

# 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 or 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, that is air bag or inflator modules, SDM and/or seat belt with pretensioner, beforehand to avoid component damage or unintended activation.

## FOREWORD

This SUPPLEMENTARY SERVICE MANUAL is a supplement to LIANA (RH413/RH416) SERVICE MANUAL. It has been prepared exclusively for the following applicable model.

**Applicable model: LIANA (RH413/RH416) vehicles on and after following vehicle identification numbers (VINs).**

### WAGON

RC11S-150001 ~	ⓧJSAERC11S00150001ⓧ~	
RC31S-150001 ~	ⓧJSAERC31S00150001ⓧ~	JS2RC31S□25150001~
	ⓧJSAERC31S20150001ⓧ~	
	ⓧJSAERC31S25150001ⓧ~	
	ⓧJSAERC31S35150001ⓧ~	
	ⓧJSAERD31S00150001ⓧ~	

### SEDAN

RA11S-100001 ~	ⓧJSAERA11S00100001ⓧ~	JS2RA11S□25100001~
	ⓧJSAERA11S35100001ⓧ~	
RA31S-100001 ~	ⓧJSAERA31S00100001ⓧ~	JS2RA31S□25100001~
	ⓧJSAERA31S20100001ⓧ~	
	ⓧJSAERA31S35100001ⓧ~	
	ⓧJSAERB31S00100001ⓧ~	

This supplementary service manual describes only different service information of the above applicable model as compared with LIANA SERVICE MANUAL. Therefore, whenever servicing the above applicable model, consult this supplement first. And for any section, item or description not found in this supplement, refer to the related service manual below.

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

All information, illustrations and specifications contained in this literature are based on the latest product information available at the time of publication approval. And used as the main subject of description is the vehicle of standard specifications among others.

Therefore, note that illustrations may differ from the vehicle being actually serviced.

The right is reserved to make changes at any time without notice.

### Related Manuals:

Manual Name	Manual No.
LIANA (RH413/RH416) SERVICE MANUAL	99500-54G00-01E
LIANA (RH413/RH416) WIRING DIAGRAM MANUAL	99512-54G20-015

**SUZUKI MOTOR CORPORATION**

QUALITY ASSURANCE ADMINISTRATION DIVISION  
MANUAL GROUP



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## NOTE:

For the screen toned sections in the above table, refer to the same section of Service Manual mentioned in FOREWORD of this manual.





## SECTION 0A

0A

## GENERAL INFORMATION

**NOTE:**

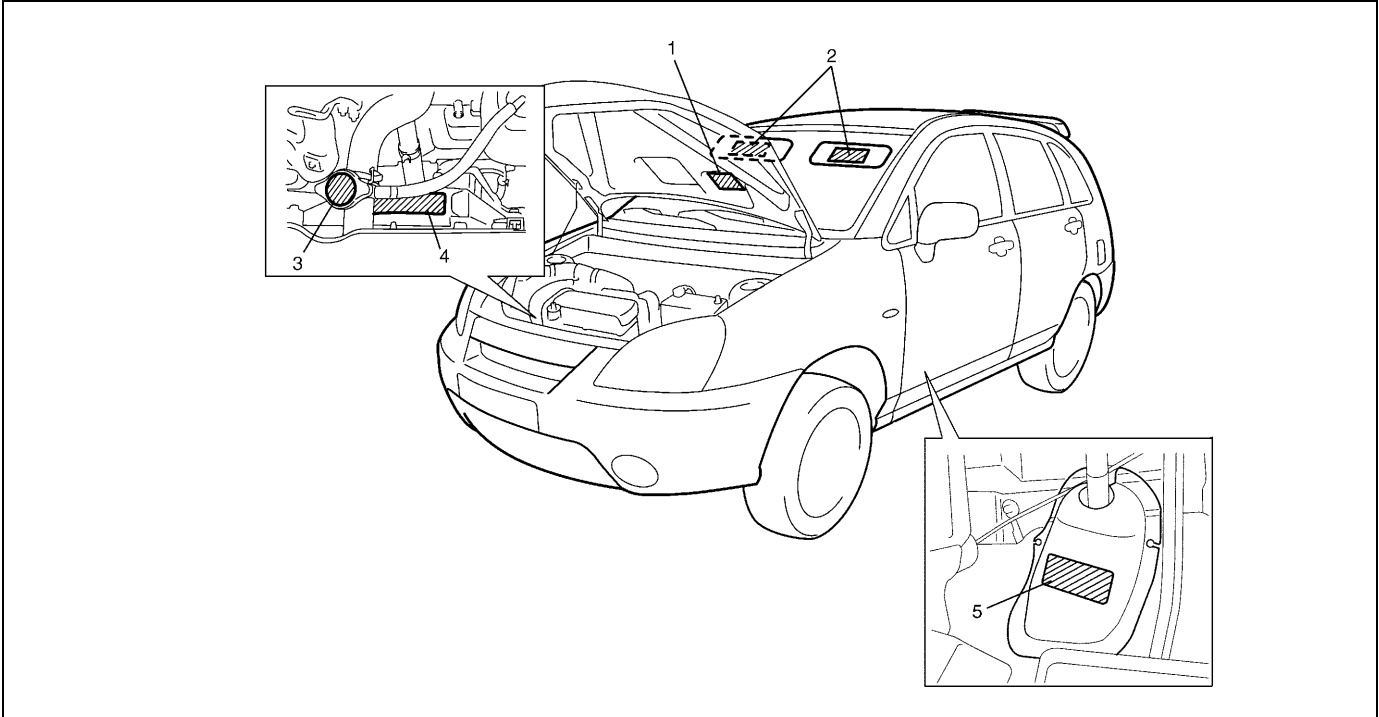
For the items with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

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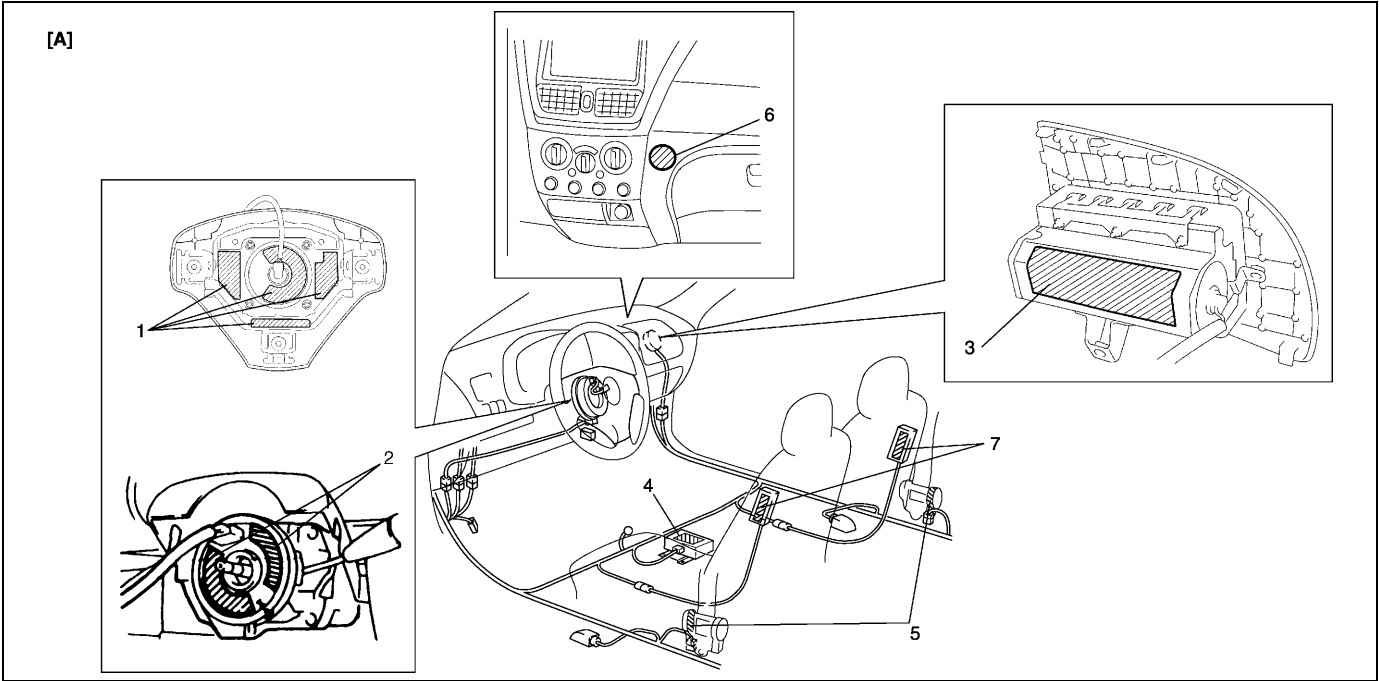
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# Warning, Caution and Information Labels

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. Air bag label on back side of engine hood (for vehicle with air bag system)
2. Air bag label on sun visor (for vehicle with air bag system)
3. Radiator cap label
4. Engine cooling fan label
5. Steering shaft joint cover label (for vehicle with air bag system)



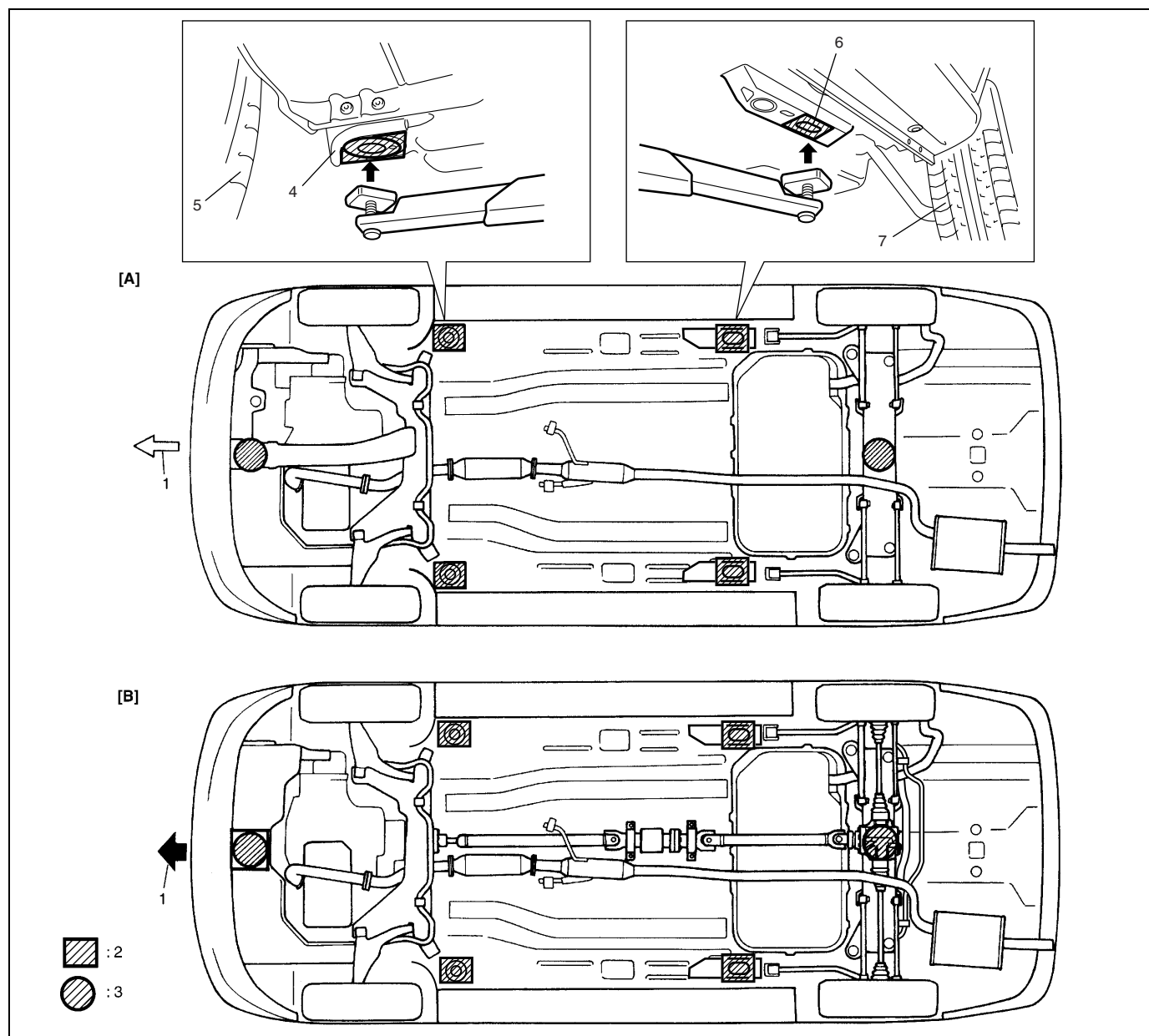
1. Air bag label on driver air bag (inflator) module	5. Pretensioner label on seat belt retractor
2. Air bag label on combination switch and contact coil assembly	6. Child seat label (if equipped)
3. Air bag label on passenger air bag (inflator) module	7. Air bag label on side air bag module
4. Air bag label on SDM	[A] : These labels are attached on vehicle equipped with air bag system only.

## Vehicle Lifting Points

### WARNING:

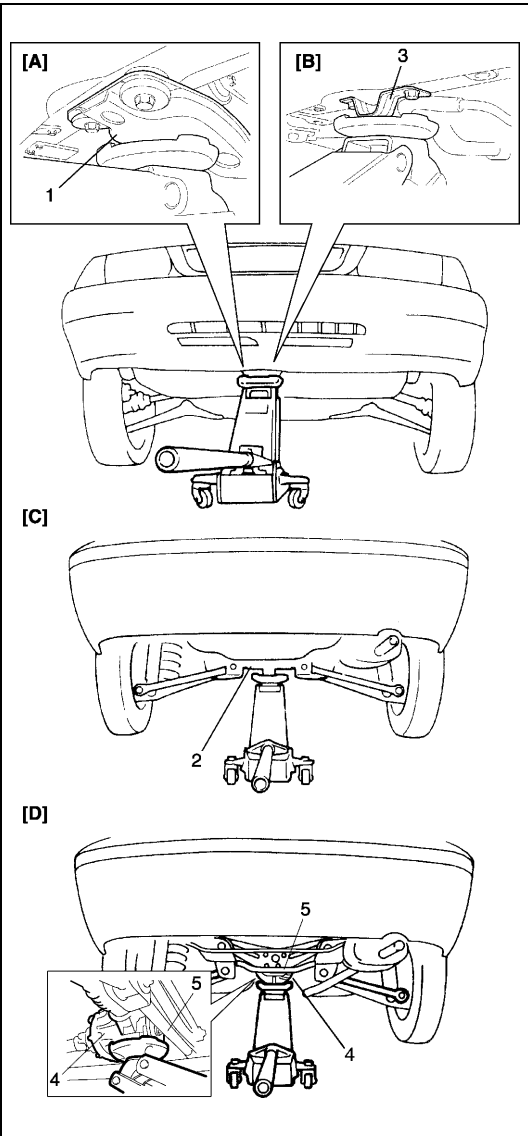
- Before applying hoist to underbody, always take vehicle balance throughout service into consideration. Vehicle balance on hoist may change depending on what part to be removed.
- Before lifting up the vehicle, check to be sure that end of hoist arm is not in contact with brake pipe, fuel pipe, bracket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

### WHEN USING FRAME CONTACT HOIST



1. Vehicle front	6. Frame hole
2. Support position for frame contact hoist and safety stand	7. Rear left tire
3. Floor jack position	[A] : 2WD vehicle
4. Hook	[B] : 4WD vehicle
5. Front left tire	

WHEN USING FLOOR JACK



**WARNING:**

If the vehicle to be jacked up only at the front or rear end, be sure to block the wheels on ground in order to ensure safety.

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

**CAUTION:**

Never apply jack against suspension parts (i.e., stabilizer, suspension frame (5), etc) or vehicle floor, or it may get deformed.

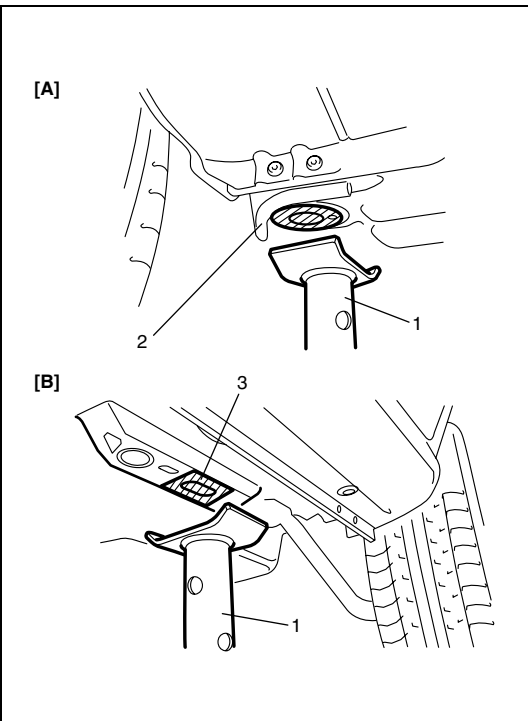
For 2WD vehicle

In raising front or rear vehicle end off the floor by jacking, be sure to put the jack against the front end of the engine mounting member (1) or rear suspension frame (2).

For 4WD vehicle

In raising front or rear vehicle end off the floor by jacking, be sure to put the jack against the jacking bracket (3) or rear differential (4).

[A] : 2WD vehicle front	[C] : 2WD vehicle rear
[B] : 4WD vehicle front	[D] : 4WD vehicle rear



To perform service with either front or rear vehicle end jacked up, be sure to place safety stands (1) under shaded positions of vehicle body so that vehicle body is securely supported. And then check to ensure that vehicle body does not slide on safety stands (1) and the vehicle is held stable for safety's sake.

[A] : Front
[B] : Rear
2. Hook
3. Frame hole

## SECTION 0B

## MAINTENANCE AND LUBRICATION

0B

**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 items with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

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## 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 (x 1,000)	15	30	45	60	75	90	
		Miles (x 1,000)	9	18	27	36	45	54	
		Months	12	24	36	48	60	72	
ENGINE									
Drive belt			–	–	I	–	–	R	
Valve lash (clearance)			–	I	–	I	–	I	
Engine oil and oil filter			R	R	R	R	R	R	
Engine coolant			–	–	R	–	–	R	
Exhaust system			–	I	–	I	–	I	
IGNITION SYSTEM									
*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 (63,000 miles) or 84 months					
	When leaded fuel is used, refer to “Maintenance Recommended under Severe Driving Condition” in this section.								
FUEL SYSTEM									
Air cleaner filter		Paved-road	I	I	R	I	I	R	
		Dusty conditions	Refer to “Maintenance Recommended under Severe Driving Conditions” in this section.						
Fuel lines and connections			–	I	–	I	–	I	
Fuel filter			Replace every 105,000 km (63,000 miles)						
Fuel tank			–	–	I	–	–	I	
EMISSION CONTROL SYSTEM									
*PCV valve		Vehicle without HO2S	–	–	I	–	–	I	
		Vehicle with HO2S	–	–	–	–	–	I	
*Fuel evaporative emission control system			–	–	–	–	–	I	

**NOTE:**

- “R” : Replace or change
- “I” : Inspect and correct, replace or lubricate if necessary
- For Sweden, items with \* (asterisk) should be performed by odometer reading only.
- For spark plugs, replace every 50,000 km if the local law requires.
- Nickel spark plug : BKR6E-11 (NGK) or K20PR-U11 (DENSO)
- Iridium spark plug : IFR6E11 (NGK)

Interval	Km (x 1,000)	15	30	45	60	75	90
	Miles (x 1,000)	9	18	27	36	45	54
	Months	12	24	36	48	60	72
<b>BRAKE</b>							
Brake discs and pads (thickness, wear, damage)		I	I	I	I	I	I
Brake drums and shoes (wear, damage)		–	I	–	I	–	I
Brake hoses and pipes (leakage, damage, clamp)		–	I	–	I	–	I
Brake fluid		–	R	–	R	–	R
Brake lever and cable (damage, stroke, operation)		Inspect at first 15,000 km (9,000 miles only)					
<b>CHASSIS AND BODY</b>							
Clutch (fluid level, leakage)		–	I	–	I	–	I
Tires (wear, damage, rotation) /wheels (damage)		I	I	I	I	I	I
Suspension system (tightness, damage, rattle, breakage)		–	I	–	I	–	I
Steering system (tightness, damage, breakage, rattle)		–	I	–	I	–	I
Drive shaft (axle) boots/Propeller shafts (4WD)		–	–	I	–	–	I
Manual transaxle oil (leakage, level) (I : 1st 15,000 km only)		I	–	R	–	–	R
Automatic transaxle fluid	Fluid level	–	I	–	I	–	I
	Fluid change	Replace every 165,000 km (99,000 miles)					
	Fluid hose	–	–	–	I	–	–
Transfer oil (4WD A/T) (leakage, level)		I	–	I	–	I	–
Rear differential oil (4WD) (leakage, level) (R : 1st 15,000 km only)		R or I	–	I	–	I	–
All latches, hinges and locks		–	I	–	I	–	I
Power steering (if equipped)		I	I	I	I	I	I

**NOTE:**

- “R” : Replace or change
- “I” : Inspect and correct or replace if necessary



## Maintenance Recommended under Severe Driving Conditions

If the vehicle is usually used under the conditions corresponding to any severe condition code given below, IT IS RECOMMENDED that applicable maintenance operation be performed at the particular interval as shown in the following table.

### 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 : Towing a trailer (if admitted)

Severe Condition Code	Maintenance		Maintenance Operation	Maintenance Interval
- B C D - - - -	Drive belt		I	Every 15,000 km (9,000 miles) or 12 months
			R	Every 45,000 km (27,000 miles) or 36 months
A - C D E F - H	Engine oil and oil filter		R	Every 5,000 km (3,000 miles) or 4 months
- - C - - - - -	Air cleaner filter *1		I	Every 2,500 km (1,500 miles)
			R	Every 30,000 km (18,000 miles) or 24 months
A B C - E F - H	Spark plugs	Nickel spark plug	R	Every 10,000 km (6,000 miles) or 8 months
		Iridium spark plug	R	Every 30,000 km (18,000 miles) or 24 months
- B C D - - - - H	Wheel bearings		I	Every 15,000 km (9,000 miles) or 12 months
- B - D E - - - H	Drive shafts and propeller shafts (4WD)		I	Every 15,000 km (9,000 miles) or 12 months
- B - - E - - - H	Manual transaxle oil, transfer oil (4WD A/T) and differential oil (4WD)		R	First time only: 15,000 km (9,000 miles) or 12 months
				Second time and after: Every 30,000 km (18,000 miles) or 24 months reckoning from 0 km (0 mile) or 0 month
- B - - E - - - H	Automatic transaxle fluid		R	Every 30,000 km (18,000 miles) or 24 months

### NOTE:

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

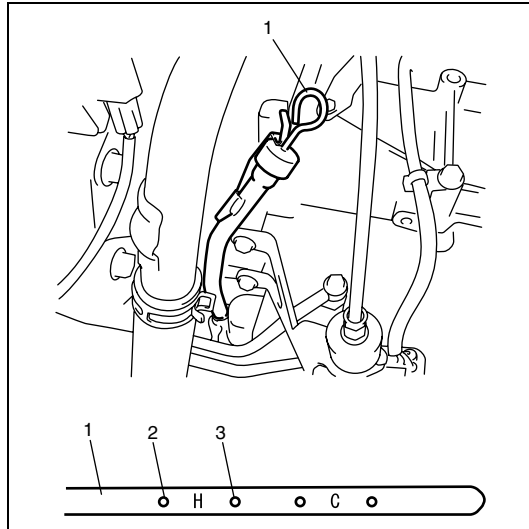
# Maintenance Service

## Chassis and Body

### Automatic transaxle fluid

#### INSPECTION

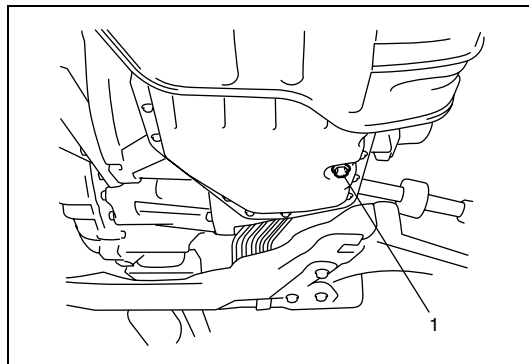
- 1) Inspect transaxle case for evidence of fluid leakage.  
Repair leaky point, if any.
- 2) Make sure that vehicle is placed level for fluid level check.
- 3) Pull out dipstick and check fluid level.  
For fluid level checking procedure, refer to "Fluid Level Check" in Section 7B1 and be sure to perform it under specified conditions. If fluid level is low, replenish specified fluid.



1. Dipstick
2. FULL HOT mark
3. LOW HOT mark

#### REPLACEMENT

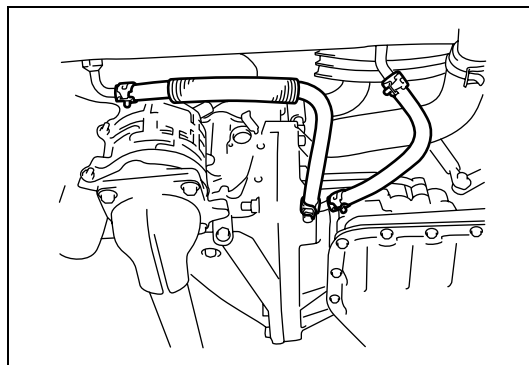
- 1) Inspect transaxle case for evidence of fluid leakage.  
Repair leaky point, if any.
- 2) Make sure that vehicle is placed level.
- 3) Change fluid. For its procedure, refer to "Fluid Change" in Section 7B1.



1. Drain plug
---------------

#### FLUID COOLER HOSE INSPECTION

Check automatic transaxle fluid cooler hose for fluid leakage, cracks, damage and deterioration.  
Replace hose and/or clamp if any faulty condition is found.



## Recommended Fluids and Lubricants

Engine oil	SE, SF, SG, SH, SJ or SL grade (Refer to “Engine Oil and Oil Filter” in this section for engine oil viscosity.)
Engine coolant (Ethylene glycol base coolant)	“Antifreeze/Anticorrosion coolant”
Brake fluid	DOT 3
Manual transaxle oil	Refer to “M/T Oil Change” in Section 7A1.
Transfer oil (4WD)	Refer to “Transfer Oil Change” in Section 7D.
Differential oil (4WD)	Refer to “Differential Oil Change” in Section 7F.
Automatic transaxle fluid	An equivalent of DEXRON®-III or DEXRON®-IIE
Power steering fluid	Refer to “Required Service Material (For Power Steering System)” in Section 3.
Door hinges	Engine oil or water resistance chassis grease
Hood latch assembly	Engine oil or water resistance chassis grease
Key lock cylinder	Spray lubricant

## SECTION 3

## STEERING, SUSPENSION, WHEELS AND TIRES

## NOTE:

For the items with asterisk (\*) in the "CONTENTS" below, refer to the same section of the Service Manual mentioned in "FOREWORD" of this manual.

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## POWER STEERING (P/S) SYSTEM

**WARNING:**

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

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

**NOTE:**

- Some parts in the Power Steering Gear Box cannot be disassembled or adjusted. For detailed information, refer to the description of POWER STEERING GEAR BOX under ON-VEHICLE SERVICE.
- All steering gear fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.
- Although the figures in this section show only the left-hand steering vehicle, the same work procedure and data apply to the right-hand steering vehicle.

## Specifications

### Specification and Service Data

Item		Specification	
Hydraulic pressure Control	Relieved pressure	8,200 – 8,900 kPa (82 – 89 kg/cm <sup>2</sup> , 1,189 – 1,290 psi)	
	Control device	Flow control valve	
		Relief valve	
Power steering pressure switch		Switch turns on (closes) when the pressure is higher than 2,400 – 3,100 kPa (24 – 31 kg/cm <sup>2</sup> , 341 – 441 psi). ECM uses this signal for idle speed control.	
Specified fluid		An equivalent of DEXRON®-III, DEXRON®-II E or DEXRON®-II	
Fluid capacity of system		LH steering	about 0,86 liters (1.8/1.5 US/Imp pt.)
		RH steering	about 0,78 liters (1.6/1.3 US/Imp pt.)
		CAUTION:	
		The value given above is rough amount of fluid in entire system. Fluid level should be in between “LOWER” and “UPPER” level marks on fluid reservoir, which means that appropriate amount of fluid is in it. For details, refer to “Steering Fluid Level Check” in this section.	
Steering Wheel Play		0 – 30 mm (0 – 1.2 in.)	
Steering force		Less than 40 N (4.0 kg, 8.8 lb) Refer to “Steering Force Check” in this Section.	
P/S belt tension		5.5 – 8.5 mm (0.22 – 0.33 in.) deflection for vehicle with A/C or 4 – 9 mm (0.16 – 0.35 in.) deflection for vehicle without A/C under 100 N (10 kg, 22 lb) pressure	

# STEERING WHEEL AND COLUMN

**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. 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 temporarily disable the air bag system and prevent false diagnostic codes from setting. Failure to follow procedures could result in possible air bag system activation, personal injury or otherwise unneeded air bag system repairs.

**CAUTION:**

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

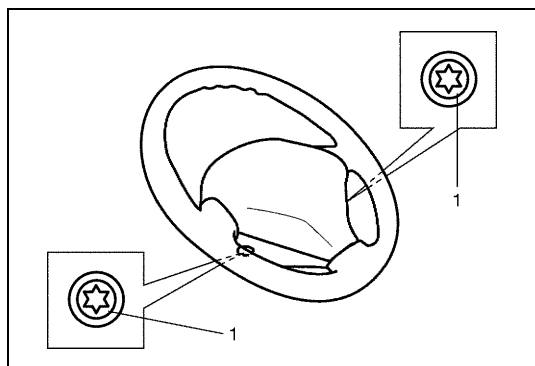


## On-Vehicle Service

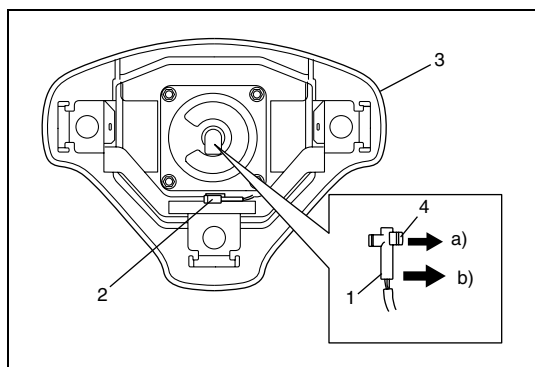
### Driver Air Bag (Inflator) Module

**WARNING:**

When handling an air bag (inflator) module, be sure to read “Service Precautions” in Section 10B and observe each instruction. Failure to follow them could cause a damage to the air bag (inflator) module or result in personal injury.

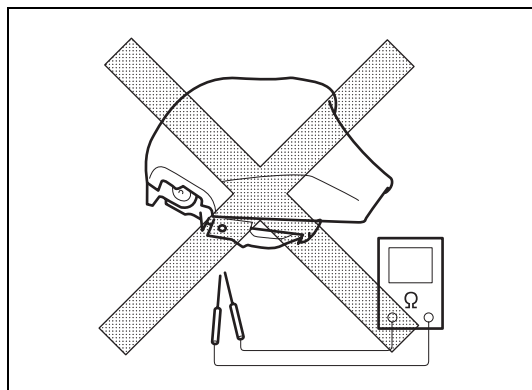
**REMOVAL**

- 1) Disconnect negative cable at battery.
- 2) Disable air bag system. Refer to “Disabling Air Bag System” under “Service Precautions” in Section 10B.
- 3) Loosen 2 bolts (1) mounting driver air bag (inflator) module completely.



