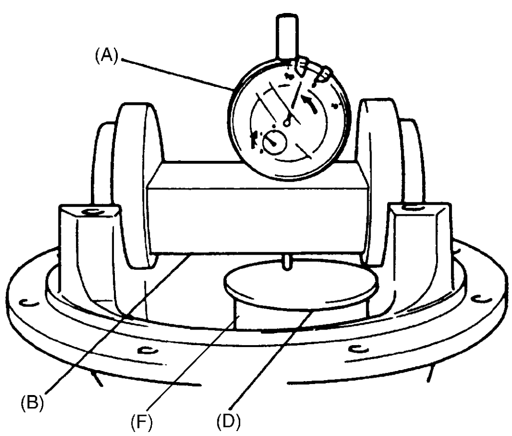
3) Set dial gauge to mounting dummy and make 0 (zero) adjustment on surface plate.

NOTE:

- **When setting dial gauge to mounting dummy, tighten screw lightly. Be careful not to overtighten it, which will cause damage to dial gauge.**
- **With dial gauge set, turn dummy back and force by hand a couple of times and attain accurate 0 (zero) adjustment.**
- **It is desirable that short pointer indicates beyond 2 mm when long one is at 0 (zero).**

Special tool
(A) : 09900-20606
(B): 09926-78320

1.	Surface plate
2.	Screw



4) Place zero-adjusted mounting dummy and dial gauge set on pinion mounting dummy and take measurement between zero position and extended dial gauge measuring tip.

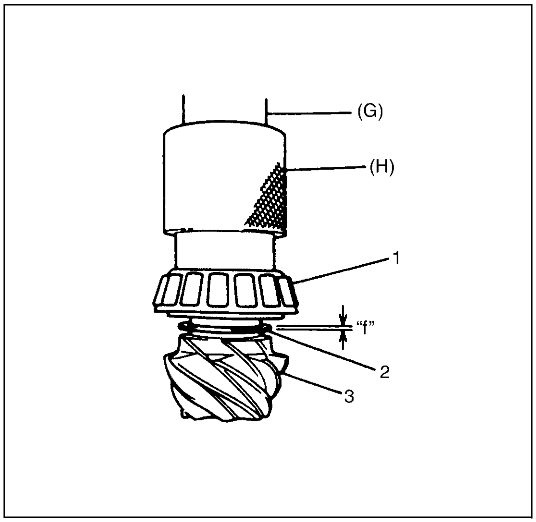
NOTE:

- **Repeat turning back and force of dummy and measure distance as far as top surface of pinion dummy accurately.**
- **When dial gauge measuring tip extends from 0 (zero) position, pointer turns counterclockwise.**
- **Measured value may exceed 1 mm. Therefore, it is also necessary to know reading of short pointer.**

Special tool
(A) : 09900-20606
(B) : 09926-78311
(D) : 09922-76570
(F) : 09926-78311-002

5) Obtain adjusting shim thickness by using measured value by dial gauge in previous step.

Necessary shim thickness "e"	=	Dial gauge measured value "c"



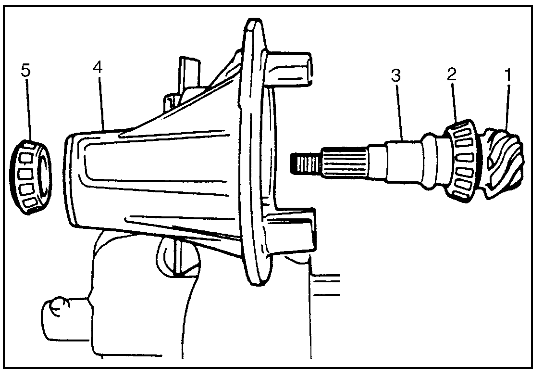
6) Select adjusting shim(s) (2) closest to calculated value from among following available sizes and put it in place and then press-fit rear bearing (1).

Calculated valve
"f" : Closest value to "e" (refer to Step 5).)

Special tool
(G) : 09925-18011
(H) : 09927-66010

Available shim thickness
: 1.12, 1.15, 1.18, 1.21,1.24, 1.27, 1.30 and 0.3 mm
(0.044, 0.045, 0.046, 0.047 0.048, 0.049, 0.050 and 0.012 in.)

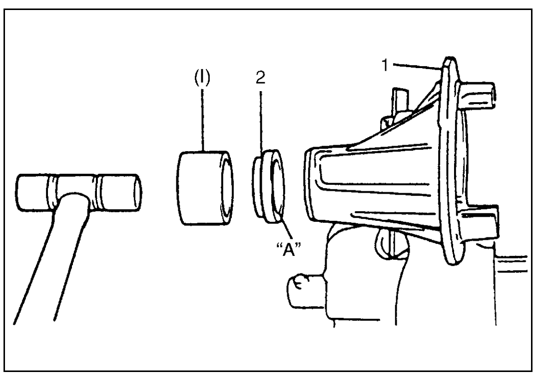
3. Drive bevel pinion



7) With new pinion spacer (3) inserted as shown in the figure, install front bearing (5) to differential carrier (4).

NOTE:
- **Make sure to use new spacer for reinstallation.**
- **Apply differential oil to bearings.**

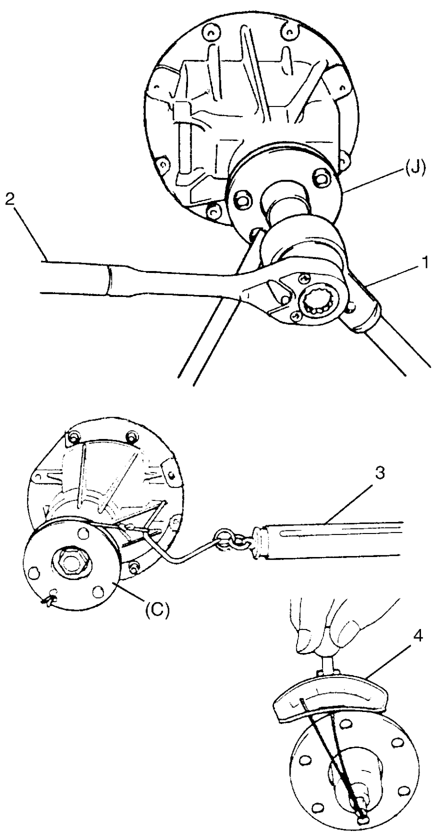
1. Drive bevel pinion
2. Rear bearing



8) Using special tool and plastic hammer, drive oil seal (2) into differential carrier (1) till it becomes flush with carrier end. Then apply grease "A" to oil seal lip.

"A" : Grease 99000-25010

Special tool
(I) : 09951-18210



9) While tightening flange nut gradually with special tool and power wrench (4 - 10 magnification) (1), set preload of pinion to specification.

NOTE:

- **Before taking measurement with spring balance (3) or torque wrench (4), check for smooth rotation by hand.**
- **On measuring preload, rotate the drive bevel pinion about 1 rotation per 2 seconds.**
- **Be sure to tighten gradually and carefully till specified starting torque is obtained. Turning back overtightened flange nuts should be avoided.**

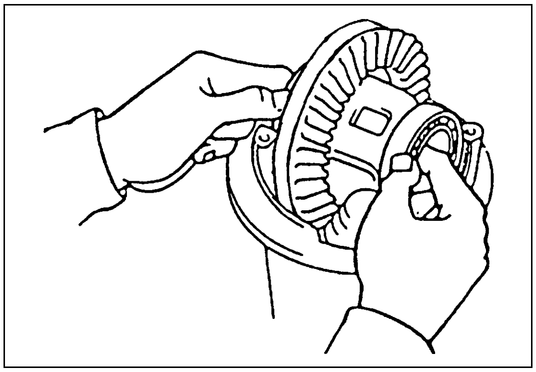
Pinion bearing preload
: 0.9 – 1.7 N·m (9.0 – 17.0 kg-cm, 7.8 – 14.7 lb-in.)

Spring measure reading with special tool
: 16 – 30 N (1.6 – 3.0 kg, 3.5 – 6.6 lb)

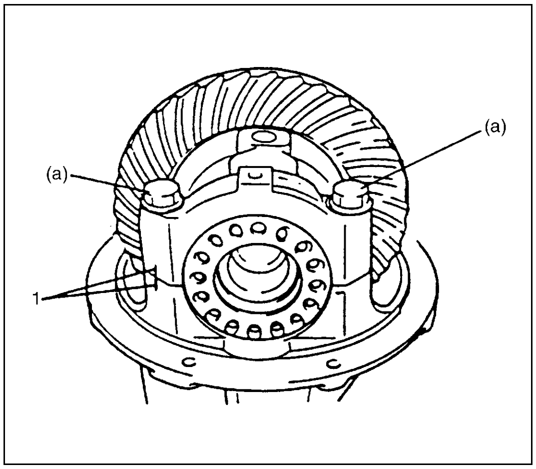
Special tool
(C) : 09922-76560
(J) : 09922-66021

2. Socket wrench

Assembling Unit



1) Place bearing outer races on their respective bearings. Used left and right outer races are not interchangeable.
2) Install case assembly in carrier.
3) Install side bearing adjusters on their respective carrier, making sure adjuster are threaded properly.



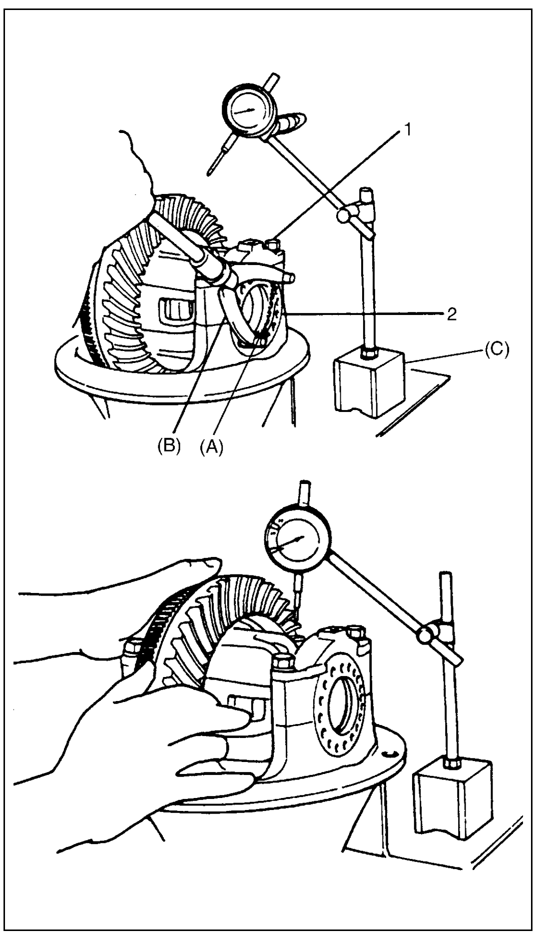
4) Align match marks (1) on cap and carrier. Screw in 2 side bearing cap bolts 2 or 3 turns and press down bearing cap by hand.

NOTE:

If bearing cap does not fit tightly on carrier, side bearing adjuster is not threaded properly. Reinstall adjuster.

5) Tighten cap bolts (provisional torque).

Tightening torque
Bearing cap bolt (Provisional torque) (a) :
15 N·m (1.5 kg-m, 11.0 lb-ft)



6) Tighten both bearing adjusters (2) so as to obtain specified gear backlash and at the same time, obtain preload of side bearing.

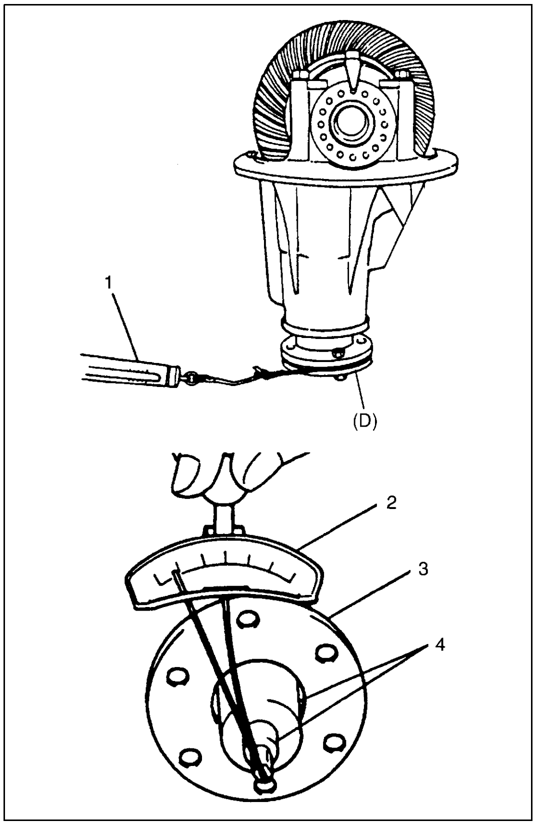
NOTE:

- **Be sure to apply measuring tip of dial gauge at right angles to convex side of tooth.**
- **As a practical measure the following would be recommended to obtain specified backlash and side bearing preload at the same time.**
  - **Obtain specified backlash by turning both adjusters inward lightly.**
  - **Tighten both adjusters further by one notch at a time.**
- **Measure at least 4 points on drive bevel gear periphery.**

Standard backlash
: 0.13 – 0.18 mm (0.005 – 0.007 in.)

Special tool
(A) : 09930-40120
(B) : 09930-40113
(C) : 09900-20701

1. Bearing cap bolt



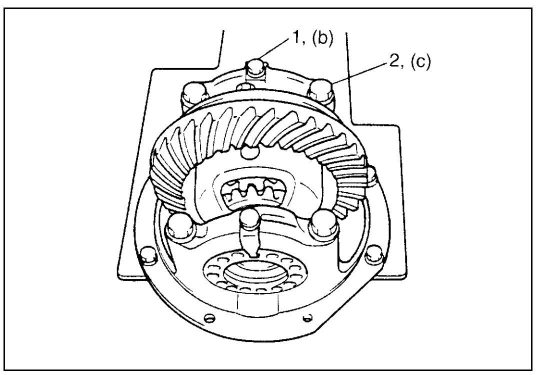
7) Measure preload of pinion bearing with spring balance (1) or torque wrench (2) and check composite preload of pinion bearing and side bearing.

NOTE:
- **Before taking measurement with spring balance (1) or torque wrench (2), check for smooth rotation by hand.**
- **On measuring preload, rotate the drive bevel pinion about 1 rotation per 2 seconds.**

Composite preload of pinion bearing and side bearing
: 1.1 – 2.0 N·m (11.0 – 20.0 kg-cm, 9.5 – 17.4 lb-in.)
Spring measure reading with special tool
: 19.5 – 35.5 N (1.95 – 3.55 kg, 4.30 – 7.83 lb)

Special tool
(D) : 09922-76560

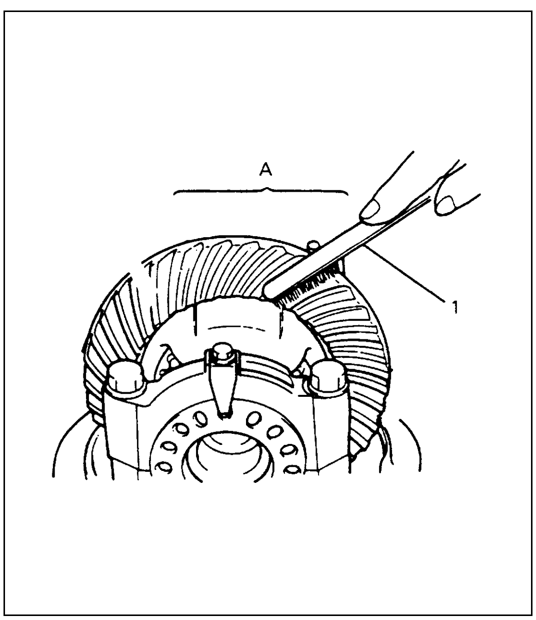
3.	Universal joint flange
4.	Socket with adapter



8) Torque bearing cap bolts (2) to specification and install bearing lock plates.

Tightening torque
Lock plate bolt (b) : 12 N·m (1.2 kg-m, 9.0 lb-ft)
Bearing cap bolt (c) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

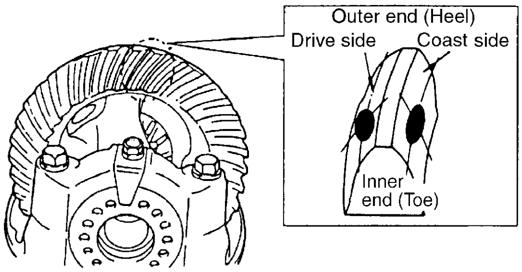
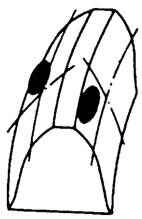
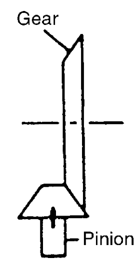
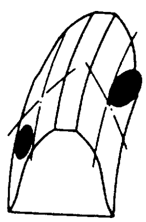
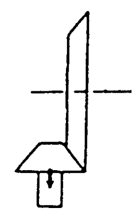
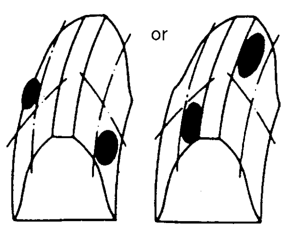
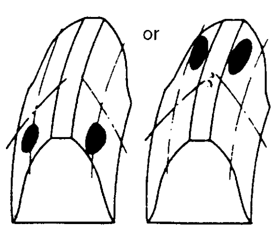
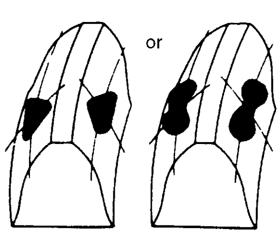
1.	Lock plate bolt

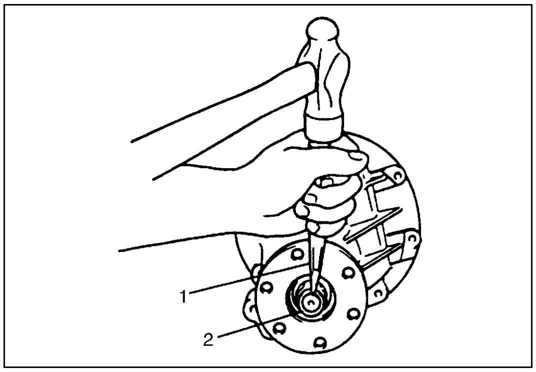


9) As final step, check gear tooth contact as follows.
   a) After cleaning 10 drive bevel gear teeth, paint them with gear marking compound evenly by using brush or sponge etc.
   b) Turn gear to bring its painted part in mesh with drive bevel pinion and turn it back and forth by hand to repeat their contact.
   c) Bring painted part up and check contact pattern, referring to following chart. If contact pattern is not normal, readjust or replace as necessary according to instruction in chart.

NOTE:
Be careful not to turn drive bevel gear more than one full revolution, for it will hinder accurate check.

1.	Brush
“A”:	Paint gear marking compound evenly

TOOTH CONTACT PATTERN	DIAGNOSIS AND REMEDY	
	NORMAL	
	HIGH CONTACT Pinion is positioned too far from the center of drive bevel gear. 4) Increase thickness of pinion height adjusting shim and position pinion closer to gear center. 5) Adjust drive bevel gear backlash to specification.	
	LOW CONTACT Pinion is positioned too close to the center of drive bevel gear. 1) Decrease thickness of pinion height adjusting shim and position pinion farther from gear center. 2) Adjust drive bevel gear backlash to specification.	
	If adjustment is impossible, replace differential carrier.	
	1) Check seating of bevel gear or differential case. (Check bevel gear for runout). 2) If adjustment is impossible, replace drive bevel gear & pinion set or differential carrier.	
	Replace drive bevel gear & pinion set or differential case.	



10) Upon completion of gear tooth contact check in Step 9), caulk flange nut (2) with caulking tool (1) and hammer.

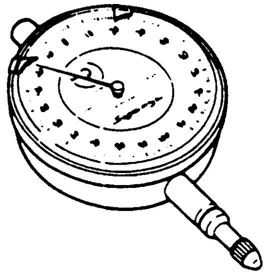
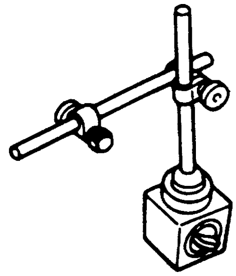
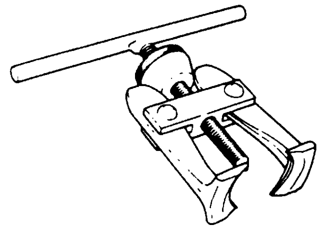
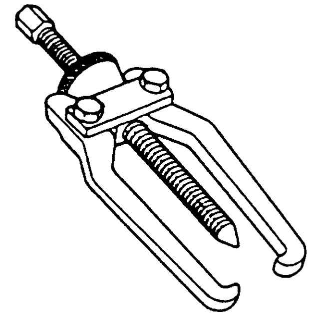
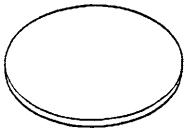
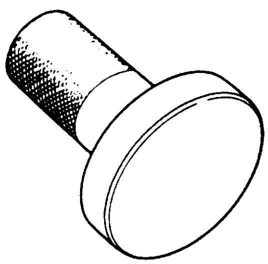
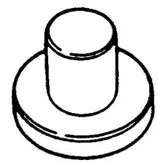
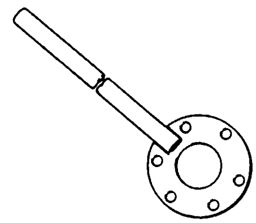
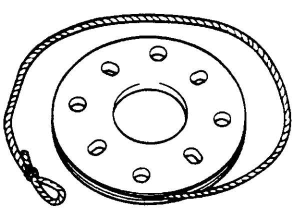
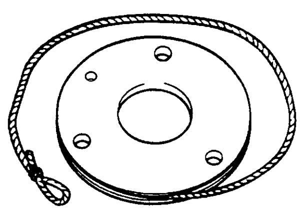
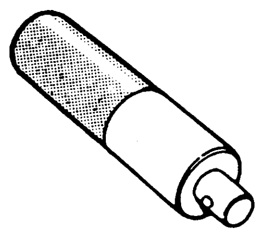
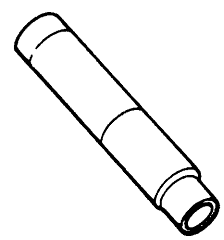
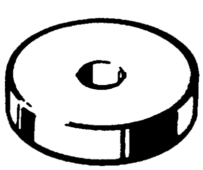
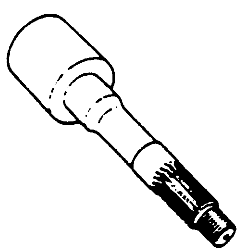
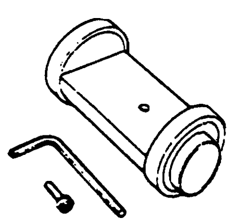
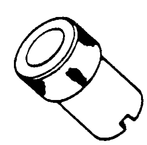
Tightening Torque Specification

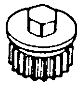
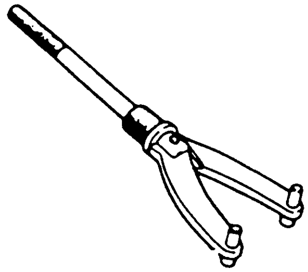
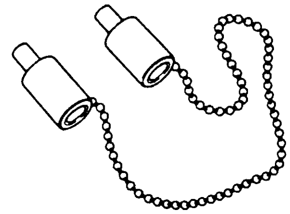
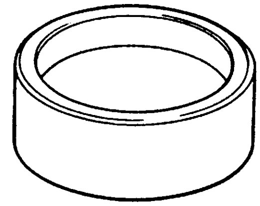
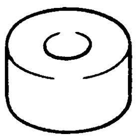
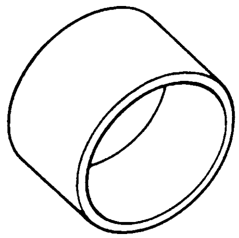
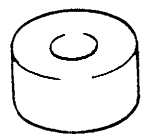
Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Differential oil level/filler plug	50	5.0	36.5
Differential oil drain plug	28	2.8	20.5
Propeller shaft flange nuts	60	6.0	43.5
Differential carrier bolts	55	5.5	40.0
Bevel gear bolts	105	10.5	76.0
Bearing cap bolts	85	8.5	61.5
Lock plate bolts	12	1.2	9.0
Differential case screws	9	0.9	6.5

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Thread lock cement	THREAD LOCK CEMENT SUPER 1322 (99000-32110)	• Bevel gear bolts • Differential case bolts • Bevel gear mating surface • Propeller shaft flange bolt
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	Oil seal lips
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	• Rear differential drain plug • Mating surface of differential housing • Mating surface of rear axle housing

Special Tool

 09900-20606 Dial gauge	 09900-20701 Magnetic stand	 09913-61510 Bearing puller	 09913-65135 Bearing puller
 09922-76570 Attachment	 09913-75510 Bearing installer	 09913-85230 Bearing removing jig	 09922-66021 Flange holder
 09922-75222 Preload checking tool	 09922-76560 Preload checking tool	 09924-74510 Installer attachment	 09925-18011 Bearing installer
 09926-68310 Bearing installer	 09926-78311-002 Pinion mounting dummy (See NOTE.)	 09926-78320 Mounting dummy	 09927-66010/J-23082-01 Oil pump aligner

 09928-06510 Differential torque checking tool	 09930-40113 Rotor holder	 09930-40120 Attachment	 09944-66020 Bearing installer
 09951-16060 Lower arm bush remover	 09951-18210 Oil seal remover & installer No. 2	 09951-46010 Drive shaft oil seal installer	

NOTE:

This tool is constituent of tools with 09926-78311.

SECTION 8

BODY ELECTRICAL SYSTEM

WARNING:

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

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

NOTE:

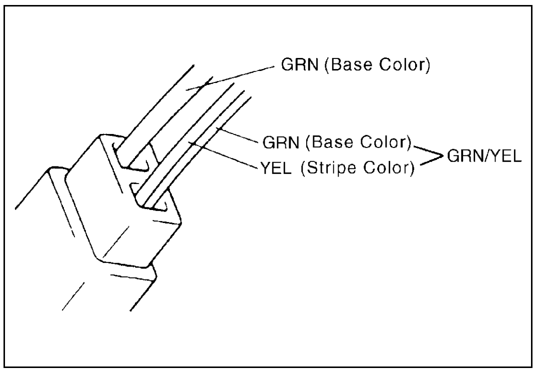
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

CONTENTS

General Description

WIRE COLOR SYMBOLS

Symbol		Wire Color	Symbol		Wire Color
B	BLK	Black	O, Or	ORN	Orange
Bl	BLU	Blue	R	RED	Red
Br	BRN	Brown	W	WHT	White
G	GRN	Green	Y	YEL	Yellow
Gr	GRY	Gray	P	PNK	Pink
Lbl	LT BLU	Light blue	V	PPL	Violet
Lg	LT GRN	Light green			



There are two kinds of colored wire used in this vehicle. One is single-colored wire and the other is dual-colored (striped) wire.
The single-colored wire uses only one color symbol (i.e. “GRN”).
The dual-colored wire uses two color symbols (i.e. “GRN/YEL”). The first symbol represents the base color of the wire (“GRN” in the figure) and the second symbol represents the color of the stripe (“YEL” in the figure).

SECTION 8C

INSTRUMENTATION/DRIVER INFORMATION

WARNING:

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

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

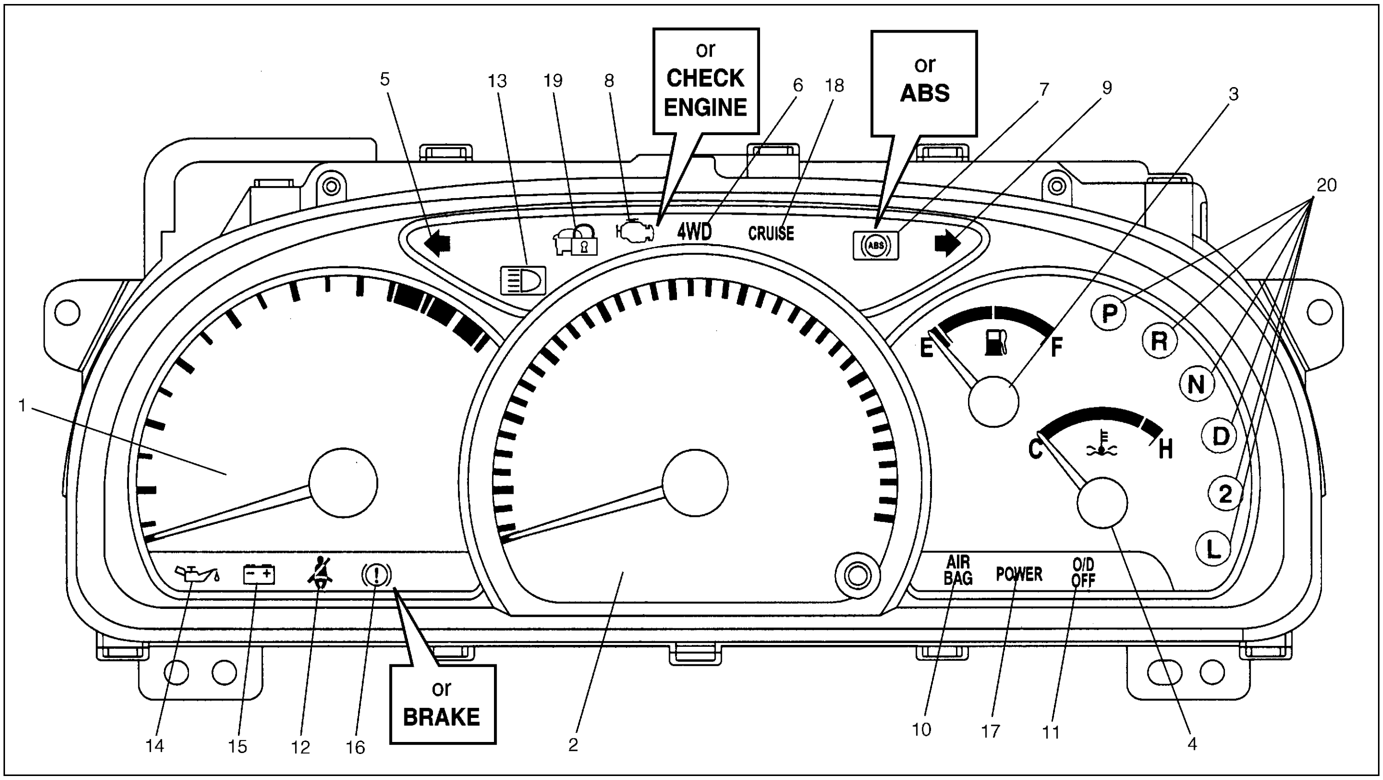
NOTE:

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

CONTENTS

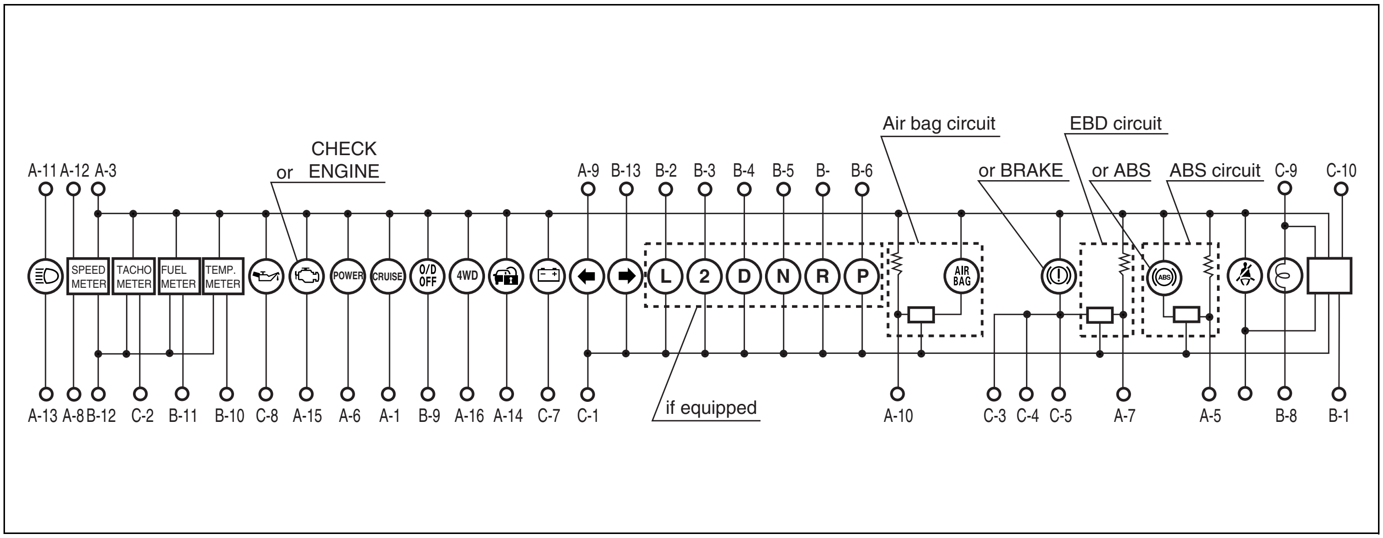
General Description

Combination Meter

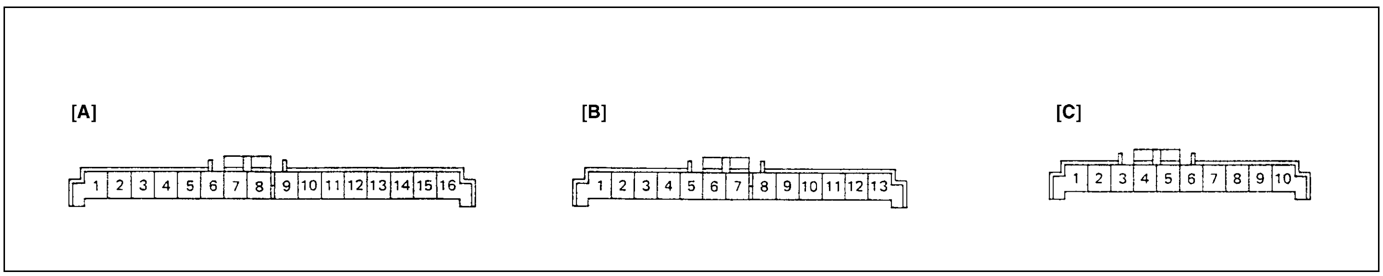


1. Tachometer	8. Multifunction indicator light	15. Charge warning light
2. Speedometer	9. Turn signal pilot light (RH)	16. Brake fluid level, parking brake and EBD warning light
3. Fuel level meter	10. AIR BAG warning light	17. POWER indicator light (A/T vehicle only)
4. Engine coolant temperature meter	11. O/D OFF light (A/T vehicle only)	18. CRUISE indicator light
5. Turn signal pilot light (LH)	12. Fasten seat belt light (if equipped)	19. Immobilizer warning light (if equipped)
6. 4WD indicator	13. High beam light	20. Shift position indicator (A/T vehicle, if equipped)
7. ABS warning light	14. Engine oil pressure warning light	

COMBINATION METER INTERNAL CIRCUITS



COMBINATION METER COUPLERS



[A] :	Coupler A	
1.	To Cruise control module (if equipped)	GRY/YEL
2.	Blank	–
3.	To ignition switch	BLK/WHT
4.	Blank	–
5.	To ABS control module (if equipped)	BLU/ORN
6.	To PCM (A/T vehicle only)	GRY/BLU
7.	To ABS control module (if equipped)	BRN
8.	To VSS	BLU/YEL
9.	To combination switch	GRN/RED
10.	To air bag SDM	BLU
11.	To main fuse	WHT/BLU
12.	To fuse box	WHT
13.	To combination switch	RED
14.	To immobilizer control module (if equipped)	PPL
15.	To ECM (PCM for A/T vehicle)	PPL/YEL
16.	To ECM (PCM for A/T vehicle)	ORN/BLK

[B] :	Coupler B	
1.	To door switch (drive side)	BLK/BLU
2.	To transmission range switch (A/T vehicle only, if equipped) L	GRN/BLU
3.	To transmission range switch (A/T vehicle only, if equipped) 2	GRN/ORN
4.	To transmission range switch (A/T vehicle only, if equipped) D	YEL/GRN
5.	To transmission range switch (A/T vehicle only, if equipped) N	ORN/BLU
6.	To transmission range switch (A/T vehicle only, if equipped) P	ORN/GRN
7.	To transmission range switch (A/T vehicle only, if equipped) R	RED
8.	To illumination control module	RED/GRN
9.	To PCM (A/T vehicle only)	WHT/BLK
10.	To ECT sensor	YEL/WHT
11.	To fuel level gauge	BLU/WHT
12.	To ground	BLU/YEL
13.	To combination switch	GRN/YEL

[C] :	Coupler C	
1.	To ground	BLK
2.	To ECM (PCM for A/T vehicle)	BRN
3.	To ignition switch	PPL/RED
4.	To brake fluid level switch	RED/BLK
5.	To parking brake switch	PPL
6.	To seat belt switch	GRY/RED
7.	To generator	WHT/RED
8.	To engine oil pressure switch	YEL/BLK
9.	To combination switch	RED/YEL
10.	To ignition switch	BLU/RED

NOTE:

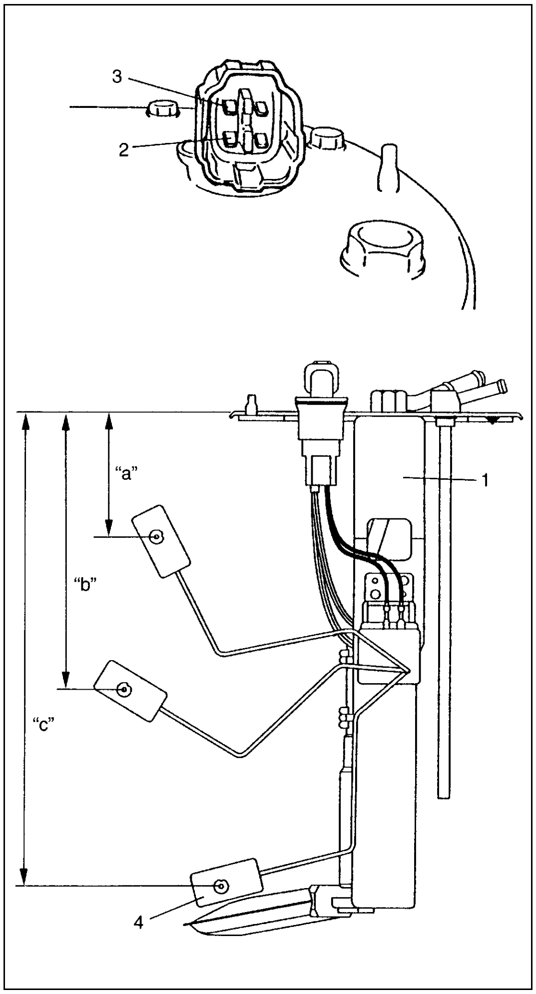
Terminal arrangement of coupler viewed from harness side.

On-vehicle Service

Fuel Meter/Fuel Gauge Unit

Fuel level sensor (sender gauge)

INSPECTION



Remove fuel pump assembly referring to Section 6C.
Use an ohmmeter to confirm that resistance of sender gauge unit changes with change of float position.
If measured value is out of specification, replace fuel sender gauge.

Fuel level sensor specification :

	Float Position	Resistance (Ω)
"a"	53.6 mm (2.11 in.)	6 – 8
"b"	143.1 mm (5.63 in.)	28 – 36
"c"	256.9 mm (10.11 in.)	90 – 100

1. Fuel pump assembly
2. Fuel level gauge (–) terminal
3. Fuel level gauge (+) terminal
4. Float

Engine Coolant Temperature (ECT) Meter and Sensor

Engine coolant temperature sensor

REMOVAL AND INSTALLATION

Refer to “ECT SENSOR” in Section 6E2.

Oil Pressure Light

Oil pressure switch

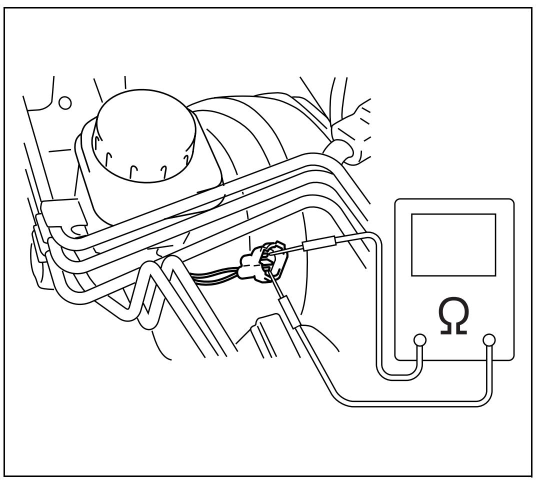
REMOVAL AND INSTALLATION

Refer to “OIL PRESSURE CHECK” in Section 6A2.

Brake Warning Light

Brake fluid level switch

INSPECTION



Use an ohmmeter to check switch for continuity.
If found defective, replace switch (reservoir).

Brake fluid level switch specification
OFF position (float up) : No continuity
ON position (float down) : Continuity

SECTION 8D

WINDOWS, MIRRORS, SECURITY AND LOCKS

WARNING:

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

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

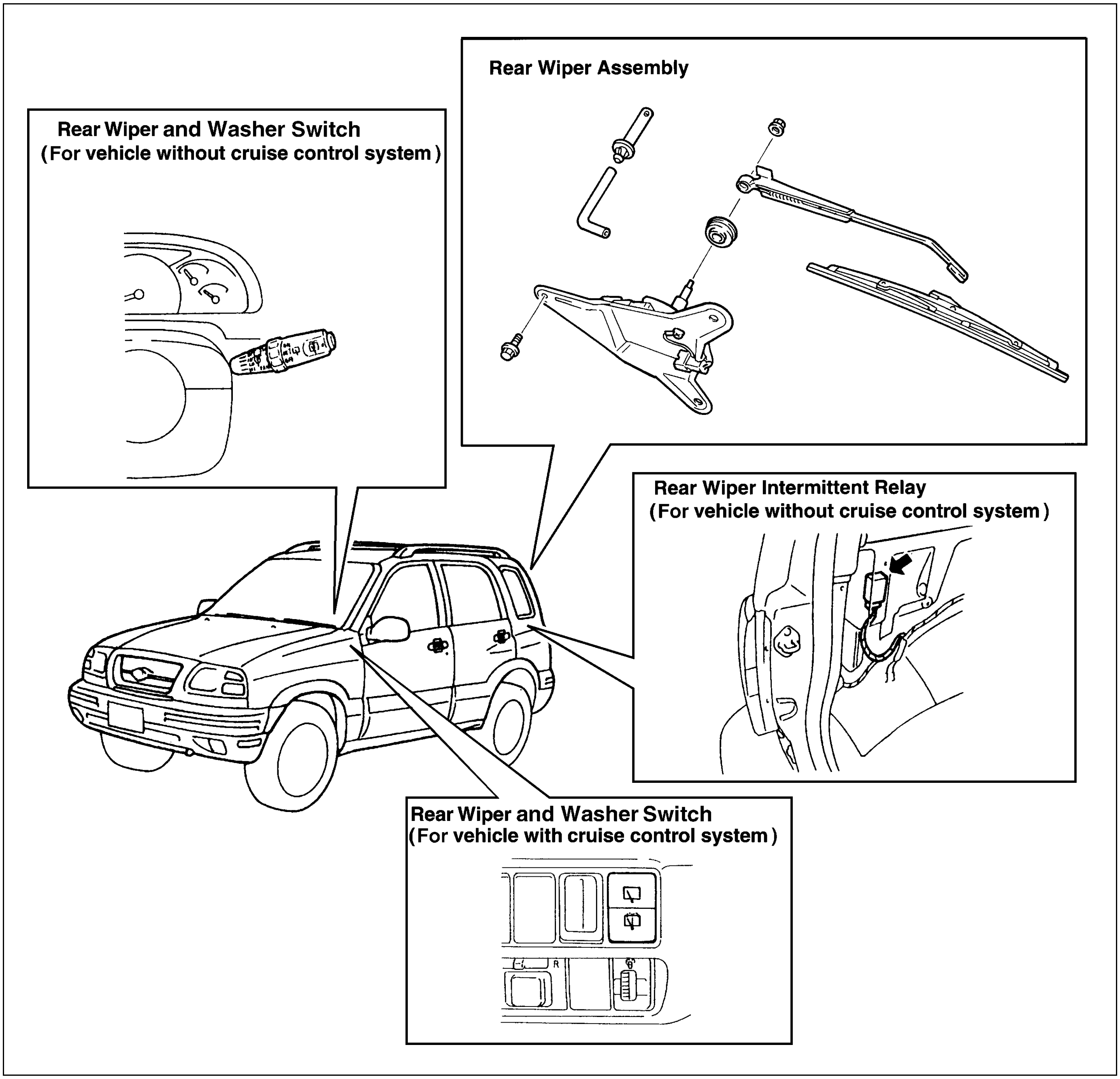
NOTE:

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

CONTENTS

General Description

Rear Wiper and Washer (If Equipped)

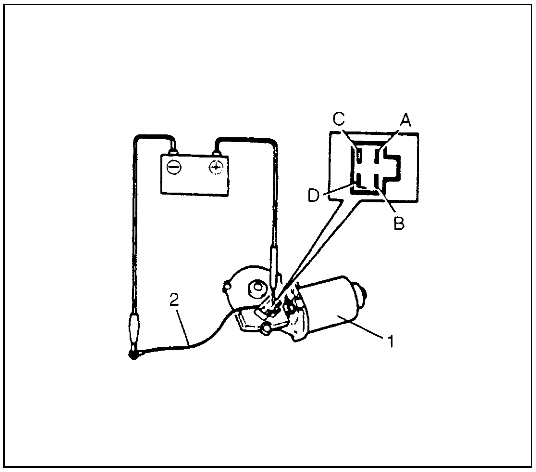


On-Vehicle Service

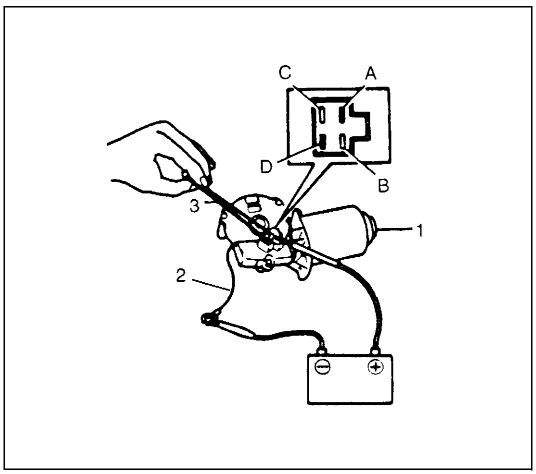
Windshield Wipers

Front wiper and washer

Wiper motor



- As shown in the figure, use a 12 V battery to connect its (+) terminal to terminal “A”, and its (–) terminal to “Black” lead wire (2).
  If motor (1) rotates at a low revolution speed of 45 to 55 rpm, it is proper. For high speed check, connect battery (+) terminal to terminal “B”, and its (–) terminal to “Black” lead wire (2). If motor rotates at a high revolution speed of 67 to 83 rpm, it is proper.



- Testing automatic stop action.

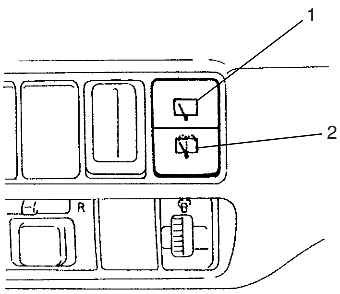
a) Connect 12 V battery (+) terminal to terminal “A” of wiper motor and (–) terminal to Black lead wire (2) and let the motor turn.
b) Disconnect terminal “A” from battery, and let the motor stop.
c) Connect terminal “A” and “D” with a jumper wire (3), and connect terminal “C” to battery (+) terminal. Observe the motor turns once again then stops at a given position.
d) Repeat a) through c) several times and inspect if the motor stops at the given position every time.

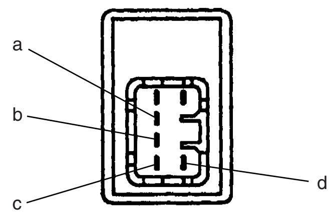
Rear Window Wiper and Washer (For Vehicle with Cruise Control System)

INSPECTION

Rear Wiper and Washer Switch

1) Disconnect negative (–) cable at battery.
2) Disconnect combination switch lead wire coupler.
3) Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace switch.





Switch \ Terminal	a	b	c	d
OFF	○	○		
Rear wiper ON	○		○	
Rear washer ON	○		○	○

1. Rear wiper switch	2. Rear washer switch

Rear Window Wiper and Washer (For Vehicle without Cruise Control System)

INSPECTION

Refer to “Rear Wiper and Washer Switch (In Combination Switch)” under “Rear Wiper and Washer (If Equipped)” in the same section of the Service Manual mentioned in FOREWORD of this manual.

Rear Wiper Intermittent Relay

INSPECTION

Refer to “Rear Wiper Intermittent Relay” under “Rear Wiper and Washer (If Equipped)” in the same section of the Service Manual mentioned in FOREWORD of this manual when service vehicle without cruise control system.

SECTION 8E

CRUISE CONTROL SYSTEM

WARNING:

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

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

CONTENTS

General Description

Cautions in Servicing

Refer to Section 8.

Symbols and Marks

Refer to Section 8A.

Abbreviations

Refer to Section 8A.

Wiring Color Symbols

Refer to Section 8.

Joint Connector

Refer to Section 8.