- 4) Remove driver air bag (inflator) module (3) from steering wheel.
- 5) Disconnect driver air bag (inflator) module connector from driver air bag (inflator) module as follows.
  - a) Unlock lock button (4).
  - b) Disconnect connector.
- 6) Disconnect horn connector (2).

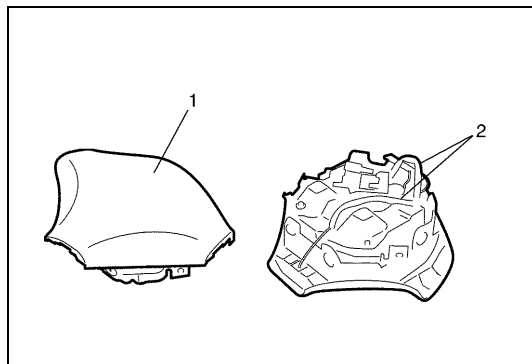
## INSPECTION

**WARNING:**

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

**CAUTION:**

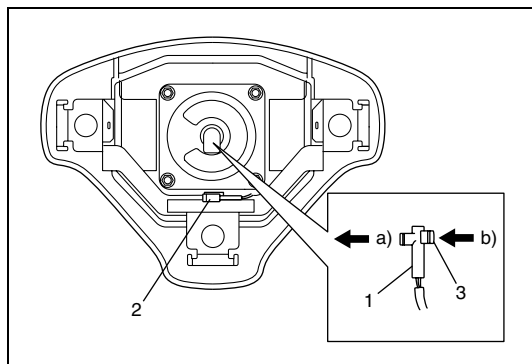
**If air bag (inflator) module was dropped from a height of 90 cm (3 ft) or more, it should be replaced.**



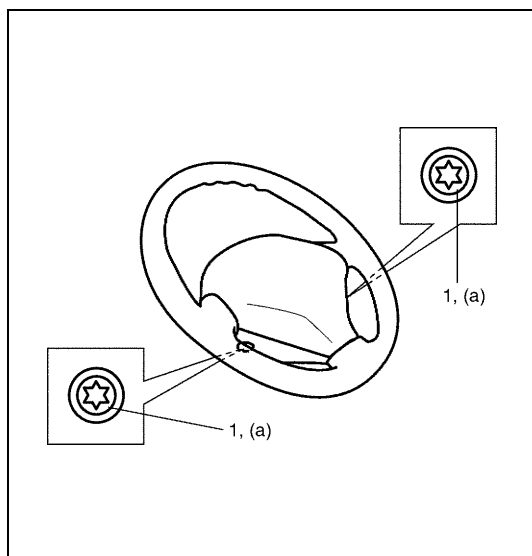
Check air bag (inflator) module visually and if any of the following is found, replace it with a new one.

- Air bag (inflator) being deployed
- Trim cover (pad surface) (1) being cracked
- Air bag (inflator) module connector (2) being damaged
- Air bag (inflator) module being damaged or having been exposed to strong impact (dropped)

## INSTALLATION



- 1) Check that horn wire is connected to horn connector (2) securely.
- 2) Connect driver air bag (inflator) module connector (1) to driver air bag (inflator) module as follows.
  - a) Connect driver air bag (inflator) module connector.
  - b) Lock connector with lock button (3).



- 3) Install driver air bag (inflator) module to steering wheel, taking care so that no part of wire harness is caught between them.
- 4) Make sure that clearance between module and steering wheel is uniform all the way.
- 5) Tighten driver air bag (inflator) module mounting bolts (1) to specified torque.

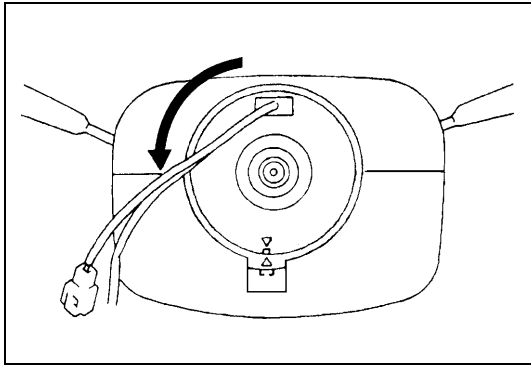
**Tightening torque****Driver air bag (inflator) module mounting bolt**

**(a) : 9 N·m (0.9 kg-m, 6.5 lb-ft)**

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

## Centering Contact Coil

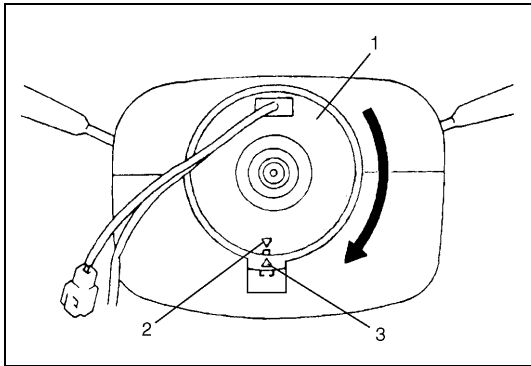
- 1) Check that front wheels are set at straight-ahead position.
- 2) Check that ignition switch is at "LOCK" position.
- 3) Turn contact coil (1) counterclockwise slowly with a light force till contact coil (1) will not turn any further.



### NOTE:

**Contact coil (1) can turn about 4 and a half turns at maximum, that is, if it is at the center position, can turn about two and a quarter turns both clockwise and counterclockwise.**

- 4) From the position where contact coil (1) became unable to turn any further (it stopped), turn it back clockwise about two and a quarter rotations and align center mark (2) with alignment mark (3).



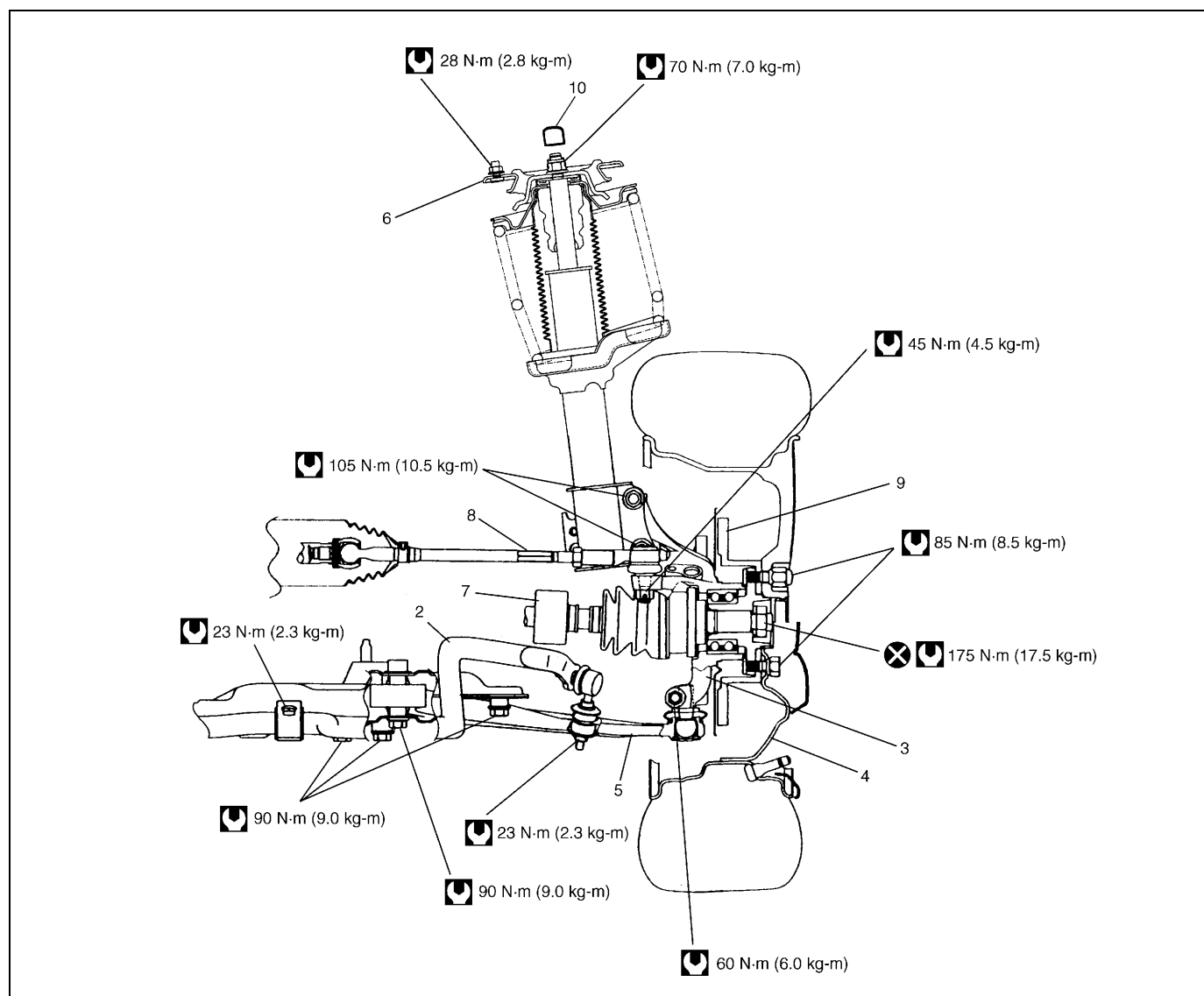
# FRONT SUSPENSION

## NOTE:

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

## General Description

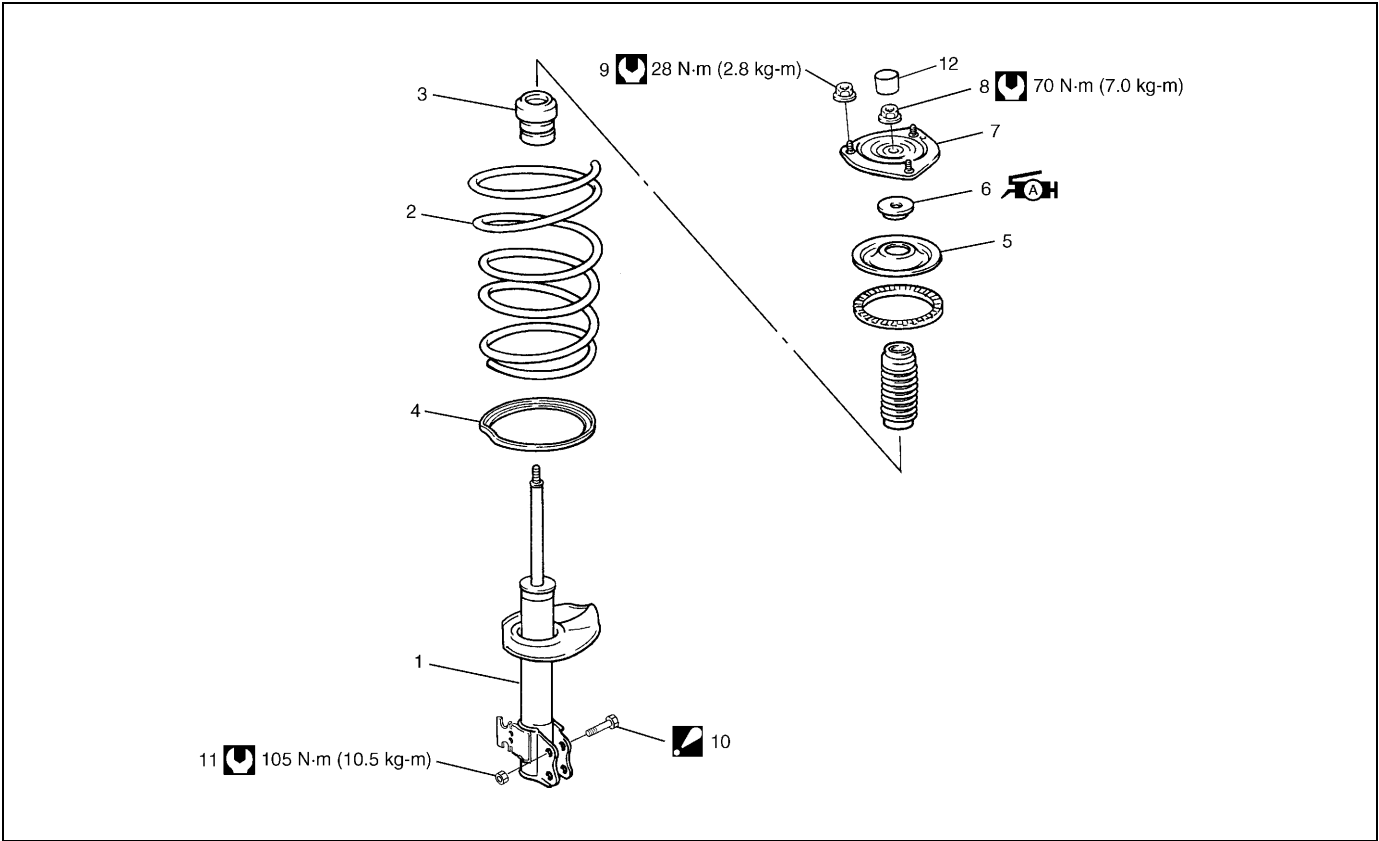
### Construction






1. Strut assembly	4. Wheel	7. Drive shaft	10. Rubber cap
2. Stabilizer bar	5. Suspension control arm	8. Tie rod	Tightening torque
3. Steering knuckle	6. Vehicle body	9. Brake disc	Do not reuse.

On-vehicle Service

Strut Assembly



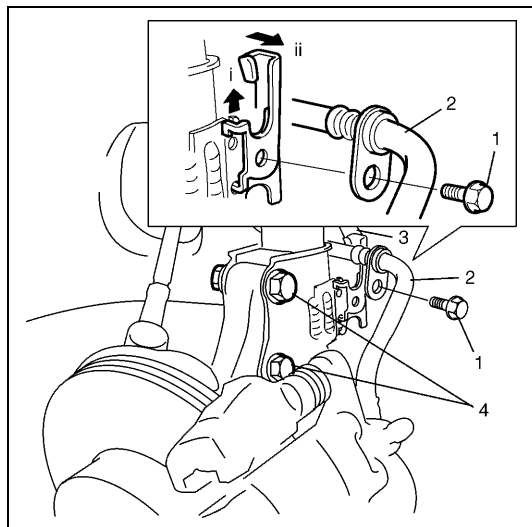
1. Strut assembly		6. Strut bearing : Apply grease (99000-25010) to all around bearing.	11. Strut bracket nut
2. Coil spring		7. Strut support	12. Rubber cap
3. Bump stopper		8. Strut nut	 Tightening torque
4. Coil spring lower seat		9. Strut support nut	
5. Coil spring upper seat		10. Strut bracket bolt : Insert from vehicle rear side.	

REMOVAL

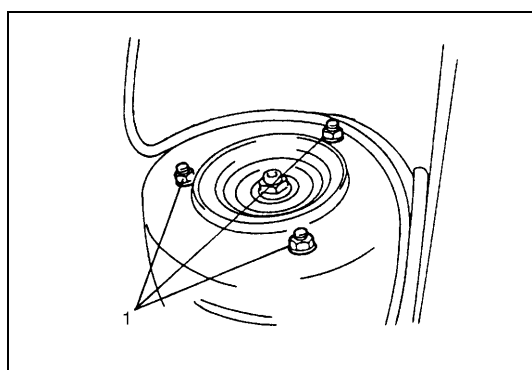
**NOTE:**

When servicing component parts of strut assembly, remove rubber cap and then loosen strut nut a little before removing strut assembly. This will make service work easier. Note, however, nut must not be removed at this point.

- 1) Hoist vehicle, allowing front suspension to hang free.
- 2) Remove wheel.



- 3) Remove brake hose mounting bolt (1) and take off brake hose (2) and then ABS wheel speed sensor harness (if equipped) (3) from strut bracket as shown in the figure.
- 4) Remove strut bracket bolts (4).



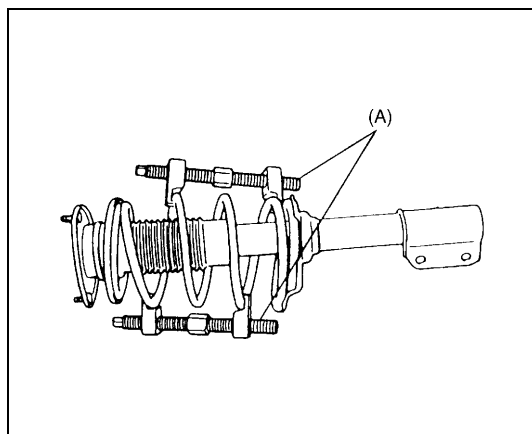
- 5) Remove strut support nuts (1).

**NOTE:**

**Hold strut by hand so that it will not fall off.**

- 6) Remove strut assembly.

**DISASSEMBLY**



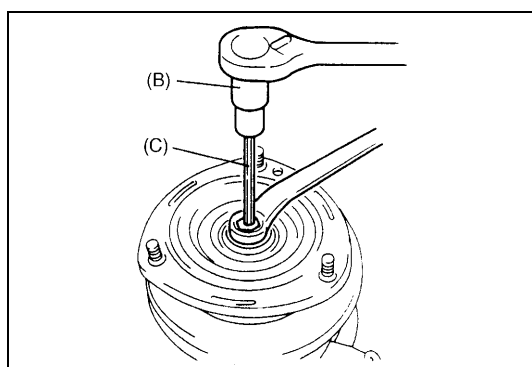
- 1) With special tool (A) placed to spring as shown, turn special tool bolts alternately until spring tension is released. Whether it is released or not can be known by whether strut turns lightly while strut spring is held stationary.

**Special tool**

**(A) : 09940-71431**

**WARNING:**

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



- 2) While keeping spring compressed with special tool as shown above, remove strut nut.

**Special tool**

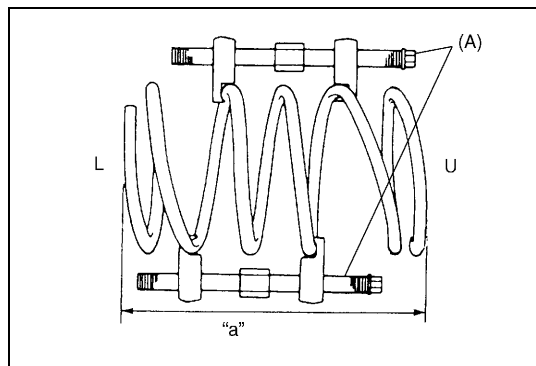
**(B) : 09900-00411 (Socket)**

**(C) : 09900-00414 (6 mm)**

- 3) Disassemble strut assembly.

**ASSEMBLY**

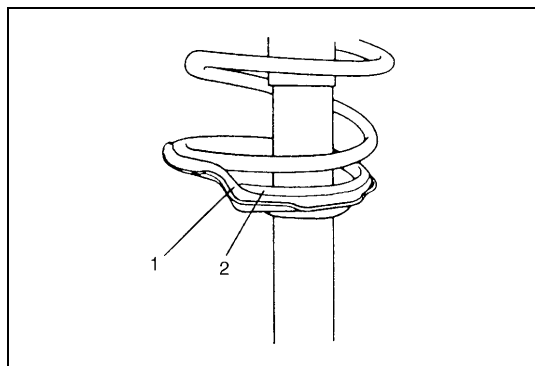
For assembly, reverse disassembly procedure, noting the following instructions.



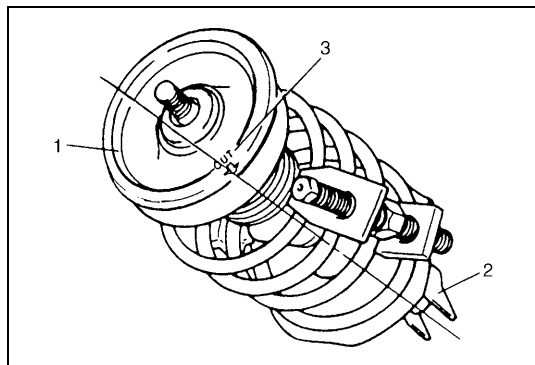
- 1) Compress spring with special tool (A) until total length becomes about 250 mm or 230 mm as shown.

**Length “a”:** 250 mm (9.8 in.)...For HATCHBACK  
230 mm (9.0 in.)...For SEDAN

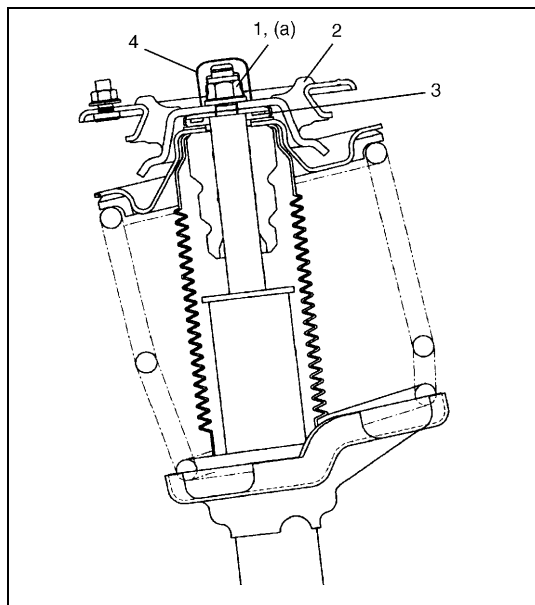
U :	Upper side (large diam.)
L :	Lower side (small diam.)



- 2) Install coil spring lower seat and compressing coil spring, and mate spring end (2) with stepped part (1) of lower seat as shown.
- 3) Install bump stopper and dust cover onto strut rod. For installing direction, refer to figure under “Strut Assembly”.
- 4) Pull strut rod as far up as possible and use care not to allow it to retract into strut.



- 5) Install spring seat on coil spring and then spring upper seat (1) aligning “OUT” mark (3) on spring upper seat and center of strut bracket (2).



- 6) Install bearing (3), strut support (2) and strut nut (1) in this sequence.  
Tighten strut nut (1) to specified torque.

**Tightening torque**

**Strut nut (a): 70 N·m (7.0 kg-m, 50.5 lb-ft)**

- 7) Install rubber cap (4).

## Tightening Torque Specifications

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Strut nut	70	7.0	51.0
Strut bracket nut	105	10.5	76.0
Strut support nut	28	2.8	20.5
Brake hose mounting bolt	23	2.3	17.0
Wheel nut	85	8.5	61.5
Stabilizer bar mounting bracket bolt	23	2.3	17.0
Stabilizer joint nut	50	5.0	36.5
Stabilizer link nut	23	2.3	17.0
Suspension arm ball joint nut	60	6.0	43.5
ABS wheel speed sensor mounting bolt	23	2.3	17.0
Tie rod end castle nut	45	4.5	32.5
Brake caliper bolt	85	8.5	61.5
Control arm bolt	90	9.0	65.0
Mounting member bolt	55	5.5	40.0
Engine rear mounting nut	45	4.5	33.0
Suspension frame mounting bolt	90	9.0	65.0



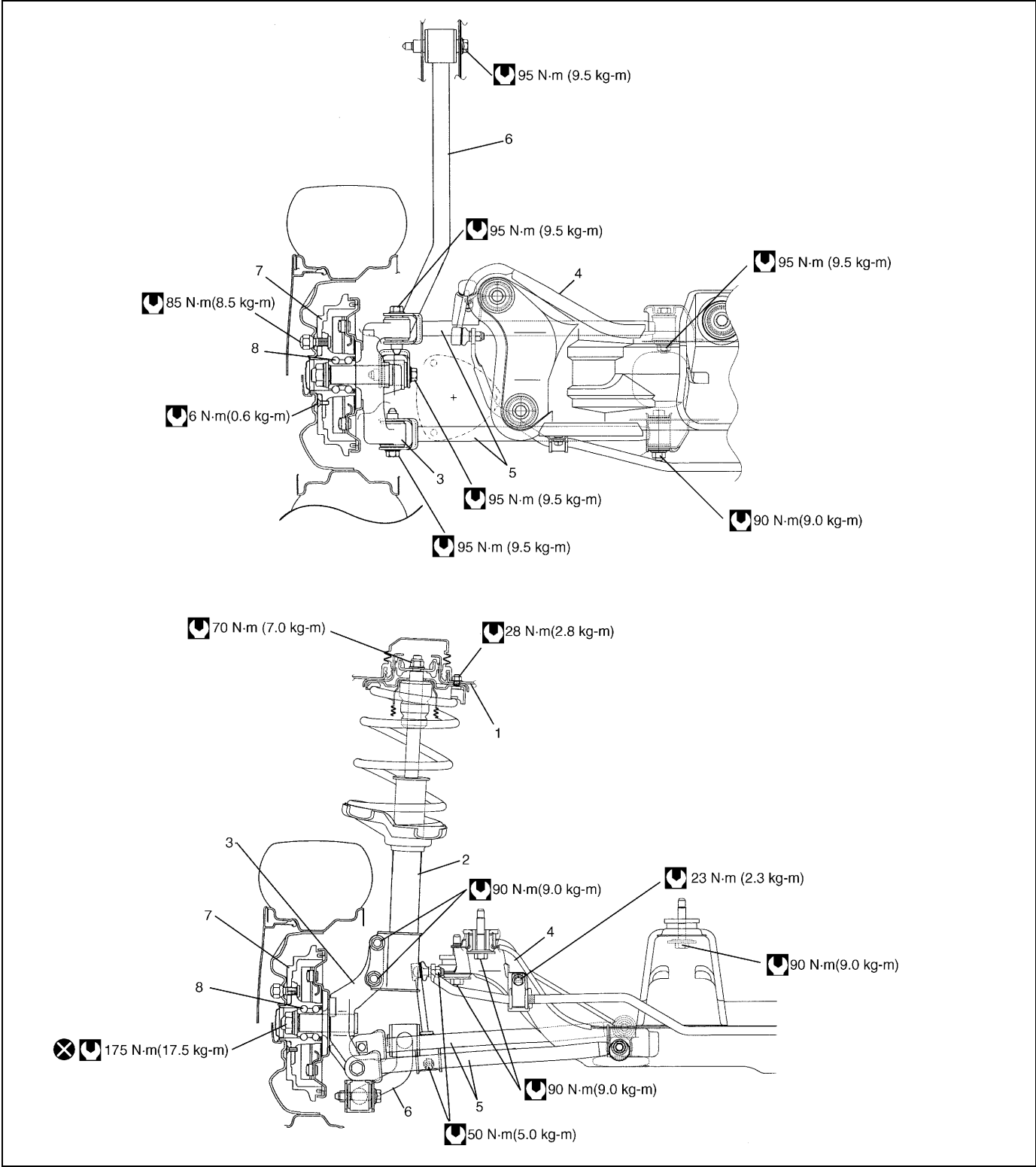
## **REAR SUSPENSION (2WD VEHICLE)**

**NOTE:**

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

# General Description

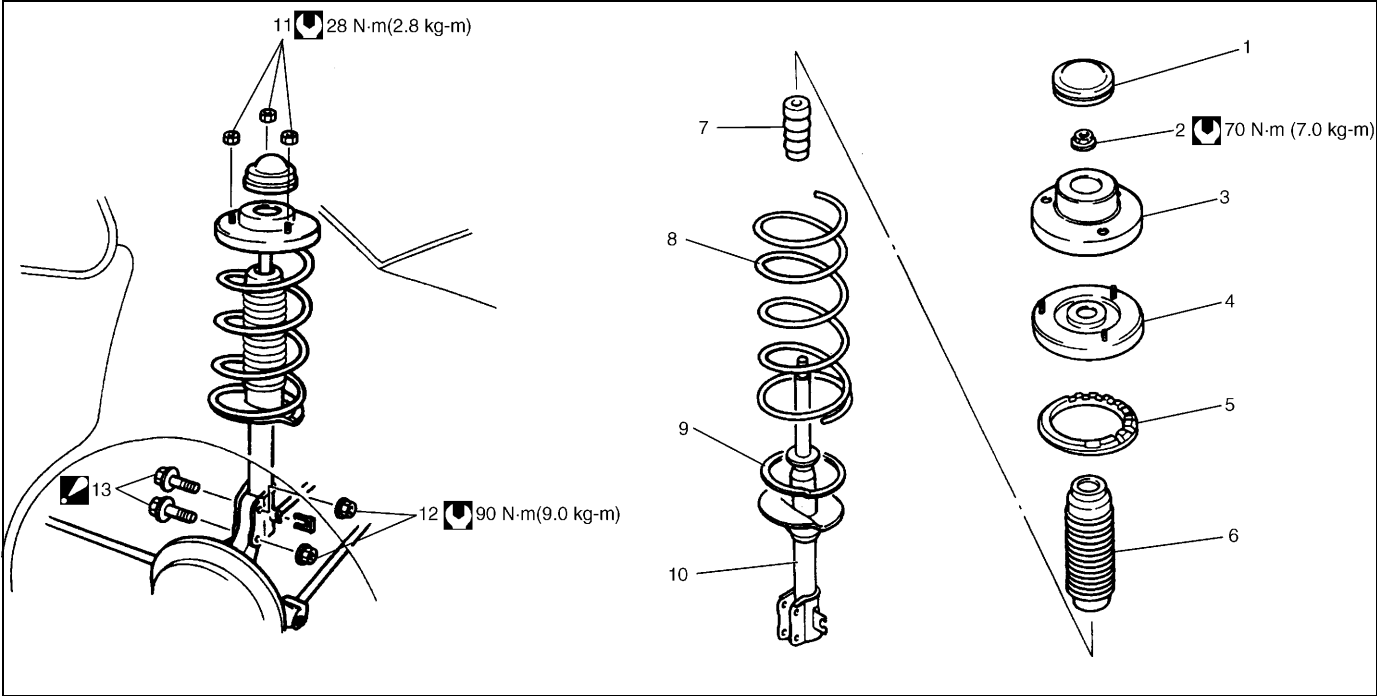
## Construction



1. Vehicle body	5. Control rod	Tightening torque
2. Strut assembly	6. Trailing rod	Do not reuse.
3. Rear knuckle	7. Brake drum	
4. Suspension frame	8. Wheel Bearing	

On-vehicle Service

Rear Strut Assembly

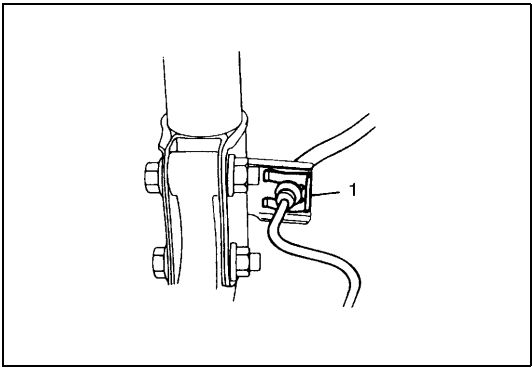


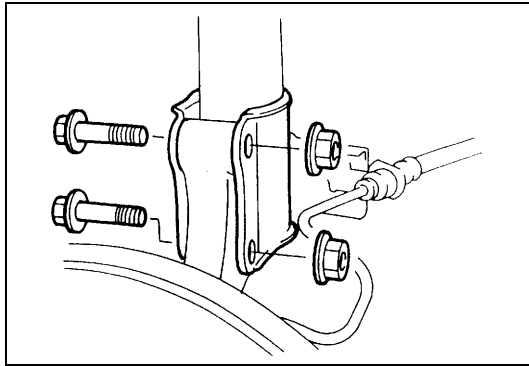
1. Strut upper cap	6. Strut dust cover	11. Strut support nut
2. Strut upper nut	7. Bump stopper	12. Strut bracket nut
3. Strut support	8. Coil spring	13. Strut bracket bolt : Insert from vehicle front side.
4. Spring upper seat	9. Spring lower seat	Tightening torque
5. Spring (rubber) seat	10. Strut	

REMOVAL

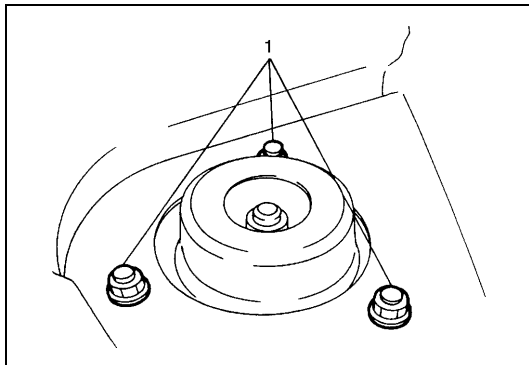
**NOTE:**  
When servicing component parts of strut assembly, remove strut upper cap and then loosen strut upper nut a little before removing strut assembly. This will make service work easier. Note, however, nut must not be removed at this point.

- 1) Hoist vehicle, allowing rear suspension to hang free.
- 2) Remove wheel.
- 3) Remove E-ring (1) securing brake hose.
- 4) Remove ABS wheel speed sensor harness mounting bolt (if equipped).



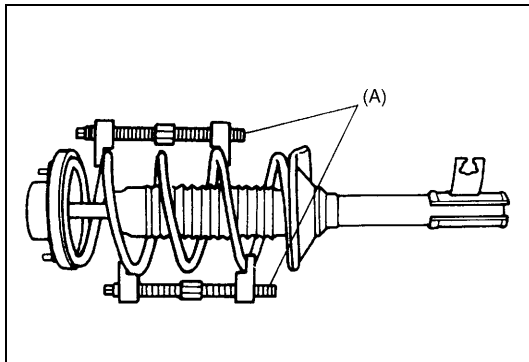


- 5) Remove strut bracket bolts and nuts. And then take brake hose off strut bracket using care not to deform brake pipe.
- 6) Remove seat cushion, seat back, partition front trim and rear seat back side trim (for sedan model).



- 7) Remove strut support nuts. (1)  
Hold strut by hand so that it will not fall off.
- 8) Remove strut assembly.

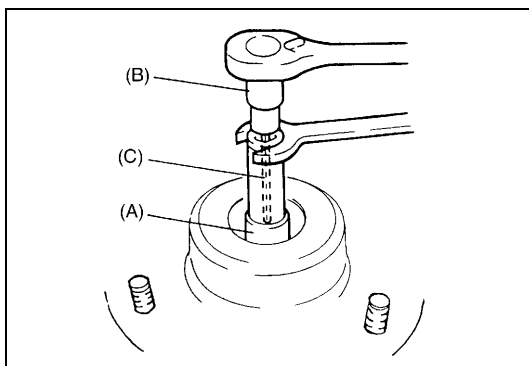
## DISASSEMBLY



- 1) With special tool (A) placed to spring as shown, turn special tool bolts alternately until spring tension is released. Whether it is released or not can be known by whether strut turns lightly while strut spring is held stationary.

### Special tool

(A) : 09940-71431



- 2) While keeping spring compressed with special tool as shown above, remove strut nut.

### Special tool

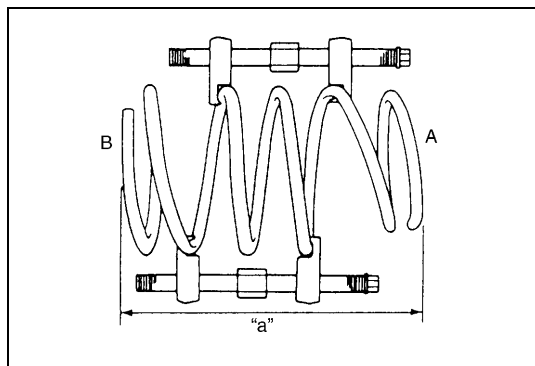
(A): 09945-26010 (17 mm socket)

(B): 09900-00411 (Socket)

(C): 09900-00414 (6 mm)

- 3) Disassemble strut assembly.

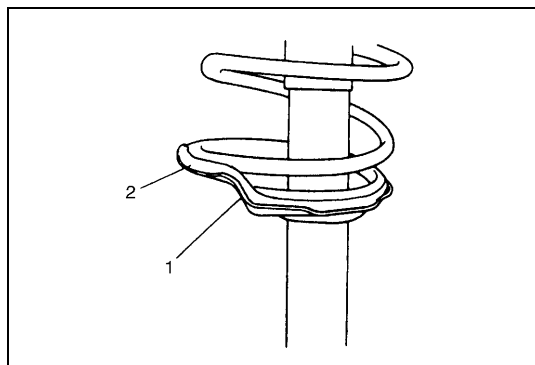
## ASSEMBLY



- 1) Compress spring with special tool (A) until total length becomes about 290 mm or 260 mm as shown.

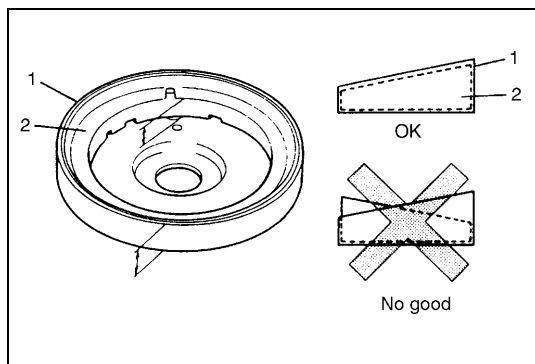
**Length “a”:**290 mm (11.42 in.)...For HATCHBACK  
260 mm (10.23 in.)...For SEDAN

A : Upper side (small diam.)
B : Lower side (large diam.)

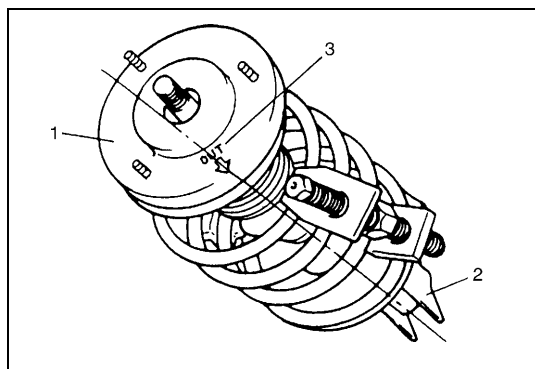


- 2) Install coil spring lower seat (2) and compressing coil spring, mate large-dia. spring end with stepped part of lower seat as shown.
- 3) Install bump stopper onto strut rod.
- 4) Install dust cover onto bump stopper.

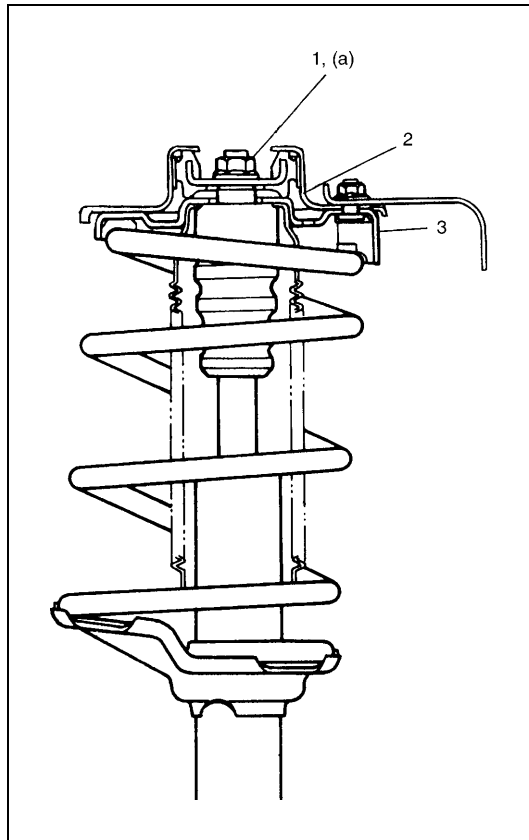
1. Strut lower seat
---------------------



- 5) Fit coil spring (rubber) seat (2) in coil spring upper seat (1), making sure that their depth matches all around. No part of rubber seat should stick out higher than upper seat.



- 6) Pull strut rod as far up as possible and use care not to allow it to retract into strut.
- 7) With “OUT” mark (3) on spring upper seat (1) and the center of strut bracket (2) aligned, place upper spring seat together with spring (rubber) seat on coil spring.



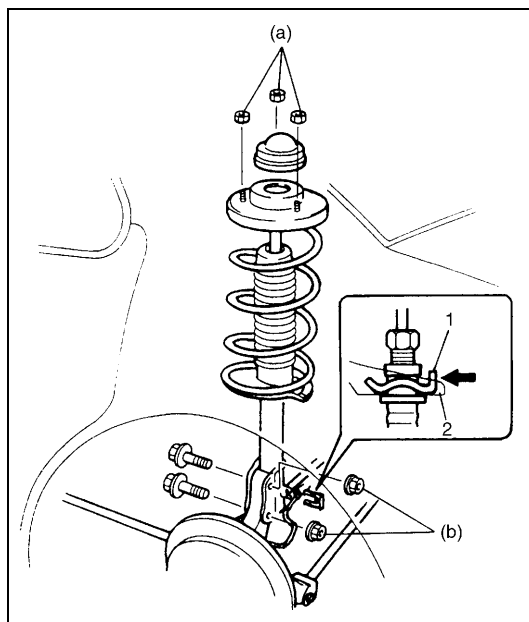
- 8) Put strut support (2) on spring upper seat (3).  
Tighten strut nut (1) to specified torque.

### Tightening torque

**Strut upper nut (a) : 70 N·m (7.0 kg-m, 51.0 lb-ft)**

- 9) Loosen and remove special tool (A) from compressing coil spring. While loosening special tool, recheck that stepped part of spring seat and spring end are in place to each other as described in foregoing Step 2).  
Also, check to make sure that "OUT" mark on upper seat is matched with the center of strut bracket as described in Step 7).

## INSTALLATION



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

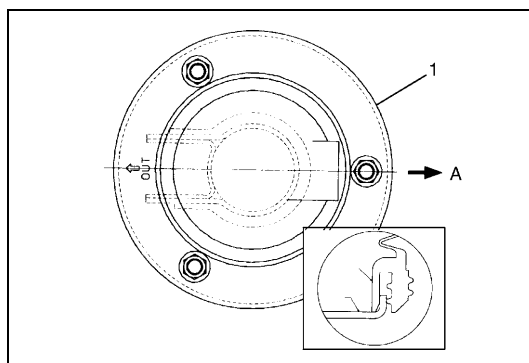
### Tightening torque

**Strut support nuts (a) : 28 N·m (2.8 kg-m, 20.5 lb-ft)**

**Strut bracket nuts (b) : 90 N·m (9.0 kg-m, 65.0 lb-ft)**

### NOTE:

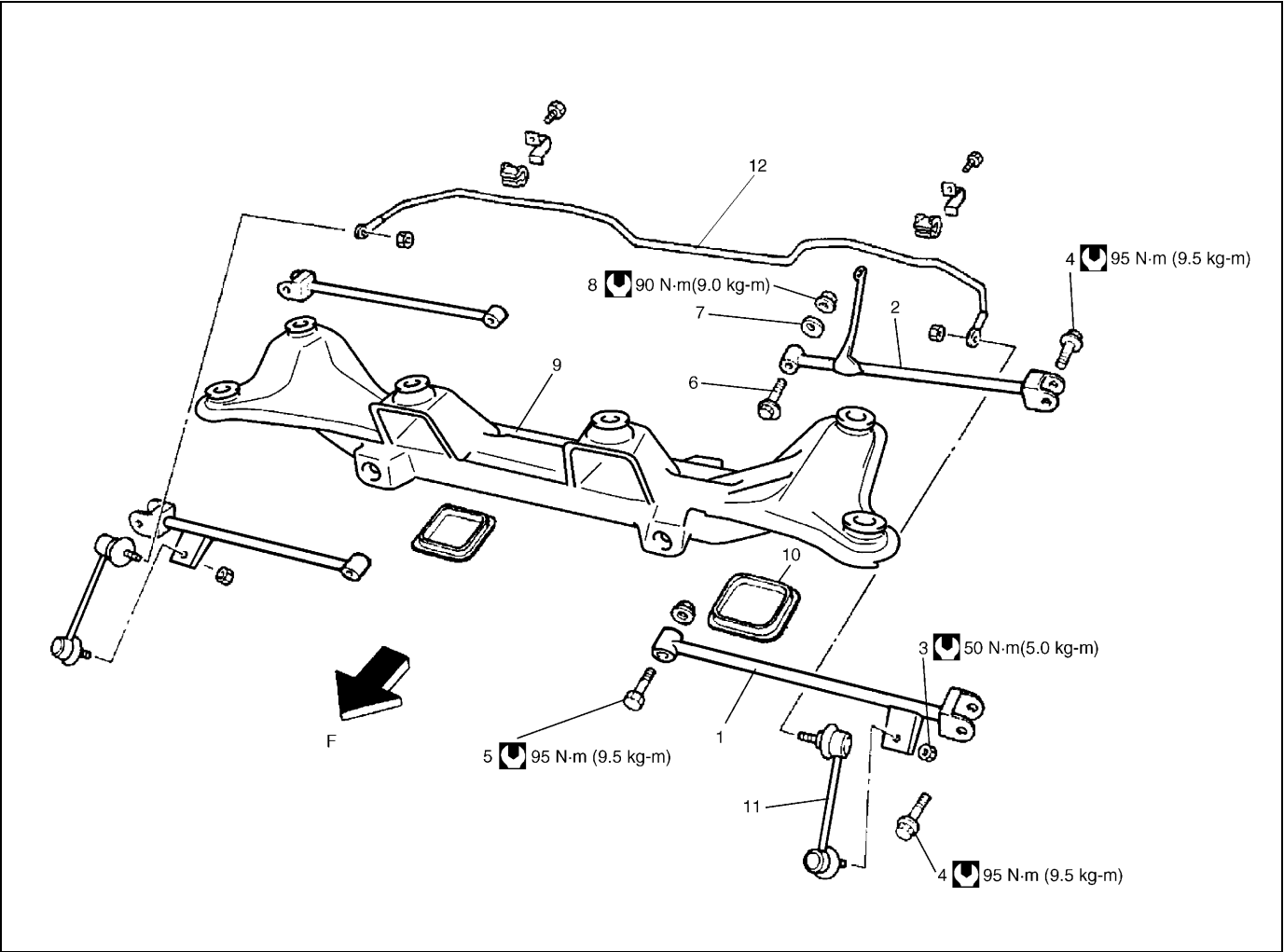
**Do not twist brake hose when installing it. Install E-ring (1) as far as it fits to bracket as shown.**



- 3) Install strut upper cap (1) in such a direction as shown figure.

A. Vehicle inside

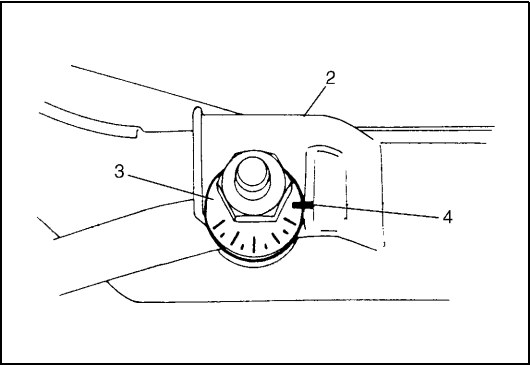
Control Rod

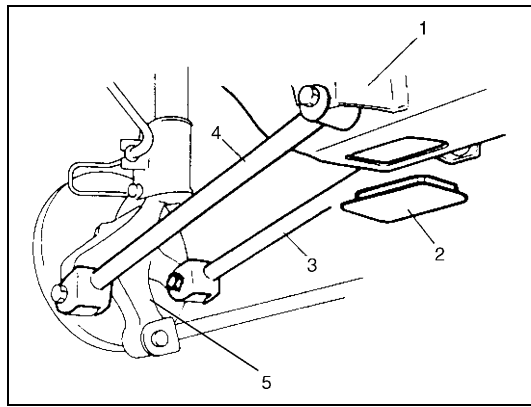


1. Control rod (No.1)	6. No.2 control rod bolt (inner bolt)	11. Joint
2. Control rod (No.2)	7. Control rod washer	12. Stabilizer bar
3. Stabilizer bar link nut	8. Control rod inner nut	F : Forward
4. Control rod outer bolt	9. Suspension frame	Tightening torque
5. Control rod inner bolt (inner bolt)	10. Suspension frame cap	

REMOVAL

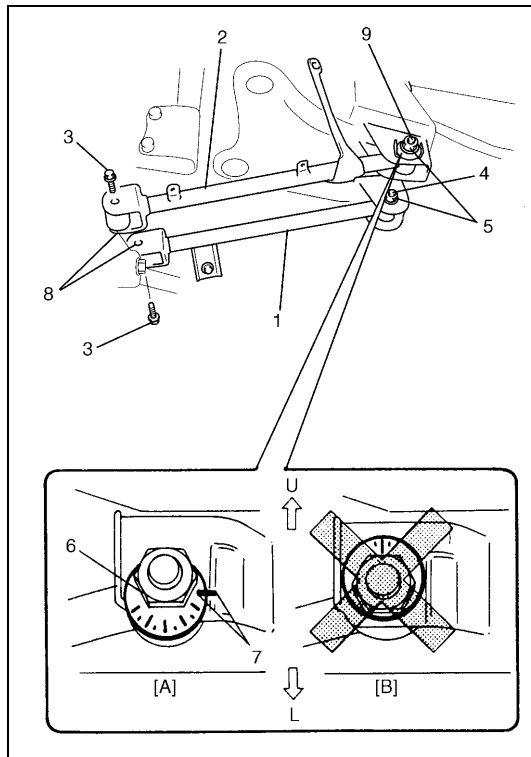
- 1) Hoist vehicle and remove rear wheels.
- 2) Detach spring end from left side control rod (No.2) (if equipped with LSPV).
- 3) Remove stabilizer bar. Refer to “Stabilizer Bar and/or Bushings” in this section.
- 4) To facilitate toe adjustment after reinstallation, put match marks (4) on washer (3) and on suspension frame (2).





- 5) Remove suspension frame cap (2).
- 6) Remove control rod (No.2) (4) from suspension frame (1) and knuckle (5).
- 7) Remove control rod (No.1) (3) from suspension frame and knuckle.

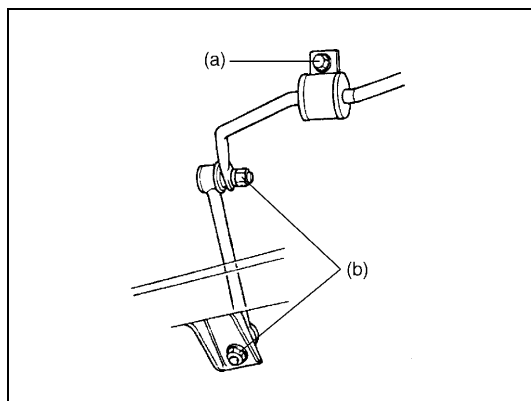
## INSTALLATION



- 1) Install control rod (No.1) (1).
  - a) Install control rod (No.1) (1), setting it so that its welded nut (8) comes toward the rear.
  - b) Insert inner bolt (4) and outer bolt (3) from the vehicle front and tighten them temporarily by hand.
- 2) Install control rod (No.2) (2).
  - a) Install control rod (No.2) (2), setting it so that its welded nut (8) comes toward the front.
  - b) Insert control rod (No.2) bolt (9) from the vehicle front and outer bolt (3) from the rear.
  - c) Install washer (6) with its graduated part facing down.
  - d) With marks (7) on washer (6) and frame marked before removal aligned to each other, tighten bolts (3) and nut (5) temporarily by hand.

[A] : Correct	U : Upper side
[B] : Wrong	L : Lower side

- 3) Install LSPV spring to control rod (No.2).  
Tighten nut temporarily at this step (if equipped with LSPV).



- 4) Install stabilizer bar. Refer to "Stabilizer Bar and/or Bushings" in this section.

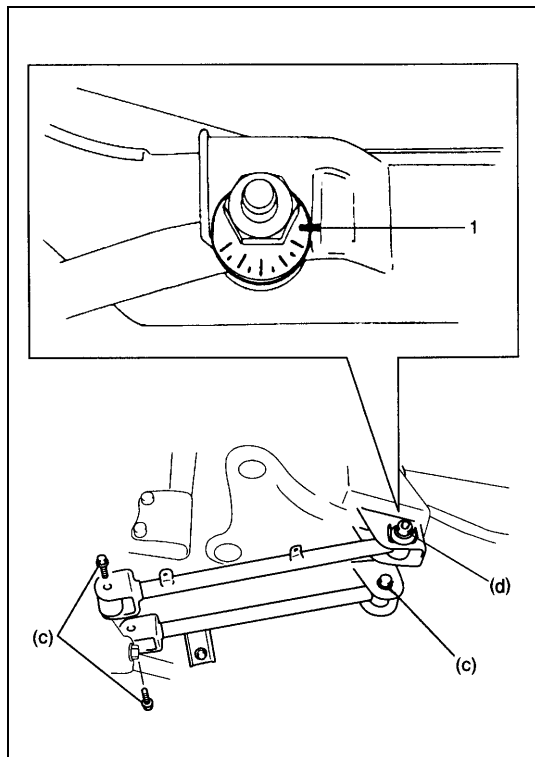
### Tightening torque

**Stabilizer bar mounting bracket bolts (a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)**

**Stabilizer link nuts and joint nuts (b) : 50 N·m (5.0 kg-m, 36.5 lb-ft)**

- 5) Install wheels and tighten wheel nuts to specified torque.
- 6) Lower hoist and bounce vehicle up and down to stabilize suspension.





- 7) Tighten control rod bolts and nuts to specified torque with vehicle weight on suspension.

#### NOTE:

- It is the most desirable to have vehicle off hoist and in non-loaded condition when tightening them.
- Tighten control rod (No.2) inner nut with match marks (1) aligned.

#### Tightening torque

Control rod (No.1 and No.2) inner nuts and outer bolts

(c) : 95 N·m (9.5 kg-m, 68.5 lb-ft)

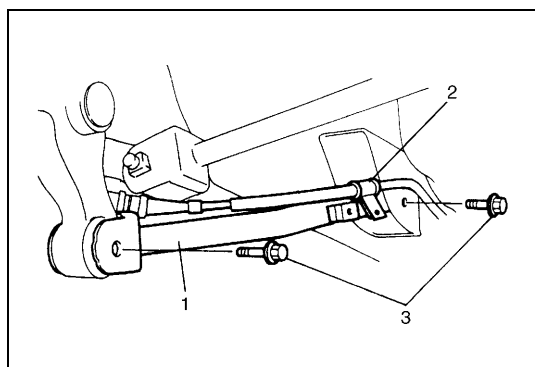
(d) : 90 N·m (9.0 kg-m, 65.0 lb-ft)

- 8) If equipped with LSPV, check and adjust LSPV spring referring to "LSPV Inspection and Adjustment" and perform "Fluid Pressure Test" in Section 5.
- 9) Check rear toe and adjust it as necessary. For check and adjustment procedures, refer to "Rear Wheel Alignment" in Section 3.
- 10) Install suspension frame cap.

## Trailing Rod

### REMOVAL

- 1) Hoist vehicle.
- 2) Detach parking brake cable clamp (2) from trailing rod (1).
- 3) Remove trailing rod bolts (3) and trailing rod (1).

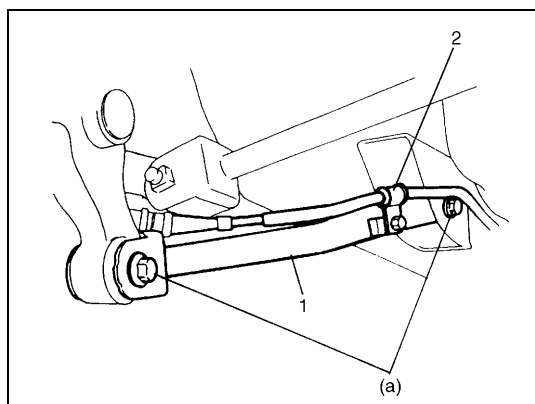


### INSTALLATION

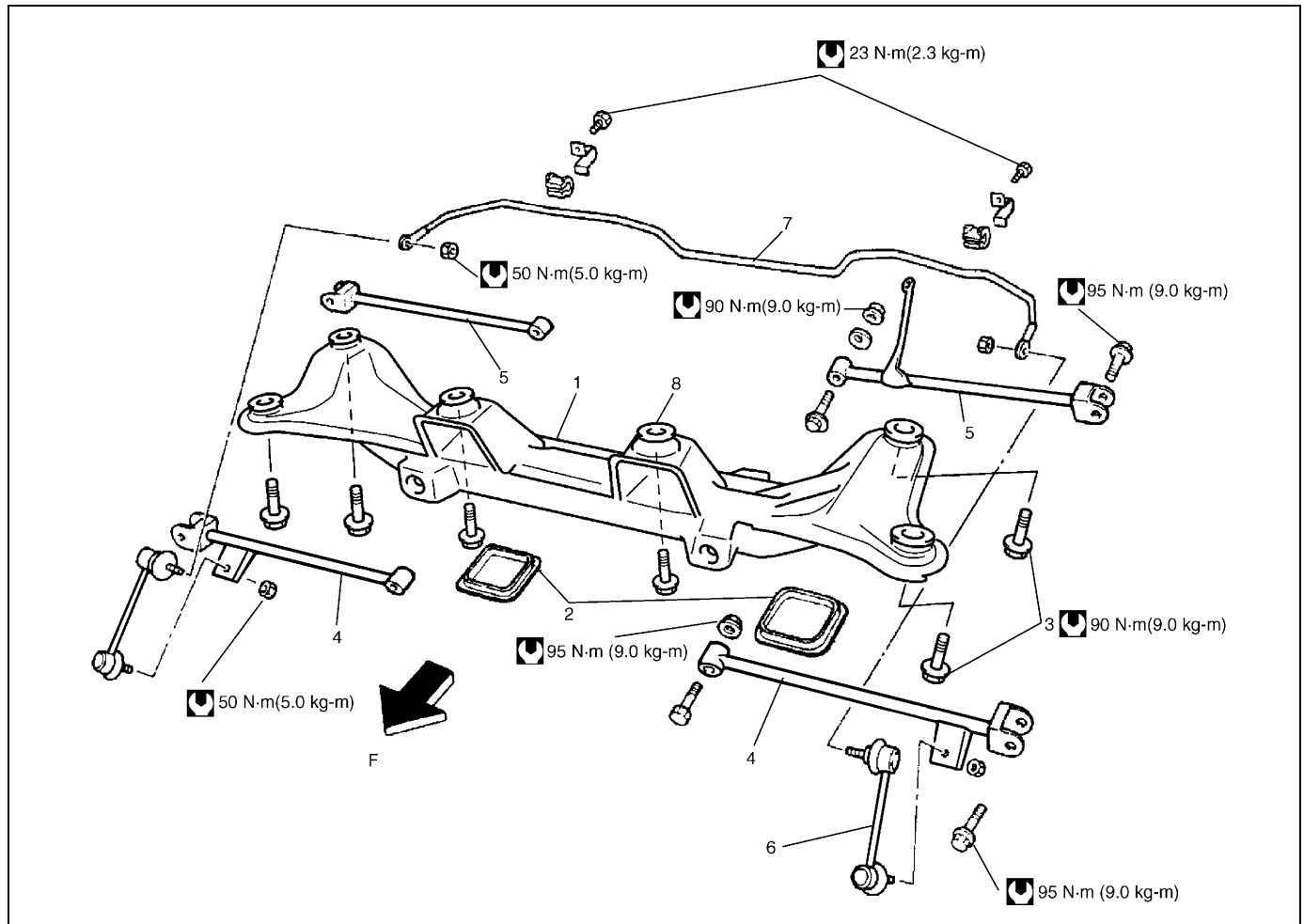
- 1) Install trailing rod (1) and tighten bolts by hand.
- 2) Attach parking brake cable clamp (2) to trailing rod.
- 3) Install wheel and tighten wheel nuts to specified torque.
- 4) Lower hoist and bounce vehicle up and down to stabilize suspension.
- 5) Tighten trailing rod bolts to specified torque with vehicle weight on suspension.


#### Tightening torque

Trailing rod bolts (a) : 95 N·m (9.5 kg-m, 68.5 lb-ft)



## Suspension Frame



1. Suspension frame	5. Control rod (No.2)	F : Forward
2. Suspension frame cap	6. Joint	 Tightening torque
3. Suspension frame bolt	7. Stabilizer bar	
4. Control rod (No.1)	8. Pad	

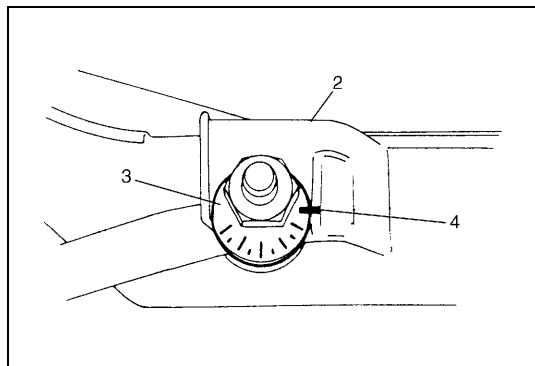
### REMOVAL

- 1) Hoist vehicle and remove rear wheels.
- 2) Remove muffler referring to Section 6K.

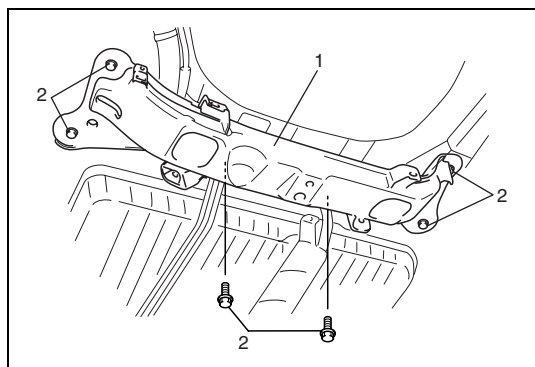
#### WARNING:

**To avoid the danger of being burned, do not touch the exhaust system when the system is hot. Any service on the exhaust system should be performed when the system has cooled down.**

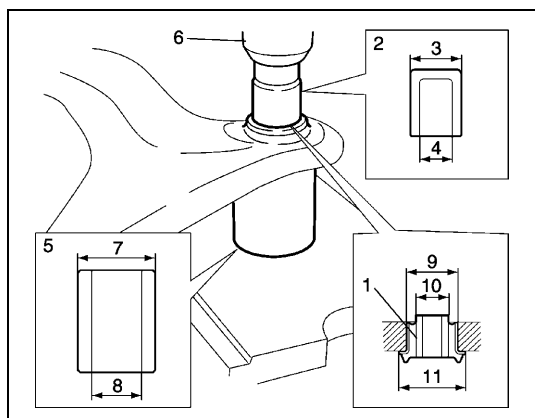
- 3) Remove stabilizer bar. Refer to "Stabilizer Bar and/or Bushings" in this section.
- 4) Detach spring end from left side control rod (No.2) (if equipped with LSPV).