Fuse Box and Relay

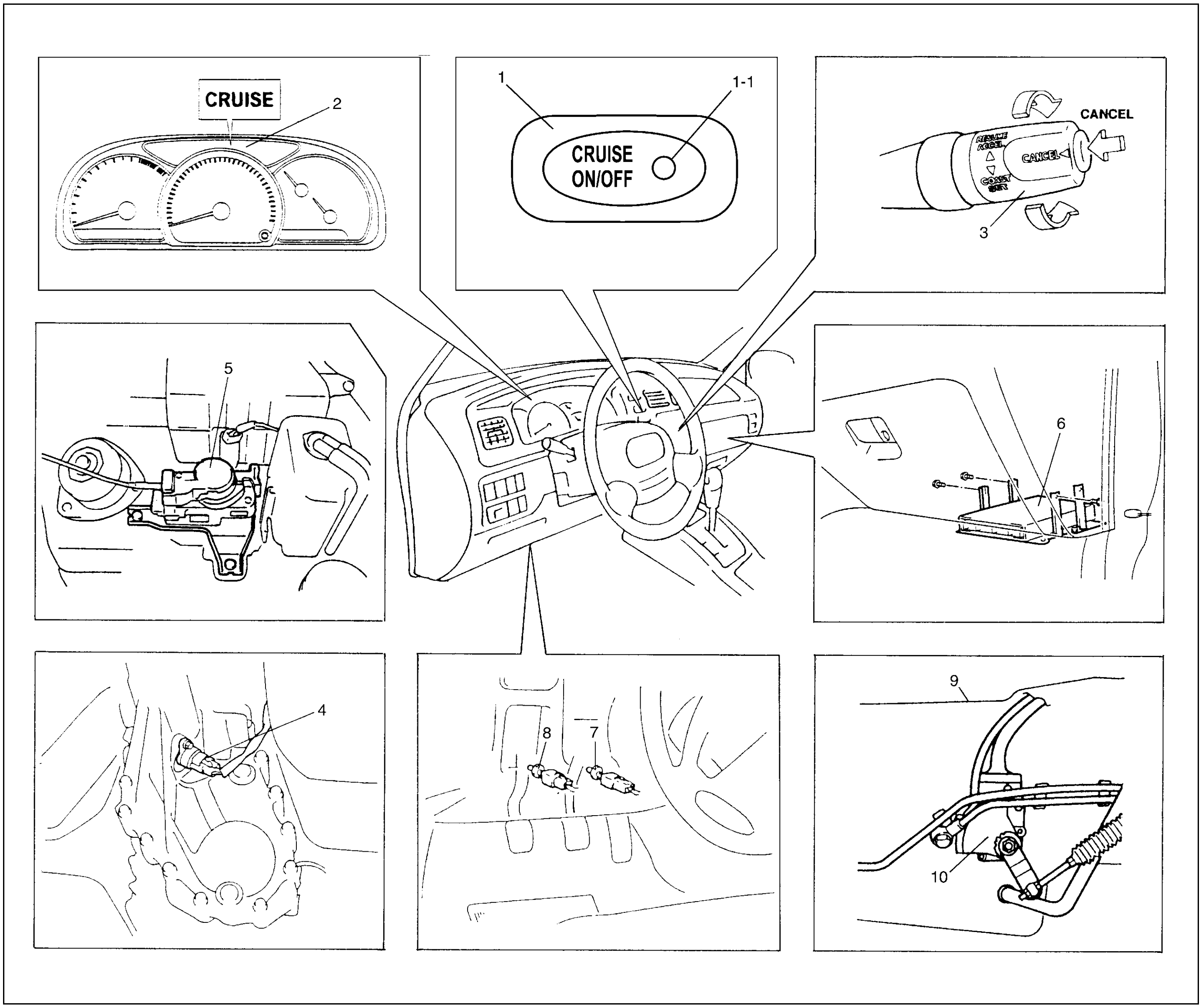
Refer to Section 8A.

Power Supply Diagram

Refer to Section 8A.

Cruise Control System

The cruise control system is a device which maintains a preset vehicle speed while driving at a high speed, e.g., on a highway. It allows the driver to drive his vehicle at a constant speed of 40 km/h (25 mile/h) or higher without depressing the accelerator pedal (constant cruising). The system also has such functions as to change the vehicle speed without operating the accelerator pedal (but using SET COAST and ACCEL RESUME switches), cancel cruise control (CANCEL switch) and resume the speed in memory automatically after cruise control is cancelled (ACCEL RESUME switch). The system mainly consists of a vehicle speed sensor, an actuator assembly incorporated with control module, cruise main switch, SET COAST switch, ACCEL RESUME switch and CANCEL switch, etc.



1.	Cruise main switch	6.	PCM / ECM
1-1	Cruise main switch indicator lamp	7.	Stop lamp switch (with brake pedal position switch)
2.	“CRUISE” Indicator light	8.	Clutch pedal position switch (M/T vehicle)
3.	SET COAST/ACCEL RESUME/CANCEL switch	9.	Automatic transmission
4.	Vehicle speed sensor	10.	Transmission range switch (Park/Neutral position switch) (A/T vehicle)
5.	Cruise control actuator assembly (with control module)		

Cruise control system circuit

Refer to Section 8A.

Components and functions

Component	Function
Cruise control actuator assembly with control module	Cruise control module: Executes centralized control by means of a microcomputer over all functions including setting a constant speed, resuming it, setting coast, limiting minimum speed and cancelling cruise control. Cruise control actuator (stepping motor & clutch) : Actuates accelerator pedal through cruise cable and arm according to a signal from cruise control module to control vehicle speed.
Cruise main switch	This switch has a momentary contact type button to turn the cruise control system ON and OFF.
SET COAST switch	When this switch is rotated (ON) and then released (OFF) while vehicle is running at a speed 40 km/h (25 mile/h) or higher, vehicle speed at that OFF moment is stored in memory and it is maintained (constant cruising). Rotating this switch (ON) continuously during constant cruising keeps slowing down vehicle speed as long as it is ON. When it is released (OFF), vehicle speed at that moment is stored in memory and vehicle starts constant cruising.
ACCEL RESUME switch	When this switch is rotated (ON) during constant cruising, vehicle speed keeps increasing as long as it is ON. When it is released (OFF), vehicle speed at that moment is stored in memory and vehicle starts constant cruising. If vehicle speed is higher than 40 km/h (25 mile/h) after cruise control is cancelled, turning this switch ON momentarily will resume the speed at which vehicle was running before cancellation.
CANCEL switch	When this switch is pressed (ON), cruise control (accelerator pedal control) is cancelled.
Vehicle speed sensor (VSS)	The vehicle speed sensor (VSS) is mounted on the transfer or transmission. The VSS converts vehicle speed into pulse signal and send it to the cruise control module.
Stop lamp switch	The stop lamp switch has 2 contact points. One contact point closes when the brake pedal is depressed to light the stop lamp and provides a voltage signal to the cruise control module. This signal, when inputted cancels cruise control (sets the accelerator pedal free). The other contact point (brake pedal position switch) opens when the brake pedal is depressed, to shut off the power to the magnetic clutch in the actuator, thereby cancelling cruise control (setting the accelerator pedal free). This switch is installed to cancel cruise control (constant cruising) without fail.
Clutch pedal position switch (M/T vehicle only)	When the clutch pedal is depressed, the clutch pedal position switch closes and provides a ground signal to cruise control module. The cruise control module cancels cruise control (accelerator pedal control) when this signal is inputted.
Transmission range switch (Park/Neutral position switch) (A/T vehicle only)	When the selector lever is places in either “P” or “N” position, the transmission range switch closes and provides a ground signal to cruise control module. The cruise control module cancels cruise control (accelerator pedal control) when this signal is inputted.
PCM – Throttle opening signal (4 A/T vehicle only)	Throttle opening signal is inputted from PCM. From this signal, the cruise control module detects the throttle opening and uses it as one of the factors to output the overdrive and TCC OFF command signal to PCM.

Component	Function
PCM – Overdrive and TCC off command signal output	When the throttle opening for the vehicle speed exceeds the specified value during cruise control, the cruise control module sends this signal to PCM. PCM uses this signal as one of signals to control 4-A/T.
Cruise main switch indicator lamp	In the state with the ignition switch ON and the cruise control system OFF, pressing this switch once and releasing it will activate the cruise control system and the cruise control module will cause the indicator lamp to light up.
“CRUISE” indicator lamp	It lights up when cruise control (accelerator pedal control) is functioning.

Cancel Conditions

Constant cruising is cancelled under the following conditions.

- Ignition switch is turned OFF.
- Cruise main switch is turned OFF.
- Vehicle speed has slowed down to lower than minimum operating speed (40 km/h (25 mile/h)).
- *Vehicle speed varies beyond cancel speed range (–15 km/h, –9 mile/h) from preset speed.
- *Brake pedal is depressed. (Stop lamp switch is turned ON).
- *Clutch pedal is depressed (Clutch pedal position switch is turned ON) (For M/T vehicle).
- *Selector lever is shifted to N range (Park/Neutral position switch in transmission range switch is turned ON).
- *CANCEL switch is turned ON.

NOTE:

When constant cruising is cancelled under above any condition with * (asterisk), vehicle speed before cancellation can be resumed by operating ACCEL RESUME switch, provided that vehicle speed is higher than 40 km/h (25 miles/h).

Diagnosis

Diagnosis Table

Condition	Possible Cause	Correction
Main switch indicator lamp fails to light up or remains ON.	Main switch indicator lamp circuit faulty	Refer to “CRUISE MAIN SWITCH INDICATOR LAMP CIRCUIT CHECK” in this section.
	Cruise control module power and ground circuits faulty	Refer to “CRUISE CONTROL MODULE POWER AND GROUND CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
“CRUISE” indicator lamp fails to light up or remains ON.	“CRUISE” indicator lamp circuit	Refer to ““CRUISE” INDICATOR LAMP CIRCUIT CHECK” in this section.
	Cruise control module power and ground circuits	Refer to “CRUISE CONTROL MODULE POWER AND GROUND CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.

Condition	Possible Cause	Correction
Vehicle speed can not be set.	Actuator cable play maladjusted or actuator cable faulty	Refer to “CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT” in this section.
	Main switch, “COAST/SET”, “RESUME/ACCEL” and “CANCEL” switch circuits faulty	Refer to “CRUISE MAIN SWITCH, COAT/SET, RESUME/ACCEL AND CANCEL SWITCHES CIRCUITS CHECK” in this section.
	VSS circuit faulty	Refer to “VSS CIRCUIT CHECK” in this section.
	Stop lamp switch circuit faulty	Refer to “STOP LAMP SWITCH (WITH PEDAL POSITION SWITCH) CIRCUITS CHECK” in this section.
	Transmission range switch circuit (4 A/T model only) faulty	Refer to “TRANSMISSION RANGE SWITCH CIRCUIT CHECK” in this section.
	Clutch pedal position switch circuit faulty	Refer to “CLUTCH PEDAL POSITION SWITCH CIRCUIT CHECK” in this section.
	Cruise control module power and ground circuits faulty	Refer to “CRUISE CONTROL MODULE POWER AND GROUND CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
Vehicle set speed is unstable.	Actuator cable play maladjusted or actuator cable faulty	Refer to “CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT” in this section.
	VSS circuit faulty	Refer to “VSS CIRCUIT CHECK” in this section.
	Throttle valve opening signal circuit faulty	Refer to “THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
Actual vehicle speed deviates above or below set speed.	Actuator cable play maladjusted or actuator cable faulty	Refer to “CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT” in this section.
	Throttle valve opening signal circuit faulty	Refer to “THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
Acceleration or deceleration by using “RESUME/ACCEL” or “COAST/SET” switch is not attained.	Main switch, “COAST/SET”, “RESUME/ACCEL” and “CANCEL” switch circuits faulty	Refer to “CRUISE MAIN SWITCH, COAT/SET, RESUME/ACCEL AND CANCEL SWITCHES CIRCUITS CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
Cruise control is not cancelled even when “CANCEL” switch is operated.	Main switch, “COAST/SET”, “RESUME/ACCEL” and “CANCEL” switch circuits faulty	Refer to “CRUISE MAIN SWITCH, COAT/SET, RESUME/ACCEL AND CANCEL SWITCHES CIRCUITS CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.

Condition	Possible Cause	Correction
"RESUME/ACCEL" switch fails to resume preset vehicle speed after cruise control is cancelled.	Main switch, "COAST/SET", "RESUME/ACCEL" and "CANCEL" switch circuits faulty	Refer to "CRUISE MAIN SWITCH, COAT/SET, RESUME/ACCEL AND CANCEL SWITCHES CIRCUITS CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.
Cruise control is not cancelled even when brake pedal is depressed.	Stop lamp switch circuit faulty	Refer to "STOP LAMP SWITCH (WITH PEDAL POSITION SWITCH) CIRCUITS CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.
Cruise control is not cancelled even when clutch pedal is depressed.	Clutch pedal position switch circuit faulty	Refer to "CLUTCH PEDAL POSITION SWITCH CIRCUIT CHECK" in this Section.
	Actuator assembly faulty	Replace actuator assembly.
Cruise control is not cancelled even when selector lever is shifted to "N" position.	Transmission range switch circuit (4 A/T model only) faulty	Refer to "TRANSMISSION RANGE SWITCH CIRCUIT CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.
4 speed A/T gear shifting is frequent between 3rd and overdrive when driving on uphill road (Hunting).	Throttle valve opening signal circuit faulty	Refer to "THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK" in this Section.
	Overdrive and TCC off command signal circuit faulty	Refer to "OVERDRIVE AND TCC OFF COMMAND SIGNAL CIRCUIT CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.
4 speed A/T is not shifted to overdrive gear even though not on uphill road.	Throttle valve opening signal circuit faulty	Refer to "THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK" in this section.
	Overdrive and TCC off command signal circuit faulty	Refer to "OVERDRIVE AND TCC OFF COMMAND SIGNAL CIRCUIT CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.

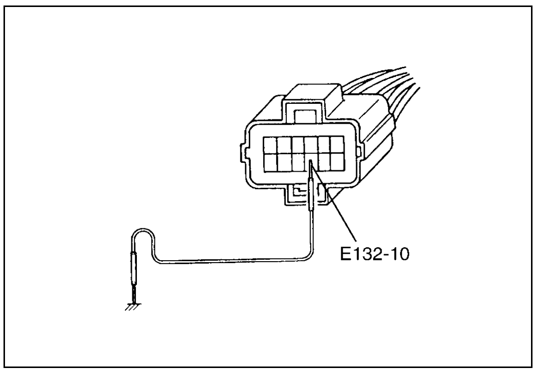
Note on System Circuit Inspection

Refer to "PRECAUTION FOR ELECTRICAL CIRCUIT SERVICE" in Section 0A.

Cruise Main Switch Indicator Lamp Circuit Check

Step	Action	Yes	No
1	Check Circuit for Short. 3) Disconnect connector from cruise control module with ignition switch OFF. 4) Turn ignition switch ON. Does cruise main switch indicator lamp turn ON?	"LT GRN/WHT" circuit is shorted to ground.	Go to Step 2.
2	Check Circuit for Open 1) Check for proper connection to cruise control module at terminal E132-10. 2) If OK, connect terminal E132-10 to ground. Does indicator lamp turn ON at ignition switch ON?	Lamp circuit is OK.	Go to Step 3.
3	Lamp Bulb Check 1) Remove cruise main switch from instrument panel. 2) Remove lamp bulb and check it. Is bulb in good condition?	"BLK/WHT" or "LT GRN/WHT" circuit is open.	Replace bulb.

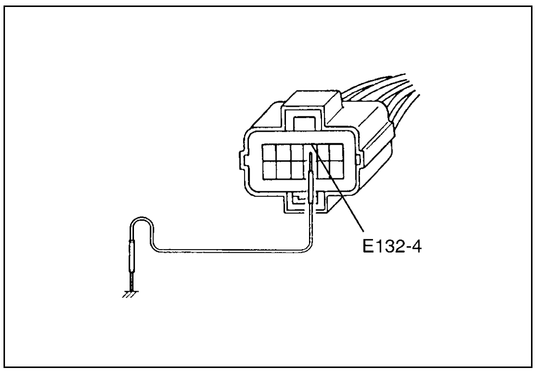
Fig. for Step 2



"Cruise" Indicator Lamp Circuit Check

Step	Action	Yes	No
1	Check Circuit for Short. 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Turn ignition switch ON. Does "CRUISE" indicator lamp turn ON?	"GRN/YEL" circuit is shorted to ground.	Go to Step 2.
2	Check Circuit for Open 1) Check for proper connection to cruise control module at terminal E132-4. 2) If OK, connect terminal E132-4 to ground. Does indicator lamp turn ON at ignition switch ON?	Lamp circuit is OK.	Go to Step 3.
3	Lamp Bulb Check 1) Remove combination meter from instrument panel. 2) Remove lamp bulb and check it. Is bulb in good condition?	"BLK/WHT" or "GRN/YEL" circuit is open.	Replace bulb.

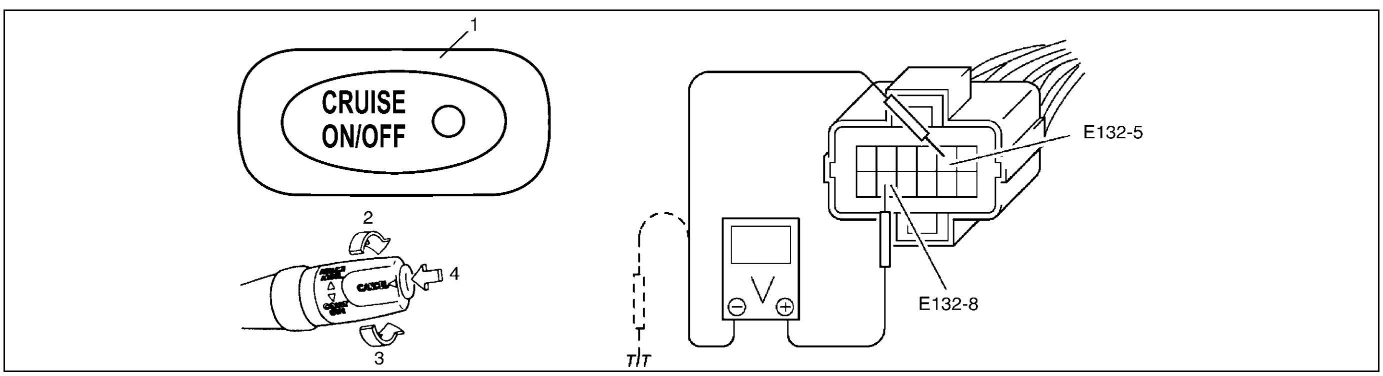
Fig. for Step 2



Cruise Main Switch, Coast/Set, Resume/Accel and Cancel Switches Circuits Check

Step	Action	Yes	No
1	Switch Circuit Check 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Check for proper connection to cruise control module at terminal E132-8. 3) If OK, check resistance between terminal E132-8 and E132-5 under each condition below. **Switch circuit specification (resistance)** **All switches OFF : Infinity** **COAST/SET switch rotated (ON) : 200 – 240 Ω** **RESUME/ACCEL switch rotated (ON) : 820 – 1000 Ω** **CANCEL switch pressed (ON) : About 0 Ω** 4) Turn ignition switch ON and check voltage between terminal E132-8 and ground under each condition below. **Switch circuit specification (voltage)** **Cruise main switch released (OFF) : 0 V** **Cruise main switch pressed (ON) : 10 – 14 V** Are check results in above steps 3) and 4) satisfactory?	Switch circuit is OK.	Go to Step 2.
2	Cruise Main Switch Check 1) Check cruise main switch for operation referring to “Cruise Main Switch Inspection” in this section. Is switch in good condition?	Go to step 3.	Replace.
3	COAST/SET, RESUME/ACCEL and CANCEL Switches Check 1) Check COAST/SET, RESUME/ACCEL and CANCEL switches for operation referring to “COAST/SET, RESUME/ACCEL and CANCEL SWITCHES” in this section. Are all switches in good condition?	“BLK/YEL” or “LT GRN” circuit is open or short.	Replace.

Fig. for Step 1

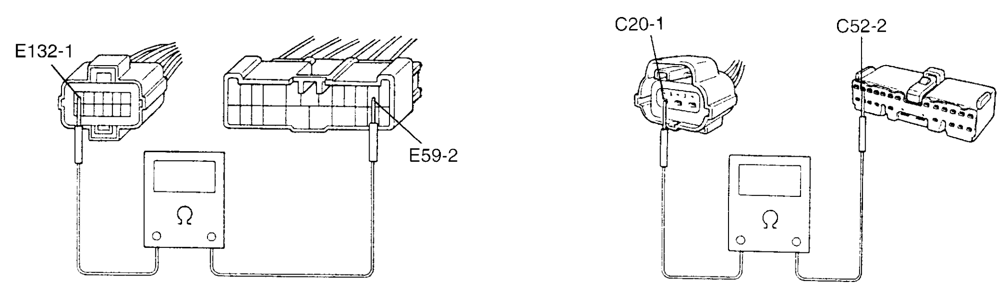


1.	Cruise main switch
2.	“RESUME ACCEL” switch
3.	“COAST SET” switch
4.	“CANCEL” switch

VSS Circuit Check

Step	Action	Yes	No
1	Vehicle Speed Sensor Circuit Check 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Check for proper connection to cruise control module at terminal E132-1. 3) If OK, check for continuity between terminals E132-1 and E59-2, terminals C52-2 and C20-1 referring to “CRUISE CONTROL SYSTEM” in Section 8A. Is check result satisfactory?	VSS circuit is OK.	“BLU/YEL” circuit is open.

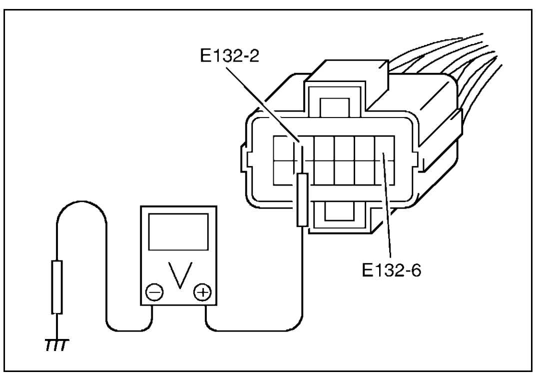
Fig. for Step 1



Stop Lamp Switch (with Pedal Position Switch) Circuits Check

Step	Action	Yes	No
1	Stop Lamp Switch (With Pedal Position Switch) Circuits Check 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Check for proper connection to cruise control module at terminals E132-2 and E132-6. 3) If OK, turn ignition switch ON. 4) Check Voltage between each terminal and ground under each condition below. **Stop lamp switch circuit specification** **Brake pedal released terminal E132-2 : 0 V** **Brake pedal released terminal E132-6 : 10 – 14 V** **Brake pedal depressed terminal E132-2 : 10 – 14 V** **Brake pedal depressed terminal E132-6 : 0 V** Is check result satisfactory?	Stop lamp switch (with pedal position switch) circuits are OK.	Go to Step 2.
2	Stop Lamp Switch Position Check 1) Check stop lamp switch for installation position referring to “STOP LAMP SWITCH” in Section 5. Is check result satisfactory?	Go to Step 3.	Adjust.
3	Stop Lamp Switch (With Pedal Position Switch) Check 1) Disconnect connector from stop lamp switch. 2) Check for proper connection to stop lamp switch at all terminals. 3) If OK, check stop lamp and pedal position switches for operation referring to “STOP LAMP SWITCH” in this section. Is this switch in good condition?	“YEL/GRN” or “GRN/WHT” circuit is open or short.	Replace.

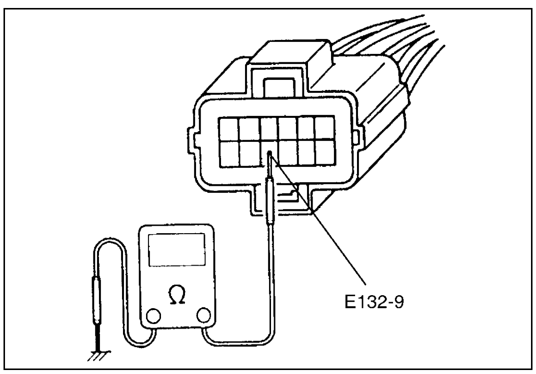
Fig. for Step 1



Transmission Range Switch Circuit Check

Step	Action	Yes	No
1	Transmission Range Switch Circuit Check 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Check for proper connection to cruise control module at terminal E132-9. 3) If OK, connect ohmmeter between terminal E132-9 and ground. 4) Check for continuity under each condition below. **Transmission range switch circuit specification** **Selector lever at "P" or "N" range : Continuity** **"R", "D", "2" or "L" range : Infinity** Is check result satisfactory?	Transmission range switch circuit is OK.	Go to Step 2.
2	Transmission Range Switch Check 1) Disconnect transmission range switch connector. 2) Check for proper connection to transmission range switch at disconnected connector terminals. 3) If OK, check transmission range switch for operation referring to "TRANSMISSION RANGE SWITCH" in Section 7B1. Is check result satisfactory?	"BLK/RED" or "BLK/YEL" circuit is open or short.	Adjust or replace.

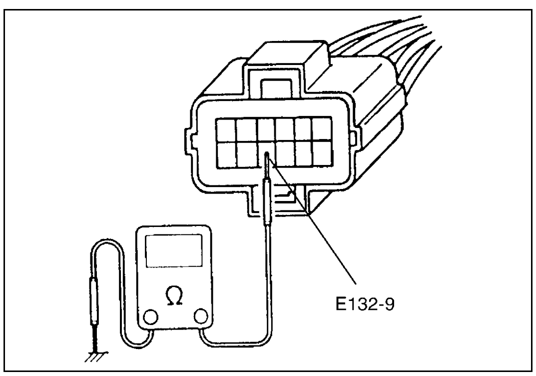
Fig. for Step 1



Clutch Pedal Position Switch Circuit Check

Step	Action	Yes	No
1	Clutch Pedal Position Switch Circuit Check 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Check for proper connection to cruise control module at terminal E132-9. 3) If OK, check for resistance between terminal E132-9 and ground under each condition below. **Clutch pedal position switch circuit specification** **Clutch pedal released : Infinity** **Clutch pedal depressed : Continuity** Is check result satisfactory?	Clutch pedal position switch circuit is OK.	Go to Step 2.
2	Clutch Pedal Position Switch Position Check 1) Check clutch pedal position switch for installation position referring to “CLUTCH PEDAL POSITION SWITCH” in this section. Is check result satisfactory?	Go to Step 3.	Adjust.
3	Clutch Pedal Position Switch Check 1) Disconnect connector from clutch pedal position switch. 2) Check for proper connection to clutch pedal position switch at all terminals. 3) If OK, check clutch pedal position switch for operation referring to “CLUTCH PEDAL POSITION SWITCH” in this section. Is this switch in good condition?	“BLU” or “BLK” circuit is open or short.	Replace.

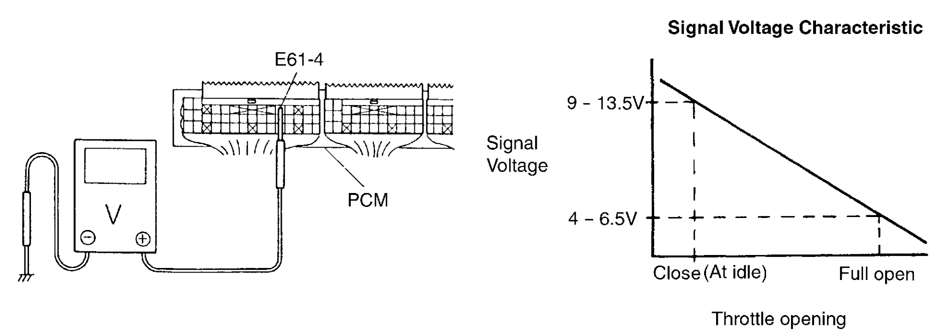
Fig. for Step 1



Throttle Valve Opening Signal Circuit Check

Step	Action	Yes	No
1	Powertrain Control Module (PCM) Diagnostic Trouble Code Check 1) Check PCM for DTC. Is there a DTC related to throttle position sensor?	Check and repair TP sensor referring to Section 6-1.	Go to Step 2.
2	Throttle Valve Opening Signal Circuit Check 1) Turn ignition switch ON. 2) Check voltage between terminal E61-4 of PCM connector connected and ground. Does voltage vary linearly according to throttle opening?	Throttle valve opening signal circuit is OK.	Go to Step 3.
3	Supply Voltage Check 1) Disconnect connector from PCM with ignition switch OFF. 2) Check for proper connection to PCM at terminal E61-4. 3) If OK, connect “BLU” wire terminal of main relay to ground with service wire. 4) Turn ignition switch ON. 5) Check voltage between E61-4 of PCM connector and ground. Is it 10 – 14 V?	Check TP sensor and circuits referring to Section 6-1. If OK, substitute a known-good PCM and recheck.	Check “GRY” wire for open and short. If OK, proceed to cruise control module power and ground circuits check.

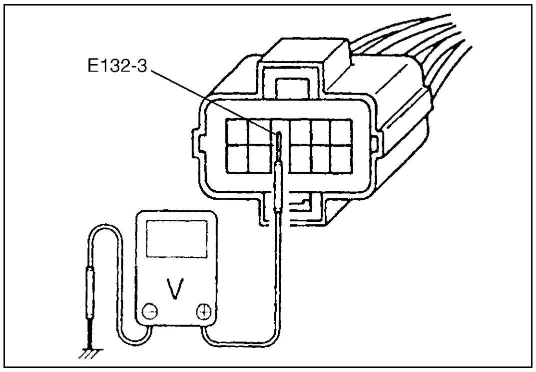
Fig. for Step 2



Overdrive and TCC off Command Signal Circuit Check

Step	Action	Yes	No
1	Overdrive off Command Signal Circuit Check 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Check for proper connection to cruise control module at terminal E132-3. 3) If OK, turn ignition switch ON. 4) Check voltage between terminal E132-3 and ground. Is it 10 –14 V?	This signal circuit is OK.	Check “PNK/ BLU” wire for open and short. If OK, substitute a known-good PCM and recheck.

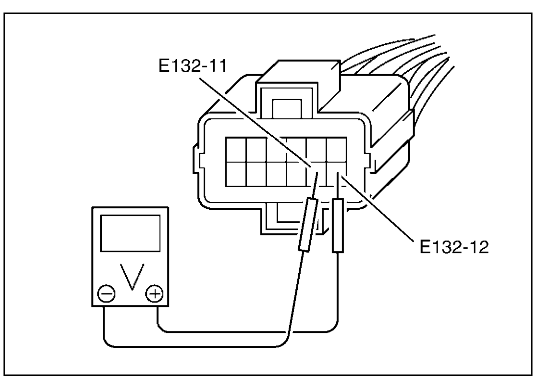
Fig. for Step 1



Cruise Control Module Power and Ground Circuits Check

Step	Action	Yes	No
1	Power and Ground Circuits Check 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Check for proper connection to cruise control module at terminals E132-12 and E132-11. 3) If OK, turn ignition switch ON. 4) Check voltage between terminals E132-12 and E132-11. Does voltmeter indicate 10 – 14 V?	Power and ground circuits are OK.	“BLU/BLK” or “BLK” circuit is open.

Fig. for Step 1



Cruise Control Module and Its Circuit Inspection

CAUTION:

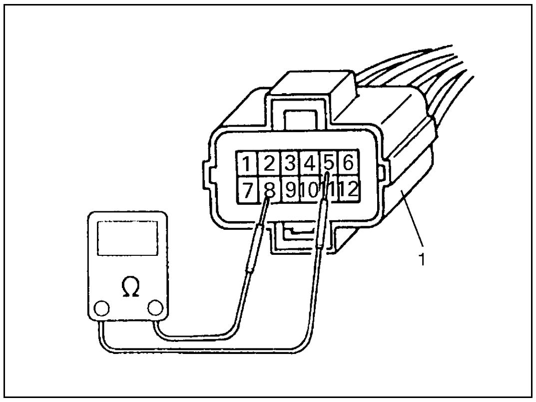
Cruise control module can not be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to cruise control module with coupler disconnected from it.

VOLTAGE CHECK

Check for input or output voltage of control module (voltage between each circuit and body ground) with cruise control module connector connected.

CIRCUIT	NORMAL VOLTAGE	CONDITION
Vehicle speed sensor	Indicator deflection repeated between 0 – 1 V and 3 – 5 V	Ignition switch ON and cruise main switch ON. Vehicle hoisted and rear left tire turned slowly with rear right tire locked.
Stop lamp switch	0 – 2 V	Brake pedal released.
	10 – 14 V	Brake pedal depressed.
Overdrive and TCC off signal (4 A/T only)	10 – 14 V	Ignition switch ON.
CRUISE indicator light	10 – 14 V	Ignition switch ON.
Ground	–	–
Brake pedal position switch (in stop lamp switch)	10 – 14 V	Ignition switch ON and brake pedal released.
	0 V	Ignition switch ON and brake pedal depressed.
Throttle valve opening signal from PCM (4A/T only)	Ignition switch ON. Voltage varies as specified by graph in “THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK” in this section.	
Cruise main switch	7 – 9V	Ignition switch ON and cruise main switch released.
	3 – 5 V	Ignition switch ON and cruise main switch pressed.
CANCEL switch	0 – 1 V	Ignition switch ON and CANCEL switch pressed.
COAST SET switch	1 – 2 V	Ignition switch ON and COAST SET switch rotated.
RESUME ACCEL switch	2.5 – 4 V	Ignition switch ON and RESUME ACCEL switch rotated.
Clutch pedal position switch (M/T only)	10 – 14 V	Ignition switch ON and clutch pedal released.
	0 – 1 V	Ignition switch ON and clutch pedal depressed fully.
Transmission range switch (Park/Neutral position switch) (A/T only)	0 V	Ignition switch ON and selector lever in “P” or “N” range.
	10 – 14 V	Ignition switch ON and selector lever in “R”, “D”, “2” or “L” range.
Cruise main switch indicator lamp	0 – 1 V	Ignition switch ON.
	10 – 14 V	Ignition switch ON and after input main switch ON signal.

RESISTANCE CHECK



4) Disconnect cruise control module connector from cruise control module with ignition switch OFF.

CAUTION:
Never touch terminals of cruise control module itself or connect voltmeter or ohmmeter.

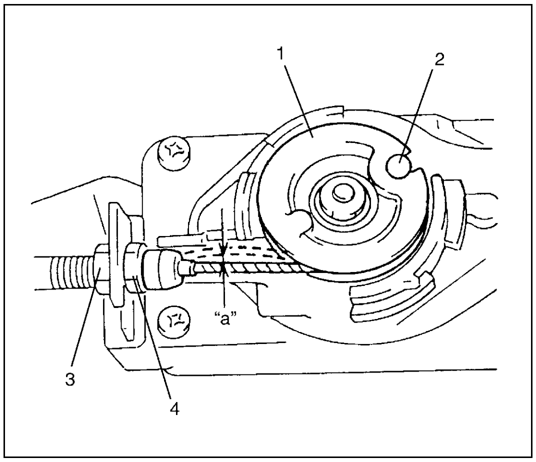
5) Check resistance between each pair of terminals of disconnected connectors as shown in the following table.

1. Cruise control module connector (E132)

TERMINALS	CIRCUIT	STANDARD RESISTANCE	CONDITION
E132-11 – body ground	Ground	Continuity	–
E132-6 – E132-12	Brake pedal position switch (in stop lamp switch)	Continuity	Brake pedal released.
		No continuity	Brake pedal depressed.
E132-8 – E132-5	CANCEL switch	No continuity	CANCEL switch OFF (released).
		Continuity	CANCEL switch ON (pressed).
	COAST SET switch	No continuity	COAST SET switch OFF (released).
		200 – 240 Ω	COAST SET switch ON (rotated).
	RESUME ACCEL switch	No continuity	RESUME ACCEL switch OFF (released).
		820 – 1000 Ω	RESUME ACCEL switch ON (rotated).
E132-9 – E132-11 (M/T)	Clutch pedal position switch (M/T only)	No continuity	Clutch pedal released.
		Continuity	Clutch pedal depressed fully.
E132-9 – E132-11 (A/T)	Transmission range switch (Park/neutral position switch) (A/T only)	Continuity	Selector lever in “P” or “N” range.
		No continuity	Selector lever in “R”, “D”, “2” or “L” range.

Cruise Cable Play Inspection and Adjustment

INSPECTION AND ADJUSTMENT



1) Remove actuator cap.
2) With actuator lever (1) returned at original position (2) (Where lever does not move clockwise any further), check cruise cable for play.
   If it is out of specification, adjust it as follows

Cruise Cable play "a" :
1 – 2 mm (0.04 – 0.08 in.)

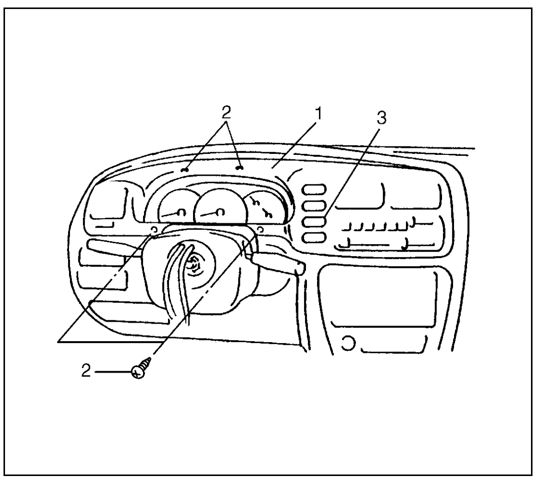
3) Loosen cable lock nut (3).
4) Adjust cable play to specified value by turning adjusting nut (4).
5) Tighten lock nut (3) securely after adjustment.

On-Vehicle Service

Cruise Main Switch

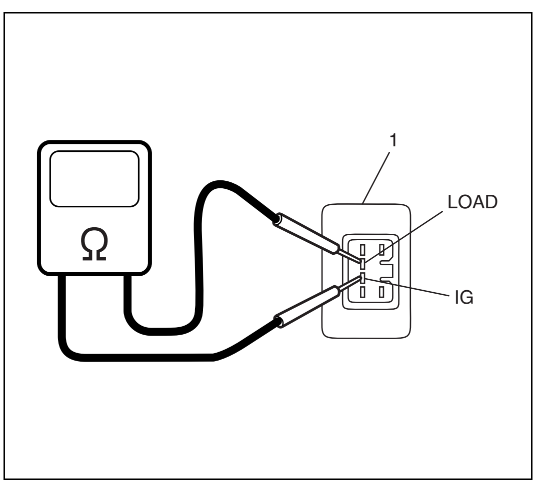
REMOVAL

1) Disconnect negative (–) cable at battery.



2) Remove meter cluster hood (1) by removing its mounting screws (2).
3) Remove cruise main switch (3) from instrument panel.
4) Disconnect connector from cruise main switch (3).

INSPECTION



1) Check for resistance between "IG" and "LOAD" terminals.
   If check result is not satisfactory, replace.

Cruise main switch specification
Switch button released : Infinity
Switch button pressed : About 3.9 kΩ

INSTALLATION

Reverse removal procedure for installation.

Coast/Set, Resume/Accel and Cancel Switches

CAUTION:

Never disassemble combination switch assembly. Disassembly will spoil its original functions.

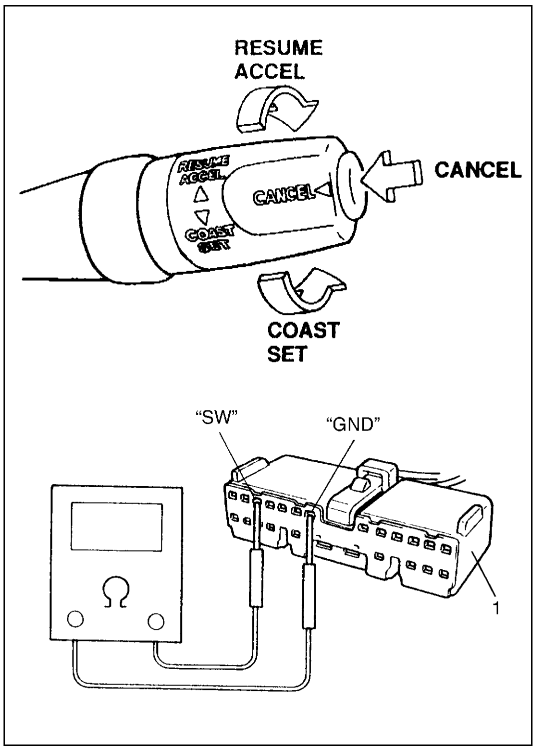
These switches are built in the combination switch assembly.

REMOVAL AND INSTALLATION

Refer to “COMBINATION SWITCH” in Section 3C1.

INSPECTION

1) Disable air bag system referring to “DISABLING AIR BAG SYSTEM” in Section 10B.



2) Disconnect connector (1) of COAST/SET, RESUME/ACCEL and CANCEL switches.
3) Check for resistance between “SW” and “GND” terminals of disconnected switch connector (1) under each condition below.
   If check result is not satisfactory, replace combination switch assembly.

COAST/SET, RESUME/ACCEL and CANSEL switch specification
All switches released (OFF) : Infinity
CANCEL switch pressed (ON) : About 0 Ω
COAST/SET switch rotated (ON) : 200 – 240 Ω
RESUME/ACCEL switch rotated (ON) : 820 – 1000 Ω

Vehicle Speed Sensor (VSS)

INSPECTION

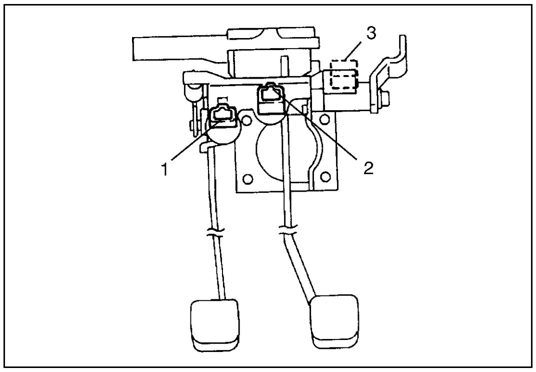
Refer to Section 6E2.

Transmission Range Switch

Refer to Section 7B1 for inspection, removal, installation and adjustment.

Clutch Pedal Position (CPP) Switch

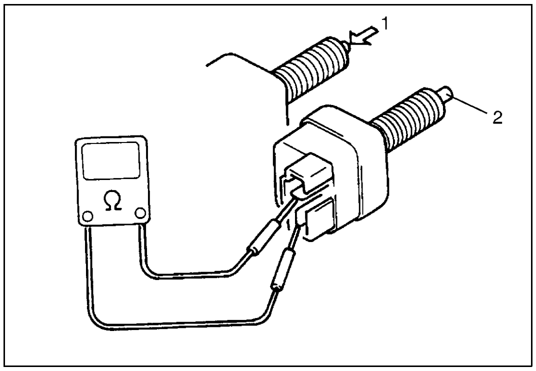
REMOVAL



1) Disconnect CPP switch connector with ignition switch OFF.
2) Remove CPP switch from pedal bracket.

1.	CPP switch for cruise control
2.	Stop lamp switch
3.	CPP switch for starter (if equipped)

INSPECTION

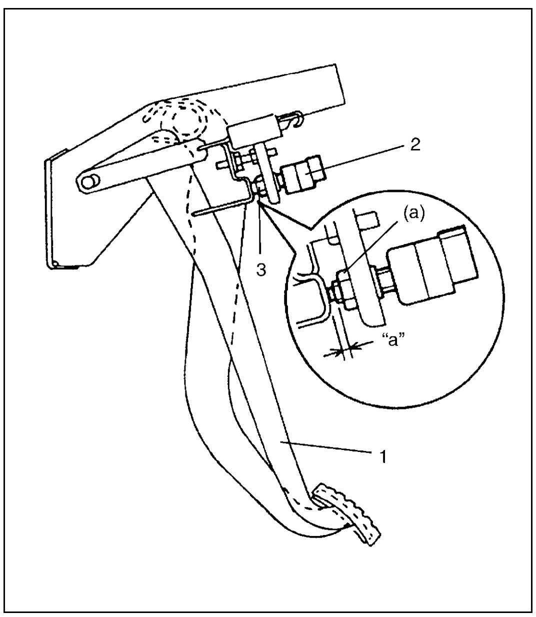


Check for resistance between terminals under each condition below.
If check result is not satisfactory, replace.

CPP switch resistance
When switch shaft is free : Continuity
When switch shaft is pushed : No continuity

1.	Push
2.	Free

INSTALLATION



1) Install CPP switch to pedal bracket.
2) With clutch pedal released, adjust switch position so that clearance between end of thread and clutch pedal bracket is within specification.

Clearance "a" between end of thread and clutch pedal bracket :
1.5 – 2.0 mm (0.06 – 0.08 in)

3) Tighten lock nut to specified torque.

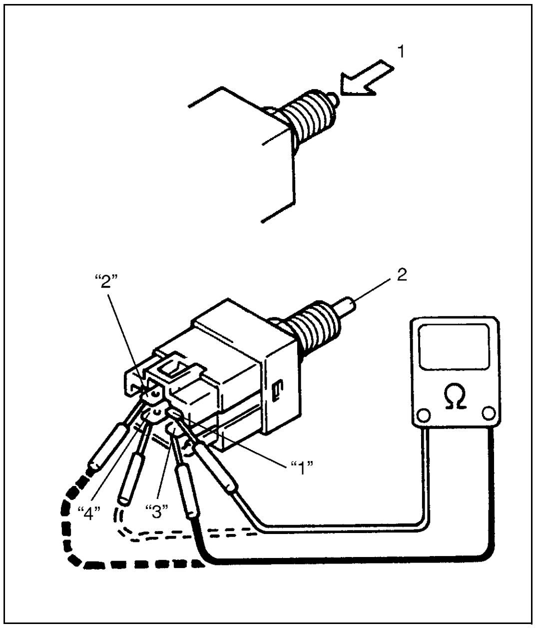
Tightening torque
CPP switch lock nut (a) : 7.5 N·m (0.75 kg-m, 5.5 lb-ft)

4) Connect connector to CPP switch securely.

1.	Clutch pedal
2.	CPP switch for cruise control
3.	Lock nut

Stop Lamp Switch (with Pedal Position Switch)

INSPECTION



1) Disconnect negative (–) cable at battery.
2) Disconnect stop lamp switch connector and remove stop lamp switch from pedal bracket.
3) Check switch (2 contacts) for resistance under each of the following each conditions.
   If check result is not satisfactory, replace stop lamp switch.

Stop lamp switch specification
Between terminals "1" and "3" (Contact for stop lamp)
FREE (2) : Continuity, PUSH (1) : No continuity
Between terminals "2" and "4" (Contact for brake pedal position)
FREE (2) : No continuity, PUSH (1) : Continuity

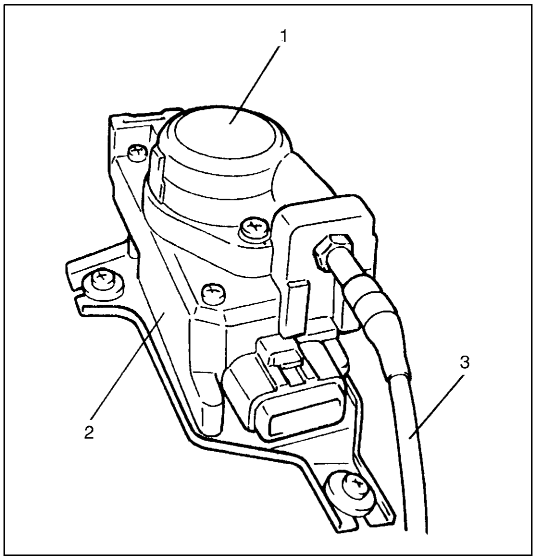
4) Install stop lamp switch and adjust its position referring to Section 5.

Cruise Control Actuator Assembly (with Control Module)

> **CAUTION:**
> **Never disassemble cruise control actuator assembly. Disassembly will spoil its original function.**

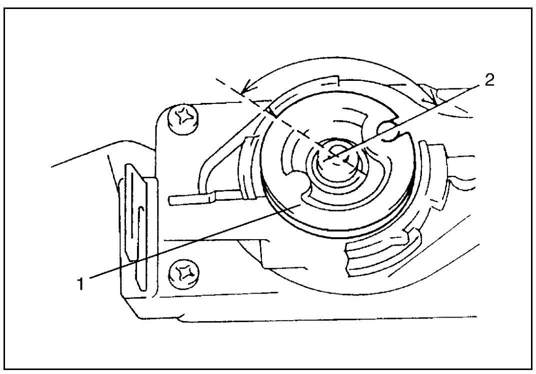
REMOVAL

1) Disconnect negative (–) cable at battery.



2) Disconnect connector from actuator assembly (2) (with control module).
3) Remove actuator cap (1) from actuator assembly (2).
4) Disconnect cruise cable (3) from actuator assembly (2).
5) Remove actuator assembly (2) from vehicle.

INSPECTION



Move actuator lever (1) by hand and check its operation as described below.

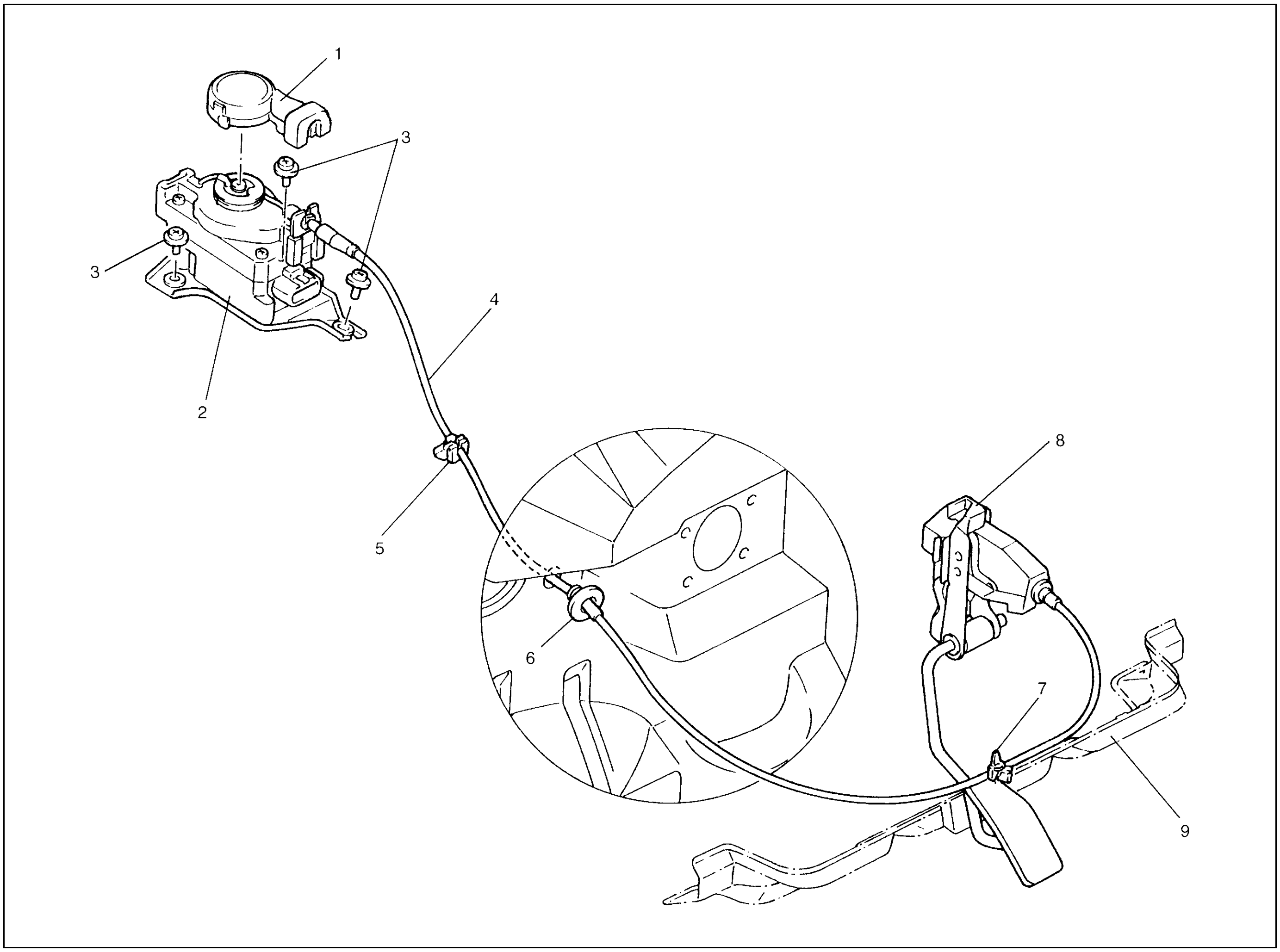
1) Actuator lever (1) should not turn clockwise.
2) Actuator lever (1) should turn smoothly by about 1/3 rotation counterclockwise and contact internal stopper.
3) When hand is taken off from actuator lever (1) at the position in 2) above, it should return to its original position (2) by return spring force. If actuator lever (1) does not operate as described above, replace it.