- 5) To facilitate toe adjustment after reinstallation, put match marks (4) on washer (3) and on suspension frame (2).
- 6) Remove control rod (No.2) (right and left).
- 7) Remove control rod (No.1) (right and left).



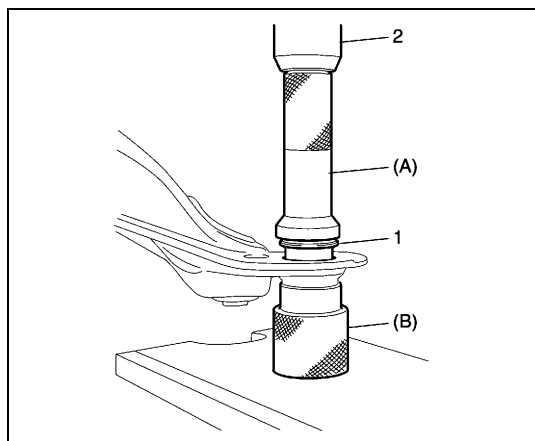
- 8) Remove suspension frame bolts (2) and suspension frame (1).



- 9) Remove suspension frame bushings (1) by using a pipe (2) whose outer diameter (3) is 37 mm (1.46 in.) and inner diameter (4) is 27 mm (1.06 in.) or more, an appropriate support (5) and hydraulic press (6).

7.	54 mm (2.13 in.) or less
8.	47 mm (1.85 in.) or more
9.	38 mm (1.50 in.)
10.	25 mm (0.98 in.)
11.	46 mm (1.81 in.)

## INSTALLATION

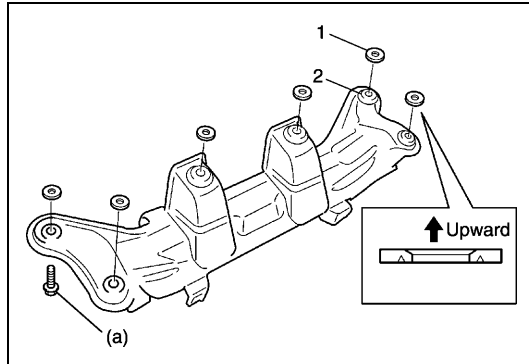


- 1) Press-fit suspension frame bushings (1) by using special tools (A), (B) and hydraulic press (2).

### Special tool

(A) : 09951-16080

(B) : 09940-53111



- 2) Install suspension frame pads (1) to bushings (2) as shown.
- 3) Install suspension frame and tighten suspension frame bolts to specified torque.

### Tightening torque

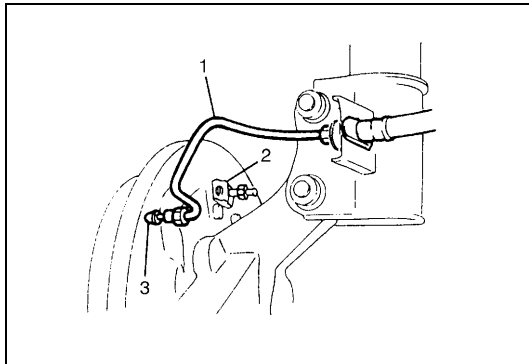
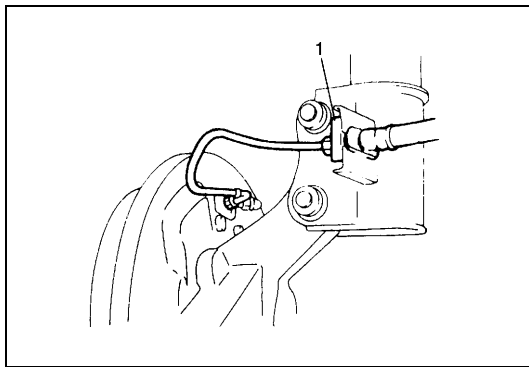
**Suspension frame bolts (a) : 90 N·m (9.0 kg-m, 65.0 lb-ft)**

- 4) Install control rods referring to "Control Rod" in this section.
- 5) Install stabilizer bar. Refer to "Stabilizer Bar and/or Bushings" in this section.
- 6) Install muffler referring to Section 6K.
- 7) Install wheels and tighten wheel nuts to specified torque.
- 8) Check rear toe and adjust it as necessary. For check and adjustment procedures, refer to "Rear Wheel Alignment" in this section.

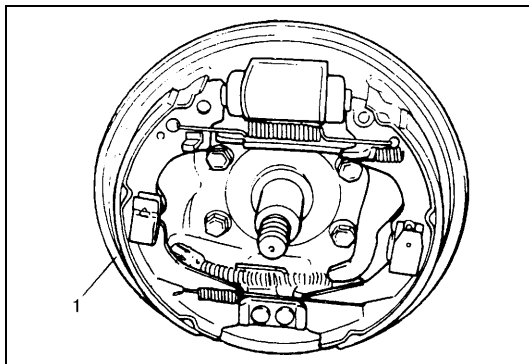
## Knuckle

### REMOVAL

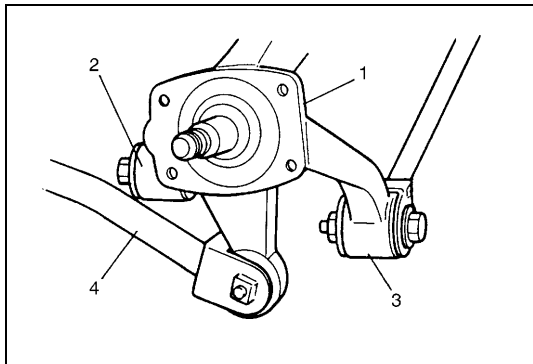
- 1) Hoist vehicle and remove wheel hub referring to "Wheel Hub, Wheel Bearing and Wheel Stud" in this section.
- 2) Remove E-ring (1) securing brake hose.



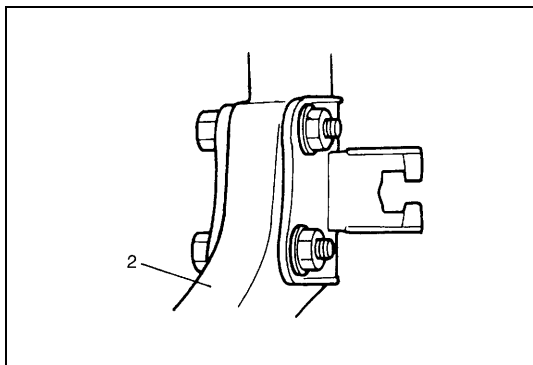
- 3) Disconnect brake pipe (1) from wheel cylinder (2) and put wheel cylinder bleeder plug cap (3) onto pipe to prevent fluid from spilling.
- 4) Remove ABS wheel speed sensor from knuckle, if equipped.



- 5) Remove brake back plate (1) from knuckle.



- 6) Loosen control rod outer bolts, trailing rod rear bolt and strut bracket nuts.
- 7) Disconnect control rods (No.1 (2) and No.2 (3)) from knuckle (1).
- 8) Disconnect trailing rod (4) from knuckle (1).



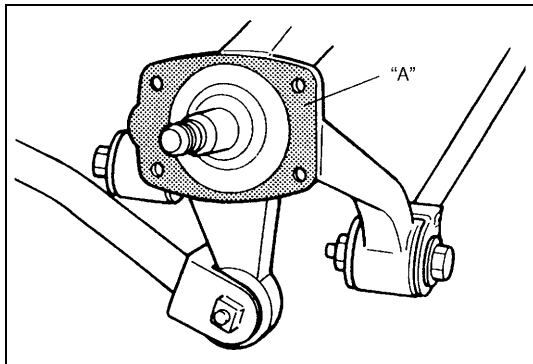
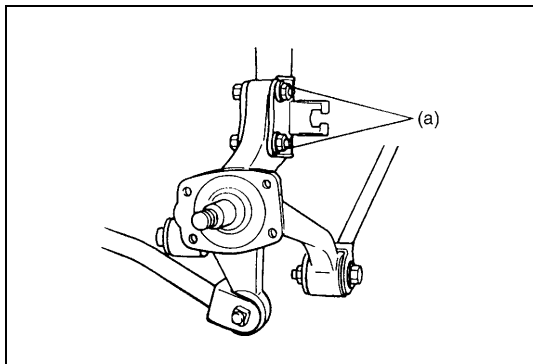
- 9) Remove knuckle (2) from strut.

## INSTALLATION

- 1) Install rear knuckle to strut, and connect control rods and trailing rod to knuckle. At this point, temporarily tighten them by hand.
- 2) Tighten strut bracket bolts and nuts to specified torque.

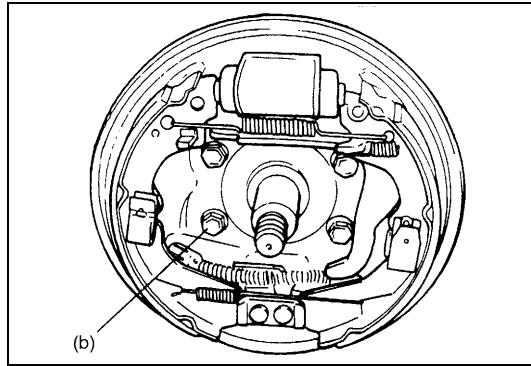
### Tightening torque

**Strut bracket nuts (a) : 90 N·m (9.0 kg-m, 65.0 lb-ft)**



- 3) Apply water tight sealant to mating surfaces of brake back plate and rear knuckle.

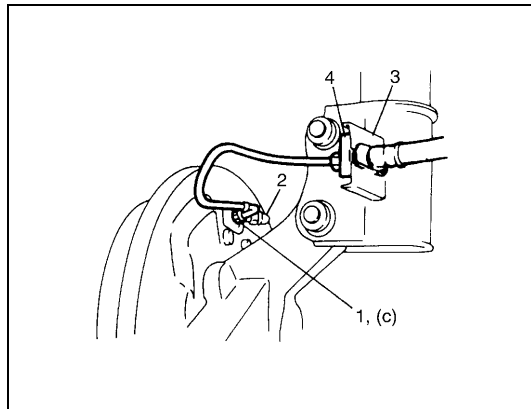
**"A" : Sealant 99000-31090**



- 4) Install brake back plate and tighten back plate bolts to specified torque.

#### Tightening torque

**Back plate bolts (b) : 50 N·m (5.0 kg-m, 36.0 lb-ft)**

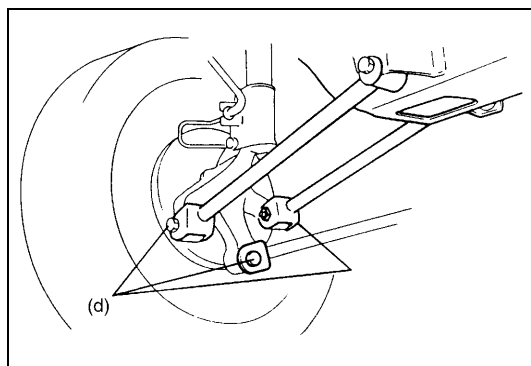


- 5) For ABS equipped vehicle, check to make sure that ABS wheel speed sensor tooth is free from any metal particles and install it to knuckle.
- 6) Connect brake pipe to wheel cylinder and tighten brake pipe flare nut (1) to specified torque and install bleeder plug cap (2) taken off from pipe back to bleeder plug.

#### Tightening torque

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

- 7) Attach brake hose to strut bracket (3) with E-ring (4) securely.
- 8) Install wheel hub referring to "Wheel Hub, Wheel Bearing and Wheel Stud" in this section.
- 9) Install brake drum referring to "Brake Drum" in Section 5.
- 10) Fill reservoir with brake fluid and bleed brake system. Refer to "Air Bleeding of Brake System" in Section 5.
- 11) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to five times so as to obtain proper drum-to-shoe clearance.  
Adjust parking brake cable. Refer to "Parking Brake Inspection and Adjustment" in Section 5.
- 12) Install wheel and tighten wheel nuts to specified torque.
- 13) Check to ensure that brake drum is free from dragging and proper braking is obtained.
- 14) Lower hoist and bounce vehicle up and down to stabilize suspension.



- 15) Tighten control rod outer bolts and trailing rod rear bolt to specified torque with vehicle weight on suspension. Then check toe.

#### Tightening torque

**Control rod outer bolts and trailing rod rear bolt (d) : 95 N·m (9.5 kg-m, 68.5 lb-ft)**

- 16) Perform brake test (foot brake and parking brake).
- 17) Check each installed part for fluid leakage.

## Tightening Torque Specifications

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Stabilizer bar mounting bracket	23	2.3	17.0
Stabilizer link nut and joint nut	50	5.0	36.5
Control rod outer bolt	95	9.5	68.5
Control rod front side inner bolt & nut			
Trailing rod bolt			
Control rod rear side inner bolt & nut	90	9.0	65.0
Suspension frame bolt			
Strut support nut	28	2.8	20.5
Strut upper nut	70	7.0	51.0
Strut bracket nut	90	9.0	65.0
Rear spindle nut	175	17.5	126.5
Back plate bolt	50	5.0	36.0
Wheel nut (hub nut)	85	8.5	61.5
Brake pipe flare nut	16	1.6	12.0

## Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Brake fluid	Indicated on reservoir tank cap or described in owner's manual of vehicle	• Brake reservoir tank
Water tight sealant	SUZUKI SEALING COMPOUND 366E (99000-31090)	• Joint seam of knuckle and brake back plate

# REAR SUSPENSION

## (4WD VEHICLE)

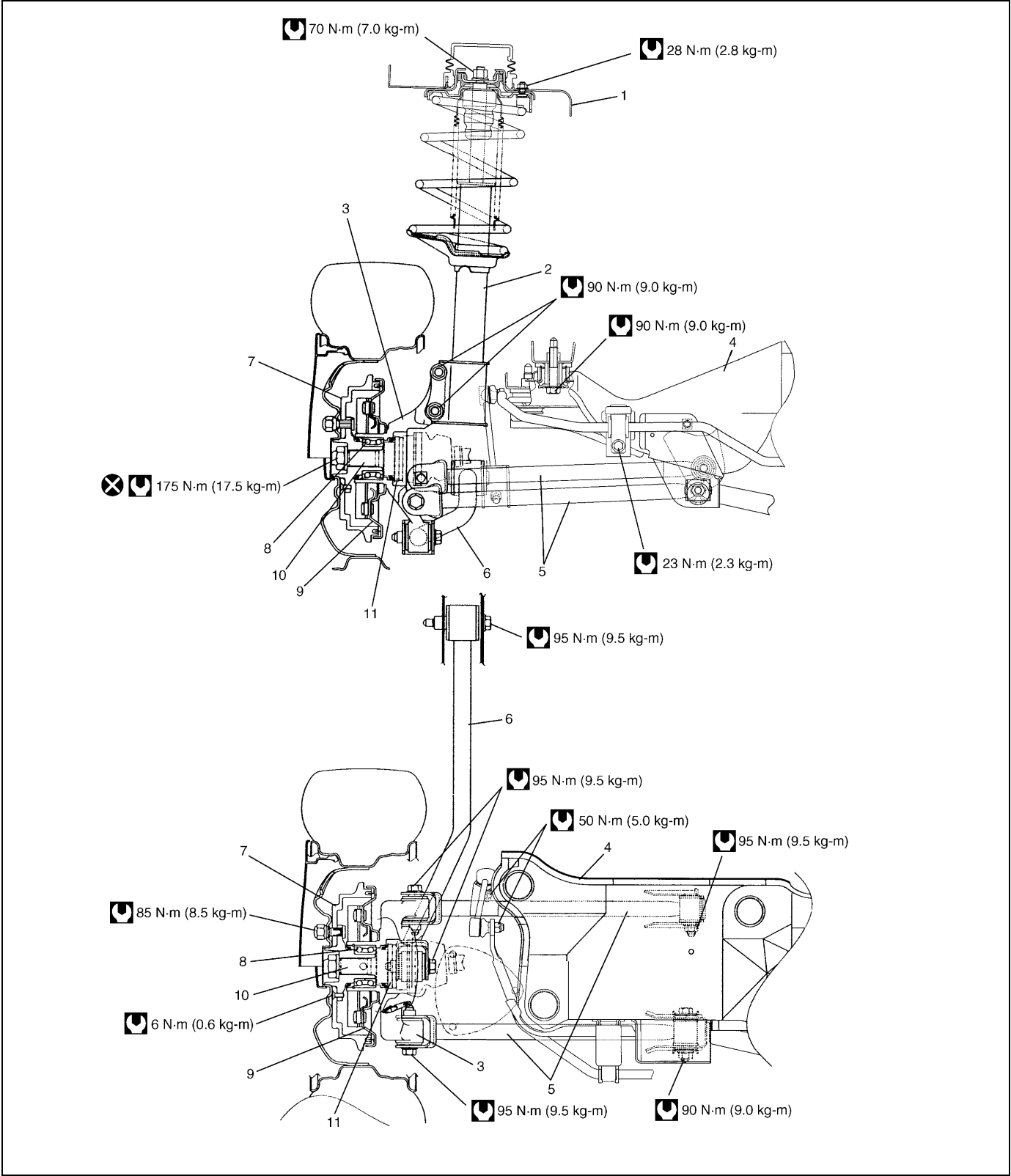
**NOTE:**

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



# General Description

## Construction



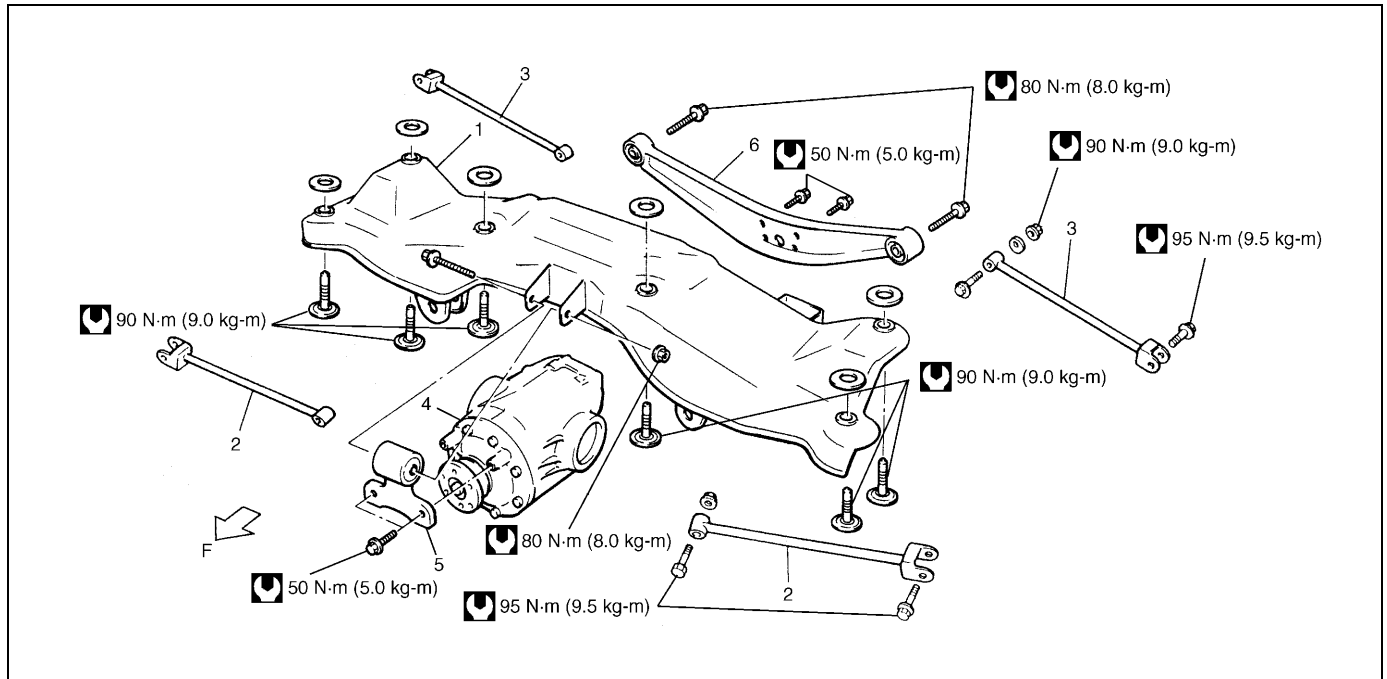
1. Vehicle body	6. Trailing rod	11. ABS wheel speed sensor ring (if equipped)
2. Strut assembly	7. Brake drum	Tightening torque
3. Rear knuckle	8. Wheel bearing	Do not reuse.
4. Suspension frame	9. Brake back plate	
5. Control rod	10. Drive shaft	

# On-vehicle Service

## CAUTION:

When hoisting the vehicle by using a floor jack, use care not to apply the floor jack to the rear suspension frame. For the appropriate lifting point, refer to “Vehicle Lifting Points” in Section 0A.

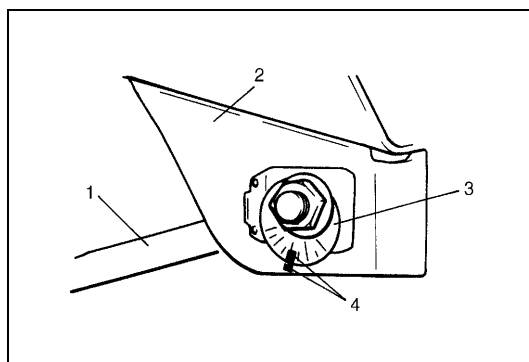
## Rear Suspension Frame

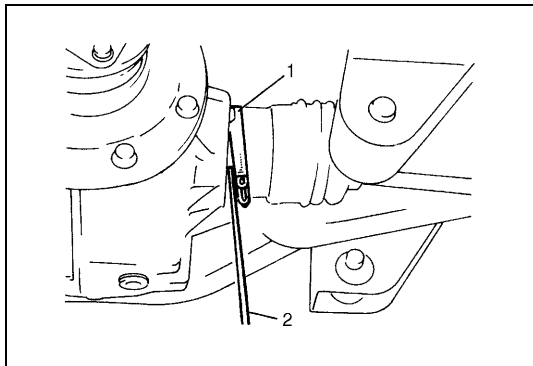


1. Suspension frame	4. Differential	F : Forward
2. Control rod (No.1)	5. Differential mounting	Tightening torque
3. Control rod (No.2)	6. Differential mounting bracket	

## REMOVAL

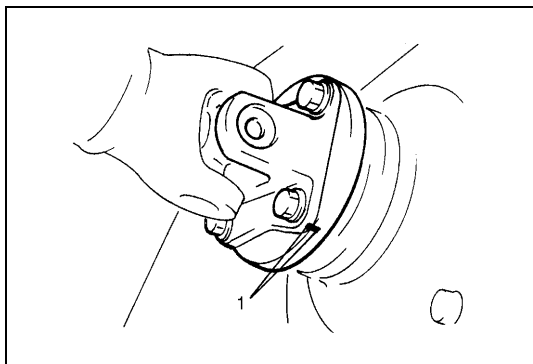
- 1) Hoist vehicle and remove wheels (right and left).
- 2) Drain differential oil.
- 3) Remove rear drive shaft nut of left side.
- 4) Detach LSPV spring end from left side control rod (No.2) (if equipped with LSPV).
- 5) Remove stabilizer bar referring to “Stabilizer Bar And/or Bushings” in this section.
- 6) To facilitate toe adjustment after reinstallation, put match marks (4) on washer (3) and on suspension frame (2) (right and left).
- 7) Remove control rod (No.2) (1).
- 8) Remove control rod (No.1).





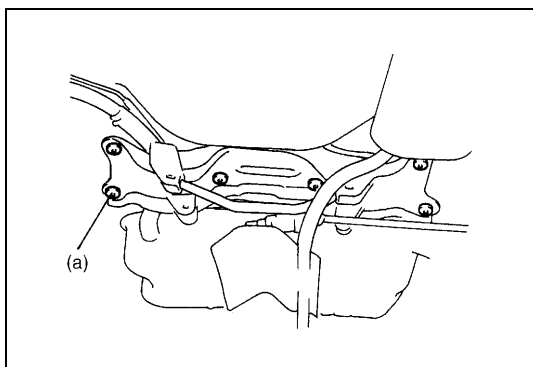
- 9) Remove left drive shaft from differential and knuckle, and disconnect right drive shaft from differential.

1. Used clamp
2. Tire lever



- 10) To facilitate reinstallation, put match marks (1) on No.2 propeller shaft flange and differential flange. Disconnect No.2 propeller shaft from differential.
- 11) Remove differential with differential mounting and mounting bracket from suspension frame.
- 12) Remove suspension frame from vehicle body.

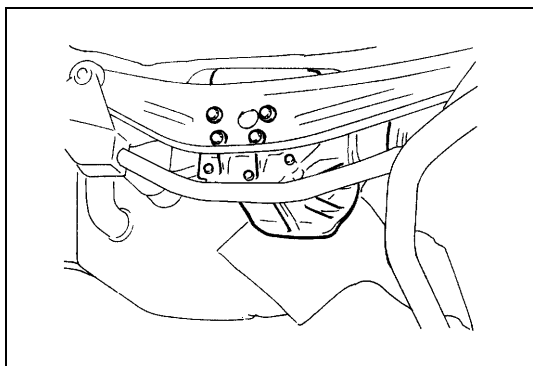
## INSTALLATION



- 1) Install suspension frame to vehicle body and tighten suspension frame bolt to specified torque.

### Tightening torque

**Suspension frame bolts (a) : 90 N·m (9.0 kg-m, 65.0 lb-ft)**



- 2) Install differential mounting bracket and differential with differential mounting to suspension frame.  
Tighten each bolt to specified torque referring to Section 7F.
- 3) Connect No.2 propeller shaft to differential aligning match marks on flanges. Tighten bolts and nuts to specified torque referring to Section 4B.
- 4) Install drive shafts (right and left) referring to "Drive Shaft Assembly" in Section 4C.
- 5) Install control rods referring to "Control Rod" in this section.
- 6) Install stabilizer bar referring to "Stabilizer Bar and/or Bushings" in this section.
- 7) If equipped with LSPV, check and adjust LSPV spring referring to "LSPV Inspection and Adjustment" and perform "Fluid Pressure Test" in Section 5.
- 8) Fill differential oil, referring to Section 7F.
- 9) Install wheels and tighten wheel nuts to specified torque.

## SECTION 4A

# FRONT DRIVE SHAFT

**NOTE:**

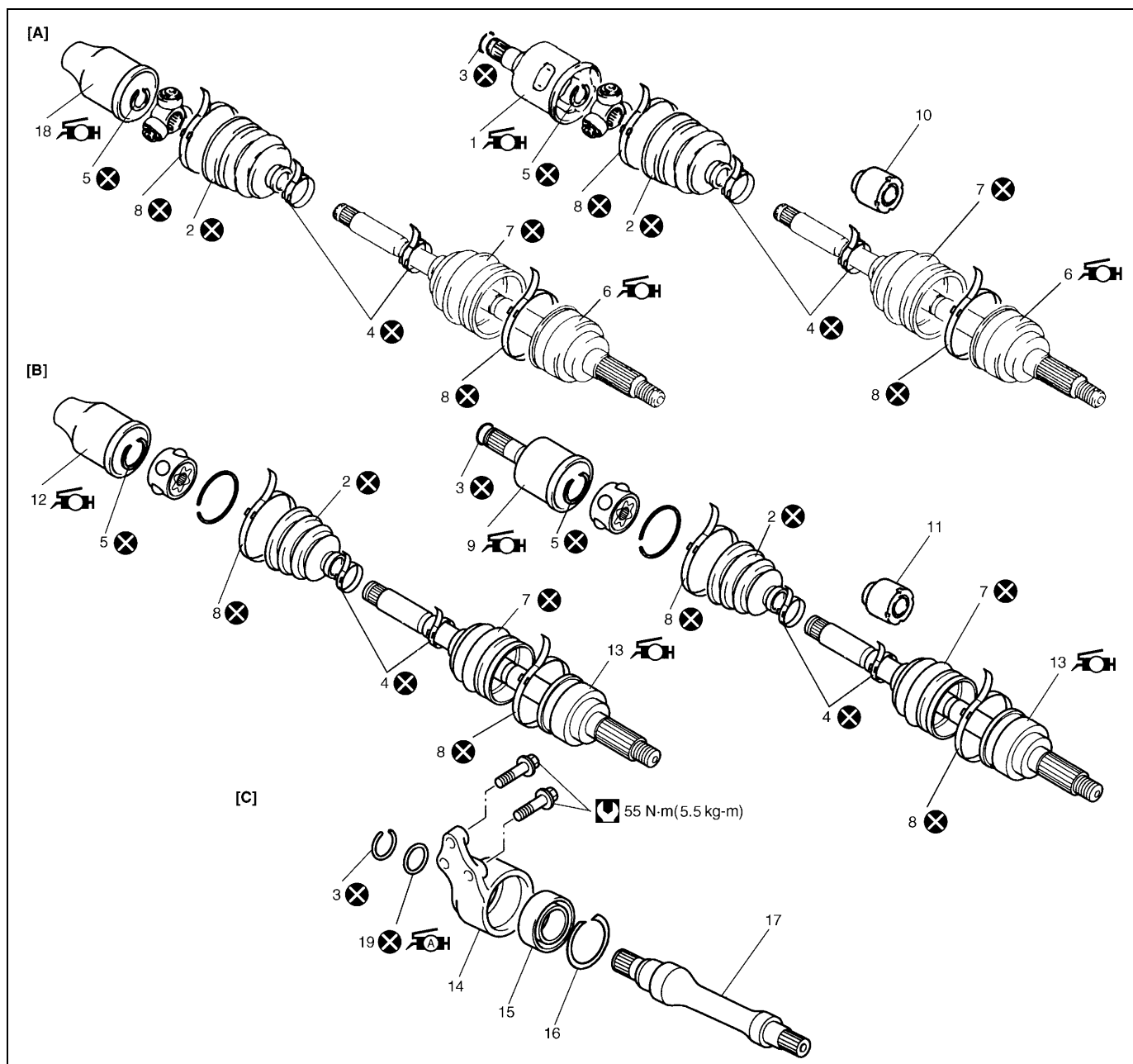
For the items with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.










### CONTENTS

4A

<b>General Description</b> .....	*	<b>On-Vehicle Service</b> .....	<b>4A-2</b>
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<b>Diagnosis</b> .....	*	<b>Tightening Torque Specification</b> .....	<b>4A-10</b>
Diagnosis Table .....	*	<b>Required Service Material</b> .....	<b>4A-10</b>
Drive Shaft Boot Check .....	*	<b>Special Tool</b> .....	<b>4A-10</b>

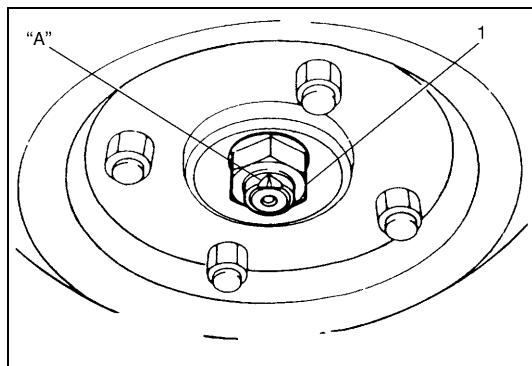
# On-Vehicle Service



 1. Differential side joint for A/T vehicle :Apply orange grease included in spare part to joint.	 9. Differential side joint for LH of M/T vehicle :Apply light black grease included in spare part to joint.	17. Center shaft
2. Boot for Differential, transfer or center shaft side	10. Dynamic damper for A/T 2WD vehicle and LH of A/T 4WD vehicle	 18. Transfer side joint for RH of A/T 4WD vehicle :Apply orange grease included in spare part to joint.
3. Circlip	11. Dynamic damper for LH of M/T vehicle	 19. O-ring :Apply grease 99000-25010 to all round of O-ring.
4. Small boot band	 12. Center shaft side joint for RH of M/T vehicle :Apply light black grease included in spare part to joint.	[A] : Tripod type constant velocity joint
5. Snap ring	 13. Wheel side joint :Apply black grease included in spare part to joint.	[B] : Double offset type constant velocity joint
 6. Wheel side joint :Apply black grease included in spare part to joint.	14. Center shaft support bracket	[C] : Center shaft for M/T vehicle
7. Boot for Wheel side	15. Center shaft support bearing	 Tightening torque
8. Large boot band	16. Circlip	 Do not reuse.

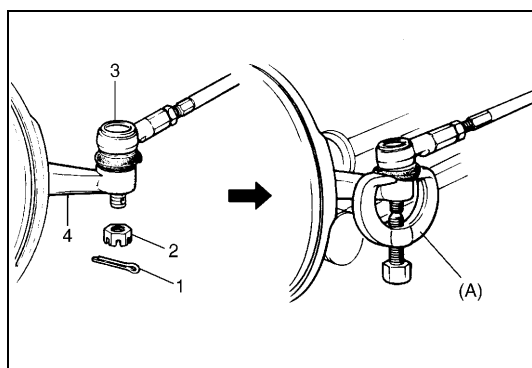
## Drive Shaft Assembly

### REMOVAL



- 1) Undo caulking ("A") and remove drive shaft nut (1) and washer.

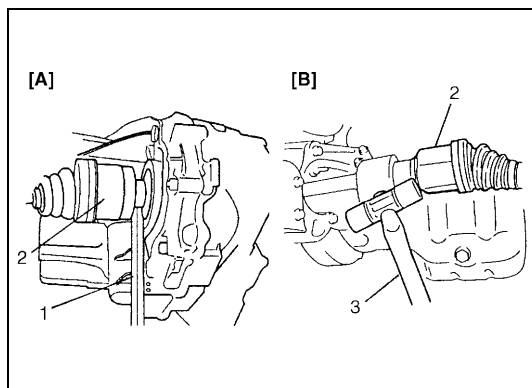
- 2) Hoist vehicle.
- 3) Remove wheel.
- 4) Remove engine under covers.
- 5) Drain transaxle oil or transfer oil.



- 6) Remove tie rod end split pin (1) and castle nut (2).
- 7) Disconnect tie rod end (3) from steering knuckle (4) by using special tool.

#### Special tool

(A) : 09913-65210



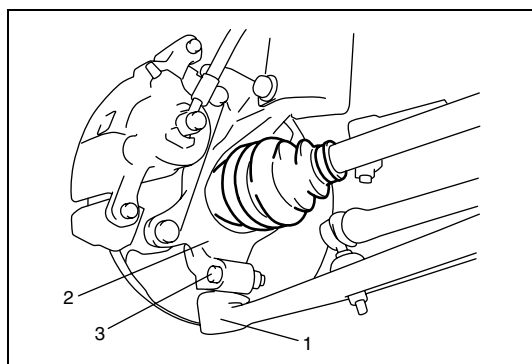
#### 8) [For vehicle without center shaft]

Using tire lever (1), pull out drive shaft joint (2) so as to release snap ring fitting of joint spline at differential side.

#### [For vehicle with center shaft]

Using plastic hammer (3), drive out drive shaft joint (2) so as to release snap ring fitting of joint spline at center shaft.

[A] : Vehicle without center shaft
[B] : Vehicle with center shaft

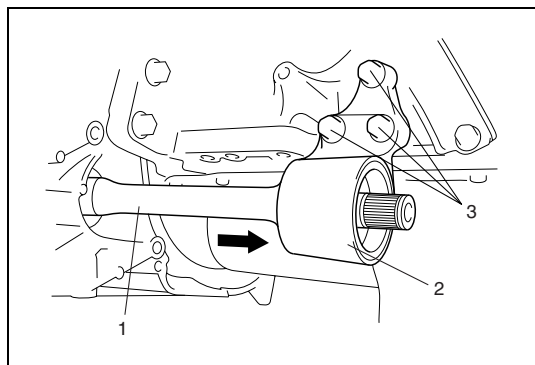


- 9) Disconnect front suspension control arm ball stud (1) from steering knuckle (2) after removing ball stud bolt (3) and nut.

**CAUTION:**

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

10) Remove drive shaft assembly.

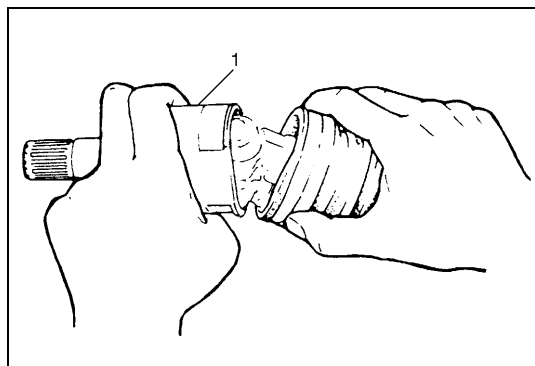


11) **[For vehicle with center shaft]**

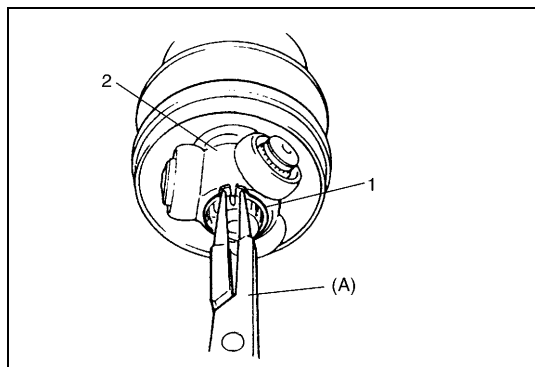
Remove center shaft support bolts (3) and remove center shaft support (2) with center shaft (1) from differential side gear.

**DISASSEMBLY**

**For tripod joint type drive shaft**



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

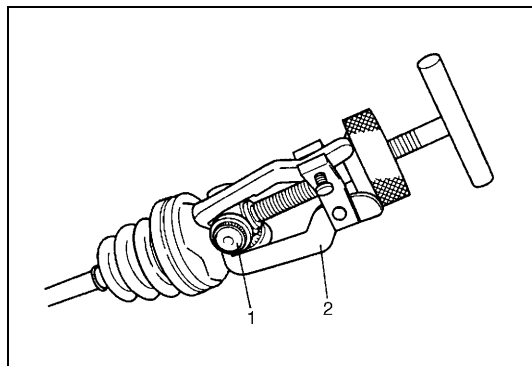


2) Remove grease from shaft and take off snap ring (1) by using special tool.

2 Spider

**Special tool**

**(A) : 09900-06107**



3) Remove spider (1) by using 3 arms puller (2).

**CAUTION:**

To prevent any problem caused by washing solution, do not wash tripod joint except its housing. Degreasing of tripod joint with cloth is allowed.

4) Remove boot band, then pull out differential side boot from shaft.

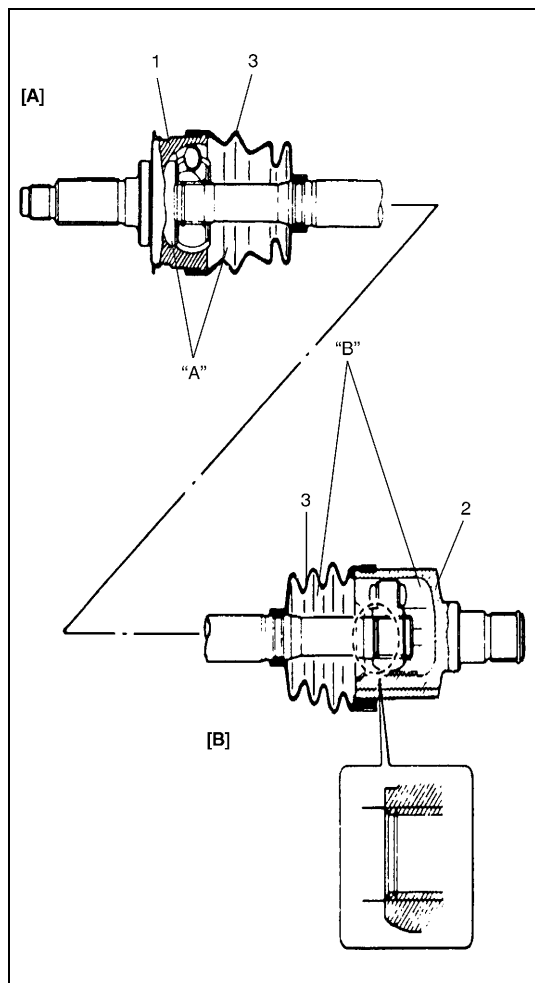
5) Pull out damper through shaft, if equipped.

6) Undo boot bands of wheel side joint boot, then pull out boot through shaft.

**CAUTION:**

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



**ASSEMBLY****For tripod joint type drive shaft**

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

Make sure that wheel side joint assembly (1) and tripod joint housing (2) are washed thoroughly and air dried.

Replace boot(s) (3) with new one(s).

**CAUTION:**

**To ensure full performance of joint as designed, be sure to distinguish between two types of grease in repair set and apply specified volume to respective joint. Refer to the followings for identification of the grease.**

“A” : Black grease

“B” : Orange grease

**Grease volume to be applied**

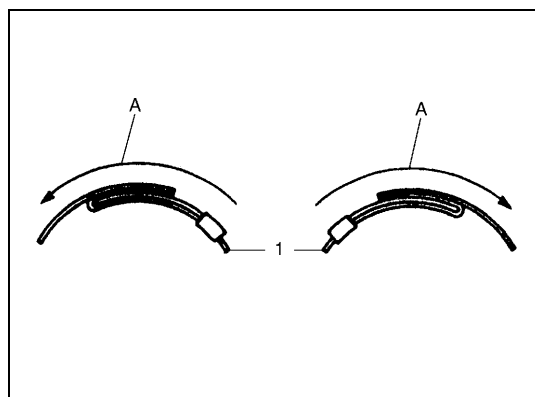
“A” : 45 - 65 g (1.6 - 2.3 oz)

“B” : 90 - 110 g (3.2 - 3.9 oz) for RH of 4WD vehicle

“B” : 100 - 120 g (3.5 - 4.2 oz) for 2WD vehicle and LH of 4WD vehicle

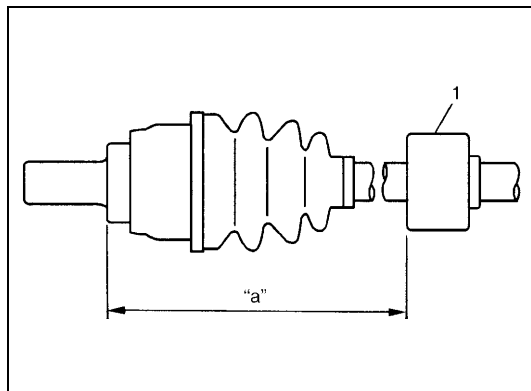
[A] : Wheel side
[B] : Differential side

- 1) Wash disassembled parts. After washing, dry parts completely by blowing air.
- 2) Clean boots with cloth. Do not wash boots in degreaser such as gasoline or kerosene. etc. Washing in degreaser causes deterioration of boot.
- 3) Apply grease to wheel side joint. Use specified grease in tube in wheel side boot set.
- 4) Install wheel side boot on shaft.

**CAUTION:**

- Bend each boot band against forward rotation (A).
- Do not squeeze or distort boot when fastening it with bands.  
Distorted boot caused by squeezing air may reduce its durability.

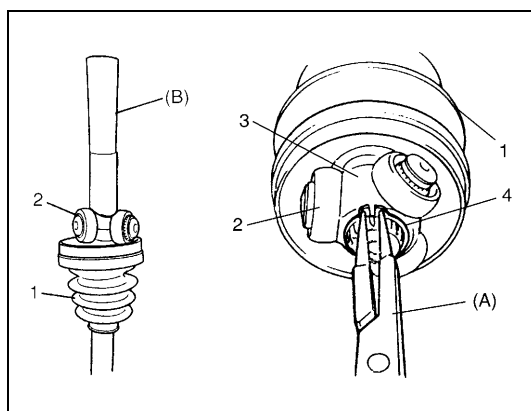
- 5) Fill up boot inside with specified grease and then fasten boot with bands (1).



- 6) Install dynamic damper (1) on drive shaft according to dimension specified below. (if equipped)

#### Drive shaft dynamic damper installing position

Applicable drive shaft	Position (Distance "a" between reference position and damper)
RH drive shaft for 2WD vehicle	"a" : 369 - 375 mm (14.5 - 14.8 in.)
LH drive shaft for 2WD vehicle and 4WD vehicle	"a" : 189.5 - 195.5 mm (7.5 - 7.7 in.)

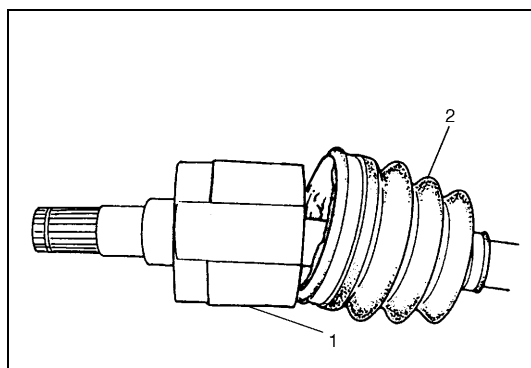


- 7) Set new differential side small band and new differential side boot (1) on shaft temporarily.  
Apply grease to tripod joint (2). Use specified grease in tube included in spare parts.
- 8) Install tripod joint spider (3) on shaft by using special tool with hammer, directing its chamfered spline toward wheel side, then fasten it with new snap ring (4).

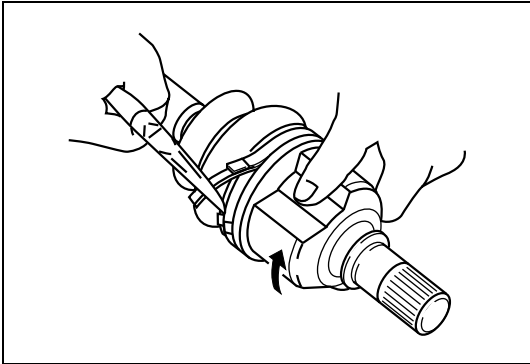
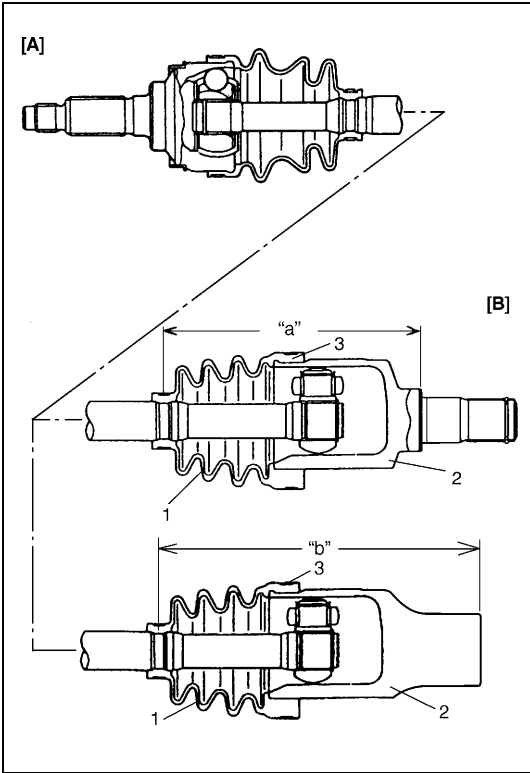
#### Special tool

(A) : 09900-06107

(B) : 09941-74910



- 9) Apply grease to inside of tripod joint housing (1), joint it with tripod joint and fit boot (2) to tripod joint housing.  
After fitting boot, insert screwdriver into boot on tripod joint housing side and allow air to enter boot so that air pressure in boot at the joint position shown in next step becomes the same as atmospheric pressure.



10) When fixing boot (1) to tripod joint housing (2) with differential side big band (3), adjust so that measured dimensions become as indicated below.

Joint set position when fixing boot

Applicable drive shaft	Position (Distance between reference position and small boot band)
2WD vehicle and left side of 4WD vehicle	“a” : 157.5 - 167.5 mm (6.20 - 6.59 in.)
Right side of 4WD vehicle	“b” : 182.5 - 192.5 mm (7.19 - 7.58 in.)

[A] : Wheel side
[B] : Differential side

CAUTION:

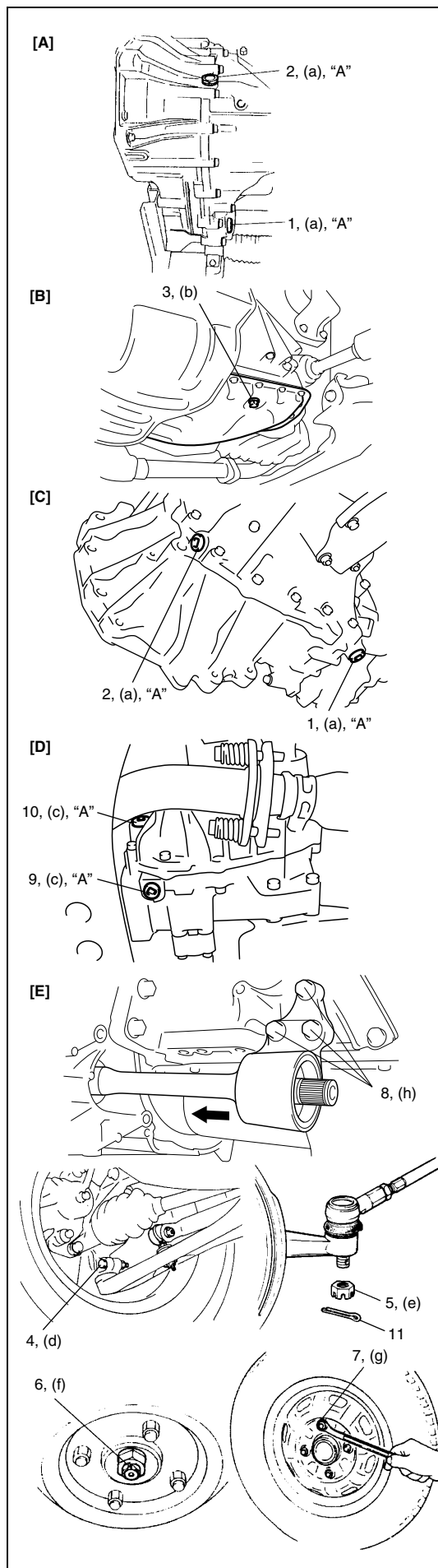
- Bend each boot band against forward rotation.
- Do not squeeze or distort boot when fastening it with bands.  
Distorted boot caused by squeezing air may reduce its durability.

INSTALLATION

CAUTION:

- To avoid excessive expansion of boot and consequential disconnection of joint in boot, do not pull differential side joint housing.
- Protect boots from any damage, preventing them from unnecessary contact while installing drive shaft.
- Do not hit joint boot with hammer. Inserting joint only by hands is allowed.
- Make sure that differential side joint is inserted fully and its snap ring is seated as it was.

Install drive shaft assembly by reversing removal procedure and noting following points.



- Do not reuse drive shaft nut (6).
- Do not reuse split pin (11).
- Tighten each bolt and nut to the specified torque.

#### Tightening torque

#### Transaxle oil filler/level and drain plugs for M/T vehicle

(a) : 21 N·m (2.1 kg-m, 15.5 lb-ft)

#### Transaxle fluid drain plug for A/T vehicle

(b) : 17 N·m (1.7 kg-m, 12.5 lb-ft)

#### Transfer oil filler/level and drain plugs for A/T vehicle

(c) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

Ball stud bolt (d) : 60 N·m (6.0 kg-m, 43.5 lb-ft)

#### Tie rod end castle nut

(e) : 35 – 55 N·m (3.5 – 5.5 kg-m, 25.5 – 40.0 lb-ft)

Drive shaft nut (f) : 175 N·m (17.5 kg-m, 127.0 lb-ft)

Wheel nut (g) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

#### Center shaft support bolts

(h) : 55 N·m (5.5 kg-m, 40.0 lb-ft)

- Apply sealant to drain plug (1) and filler/level plug (2) for manual transaxle.

#### “A” : Sealant 99000-31110

- For A/T 4WD vehicle, apply sealant to drain plug (9) and filler/level plug (10) for transfer.

#### “A” : Sealant 99000-31110

- Fill transaxle or transfer with oil as specified referring to Section 7A1, 7B1 or 7D.

[A] :	For M/T 2WD vehicle
[B] :	For A/T vehicle
[C] :	For M/T 4WD vehicle
[D] :	For A/T 4WD vehicle
[E] :	For M/T 2WD vehicle
3.	Drain plug for A/T vehicle
4.	Ball stud bolt
5.	Castle nut
7.	Wheel nut
8.	Center bearing support bolt

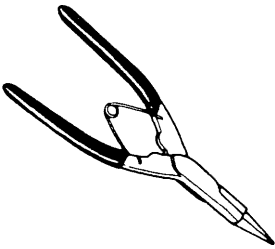
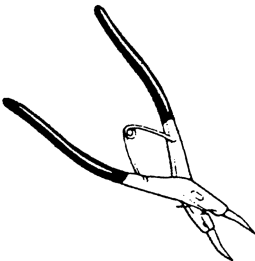
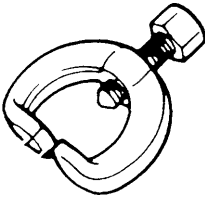

## Tightening Torque Specification

Fastening portion	Tightening torque		
	N•m	kg-m	lb-ft
Transfer oil filler/level and drain plugs for A/T vehicle	23	2.3	17.0
Transaxle oil filler/level and drain plugs for M/T vehicle	21	2.1	15.5
Transaxle fluid drain plug for A/T vehicle	40	4.0	29.0
Ball stud bolt	60	6.0	43.5
Tie rod end castle nut	35 – 55	3.5 – 5.5	25.5 – 40.0
Drive shaft nut	175	17.5	127.0
Wheel nut	85	8.5	61.5
Center shaft support bolts	55	5.5	40.0

## Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Center shaft O-ring
Sealant	SUZUKI BOND NO. 1215 (99000-31110)	• Oil drain and filler plug for manual transaxle or transfer

## Special Tool

 <p>09900-06107 Snap ring pliers (Open type)</p>	 <p>09900-06108 Snap ring pliers (Closing type)</p>	 <p>09913-65210 Tie-rod end remover</p>	 <p>09941-74910 Bearing installer</p>
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## SECTION 5

# BRAKES

### NOTE:

- All front 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.
- For the items with asterisk (\*) in the "CONTENTS" below, refer to the same section of the Service Manual mentioned in "FOREWORD" of this manual.

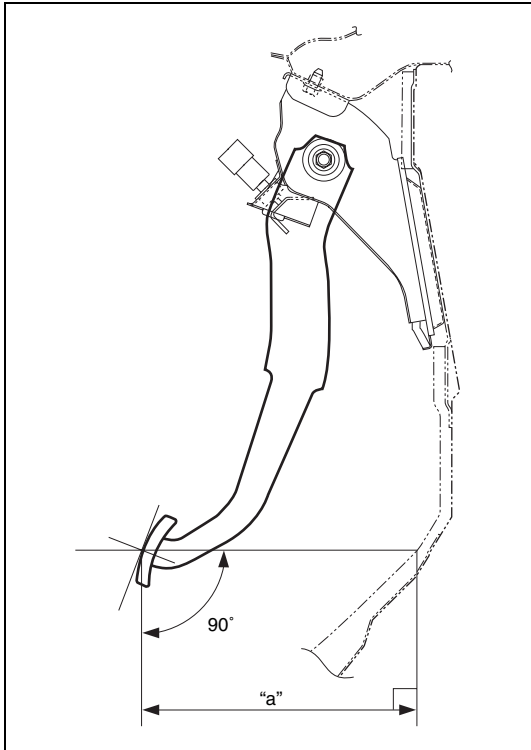
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## Diagnosis

### Brake Pedal Free Height Inspection

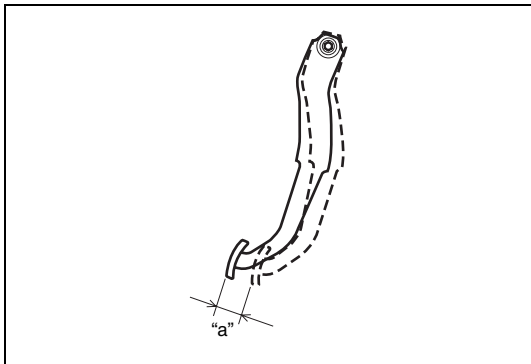


- 1) Check brake pedal free height.  
If it is not within specification, check and adjust following item 2) and 3).

**Brake pedal free height "a" from dash silencer**  
**222 – 242 mm (8.74 – 9.53 in.)**

- 2) Check measurement between booster mounting surface and center of clevis pin hole. When booster push rod clevis has been reinstalled, it is important that the measurement is adjusted (refer to "Brake Booster Inspection and Adjustment").
- 3) Check stop light switch position. Adjust it if it is out of specification.
  - pedal for dent
  - brake booster for installation
  - brake booster push rod for length

### Brake Pedal Play Inspection

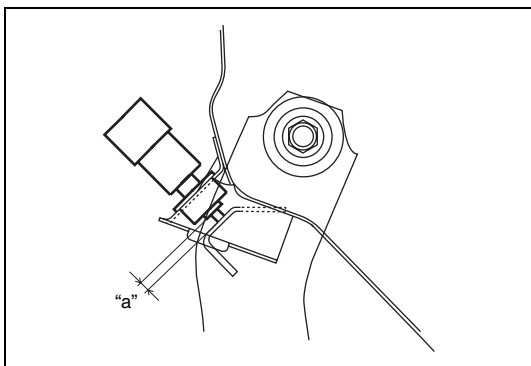


Pedal play should be within specification below. If out of specification, check stop light switch for proper installation position and adjust if necessary.

Also check pedal shaft bolt and master cylinder pin installation for looseness and replace if defective.

**Brake pedal play**  
**"a" : 1 - 8 mm (0.04 - 0.31 in.)**

### Stop Light Switch Adjustment



Adjustment should be made as follows. Pull up brake pedal toward you and while holding it there, adjust switch position so that clearance between end of thread and brake pedal is as specified. Then lock it by turning clockwise.

**Clearance between brake pedal and stop light switch**  
**"a" : 0.5 - 1.5 mm (0.02 - 0.06 in.)**

## Excessive Pedal Travel Inspection

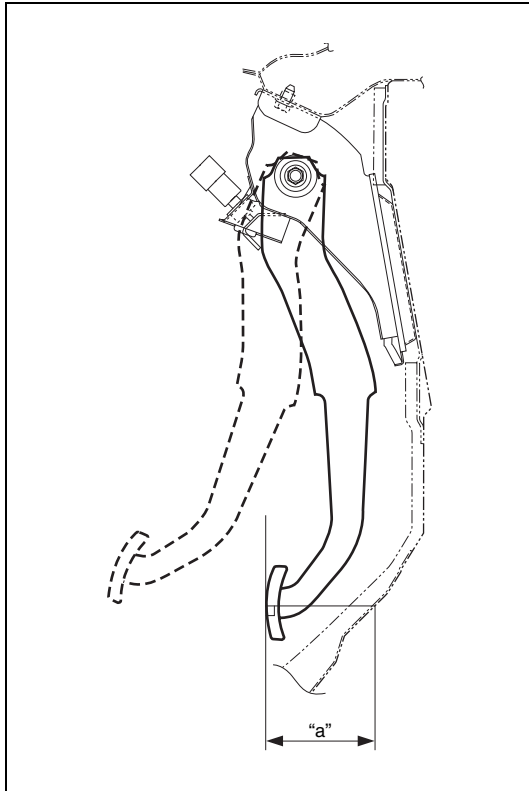
- 1) Start engine.
- 2) Depress brake pedal a few times.
- 3) With brake pedal depressed with approximately 300 N (30 kg, 66 lbs) load, measure brake pedal to wall (dash panel silencer) clearance "a".

If clearance "a" is less than specification, the most possible cause is either rear brake shoes are worn out beyond limit or air is in lines.

Should clearance "a" remain less than specification even after replacement of brake shoes and bleeding of system, other possible but infrequent cause is malfunction of rear brake shoe adjusters or booster push rod length out of adjustment.

- Bleed brake system. Refer to "Air Bleeding of Brake System".
- Remove brake drums for adjuster inspection. (Refer to "Rear Brake".) If defective, correct or replace.