INSTALLATION

Install actuator assembly by reversing removal procedure, noting the following point.

- Adjust cruise cable play to specification referring to “CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT” in this section.

Cruise Cable



1. Actuator cap	4. Cruise cable	7. Clamp at member
2. Actuator assembly	5. Clamp	8. Accelerator pedal
3. Screw	6. Grommet	9. Member

REMOVAL

1) Disconnect cruise cable from cruise control arm and accelerator bracket.
2) Remove actuator cap and disconnect cruise cable from actuator.
3) Release cable from all clamps.
4) Remove cable from vehicle.

INSTALLATION

Install cruise cable by reversing removal procedure, noting the following points.

- Refer to the figure for proper clamp location and cable routing.
- Adjust cable play to specification referring to “CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT” in this section.

SECTION 9

BODY SERVICE

WARNING:

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

- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in air bag system section in order to confirm whether you are performing service on or near the air bag system components or wiring. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in air bag system section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintentional activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **Technical service work must be started at least 90 seconds after the ignition switch is turned to the "LOCK" position and the negative cable is disconnected from the battery. Otherwise, the system may be activated by reserve energy in the Sensing and Diagnostic Module (SDM).**
- **When body servicing, if shock may be applied to air bag system component parts, remove those parts beforehand. (Refer to Section 10B.)**

NOTE:

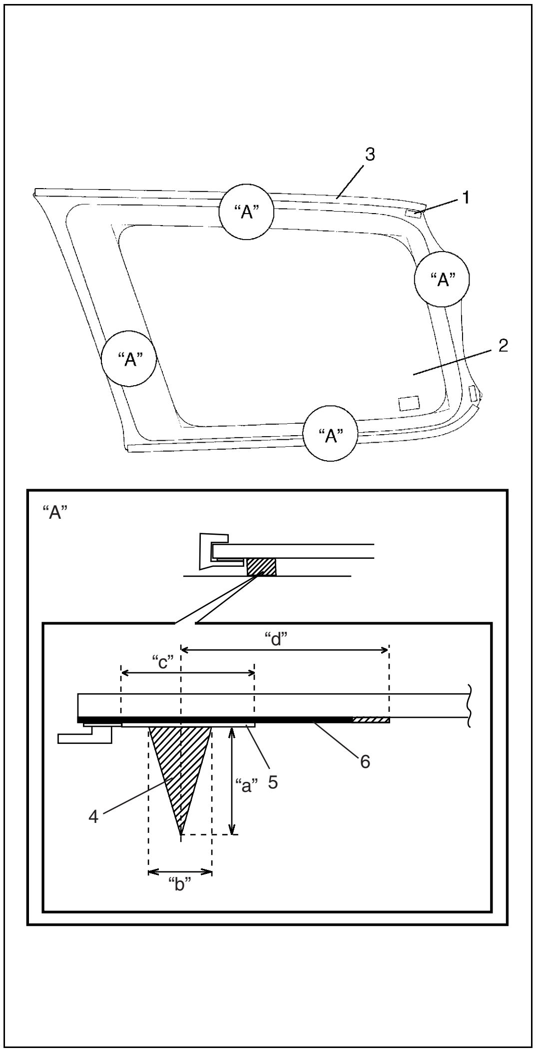
- **For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.**
- **Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number of with an equivalent part if replacement becomes necessary.**
  Do not use a replacement part of lesser quality or substitute a design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

CONTENTS

Glass, Windows and Mirror

Quarter Window

REMOVAL AND INSTALLATION



Refer to "WINDSHIELD" in this section as removal and installation procedures are basically the same. However, note the followings.

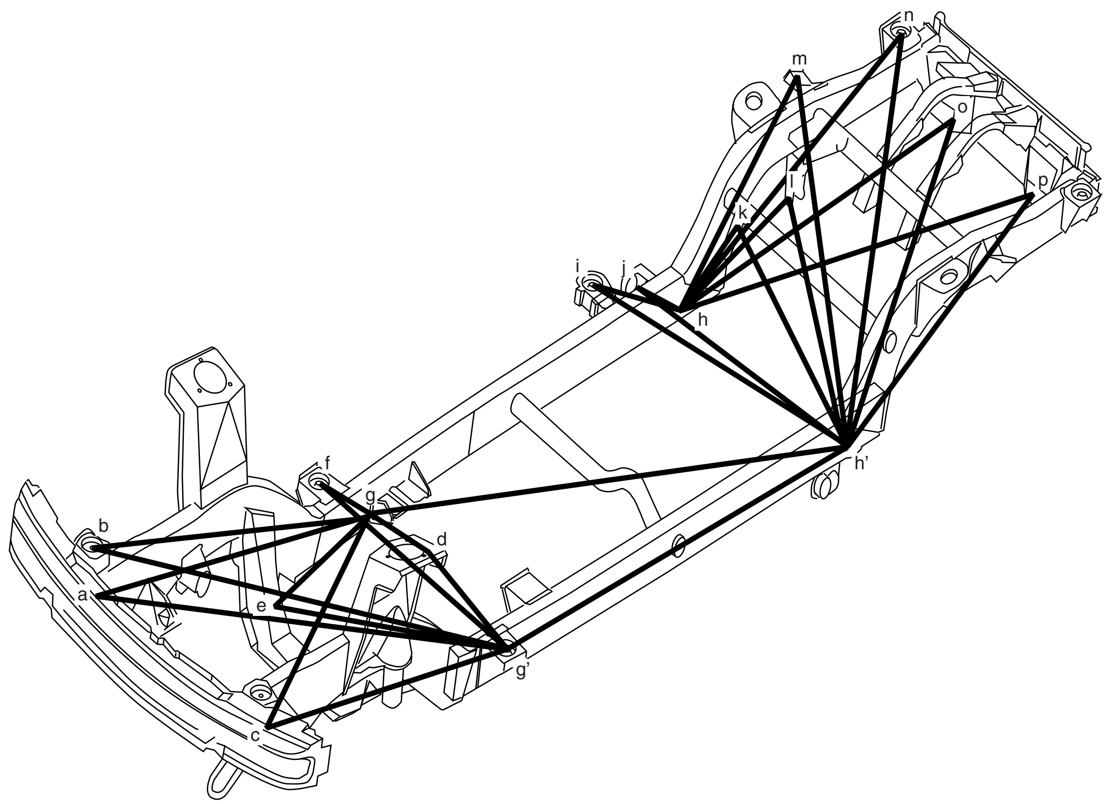
- Before applying primer to glass edge, install molding according to installing position shown in the figure.
- Observe the following precautions when applying adhesive along glass edge.
  – Adhesive should be applied evenly especially in height.
  – Be careful not to damage primer.
  – Press glass against body quickly after adhesive is applied.

Adhesive amount specification (quarter window)
Height "a" : 12 mm (0.47 in.)
Width "b" : 8 mm (0.31 in.)
Width "c" : 16 mm (0.63 in.) for glass front, rear and upper section.
Width "c" : 14 mm (0.55 in.) for glass bottom section.
Position "d" : 177 mm (6.97 in.) for left side glass front section.
Position "d" : 75 mm (2.95 in.) for right side glass front section.
Position "d" : 29 mm (1.15 in.) for glass rear section.
Position "d" : 39 mm (1.54 in.) for glass upper section.
Position "d" : 22 mm (0.87 in.) for glass bottom section.

1. Spacer	4. Adhesive
2. Glass	5. Primer
3. Molding	6. Ceramic print

Body Structure

Under Body Dimensions

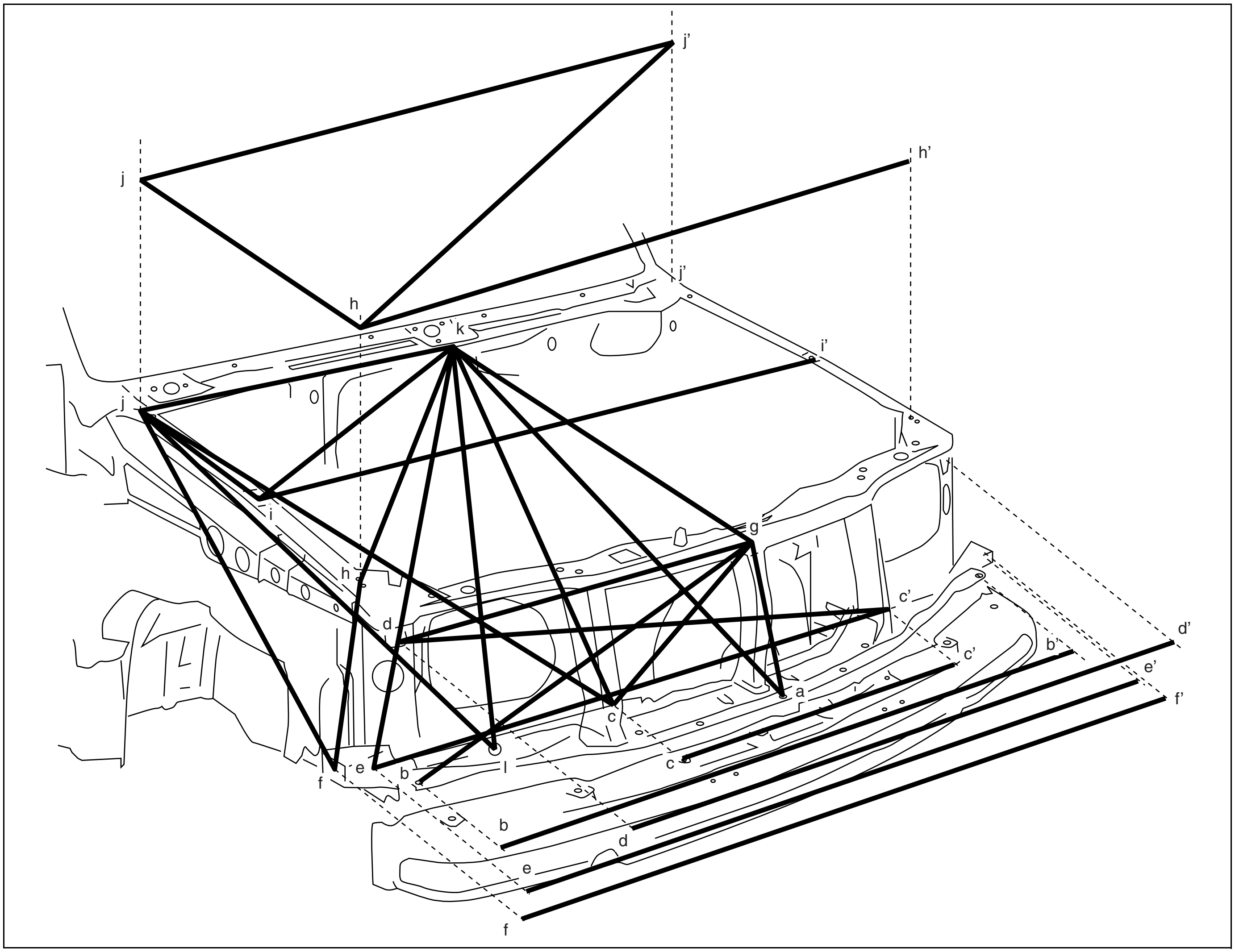


a.	Front bumper side installation hole	i.	3rd mounting installation hole
b.	1st mounting installation hole	j.	Lower rod installation hole
c.	Suspension frame front installation hole	k.	Upper rod installation inside hole
d.	Front strut installation outside hole	l.	Lateral rod installation hole
e.	Suspension arm installation rear side hole	m.	Rear shock absorber installation hole
f.	2nd mounting installation hole	n.	4th mounting installation hole
g (g').	ϕ20 jig hole	o.	Fuel tank installation rear right side hole
h (h').	Jig hole	p.	Fuel tank installation rear left side hole

Hole to hole distance :

a – g :	1363 mm (53.66 in.)	f – g :	200 mm (7.87 in.)	h – p :	1770 mm (69.68 in.)
a – g' :	1574 mm (61.97 in.)	f – g' :	928 mm (36.54 in.)	i – h' :	1073 mm (42.24 in.)
b – g :	1291 mm (50.83 in.)	g – h' :	1488 mm (58.58 in.)	j – h' :	1029 mm (40.51 in.)
b – g' :	1554 mm (61.18 in.)	g' – h' :	1225 mm (48.23 in.)	k – h' :	970 mm (38.19 in.)
c – g :	1354 mm (53.31 in.)	h – i :	181 mm (7.13 in.)	l – h' :	1353 mm (53.27 in.)
c – g' :	1084 mm (42.68 in.)	h – k :	606 mm (23.86 in.)	m – h' :	1477 mm (58.15 in.)
d – f :	1339 mm (52.72 in.)	h – l :	1004 mm (39.53 in.)	n – h' :	1876 mm (73.86 in.)
d – g' :	913 mm (35.94 in.)	h – m :	1110 mm (43.70 in.)	o – h' :	1781 mm (70.12 in.)
e – g :	569 mm (22.40 in.)	h – n :	1633 mm (64.29 in.)	p – h' :	1664 mm (65.51 in.)
e – g' :	881 mm (34.68 in.)	h – o :	1660 mm (65.35 in.)		

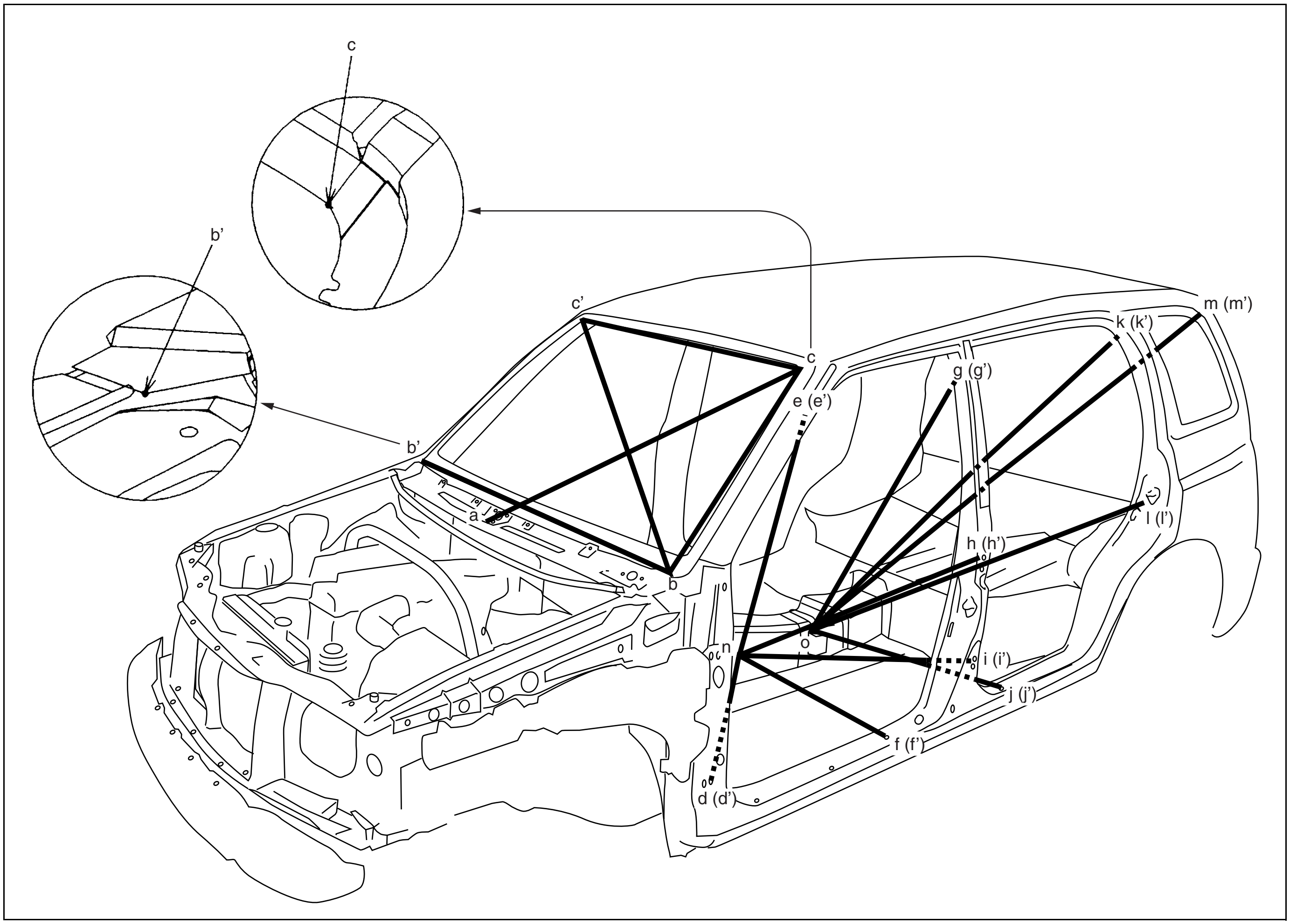
Body Dimensions



a. Front bumper installation clip hole	g. Center member installation hole
b (b'). Front bumper installation hole	h (h'). Fender installation reference hole
c (c'). Headlight installation hole	i (i'). Fender installation hole
d (d'). Headlight installation resin nut hole	j (j'). Fender installation reference hole
e (e'). Headlight installation bolt hole	k. Cowl top panel center hole (ϕ6)
f (f'). Front fender installation bolt hole	l. Mounting installation hole

Hole to hole distance :

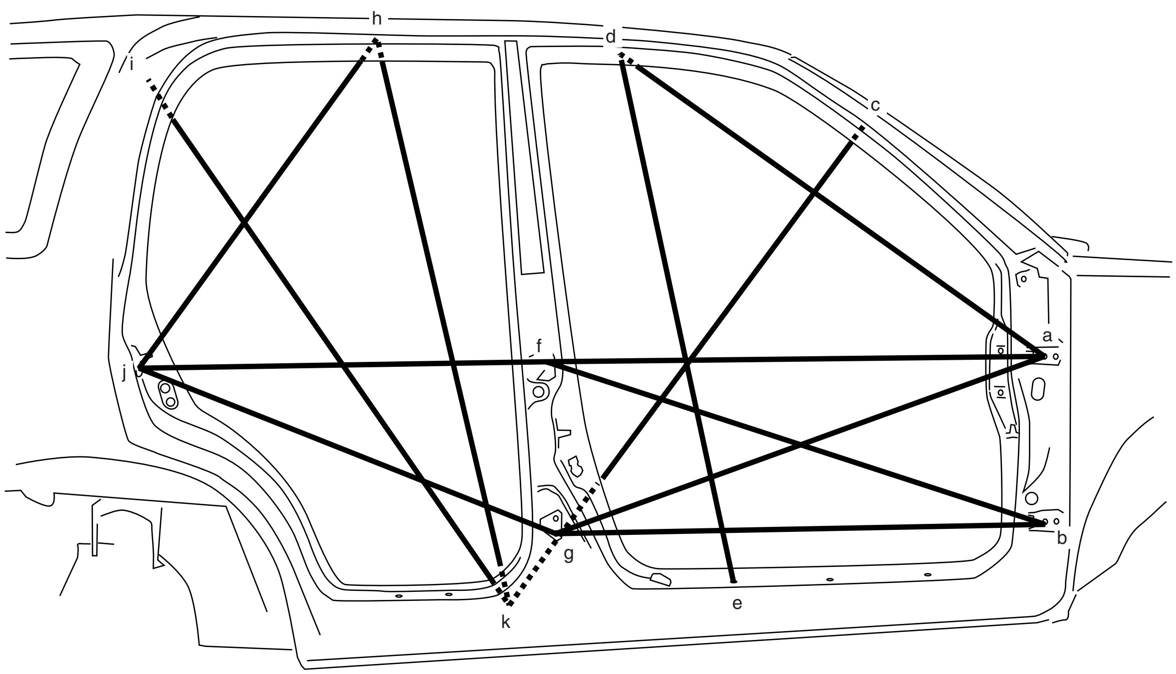
a – g :	276 mm (10.87 in.)	d – d' :	1302 mm (51.26 in.)	h – j :	677 mm (26.65 in.)
a – k :	1000 mm (39.37 in.)	d – e :	189 mm (7.44 in.)	h – j' :	1504 mm (59.21 in.)
b – b' :	1370 mm (53.94 in.)	d – g :	672 mm (26.46 in.)	h – k :	927 mm (36.50 in.)
b – g :	730 mm (28.74 in.)	d – k :	968 mm (38.11 in.)	i – i' :	1344 mm (52.91 in.)
c – c' :	668 mm (26.30 in.)	e – e' :	1456 mm (57.32 in.)	i – j :	391 mm (15.39 in.)
c – e :	414 mm (16.30 in.)	f – f' :	1550 mm (61.02 in.)	i – k :	760 mm (29.92 in.)
c – g :	406 mm (15.98 in.)	f – h :	299 mm (11.77 in.)	j – j' :	1348 mm (53.07 in.)
c – j :	1029 mm (40.51 in.)	f – j :	811 mm (31.93 in.)	j – k :	676 mm (26.61 in.)
c – k :	1000 mm (39.37 in.)	g – k :	854 mm (33.62 in.)	l – j :	961 mm (37.83 in.)
d – c' :	1016 mm (40.00 in.)	h – h' :	1339 mm (52.72 in.)	l – k :	1018 mm (40.08 in.)



a.	Garnish installation clip hole	i (i').	Hole in rear door lower hinge in lower part
b (b').	Front end of front windshield lower installation section	j (j').	Rear scuff installation hole (at front end)
c (c').	Front end of front windshield upper installation section	k (k').	Trim installation hole
d.	Hole in front door lower hinge at rear	l (l').	Rear door striker lower section installation hole
e.	Trim installation clip hole	m (m').	Trim installation hole
f (f').	Scuff installation hole (at rear end)	n.	Installation hole for front seat front inside
g (g').	Trim installation hole	o.	Installation hole for front seat rear inside
h (h').	Hole in rear door upper hinge in upper part		

Hole to hole distance :

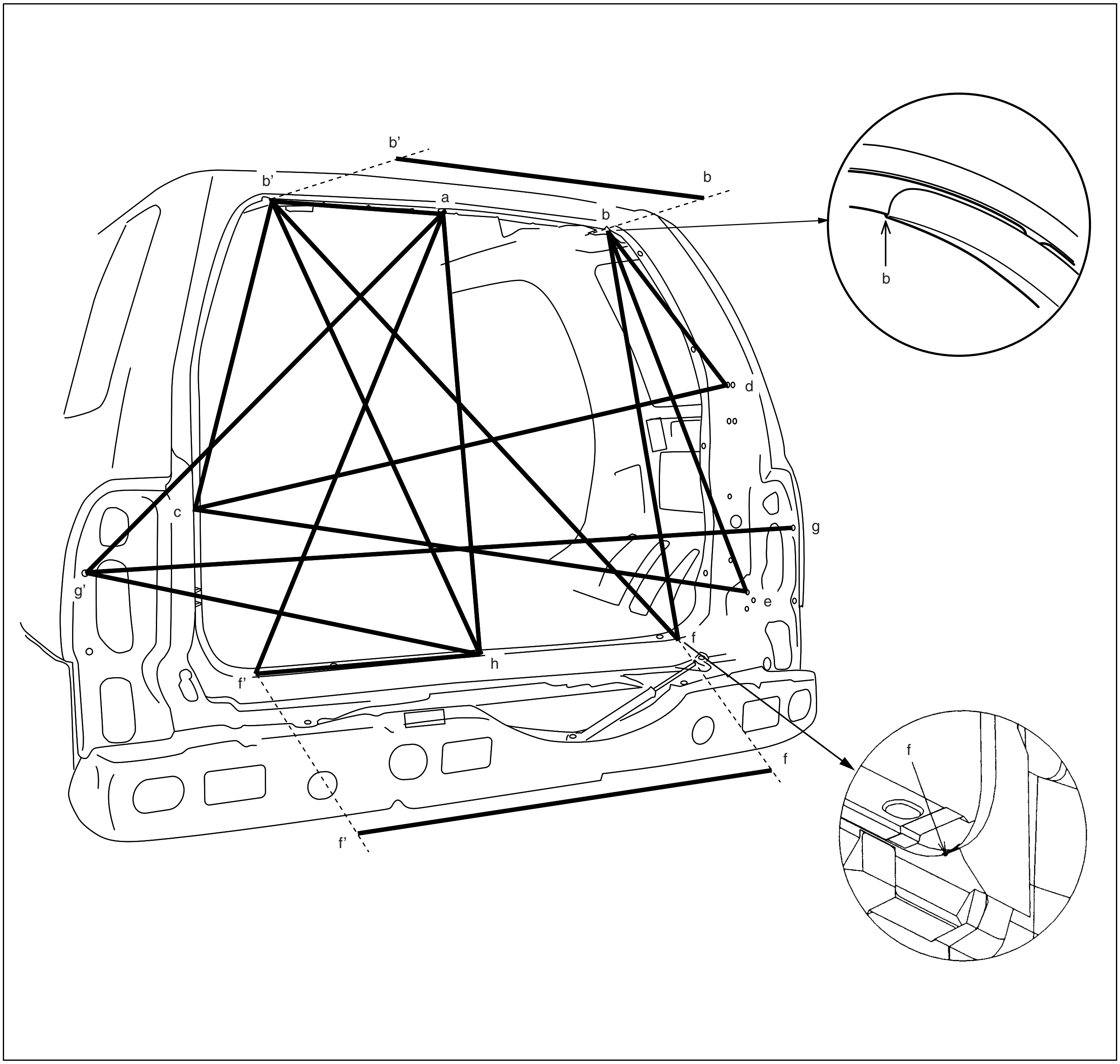
a – c :	982 mm (38.66 in.)	f – f' :	1511 mm (59.49 in.)	j – o :	649 mm (25.55 in.)
b – b' :	1390 mm (54.72 in.)	f – n :	620 mm (34.41 in.)	k – k' :	1095 mm (43.11 in.)
b – c :	755 mm (29.72 in.)	g – g' :	1085 mm (42.72 in.)	k – o :	1475 mm (58.07 in.)
b – c' :	1406 mm (55.35 in.)	g – o :	1099 mm (43.27 in.)	l – l' :	1513 mm (59.57 in.)
c – c' :	1012 mm (39.84 in.)	h – h' :	1521 mm (59.88 in.)	l – o :	1273 mm (50.12 in.)
d – d' :	1545 mm (60.83 in.)	h – o :	901 mm (35.47 in.)	m – m' :	1110 mm (43.70 in.)
d – n :	800 mm (31.50 in.)	i – i' :	1547 mm (60.91 in.)	m – o :	2037 mm (80.20 in.)
e – e' :	1110 mm (43.70 in.)	i – n :	806 mm (31.73 in.)		
e – n :	1036 mm (40.79 in.)	j – j' :	1511 mm (59.49 in.)		



a. Hole in front door upper hinge at rear	g. Hole in rear door lower hinge in lower part
b. Hole in front door lower hinge at rear	h. Assistant grip front installation hole
c. Trim installation clip hole	i. Trim installation hole
d. ϕ7 jig hole	j. Door striker lower section installation hole
e. Scuff installation hole (rear end)	k. Front seat belt installation hole
f. Hole in rear door upper hinge in upper part	

Hole to hole distance:

a – d :	1155 mm (45.47 in.)	b – g :	1140 mm (44.88 in.)	g – j :	1082 mm (42.60 in.)
a – f :	1046 mm (41.18 in.)	c – k :	1245 mm (49.02 in.)	h – j :	879 mm (34.61 in.)
a – g :	1090 mm (42.91 in.)	d – e :	1174 mm (46.22 in.)	h – k :	1282 mm (50.47 in.)
b – f :	1120 mm (44.09 in.)	f – j :	1029 mm (40.51 in.)	i – k :	1435 mm (56.50 in.)



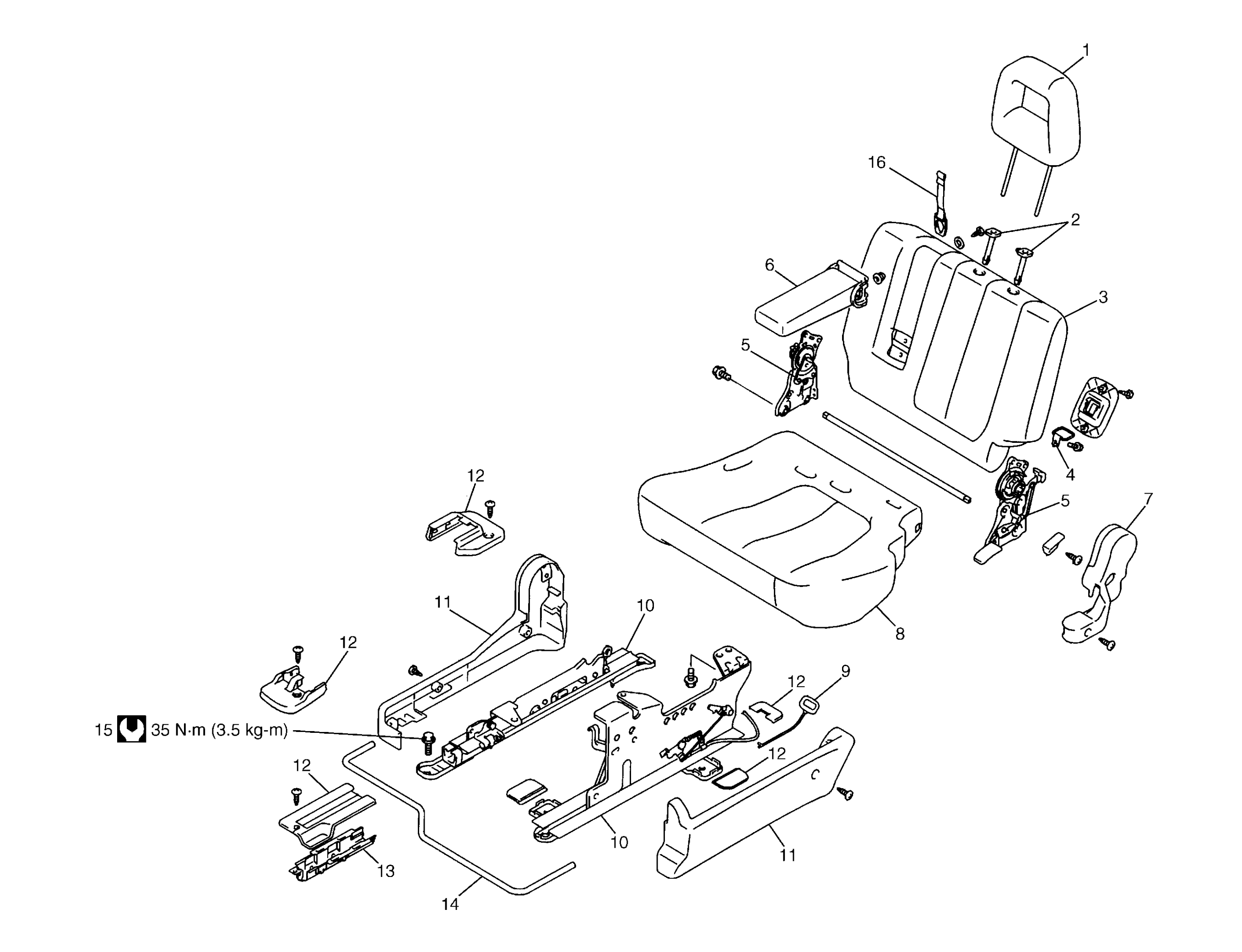
a.	Clip hole in the center of head lining rear installation section	e.	Installation hole in uppermost part of lower hinge
b (b').	Innermost end of roof panel installation section	f (f').	Innermost end of rear floor tail member installation section
c.	Installation hole in upper part of back door striker	g (g').	Installation hole in outer upper section of rear combination right lamp
d.	Installation hole in uppermost part of upper hinge	h.	Nut hole

Hole to hole distance :

a – b' :	448 mm (17.64 in.)	b – e :	837 mm (32.95 in.)	c – e :	1293 mm (50.90 in.)
a – f' :	1054 mm (41.50 in.)	b – f :	892 mm (35.12 in.)	f – f' :	1030 mm (40.55 in.)
a – g' :	1050 mm (41.34 in.)	b' – c :	650 mm (25.59 in.)	f' – h :	512 mm (20.16 in.)
a – h :	921 mm (36.25 in.)	b' – f :	1314 mm (51.73 in.)	g – g' :	1544 mm (60.79 in.)
b – b' :	888 mm (34.96 in.)	b' – h :	996 mm (39.21 in.)	g' – h :	806 mm (31.73 in.)
b – d :	400 mm (15.75 in.)	c – d :	1245 mm (49.02 in.)		

Seat

Second Seat



1. Head restraint	6. Rod	11. Seat adjuster cover	16. Rod belt (if equipped)
2. Head restraint guide	7. Seat reclining assembly cover	12. Cover	Tightening torque
3. Seat back	8. Seat cushion	13. Adjuster extension bracket	
4. Tether anchor hook	9. Adjuster handle (back side)	14. Adjuster handle (front side)	
5. Seat reclining assembly	10. Seat adjuster	15. Second seat mounting bolt	

REMOVAL

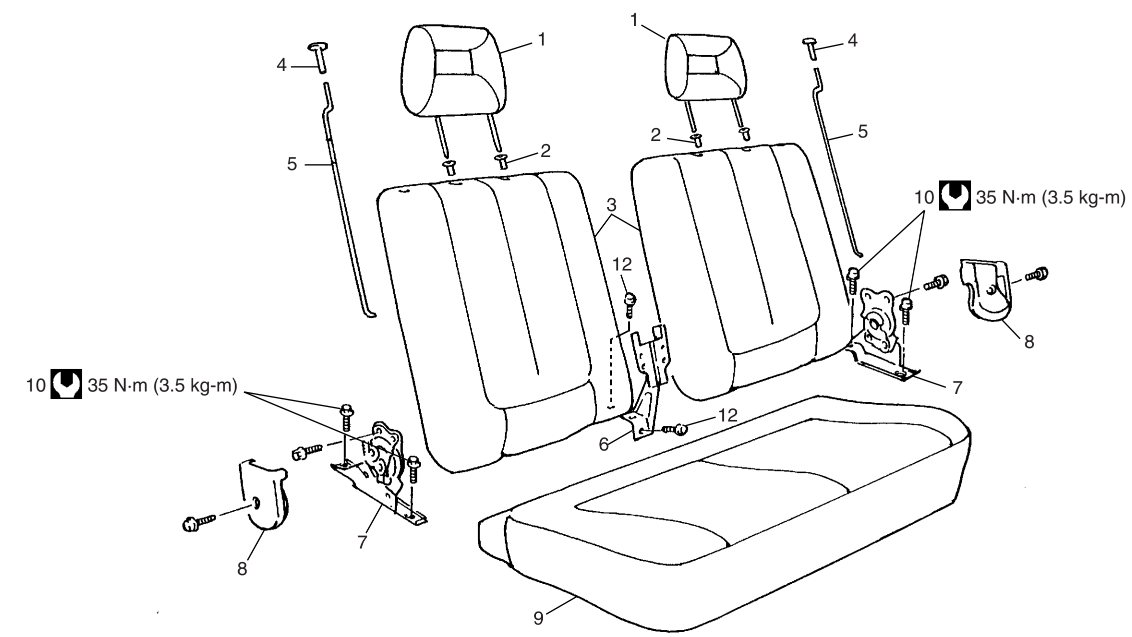
1) Remove adjuster extension cover.
2) Remove adjuster extension bracket.
3) Remove front and rear adjuster inside covers.
4) Remove adjuster outside covers.
5) Remove second seat mounting bolts.
6) Disassemble and repair seat as necessary.

INSTALLATION

Reverse removal procedure to install rear seat, noting the following instruction.

- Tighten second seat mounting bolts as specified torque.

Third Seat (If Equipped)



1. Head restraint	6. Reclining supporter	Tightening torque
2. Head restraint guide	7. Seat reclining assembly	
3. Seat back	8. Seat reclining assembly cover	
4. Seat reclining knob	9. Seat cushion	
5. Seat reclining rod	10. Third seat mounting bolt	

REMOVAL

1) Raise the front portion of seat cushion to remove rear seat cushion.
2) Remove 6 mounting bolts to remove seat back.
3) Disassemble and repair seat if necessary.

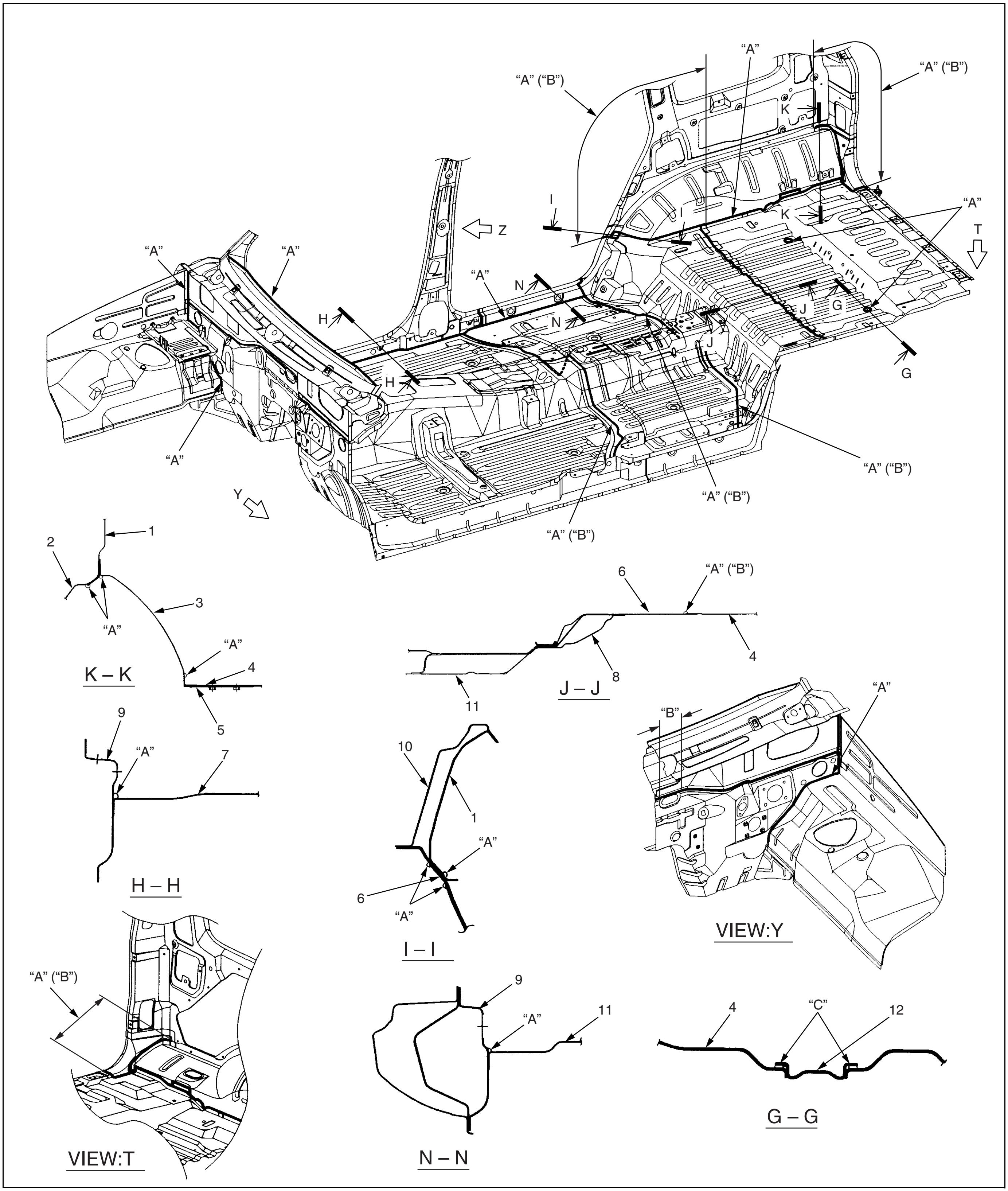
INSTALLATION

Reverse removal procedure to install rear seat noting the following instruction.

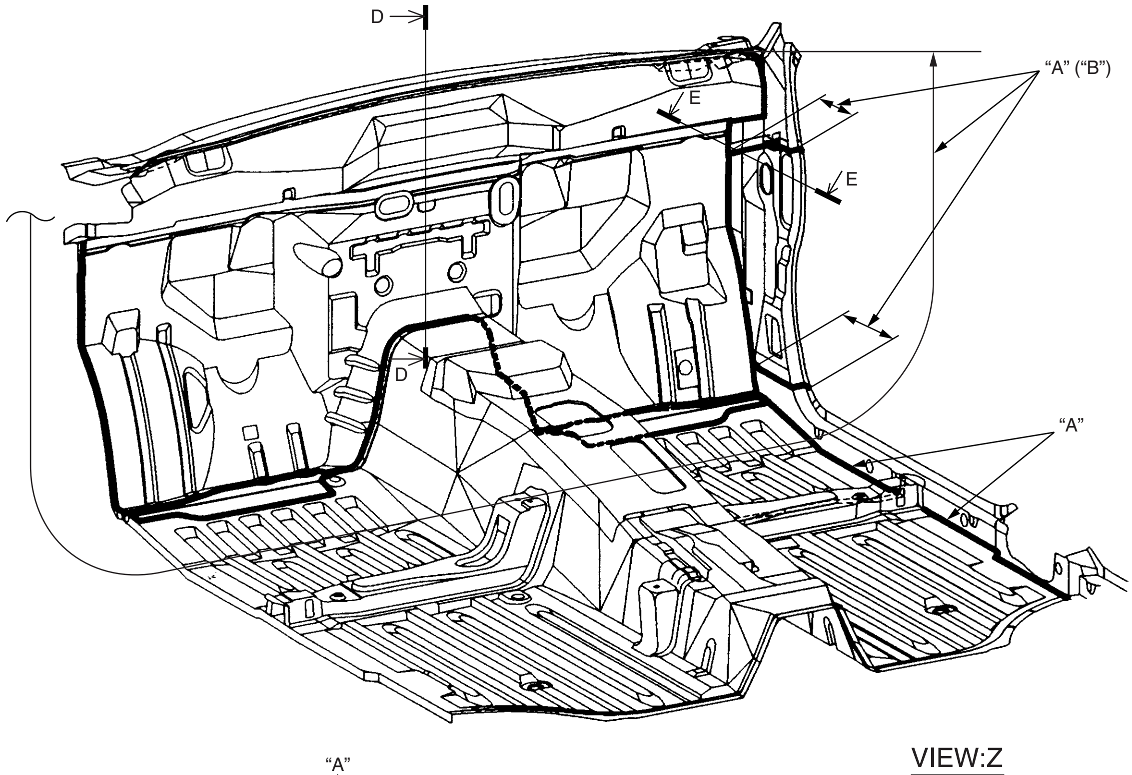
- Tighten third seat mounting bolts as specified torque.