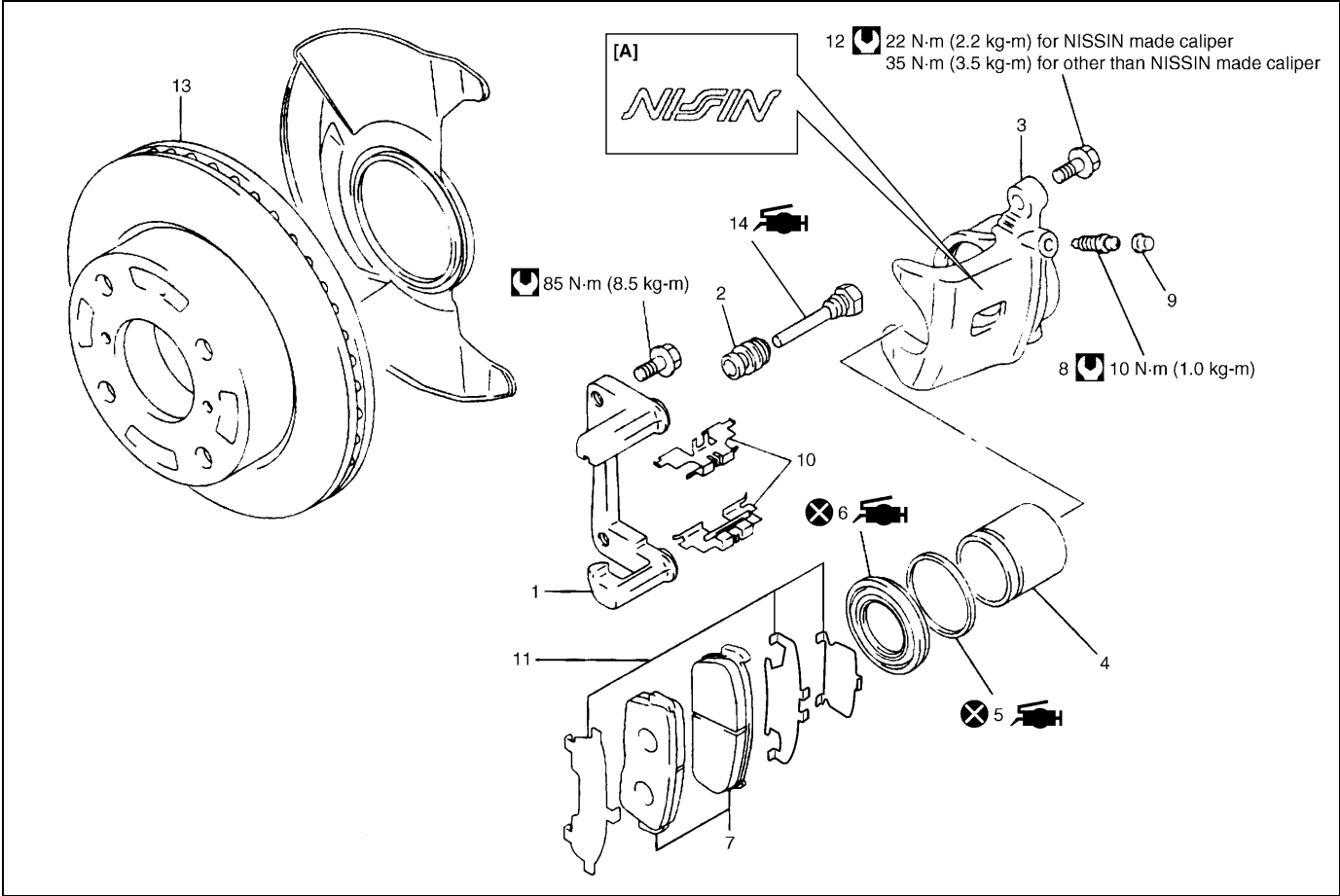
**Clearance "a" between brake pedal and dash panel silencer  
over 110 mm (4.33 in.)**









On-Vehicle Service

Front Brake

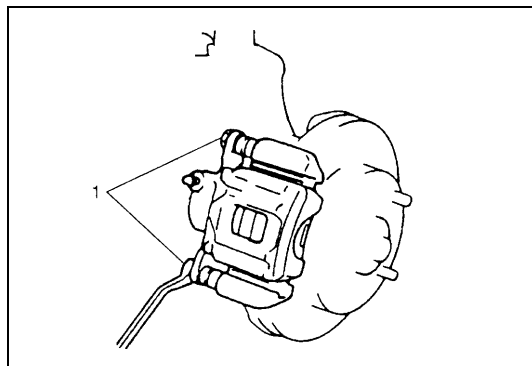


[A]. Identification mark of NISSIN made caliper	9. Bleeder plug cap
1. Brake caliper carrier	10. Pad spring
2. Boot	11. Anti noise shim Apply small amount of grease (included in spare parts) to mating surfaces of brake pad and pad shim.
3. Caliper	12. Caliper pin bolt
4. Disc brake piston	13. Brake disc
 5. Piston seal : Apply grease included in spare parts.	14. Slide pin : Apply grease included in spare parts.
 6. Cylinder boot : Apply grease included in spare parts.	 Tightening torque
7. Brake pad	 Do not reuse.
8. Bleeder plug	

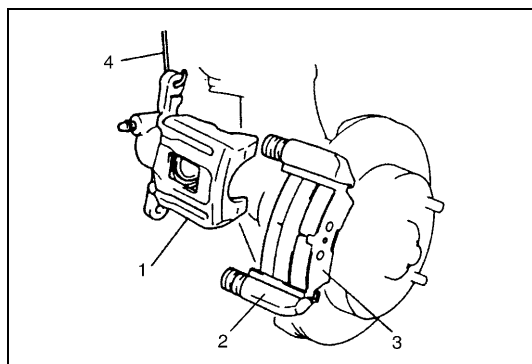
Brake pad

REMOVAL

- 1) Loosen wheel nuts and with vehicle lifted up, remove wheels.



2) Remove caliper pin bolts (1).



3) Remove caliper (1) from caliper carrier (2).

**NOTE:**

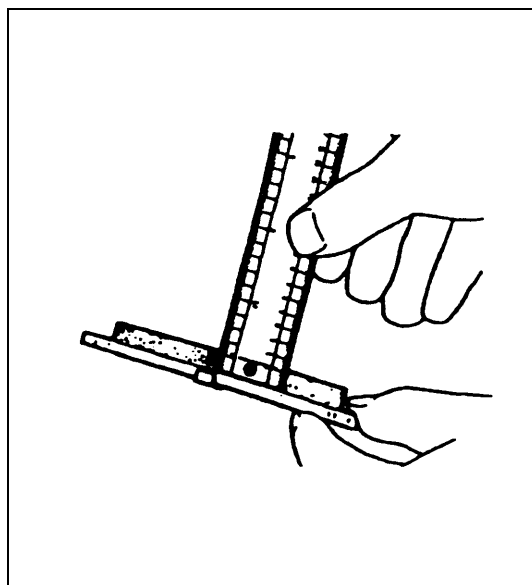
Hang removed caliper (1) with a wire hook (4) or the like so as to prevent brake hose from bending and twisting excessively or being pulled.

Don't operate brake pedal with brake pads removed.

4) Remove brake pads (3).

## INSPECTION

Check pad lining for wear. When wear exceeds limit, replace with new one.



**CAUTION:**

Never polish pad lining with sandpaper. If lining is polished with sandpaper, hard particles of sandpaper will be deposited in lining and may damage disc. When pad lining requires correction, replace it with a new one.

Brake pad thickness (lining thickness)

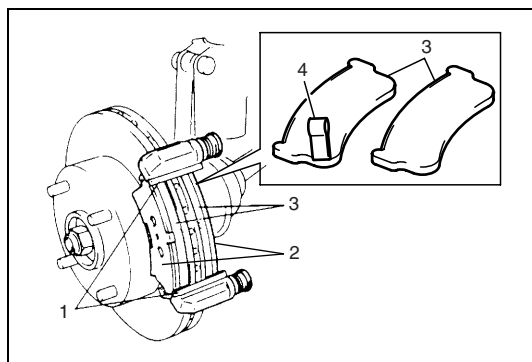
Standard : 10 mm (0.40 in.)

Limit : 2 mm (0.08 in.)

**NOTE:**

When pads are removed, visually inspect caliper for brake fluid leak. Correct leaky point, if any.

## INSTALLATION

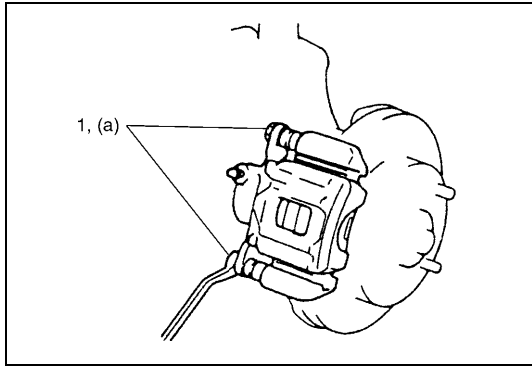


1) Before installing brake pad shim, apply small amount of grease (included in spare parts) to mating surfaces of brake pad and pad shim.

2) Set brake pad springs (1) and shim (2) and install brake pads (3).

**NOTE:**

For right side brake, install pad with wear indicator (4) to vehicle center side.



- 3) Install caliper and tighten caliper pin bolts (1) to specified torque.

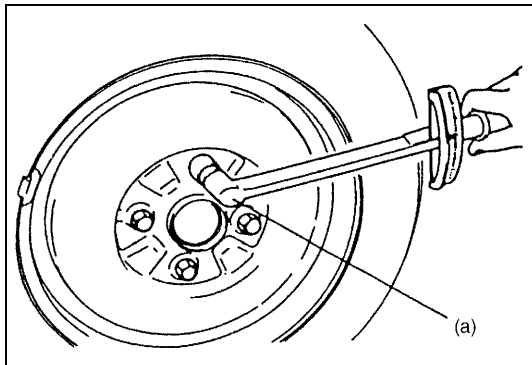
**Tightening torque**

**Caliper pin bolts (a) :**

**22 N·m (2.2 kg-m, 16.0 lb-ft) for NISSIN made caliper**

**35 N·m (3.5 kg-m, 25.5 lb-ft) for other than NISSIN made caliper**

- 4) Install wheel and lower lift.



- 5) Tighten wheel nuts to specified torque.

**Tightening torque**

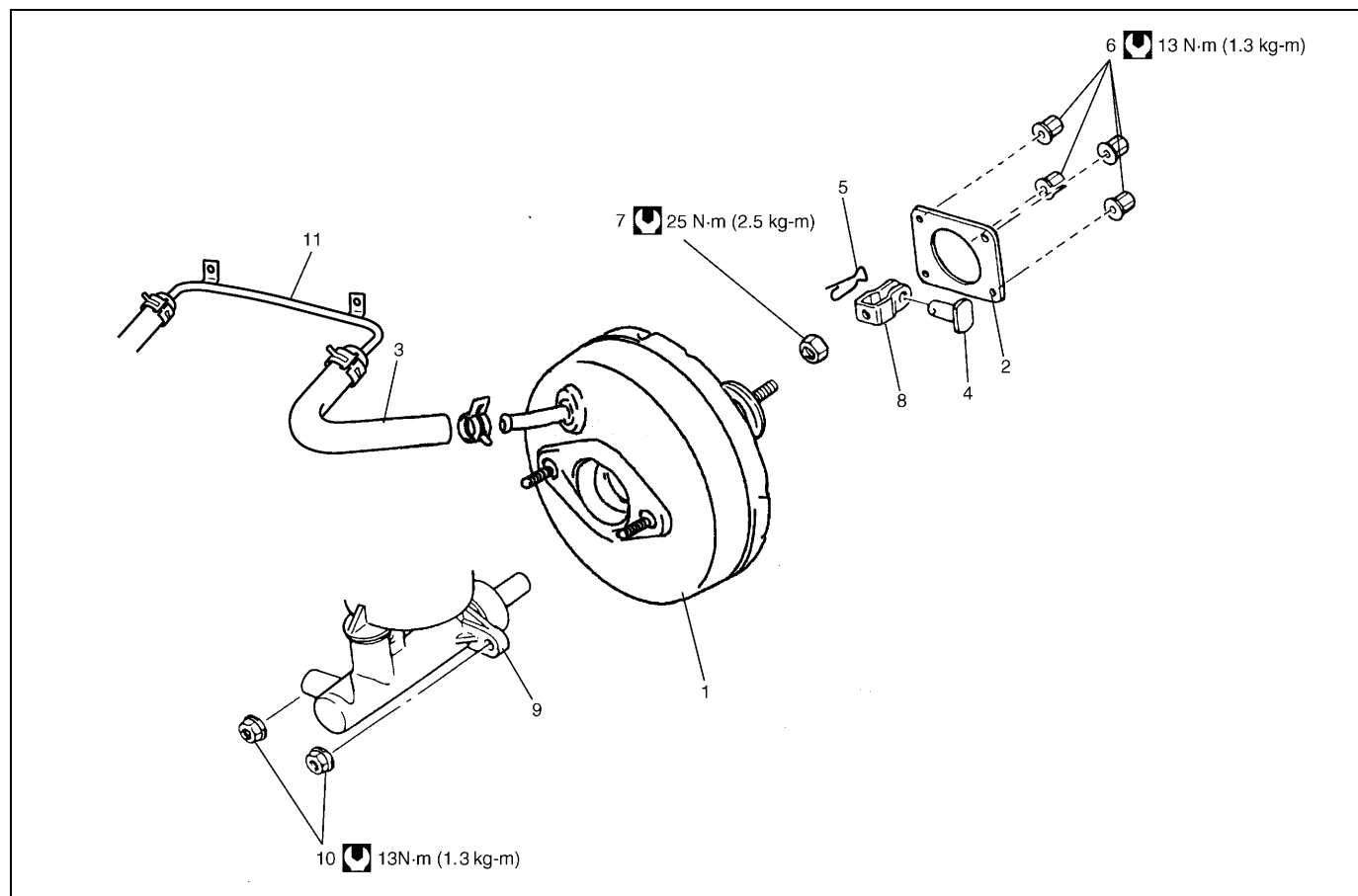
**Wheel nuts (a) : 85 N·m (8.5 kg-m, 61.5 lb-ft)**

- 6) After completion of installation, check for brake effectiveness.

## Brake Booster

### NOTE:

The figure shows left-hand steering vehicle.



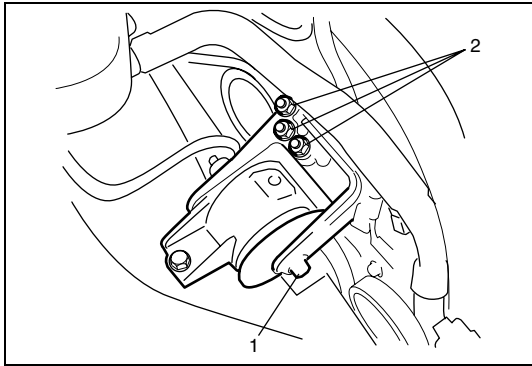
1. Booster assembly	5. Clip	9. Brake master cylinder
2. Gasket	6. Nut	10. Master cylinder fixing nut
3. Brake vacuum hose	7. Clevis pin lock nut	11. Brake vacuum pipe
4. Clevis pin	8. Push rod clevis	Tightening torque

### CAUTION:

**Never disassemble brake booster. Disassembly will spoil its original function. If faulty condition is found, replace it with new one.**

### REMOVAL

- 1) Remove master cylinder assembly (9) from booster (1). Refer to "Master Cylinder" in this section.
- 2) Disconnect vacuum hose (3) from booster.
- 3) [For left-hand steering vehicle with ABS]  
Remove brake vacuum pipe (11) from dash panel.
- 4) [For right-hand steering vehicle]
  - a) Remove air cleaner case assembly from vehicle body.
  - b) Support engine with support device.

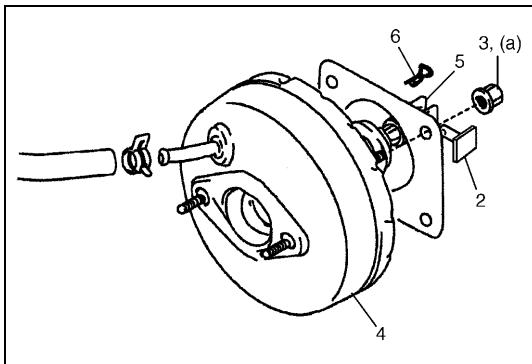


- c) Loosen right side engine mounting bolt (1) and then remove engine mounting bracket nuts (2).
- d) Remove right side engine mounting bracket from timing chain cover and move engine in front direction.

- 5) Remove push rod clevis pin and booster mounting nuts and then remove booster.

## INSTALLATION

- 1) [For left-hand steering vehicle]  
Check and adjust clearance between booster piston rod and master cylinder piston referring to "Inspection and Adjustment" of "Brake Booster" in this section.
- 2) Check and adjust distance between booster installation surface (without including packing) and the center of clevis pin hole referring to "Inspection and Adjustment" of "Brake Booster" in this section.

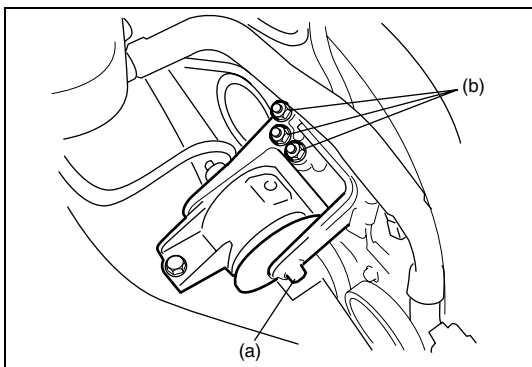


- 3) Install booster (4) to dash panel. Then connect push rod clevis (5) to pedal arm with clevis pin (2) and clip (6).
- 4) Tighten booster mounting nuts (3) to specified torque.

### Tightening torque

**Booster mounting nuts (a) : 13 N·m (1.3 kg-m, 9.5 lb-ft)**

- 5) [For left-hand steering vehicle with ABS]  
Install brake vacuum pipe to dash panel.



- 6) [For right-hand steering vehicle]
  - a) Install right side engine mounting bracket to timing chain cover and tighten right side engine mounting bolt and bracket nuts to specified torque.

### Tightening torque

**Right side engine mounting bolt**

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

**Engine mounting bracket nuts**

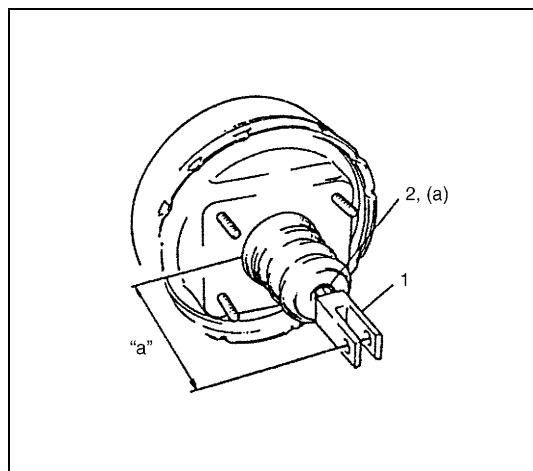
**(b) :75 N·m (7.5 kg-m, 54.5 lb-ft)**

- b) Remove support device.
- c) Install air cleaner case assembly to vehicle body.
- 7) Install master cylinder assembly to booster referring to "Master Cylinder" in this section.
- 8) Fill reservoir with specified fluid.
- 9) Bleed air from brake system.
- 10) Check pedal height and play referring to "Brake Pedal Free Height Inspection" and "Brake Pedal Play Inspection" in this section.

- 11) Perform brake test and check each installed part for fluid leakage.

## INSPECTION AND ADJUSTMENT

### Installation position of push rod



If push rod clevis (1) has been removed, adjust distance between booster installation surface (without including packing) and the center of clevis pin hole to standard value "a" and tighten nut (2) to specified torque.

**Distance "a" between center of booster clevis pin hole and booster surface**

**Standard:**

104.5–105.5 mm (4.11–4.15 in.)...Left-hand steering vehicle

109.5–110.5 mm (4.31–4.35 in.)...Right-hand steering vehicle

**Tightening torque**

Clevis pin lock nut (a) : 25 N·m (2.5 kg-m, 18.5 lb-ft)

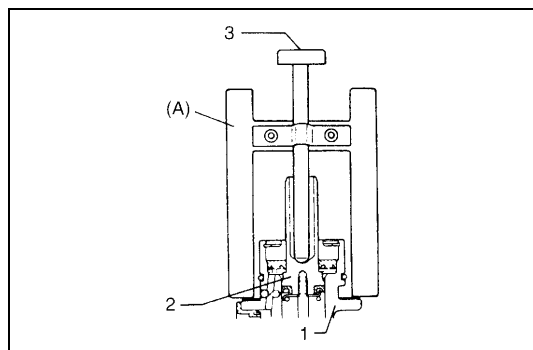
### Clearance Between Booster Piston Rod And Master Cylinder Piston

#### [For left-hand steering vehicle]

- a) Set special tool (A) on master cylinder (1) and push pin head (3) until it contacts piston (2).

**Special tool**

(A) : 09950-96010

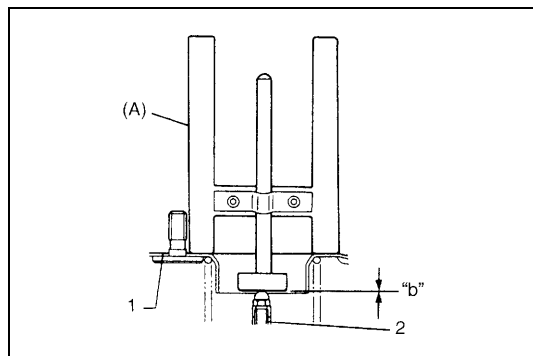


- b) Turn special tool upside down and place it on booster (1). Adjust booster piston rod (2) length until rod end contacts pin head.

**Clearance "b" (Between special tool and piston rod):**  
0 mm (0 in.)

**Special tool**

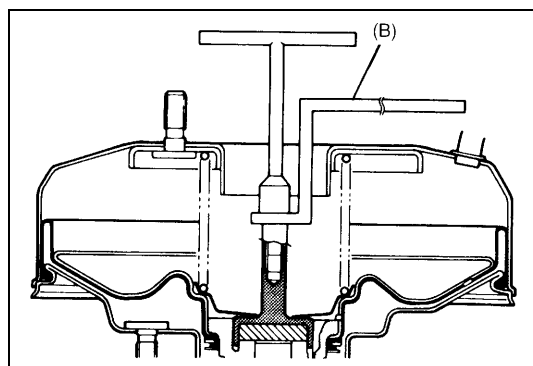
(A) : 09950-96010



- c) Adjust clearance by turning adjusting screw of piston rod.

**Special tool**

(B) : 09952-16010



**[For right-hand steering vehicle]**

**NOTE:**

**Adjustment of clearance between booster piston rod and master cylinder piston is not necessary.**

## SECTION 6

# ENGINE GENERAL INFORMATION AND DIAGNOSIS (M13/M16 ENGINES)

### 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 item with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

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

- EGR valve
- Heated oxygen sensor(s) or CO adjusting resistor
- Three way catalytic converter
- Immobilizer indicator lamp
- Knock sensor

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## Engine Diagnosis

### Engine Diagnostic Flow Table

#### Diagnostic trouble code (DTC) table

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle with immobilizer indicator lamp)	MIL (vehicle without immobilizer indicator lamp)
P0105 (No.11)	Manifold absolute pressure circuit malfunction	Low pressure-high vacuum-low voltage (or MAP sensor circuit shorted to ground) High pressure-low vacuum-high voltage (or MAP sensor circuit open)	1 driving cycle	1 driving cycle
P0110 (No.18)	Intake air temp. circuit malfunction	Intake air temp. circuit low input Intake air temp. circuit high input	1 driving cycle	1 driving cycle
P0115 (No.19)	Engine coolant temp. circuit malfunction	Engine coolant temp. circuit low input Engine coolant temp. circuit high input	1 driving cycle	1 driving cycle
P0120 (No.13)	Throttle position circuit malfunction	Throttle position circuit low input Throttle position circuit high input	1 driving cycle	1 driving cycle
P0121	Throttle position circuit performance problem	Poor performance of TP sensor	2 driving cycles	Not applicable
P0130 (No.14)	HO2S circuit malfunction (Sensor-1)	Min. output voltage of HO2S-higher than specification Max. output voltage of HO2S-lower than specification	2 driving cycle	1 driving cycle
P0133	HO2S circuit slow response (Sensor-1)	Response time of HO2S-1 output voltage between rich and lean is longer than specification.	2 driving cycles	Not applicable
P0134	HO2S circuit no activity detected (Sensor-1)	Output voltage of HO2S-1 fails to go above specification. (or HO2S-1 circuit open or short)	2 driving cycles	1 driving cycle
P0135 (No.14)	HO2S heater circuit malfunction (Sensor-1)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON.	2 driving cycles	1 driving cycle
P0136	HO2S circuit malfunction (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 (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	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	Short term fuel trim or total fuel trim (short and long term added) is smaller than specification for specified time or longer. (fuel trim toward lean side is large.)	2 driving cycles	Not applicable

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle with immo- bilizer indi- cator lamp)	MIL (vehicle without immobi- lizer indica- tor lamp)
P0300 P0301 P0302 P0303 P0304	Random misfire detected Cylinder 1 misfire detected Cylinder 2 misfire detected Cylinder 3 misfire detected Cylinder 4 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.17)	Knock sensor circuit malfunction	Knock sensor circuit low input Knock sensor circuit high input	1 driving cycle	1 driving cycle
P0335 (No.23)	Crankshaft position sensor circuit malfunction	No signal for 2 sec. During engine cranking	1 driving cycle	1 driving cycle
P0340 (No.15)	Camshaft position sensor circuit malfunction	No signal during engine running	1 driving cycle	1 driving cycle
P0400	Exhaust gas recirculation flow malfunction detected	Excessive or insufficient EGR flow	2 driving cycles	Not applicable
P0420	Catalyst system efficiency below threshold	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
P0480	Radiator fan control circuit malfunction	Radiator cooling fan relay terminal voltage is low when cooling temp. is lower than specification	2 driving cycles	Not applicable
P0500 (No.16)	Vehicle speed sensor malfunction	No signal while running in "D" range or during fuel cut at decelerating	2 driving cycles	1 driving cycle
P0505	Idle control system malfunction	No closed signal to IAC valve is detected	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	2 driving cycles	1 driving cycle
P1450 (No.29)	Barometric pressure sensor circuit malfunction	Barometric pressure is lower or higher than specification. (or sensor malfunction)	1 driving cycle	1 driving cycle
P1451	Barometric pressure sensor performance problem	Difference between manifold absolute pressure (MAP sensor value) and barometric pressure (barometric pressure sensor value) is larger than specification during cranking.	2 driving cycles	Not applicable
P1500	Starter signal circuit malfunction	Starter signal is not inputted from engine cranking till its start and after or it is always inputted	2 driving cycles	Not applicable
P1510	ECM backup power source malfunction	No backup power after starting engine	1 driving cycle	Not applicable

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL (vehicle with immobilizer indicator lamp)	MIL (vehicle without immobilizer indicator lamp)
P1600	Serial communication problem between ECM and TCM	No signal or check sum error while engine running	1 driving cycle	Not applicable
P1717	AT D-range signal circuit malfunction	No "D" range (park/neutral position signal) is inputted while vehicle running	2 driving cycles	Not applicable

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting :)	MIL
*P0705	Transmission Range Sensor Circuit Malfunction	Refer to Section 7B.	
☆*P0710	Transmission Fluid Temperature Sensor Circuit Malfunction		
*P0715	Input/turbine Speed Sensor Circuit Malfunction		
*P0720	Output Shaft Speed Sensor Circuit Malfunction		
*P0725	Engine Speed Input Circuit Malfunction		
*P0741	Torque Converter Clutch System Performance or Stuck Off		
*P0743	Torque Converter Clutch System Electrical		
*P0748	Pressure Control Solenoid A Electrical		
*P0751	Shift solenoid A (No.1) performance or stuck off		
*P0753	Shift Solenoid A (No.1) Electrical		
*P0756	Shift solenoid B (No.2) performance or stuck off		
*P0758	Shift Solenoid B (No.2) Electrical		
*P0785	Timing solenoid		
*P1700	Throttle Position Signal Input Malfunction		
*P1702	Internal Control Module Memory Check Some Error		
*P1705	Engine coolant temp. signal input malfunction	Refer to Section 7B.	
*P1730	Engine torque signal circuit malfunction		
☆*P1895	TCM to ECM torque reduction circuit malfunction		
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 in ECM		
P1623 (No.81)	ECU code not matched		

**NOTE:**

- For parenthetic No. in DTC column, it is used for vehicle without immobilizer indication lamp.
- For star (☆) marked items in MIL column, MIL does not light even when DTC is detected. DTC is erased after turning ignition switch OFF. Bear these in mind when diagnosing troubles.
- DTC No.12 appears when none of the other codes is identified.
- For vehicle with immobilizer indication lamp, star (\*) marked DTCs can be read with SUZUKI scan tool ECM application.

## 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 table below that can be checked by the scan tool are those detected by ECM and output from ECM as commands and there may be cases where the engine or actuator is not operating (in the condition) as indicated by the scan tool. Be sure to use the timing light to check the ignition timing.

### NOTE:

- With the generic scan tool, only star (\*) marked data in the table below can be read.
- The triangle (Δ) marked data in the table below can not be read for vehicle without immobilizer indicator lamp.
- 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	VEHICLE CONDITION	NORMAL CONDITION/ REFERENCE VALUES
*	FUEL SYSTEM B1 (FUEL SYSTEM STATUS)	At specified idle speed after warming up	CLOSED (closed loop)
*	CALC LOAD (CALCULATED LOAD VALUE)	At specified idle speed with no load after warming up	3 – 9%
		At 2500 r/min with no load after warming up	12 – 17%
*	COOLANT TEMP. (ENGINE COOLANT TEMP.)	At specified idle speed after warming up	80 – 100°C, 176 – 212°F
*	SHORT FT B1 (SHORT TERM FUEL TRIM)	At specified idle speed after warming up	– 20 – +20%
*	LONG FT B1 (LONG TERM FUEL TRIM)	At specified idle speed after warming up	– 15 – +15%
*	MAP (INTAKE MANIFOLD ABSOLUTE PRESSURE)	At specified idle speed with no load after warming up	24 – 37 kPa, 180 – 280 mmHg
*	ENGINE SPEED	At idling with no load after warming up	Desired idle speed ±50 r/min
*	VEHICLE SPEED	At stop	0 km/h, 0 MPH
*	IGNITION ADVANCE (IGNITION TIMING ADVANCE FOR NO.1 CYL- INDER)	At specified idle speed with no load after warming up	1.3L : 8 – 15° BTDC 1.6L : 5 – 15° BTDC
*	INTAKE AIR TEMP.	At specified idle speed after warming up	Ambient temp. : +30°C –5°C
*	MAF (MASS AIR FLOW RATE)	At specified idle speed with no load after warming up	1 – 4 gm/sec
		At 2500 r/min with no load after warming up	4 – 9 gm/sec

		SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/ REFERENCE VALUES
	*	THROTTLE POS (ABSOLUTE THROTTLE POSITION)	Ignition switch ON/engine stopped	Throttle valve fully closed	7 – 18%
				Throttle valve fully open	70 – 90%
	*	O2S B1 S1 (HEATED OXYGEN SENSOR-1)	At specified idle speed after warming up		0 – 0.95 V
Δ	*	O2S B1 S2 (HEATED OXYGEN SENSOR-2)	When engine is running at 2000 r/min. for 3 min or longer after warming up.		0 – 0.95 V
		DESIRED IDLE (DESIRED IDLE SPEED)	At idling with radiator cooling fan stopped and all electrical parts turned OFF after warming up, M/T at neutral, A/T at “P” range		1.3L MT : 700 r/min 1.6L MT : 660 r/min 1.6L AT : 700 r/min
		TP SENSOR VOLT (THROTTLE POSITION SENSOR OUTPUT VOLTAGE)	Ignition switch ON/engine stopped	Throttle valve fully closed	More than 0.2 V
				Throttle valve fully open	Less than 4.8 V
		INJ PULSE WIDTH (FUEL INJECTION PULSE WIDTH)	At specified idle speed with no load after warming up		2.0 – 4.0 msec.
			At 2500 r/min with no load after warming up		2.0 – 3.6 msec.
		IAC FLOW DUTY (IDLE AIR CONTROL FLOW DUTY)	At idling with no load after warming up		5 – 25%
		TOTAL FUEL TRIM	At specified idle speed after warming up		– 35 – +35%
		BATTERY VOLTAGE	Ignition switch ON/engine stop		10 – 14 V
		CANIST PRG DUTY (EVAP CANISTER PURGE FLOW DUTY)	–		0 – 100%
		CLOSED THROT POS (CLOSED THROTTLE POSITION)	Throttle valve at idle position		ON
			Throttle valve opens larger than idle position		OFF
		FUEL CUT	When engine is at fuel cut condition		ON
			Other than fuel cut condition		OFF
		RADIATOR FAN (RADIATOR FAN CONTROL RELAY)	Ignition switch ON	Engine coolant temp. : Lower than 95°C (203°F)	OFF
				Engine coolant temp. : 97.5°C (208°F) or higher	ON
		ELECTRIC LOAD	Ignition switch ON/Headlight, small light and rear window defogger all turned OFF		OFF
			Ignition switch ON/Headlight, small light or rear window defogger turned ON		ON
		A/C SWITCH	Ignition switch turned ON	A/C switch and blower motor switch turned ON	ON
				A/C switch and/or blower motor switch turned OFF	OFF
		PNP SIGNAL (PARK/NEUTRAL POSITION SIGNAL) A/T only	Ignition switch ON	Selector lever in “P” or “N” position	P/N Range
				Selector lever in “R”, “D”, “2” or “L” position	D Range

	SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/ REFERENCE VALUES
	EGR VALVE	At specified idle speed after warming up		0%
Δ	FUEL TANK LEVEL	—		0 – 100%
	BAROMETRIC PRESS	—		Display the barometric pressure
	FUEL PUMP	Within 3 seconds after ignition switch ON or engine running		ON
		Engine stop at ignition switch ON.		OFF
	BRAKE SW	Ignition switch ON	Brake pedal is depressing	ON
			Brake pedal is releasing	OFF
	PSP SWITCH (POWER STEERING PRESSURE SWITCH)	Engine running at idle speed	steering wheel at straight ahead position	OFF
			steering wheel turned to the right or left as far as it stop	ON
	A/C COND FAN (if equipped with A/C)	Engine running	Blower motor switch and A/C switch turned ON / ECT over 110°C, 230°F	ON
			Blower motor switch and/or A/C switch turned OFF	OFF
	A/C PRESSURE SW (if equipped with A/C)	Ignition switch turned ON		ON
	BLOWER FAN	Ignition switch ON	Blower fan switch: 2nd speed position or more	ON
			Blower fan switch: under 2nd speed position	OFF
	A/C MAG CLUTCH (if equipped with A/C)	Engine running	A/C switch and blower motor switch turned ON	ON
			A/C switch and blower motor switch turned OFF	OFF

**SCAN TOOL DATA DEFINITIONS :****FUEL SYSTEM (FUEL SYSTEM STATUS)**

Air/fuel ratio feedback loop status displayed as either open or closed loop. Open indicates that ECM ignores feedback from the exhaust oxygen sensor.

Closed indicates final injection duration is corrected for oxygen sensor feedback.

**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%.

**COOLANT TEMP. (ENGINE COOLANT TEMPERATURE, °C, °F)**

It is detected by engine coolant temp. sensor

**SHORT FT B1 (SHORT TERM FUEL TRIM, %)**

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, %)**

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.

**MAP (INTAKE MANIFOLD ABSOLUTE PRESSURE, kPa, inHg)**

It is detected by manifold absolute pressure sensor and used (among other things) to compute engine load.

**ENGINE SPEED (rpm)**

It is computed by reference pulses from crankshaft position sensor.

**VEHICLE SPEED (km/h, MPH)**

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

**IGNITION ADVANCE (IGNITION TIMING ADVANCE FOR NO.1 CYLINDER, °)**

Ignition timing of NO.1 cylinder is commanded by ECM. The actual ignition timing should be checked by using the timing light.

**INTAKE AIR TEMP. (°C, °F)**

It is detected by intake air temp. sensor and used to determine the amount of air passing into the intake manifold as air density varies with temperature.

**MAF (MASS AIR FLOW RATE, gm/s, lb/min)**

It represents total mass of air entering intake manifold which is computed based on signals from MAP sensor, IAT sensor, TP sensor, etc.

**THROTTLE POS (ABSOLUTE THROTTLE POSITION, %)**

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

**OXYGEN SENSOR B1 S1 (HEATED OXYGEN SENSOR-1, V)**

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

**OXYGEN SENSOR B1 S2 (HEATED OXYGEN SENSOR-2, V)**

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

**DESIRED IDLE (DESIRED IDLE SPEED, rpm)**

The Desired Idle Speed is an ECM internal parameter which indicates the ECM requested idle. If the engine is not running, this number is not valid.

**TP SENSOR VOLT (THROTTLE POSITION SENSOR OUTPUT VOLTAGE, V)**

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

**INJ PULSE WIDTH (FUEL INJECTION PULSE WIDTH, msec.)**

This parameter indicates time of the injector drive (valve opening) pulse which is output from ECM (but injector drive time of NO.1 cylinder for multiport fuel injection).

**IAC FLOW DUTY (IDLE AIR (SPEED) CONTROL DUTY, %)**

This parameter indicates current flow time rate within a certain set cycle of IAC valve (valve opening rate) which controls the amount of bypass air (idle speed).

**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.

**BATTERY VOLTAGE (V)**

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

**CANIST PURGE DUTY (EVAP CANISTER PURGE FLOW DUTY, %)**

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

0% means that the purge valve is completely closed while 100% is a fully open valve.

**CLOSED THROTTLE POSITION (ON/OFF)**

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

**FUEL CUT (ON/OFF)**

ON : Fuel being cut (output signal to injector is stopped)

OFF : Fuel not being cut

**RADIATOR FAN (RADIATOR FAN CONTROL RELAY, ON/OFF)**

ON : Command for radiator fan control relay operation being output.

OFF : Command for relay operation not being output.

**ELECTRIC LOAD (ON/OFF)**

ON : Headlight, small light or rear window defogger ON signal inputted.

OFF : Above electric loads all turned OFF.

**A/C SWITCH (ON/OFF)**

ON : A/C switch and blower motor switch ON signal inputted.

OFF : A/C switch or blower motor switch ON signal not inputted.

**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.

**PNP SIGNAL (PARK/NEUTRAL POSITION SIGNAL, P/N RANGE or D RANGE)**

It is detected by signal from TCM.

D range : A/T is in "R", "D", "2" or "L" range.

P/N range : A/T is in "P" or "N" range or the above signal is not inputted from TCM.

**EGR VALVE (%)**

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

**PSP SWITCH (POWER STEERING PRESSURE SWITCH) (ON/OFF)**

ON : PSP switch detected P/S operation. (high PS pressure)

OFF : PSP switch not detected P/S operation.

**A/C COND FAN (ON/OFF)**

ON : Command for operation being output.

OFF : Command operation not being output.

**A/C PRESSURE SW (ON/OFF)**

ON : A/C pressure switch not detected insufficient refrigerant amount.

OFF : A/C pressure switch detected insufficient refrigerant amount.

## Inspection of ECM and Its Circuits

ECM and its circuits can be checked at ECM wiring couplers by measuring voltage, pulse signal and resistance.

### CAUTION:

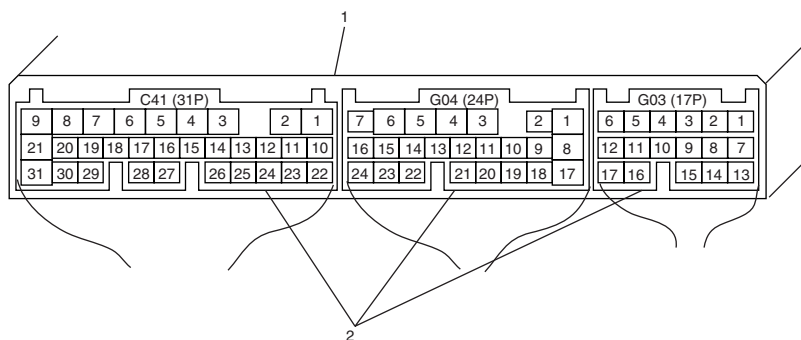
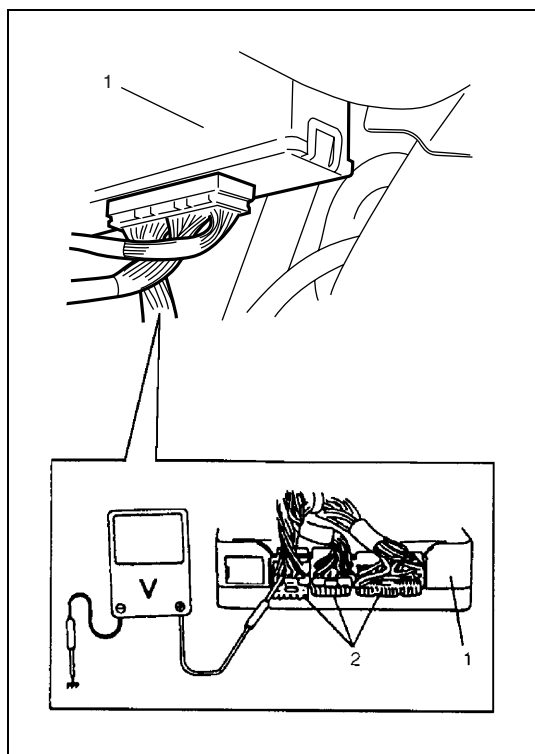
ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to ECM with coupler disconnected from it.

### VOLTAGE CHECK

- 1) Remove ECM (1) from vehicle body referring to Section 6E.
- 2) Check voltage at each terminal of couplers (2) 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.
- Pulse signal cannot be measured by voltmeter. It can be measured by oscilloscope.



1. ECM

2. ECM couplers (Viewed from harness side)

TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
C41	1	Ground	Below 0.3 V
	2	Ground	Below 0.3 V
	3	Ground	Below 0.3 V
	4	EVAP canister purge valve	10 – 14 V
	5	Power steering pressure switch (if equipped)	10 – 14 V
			0 – 1.5 V
	6	Idle air control valve	10 – 14 V
			0 – 1.5 V ↑↓ 10 – 14 V
	7	Heater of HO2S-1 (Vehicle with EGR)	10 – 14 V
			0 – 1 V ↑↓ 10 – 14 V
	8	Fuel injector No.4	10 – 14 V
			0 – 0.6 V ↑↓ 10 – 14 V
	9	Fuel injector No.1	10 – 14 V
			0 – 0.6 V ↑↓ 10 – 14 V
	10	Sensor ground	Below 0.3 V
	11	Camshaft position (CMP) sensor	0 – 0.5 V ↑↓ 4 – 6 V
			Engine running at idling with after warming up. (Pulse frequency varies depending on engine speed. (6 pulses are generated par 1 camshaft revolution.))
	12	Generator control signal	Min. 4.8 V
	13	Heated oxygen sensor-1 (Vehicle with EGR system)	Refer to DTC P0130 diag. flow table
		CO adjusting resistor (if equipped)	–
	14	Engine coolant temperature (ECT) sensor	1.75 – 2.1 V
			0.67 – 0.84 V
			0.32 – 0.41 V

TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
C41	15 Intake air temperature (IAT) sensor	3.18 – 3.67 V	Ignition switch turned ON at IAT 0°C (32°F)
		1.34 – 1.63 V	Ignition switch turned ON at ECT 40°C (104°F)
		0.47 – 0.59 V	Ignition switch turned ON at ECT 80°C (176°F)
	16 Throttle position sensor	0.2 – 1.0 V	Ignition switch ON Throttle valve at idle position
		2.8 – 4.8 V	Ignition switch ON Throttle valve at full open position
	17 EGR valve (stepper motor coil 3)	10 – 14 V	Ignition switch ON
	18 EGR valve (stepper motor coil 1)	0 – 1 V	Ignition switch ON
	19 Ignition coil No.2	0 – 1 V	Ignition switch turned ON
		0 – 0.6 V ↑↓ 4 – 6 V	Engine running. (Output signal is active high pulse. Pulse frequency varies depending on engine speed.)
	20 Ignition coil No.1	0 – 1 V	Ignition switch turned ON
		0 – 0.6 V ↑↓ 4 – 6 V	Engine running. (Output signal is active high pulse. Pulse frequency varies depending on engine speed.)
	21 Fuel injector No.2	10 – 14 V	Ignition switch ON
		0 – 0.6 V ↑↓ 10 – 14 V	Engine running. (Output signal is active low pulse. Pulse frequency varies depending on engine speed.)
	22 5 V power source for sensors	4.75 – 5.25 V	Ignition switch ON
	23 Crank shaft position (CKP) sensor	0 – 0.5 V ↑↓ 4 – 6 V	Engine running at idling with after warming up. (Signal from sensor is pulse. Pulse frequency varies depending on engine speed. (30 pulses are generated per 1 crankshaft revolution.))
	24 Fuel pump relay	0 – 1 V	For 2 seconds after ignition switch ON
		10 – 14 V	After the time shown above
	25 Knock sensor (vehicle with EGR)	2.1 – 2.9 V	Ignition switch ON
	26 Manifold absolute pressure sensor	3.3 – 4.0 V	Ignition switch ON and Barometric pressure : 100 kPa (760 mmHg)
	27 Diag. switch terminal (vehicle without immobilizer)	4 – 6 V	Ignition switch ON
	28 EGR valve (stepper motor coil 4)	0 – 1 V	Ignition switch ON
	29 EGR valve (stepper motor coil 2)	10 – 14 V	Ignition switch ON
	30 Engine start switch (Engine start signal)	6 – 12 V	While engine cranking
		0 V	Other than above
	31 Fuel injector No.3	10 – 14 V	Ignition switch ON
		0 – 0.6 V ↑↓ 10 – 14 V	Engine running. (Output signal is active low pulse. Pulse frequency varies depending on engine speed.)

TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
G04	1 A/C compressor relay (if equipped)	0 – 1 V	Engine running and A/C operated
		10 – 14 V	Engine running and A/C not operated
	2 Stop lamp switch	0 V	Ignition ON and stop lamp switch OFF
		10 – 14 V	Ignition ON and stop lamp switch ON
	3 Radiator fan relay No.2 and No.3	10 – 14 V	Ignition switch ON and Engine coolant temp. : 100°C (212°F) or lower
		0 – 1 V	Ignition switch ON and Engine coolant temp. : 102.5°C (216.5°F) or higher
	4 Heater of HO2S-2 (if equipped)	10 – 14 V	Ignition switch ON
		0 – 1 V	Engine running at idling with after warming up.
	5 Power source	10 – 14 V	Ignition switch ON
	6 Power source	10 – 14 V	Ignition switch ON
	7 A/C triple pressure switch (if equipped)	0 – 1 V	A/C refrigerant pressure below 1500 kpa, 15 kg/cm <sup>2</sup> , 23 psi.
		10 – 14 V	A/C refrigerant pressure 1500 kpa, 15 kg/cm <sup>2</sup> , 23 psi or more.
	8 Engine coolant temp. signal for TCM (AT)	10 – 14 V	Ignition switch ON
		0 – 1 V ↑↓	Engine running at idling. (Output signal is active low duty pulse. Duty ratio varies depending on ECT. Duty ON time : 850 ms (20°C, 68°F)
		8 – 14 V	1450 ms (80°C, 176°F))
	9 A/C condenser fan relay (if equipped)	0 – 1 V	Engine running and A/C operated
		10 – 14 V	Engine running and A/C not operated
	10 Main relay	10 – 14 V	Ignition switch OFF
		0.4 – 1.5 V	Ignition switch ON
	11 A/C evaporator inlet temperature sensor (if equipped)	3.3 – 3.8 V	Ignition switch turned ON at A/C evaporator inlet temperature 0°C (32°F)
		2.5 – 2.9 V	Ignition switch turned ON at A/C evaporator inlet temperature 15°C (59°F)
		1.9 – 2.3 V	Ignition switch turned ON at A/C evaporator inlet temperature 25°C (77°F)
	12 Blank	–	–
	13 Heated oxygen sensor-2 (if equipped)	Refer to DTC 0130 diag. flow table	

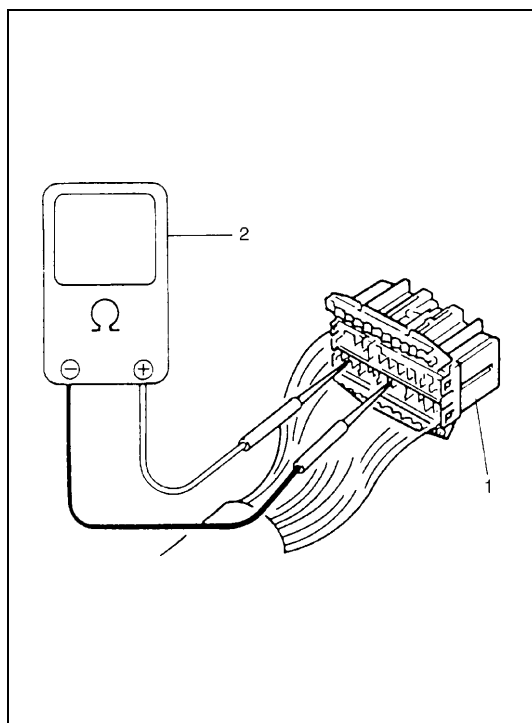
TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
G04	14 A/C evaporator outlet temperature sensor (if equipped)	3.3 – 3.8 V	Ignition switch turned ON at A/C evaporator outlet temperature 0°C (32°F)
		2.5 – 2.9 V	Ignition switch turned ON at A/C evaporator outlet temperature 15°C (59°F)
		1.9 – 2.3 V	Ignition switch turned ON at A/C evaporator outlet temperature 25°C (77°F)
	15 Test switch terminal (vehicle without immobilizer)	4 – 6 V	Ignition switch turned ON
	16 A/C switch (if equipped)	10 – 14 V	Ignition switch turned ON and A/C switch or blower motor switch turned OFF
		0 – 2 V	Ignition switch turned ON and A/C switch and blower motor switch turned ON (at second speed position)
	17 Electric load signal (+)	0 V	Ignition switch ON Small light and rear defogger OFF
		10 – 14 V	Ignition switch ON Small light or rear defogger ON
	18 Radiator fan relay No.1	10 – 14 V	Ignition switch ON and Engine coolant temp. : 95°C or lower (203°F)
		0 – 1 V	Ignition switch ON and Engine coolant temp. : 97.5°C or higher (208°F)
	19 Immobilizer indicator lamp (vehicle with immobilizer)	0 – 1 V	Ignition switch ON
		10 – 14 V	When engine running
	20 Sensor ground	Below 0.3 V	Ignition switch turned ON
	21 Blank	–	–
	22 Blank	–	–
	23 Ignition switch	10 – 14 V	Ignition switch ON
	24 Vehicle speed sensor	0 – 1 V ↑↓ 4 – 6 V	Vehicle running. (Signal from sensor is pulse. Pulse frequency varies depending on vehicle speed. (2590 pulses are generated per 60 km/h, 37.5 ml/h.))

TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
G03	1 Tachometer	0 – 1 V	Ignition switch ON
		0 – 1 V ↑↓ 8 – 14 V	While engine running. Output signal is pulse. (Pulse frequency varies depending on engine speed. (3000 r/min=100 Hz)
	2 Blank	–	–
	3 Blank	–	–
	4 A/C compressor operation signal (if equipped)	0 – 1 V	Engine running and A/C operated
		6 – 10 V	Engine running and A/C not operated
	5 Engine torque signal for TCM (A/T)	9 – 13 V	Ignition switch ON
		0 – 1 V ↑↓ 9 – 13 V	Engine running at after warming up. (Output signal is 128 Hz low duty pulse. Duty ratio varies depending on engine torque)
	6 D-range ID-up signal (A/T)	0 – 1 V	Ignition switch turned ON and transmission select lever in “P” or “N” range.
		10 – 14 V	Ignition switch turned ON and transmission select lever in “R” or “D”, “2” or “L” range.
	7 Malfunction indicator lamp	0 – 1 V	Ignition switch ON
		10 – 14 V	When engine running
	8 Data link connector (SUZUKI serial data line) (Vehicle with immobilizer)	4 – 6 V	Ignition switch ON
	9 Engine coolant temp. signal for meter	0 – 1 V ↑↓ 10 – 14 V	Ignition switch turned ON. (Output signal is active low duty pulse. Duty ratio varies depending on ECT.) 40°C = 10% ON duty 120°C = 90% ON duty
	10 Electric load signal (–)	4 – 14 V	Ignition switch turned ON and blower motor switch turned to 1st speed position or OFF
		0 – 2 V	Ignition switch turned ON and blower motor switch turned to 2nd speed position or more.
	11 Power source for back-up	10 – 14 V	Anytime
	12 Torque control input signal (A/T)	10 – 14 V	Ignition switch ON
		0 – 1 V ↑↓ 4 – 6 V	Vehicle running at after warming up. (Signal from TCM is 100 Hz low duty pulse. Pulse generated time is shifting time when transmission gear is shifted by TCM.)
	13 Data link connector (K line of ISO 9141)	10 – 14 V	Ignition switch ON



TERMINAL NO.	CIRCUIT	NORMAL VOLTAGE	CONDITION
G03	14	Throttle opening signal for TCM (A/T)	0 – 0.6 V ↑↓ 8 – 12 V Ignition switch turned ON. (Output signal is 128 Hz active low duty pulse. Duty ratio varies as throttle valve is opened gradually.) Throttle opening 0%=0.78 ms ON duty Throttle opening 100% = 6.24 ms ON duty
	15	Fuel level sensor (gauge) (vehicle with heated oxygen sensor 2)	0 – 2 V Ignition ON and fuel tank fully filled
			4.5 – 7.5 V Ignition ON and fuel tank emptied
	16	Blank	– –
	17	Serial data for TCM (A/T)	0 – 1 V ↑↓ 10 – 14 V Ignition switch ON (Output signal is active low duty pulse. Pulse is generated from ECM and TCM each other.)
		Monitor output (without immobilizer)	10 – 14 V Ignition switch ON

## Resistance Check



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

### CAUTION:

**Never touch terminals of ECM itself or connect voltmeter or ohmmeter.**

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

### CAUTION:

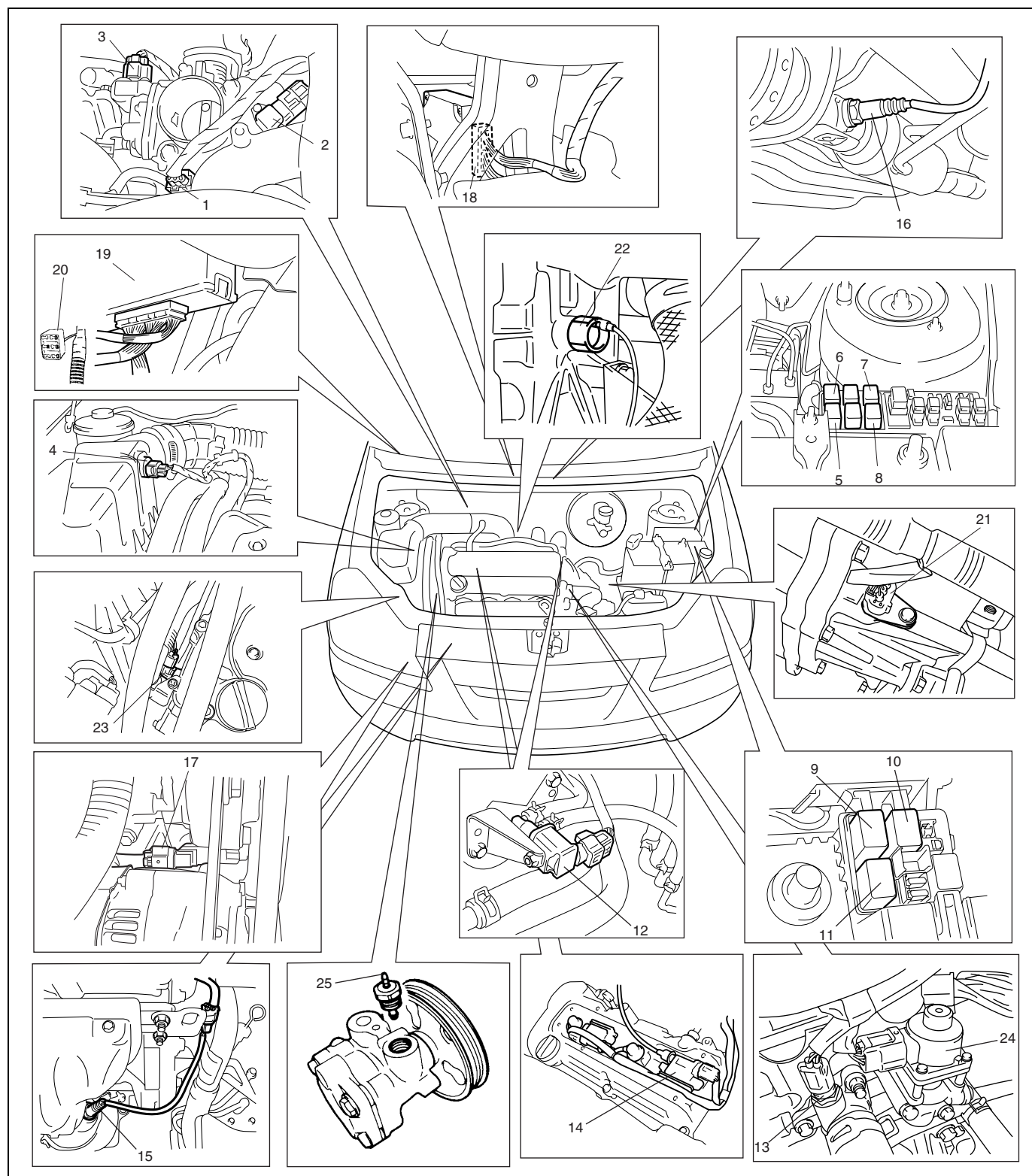
- Be sure to connect ohmmeter probe from wire harness side of coupler.
- Be sure to turn OFF ignition switch for this check.
- Resistance in table below represents that when parts temperature is 20°C (68°F).

1. ECM coupler disconnected

2. Ohmmeter

TERMINALS	CIRCUIT	STANDARD RESISTANCE
C41-7 to G04-23	HO2S-1 heater (if equipped)	5.0 – 10 $\Omega$
G04-4 to G04-23	HO2S-2 heater (if equipped)	12.0 – 17 $\Omega$
C41-9 to G04-5/6	No.1 injector	11.3 – 17 $\Omega$
C41-21 to G04-5/6	No.2 injector	11.3 – 17 $\Omega$
C41-31 to G04-5/6	No.3 injector	11.3 – 17 $\Omega$
C41-8 to G04-5/6	No.4 injector	11.3 – 17 $\Omega$
C41-18 to G04-5/6	EGR valve (stepper motor coil 1) (if equipped)	20 – 27 $\Omega$
C41-29 to G04-5/6	EGR valve (stepper motor coil 2) (if equipped)	20 – 27 $\Omega$
C41-17 to G04-5/6	EGR valve (stepper motor coil 3) (if equipped)	20 – 27 $\Omega$
C41-28 to G04-5/6	EGR valve (stepper motor coil 4) (if equipped)	20 – 27 $\Omega$
C41-4 to G04-5/6	EVAP canister purge valve	30 – 37 $\Omega$
C41-24 to G04-23	Fuel pump relay	56 – 151 $\Omega$
G04-1 to G04-23	A/C compressor relay	56 – 151 $\Omega$
G04-9 to G04-23	A/C condenser fan relay	56 – 151 $\Omega$
G04-18 to G04-23	Radiator fan relay 1	56 – 151 $\Omega$
G04-10 to G03-11	Main relay	56 – 151 $\Omega$
C41-1 to Body ground	Ground	Continuity (below 1.5 $\Omega$ )
C41-2 to Body ground	Ground	Continuity (below 1.5 $\Omega$ )
C41-3 to Body ground	Ground	Continuity (below 1.5 $\Omega$ )

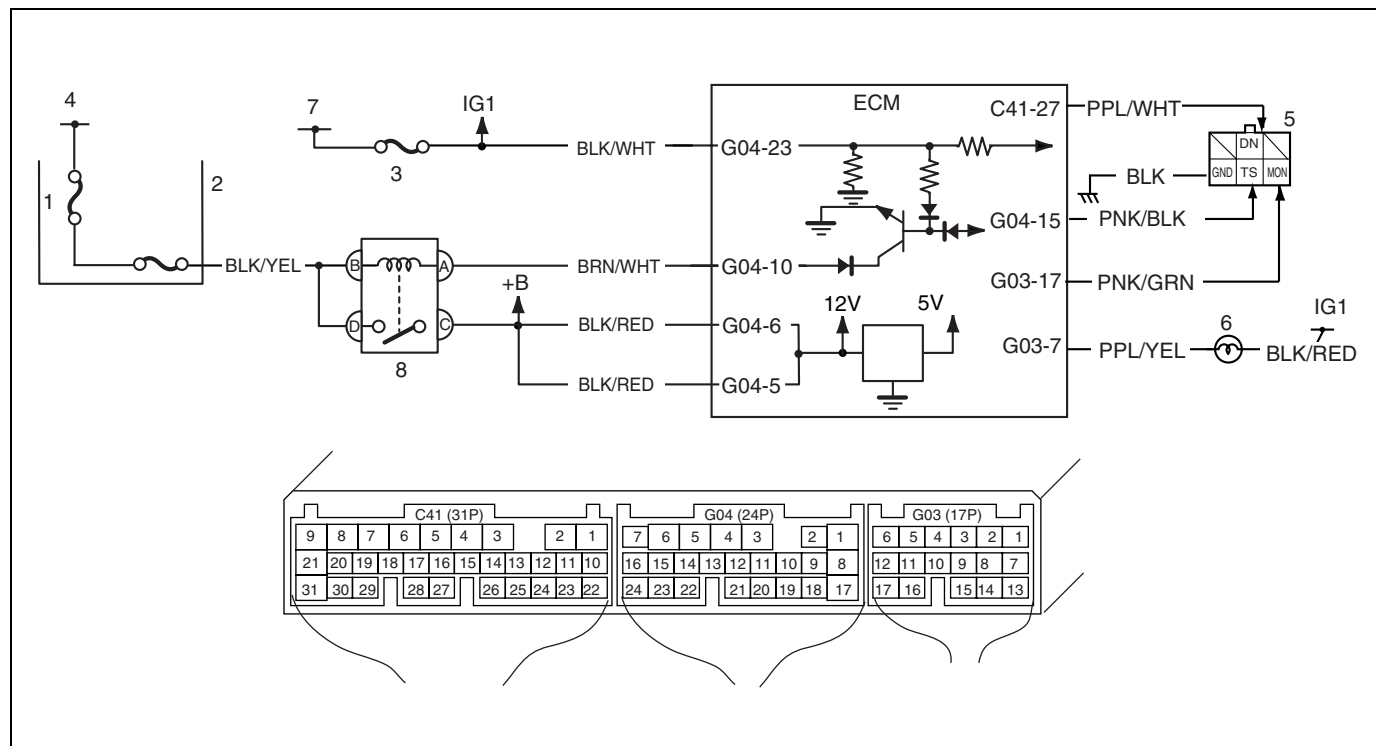
## Component Location



1. TP sensor	10. Radiator fan control relay No.2	19. ECM
2. MAP sensor	11. Radiator fan control relay No.3	20. Monitor connector
3. IAC valve	12. EVAP canister purge valve	21. VSS
4. IAT sensor	13. ECT sensor	22. Knock sensor (if equipped)
5. A/C compressor relay	14. Ignition coil with igniter	23. CMP sensor
6. A/C condenser fan relay	15. HO2S-1 (if equipped)	24. EGR valve (if equipped)
7. Fuel pump relay	16. HO2S-2 (if equipped)	25. Power steering pressure switch
8. Main relay	17. CKP sensor	* : This figure shows left-hand steering vehicle, these parts are installed at the other side for right-hand steering vehicle.
9. Radiator fan control relay No.1	18. TCM	

### Table A-1 Malfunction Indicator Lamp Circuit Check - Lamp Does Not Come "ON" at Ignition Switch ON (But Engine at Stop)

## WIRING DIAGRAM



1. BATT fuse	3. IG fuse	5. Monitor connector (vehicle without immobilizer indicator lamp)	7. To ignition switch
2. Main fuse box	4. To battery	6. MIL	8. Main relay

### 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” fuse and combination meter or poor coupler connection at combination meter.
2	ECM Power and Ground Circuit Check Does engine start?	Go to Step 3.	Go to “Table A-5 ECM Power and Ground Circuit Check”. If engine is not cranked, go to “Diagnosis” in Section 6G.