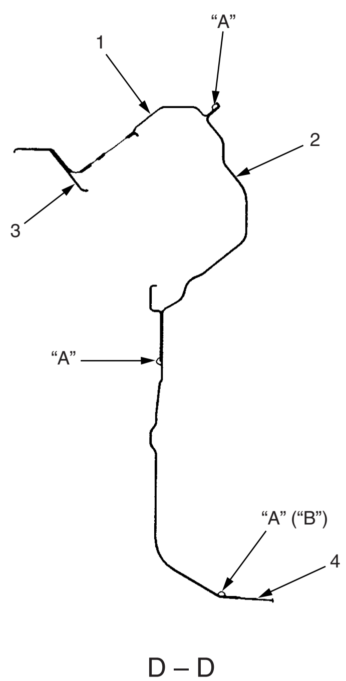
Paint and Coatings

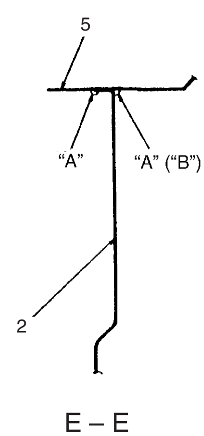
Sealant Application Area



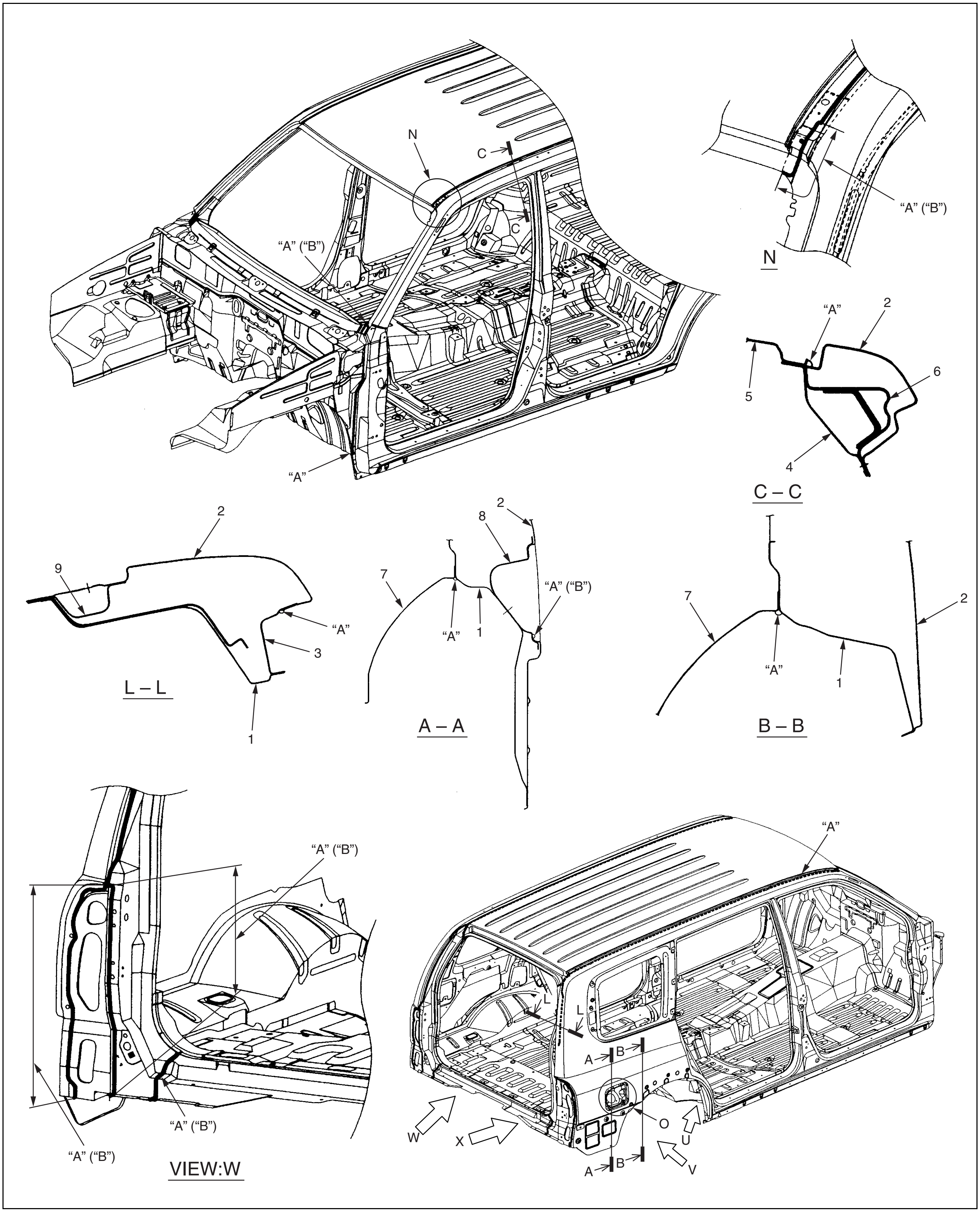
1. Side body inner panel	6. Center floor panel	11. Main floor extension panel
2. Rear wheel housing outer rear panel	7. Front floor panel	12. Rear floor cap
3. Rear wheel housing panel	8. Center floor member	"A" : Apply sealant
4. Rear floor panel	9. Side sill inner panel	"B" : Brush treatment
5. Tail lower member	10. Side outer panel	"C" : Apply sealant between cap and panel



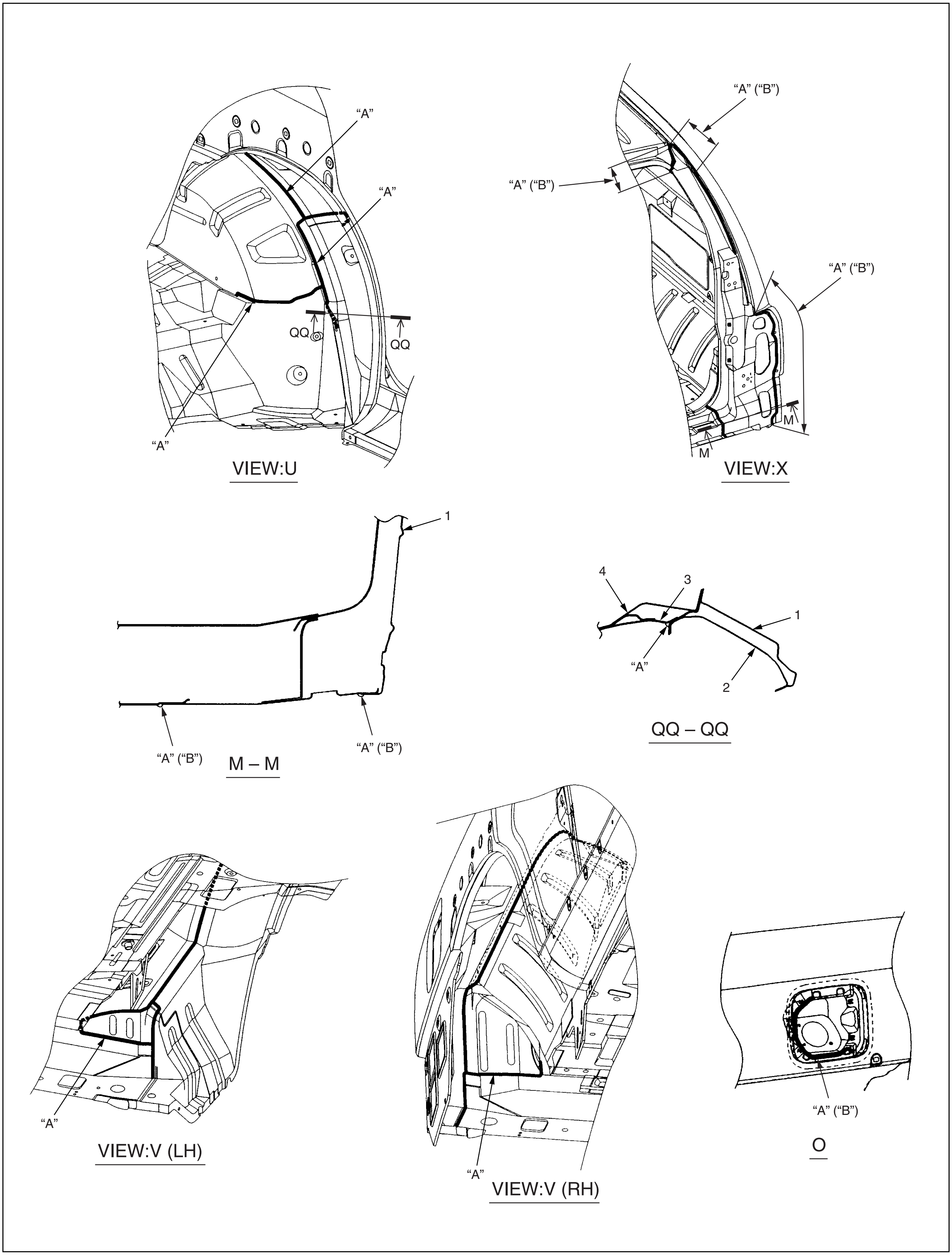




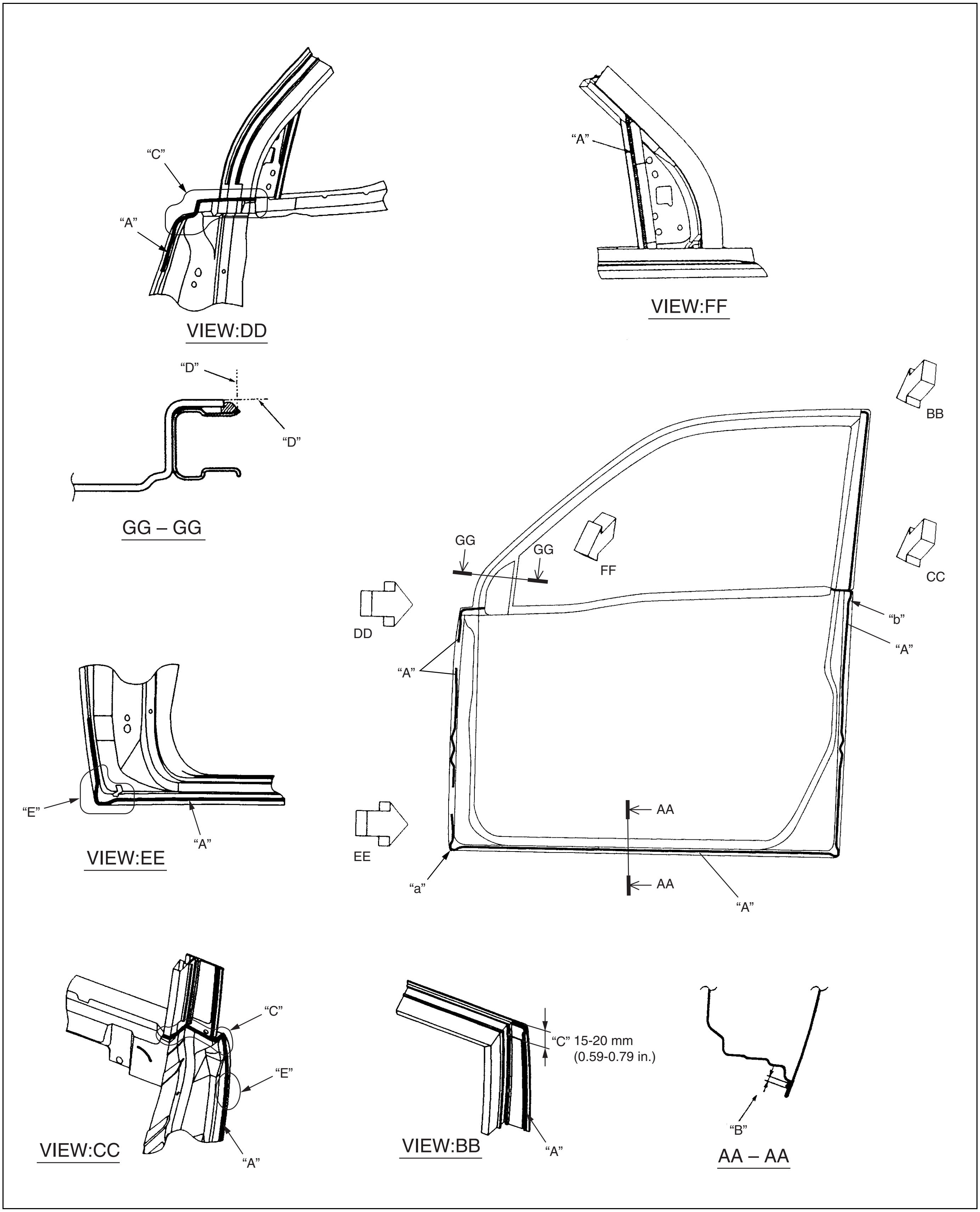
1. Cowl top panel	"A" : Apply sealant
2. Dash panel	"B" : Brush treatment
3. Cowl front panel	
4. Front floor panel	
5. Front pillar inner lower panel	



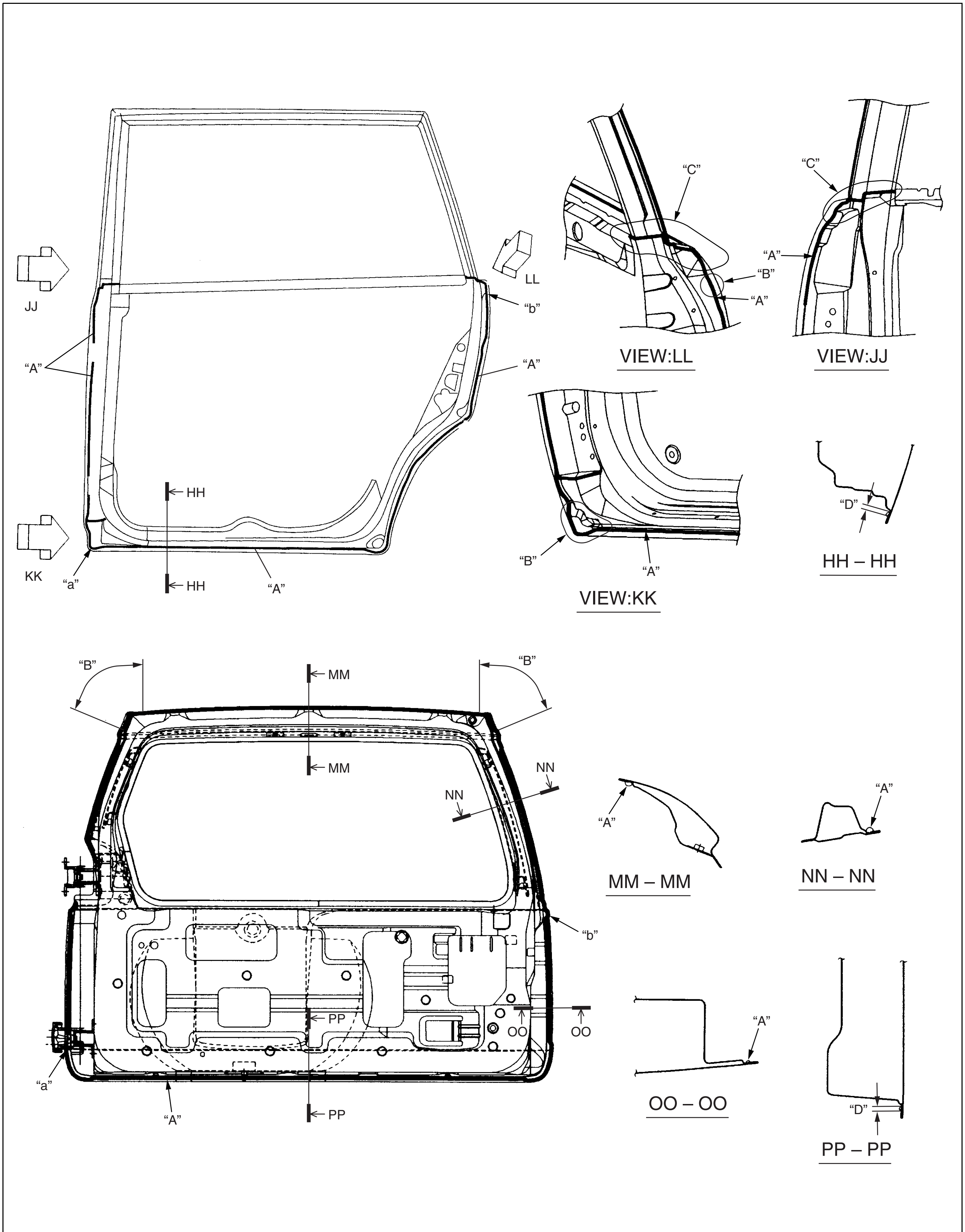
1. Rear quarter inner panel	5. Roof panel	9. Air outlet panel
2. Side body outer panel	6. Front pillar upper reinforcement	"A" : Apply sealant
3. Back pillar outer panel	7. Rear wheel housing panel	"B" : Brush treatment
4. Front pillar inner panel	8. Fuel inlet box	



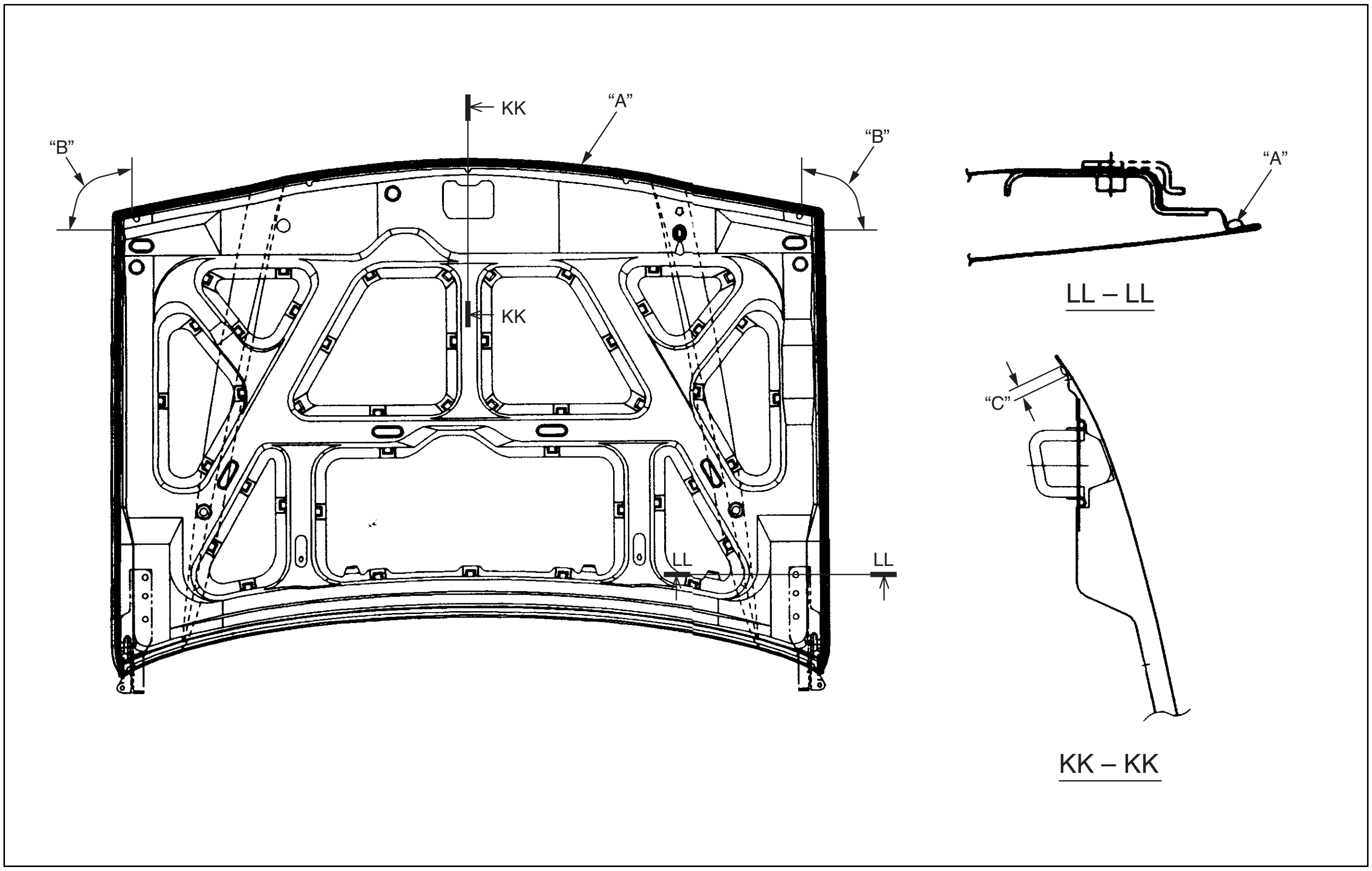
1. Side body outer panel	3. Center floor gusset	"A" : Apply sealant
2. Rear wheel housing outer panel	4. Center floor panel	"B" : Brush treatment



"A" :	Apply sealant
"B" :	Sealant width (more than 5 mm (0.20 in.) between "a" and "b")
"C" :	Wipe off sealant in this section
"D" :	Be free from protrude of sealant outside from this line
"E" :	Smooth out sealant with a brush

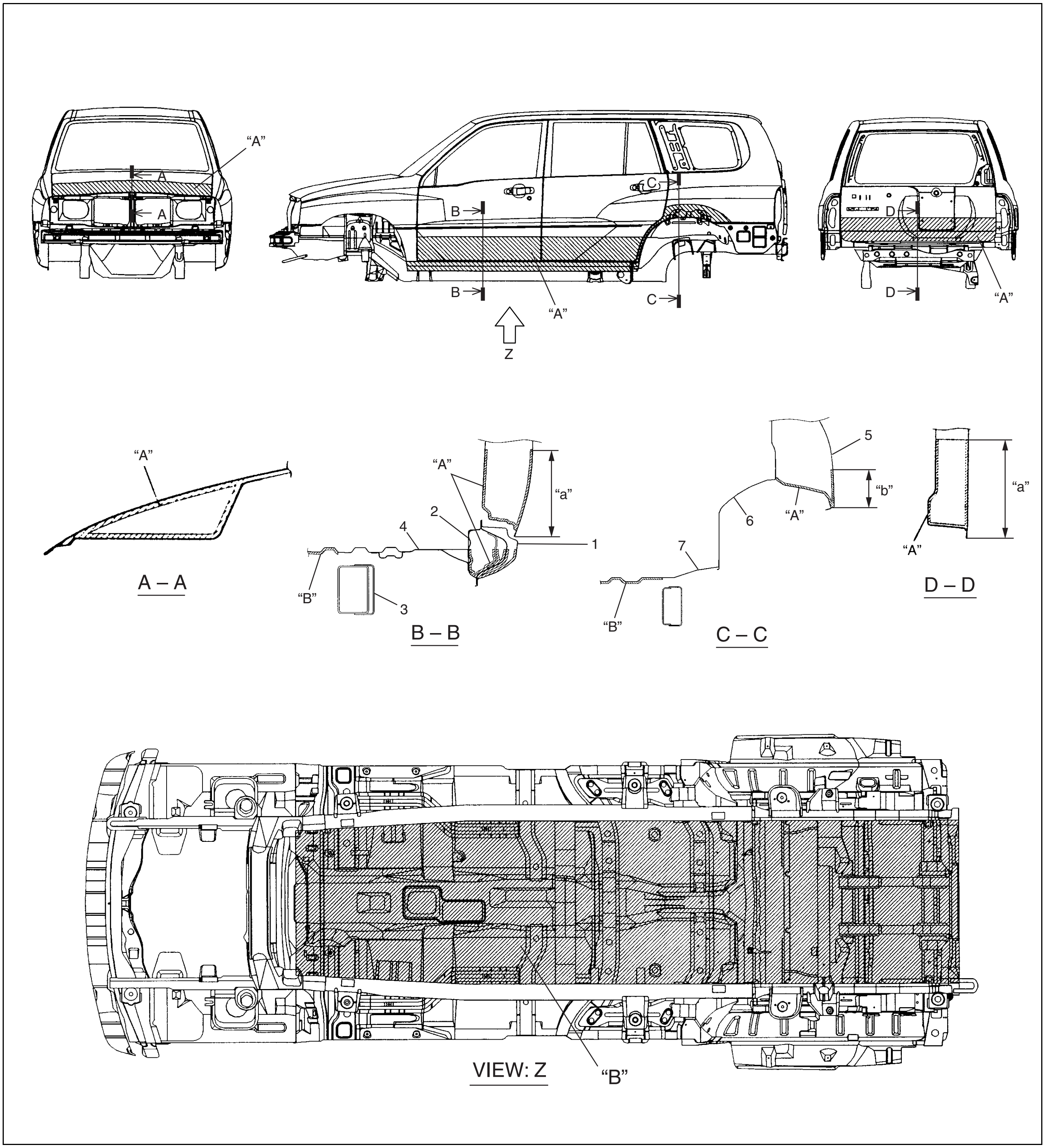


"A" : Apply sealant	"C" : Wipe off sealant in this section
"B" : Smooth out sealant with a brush	"D" : Sealant width (more than 5 mm (0.20 in.) between "a" and "b")

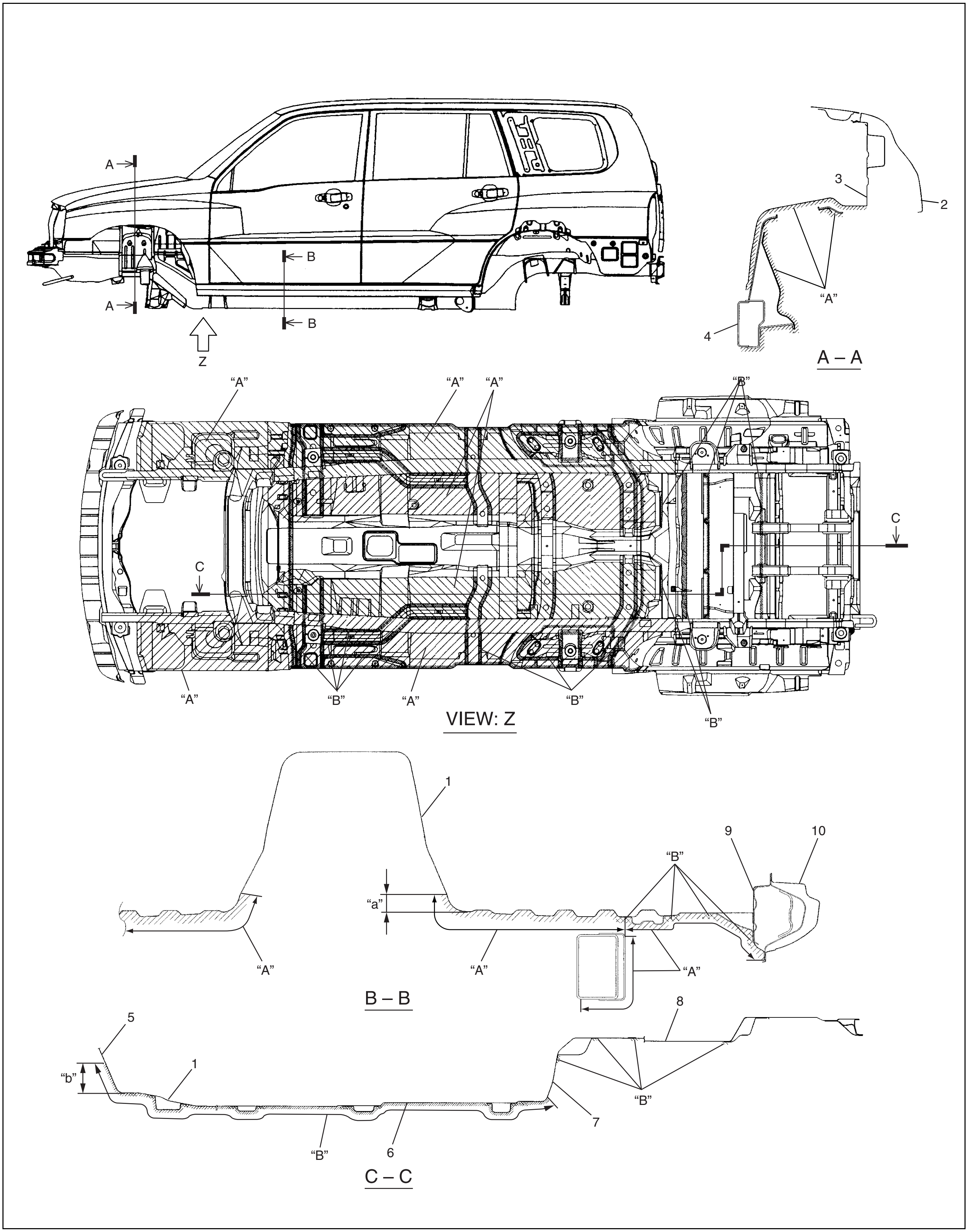


"A" :	Apply sealant
"B" :	Smooth out sealant with a brush
"C" :	Sealant width C more than 5 mm (0.20 in.)

Undercoating/Anti-corrosion Compound Application Area



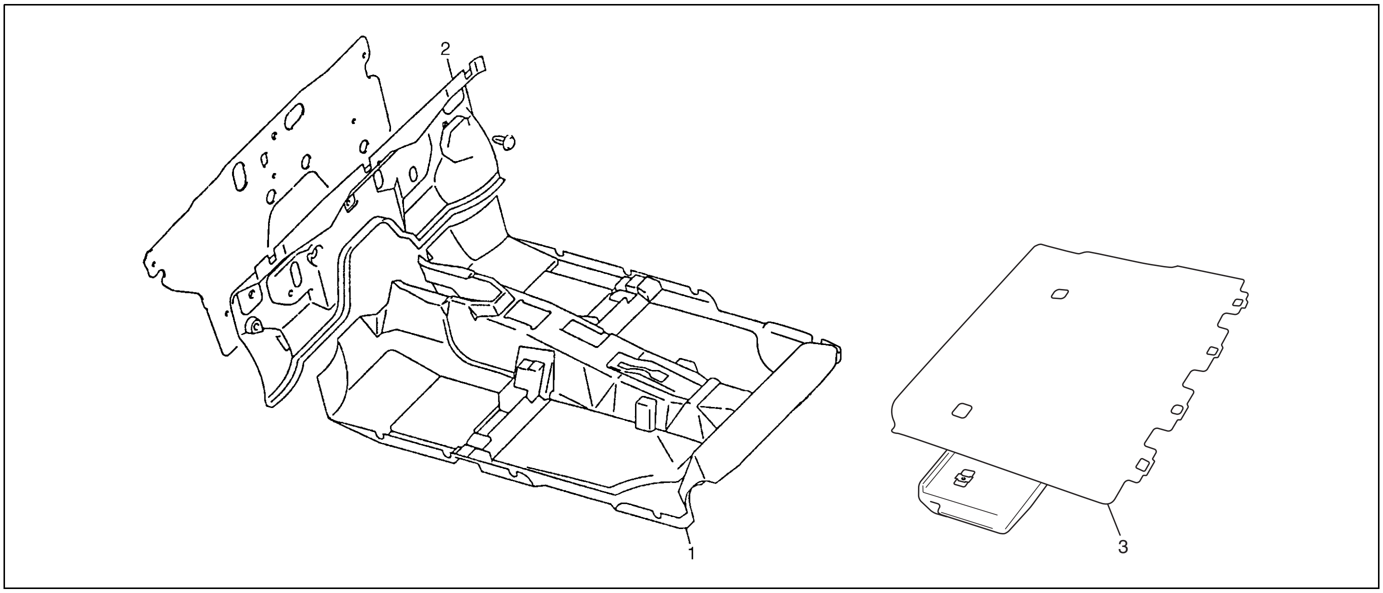
“a” : 200 mm (7.87 in.)	1. Side body outer
“b” : 100 mm (3.94 in.)	2. Side sill inner
“A” : Apply rust proof wax (hot wax 50 μm or more)	3. Frame
“B” : Apply rust proof wax (high viscosity wax 50 μm or more)	4. Main floor
	5. Side body outer
	6. Rear wheel housing
	7. Center floor



"a" : 30 mm (1.18 in.)	1. Main floor	6. Extension floor
"b" : 100 mm (3.94 in.)	2. Front fender	7. Center floor
"A" : Apply undercoating (PVC, 400 µm or more)	3. Front wheel housing	8. Rear floor
"B" : Add undercoating (PCV) to cover edges and mating parts	4. Frame	9. Side sill inner
	5. Dash panel	10. Side sill outer

Exterior and Interior Trim

Floor Carpet

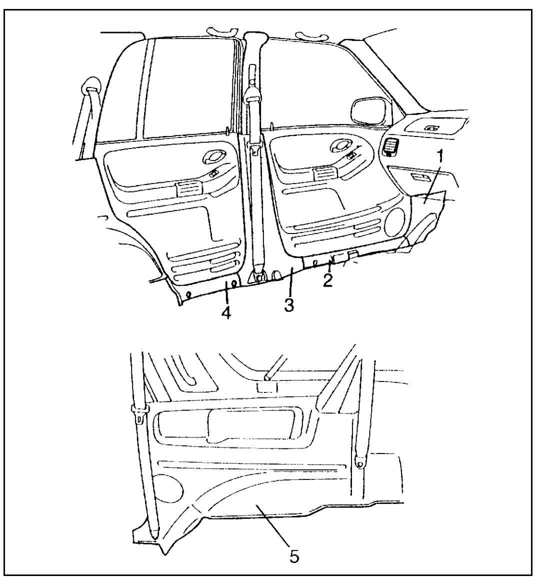


1. Front floor carpet	2. Dash panel insulation	3. Rear floor carpet

Front floor carpet

REMOVAL

1) Remove front and second seats.
2) Remove third seat cushion (if equipped).
3) Remove front and second seat belt lower anchor bolts.
4) Remove dash side trims (1), front side sill scuffs (2), center pillar inner lower trims (3), rear side sill scuffs (4) and rear quarter lower trims (5).



5) Remove parking brake lever cover, console box and console box front extension.
6) Remove front floor carpet.

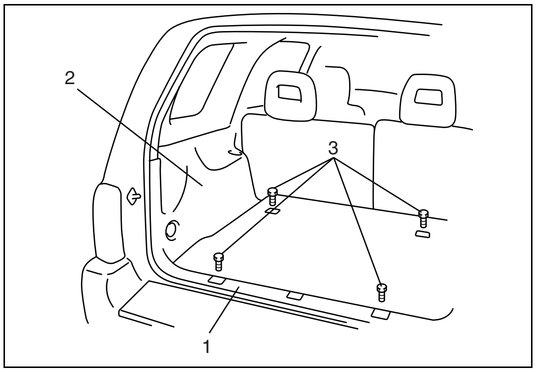
INSTALLATION

Reverse removal sequence to install front floor carpet noting the following point.

- Tighten seat belt anchor bolts as specified torque referring to Section 10A.

Rear floor carpet (without third seat vehicle)

REMOVAL



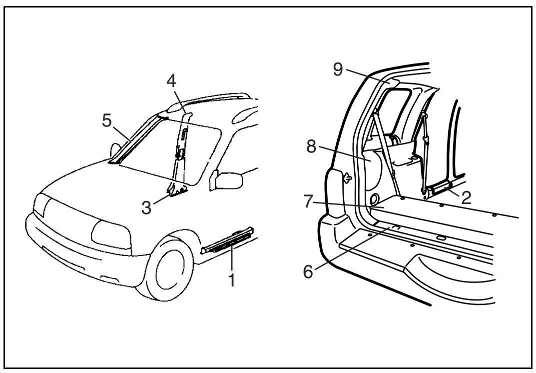
1) Remove rear luggage mat end garnish (1), rear side sill scuff and rear quarter lower trims (2).
2) Remove luggage hook plate nut (3).
3) Remove rear floor carpet.

INSTALLATION

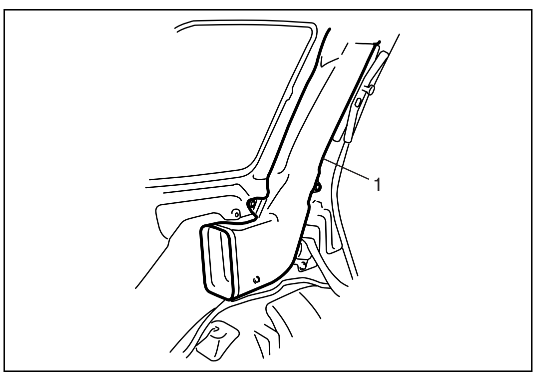
Reverse removal procedure for installation, noting the following.

Head Lining

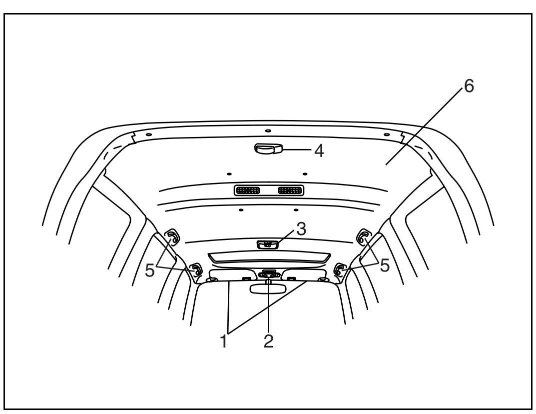
REMOVAL



1) Remove front side sill scuffs (1), rear side sill scuffs (2), center pillar lower trims (3), center pillar upper trims (4), front pillar upper trims (5) rear luggage mat end garnish (6), rear luggage box (7), rear quarter lower trims (8) and rear quarter upper trims (9).



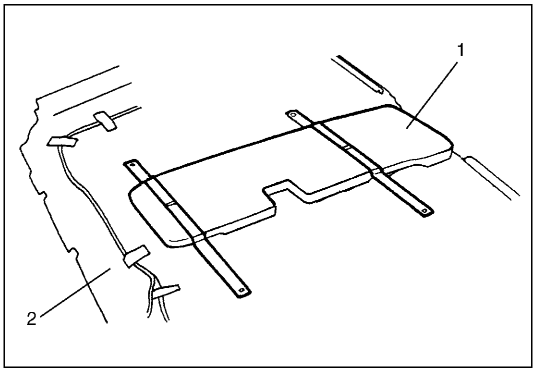
2) Remove rear A/C No.1 duct (1).
3) Remove sliding roof switch and sliding roof trim (if equipped).



4) Remove sun visor assembly (1)
5) Remove map lamp (2), dome lamp (3) and luggage lamp (4).
6) Remove assistant grips (5).
7) Disconnect rear washer hose and roof harness.
8) Remove head lining (6).

NOTE:

For without sunroof model.
Adhesive is used in head lining. Clear adhesive from head lining and roof after removing roof lining.

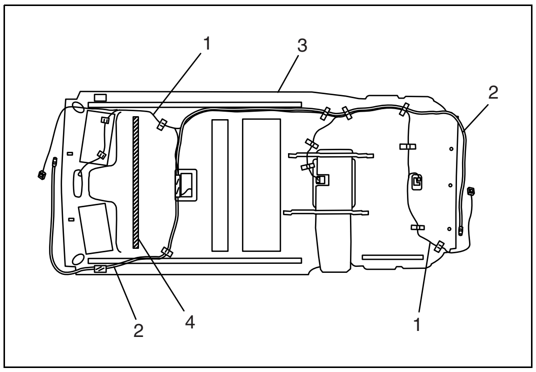


CAUTION:

Do not remove rear A/C No.2 duct (1) from head lining (2). If perform this prohibited service, head lining (2) will be broken.

INSTALLATION

Reverse removal procedure to install head lining noting the following instructions.



- Set roof harness (1) and rear washer hose (2) to head lining (3) with adhesive tape as shown.
- For without sunroof model
  Apply double coated tape (4) to head lining as shown.

- Tighten seat belt anchor bolt as specified torque referring to Section 10A.

SECTION 10

RESTRAINT SYSTEM

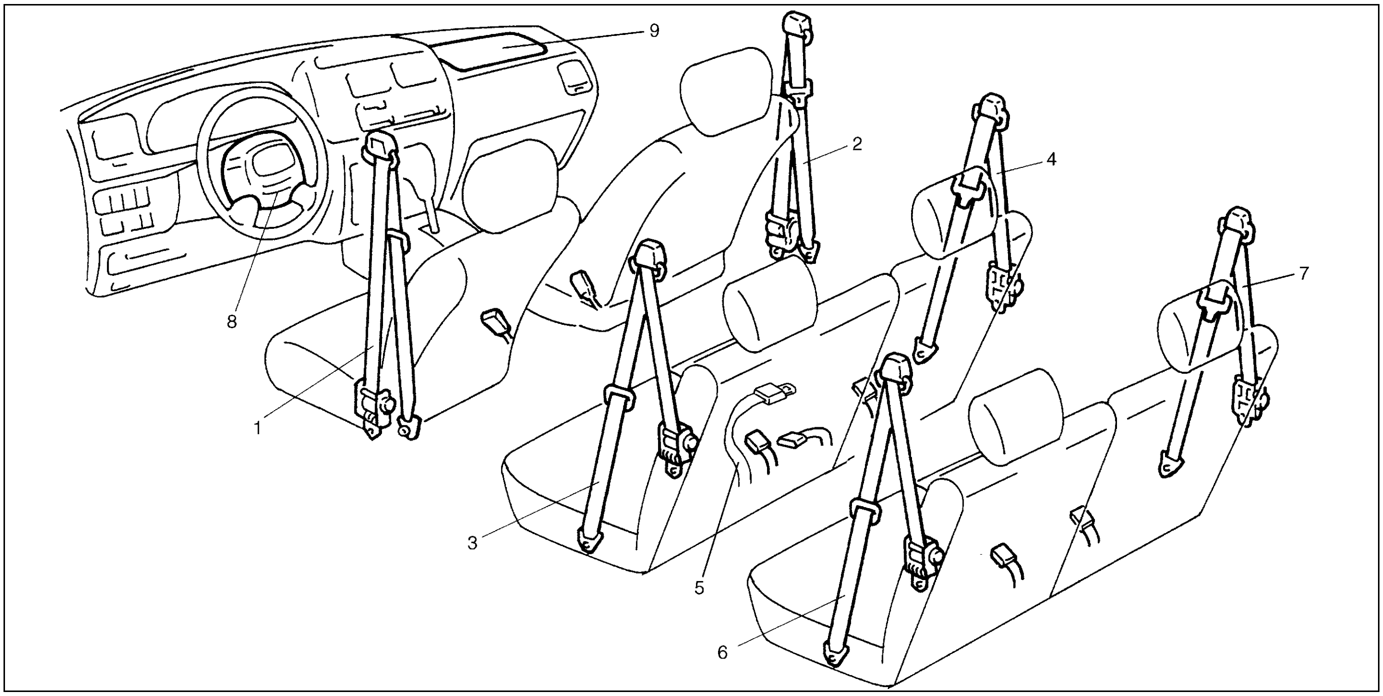
WARNING:

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

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

CONTENTS

General Description



1. Driver side seat belt with ELR and pretensioner (if equipped)	4. Second rear seat belt (RH) with A-ELR	7. Third rear seat belt (RH) with A-ELR (if equipped)
2. Front passenger side seat belt with ELR and pretensioner (if equipped)	5. Second rear seat belt (center) without ELR and A-ELR	8. Driver side air bag
3. Second rear seat belt (LH) with A-ELR	6. Third rear seat belt (LH) with A-ELR (if equipped)	9. Passenger side air bag

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 A-ELR

The automatic and emergency locking retractor (A-ELR) works as an Emergency Locking Retractor (ELR) till its webbing is pulled all the way out and then on as an Automatic Locking Retractor (ALR) till it is retracted fully.

ALR :
Automatically locks when the webbing is pulled out from the retractor and allowed to retract even a little.
Then the webbing can not be pulled out any further, unless it is wound all the way back into the retractor, which releases the lock and allows the webbing to be pulled out.

SEAT BELT WITH PRETENSIONER (IF EQUIPPED)

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

The driver and front passenger side air bags are components of the air bag system. In occurrence of a front collision with an impact larger than a certain set value, they are activated by the ignition signal from SDM to supplement protection offered by the driver and front passenger seat belts.

- the driver air bag (inflator) module is deployed from the center of the steering column
- the passenger air bag (inflator) module from the top of the instrument panel in front of the front passenger seat

For more information, refer to Section 10B “Air Bag System”.

SECTION 10A

SEAT BELT

WARNING:

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

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

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

On-Vehicle Service

Service Precautions

Service and diagnosis

WARNING:

If replacing seat belt is necessary, replace buckle and ELR (or webbing) together as a set. This is for the reason of ensuring locking of tongue plate with buckle. If these parts are replaced individually, such a locking condition may become unreliable. For this reason, SUZUKI will supply only the spare buckle and ELR (or webbing) in a set part.

Before servicing or replacing seat belts, refer to following precautionary items.

- Seat belts should be normal relative to strap retractor and buckle portions.
- Keep sharp edges and damaging objects away from belts. Avoid bending or damaging any portion of belt buckle, latch plate and ELR.
- Do not bleach or dye belt webbing. (Use only mild soap and lukewarm water to clean it.)
- When installing a seat belt anchor bolt, start bolt by hand to prevent cross-threading.
- Use only the correct seat belt anchor bolts and screws and tighten to the correct torque value.
- 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

Refer to “SERVICE AND DIAGNOSIS” of “SERVICE PRECAUTIONS” under “ON-VEHICLE SERVICE” in Section 10B.

WARNING:

When performing service on or around air bag system components or air bag system wiring, disable the air bag system. Refer to “DISABLING AIR BAG SYSTEM” of “SERVICE PRECAUTIONS” under “ON-VEHICLE SERVICE” in Section 10B.
Failure to follow procedures could result in possible air bag activation, personal injury or unneeded air bag system repairs.

Disabling air bag system

Refer to “DISABLING AIR BAG SYSTEM” of “SERVICE PRECAUTIONS” under “ON-VEHICLE SERVICE” in Section 10B.

Enabling air bag system

Refer to “ENABLING AIR BAG SYSTEM” of “SERVICE PRECAUTIONS” under “ON-VEHICLE SERVICE” in Section 10B.

Handling and storage

Refer to “HANDLING AND STORAGE” of “SERVICE PRECAUTIONS” under “ON-VEHICLE SERVICE” in Section 10B.

Disposal

Refer to “DISPOSAL” of “SERVICE PRECAUTIONS” under “ON-VEHICLE SERVICE” in Section 10B.

Front Seat Belt

INSPECTION ON VEHICLE

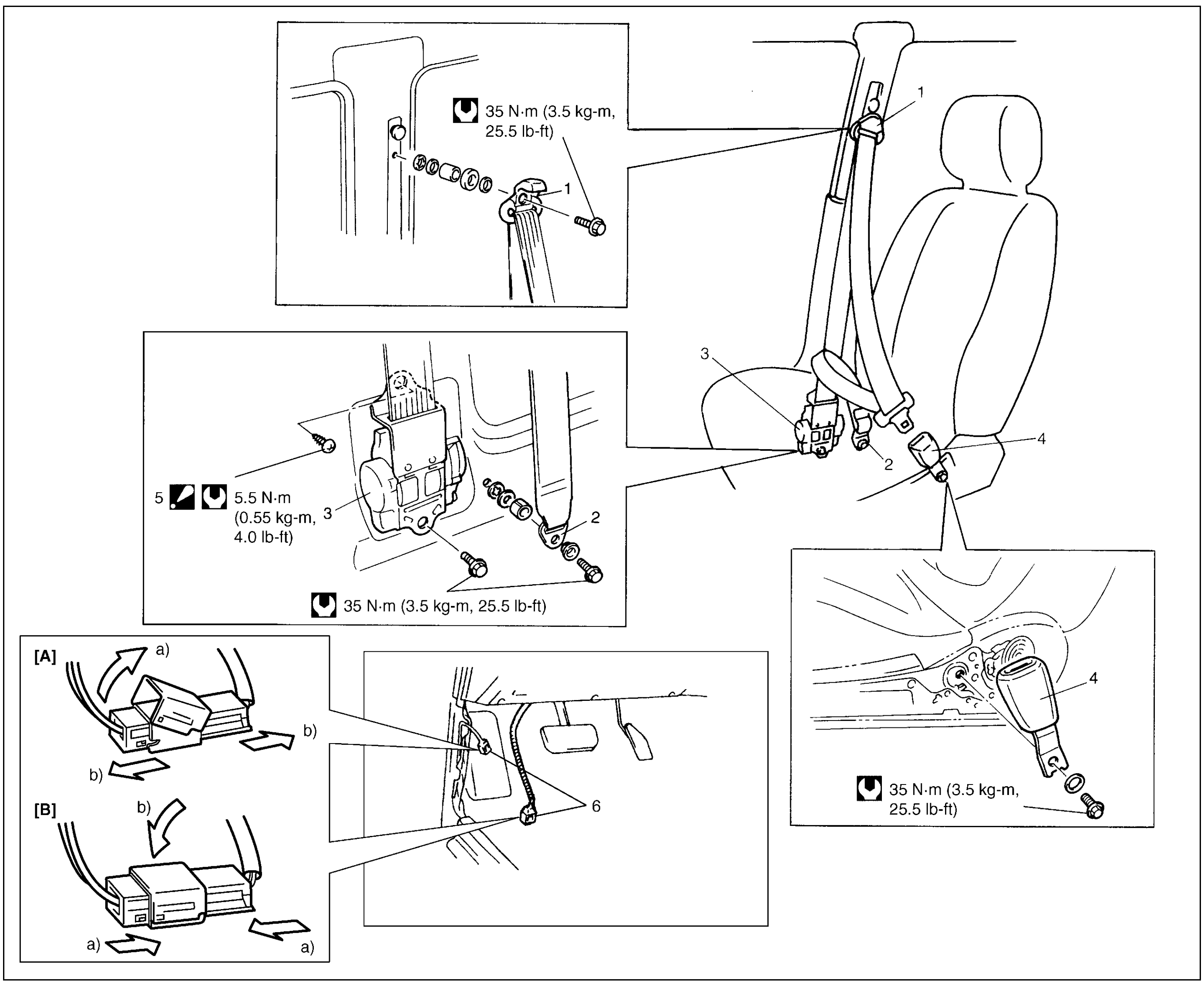
Seat belts with ALR

As to seat belts with ALR (other than driver side seat belt), check them as follows in addition to above check.

- With vehicle at stop, pull seat belt all the way out, let it retract a little and try to pull it. It should not be pulled out, that is, it should be locked where retracted.
- Let seat belt retract to its original state. Next, pull it half way out, let it retract a little and try to pull it again. It should be pulled out smoothly, that is it should not be locked at this time.

WARNING:

- **Never attempt to disassemble or repair the seat belt pretensioner (retractor assembly). If any abnormality is found, be sure to replace it with new one as an assembly.**
- **Be sure to read "SERVICE PRECAUTIONS", before starting to work and observe every precaution during work. Neglecting them may result in personal injury or unactivation of the seat belt pretensioner, if necessary.**

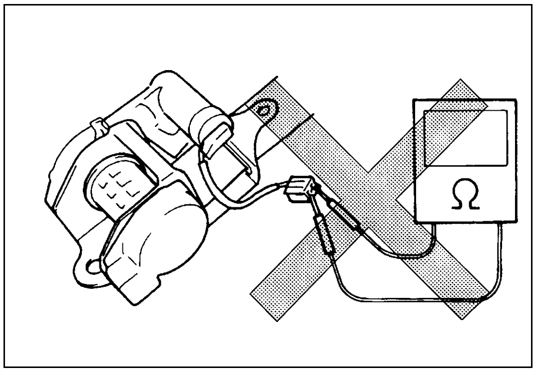


1. Upper anchor	4. Buckle	Tightening Torque
2. Lower anchor	5. Retractor assembly upper mounting bolt : After tightening lower bolt, tightening upper bolt	[A] Removal
3. Retractor assembly	6. Yellow connector for seat belt pretensioner (if equipped)	[B] Installation

REMOVAL

1) Disconnect negative cable at battery.
2) Disable air bag system referring to “DISABLING AIR BAG SYSTEM” of “SERVICE PRECAUTIONS” under “ON-VEHICLE SERVICE” in Section 10B, if necessary.
3) Remove front pillar lower trim.
4) Disconnect Yellow connector for seat belt pretensioner, if necessary.
   a) Release locking of lock lever.
   b) After unlocking, disconnect to connector.
5) Remove front seat belts from the vehicle.

INSPECTION



WARNING:
Never measure resistance of pretensioner or disassemble it. Otherwise, personal injury may result.

CAUTION:
If seat belt pretensioner (retractor assembly) was dropped from a height of 30 cm (1 ft) or more, it should be replaced.

Seat belts and attaching parts can affect the vital components and systems of a vehicle. Therefore, they should be inspected carefully and replaced with genuine parts only.

Seat belt

- The seat belt webbing or strap should be free from damage.
- Fully extend the seat belt to make sure there are no twists or tears in it.

Retractor assembly

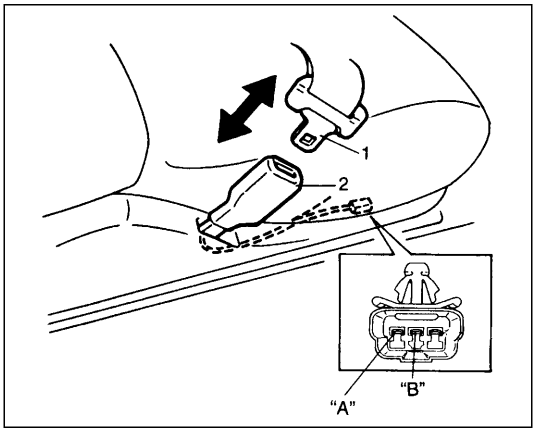
1) Let the seat belt retract fully to confirm its easy retraction.
   - The retractor assembly should lock webbing when pulled quickly.
   - The retractor assembly should lock webbing even when tilted (approx. 15°) toward the fore and aft or right and left directions.
2) Check retractor assembly with 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 damage.
   - Seat belt pretensioner (retractor assembly) is damaged or a strong impact (e.g., dropping) was applied to it.

Anchor bolt

- Inspect all seat belt anchor bolts to verify that they are secure.
- All anchor bolts should be secure and torqued to specification.

Belt latch

- Belt latch should be secure when latched.
- Inspect the seat belt buckle, ensuring that it locks and unlocks easily.
- After buckling the seat belt, tug sharply on the belt, checking that the buckle remains locked.



Seat belt switch

Check driver side seat belt strap switch for continuity by using ohmmeter.

Seat belt strap switch specification
Without inserted buckle tongue to buckle catch:
Terminal "A" and "B" : Continuity
With inserted buckle tongue to buckle catch:
Terminal "A" and "B" : No continuity (∞Ω)

1. Buckle tongue
2. Buckle catch

INSTALLATION

Install in reverse order of removal, noting the followings.

- 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.
- Connect Yellow connector for seat belt pretensioner securely and fit seat belt pretensioner connector onto front pillar lower panel, if necessary.

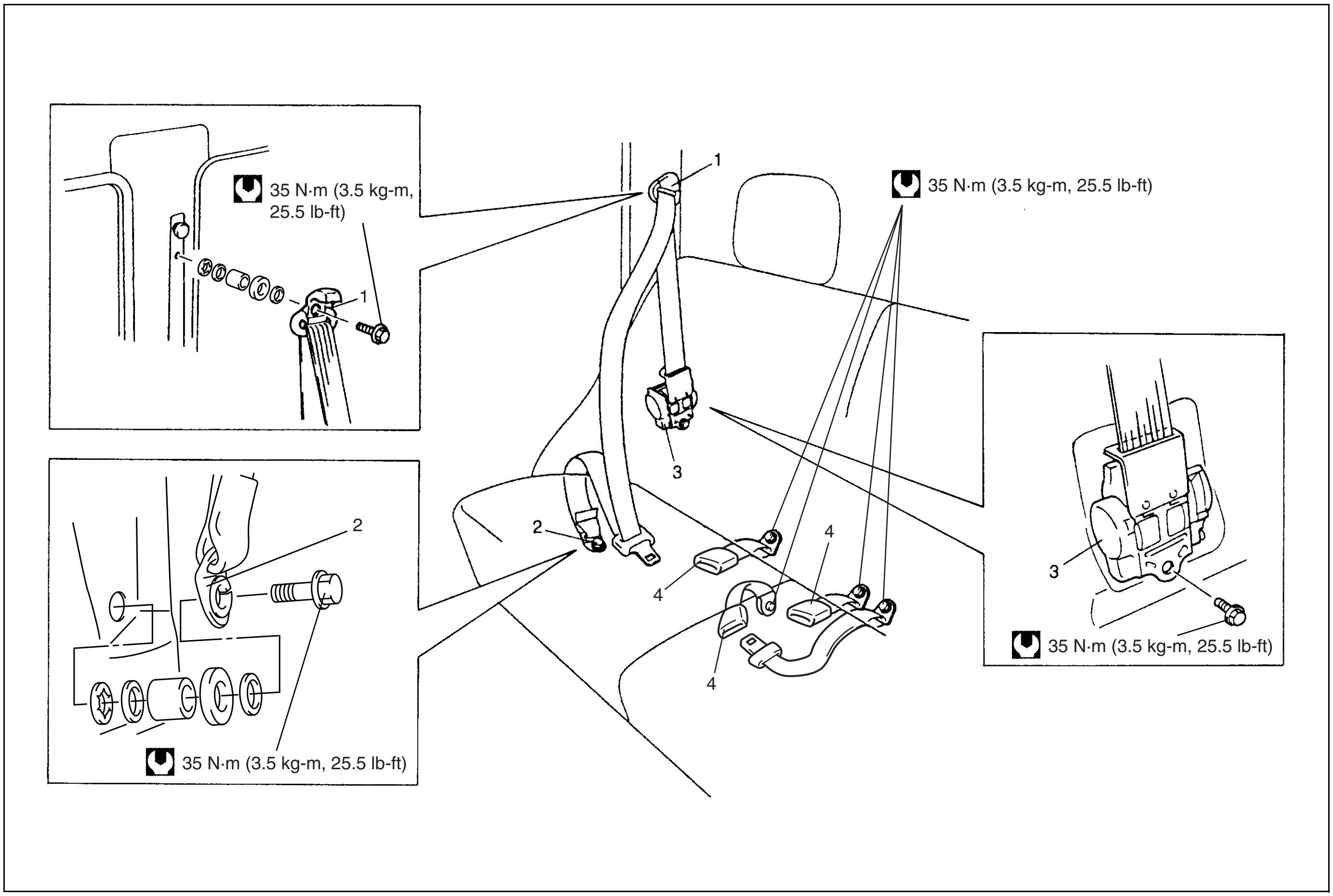
a) Connect connector

b) Lock connector with lock lever

- Enable air bag system referring to "ENABLING AIR BAG SYSTEM" under "SERVICE PRECAUTIONS" in Section 10B, if necessary.

Second Rear Seat Belt

> **WARNING:**
> **Be sure to read "SERVICE PRECAUTIONS" in this section before starting to work and observe every precaution during work.**



1. Upper anchor	4. Buckle
2. Lower anchor	Tightening Torque
3. Retractor assembly	

REMOVAL

Refer to the figure above to remove rear seat belts.

INSPECTION

Check second rear seat belt in the same way as when inspecting front seat belt except pretesioner inspection. (Refer to "FRONT SEAT BELT" in this section.)

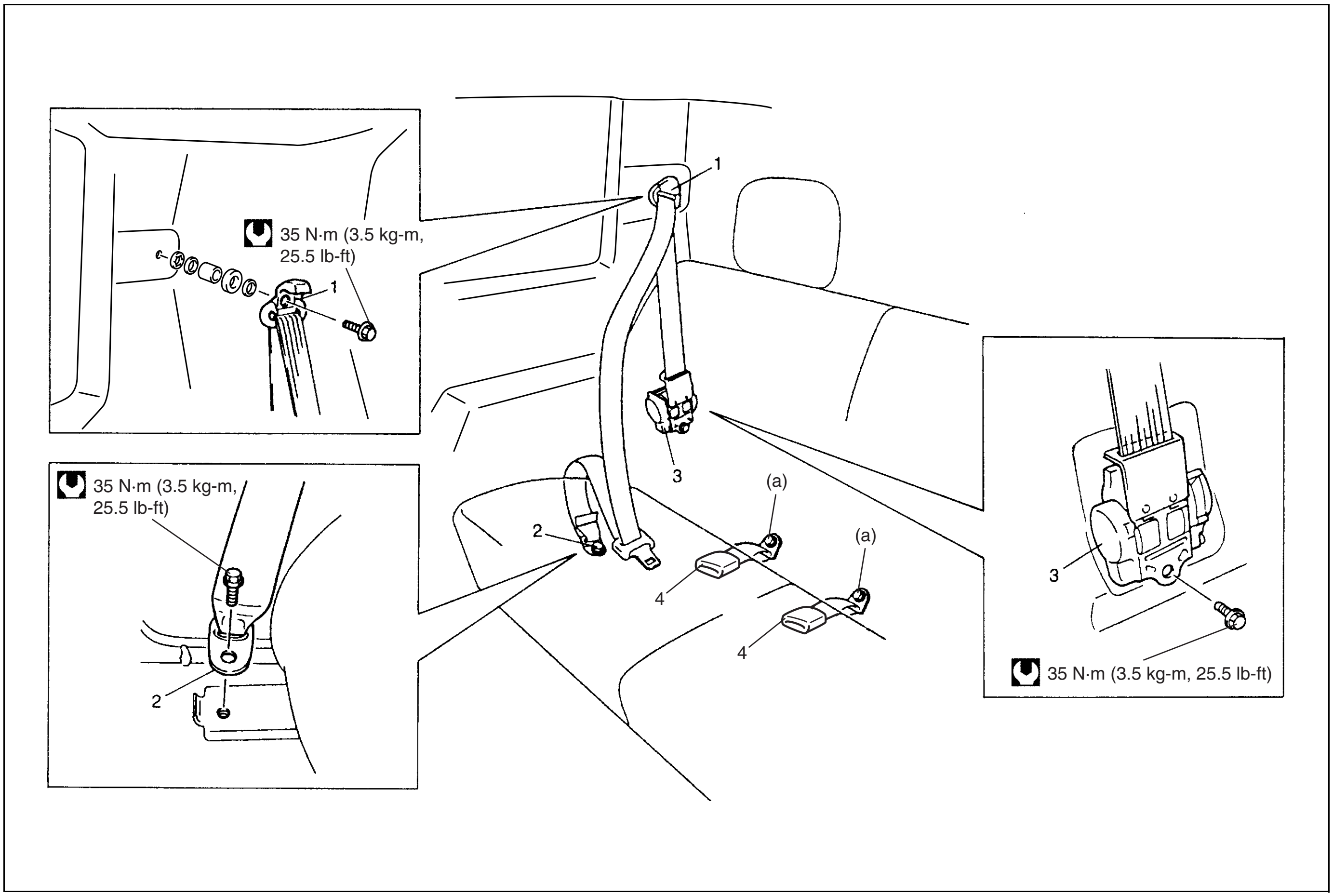
INSTALLATION

Install in reverse order of removal, noting the followings.

- 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.

Third Rear Seat Belt (If Equipped)

WARNING:
Be sure to read "SERVICE PRECAUTIONS" in this section before starting to work and observe every precaution during work.



1. Upper anchor	4. Buckle
2. Lower anchor	Tightening Torque
3. Retractor assembly	

REMOVAL

Refer to the figure above to remove rear seat belts.

INSPECTION

Check third rear seat belt in the same way as when inspecting second rear seat belt. (Refer to "SECOND REAR SEAT BELT" in this section.)

INSTALLATION

Install in reverse order of removal, noting the followings.

- 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.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Upper and lower anchor bolt	35	3.5	25.5
Retractor assembly bolt	35	3.5	25.5
Retractor assembly screw	5.5	0.55	4.0
Buckle bolt	35	3.5	25.5

SECTION 10B

AIR BAG SYSTEM

WARNING:

- **Service on or around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Please observe all WARNINGS and "Service Precautions" under "On-Vehicle Service" in this section before performing service on or around the air bag system components or wiring. Failure to follow WARNINGS could result in unintended activation of the system or could render the system inoperative. Either of these two conditions may result in severe injury.**
- **The procedures in this section must be followed in the order listed to disable the air bag system temporarily and prevent false diagnostic trouble codes from setting. Failure to follow procedures could result in possible activation of the air bag system, personal injury or otherwise unneeded air bag system repairs.**

CAUTION:

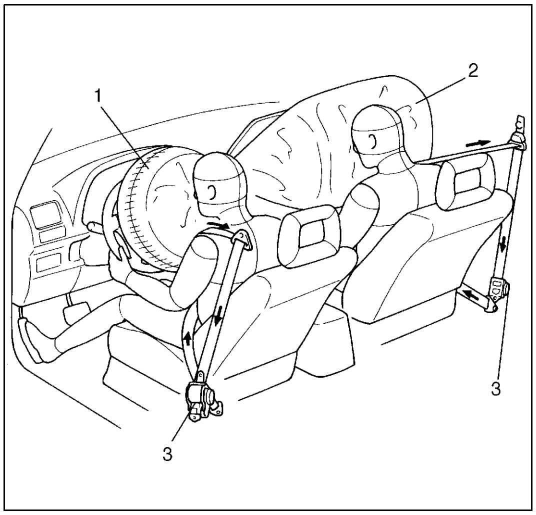
When fasteners are removed, always reinstall them at the same location from which they were removed. If a fastener needs to be replaced, use the correct part number fastener for that application. If the correct part number fastener is not available, a fastener of equal size and strength (or stronger) may be used. Fasteners that are not reused, and those requiring thread-locking compound, will be called out. The correct torque value must be used when installing fasteners that require it. If the above conditions are not followed, parts or system damage could result.

NOTE:

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

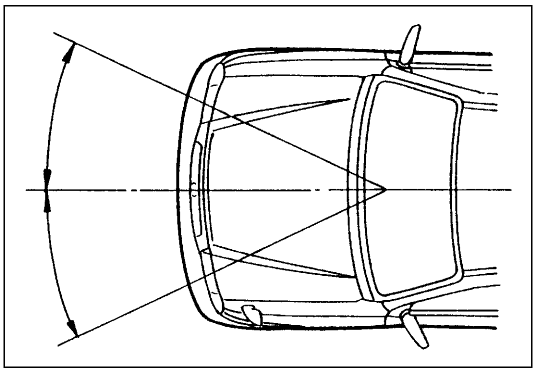
CONTENTS

General Description



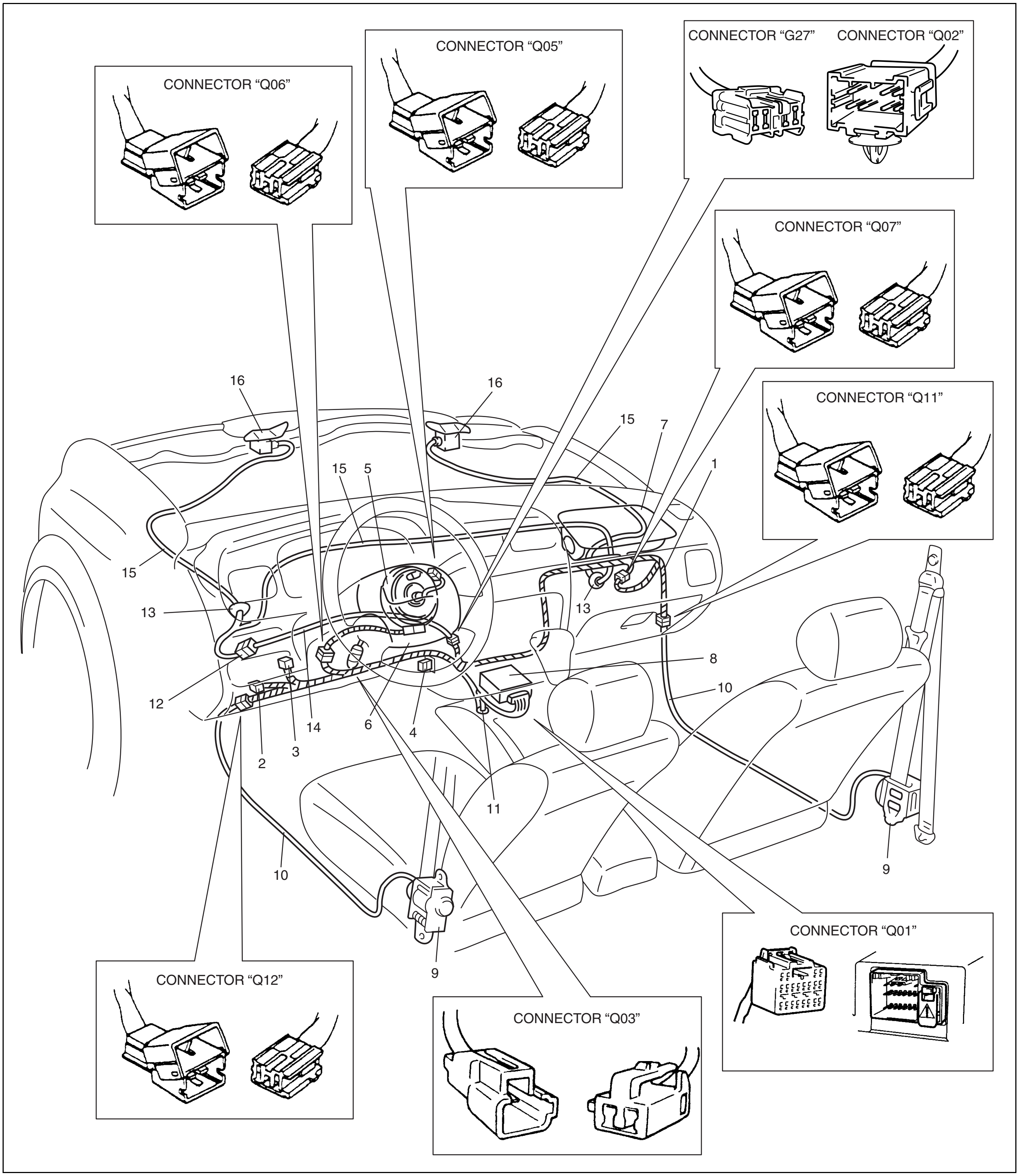
With the air bag system which includes air bags for both the driver's and passenger's sides as well as the seat belt pretensioners (if equipped), the sag of the seat belt is taken up (for seat belt with pretensioner), the driver air bag (inflator) module is deployed from the center of the steering column 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.

1.	Driver side air bag
2.	Passenger side air bag
3.	Seat belt pretensioner (if equipped)



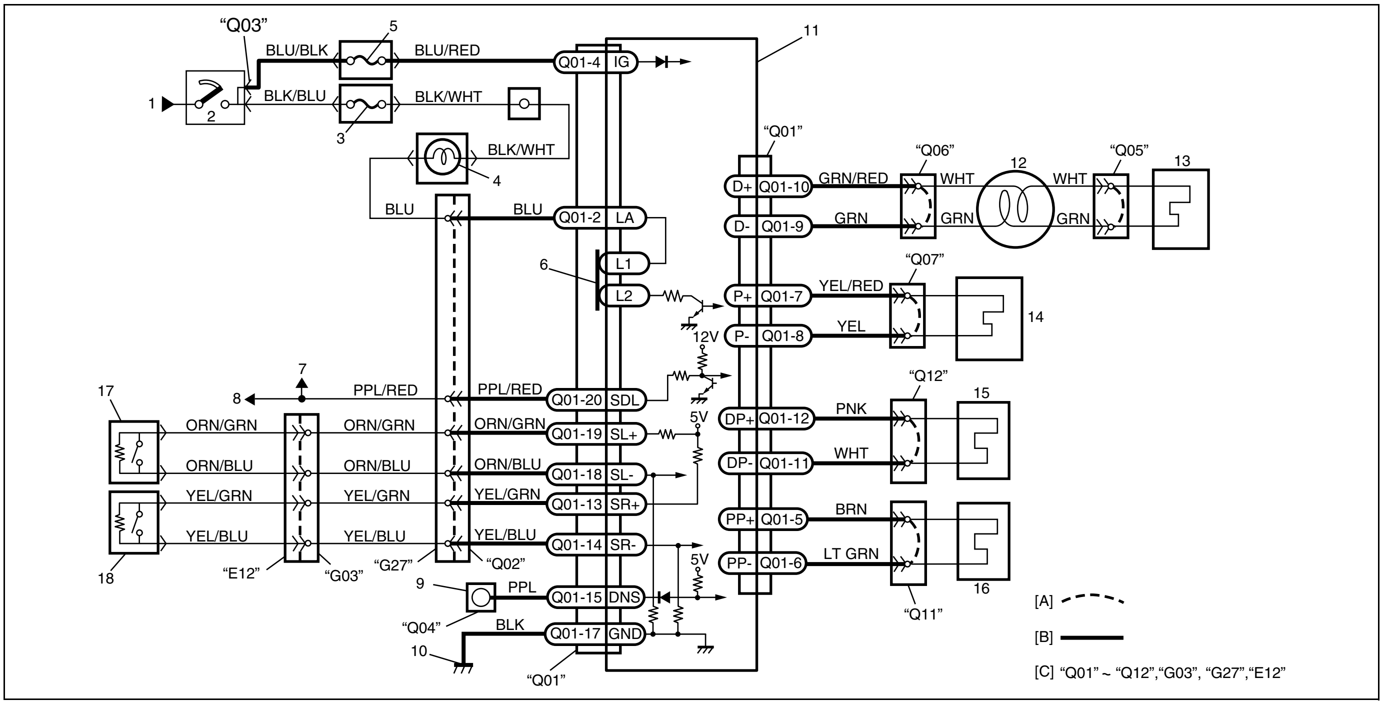
The air bag system is designed to activate only in severe frontal collisions. It is not designed to activate in rear impacts, side impacts, rollovers, or minor frontal collisions, since it would offer no protection in those types of accidents.

System Components and Wiring Location View and Connectors



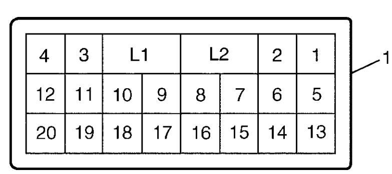
1. Air bag harness	7. Passenger air bag (inflator) module	13. Grommet
2. "AIR BAG" fuse box	8. SDM	14. Instrument panel harness
3. "AIR BAG" monitor coupler	9. Seat belt pretensioner (retractor assembly) (if equipped)	15. Main harness
4. DLC	10. Pretensioner harness	16. Forward sensor
5. Contact coil assembly	11. Ground for air bag system	
6. Driver air bag (inflator) module	12. Connector "G03", "E12"	

System Wiring Diagram



[A]: Shorting bar	6. Connection detection pin	14. Passenger air bag (inflator) module
[B]: Air bag harness	7. To ECM, TCM (if equipped) and ABS control module (if equipped)	15. Driver seat belt pretensioner (if equipped)
[C]: Connector	8. To data link connector (DLC)	16. Passenger seat belt pretensioner (if equipped)
1. From main fuse	9. "AIR BAG" monitor coupler	17. LH Forward sensor
2. Ignition switch	10. Ground for air bag system	18. RH Forward sensor
3. "IG METER" fuse	11. SDM	19. To seat belt switch
4. "AIR BAG" warning lamp in combination meter	12. Contact coil assembly	
5. "AIR BAG" fuse	13. Driver air bag (inflator) module	

TERMINAL ARRANGEMENT OF SDM (VIEWED FROM HARNESS SIDE)



1. CONNECTOR "Q01" (SDM CONNECTOR)

CONNECTOR "Q01" (SDM connector)

TERMINAL	CIRCUIT		TERMINAL	CIRCUIT	
Q01-1	–		Q01-11	Driver pretensioner (if equipped)	Low
Q01-2	"AIR BAG" warning lamp		Q01-12		High
Q01-3	–		Q01-13	RH Forward sensor	High
Q01-4	Ignition switch (power source)		Q01-14		Low
Q01-5	Passenger pretensioner (if equipped)	High	Q01-15	Diagnosis switch	
Q01-6		Low	Q01-16	–	
Q01-7	Passenger air bag (inflator) module	High	Q01-17	Ground	
Q01-8		Low	Q01-18	LH Forward sensor	Low
Q01-9	Driver air bag (inflator) module	Low	Q01-19		High
Q01-10		High	Q01-20	Data link connector (DLC)	

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.

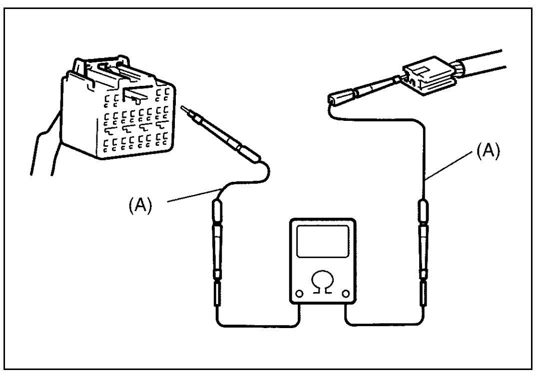
Diagnostic Trouble Code (DTC)

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 (DTCs) using on-board diagnosis function or SUZUKI scan tool.

Use of Special Tool

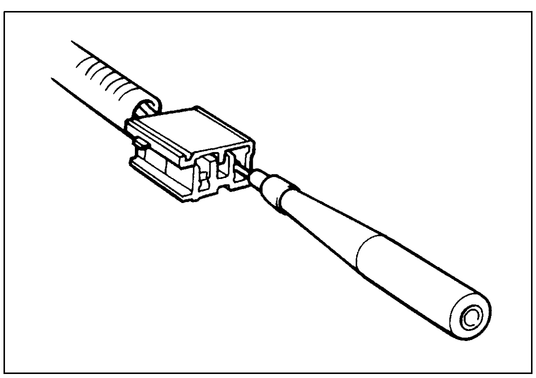
WARNING:
To avoid deployment when troubleshooting the air bag system, do not use electrical test equipment such as a battery powered or AC powered voltmeter, ohmmeter, etc., or any type of electrical equipment other than that specified in this manual. Do not use a non-powered probe type tester. Instructions in this manual must be followed carefully, otherwise personal injury may result.

You should be familiar with the tools listed in 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 Air Bag Driver/Passenger Load Tool, Connector Test Adapter Kit and the Digital Multimeter.

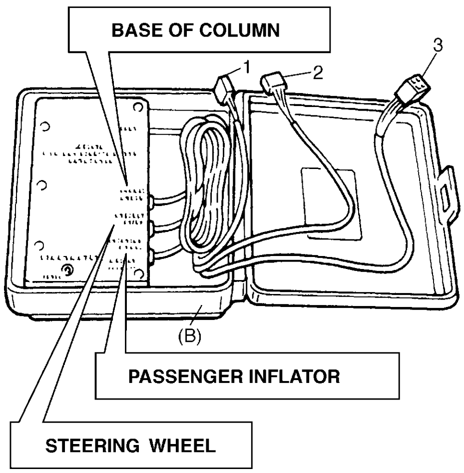


Special tool
(A) : 09932-75020 (Connector Test Adapter Kit)

This must be used whenever a diagnostic procedure requests checking or probing a terminal.
Using the appropriate adapter in the special tool will ensure that no damage to the terminal will occur from the multimeter probe, such as spreading or bending.



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
(B) : 09932-75010 (Air Bag Driver/Passenger Load Tool)

This tool is used only when called for in this section. It is used as a diagnostic aid and safety device to prevent inadvertent air bag (inflator) module deployment.
The load tool has three connectors attached to its case which 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.
- Each of driver and passenger seat belt pretensioners when it is connected to air bag harness connector for driver and passenger seat belt pretensioner (if equipped).

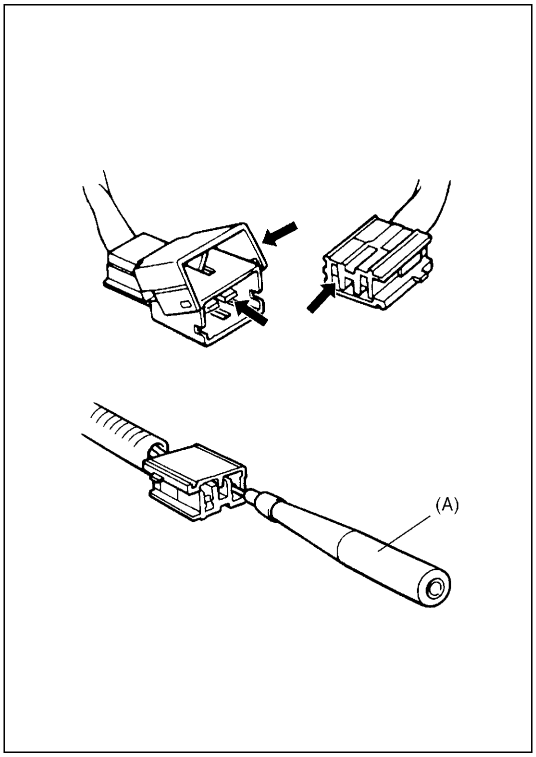
Another connector ("BASE OF COLUMN") is used to substitute the load of the driver air bag (inflator) module and the contact coil assembly when it is connected at the base of the column to the air bag wire harness.
The third connector ("PASSENGER INFLATOR") is not used.

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.

1.	Connector for contact coil and driver air bag (inflator) module (Located near the base of the steering column)
2.	Connector for driver, passenger air bag (inflator) module and driver and passenger seat belt pretensioners
3.	Not used

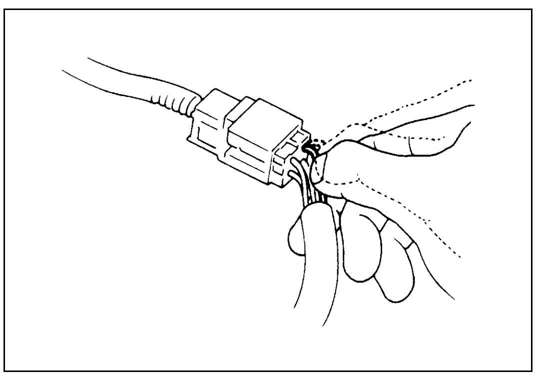
Intermittents and Poor Connections

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:

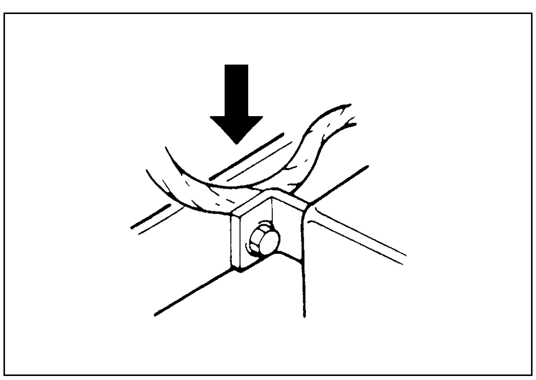


- Poor mating of connector halves, or terminals not fully seated in the connector body (backed out).
- Dirt or corrosion on the terminals. The terminals must be clean and free of any foreign material which could impede proper terminal contact.
  However, cleaning the terminal with a sand paper or the 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
(A) : 09932-75020 (Connector Test Adapter Kit)



- 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.
- Wire 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.

1) 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 diagnosis.
   The AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE checks for proper "AIR BAG" warning lamp operation through "AIR BAG" warning lamp and whether air bag diagnostic trouble codes exist.)
2) Refer to the proper diagnostic table as directed by the AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE.
   (The AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE will lead you to the correct table to diagnose any air bag system malfunctions. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis and incorrect parts replacement.)
3) Repeat the AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE after any repair or diagnostic procedures have been performed.
   (Performing the AIR BAG DIAGNOSTIC SYSTEM CHECK FLOW TABLE after all repair or diagnostic procedures will ensure that the repair has been made correctly and that no other malfunctions exist.)

FLOW TABLE TEST DESCRIPTION

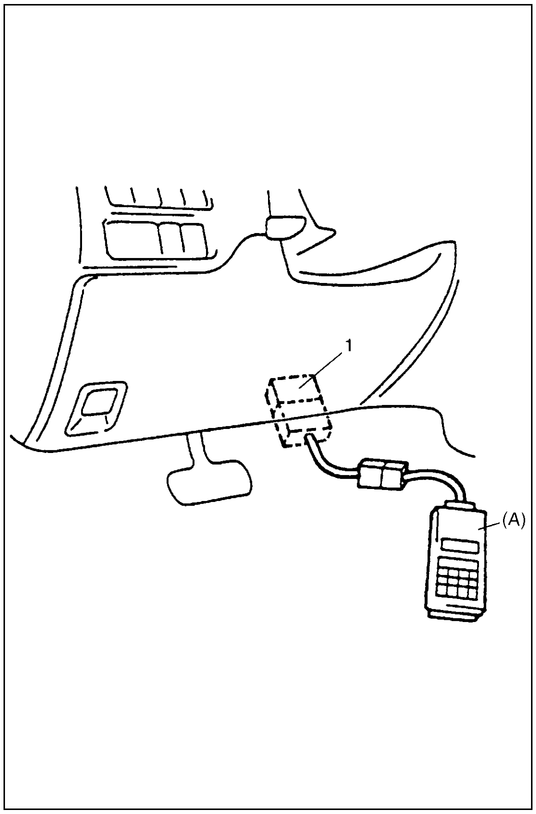
STEP 1 : Check that "AIR BAG" warning lamp lights.
STEP 2 : Check that "AIR BAG" warning lamp lights.
STEP 3 : Check diagnosis switch circuit.
STEP 4 : Check that "AIR BAG" warning lamp flashes 6 times after ignition switch is turned ON.
STEP 6 : Check that history codes are in SDM memory. (using SUZUKI scan tool)
STEP 7 : Check that history codes are in SDM memory. (using monitor coupler)
STEP 9 : Check that current code is in SDM memory. (using SUZUKI scan tool)
STEP 10 : Check that current code is in SDM memory. (using monitor coupler)

Air Bag Diagnostic System Check Flow Table

Step	Action	Yes	No
1	1) Make sure that battery voltage is about 11V or higher. 2) Note “AIR BAG” warning lamp as ignition switch is tuned ON. Does “AIR BAG” warning lamp come ON when ignition switch is tuned ON?	Go to step 2.	Proceed to Diagnostic Flow Table B (“AIR BAG” warning lamp circuit check).
2	Does “AIR BAG” warning lamp come ON steady?	Proceed to Diagnostic Flow Table A (“AIR BAG” warning lamp circuit check).	Go to step 3.
3	Does “AIR BAG” warning lamp keep flashing (indicating DTC) when ignition switch is ON?	Proceed to Diagnostic Flow Table C (“AIR BAG” warning lamp circuit check).	Go to step 4.
4	Does “AIR BAG” warning lamp turn OFF, after flashing 6 times?	Go to step 5.	Go to step 8.
5	Do you have SUZUKI scan tool?	Go to step 6.	Go to step 7.
6	1) Check DTC using SUZUKI scan tool. Refer to DTC CHECK. Is “NO CODES” displayed on SUZUKI scan tool?	Air bag system is in good condition.	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 DTC CLEARANCE.) and repeat this table.
7	1) Check DTC using monitor coupler. Refer to DTC CHECK. Is flashing pattern no. 12 indicated on “AIR BAG” warning lamp?	Air bag system is in good condition.	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 DTC CLEARANCE.) and repeat this table.
8	Do you have SUZUKI scan tool?	Go to step 9.	Go to step 10.
9	1) Check DTC using SUZUKI scan tool. Refer to DTC CHECK. Is “NO CODES” displayed on SUZUKI scan tool?	Substitute a known-good SDM and recheck.	Check and repair according to Flow Table corresponding to that DTC.
10	1) Check DTC using monitor coupler. Refer to DTC CHECK. Is flashing pattern no. 12 indicated on “AIR BAG” warning lamp?	Substitute a known-good SDM and recheck.	Check and repair according to Flow Table corresponding to that DTC.

DTC Check

Using SUZUKI scan tool



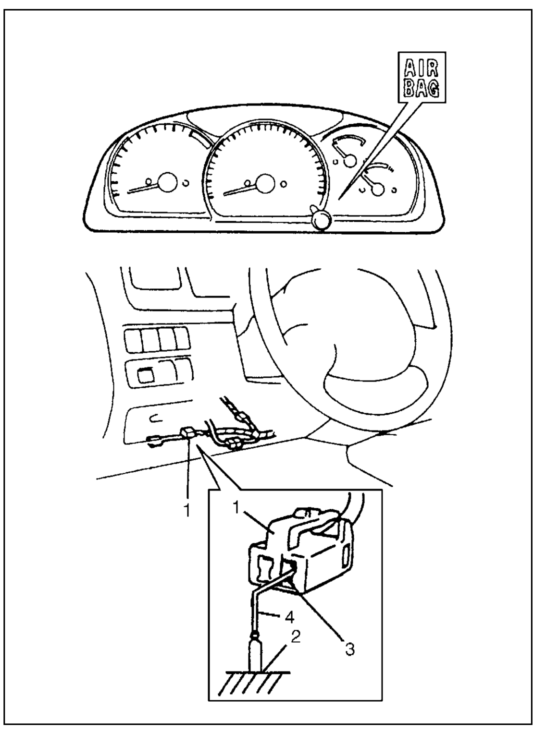
1) Turn ignition switch to OFF position.
2) After setting cartridge to SUZUKI scan tool, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

Special tool
(A) : SUZUKI scan tool

3) Turn ignition switch to ON position.
4) Read DTC according to instructions displayed on SUZUKI scan tool and print it or write it down. Refer to SUZUKI scan tool operator's manual for further details.
   If communication between scan tool and SDM is not possible, proceed to Diagnostic Flow Table E (Serial data check circuit).
5) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from data link connector (DLC).

1. Data link connector (DLC)

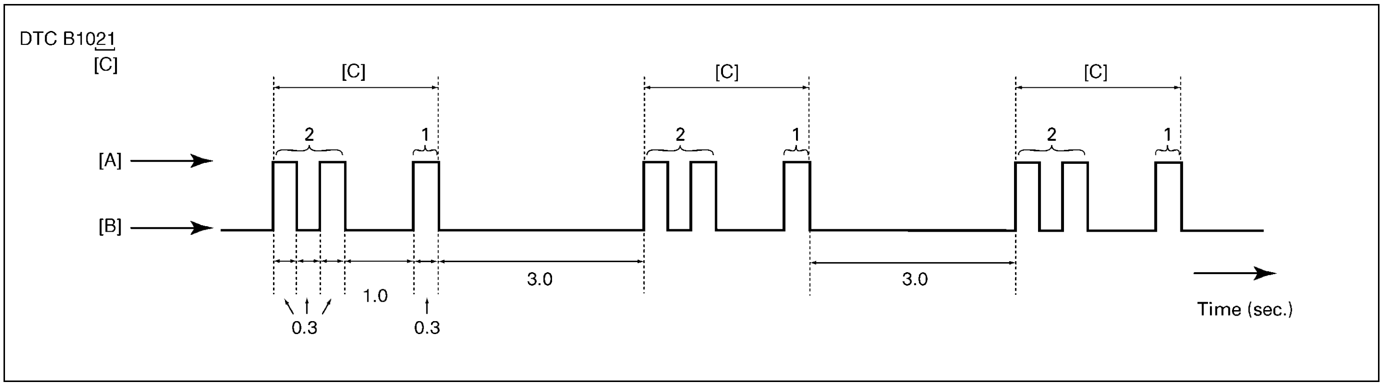
Not using SUZUKI scan tool



1) Check that malfunction indicator lamp ("AIR BAG" warning lamp) comes ON when ignition switch is turned to ON position.
   If it does not come "ON", proceed to Diagnostic Flow Table B ("AIR BAG" warning lamp circuit).
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 DTC TABLE.)
   If lamp does not indicate DTC, proceed to Diagnostic Flow Table D (Diagnosis switch terminal circuit check).
4) After completing the check, turn ignition switch to OFF position and disconnect service wire from "AIR BAG" monitor coupler.

1. "AIR BAG" monitor coupler
2. Body ground
3. Diagnosis switch terminal
4. Service wire

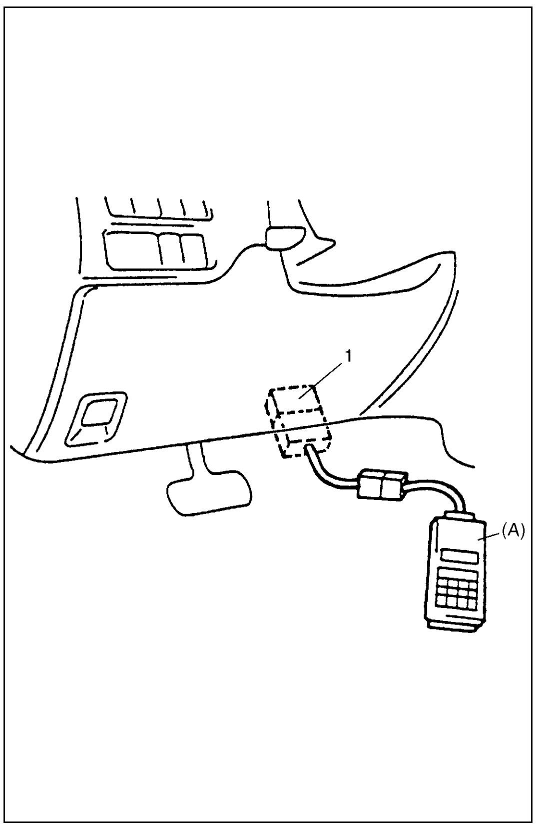
EXAMPLE : When driver air bag initiator circuit resistance high (DTC B1021) is set



[A]:	"AIR BAG" warning lamp is turned ON
[B]:	"AIR BAG" warning lamp is turned OFF
[C]:	Code No.21

DTC Clearance

Using SUZUKI scan tool



1) Turn ignition switch to OFF position.
2) Connect SUZUKI scan tool to data link connector (DLC) (1) in the same manner as when making this connection for DTC check.

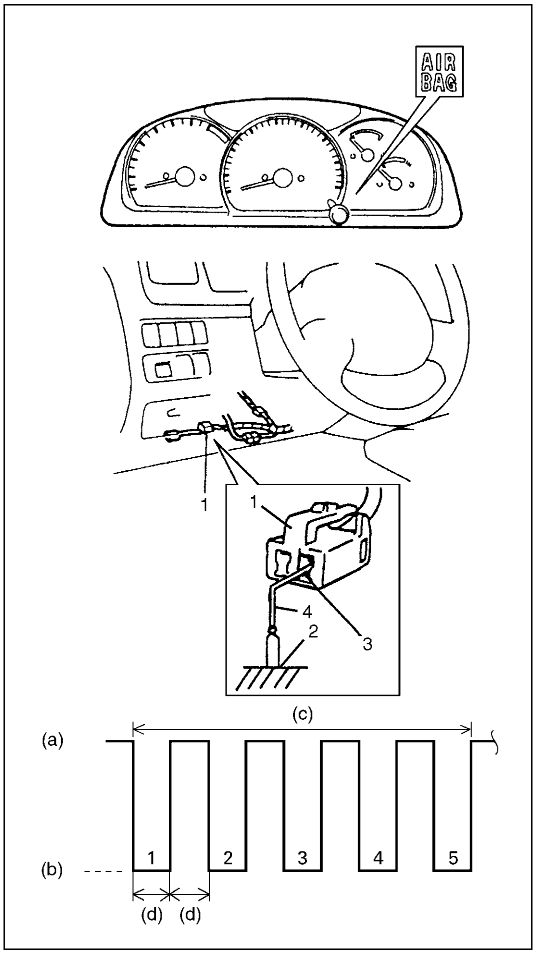
Special tool
(A) : SUZUKI scan tool

3) Turn ignition switch to ON position.
4) Erase DTC according to instructions displayed on SUZUKI scan tool. Refer to SUZUKI scan tool operator's manual for further details.
5) After completing the check, turn ignition switch to OFF position and disconnect SUZUKI scan tool from DLC.
6) Perform DTC CHECK and confirm that normal DTC (NO CODES) is displayed and not malfunction DTC.

NOTE:

If DTC B1051 or DTC B1071 is stored in SDM, it is not possible to clear DTC.

Not using SUZUKI scan tool



1) Turn ignition switch to ON position and wait about 6 seconds or more.
2) Using service wire, repeat shorting and opening between diagnosis switch terminal on “AIR BAG” monitor coupler and body ground 5 times at about 1 second intervals.
3) Perform DTC CHECK and confirm that normal DTC (DTC 12) is displayed and not malfunction DTC.

NOTE:

If DTC B1051 or DTC B1071 is stored in SDM, it is not possible to clear DTC.

1. “AIR BAG” monitor coupler	(a) Open
2. Body ground	(b) Short
3. Diagnosis switch terminal	(c) Max. 10 seconds
4. Service wire	(d) About 1 sec.

DTC Table

DTC	"AIR BAG" warning lamp flashing pattern		Diagnosis		
	NO.	MODE			
–	12		Normal		–
B1015	15		Passenger air bag circuit	Resistance high	Diagnose trouble according to diagnostic flow table corresponding to each code No.
B1016	16			Resistance low	
B1018	18			Short to ground	
B1019	19			Short to power circuit	
B1021	21		Driver air bag circuit	Resistance high	
B1022	22			Resistance low	
B1024	24			Short to ground	
B1025	25			Short to power circuit	
B1031	31		Power source voltage	Too high	
B1032	32			Too low	
B1035	35		RH Forward sensor circuit	Open or short to ground	
B1036	36			Short between two wires or short to power circuit	
B1037	37		LH Forward sensor circuit	Open or short to ground	
B1038	38			Short between two wires or short to power circuit	

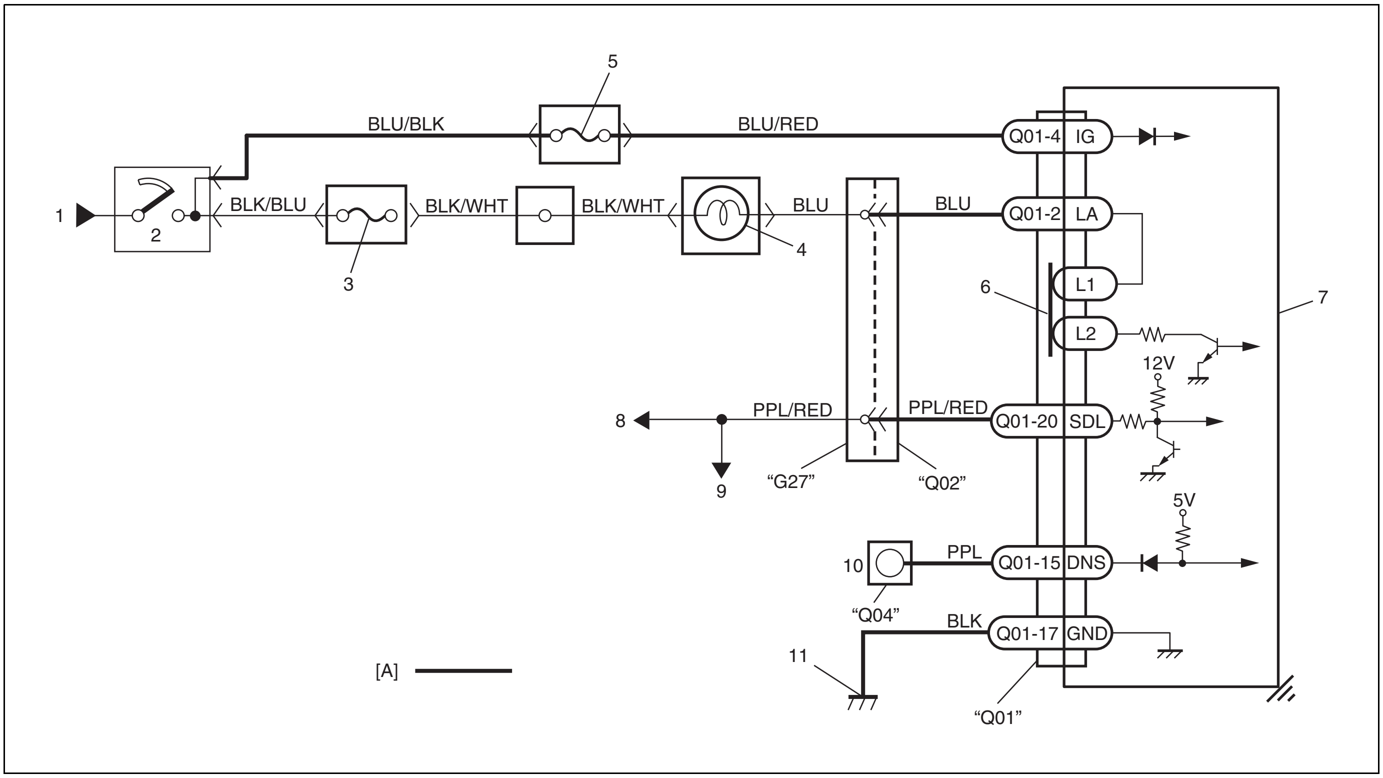
DTC	"AIR BAG" warning lamp flashing pattern		Diagnosis		
	NO.	MODE			
B1041	41		Driver preten-sioner circuit	Resistance high	Diagnose trou-ble according to diagnostic flow table corre-sponding to each code No.
B1042	42			Resistance low	
B1043	43			Short to ground	
B1044	44			Short to power circuit	
B1045	45		Passenger pretensioner circuit	Resistance high	
B1046	46			Resistance low	
B1047	47			Short to ground	
B1048	48			Short to power circuit	
B1051	51		SDM	Frontal crash detected	
B1061	61			"AIR BAG" warning lamp cir-cuit failure	
B1071	71			Internal fault	
B1013	13			Specifications different between air bag system and SDM	

NOTE:
- **When 2 or more codes are indicated, the lowest numbered code will appear first.**
- **Current DTC and history DTC can be identified by lighting and flashing of "AIR BAG" warning lamp as follows. However, if a multiple number of DTC's are set or even one of them is a current DTC, "AIR BAG" warning lamp remains on after ignition switch is turned ON. Therefore, it is not possible to identify any of them as to whether it is a current one or a history one. (But use of SUZUKI scan tool will make identification possible.)**

	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	**Flashing 6 times and turns on.**	**Flashing 6 times and turns off.**
"AIR BAG" warning lamp when grounding diagnosis switch	**Current DTC is displayed.**	**History DTC is displayed.**

Table A - “AIR BAG” Warning Lamp Comes ON Steady
Table B - “AIR BAG” Warning Lamp Does Not Come ON
Table C - “AIR BAG” Warning Lamp Flashes
Table D - “AIR BAG” Warning Lamp Cannot Indicate Flashing Pattern of DTC

WIRING DIAGRAM



1. From main fuse	5. “AIR BAG” fuse	9. To ECM, TCM (if equipped) and ABS control module (if equipped)
2. Ignition switch	6. Connection detection pin	10. “AIR BAG” monitor coupler
3. “IG METER” fuse	7. SDM	11. Ground for air bag system
4. “AIR BAG” warning lamp in combination meter	8. To DLC	[A]: Air bag harness

CAUTION:

- **Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.**
- **When measurement of resistance or voltage is required in this table, use a tester along with a correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is required, refer to INTERMITTENT AND POOR CONNECTIONS in this section.**
- **If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.**

TABLE TEST DESCRIPTION

Table A :

STEP 1 : Check “AIR BAG” fuse.
STEP 2 : Check power source circuit.
STEP 3 : Check “AIR BAG” warning lamp circuit.

Table B :

STEP 1 : Check combination meter power feed circuit.
STEP 2 : Check electrical connection check mechanism in SDM connector.
STEP 3 : Check “AIR BAG” warning lamp circuit.
STEP 4 : Check open in “AIR BAG” warning lamp circuit.
STEP 5 : Check short from “AIR BAG” warning lamp circuit to power circuit.
STEP 6 : Check “AIR BAG” bulb.

Table C and D :

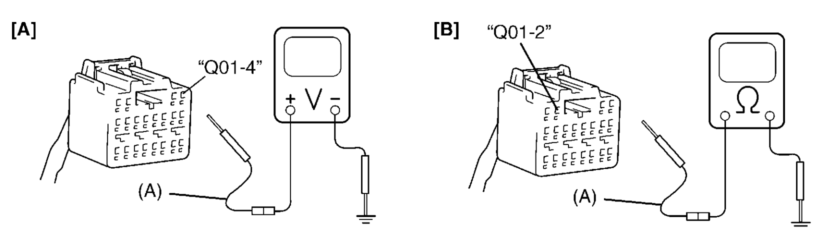
STEP 1 : Check “AIR BAG” monitor coupler.
STEP 2 : Check diagnosis switch circuit for air bag system.

DIAGNOSTIC FLOW TABLE

Table A :

Step	Action	Yes	No
1	1) Ignition switch OFF. 2) Remove and inspect “AIR BAG” fuse. Is fuse good?	Go to step 2.	“BLU/RED” wire short to ground. After repair, replace “AIR BAG” fuse.
2	1) Disconnect SDM connector 2) Check proper connection to SDM at terminal “Q01-4”. 3) If OK then check voltage between “Q01-4” terminal of SDM connector and body ground with ignition switch ON. Is it 8 V or more?	Go to step 3.	“BLU/RED” wire (between “AIR BAG” fuse and SDM connector) open “BLU/BLK” wire (between ignition switch and “AIR BAG” fuse) open or short to ground
3	1) Disconnect 16-pin connector from combination meter. Refer to COMBINATION METER in SECTION 8C. 2) Check resistance between “Q01-2” terminal of SDM connector and body ground. Is circuit open?	Substitute a known-good SDM and recheck.	“BLU” wire (between combination meter and SDM connector) short to ground

[A] Fig. for STEP 2/[B] Fig. for STEP 3



Special tool
(A) : 09932-75020

NOTE:

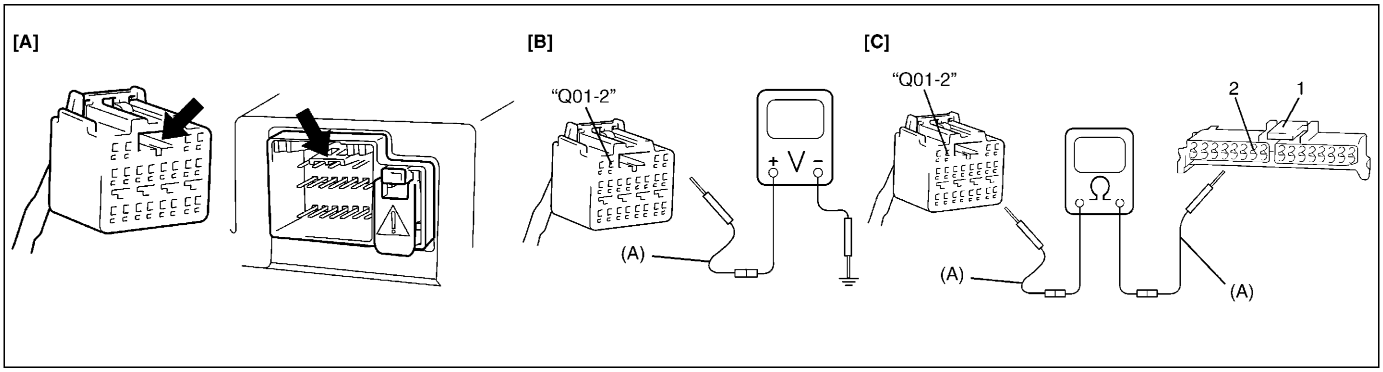
Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

Table B :

Step	Action	Yes	No
1	1) Set parking brake. 2) Note combination meter when ignition switch is turned ON. Does the “BRAKE” indicator (warning lamp) come ON?	Go to step 2.	“BLK/BLU” wire, “BLK/WHT” wire and “IG METER” fuse (between ignition switch and combination meter) open or short to ground
2	1) With ignition switch OFF, disconnect SDM connector. 2) Check electrical connection check mechanism. Is it in good condition?	Go to step 3.	Repair electrical connection check mechanism.
3	1) Disconnect SDM connector. 2) Check proper connection to SDM at terminal “Q01-2”. 3) If OK then check voltage from “Q01-2” terminal of SDM connector to body ground with ignition switch ON. Is it 8 V or more?	Substitute a known-good SDM and recheck.	Go to step 4.
4	1) Remove combination meter. Refer to COMBINATION METER in SECTION 8. 2) Check proper connection to combination meter at “BLU” terminal for “AIR BAG” warning lamp and to SDM at terminal “Q01-2”. 3) If OK then check resistance between “BLU” wire terminal of combination meter connector (16-pin connector) and “Q01-2” terminal of SDM connector. Is circuit short?	Go to step 5.	Repair high resistance or open in “BLU” wire circuit (between combination meter and SDM).
5	1) Measure voltage from “Q01-2” terminal of SDM connector to body ground with ignition switch ON. Is it 8 V or more?	Repair short from “BLU” wire circuit (between combination meter and SDM) to power circuit.	Go to step 6.
6	1) Remove and inspect “AIR BAG” bulb. Is bulb good?	Substitute a known-good combination meter and recheck.	Replace bulb.

[A] Fig. for STEP 2/[B] Fig. for STEP 3 and 5/[C] Fig. for STEP 4



1.	16-pin connector (for combination meter)
2.	"BLU" wire terminal

Special tool
(A) : 09932-75020

NOTE:

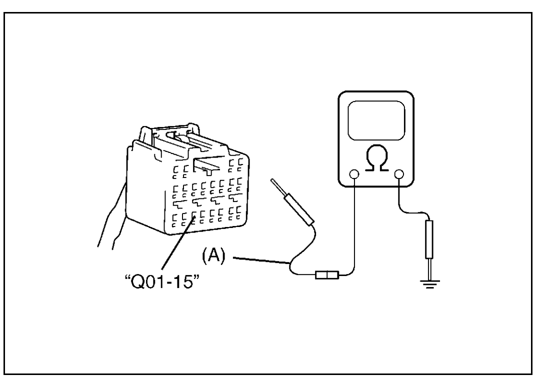
Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

Table C :

Step	Action	Yes	No
1	1) Check "AIR BAG" monitor coupler. Is it connected diagnosis switch terminal in "AIR BAG" monitor coupler and body ground by service wire?	Remove service wire.	Go to step 2.
2	1) With ignition switch OFF, disconnect SDM connector. 2) Measure resistance between "Q01-15" terminal of SDM connector and body ground. Is circuit open?	Substitute a known-good SDM and recheck.	Repair short from "PPL" wire circuit to ground.

Fig. for STEP 2



Special tool
(A) : 09932-75020

NOTE:

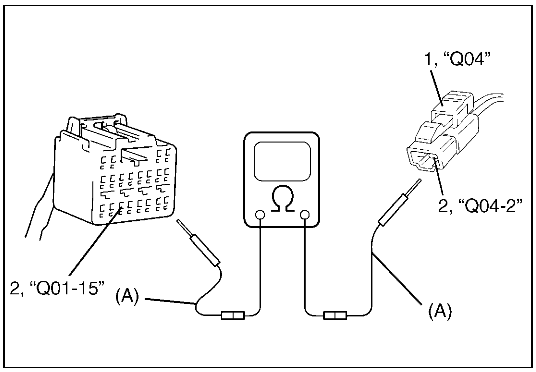
Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

Table D :

Step	Action	Yes	No
1	1) Inspect connection between diagnostic switch terminal on "AIR BAG" monitor coupler and body ground by service wire. Is it securely connected between them by service wire?	Go to step 2.	Properly connection diagnostic switch terminal on "AIR BAG" monitor coupler and body ground by service wire.
2	1) Disconnect SDM connector from SDM. 2) Check for proper connection at "PPL" wire ("Q01-15" terminal of SDM connector and "Q04-2" terminal of "AIR BAG" monitor coupler) terminals. 3) If OK then measure resistance between "Q01-15" terminal and "Q04-2" terminal. Is circuit open?	Check "PPL" wire terminals. If OK, repair open in "PPL" wire circuit.	Substitute a known good SDM and recheck

Fig. for STEP 2



1.	"AIR BAG" monitor coupler
2.	"PPL" wire terminal

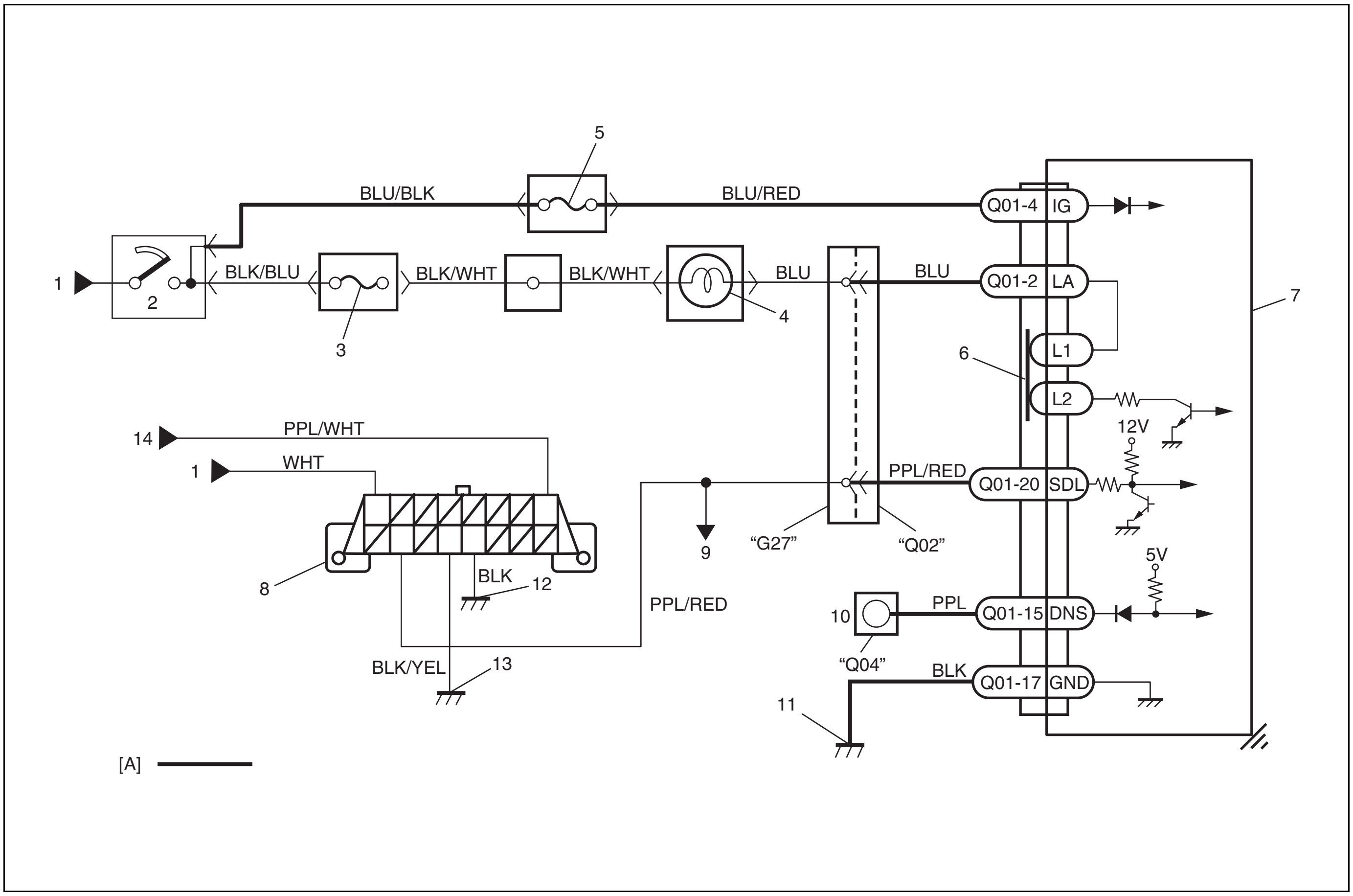
Special tool
(A) : 09932-75020

NOTE:

Upon completion of inspection and repair work, perform following items.
- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

Table E - SDM Cannot Communicate through The Serial Data Circuit

WIRING DIAGRAM



[A]: Air bag harness	5. "AIR BAG" fuse	10. "AIR BAG" monitor coupler
1. From main fuse	6. Connection detection pin	11. Ground for air bag system
2. Ignition switch	7. SDM	12. Ground on body
3. "IG METER" fuse	8. DLC	13. Ground on Engine block
4. "AIR BAG" warning lamp in combination lamp	9. To ECM, TCM (if equipped) and ABS control module (if equipped)	14. Immobilizer control module (if equipped)

CAUTION:

- **Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.**
- **When measurement of resistance or voltage is required in this table, use a tester along with a correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is required, refer to INTERMITTENT AND POOR CONNECTIONS in this section.**
- **If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.**

TABLE TEST DESCRIPTION

STEP 1 : An improper connection to the data link connector (DLC) will prevent communications from being established.

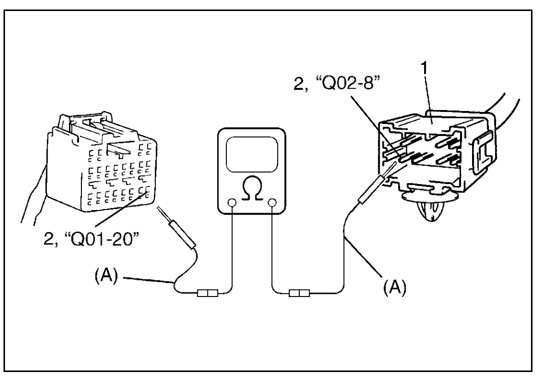
STEP 2 : This test checks whether it is possible to communicate with other control module.

STEP 3 : This test checks for an open in "PPL/RED" circuit (in air bag harness).

DIAGNOSTIC FLOW TABLE

Step	Action	Yes	No
1	1) Make sure that SUZUKI scan tool is free from malfunction and correct cartridge for air bag system is used. 2) Ignition switch OFF. 3) Check proper connection of SUZUKI scan tool to DLC. Is connection in good condition?	Go to step 2.	Properly connect SUZUKI scan tool to DLC.
2	1) Check if communication is possible by trying communication with other control module (ECM, TCM (if equipped) or ABS control module (if equipped)). Is it possible to communicate with other control module?	Go to step 3.	Repair open in common section of serial data circuit ("PPL/RED" wire circuit) used by all controllers or short to ground or power circuit which has occurred some-where in serial data circuit ("PPL/RED" wire circuit).
3	1) With ignition switch OFF, disconnect SDM and "Q02" connector. 2) Check proper connection at "Q02-8" ("PPL/RED" wire) terminal for DLC. 3) If OK, then check resistance between "Q02-8" ("PPL/RED" wire) terminal and "Q01-20" terminal of SDM connector. Is circuit short?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "PPL/RED" wire circuit (in air bag harness).

Fig. for STEP 3



1.	Air bag harness side connector
2.	"PPL/RED" wire terminal

Special tool
(A) : 09932-75020

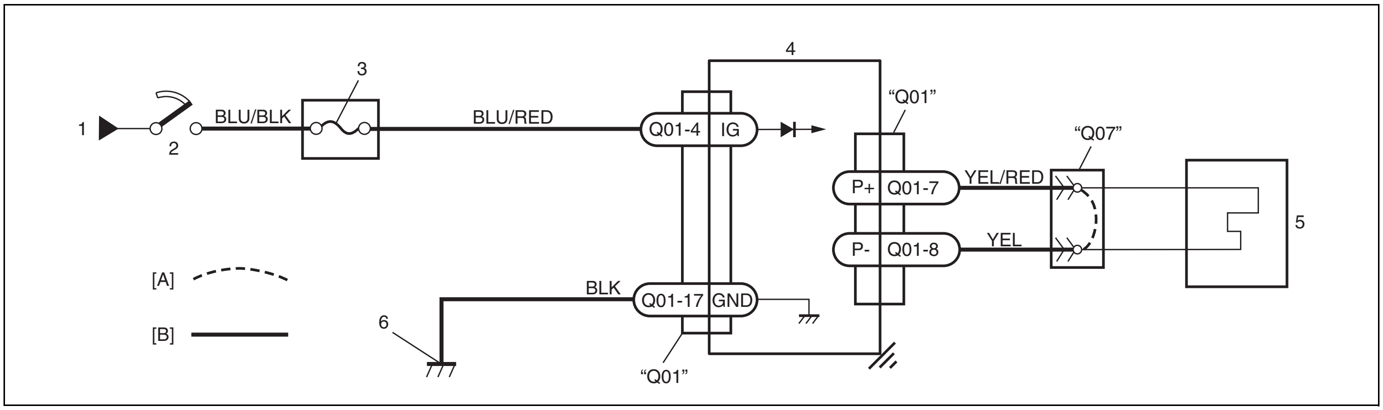
NOTE:

Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1015 - Passenger Air Bag Initiator Circuit Resistance High
DTC B1016 - Passenger Air Bag Initiator Circuit Resistance Low
DTC B1018 - Passenger Air Bag Initiator Circuit Short to Ground
DTC B1019 - Passenger Air Bag Initiator Circuit Short to Power Circuit

WIRING DIAGRAM



[A]: Shorting bar	1. From main fuse	3. "AIR BAG" fuse	5. Passenger air bag (inflator) module
[B]: Air bag harness	2. Ignition switch	4. SDM	6. Ground for air bag system

CAUTION:
- **Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.**
- **When measurement of resistance or voltage is required in this table, use a tester along with a correct terminal adaptor from special tool (Connector test adapter kit).**
- **When a check for proper connection is required, refer to INTERMITTENT AND POOR CONNECTIONS in this section.**
- **If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.**

DTC WILL SET WHEN

DTC B1015 :

The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is above a specified value for specified time.

DTC B1016 :

The combined resistance of the passenger air bag (inflator) module, harness wiring and connector terminal contact is below a specified value for specified time.

DTC B1018 :

The voltage measured at passenger air bag initiator circuit is below a specified value for specified time.

DTC B1019 :

The voltage measured at passenger air bag initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

DTC B1015, B1016, B1018 and B1019 :

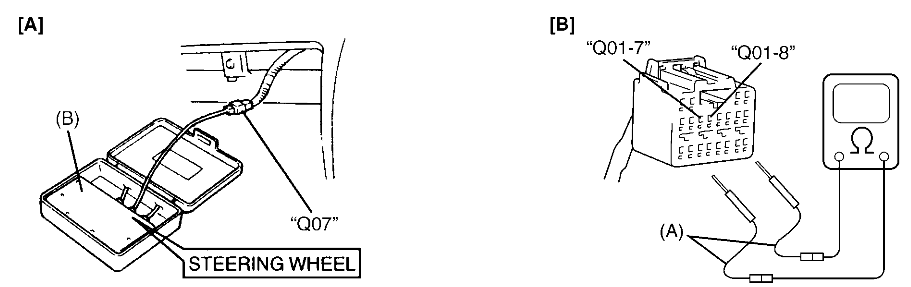
STEP 1 : Check whether malfunction is in passenger air bag (inflator) module.
STEP 2 : Check passenger air bag (inflator) module initiator circuit in air bag harness.
STEP 3 : Check passenger air bag (inflator) module initiator circuit in air bag harness. (for DTC B1019 only)

DIAGNOSTIC FLOW TABLE

DTC B1015 :

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 “Q07” connector. 3) If OK then connect Special Tool (B) to passenger air bag (inflator) module connector disconnected at the step 1). With ignition switch ON, is DTC B1015 current?	Go to step 2.	Ignition switch OFF. Replace passenger air bag (inflator) module (Refer to PASSENGER AIR BAG (INFLATOR) MODULE in this section).
2	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals “Q01-7” and “Q01-8”. 3) If OK then measure resistance between “Q01-7” and “Q01-8” terminals with connected Special Tool (B). Is resistance 4.5 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in “YEL/RED” or “YEL” wire circuit.

[A] Fig. for STEP 1 and 2/[B] Fig. for STEP 2



Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:

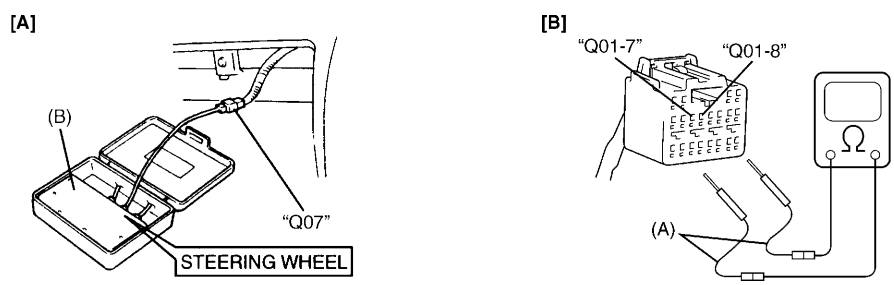
Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1016:

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 “Q07” connector. 3) If OK then connect Special Tool (B) to passenger air bag (inflator) module connector disconnected at the step 1). With ignition switch ON, is DTC B1016 current?	Go to step 2.	Ignition switch OFF. Replace passenger air bag (inflator) module (Refer to PASSENGER AIR BAG (INFLATOR) MODULE in this section).
2	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals “Q01-7” and “Q01-8”. 3) If OK then measure resistance between “Q01-7” and “Q01-8” terminals with connected Special Tool (B). Is resistance 1.4 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from “YEL/RED” wire circuit to “YEL” wire circuit or from “YEL/RED” or “YEL” wire circuit to other wire circuit.

[A] Fig. for STEP 1 and 2/[B] Fig. for STEP 2



Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:

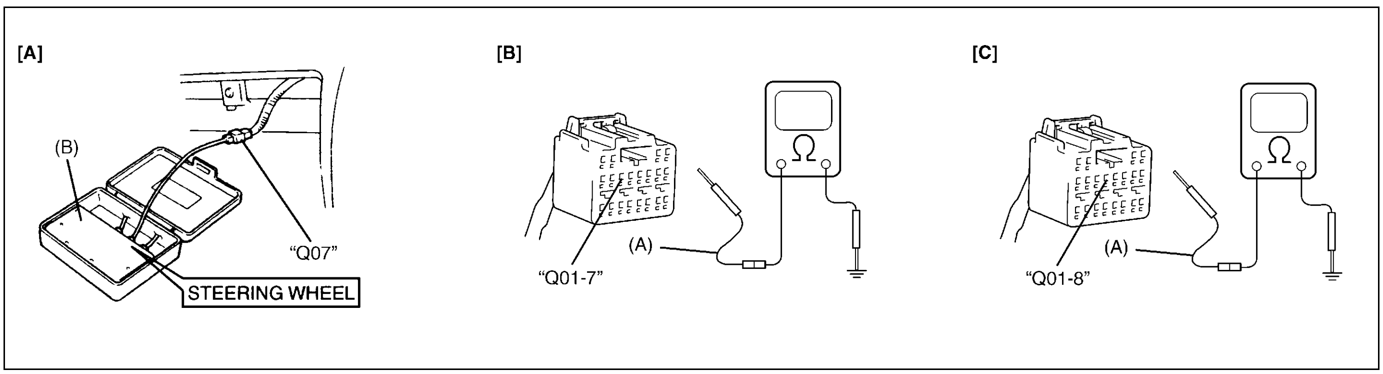
Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1018:

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 “Q07” connector. 3) If OK then connect Special Tool (B) to passenger air bag (inflator) module connector disconnected at the step 1). With ignition switch ON, is DTC B1018 current?	Go to step 2.	Ignition switch OFF. Replace passenger air bag (inflator) module (Refer to PASSENGER AIR BAG (INFLATOR) MODULE in this section).
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM connector. 2) Measure resistance between “Q01-7” terminals and body ground. Is circuit open?	Go to step 3.	Repair short from “YEL/RED” wire circuit to ground.
3	1) Measure resistance between “Q01-8” terminal and body ground. Is circuit open?	Substitute a known-good SDM and recheck.	Repair short from “YEL” wire circuit to ground.

[A] Fig. for STEP 1, 2 and 3/[B] Fig. for STEP 2/[C] Fig. for STEP 3



Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:

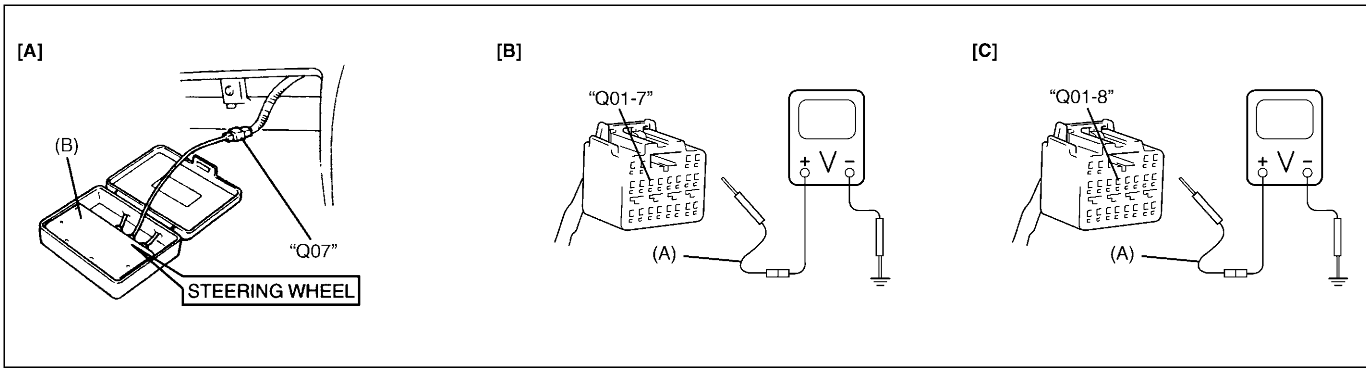
Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1019:

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 “Q07” connector. 3) If OK then connect Special Tool (B) to passenger air bag (inflator) module connector disconnected at the step 1). With ignition switch ON, is DTC B1019 current?	Go to step 2.	Ignition switch OFF. Replace passenger air bag (inflator) module (Refer to PASSENGER AIR BAG (INFLATOR) MODULE in this section).
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM connector. 2) Measure voltage from “Q01-7” terminal to body ground. With ignition switch ON, is voltage 1 V or less?	Go to step 3.	Repair short from “YEL/RED” wire circuit to power circuit.
3	1) Measure voltage from “Q01-8” terminal to body ground. With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and recheck.	Repair short from “YEL” wire circuit to power circuit.

[A] Fig. for STEP 1, 2 and 3/[B] Fig. for STEP 2/[C] Fig. for STEP 3



Special tool
(A) : 09932-75020
(B) : 09932-75010

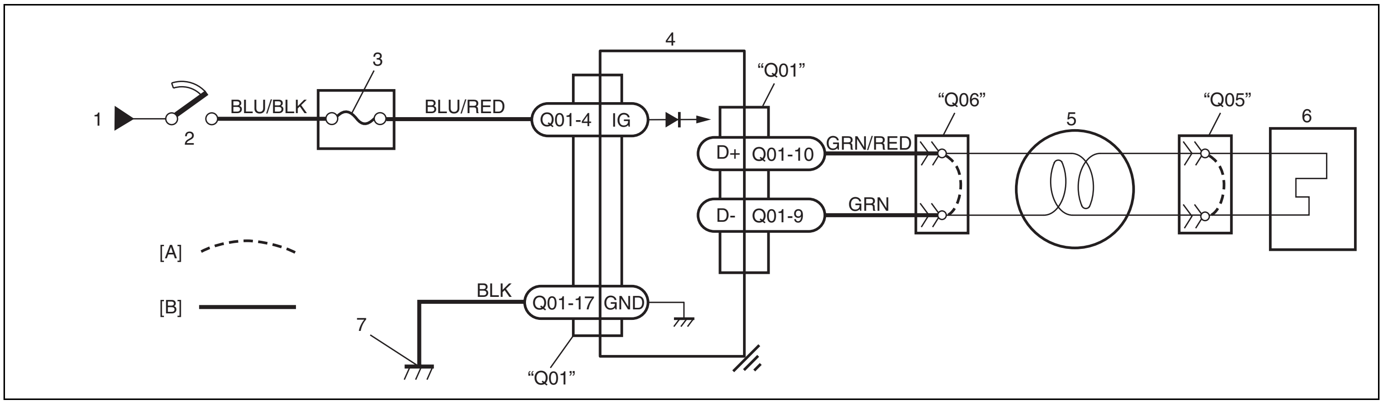
NOTE:

Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1021 – Driver Air Bag Initiator Circuit Resistance High
DTC B1022 – Driver Air Bag Initiator Circuit Resistance Low
DTC B1024 – Driver Air Bag Initiator Circuit Short to Ground
DTC B1025 – Driver Air Bag Initiator Circuit Short to Power Circuit

WIRING DIAGRAM



[A] : Shorting bar	2. Ignition switch	5. Contact coil assembly
[B] : Airbag harness	3. "AIR BAG" fuse	6. Driver air bag (inflator) module
1. From main fuse	4. SDM	7. Ground for air bag system

CAUTION:
- **Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.**
- **When measurement of resistance or voltage is required in this table, use a tester along with a correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is required, refer to INTERMITTENT AND POOR CONNECTIONS in this section.**
- **If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.**

DTC WILL SET WHEN

DTC B1021 :
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.

DTC B1022 :
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.

DTC B1024 :
The voltage measured at driver air bag initiator circuit is below a specified value for specified time.

DTC B1025 :
The voltage measured at driver air bag initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

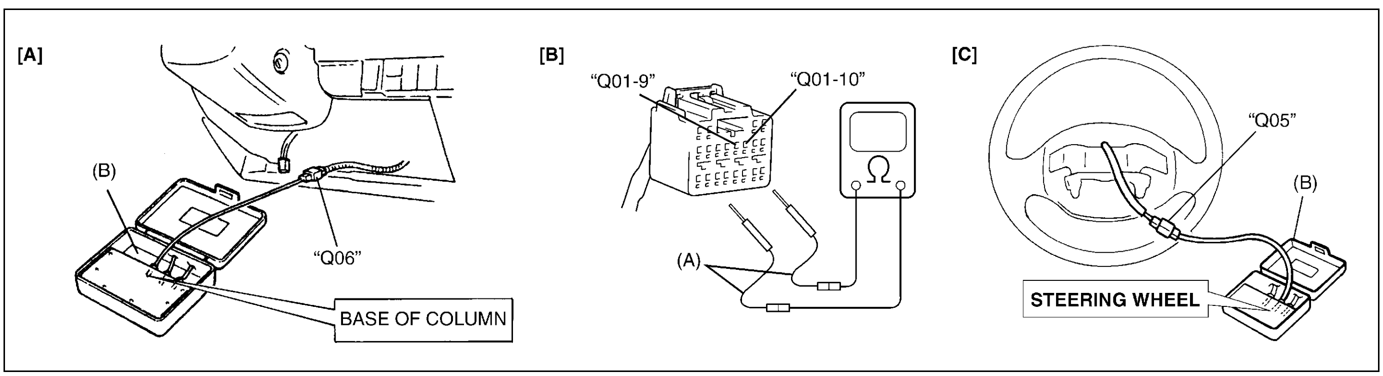
DTC B1021, B1022, B1024 and B1025 :
STEP 1 : Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.
STEP 2 : Check driver air bag (inflator) module initiator circuit in air bag harness.
STEP 3 : Check whether malfunction is in contact coil or driver air bag (inflator) module.

DIAGNOSTIC FLOW TABLE

DTC B1021 :

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 "Q06" connector. 3) If OK then connect Special Tool (B) to contact coil connector disconnected at step 1). With ignition switch ON, is DTC B1021 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals "Q01-9" and "Q01-10". 3) If OK then measure resistance between "Q01-9" and "Q01-10" terminals with connected Special Tool (B). Is resistance 4.5 Ω or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "GRN" or "GRN/RED" 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 DRIVER AIR BAG (INFLATOR) MODULE in Section 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "Q05" connector. 4) If OK then connect Special Tool (B) to "Q05" connector. With ignition switch ON, is DTC B1021 current?	Ignition switch OFF. Replace contact coil assembly (Refer to COMBINATION SWITCH/CONTACT COIL AND COMBINATION SWITCH ASSEMBLY in Section 3C1).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3C1).

[A] Fig. for STEP 1 and 2/[B] Fig. for STEP 2/[C] Fig. for STEP 3



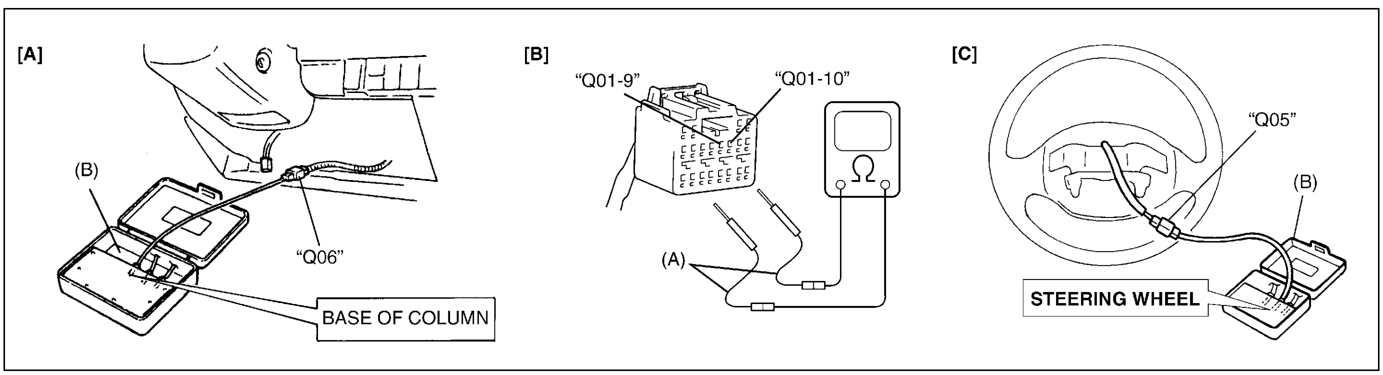
Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1022 :

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 “Q06” connector. 3) If OK then connect Special Tool (B) to contact coil connector disconnected at step 1). With ignition switch ON, is DTC B1022 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals “Q01-9” and “Q01-10”. 3) If OK then measure resistance between “Q01-9” and “Q01-10” terminals with connected Special Tool (B). Is resistance 1.7 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from “GRN” wire circuit to “GRN/RED” wire circuit or from “GRN” or “GRN/RED” 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 DRIVER AIR BAG (INFLATOR) MODULE in Section 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in “Q05” connector. 4) If OK then connect Special Tool (B) to “Q05” connector. With ignition switch ON, is DTC B1022 current?	Ignition switch OFF. Replace contact coil assembly (Refer to COMBINATION SWITCH/CONTACT COIL AND COMBINATION SWITCH ASSEMBLY in Section 3C1).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3C1).

[A] Fig. for STEP 1 and 2/[B] Fig. for STEP 2/[C] Fig. for STEP 3



Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:

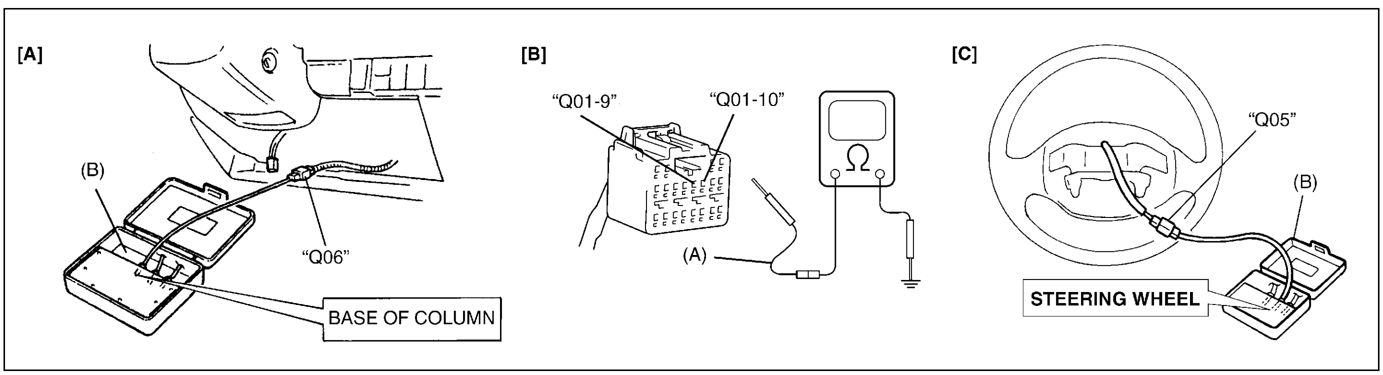
Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1024 :

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 “Q06” connector. 3) If OK then connect Special Tool (B) to contact coil connector disconnected at step 1). With ignition switch ON, is DTC B1024 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM connector. 2) Measure resistance between “Q01-9” terminal and body ground and between “Q01-10” terminal and body ground. Are circuits open?	Substitute a known-good SDM and recheck.	Repair short from “GRN” or “GRN/RED” 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 DRIVER AIR BAG (INFLATOR) MODULE in Section 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in “Q05” connector. 4) If OK then connect Special Tool (B) to “Q05” connector. With ignition switch ON, is DTC B1024 current?	Ignition switch OFF. Replace contact coil assembly (Refer to COMBINATION SWITCH/CONTACT COIL AND COMBINATION SWITCH ASSEMBLY in Section 3C1).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3C1).

[A] Fig. for STEP 1 and 2/[B] Fig. for STEP 2/[C] Fig. for STEP 3



Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:

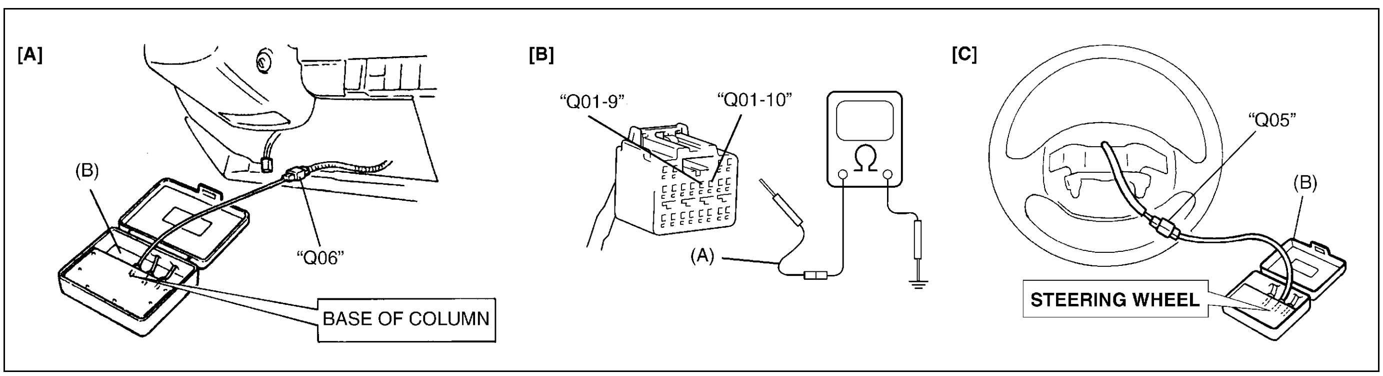
Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1025 :

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 "Q06" connector. 3) If OK then connect Special Tool (B) to contact coil connector disconnected at step 1). With ignition switch ON, is DTC B1025 current?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM connector. 2) Measure voltage from "Q01-9" terminal to body ground and from "Q01-10" terminal to body ground. With ignition switch ON, are they 1 V or less?	Substitute a known-good SDM and recheck.	Repair short from "GRN" or "GRN/RED" 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 DRIVER AIR BAG (INFLATOR) MODULE in Section 3C1). 3) Check proper connection to driver air bag (inflator) module at terminals in "Q05" connector. 4) If OK then connect Special Tool (B) to "Q05" connector. With ignition switch ON, is DTC B1025 current?	Ignition switch OFF. Replace contact coil assembly (Refer to COMBINATION SWITCH/CONTACT COIL AND COMBINATION SWITCH ASSEMBLY in Section 3C1).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to DRIVER AIR BAG (INFLATOR) MODULE in Section 3C1).

[A] Fig. for STEP 1 and 2/[B] Fig. for STEP 2/[C] Fig. for STEP 3



Special tool
(A) : 09932-75020
(B) : 09932-75010

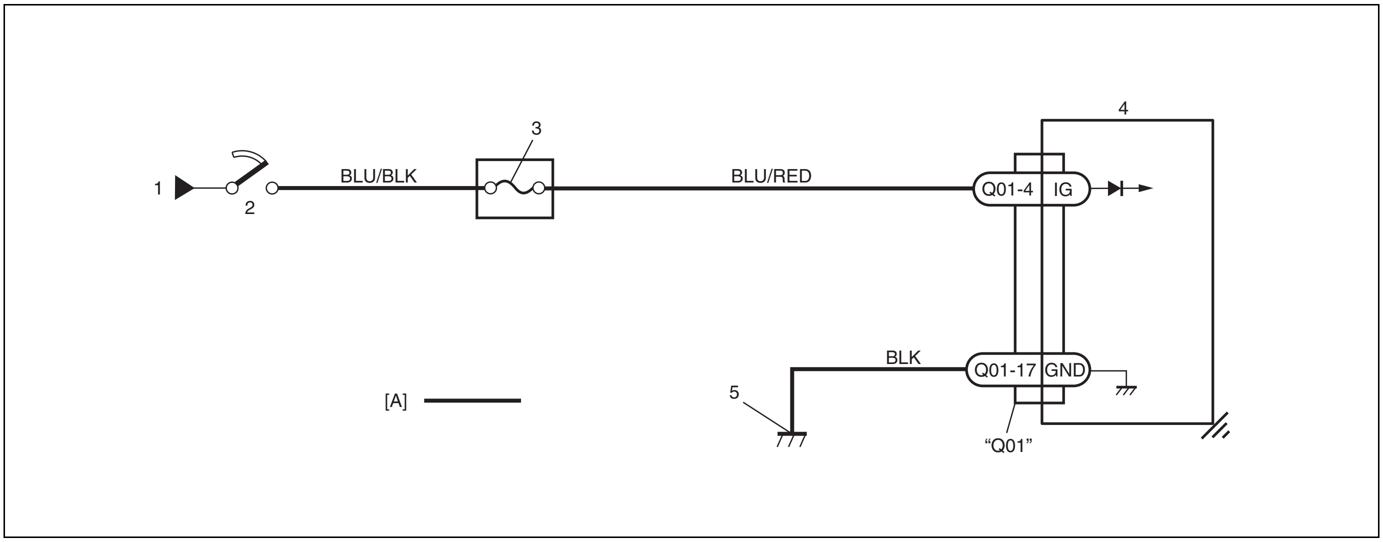
NOTE:

Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1031 – Power Source Voltage High
DTC B1032 – Power Source Voltage Low

WIRING DIAGRAM



[A] : Air bag harness	2. Ignition switch	4. SDM
1. From main fuse	3. "AIR BAG" fuse	5. Ground for air bag system

CAUTION:
- **Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.**
- **When measurement of resistance or voltage is required in this table, use a tester along with a correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is required, refer to INTERMITTENT AND POOR CONNECTIONS in this section.**
- **If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.**

DTC WILL SET WHEN

DTC B1031 :

The power source voltage to SDM is above specified value for specified time.

DTC B1032 :

The power source voltage is below an approx. 8 V for specified time.

TABLE TEST DESCRIPTION

DTC B1031 :

STEP 1 : Check if voltage applied to SDM is within normal range.

STEP 2 : Check if DTC B1031 still exists.

DTC B1032 :

STEP 1 : Check if voltage applied to SDM is within normal range.

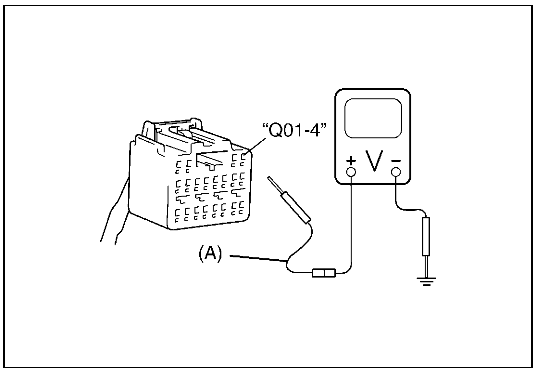
STEP 2 : Check if DTC B1032 still exists.

DIAGNOSTIC FLOW TABLE

DTC B1031 :

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at “Q01-4” terminal. 3) If OK then ignition switch ON, and then check voltage from “Q01-4” terminal on SDM connector to body ground. Is voltage 14 V or less?	Go to step 2.	Check Charging System and repair as necessary. (Refer to DIAGNOSIS in Section 6H)
2	1) With ignition switch OFF, reconnect SDM connector. With ignition switch ON, is DTC B1031 current?	Substitute a known-good SDM and recheck.	Check Charging System and repair as necessary. (Refer to DIAGNOSIS in Section 6H)

Fig. for STEP 1



Special tool
(A) : 09932-75020

NOTE:

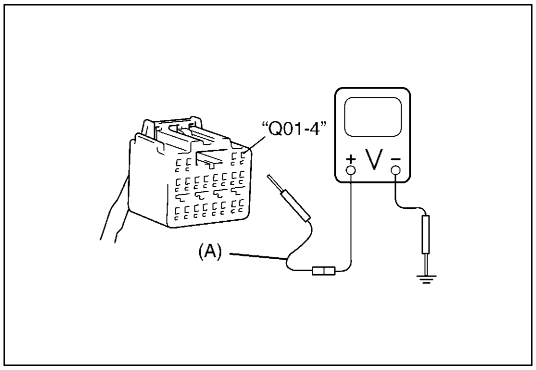
Upon completion of inspection and repair work, perform following items.
- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1032 :

Step	Action	Yes	No
1	1) Measure voltage on battery. Is voltage 11 V or more?	Go to step 2.	Check Charging System and repair as necessary. (Refer to DIAGNOSIS in Section 6H)
2	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at “Q01-4” terminal. 3) If OK then ignition switch ON, and then check voltage from “Q01-4” terminal on SDM connector to body ground. Is voltage 8 V or more?	Go to step 3.	Possibly faulty points are as follows. Check each of them and repair as necessary. • Circuit from battery to “Q01” connector • Charging System (Refer to DIAGNOSIS in Section 6H)

Step	Action	Yes	No
3	1) With ignition switch OFF, reconnect SDM connector. With ignition switch ON, is DTC B1032 current?	Substitute a known-good SDM and recheck.	Check Charging System and repair as necessary. (Refer to DIAGNOSIS in Section 6H)

Fig. for STEP 2



Special tool
(A) : 09932-75020

NOTE:

Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

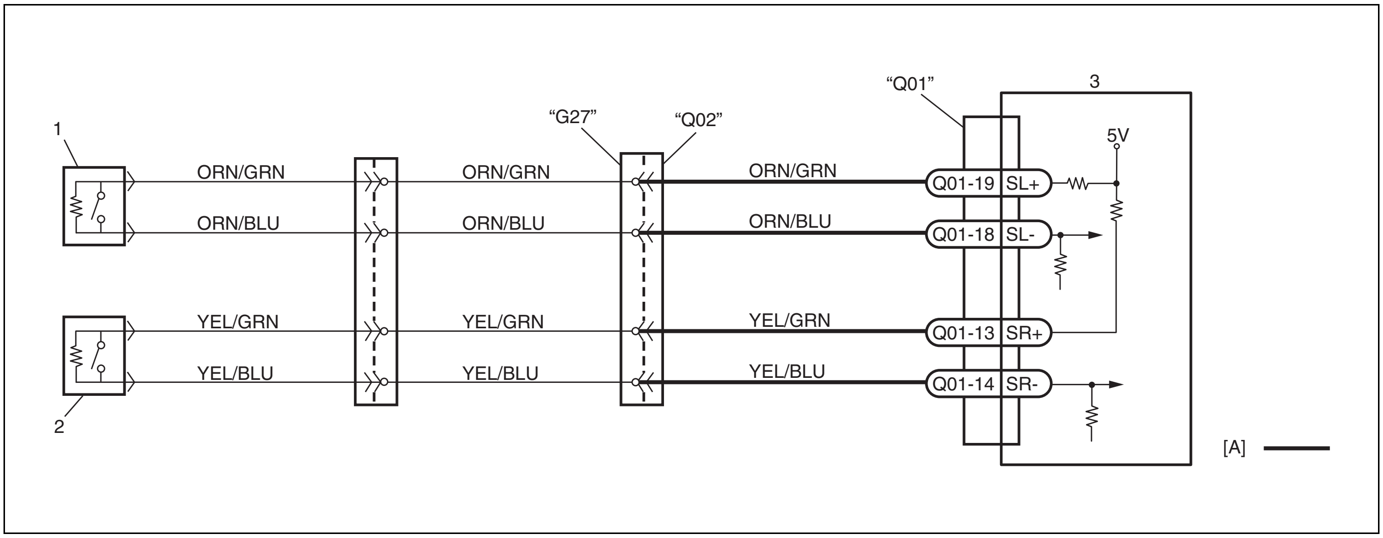
DTC B1035 – RH Forward Sensor Circuit Open or Short to Ground

DTC B1036 – RH Forward Sensor Circuit Short Between Two Wires or Short to Power Circuit

DTC B1037 – LH Forward Sensor Circuit Open or Short to Ground

DTC B1038 – LH Forward Sensor Circuit Short Between Two Wires or Short to Power Circuit

WIRING DIAGRAM



[A] : Air bag harness	2. RH Forward sensor
1. LH Forward sensor	3. SDM

CAUTION:

- **Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.**
- **When measurement of resistance or voltage is required in this table, use a tester along with a correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is required, refer to INTERMITTENT AND POOR CONNECTIONS in this section.**
- **If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.**

DTC WILL SET WHEN

DTC B1035 and B0137 :

The voltage measured at forward sensor circuit (terminal Q01-18, Q01-14) is below a specified value for specified time.

DTC B1036 and B0138 :

The voltage measured at forward sensor circuit (terminal Q01-18, Q01-14) is above a specified value for specified time.

TABLE TEST DESCRIPTION

DTC B1035 and B1037 :

STEP 1 : Check whether malfunction is in forward sensor.
STEP 2 : Check if forward sensor circuit is open.
STEP 3 : Check if forward sensor circuit is shorted to ground.

DTC B1036 and B1038 :

STEP 1 : Check whether malfunction is in forward sensor.

STEP 2 : Check if forward sensor circuit is shorted between two wires.

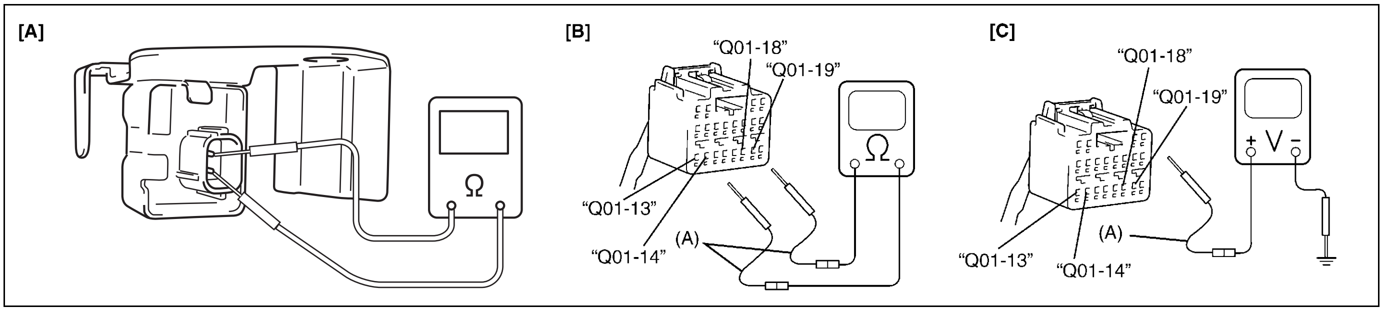
STEP 3 : Check if forward sensor circuit is shorted to power circuit.

DIAGNOSTIC FLOW TABLE

DTC B1035 and B1037 :

Step	Action	Yes	No
1	1) Ignition switch OFF. 2) Disconnect driver air bag (inflator) module connector, passenger air bag (inflator) module connector, driver pretensioner module connector, and passenger pretensioner module connector. 3) Disconnect forward sensor. 4) Check proper connection to forward sensor connector at "ORN/GRN" and "ORN/BLU" terminals or "YEL/GRN" and "YEL/BLU" terminals. 5) If OK then measure resistance between terminals of forward sensor. Is resistance 738 – 905 Ω?	Go to step 2.	Replace forward sensor.
2	1) Reconnect forward sensor. 2) Disconnect SDM connector. 3) Check proper connection to SDM connector at terminals "Q01-13" and "Q01-14" or terminals "Q01-18" and "Q01-19". 4) If OK then measure resistance between terminal "Q01-13" and "Q01-14" or terminal "Q01-18" and "Q01-19". Is circuit open?	Repair open in "ORN/GRN" and "ORN/BLU" wire circuit (between forward sensor and SDM) or "YEL/GRN" and "YEL/BLU" wire circuit (between forward sensor and SDM).	Go to step 3.
3	1) Disconnect forward sensor. 2) Measure resistance between "Q01-13" terminal and body ground, "Q01-14" terminal and body ground, or between "Q01-18" terminal and body ground, "Q01-19" terminal and body ground. Are circuits open?	Substitute a known-good SDM and recheck.	Repair short from "ORN/GRN" or "ORN/BLU" wire circuit (between forward sensor and SDM) to ground, or from "YEL/GRN" or "YEL/BLU" wire circuit (between forward sensor and SDM) to ground.

[A] Fig. for STEP 1/[B] Fig. for STEP 2/[C] Fig. for STEP 3



Special tool
(A) : 09932-75020

NOTE:

Upon completion of inspection and repair work, perform following items.

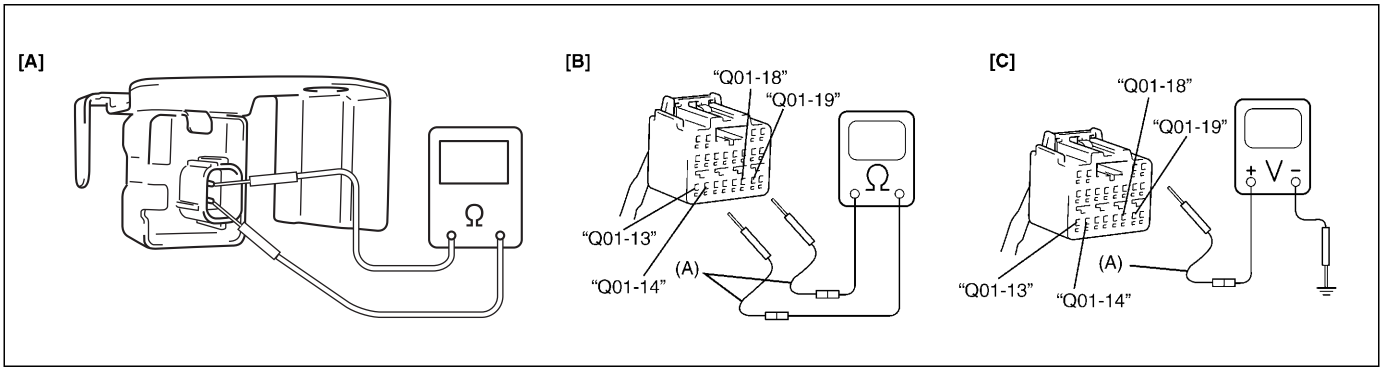
- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1036 and B1038 :

Step	Action	Yes	No
1	1) Ignition switch OFF. 2) Disconnect driver air bag (inflator) module connector, passenger air bag (inflator) module connector, driver pretensioner module connector, and passenger pretensioner module connector. 3) Disconnect forward sensor. 4) Check proper connection to forward sensor connector at "ORN/GRN" and "ORN/BLU" terminals or "YEL/GRN" and "YEL/BLU" terminals. 5) If OK then measure resistance between terminals of forward sensor. Is resistance 738 - 905 Ω?	Go to step 2.	Replace forward sensor.
2	1) Disconnect SDM connector. 2) Check proper connection to SDM connector at terminals "Q01-13" and "Q01-14" or terminals "Q01-18" and "Q01-19". 3) If OK then measure resistance between terminal "Q01-13" and "Q01-14" or terminal "Q01-18" and "Q01-19". Is circuit open?	Go to step 3.	Repair short from "ORN/GRN" wire circuit (between forward sensor and SDM) to "ORN/BLU" wire circuit (between forward sensor and SDM), or from "YEL/GRN" wire circuit (between forward sensor and SDM) to "YEL/BLU" wire circuit (between forward sensor and SDM).

Step	Action	Yes	No
3	1) Measure voltage from “Q01-13” terminal to body ground and “Q01-14” terminal to body ground, or from “Q01-18” terminal to body ground and “Q01-19” terminal to body ground. With ignition switch ON, are they 1V or less?	Substitute a known-good SDM and recheck.	Repair short from “ORN/GRN” or “ORN/BLU” wire circuit (between forward sensor and SDM) to power circuit, or from “YEL/GRN” or “YEL/BLU” wire circuit (between forward sensor and SDM) to power circuit.

[A] Fig. for STEP 1/[B] Fig. for STEP 2/[C] Fig. for STEP 3



Special tool
(A) : 09932-75020

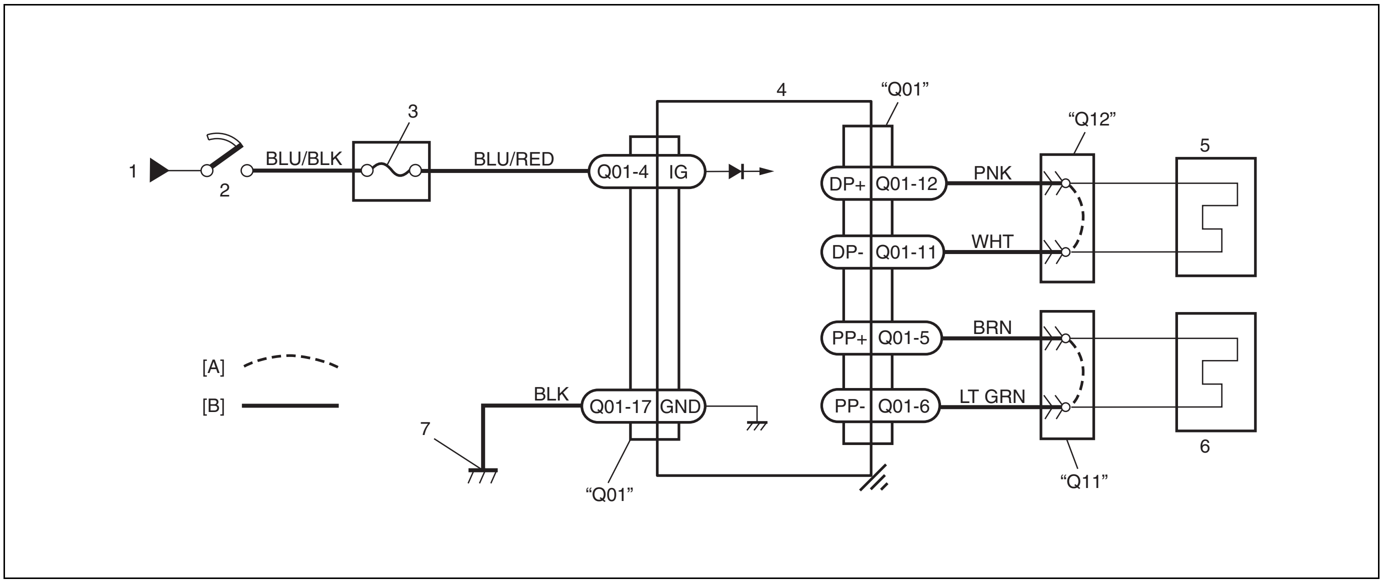
NOTE:

Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1041 – Driver Pretensioner Initiator Circuit Resistance High
DTC B1042 – Driver Pretensioner Initiator Circuit Resistance Low
DTC B1043 – Driver Pretensioner Initiator Circuit Short to Ground
DTC B1044 – Driver Pretensioner Initiator Circuit Short to Power Circuit
DTC B1045 – Passenger Pretensioner Initiator Circuit Resistance High
DTC B1046 – Passenger Pretensioner Initiator Circuit Resistance Low
DTC B1047 – Passenger Pretensioner Initiator Circuit Short to Ground
DTC B1048 – Passenger Pretensioner Initiator Circuit Short to Power Circuit

WIRING DIAGRAM



[A] :	Shorting bar	2.	Ignition switch	5.	Driver seat belt pretensioner
[B] :	Air bag harness	3.	"AIR BAG" fuse	6.	Passenger seat belt pretensioner
1.	From main fuse	4.	SDM	7.	Ground for air bag system

CAUTION:
- **Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.**
- **When measurement of resistance or voltage is required in this table, use a tester along with a correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is required, refer to INTERMITTENT AND POOR CONNECTIONS in this section.**
- **If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.**

DTC WILL SET WHEN

DTC B1041 and B1045 :

The resistance of driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.

DTC B1042 and B1046 :

The resistance of driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.

DTC B1043 and B1047 :

The voltage measured at driver or passenger seat belt pretensioner initiator circuit is below a specified value for specified time.

DTC B1044 and B1048 :

The voltage measured at driver or passenger seat belt pretensioner initiator circuit is above a specified value for specified time.

TABLE TEST DESCRIPTION

DTC B1041, B1042, B1043, B1044, B1045, B1046, B1047 and B1048 :

STEP 1 : Check whether malfunction is in seat belt pretensioner.

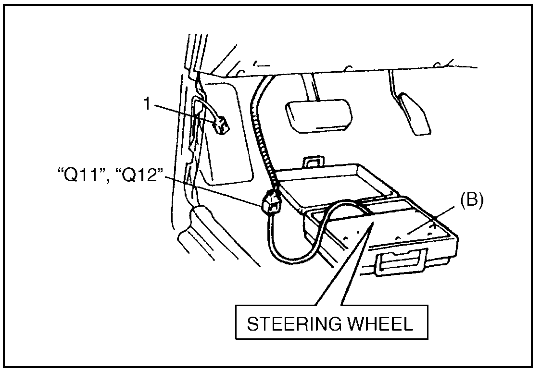
STEP 2 : Check seat belt pretensioner initiator circuit in air bag harness.

DIAGNOSTIC FLOW TABLE

DTC B1041 and B1045 :

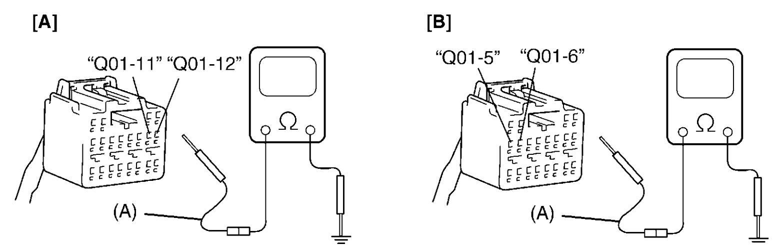
Step	Action	Yes	No
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in “Q11” or “Q12” connector. 3) If OK then connect Special Tool (B) to seat belt pretensioner connector disconnected at the step 1. With ignition switch ON, is DTC B1041 or B1045 still current?	Go to step 2.	Ignition switch OFF. Replace seat belt pretensioner (Refer to Section 10A).
2	1) With ignition switch OFF, disconnect SDM connector. 2) Check proper connection to SDM at terminals “Q01-11” and “Q01-12” or “Q01-6” and “Q01-5”. 3) If OK then measure resistance between “Q01-11” and “Q01-12” terminals or “Q01-6” and “Q01-5” terminals with connected Special Tool (B). Is resistance 4.5 Ω or less?	Substitute a known-good SDM and recheck.	DTC B1041 : Repair high resistance or open in “PNK” or “WHT” wire circuit. DTC B1045 : Repair high resistance or open in “BRN” or “LT GRN” wire circuit.

Fig. for STEP 1 and 2



1.	Pretensioner harness

Fig. for STEP 2



[A] :	For DTC B1041
[B] :	For DTC B1045

Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:

Upon completion of inspection and repair work, perform following items.

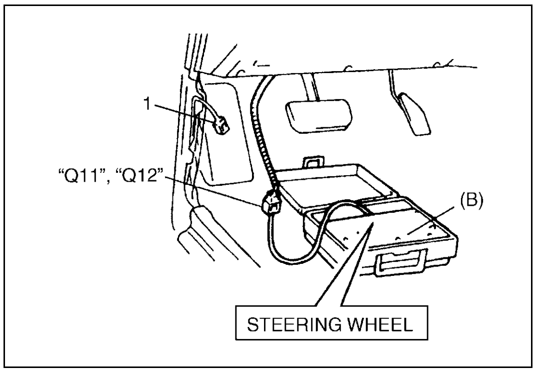
- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1042 and B1046 :

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 "Q11" or "Q12" connector. 3) If OK then connect Special Tool (B) to seat belt pretensioner connector disconnected at the step 1. With ignition switch ON, is DTC B1042 or B1046 still current?	Go to step 2.	Ignition switch OFF. Replace seat belt pretensioner (Refer to Section 10A).

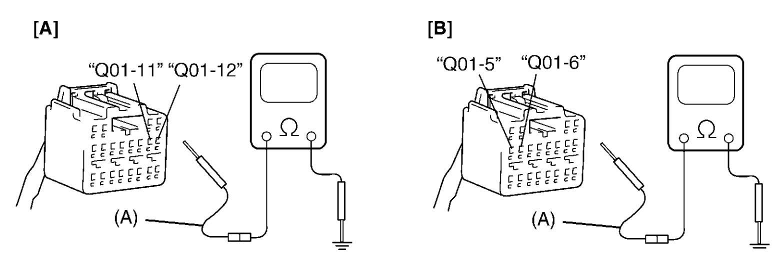
Step	Action	Yes	No
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals “Q01-11” and “Q01-12” or “Q01-6” and “Q01-5”. 3) If OK then measure resistance between “Q01-11” and “Q01-12” terminals or “Q01-06” and “Q01-05” terminals with connected Special Tool (B). Is resistance 1.4 Ω or more?	Substitute a known-good SDM and recheck.	DTC B1042 : Repair short from “PNK” wire circuit to “WHT” wire circuit or from “PNK” or “WHT” wire circuit to other wire circuit. DTC B1046 : Repair short from “BRN” wire circuit to “LT GRN” wire circuit or from “BRN” or “LT GRN” wire circuit to other wire circuit.

Fig. for STEP 1 and 2



1.	Pretensioner harness

Fig. for STEP 2



[A] :	For DTC B1042
[B] :	For DTC B1046

Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:

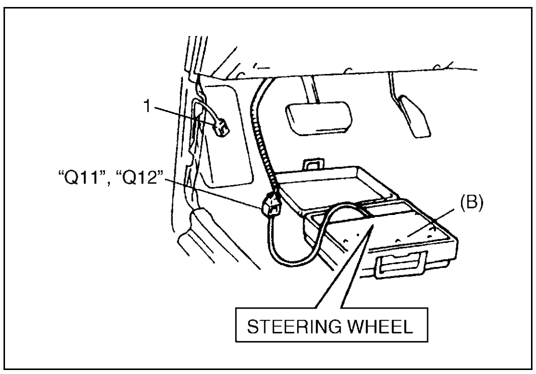
Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1043 and B1047 :

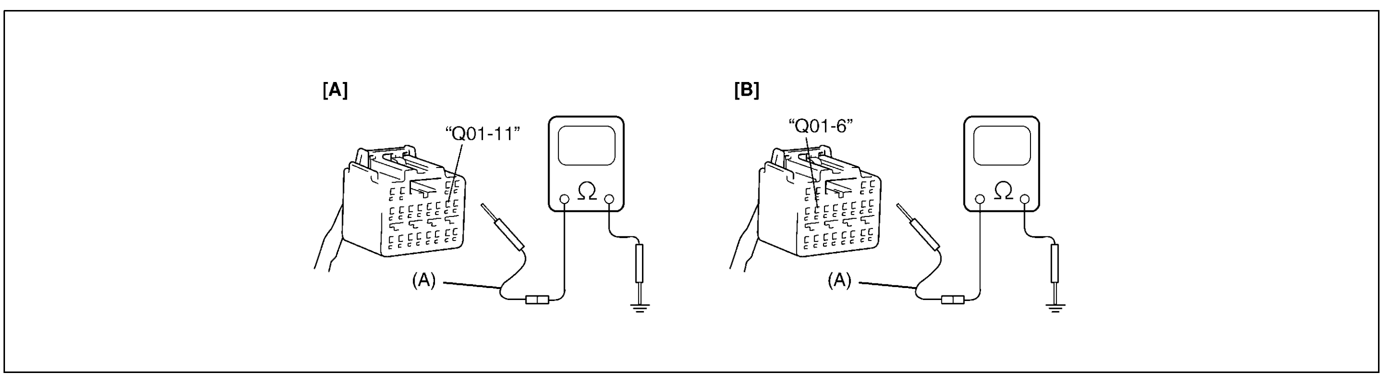
Step	Action	Yes	No
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in "Q11" or "Q12" connector. 3) If OK then connect Special Tool (B) to seat belt pretensioner connector disconnected at the step 1. With ignition switch ON, is DTC B1043 or B1047 still current?	Go to step 2.	Ignition switch OFF. Replace seat belt pretensioner (Refer to Section 10A).
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM. 2) Measure resistance between "Q01-11" or "Q01-6" and body ground. Is circuit open?	Substitute a known-good SDM and recheck.	DTC B1043 : Repair short "PNK" or "WHT" wire circuit to ground. DTC B1047 : Repair short from "BRN" or "LT GRN" wire circuit to ground.

Fig. for STEP 1 and 2



1.	Pretensioner harness

Fig. for STEP 2



[A] :	For DTC B1043
[B] :	For DTC B1047

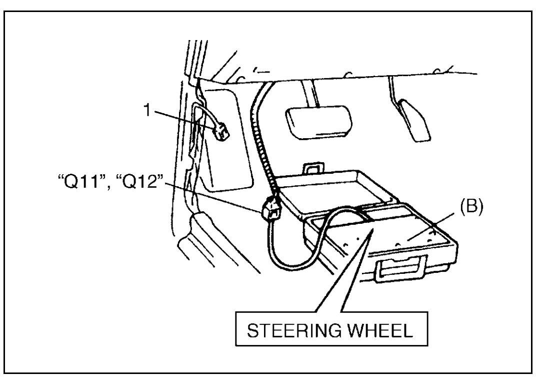
Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1044 and B1048 :

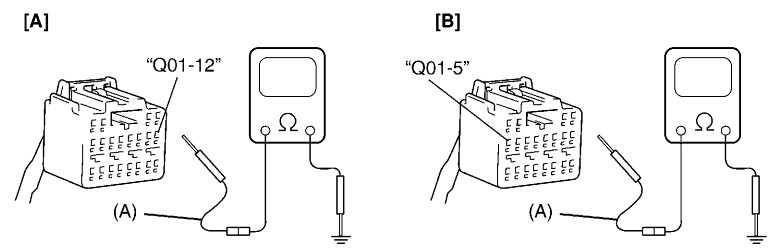
Step	Action	Yes	No
1	1) With ignition switch OFF, remove center pillar inner garnish of applicable side then disconnect seat belt pretensioner connector. 2) Check proper connection to applicable seat belt pretensioner at terminals in “Q11” or “Q12” connector. 3) If OK then connect Special Tool (B) to seat belt pretensioner connector disconnected at the step 1. With ignition switch ON, is DTC B1044 or B1048 still current?	Go to step 2.	Ignition switch OFF. Replace seat belt pretensioner (Refer to Section 10A).
2	1) With ignition switch OFF, disconnect Special Tool (B) and SDM. 2) Measure voltage from “Q01-12” or “Q01-5” terminal to body ground. With ignition switch ON, is voltage 1 V or less?	Substitute a known-good SDM and recheck.	DTC B1044 : Repair short “PNK” or “WHT” wire circuit to power circuit. DTC B1048 : Repair short from “BRN” or “LT GRN” wire circuit to power circuit.

Fig. for STEP 1 and 2



1. Pretensioner harness

Fig. for STEP 2



[A] :	For DTC B1044
[B] :	For DTC B1048

Special tool
(A) : 09932-75020
(B) : 09932-75010

NOTE:

Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Clear diagnostic trouble codes (Refer to DTC CLEARANCE), if any.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1051 – Frontal Crash Detected (System Activation Command Outputted)

DTC WILL SET WHEN

The SDM detects a frontal crash of sufficient force to warrant activation of the air bag system. (SDM outputs a deployment command.)

TABLE TEST DESCRIPTION

STEP 1 : Check that DTC B1051 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 SYSTEM CHECK.

Step	Action	Yes	No
1	1) Ignition switch OFF. Has air bag deployed?	Replace components and perform inspections as directed in "REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT".	Go to step 2.

Step	Action	Yes	No
2	1) Inspect front of vehicle and undercarriage for signs of impact. Are there signs of impact?	Replace components and perform inspections as directed in REPAIRS AND INSPECTIONS REQUIRED AFTER AN ACCIDENT in this section.	Substitute a known-good SDM and recheck.

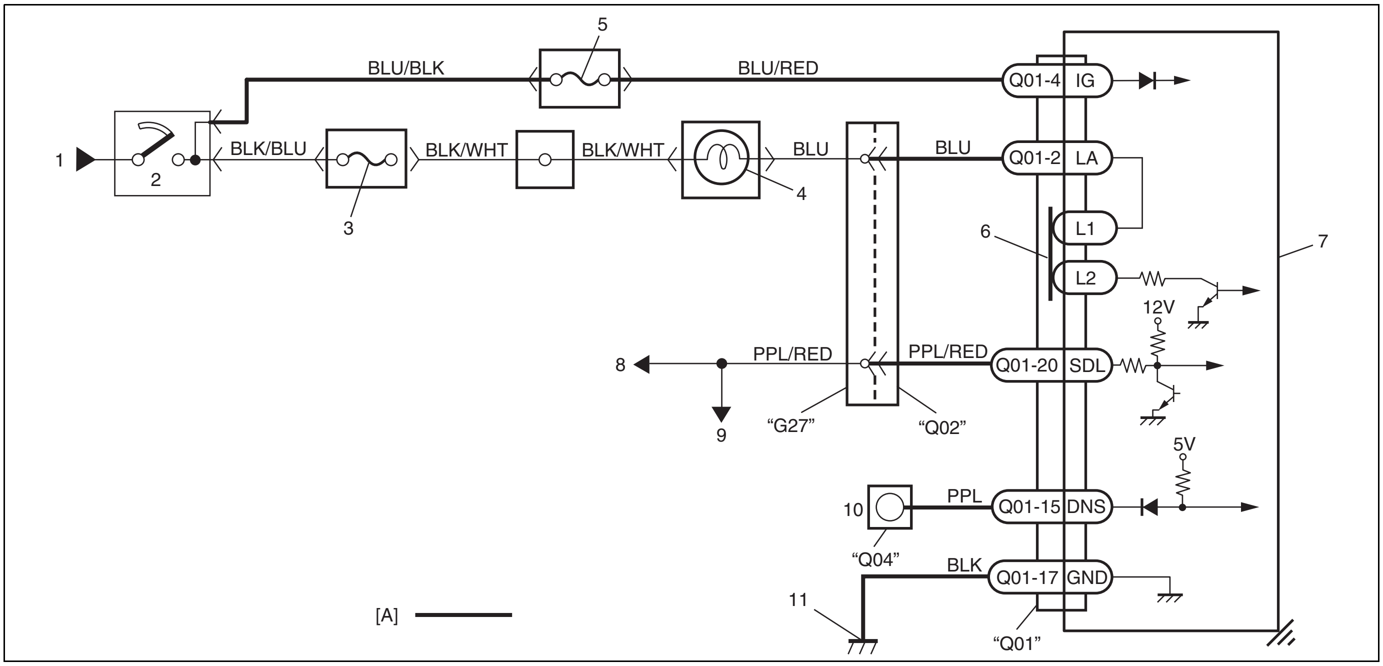
NOTE:

Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1061 – "AIR BAG" Warning Lamp Circuit Failure

WIRING DIAGRAM



1. From main fuse	5. "AIR BAG" fuse	9. To ECM, TCM (if equipped) and ABS control module (if equipped)
2. Ignition switch	6. Connection detection pin	10. "AIR BAG" monitor coupler
3. "IG METER" fuse	7. SDM	11. Ground for air bag system
4. "AIR BAG" warning lamp in combination meter	8. To DLC	[A]: Air bag harness

CAUTION:

- **Be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK before starting diagnosis according to flow table.**
- **When measurement of resistance or voltage is required in this table, use a tester along with a correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is required, refer to INTERMITTENT AND POOR CONNECTIONS in this section.**
- **If there is open circuit in the air bag wire harness, connector or terminal is found damaged, replace the wire harness, connector and terminal as an assembly.**

DTC WILL SET WHEN:

The voltage at the "AIR BAG" warning lamp circuit terminal "Q01-2" does not match the commanded state of the warning lamp driver for specified time.

TABLE TEST DESCRIPTION

STEP 1 : This test rechecks “AIR BAG” warning lamp operation.
STEP 2 : This test rechecks whether an abnormality is in SDM.

DTC B1061 :

Step	Action	Yes	No
1	1) This DTC is set when there is a trouble in “AIR BAG” warning lamp circuit. Failure to properly perform AIR BAG DIAGNOSTIC SYSTEM CHECK may also result in misdiagnosis. Therefore, check “AIR BAG” warning lamp circuit again according to AIR BAG DIAGNOSTIC SYSTEM CHECK. Is “AIR BAG” warning lamp circuit in good condition?	Go to step 2.	Repair “AIR BAG” warning lamp circuit.
2	1) Clear DTC (Refer to DTC CLEARANCE). 2) Check DTC (Refer to DTC CHECK). Is DTC B1061 set?	Substitute a known-good SDM and recheck.	Recheck air bag system. Refer to AIR BAG DIAGNOSTIC SYSTEM CHECK.

NOTE:

Upon completion of inspection and repair work, perform following items.

- **Reconnect all air bag system components, ensure all components are properly mounted.**
- **Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.**

DTC B1071 – Internal SDM Fault

DTC WILL SET WHEN

An internal SDM fault is detected by SDM.

NOTE:

DTC B1071 can never be cleared once it has been set.

1) Ignition switch OFF.
2) Replace SDM.
3) Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK.

DTC B1013 – 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 below, be sure to perform AIR BAG DIAGNOSTIC SYSTEM CHECK.

1) Ignition switch OFF.
2) Replace SDM.
3) Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK.

On-Vehicle Service

Service Precautions

Service and diagnosis

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

WARNING:

- **If the air bag system and another vehicle system both need repair, Suzuki recommends that the air bag system be repaired first, to help avoid unintended air bag system activation.**
- **Do not modify the steering wheel, dashboard or any other on or around 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.**

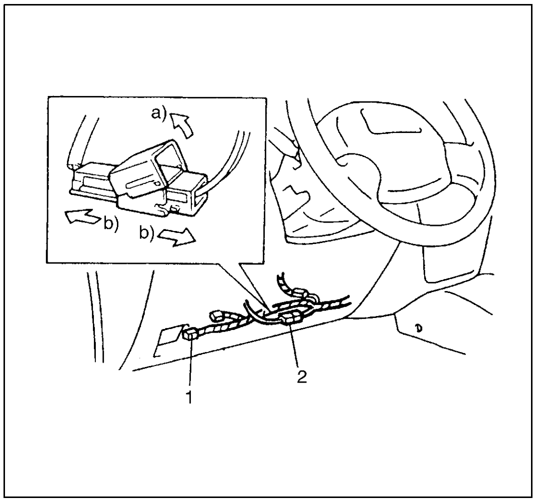
- Many of service procedures require disconnection of “AIR BAG” fuse and air bag (inflator) module(s) (driver and passenger) from initiator circuit to avoid an accidental deployment.
- Do not apply power to the air bag system unless all components are connected or a diagnostic chart requests it, as this will set a diagnostic trouble code (DTC).
- The “AIR BAG DIAGNOSTIC SYSTEM CHECK” must be the starting point of any air bag diagnostics. The “AIR BAG DIAGNOSTIC SYSTEM CHECK” will verify proper “AIR BAG” warning lamp operation and will lead you to the correct table to diagnose any air bag malfunctions. Bypassing these procedures may result in extended diagnostic time, incorrect diagnosis, and incorrect parts replacements.
- Never use air bag component parts from another vehicle.
- If the vehicle will be exposed to temperatures over 93°C (200°F) (for example, during a paint baking process), remove the air bag system components beforehand to avoid component damage or unintended system activation.
- When 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., SDM is dropped, air bag (inflator) module is dropped from a height of 90 cm (3 ft) or more, seat belt pretensioner (retractor assembly) is dropped from a height of 30 cm (1 ft) or more), never attempt disassembly or repair but replace it with a new one.
- When using electric welding, be sure to disconnect air bag (inflator) module connectors (driver and passenger) 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:

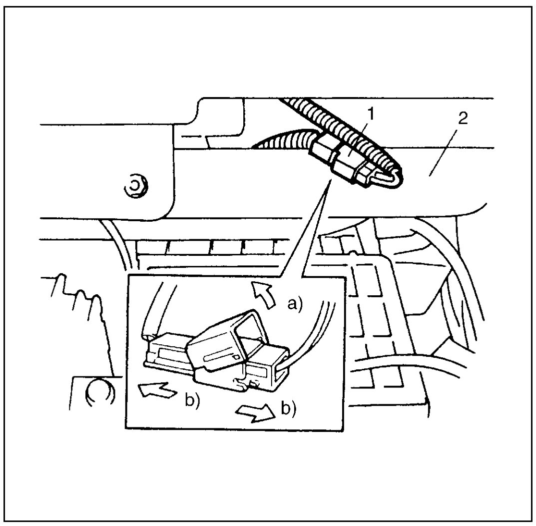
When performing service on or around air bag system components or air bag wiring, follow the procedures listed in the following pages to temporarily disable the air bag system.
Failure to follow procedures could result in possible air bag system activation, personal injury or unneeded air bag system 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 (1).



4) Disconnect Yellow connector (2) of contact coil and combination switch assembly.
   a) Release locking of lock lever.
   b) After unlocked, disconnect to connector.



5) Pull out glove box while pushing its stopper from both right and left sides and disconnect Yellow connector (1) of passenger air bag (inflator) module.
   a) Release locking of lock lever.
   b) After unlocked, disconnect to connector.

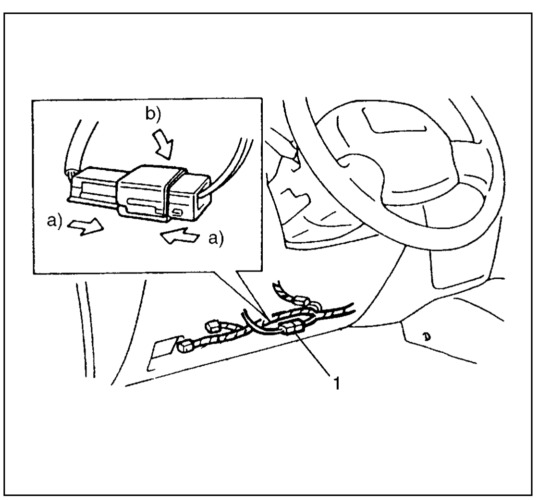
NOTE:

With "AIR BAG" fuse removed and ignition switch ON, "AIR BAG" warning lamp will be ON.
This is normal operation and does not indicate an air bag system malfunction.

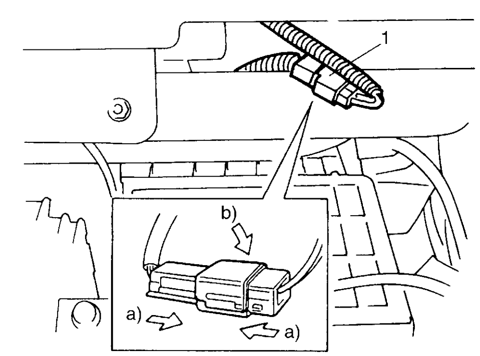
2. Steering support member

Enabling air bag system

1) Turn ignition switch to "LOCK" and remove key.



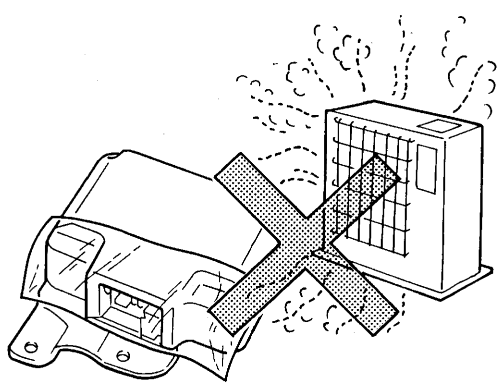
2) Connect Yellow connector (1) of contact coil and combination switch assembly, and be sure to lock connector with lock lever.
   a) Connect connector.
   b) Lock connector with lock lever.

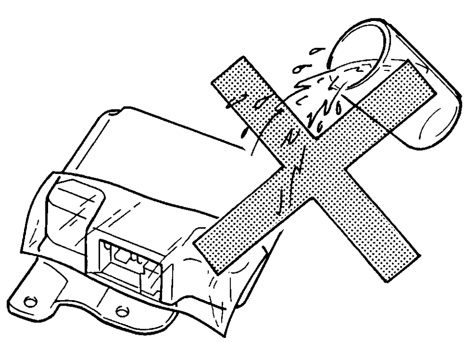


3) Connect Yellow connector (1) of passenger air bag (inflator) module, and be sure to lock connector with lock lever.
   a) Connect connector.
   b) Lock connector with lock lever.
4) Install glove box.
5) Install “AIR BAG” fuse to “AIR BAG” fuse box.
6) Turn ignition switch to ON and verify that “AIR BAG” warning lamp flashes 6 times and then turns off.
   If it does not operate as described, perform “AIR BAG DIAGNOSTIC SYSTEM CHECK” in this section.

Handling and storage

SDM





WARNING:

Never power up air bag system when SDM is not rigidly attached to the vehicle. Otherwise, personal injury may result.

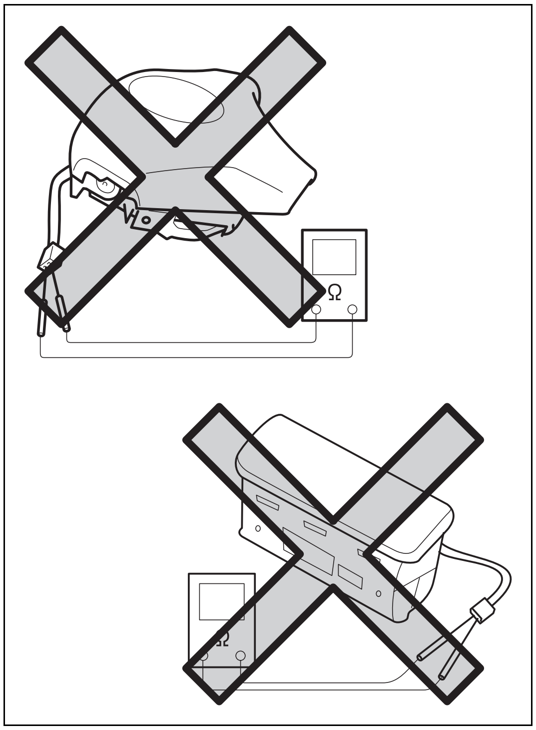
CAUTION:

After detecting one time of such collision as to meet deployment conditions, the SDM must not be used. Refer to “AIR BAG DIAGNOSTIC SYSTEM CHECK” when checking the SDM.

- Never attempt disassembly of SDM.
- When storing SDM, select a place where neither high temperature nor high humidity is anticipated and oil, water and dust are kept off.
- If SDM has been dropped, replace it with a new one.
- If installation part of SDM was damaged, repair that part completely before reinstallation.
- All SDM and mounting bracket fasteners must be carefully torqued and the arrow must be pointed toward the front of the vehicle to ensure proper operation of the air bag system.

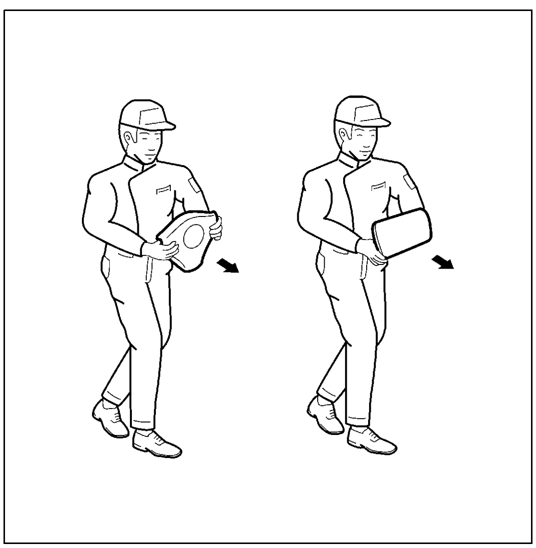
LIVE (UNDEPLOYED) AIR BAG (INFLATOR) MODULES

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



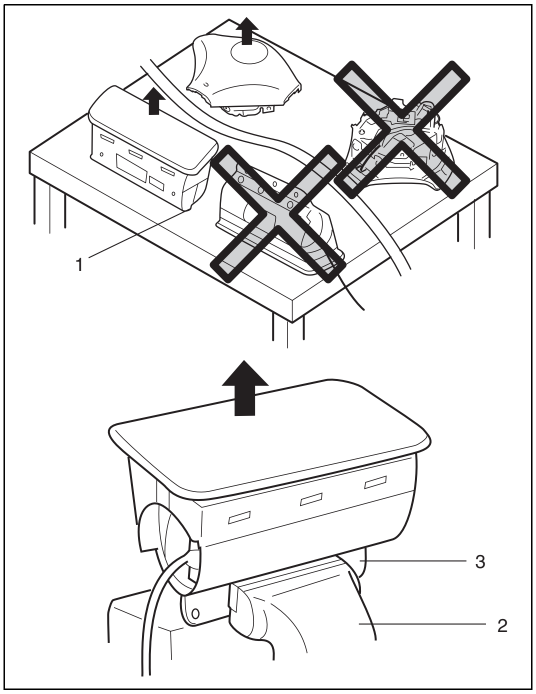
WARNING:
Never attempt to measure the resistance of the air bag (inflator) modules (driver and passenger). It is very dangerous as the electric current from the tester may deploy the air bag.

- Never attempt disassembly of the air bag (inflator) modules.
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When an abnormality is noted as existing in the live (undeployed) air bag (inflator) module, be sure to deploy it before discarding it.
- When grease, cleaning agent, oil, water, etc., got on the air bag (inflator) modules (driver and passenger), wipe it off immediately with a dry cloth.
- If air bag (inflator) module was dropped from a height of 90 cm (3 ft) or more, it should be replaced with a new one as an assembly.



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.**

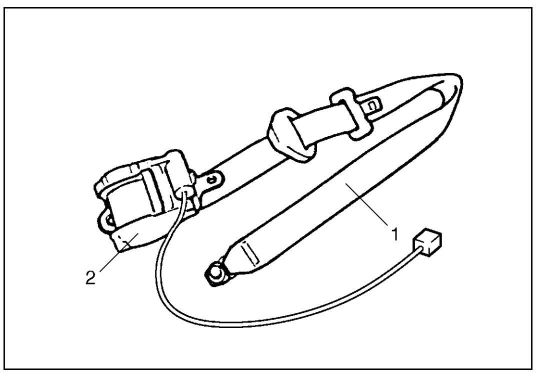
Otherwise, personal injury may result.



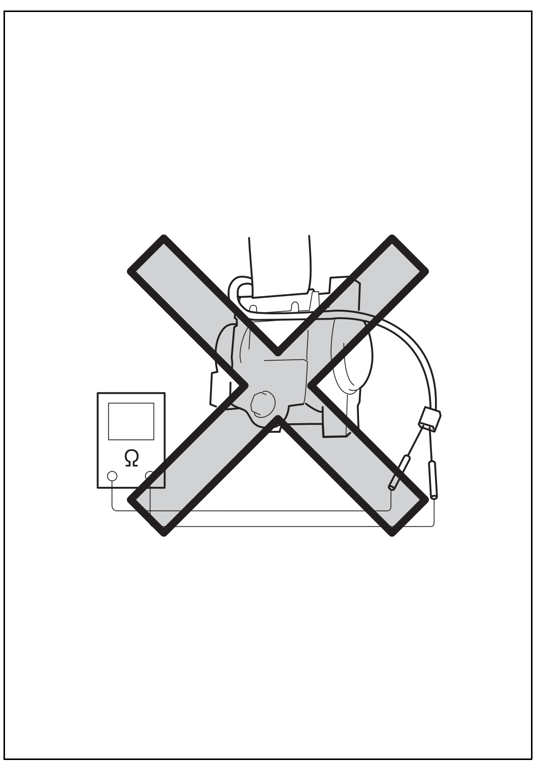
WARNING:

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 (1) or use the workbench vise (2) to hold it securely at its lower mounting bracket (3).
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 PRETENSIONER



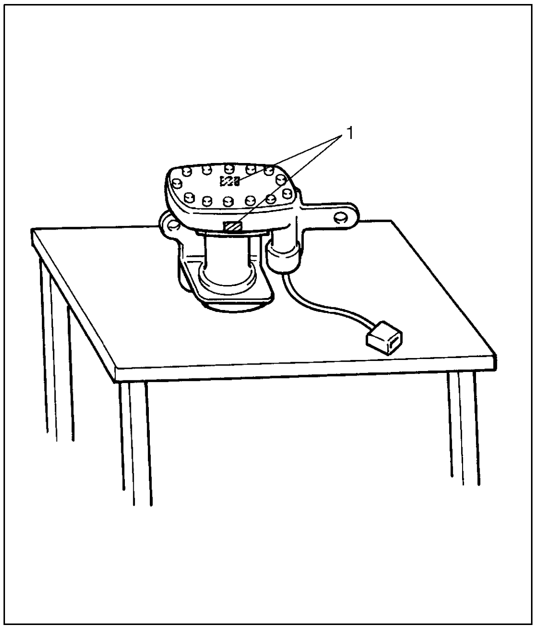
Special care is necessary when handling and storing a live (inactivated) seat belt pretensioners.
Also, when the seat belt pretensioners activate, gas is generated and the seat belt (1) is retracted into the retractor assembly (2) quickly.
Note, therefore, that if they activate accidentally, the seat belt pretensioners and other object(s) around them may be thrown through the air.



WARNING:

Never attempt to measure the resistance of the seat belt pretensioners. It is very dangerous as the electric current from the tester may activate pretensioner.

- Never attempt to disassemble the seat belt pretensioners (retractor assembly).
- If any abnormality is found, be sure to replace it with new one as an assembly.
- When an abnormality is noted as existing in the live (inactivated) seat belt pretensioner, be sure to activate it before discarding it.
- When grease, cleaning agent oil, water, etc., got on the seat belt pretensioners (retractor assembly), wipe it off immediately with a dry cloth.
- If seat belt pretensioner was dropped from a height of 30 cm (1 ft) or more, it should be replaced with a new one as an assembly.



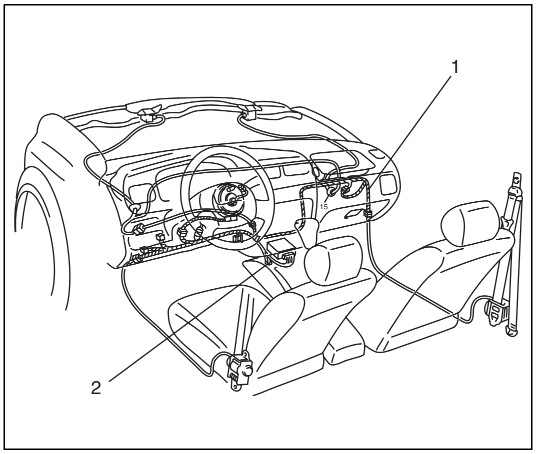
WARNING:
- **For handling and storage of a live seat belt pretensioner, select a place where the ambient temperature below 65°C (150°F), without high humidity and away from electric noise.**
- **Never carry the seat belt pretensioner by the wire or connector of the pretensioner.**
- **When placing a live seat belt pretensioner on the workbench or other surface, be sure not to lay it with its exhaust hole (1) provided side facing down. It is also prohibited to put something on its face with an exhaust hole (1) or to put a seat belt pretensioner on top of another.**

Otherwise, personal injury may result.

DEPLOYED AIR BAG (INFLATOR) MODULE AND ACTIVATED SEAT BELT PRETENSIONER

WARNING:
- **The air bag (inflator) module and seat belt pretensioner immediately after deployment/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 deployed air bag (inflator) module and to activate seat belt pretensioner.**
- **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 AND ACTIVATED SEAT BELT PRETENSIONER DISPOSAL” in this section for disposal.



AIR BAG WIRE HARNESS AND CONNECTOR

Air bag wire harness (1) 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 (1), 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 (1) is not caught or does not interfere with other parts.
- Make sure all air bag system grounding points (2) are clean and grounds are securely fastened for optimum metal-to-metal contact. Poor grounding can cause intermittent problems that are difficult to diagnose.

DISPOSAL

Do not dispose of the live (undeployed) air bag (inflator) modules and the live (inactivated) seat belt pretensioners. When disposal is necessary, be sure to deploy/activate the air bag and seat belt pretensioner according to deployment/activation procedure described in “AIR BAG (INFLATOR) MODULE AND SEAT BELT PRETENSIONER 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) modules, Driver/Passenger seat belt pretensioners**
  - **Forward sensors**
  - **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 "AIR BAG DIAGNOSTIC SYSTEM CHECK" when checking the SDM.

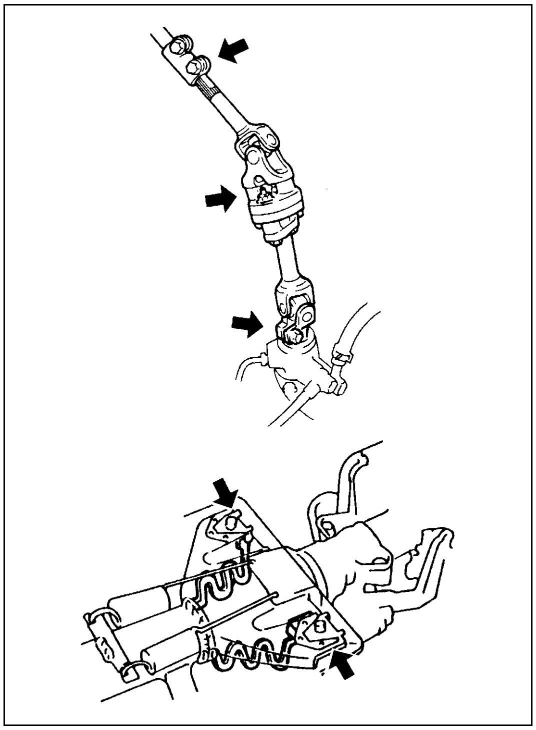
Accident with deployment/activation - component replacement

Certain air bag system components must be replaced. Those components are:

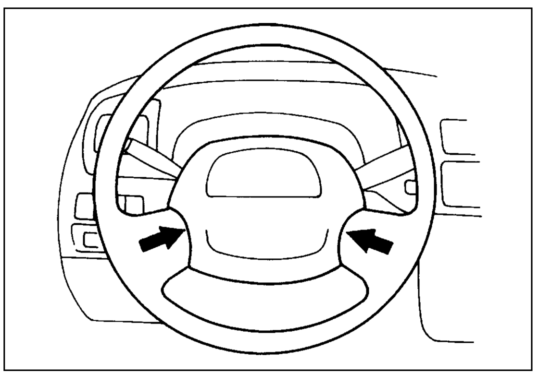
- Driver and passenger air bag (inflator) modules
  - Replace with new one.
- Driver and Passenger seat belt pretensioners
  - Replace with new one.
- SDM after detecting such collision as to meet deployment conditions
  - Replace with new one.
- Forward sensors
  - Replace with new one.

Accident with or without deployment/activation - component inspections

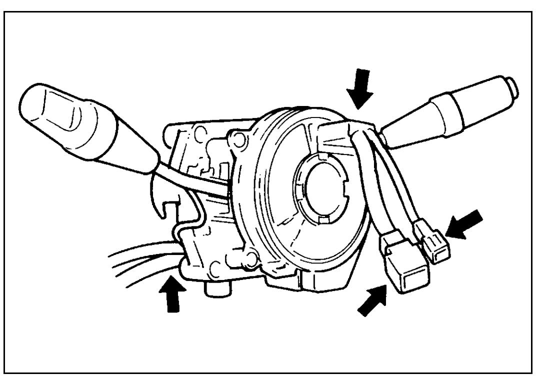
Certain air bag and restraint system components must be inspected after any crash, whether the air bag system activated or not.
Those components are:



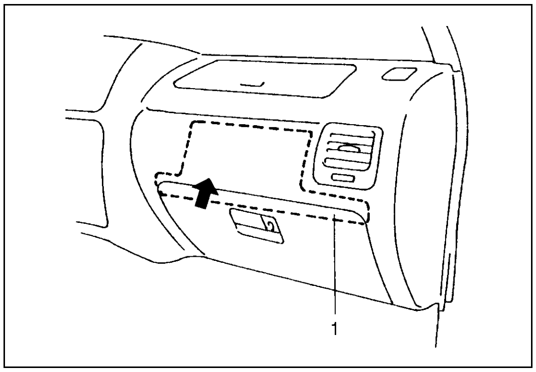
- Steering column and shaft joints
  - Check for length, damage and bend according to “CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE” in Section 3C1.
- Steering column bracket and capsules
  - Check for damage and bent.
- If any faulty condition is found in above checks, replace faulty part.



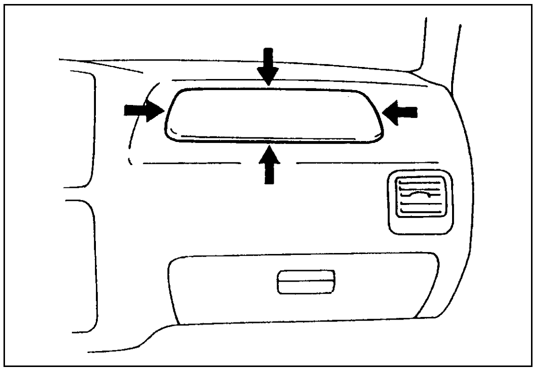
- Steering wheel and driver air bag (inflator) module
  - Check for damage or air bag (inflator) module fitness.
  - Check trim cover (pad surface) for cracks.
  - Check wire harness and connector for damage or tightness.
- If any faulty condition is found in above checks, replace faulty part.



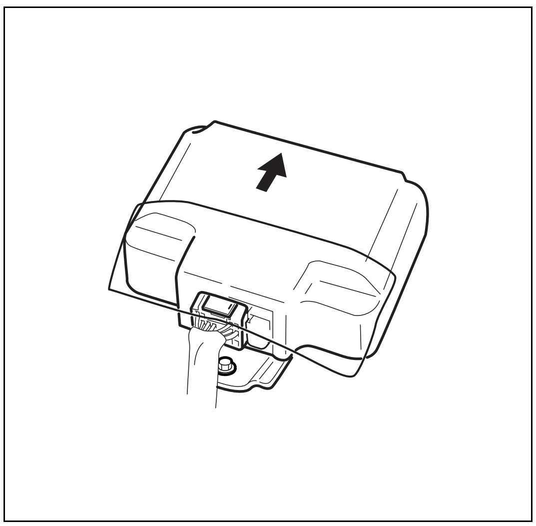
- Contact coil and combination switch assembly
  - Check wire harness and connectors for damage or tightness.
  - Check contact coil case for damage.
- If any faulty condition is found in above checks, replace.



- Instrument panel member, reinforcement and knee bolster & panel (1) (passenger)
  - Check for any distortion, bending, cracking or other damage.
- If any faulty condition is found in above checks, replace.

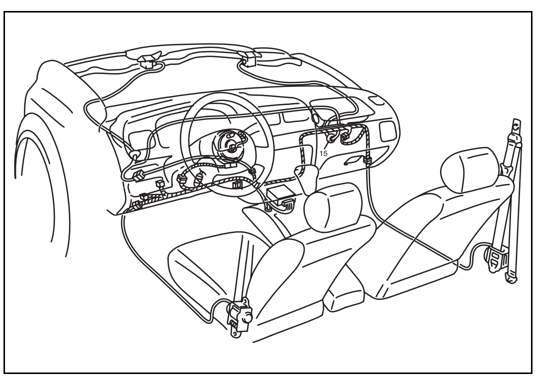


- Passenger air bag (inflator) module
  - Check for dents, cracks, damage or fitness.
  - Check trim cover for cracks or deformities.
  - Check harness and connector for damage or tightness.
- If any faulty condition is found in above checks, replace.



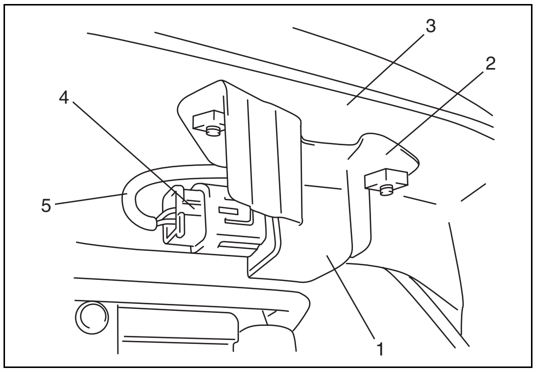
- SDM
  - Check for external damage such as deformation, scratch, crack, peeled paint, etc.
  - Check that SDM cannot be installed properly due to a cause in itself. (There is a gap between SDM and SDM plate, or it cannot be fixed securely.)
  - Check that connector or lead wire of SDM has a scorching, melting or damage.
  - Check SDM connector and terminals for tightness.
  - Check SDM sets a diagnostic trouble code (Refer to “DTC CHECK”.) and the diagnostic table leads to a malfunctioning SDM.

If any faulty condition is found in above checks, replace.



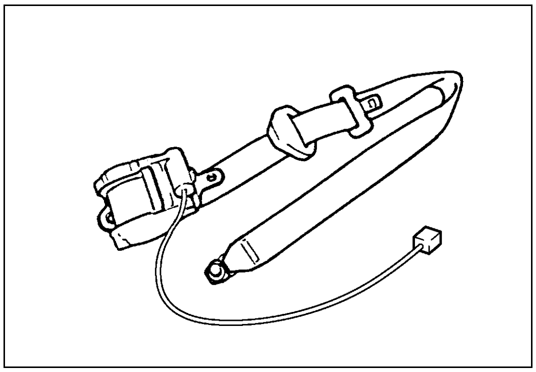
- Air bag wire harness and connections
  - Check for damages, deformities or poor connections. (Refer to “INTERMITTENTS AND POOR CONNECTIONS”.)
  - Check wire harness clamps for tightness.

If any faulty condition is found, correct or replace.



- Forward sensor
  - Check sensor (1), sensor bracket (2), and front panel (3) for damage bend or rust.
  - Check that connector (4) or lead wire (5) of forward sensor has a scorching, melting or damage.

If any faulty condition is found in above checks, replace.



- 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.

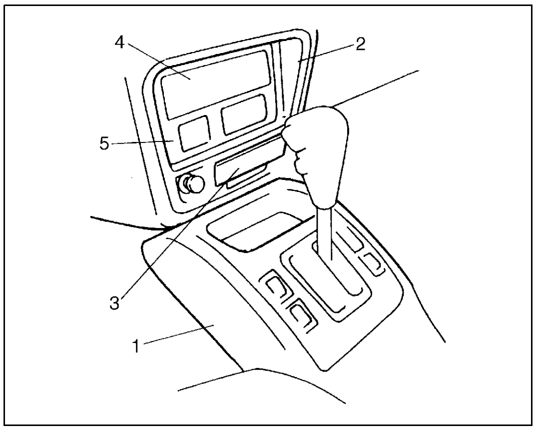
- Seat belts and mounting points
  - Refer to “FRONT SEAT BELT WITH PRETENSIONER” in SECTION 10A.
- “AIR BAG” warning lamp
  - After vehicle is completely repaired, perform “AIR BAG DIAGNOSTIC SYSTEM CHECK”.

SDM

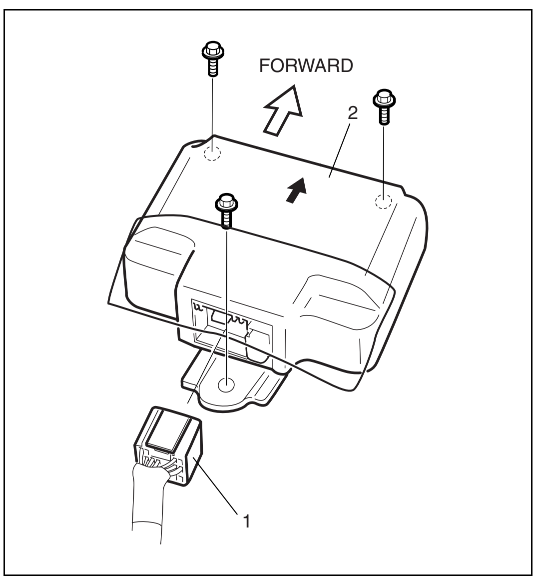
> **WARNING:**
> **During service procedures, be very careful when handling a Sensing and Diagnostic Module (SDM).**
> **Be sure to read "Service Precautions" in this section before starting to work and observe every precaution during work. Neglecting them may result in personal injury or inactivation of the air bag system when necessary.**

REMOVAL

1) Disconnect negative (–) cable at battery.
2) Disable air bag system. Refer to "DISABLING AIR BAG SYSTEM" in this section.



3) Remove rear and front center console box (1) by removing screw and clips.
4) Remove center garnish panel (2).
5) Remove ashtray (3) and tuner assembly, clock assembly (5), tuner pocket, radio hole cover (4), etc.



6) Disconnect SDM connector (1) from SDM (2).
7) Remove SDM (2) from vehicle.

INSPECTION

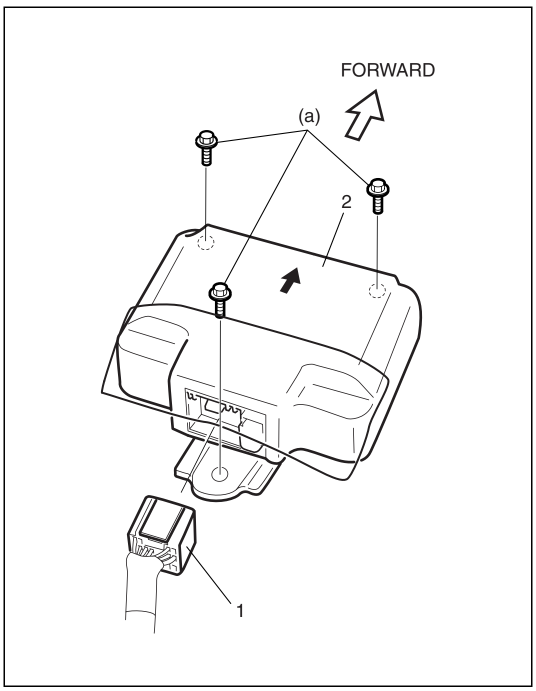
> **CAUTION:**
> - **Do not connect a tester whatever type it may be.**
> - **Never repair or disassemble SDM.**
> - **If SDM has been dropped, it should be replaced.**

- 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.

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



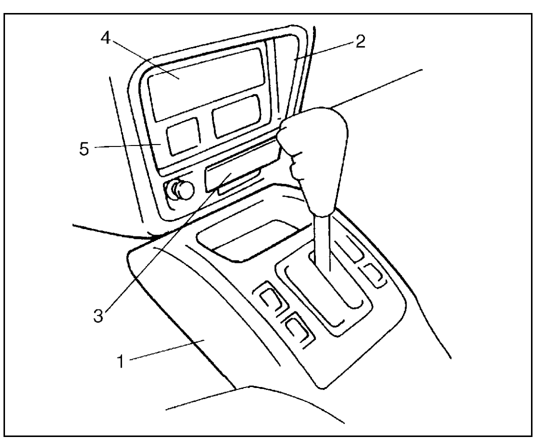
2) Install SDM (2) to vehicle.

> **CAUTION:**
> **Ensure that arrow on the SDM is pointing toward the front of the vehicle.**

3) Tighten SDM bolts to specified torque.

   Tightening torque
   SDM bolt (a) : 6 N·m (0.6 kg-m, 4.5 lb-ft)

4) Connect SDM connector (1) to SDM (2) securely.



5) Install tuner assembly, clock assembly (5), tuner pocket, radio hole cover (4), etc. and ashtray (3).
6) Install center garnish panel (2).
7) Install front and rear center console box (1).
8) Connect negative cable to battery.
9) Enable air bag system. Refer to “ENABLING AIR BAG SYSTEM” in this section.

Forward Sensor

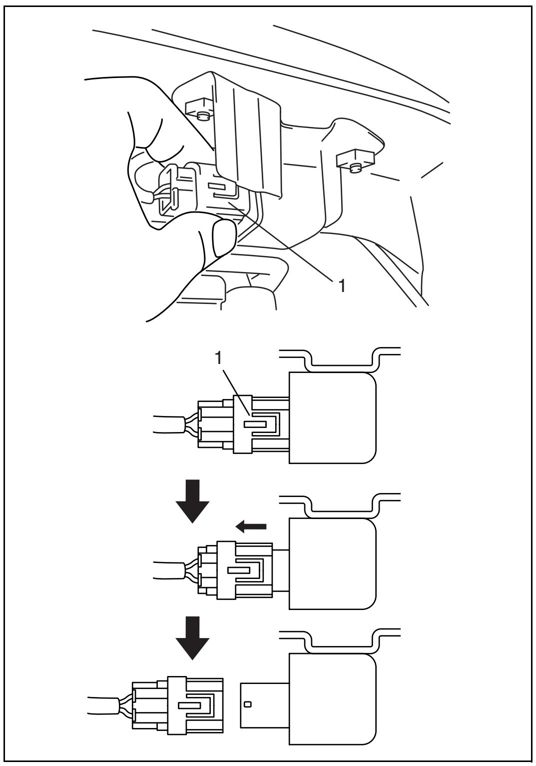
WARNING:

During service procedures, be very careful when handling a sensor.

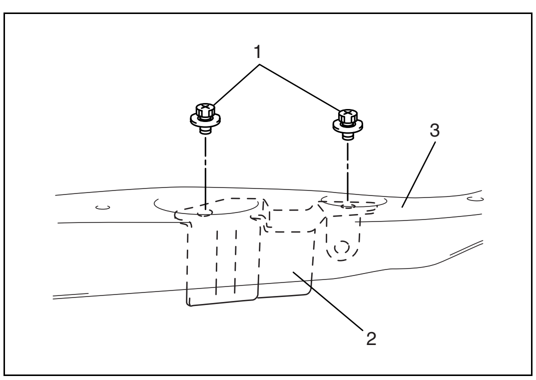
- **Never strike or jar a sensor.**
- **Under some circumstances, it could cause improper operation of the air bag system. A sensor and mounting bracket bolts must be carefully torqued to assure proper operation.**

REMOVAL

1) Disconnect negative cable at battery.
2) Disable air bag system. Refer to “DISABLING AIR BAG SYSTEM” in this section.
3) Remove front grill referring to “FRONT BUMPER” in Section 9.



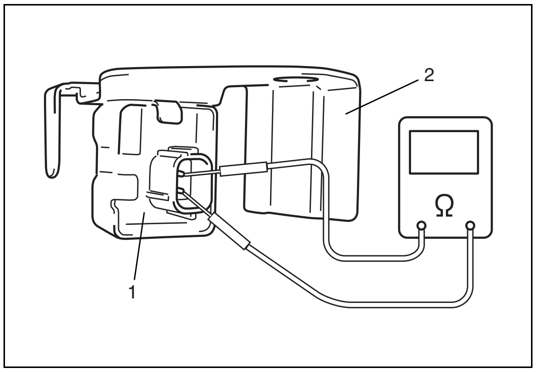
4) Disconnect forward sensor connector sliding connector outer (1) as shown.



5) Remove forward sensor bolts (1), and forward sensor (2) from front panel (3).

INSPECTION

CAUTION:
- **Never disassemble forward sensor.**
- **Sensor should be replaced when it was dropped from a height of 90 cm (3 ft) or more.**

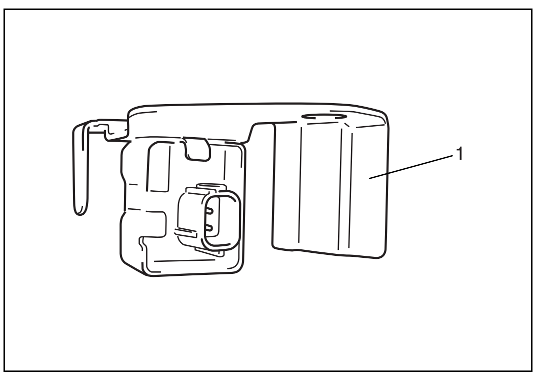


- Check sensor (1) and its bracket (2) for dents, cracks, deformation or rust.
- Check sensor connector (sensor side and harness side) or lock mechanism for damage or crack.
- Check connector terminals for bent, corrosion or rust.
- Check sensor for resistance.

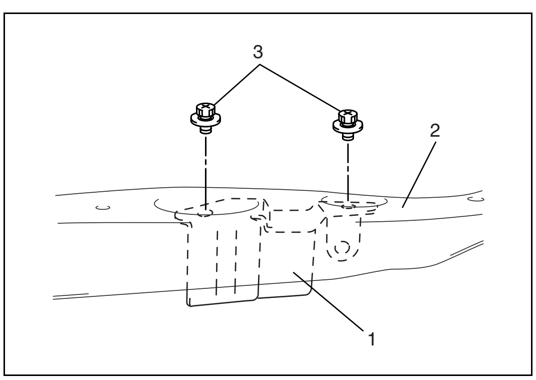
Sensor resistance : 738 - 905 Ω

INSTALLATION

CAUTION:
Proper operation of forward sensor requires sensor be rigidly attached to vehicle structure and that the arrow on sensor bracket be pointing toward the front of the vehicle.



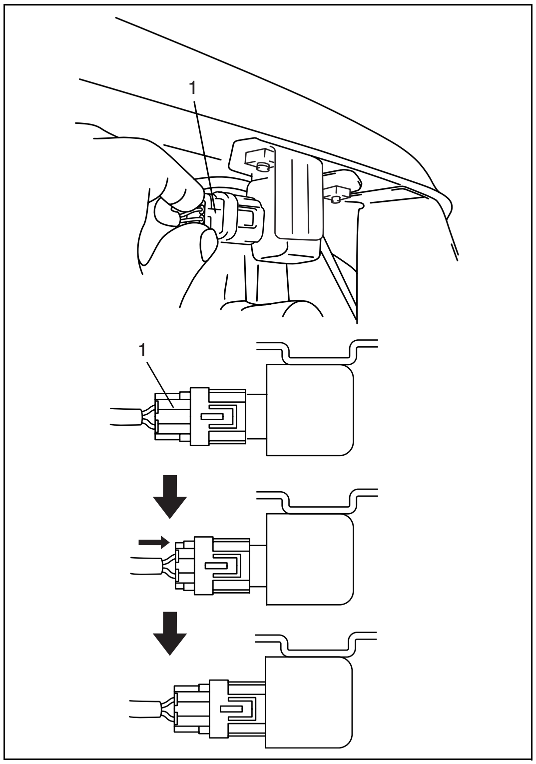
1) Check that none of following faulty conditions exists.
   - Bend or deformity of sensor bracket (1) and front panel.
   - Foreign matter on mating surface of sensor bracket (1) with sensor or excessive rust.



2) Apply thread lock cement to mounting bolts thread. Install forward sensor (1) on front panel (2) and tighten mounting bolts (3) to specified torque.

"A" : Thread lock cement "1332B" 99000-32100

Tightening torque
(a) : 10 N·m (1.0 kg-m, 7.2 lb-ft)



3) Connect forward sensor connector pushing connector inner (1) as shown.

4) Connect negative cable at battery.
5) Enable air bag system. Refer to “ENABLING AIR BAG SYSTEM” in this section.

Seat Belt Pretensioner

Refer to “FRONT SEAT BELT” in Section 10A for removal, inspection and installation.

Air Bag (Inflator) Module and Seat Belt Pretensioner 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 may cause personal injury.
Undeployed air bag (inflator) module/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.

Do not dispose of the live (undeployed) air bag (inflator) modules and seat belt pretensioners.
The method employed depends upon the final disposition of the particular vehicle, as noted in "DEPLOYMENT/ACTIVATION OUTSIDE VEHICLE" and "DEPLOYMENT/ACTIVATION INSIDE VEHICLE".

Deployment/Activation Outside Vehicle :
Follow this procedure when disposing of the air bag (inflator) module(s) and seat belt pretensioner(s) only (i.e., the vehicle itself will be used again).

Deployment/Activation Inside Vehicle :
Follow this procedure when scrapping the entire vehicle including the air bag (inflator) modules and seat belt pretensioners.

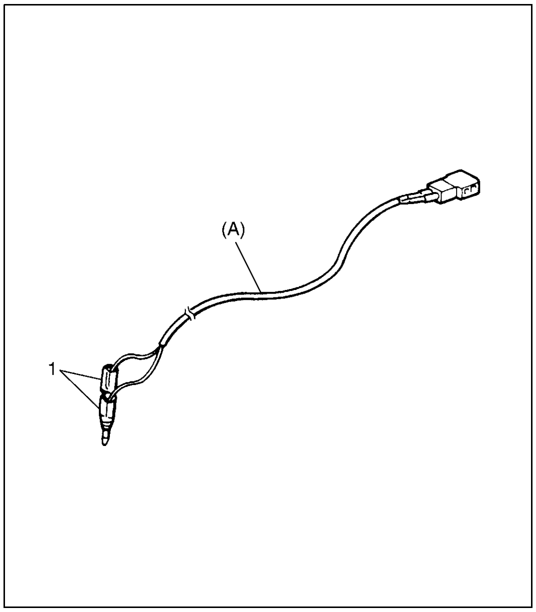
WARNING:

Following precautions must be observed for this work. Failure to observe any of them may result in personal injury.

- **The procedure should be followed strictly as described here.**
- **Be sure to read "SERVICE PRECAUTIONS" beforehand.**
- **To avoid an accidental deployment, this work should be performed by no more than one person.**
- **Since the smoke is produced when air bag is deployed and pretensioner is activated, select a well-ventilated area.**
- **The air bag (inflator) module and seat belt pretensioner will immediately deploy/activate when a power source is connected to it. Wear safety glasses throughout this entire deployment/activation and disposal procedure.**
- **Wear suitable ear protection when deploying air bag/activating pretensioner. Also, advise those who are in the area close to deployment/activation site to wear suitable ear protection.**
- **Do not deploy/activate two or more air bag system components (air bag (inflator) modules and seat belt pretensioners) at the same time.**
- **Never connect deployment harness to any power source before connecting deployment harness to the air bag (inflator) module and seat belt pretensioner. Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed and the pretensioner is to be activated.**

Deployment/Activation Outside Vehicle

Use this procedure when the vehicle itself is used again (only the air bag (inflator) module(s) and seat belt pretensioner(s) are disposed).

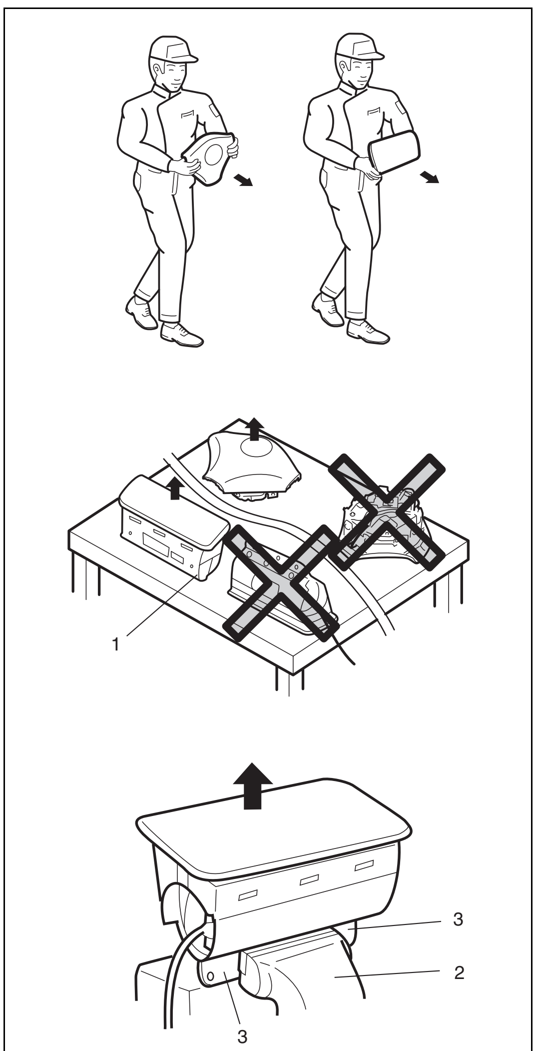


1) Turn ignition switch to “LOCK”, position remove key and put on safety glasses.
2) Check that there is no open, short or damage in special tool (deployment harness). If any faulty is found, do not use it and be sure to use new deployment harness.

Special tool
(A) : 09932-75030

3) Short (1) the two deployment harness leads together by fully seating one banana plug into the other.

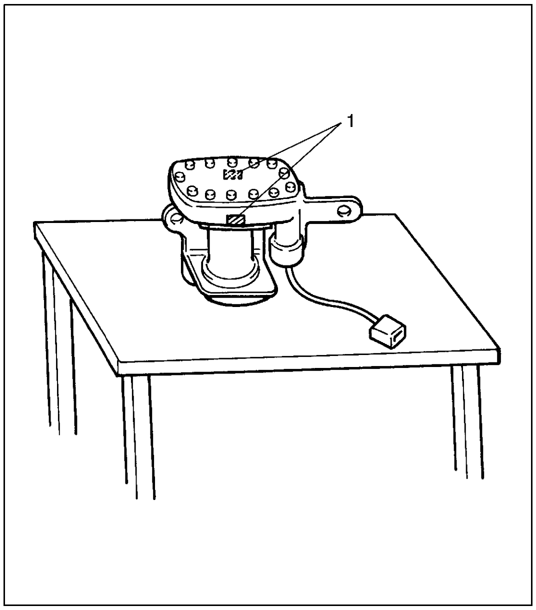
WARNING:
Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed and seat belt pretensioner is to be activated.



4) Remove air bag (inflator) module(s) and seat belt pretensioner(s) from vehicle, referring to SECTION 3C1, 10B and 10A.

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 (1) or use the workbench vise (2) to hold it securely at its lower mounting bracket (3).**
  This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.

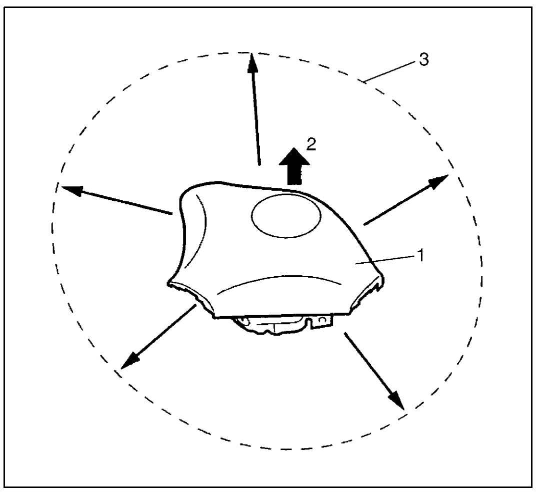
Failure to follow procedures may result in personal injury.



WARNING:
- **For handing 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 wire or connector of the pretensioner.**
- **When placing a live seat belt pretensioner on the workbench or other surface, be sure not to lay it with its exhaust hole (1) provided side facing down. It is also prohibited to put something on its face with an exhaust hole (1) or to put a seat belt pretensioner on top of another.**

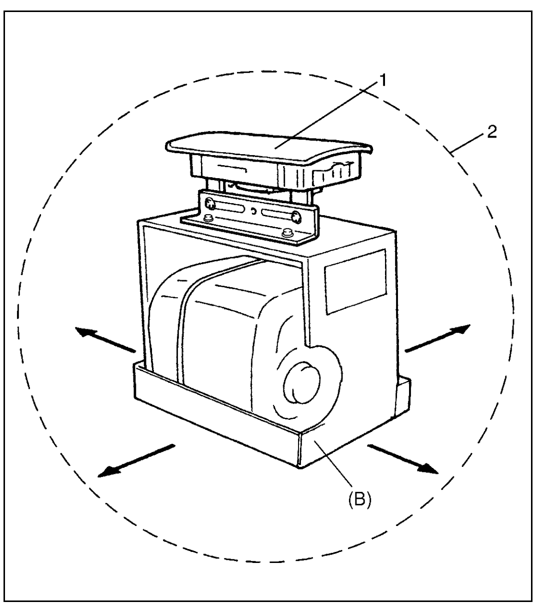
Otherwise, personal injury may result.

5) Set air bag (inflator) module or seat belt pretensioner as follows.



[In case of driver air bag (inflator) module]

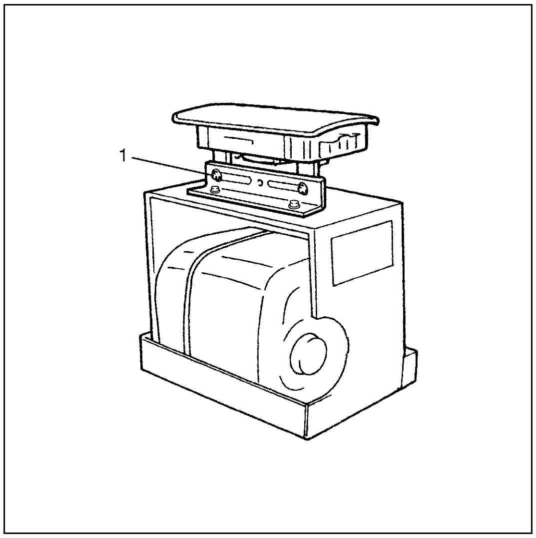
a) Clear a space on the ground about 185 cm (6 ft) (3) in diameter where the driver air bag (inflator) module (1) is to be deployed. A paved, outdoor location where there is no activity is preferred. If an outdoor location is not available, a space on the shop floor where there is no activity and sufficient ventilation is recommended.
   Ensure no loose or flammable objects are within the deployment area.
b) Place the driver air bag (inflator) module (1), with its vinyl trim cover facing up (2), on the ground in the space just cleared.



[In case of passenger air bag (inflator) module]

a) Clear a space on the ground about 185 cm (6 ft) (2) in diameter where the fixture (special tool) with attached air bag (inflator) module (1) is to be placed for deployment. A paved outdoor location where there is no activity is preferred. If an outdoor location is not available, a space on the shop floor where there is no activity and sufficient ventilation is recommended. Ensure that no loose or flammable objects are within the deployment area.
b) Place special tool (passenger air bag (inflator) module deployment fixture) on the ground in the space cleared in step a), if it has not already been placed there.

Special tool
(B) : 09932-75041

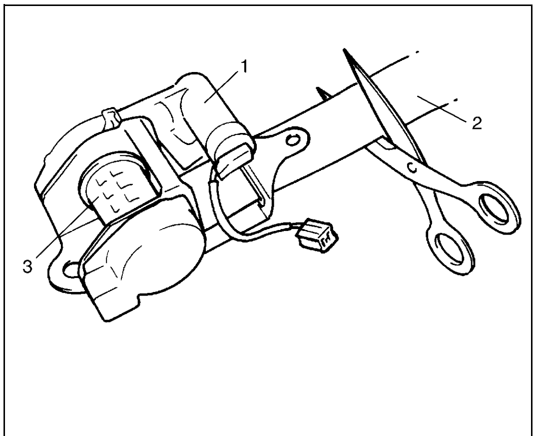


c) Fill plastic reservoir in fixture (special tool) with water or sand. This is necessary to provide sufficient stabilization of the fixture during deployment.

d) Attach the passenger air bag (inflator) module in the fixture (special tool) using mounting attachment, hold-down bolts and nuts and M8 bolts and nuts (1).

CAUTION:
Be sure to use the following bolt and nut for fixing passenger air bag (inflator) module to mounting attachment.
Size : M8, Strength : 7T

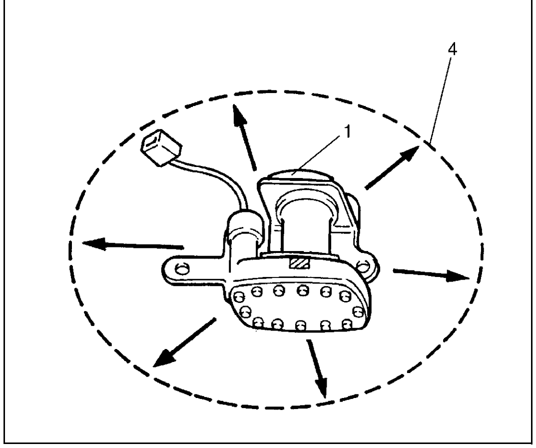
Securely hand-tighten all fastener prior to deployment.



[In case of seat belt pretensioner]

a) Pull out the webbing (2) fully as shown in the figure and cut it at the root of the pretensioner (retractor assembly) (1) as shown in the figure.

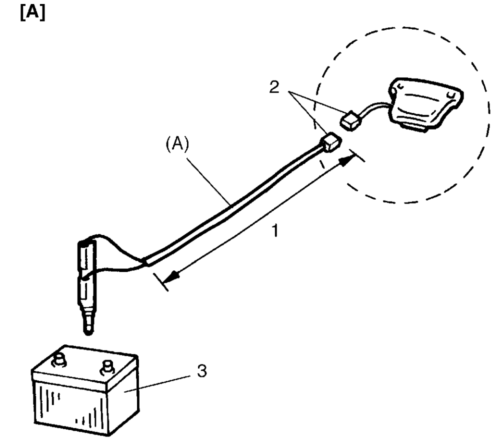
WARNING:
As the drum (3) of the retractor assembly (1) turns very quickly as soon as the webbing (2) is cut, fix the retractor assembly (1) with a vise on the workbench and keep your hands and fingers away from it when cutting the webbing (2).



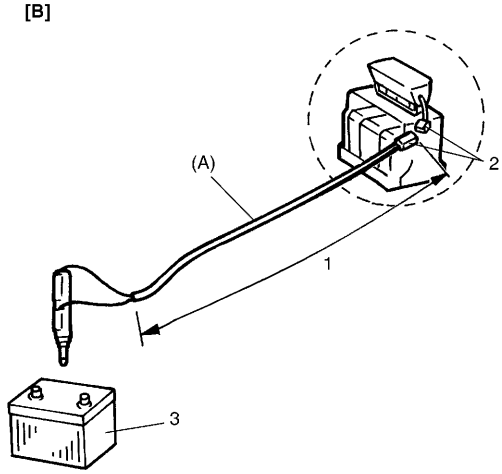
b) Clear a space on the ground about 185 cm (6 ft) (4) in diameter where the seat belt pretensioner (retractor assembly) (1) is to be activated. A paved, outdoor location where there is no activity is preferred. If an outdoor location is not available, a space on the shop floor where there is no activity and sufficient ventilation is recommended.
Ensure no loose or flammable objects are within the activation area.

c) Place the seat belt pretensioner (retractor assembly) (1) as shown in the figure on the ground in the space just cleared.

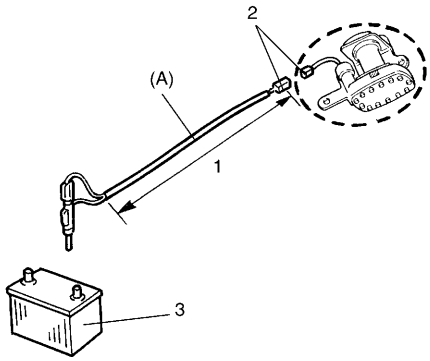
[A]



[B]



[C]



6) Stretch the deployment harness from the driver or passenger air bag (inflator) module to its full length 10 m (33 ft) (1).

Special tool
(A) : 09932-75030

7) Place a power source (3) near the shorted end of the deployment harness. Recommended application: 12 Volts minimum, 2 amps minimum. A vehicle battery is suggested.
8) Verify that the area around the air bag (inflator) module or seat belt pretensioner is clear of all people and loose or flammable objects.
9) Verify setting condition of air bag (inflator) module or pretensioner as follows.
   [In case of driver air bag (inflater) module]
   Verify that the driver air bag (inflator) module is resting with its vinyl trim cover facing up.
   [In case of passenger air bag (inflator) module]
   Verify that the passenger air bag (inflator) module is firmly and properly secured in passenger air bag (inflator) module deployment fixture (special tool).
   [In case of seat belt pretensioner]
   Verify that the seat belt pretensioner, is placed as shown in the figure on the ground in the space just cleared.
10) Connect (2) the air bag (inflator) module or seat belt pretensioner to the deployment harness connector and lock connector with lock lever.
11) Notify all people in the immediate area that you intend to deploy/activate the air bag (inflator) module or seat belt pretensioner.

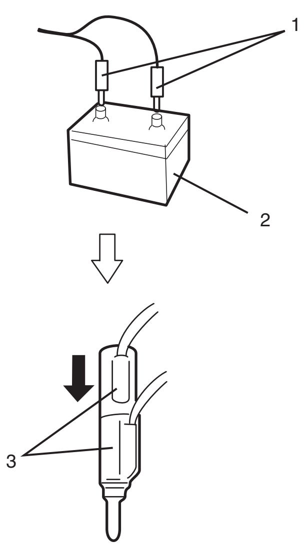
[A] :	For Driver Air Bag (Inflator) Module
[B] :	For Passenger Air Bag (Inflator) Module
[C] :	For Seat Belt Pretensioner

NOTE:

- **When the air bag deploys and 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 deploy the air bag (inflator) module or activate the seat belt pretensioner and suitable ear protection should be worn.**
- **When the driver air bag deploys and the pretensioner activates, driver air bag (inflator) module and pretensioner (retractor assembly) may jump about 30 cm (1 ft) vertically. This is a normal reaction of them to the force of the rapid gas expansion inside the air bag and pretensioner.**
- **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 by-products of the chemical reaction.**

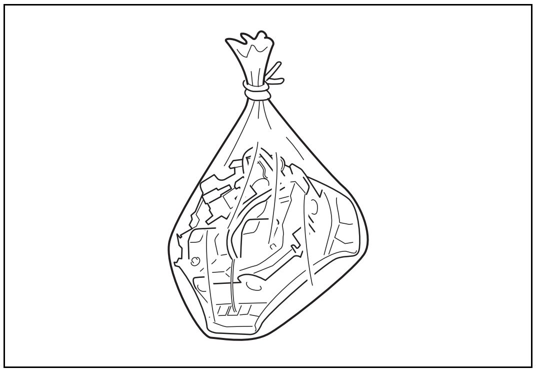
WARNING:
- **After deployment/activation, the metal surfaces of the air bag (inflator) module and the seat belt pretensioner will be very hot. Do not touch the metal areas of them for about 30 minutes after deployment/activation.**
- **Do not place the deployed air bag (inflator) module and the activated seat belt pretensioner near any flammable objects.**
- **Do not apply water, oil, etc. to deployed air bag (inflator) module and activated seat belt pretensioner.**
- **If the deployed air bag (inflator) module and the activated seat belt pretensioner must be moved before it is cool, wear gloves and handle it by using nonmetal material such as the air bag, webbing and vinyl trim.**

Failure to follow procedures may result in fire or personal injury.



12) Separate (1) the two banana plugs on the deployment harness.
13) Connect the deployment harness to the power source (12V vehicle battery) (2) to immediately deploy/activate the air bag or seat belt pretensioner.
14) Disconnect the deployment harness from power source (12V vehicle battery) (2) and short (3) the two deployment harness leads together by fully seating one banana plug into the other.
15) In the unlikely event that the air bag (inflator) module or seat belt pretensioner did not deploy/activate after following these procedures, proceed immediately with Steps 20) through 23). If the air bag (inflator) module or the seat belt pretensioner did deploy/activate, proceed with Steps 16) through 19).
16) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the deployed air bag (inflator) module and the activated seat belt pretensioner.
17) Disconnect the deployment harness from the air bag (inflator) module and the seat belt pretensioner as soon after deployment/activation as possible.

    This will prevent damage to the deployment harness due to possible contact with the hot air bag (inflator) module and seat belt pretentioner. The deployment harness are designed to be reused. They should, however, be inspected for damage after each deployment/activation and replaced it if necessary.



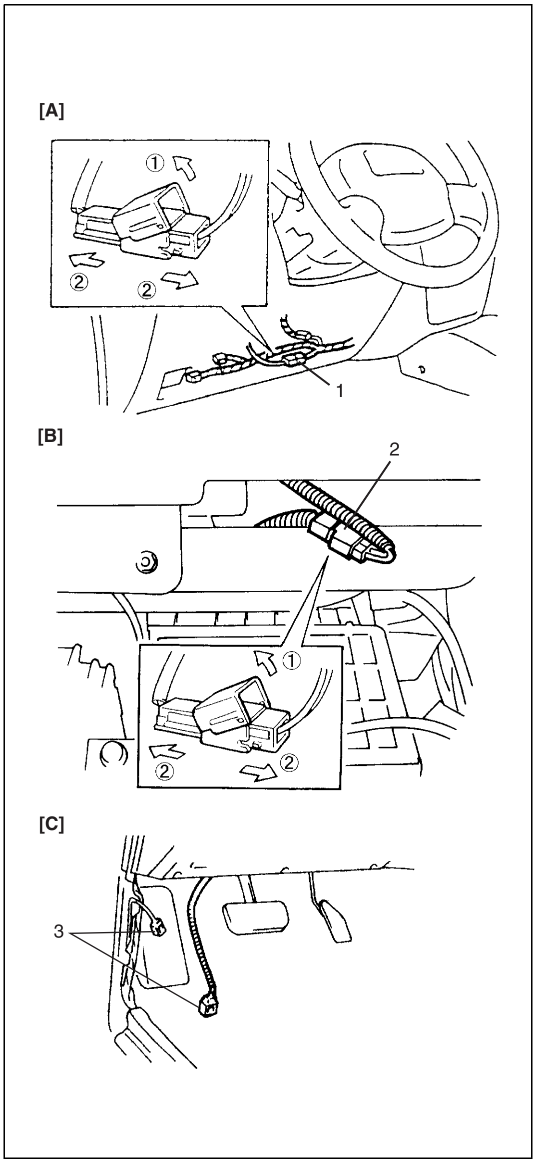
18) Dispose of the deployed air bag (inflator) module and the activated seat belt pretensioner through normal refuse channels after it has cooled for at least 10 minutes and tightly seal the air bag (inflator) module and the seat belt pretensioner in a strong vinyl bag. (Refer to “DEPLOYED AIR BAG (INFLATOR) MODULE AND ACTIVATED SEAT BELT PRETENSIONER DISPOSAL” in detail.)
19) 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 or the seat belt pretensioner did not activate after following these procedures.

20) 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.
21) Disconnect the deployment harness from the air bag (inflator) module and the seat belt pretensioner.
22) Temporarily store air bag (inflator) module or seat belt pretensioner.
    [For driver air bag (inflator) module]
    Temporarily store the air bag (inflator) module with its vinyl trim cover facing up, away from the surface upon which it rests. Refer to “SERVICE PRECAUTIONS” for details.
    [For seat belt pretensioner]
    When temporarily strong the seat belt pretensioner, be sure NOT to face its exhaust hole provided side down. It must face up. Refer to “SERVICE PRECAUTIONS” for details.
23) Contact your local distributor for further assistance.

Deployment/Activation Inside Vehicle

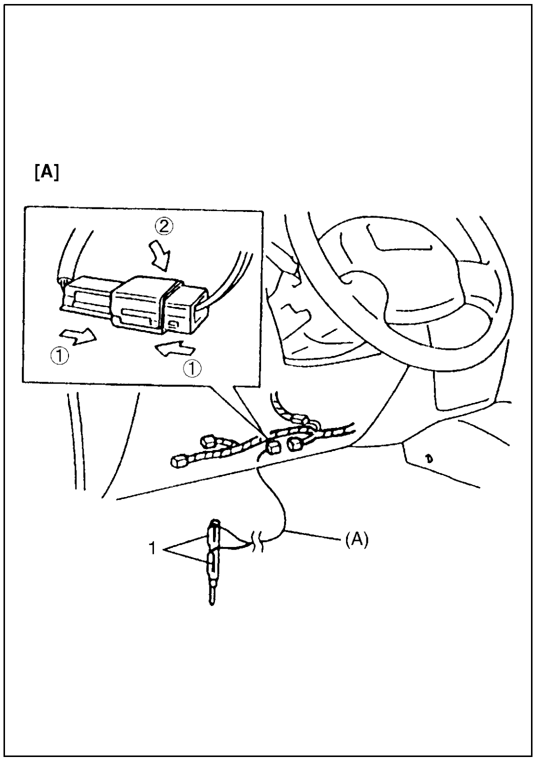


Use this procedure when scrapping the entire vehicle including the air bag (inflator) modules and seat belt pretensioners.

> **CAUTION:**
> **When vehicle itself will be used again, deploy/activate the air bag and pretensioner outside vehicle according to "DEPLOYMENT/ACTIVATION OUTSIDE VEHICLE", for deploying/activating 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.**

1) Turn ignition switch to "LOCK" position, remove key and put on safety glasses.
2) Remove all loose objects from front seats and instrument panel.
3) [For driver air bag (inflator) module]
   Disconnect contact coil connector (1) located near the base of the steering column.
   [For passenger air bag (inflator) module]
   Remove glove box from instrument panel and disconnect passenger air bag (inflator) module connector (2).
   [For seat belt pretensioner]
   Remove both side (driver and passenger side) front pillar lower trim and disconnect seat belt pretensioner connectors (3).
4) Confirm that each air bag (inflator) module is securely mounted.

[A] :	For Driver Air Bag (Inflator) Module
[B] :	For Passenger Air Bag (Inflator) Module
[C] :	For Seat Belt Pretensioner



5) Check that there is no open, short or damage in special tool (deployment harness). If any faulty condition is found, do not use it and be sure to use new deployment harness.

Special tool
(A) : 09932-75030

6) Short (1) 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 and seat belt pretensioner is to be activated.

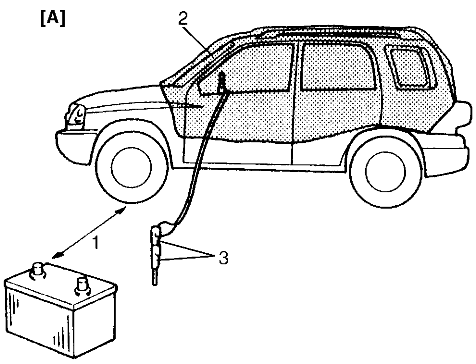
7) Connect deployment harness connector to air bag (inflator) module (driver or passenger) or seat belt pretensioner (driver or passenger) and lock connector with lock lever.
 a) Connect connector.
 b) Lock connector with lock lever.

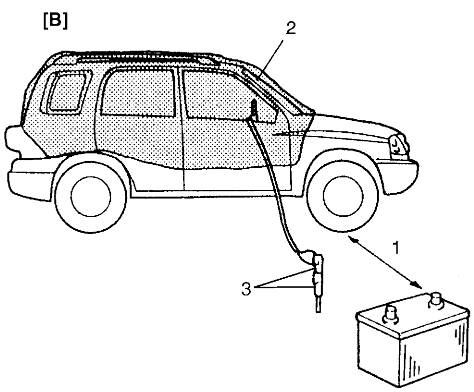
[A] : For Driver Air Bag (Inflator) Module

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) (1).

Special tool
(A) : 09932-75030

11) Place a power source near the shorted end (3) 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 (2). 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 or activate the seat belt pretensioner.





[A] :	Driver side for left hand steering vehicle
[B] :	Driver side for right hand steering vehicle

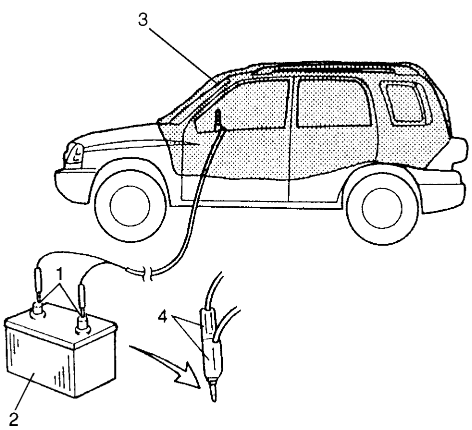
NOTE:

- **When the air bag deploys and 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 deploy the air bag (inflator) module or to activate the seat belt pretensioner 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 by-products of the chemical reaction.**

WARNING:

- **After deployment/activation, the metal surfaces of the air bag (inflator) module and the seat belt pretensioner will be very hot. Do not touch the metal areas of them for about 30 minutes after deployment/activation.**
- **Do not apply water, oil, etc. to deployed air bag (inflator) module and activated seat belt pretensioner. Failure to follow procedures may result in fire or personal injury.**

14) Separate the two banana plugs on the deployment harness.
15) Connect (1) the deployment harness to the power source (12 V vehicle battery) (2) to immediately deploy/activate the air bag or the pretensioner.
16) Disconnect the deployment harness from the power source (12 V vehicle battery) (2) and short (4) 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 and the activated seat belt pretensioner.
18) Disconnect the deployment harness from the air bag (inflator) module and the seat belt pretensioner as soon after deployment/activation as possible.
    This will prevent damage to the deployment harness due to possible contact with the hot air bag (inflator) module and seat belt pretensioner. The deployment harness are designed to be reused. They should, however, be inspected for damage after each deployment/activation and replaced it if necessary.



19) Carefully remove drop cloth (3) from vehicle and clean off any fragments or discard it entirely.
20) Repeat Steps 2) through 19) to deploy/activate air bag (inflator) modules and seat belt pretensioners which has not been deployed/activated, if any.
21) In the unlikely event that the air bag (inflator) module and the seat belt pretensioner proceed immediately with Steps 23) through 25). If the air bag (inflator) module and the seat belt pretensioner did deploy/activate, proceed with Steps 22).

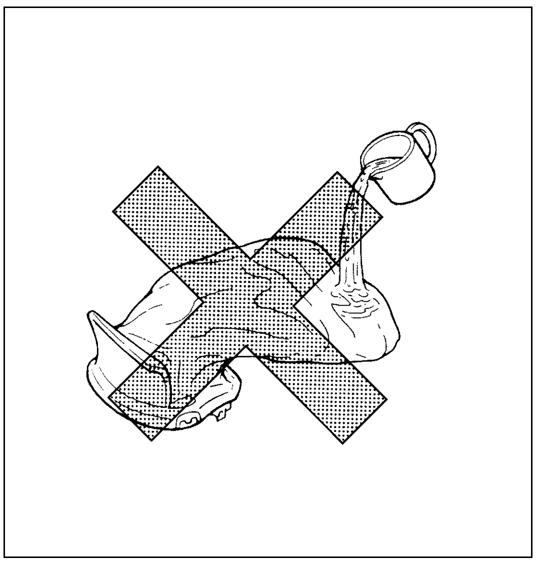
22) With air bags deployed and pretensioners activated the vehicle may be scrapped in the same manner as a non-air bag system equipped vehicle.
23) Remove the undeployed air bag (inflator) module(s) and the inactivated seat belt pretensioner(s) from the vehicle. For driver air bag (inflator) module refer to SECTION 3C1, for passenger air bag (inflator) module refer to “ON-VEHICLE SERVICE”, for seat belt pretensioner refer to SECTION 10A.
24) [For air bag (inflator) module]
    Temporarily store the air bag (inflator) module with its vinyl trim cover facing up, away from the surface upon which it rests. Refer to “SERVICE PRECAUTIONS” for details.
    [For seat belt pretensioner]
    When temporarily strong the seat belt pretensioner, be sure NOT to face its exhaust hole provided side down. It must face up. Refer to “SERVICE PRECAUTIONS” for details.
25) Contact your local distributor for further assistance.

Deployed Air Bag (Inflator) Module and Activated Seat Belt Pretensioner Disposal

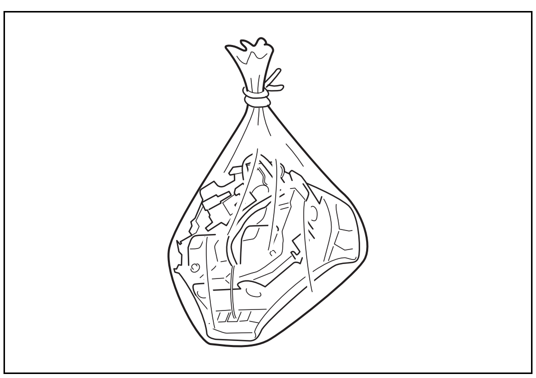
WARNING:

Failure to follow proper air bag (inflator) module and seat belt pretensioner disposal procedures can result in air bag deployment and pretensioner activation which may cause personal injury. The undeployed air bag (inflator) module and the inactivated seat belt pretensioner must not be disposed of through normal refuse channels.
The undeployed air bag (inflator) module and the inactivated seat belt pretensioner contains substances that can cause severe illness or personal injury if the sealed container is damaged during disposal.

Deployed air bag (inflator) module and the activated seat belt pretensioner 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 and the seat belt pretensioner immediately after deployment/activation 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 and the activated seat belt pretensioner to cool it off and be careful so that water, oil etc. does not get on the deployed air bag (inflator) module and the activated seat belt pretensioner.
- 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 by-products of the chemical reaction. As with many service procedures, you should wear gloves and safety glasses.

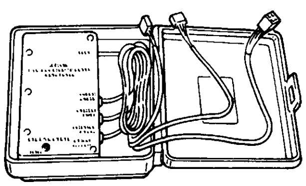
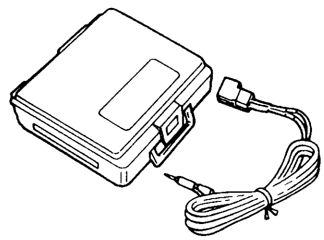
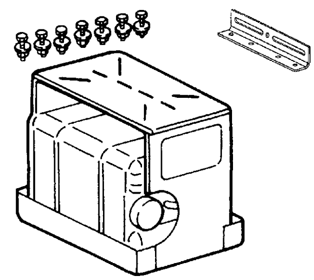
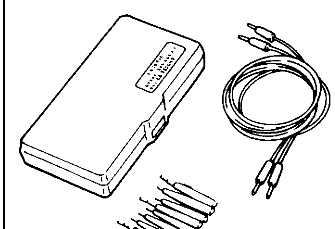
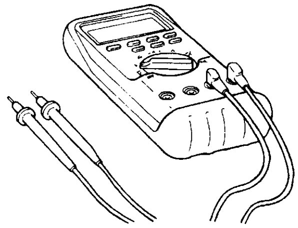
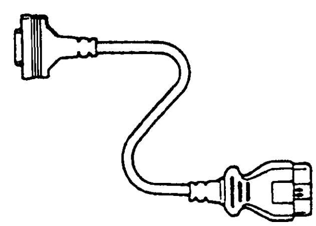
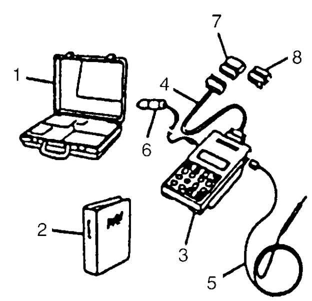
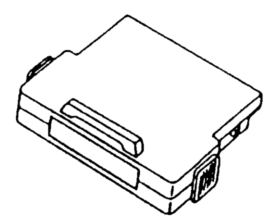
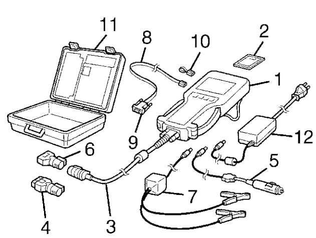


- When disposing of the deployed air bag (inflator) module and the activated seat belt pretensioner, be sure to seal it in a vinyl bag.
- When air bag (inflator) module and seat belt pretensioner have been deployed/activated inside the vehicle which is going to be scrapped, leave them as installed to the vehicle.
- Be sure to wash your hands with mild soap and water after handling it.

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
SDM bolt	6	0.6	4.5
Passenger air bag (inflator) module screw	5.5	0.55	4.0
Passenger air bag (inflator) module bolt	23	2.3	16.5
Forward sensor bolt	10	1.0	7.2
Driver air bag (inflator) module bolt	Refer to Section 3C1.		
Seat belt pretensioner (retractor assembly) bolt	Refer to Section 10A.		

Special Tool

 09932-75010 Air bag driver/passenger load tool	 09932-75030 Air bag deployment harness	 09932-75041 Passenger air bag (inflator) module deployment fixture	 09932-75020 Connector test adapter kit
 Digital multimeter (See NOTE “B” and WARNING.)	 09931-76030 16/14 pin DLC cable for Tech-1A	 09931-76011 Tech-1A kit (SUZUKI scan tool) (See NOTE “A”.)	 Mass storage cartridge for Tech-1A
 Tech-2 kit (SUZUKI scan tool) (See NOTE “C”.)			

WARNING:

Be sure to use the specified digital multimeter. Otherwise, air bag deployment or personal injury may result.

NOTE:

- **"A" : This kit includes the following items and substitutes for the Tech-2 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
- **"B" : Digital multimeter specification : The maximum test current is 10 mA or less at the minimum range of resistance measurement.**
- **"C" : This kit includes the following items and substitutes for the Tech-1A kit.**
  1. Tech 2, 2. PCMCIA card, 3. DLC cable, 4. SAE 16/19 adapter, 5. Cigarette cable, 6. DLC loopback adapter, 7. Battery power cable, 8. RS232 cable, 9. RS232 adapter, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

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