Step	Action	Yes	No
3	MIL Circuit Check 1) Turn ignition switch OFF and disconnect connectors from ECM. 2) Check for proper connection to ECM at terminal G03-7. 3) If OK, then using service wire, ground terminal G03-7 in connector disconnected. Does MIL turn on at ignition switch ON?	Substitute a known-good ECM and recheck.	Bulb burned out or "PPL/YEL" wire circuit open. Test switch terminal circuit grounded (vehicle without immobilizer indicator lamp).

## 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	Diagnostic Trouble Code (DTC) Check 1) Check DTC referring to DTC CHECK section. Is there any DTC(s)?	Go to Step 2 of ENGINE DIAG. FLOW TABLE.	Go to Step 2.
2	DTC Check 1) Start engine and recheck DTC while engine running. Is there any DTC(s)?		Go to Step 3.
3	MIL Circuit Check 1) Turn OFF ignition switch. 2) Disconnect connectors from ECM. Does MIL turn ON at ignition switch ON?	"PPL/YEL" wire circuit shorted to ground.	Substitute a known-good ECM and recheck.

## Table A-3 MIL Check - MIL Flashes at Ignition Switch ON (Vehicle without Immobilizer Indicator Lamp)

### WIRING DIAGRAM / CIRCUIT DESCRIPTION

Refer to TABLE A-1.

### INSPECTION

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.	Substitute a known-good ECM and recheck.
2	Diag. Switch Circuit Check Is diag. switch terminal connected to ground via service wire?	System is in good condition.	"PPL/WHT" circuit shorted to ground. If circuit is OK substitute a known-good ECM and recheck.

## Table A-4 MIL Check - MIL Does Not Flash or Just Remains ON Even with Grounding Diagnosis Switch Terminal (Vehicle without Immobilizer Indicator Lamp)

### WIRING DIAGRAM / CIRCUIT DESCRIPTION

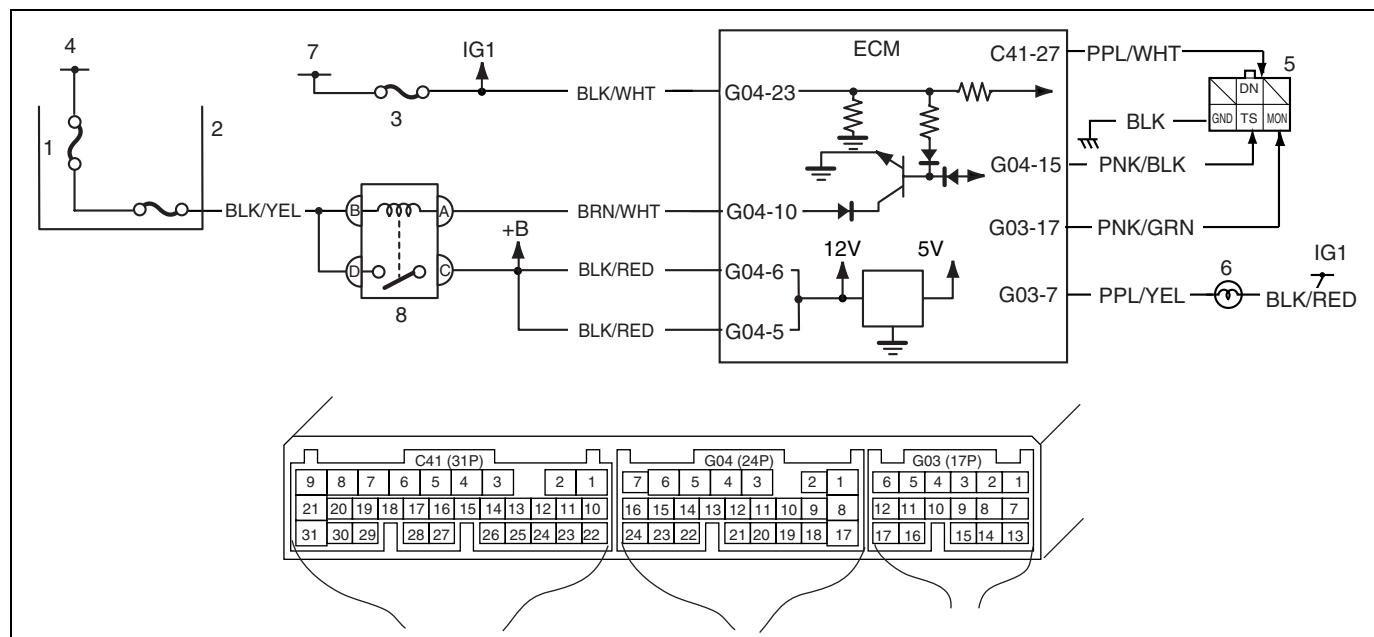
Refer to TABLE A-1.

### INSPECTION

Step	Action	Yes	No
1	MIL Circuit Check 1) Turn ignition switch OFF and disconnect connectors from ECM. Does MIL turn ON at ignition switch ON?	"PPL/YEL" circuit shorted to ground.	Go to Step 2.
2	ECM Connection Check 1) Turn ignition switch OFF. Is connector (C41-27 connection) connected to ECM properly?	Go to Step 3.	Poor connector connection.
3	Diag. Switch Terminal Circuit Check 1) Connect connectors to ECM. 2) Using service wire, ground C41-27 terminal with connectors connected to ECM. 3) Turn ignition switch ON. Does MIL flash?	"PPL/WHT" or "BLK" circuit open.	Substitute a known-good ECM and recheck.

## Table A-5 ECM Power and Ground Circuit Check - MIL Does Not Light at Ignition Switch ON and Engine Doesn't Start Though It Is Cranked Up

### WIRING DIAGRAM



1. BATT fuse	3. IG fuse	5. Monitor connector (vehicle without immobilizer indicator lamp)	7. To ignition switch
2. Main fuse box	4. To battery	6. MIL	8. Main relay

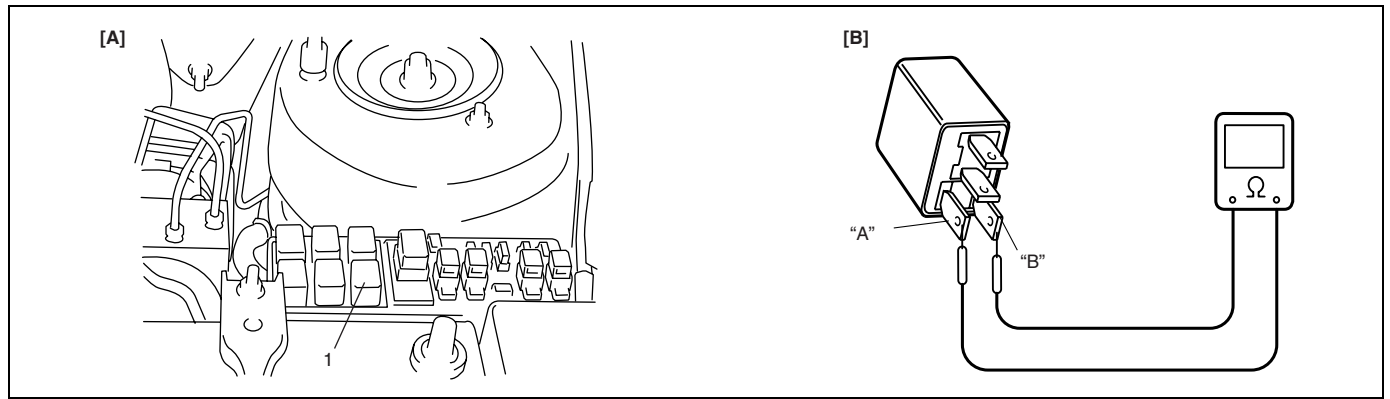
## CIRCUIT DESCRIPTION

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

## INSPECTION

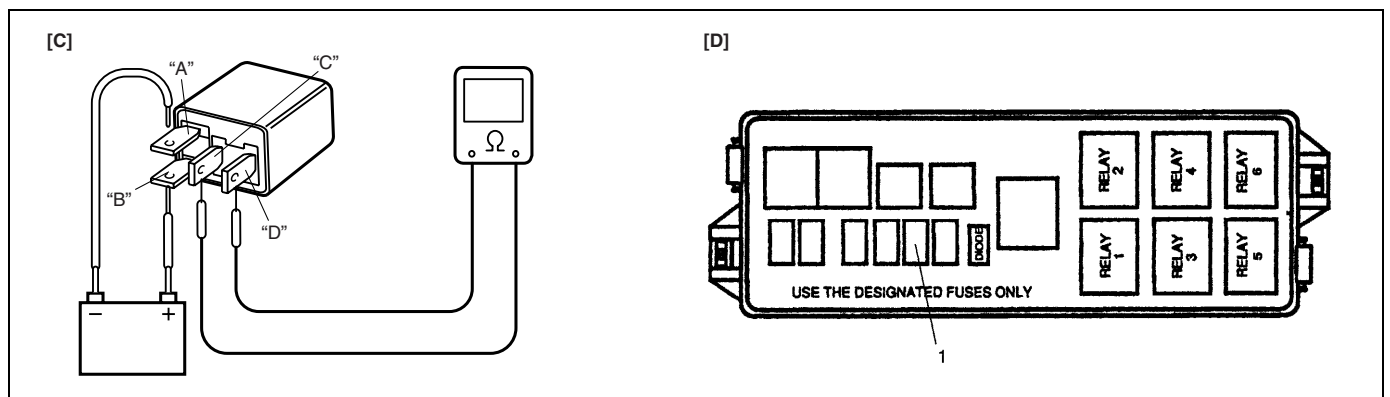
Step	Action	Yes	No
1	Main Relay Operating Sound Check Is operating sound of main relay heard at ignition switch ON?	Go to Step 5.	Go to Step 2.
2	Main Relay Check 1) Turn OFF ignition switch and remove main relay (1). 2) Check for proper connection to main relay (1). 3) Check resistance between each two terminals. See Fig. 1 and 2. Between terminals C and D : Infinity Between terminals A and B : 56 – 146 $\Omega$ 4) Check that there is continuity between terminals C and D when battery is connected to terminals A and B. See Fig. 3. Is main relay in good condition?	Go to Step 3.	Replace main relay.
3	Fuse Check Is main fuse in good condition? See Fig. 4.	Go to Step 4.	Check for short in circuits connected to this fuse.
4	ECM Power Circuit Check 1) Turn OFF ignition switch, disconnect connectors from ECM and install main relay. 2) Check for proper connection to ECM at terminals G04-23, G04-10, G04-5 and G04-6. 3) If OK, then measure voltage between terminal G04-23 and ground, G04-10 and ground with ignition switch ON. Is each voltage 10 – 14 V?	Go to Step 5.	“BLK/WHT”, “BLK/YEL” or “BRN/WHT” circuit open.
5	ECM Power Circuit Check 1) Using service wire, ground terminal G04-10 and measure voltage between terminal G04-5 and ground at ignition switch ON. Is it 10 – 14 V?	Check ground circuits “BRN/WHT” and “BLK/YEL” for open. If OK, then substitute a known-good ECM and recheck.	Go to Step 6.
6	Is operating sound of main relay heard in Step 1?	Go to Step 7.	“BLK/YEL” or “BLK/RED” wire open.
7	Main relay check 1) Check main relay according to procedure in Step 2. Is main relay in good condition?	“BLK/YEL” or “BLK/RED” wire open.	Replace main relay.

[A] Fig. 1 for Step 2 / [B] Fig. 2 for Step 2



1. Main relay

[C] Fig. 3 for Step 2 / [D] Fig. 4 for Step 3

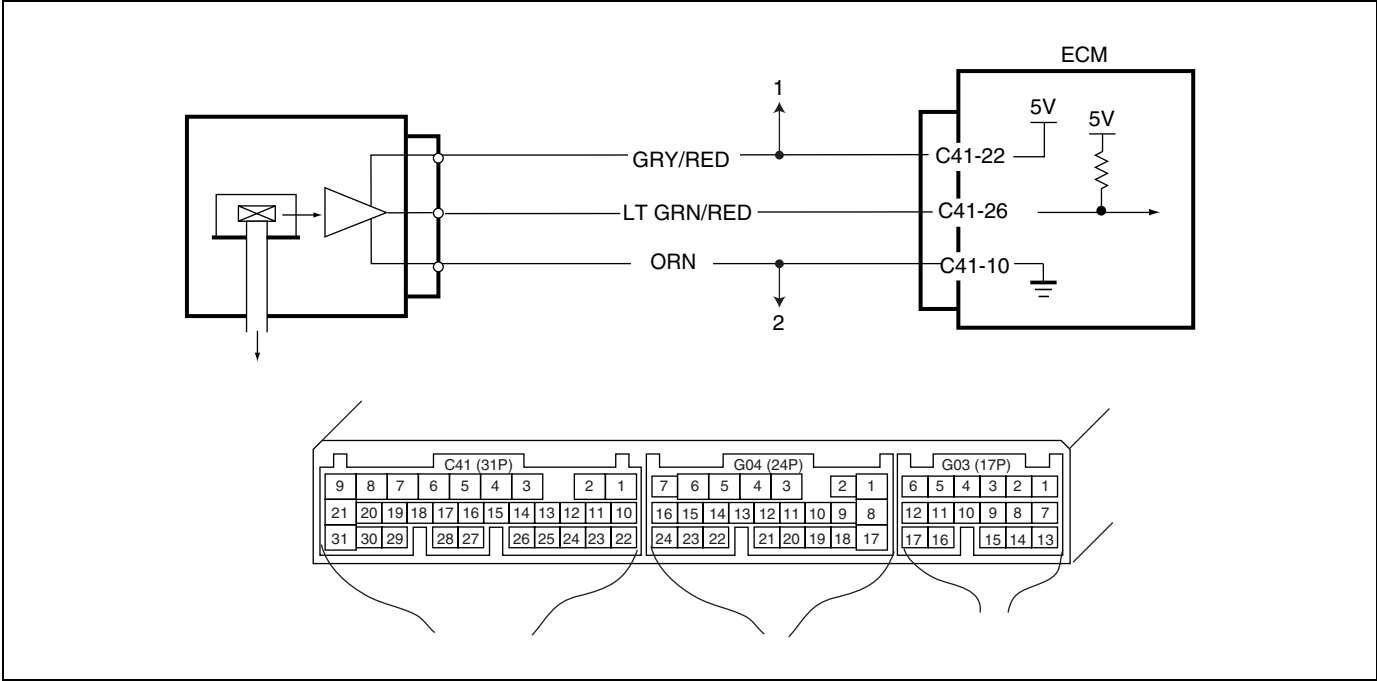


1. Fuse



# DTC P0105 (DTC No.11) Manifold Absolute Pressure (MAP) Circuit Malfunction

## WIRING DIAGRAM / CIRCUIT DESCRIPTION



- |  |
|--|
| 1. To TP sensor and Co adjust resistor (if equipped) |
| 2. From other sensors                                |

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"><li>MAP sensor signal is 0.19 V or lower (Low pressure – High vacuums – Low voltage) or</li><li>MAP sensor signal is 4.5 V or higher (High pressure – Low vacuums – High voltage)</li></ul>	<ul style="list-style-type: none"><li>“ORN” circuit open</li><li>“GRY/RED” circuit open or shorted to ground</li><li>“LT GRN/RED” circuit open or shorted to ground</li><li>MAP sensor malfunction</li><li>ECM malfunction</li></ul>

### NOTE:

- When this DTC and DTC P0120 (No.13) are indicated together, it is possible that “GRY/RED” circuit is open.
- When DTC P0105 (No.11), P0110 (No.18), P0115 (No.19) and P0120 (No.13) are indicated together, it is possible that “ORN” circuit is open.

## DTC CONFIRMATION PROCEDURE

- Clear DTC, start engine and keep it at idle for 1 min.
- Select “DTC” mode on scan tool and check DTC.

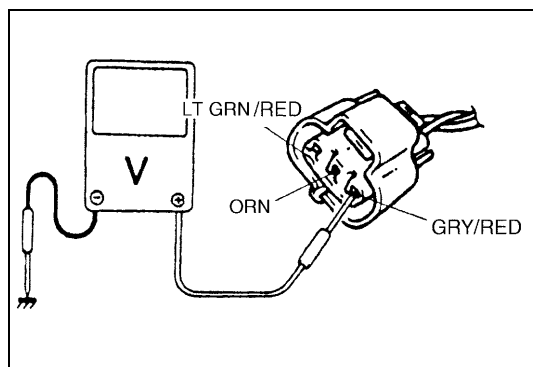
**INSPECTION**

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Check MAP Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Check intake manifold pressure. Is it 114 kPa or more or 43 kPa or less?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.
3	Check Wire Harness. 1) Disconnect MAP sensor connector with ignition switch OFF. 2) Check for proper connection of MAP sensor at "LT GRN/RED" and "GRY/RED" wire terminals. 3) If OK, then with ignition switch ON, check voltage between each of "GRY/RED" or "LT GRN/RED" wire terminals and body ground. See Fig. 1. Is voltage about 4 – 6 V at each terminal?	Go to Step 4.	"GRY/RED" wire open or shorted to ground circuit or shorted to power circuit (See NOTE), "LT GRN/RED" wire open or shorted to ground, poor C41-26 connection or C41-22 connection. If wire and connection are OK, confirm that MAP sensor is normal and then substitute a known-good ECM and recheck.
4	Check MAP sensor. Check MAP sensor according to "MAP Sensor Individual Check" below. Is it in good condition?	"GRY/RED" wire shorted to "ORN" wire, "LT GRN/RED" wire open, poor C41-10 connection. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace MAP sensor.

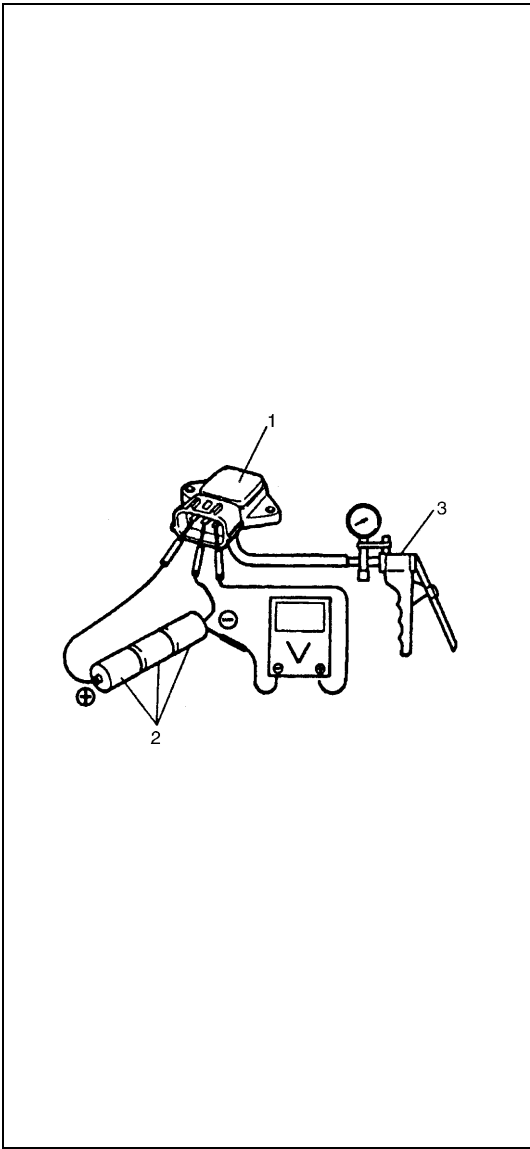
**NOTE:**

When battery voltage is applied to "GRY/RED" wire, it is possible that MAP sensor is also faulty.

Fig. 1 for Step 3



Map sensor individual check



- 1) Disconnect connector from MAP sensor (1).
- 2) Remove MAP sensor (1).
- 3) Arrange 3 new 1.5 V batteries (2) in series (check that total voltage is 4.5 – 5.0 V) and connect its positive terminal to “Vin” terminal of sensor and negative terminal to “Ground” terminal. Then check voltage between “Vout” and “Ground”. Also, check if voltage reduces when vacuum is applied up to 400 mmHg by using vacuum pump (3).

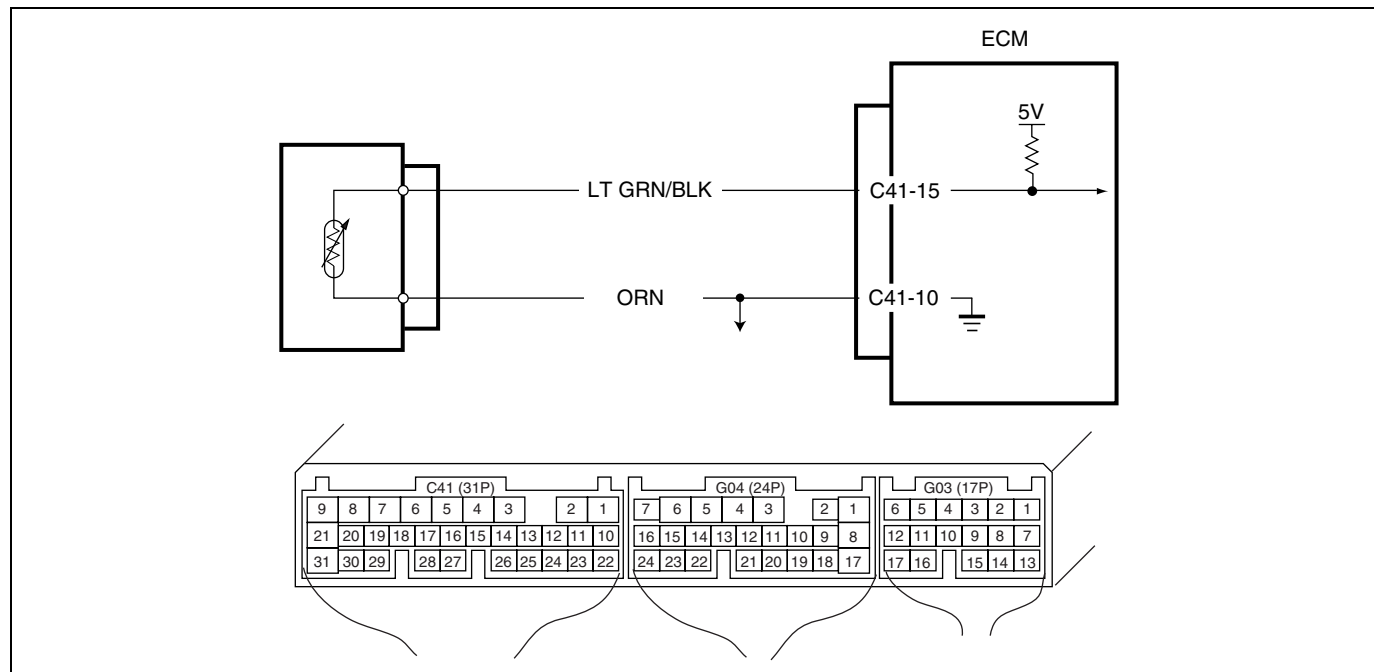
Output voltage (When input voltage is 4.5 – 5.5 V, ambient temp. 20 – 30°C, 68 – 86°F)

ALTITUDE (Reference)		BAROMETRIC PRESSURE		OUTPUT VOLTAGE
(ft)	(m)	(mmHg)	(kPa)	(V)
0	0	760	100	3.3 – 4.3
2 000	610	707	94	3.0 – 4.1
2 001	611	Under 707	94	
		over 634		
5 000	1 524		85	2.7 – 3.7
5 001	1 525	Under 634	85	
		over 567		
8 000	2 438		76	2.5 – 3.3
8 001	2 439	Under 567	76	
		over 526		
10 000	3 048		70	

- If check result is not satisfactory, replace MAP sensor (1).
- 4) Install MAP sensor (1) securely.
  - 5) Connect MAP sensor (1) connector securely.

# DTC P0110 (DTC No.18) Intake Air Temp. (IAT) Circuit Malfunction

## WIRING DIAGRAM / CIRCUIT DESCRIPTION



1. From other sensors

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>Low intake air temperature (High voltage-High resistance) or</li> <li>High intake air temperature (Low voltage-Low resistance)</li> </ul>	<ul style="list-style-type: none"> <li>“LT GRN/BLK” circuit open or shorted to power.</li> <li>“ORN” circuit open</li> <li>IAT sensor malfunction</li> <li>ECM malfunction</li> </ul>

### NOTE:

- When DTC P0105 (No.11), P0110 (No.18), P0115 (No.19) and P0120 (No.13) are indicated together, it is possible that “ORN” circuit is open.
- Before inspecting, be sure to check that ambient temperature is higher than  $-40^{\circ}\text{C}$  ( $-40^{\circ}\text{F}$ ).

### DTC CONFIRMATION PROCEDURE

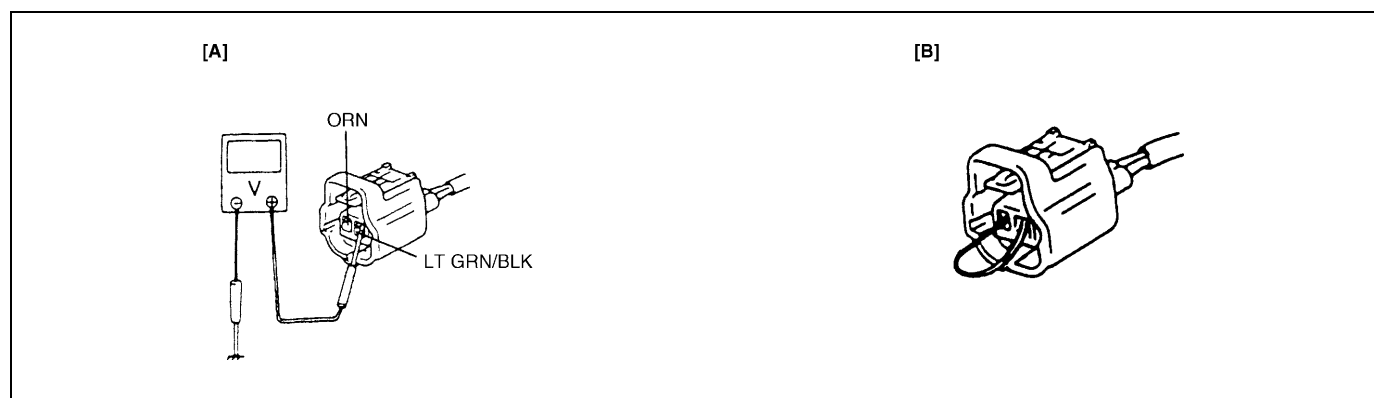
- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode no scan tool and check DTC.

### INSPECTION

Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.

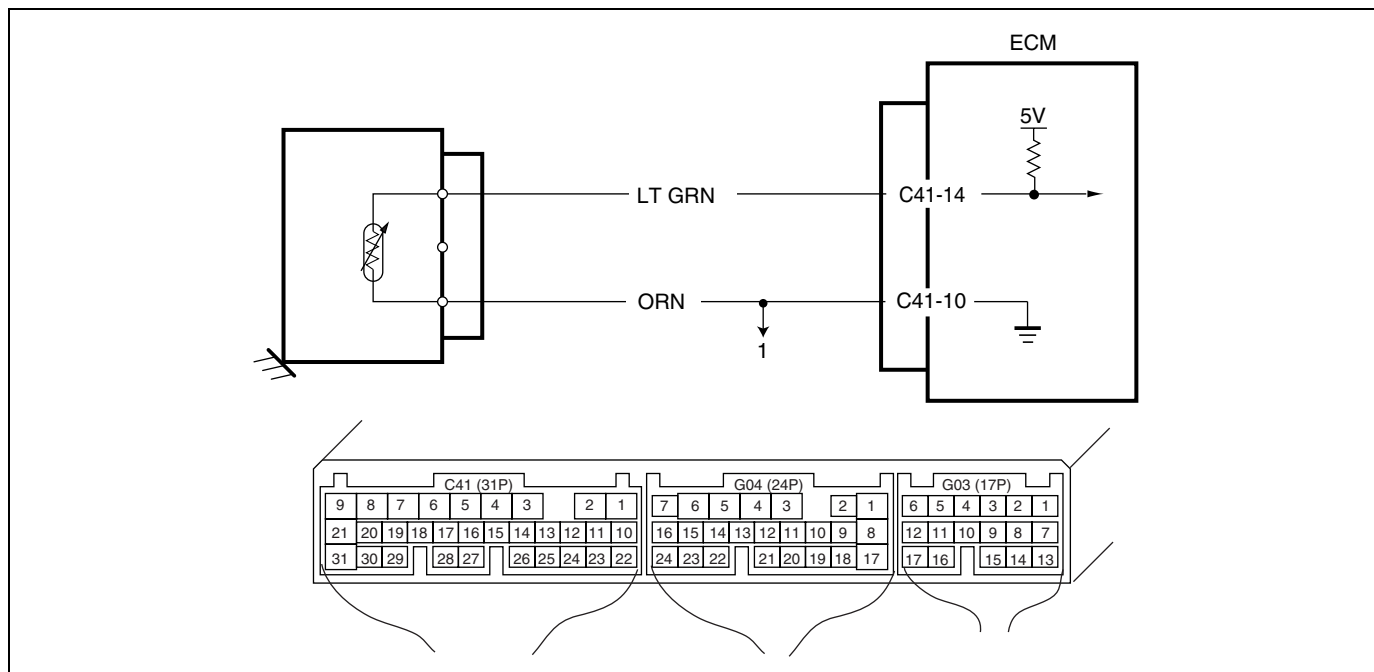
Step	Action	Yes	No
2	Check IAT Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON. 3) Check intake air temp. displayed on scan tool. Is – 40°C (– 40°F) or 119°C (246°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring 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 GRN/BLK” and “ORN” wire terminals. 3) If OK, then with ignition switch ON, is voltage applied to “LT GRN/BLK” wire terminal about 4 – 6 V? See Fig. 1.	Go to Step 5.	“LT GRN/BLK” wire open or shorted to power, or poor C41-15 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
4	Does scan tool indicate – 40°C (– 40°F) at Step 2.	Go to Step 6.	Go to Step 5.
5	Check Wire Harness 1) Check intake air temp. displayed on scan tool with ignition switch ON. Is – 40°C (– 40°F) indicated?	Replace IAT sensor.	“LT GRN/BLK” wire shorted to ground. If wire is OK, substitute a known-good ECM and recheck.
6	Check Wire Harness. 1) Using service wire, connect IAT sensor connector terminals. See Fig. 2. 2) Check intake air temp. displayed on scan tool with ignition switch ON. Is 119°C (246°F) indicated?	Replace IAT sensor.	“LT GRN/BLK” wire open or poor C41-10 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

[A] Fig. 1 for Step 3 / [B] Fig. 2 for Step 6



## DTC P0115 (DTC No.19) Engine Coolant Temperature (ECT) Circuit Malfunction

### WIRING DIAGRAM / CIRCUIT DESCRIPTION



1. From other sensors

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>Low engine coolant temperature (High voltage-High resistance)</li> <li>or</li> <li>High engine coolant temperature (Low voltage-Low resistance)</li> </ul>	<ul style="list-style-type: none"> <li>"LT GRN" circuit open or shorted to power</li> <li>"ORN" circuit open</li> <li>ECT sensor malfunction</li> <li>ECM malfunction</li> </ul>

#### NOTE:

- Before inspecting, be sure to check that coolant temp. meter in combination meter indicates normal operating temperature (Engine is not overheating).
- When this DTC and P1709 are stored together, also clear DTC stored in TCM after completion of repair.
- When DTC P0105 (No.11), P0110 (No.18), P0115 (No.19) and P0120 (No.13) are indicated together, it is possible that "ORN" circuit be open.

#### DTC CONFIRMATION PROCEDURE

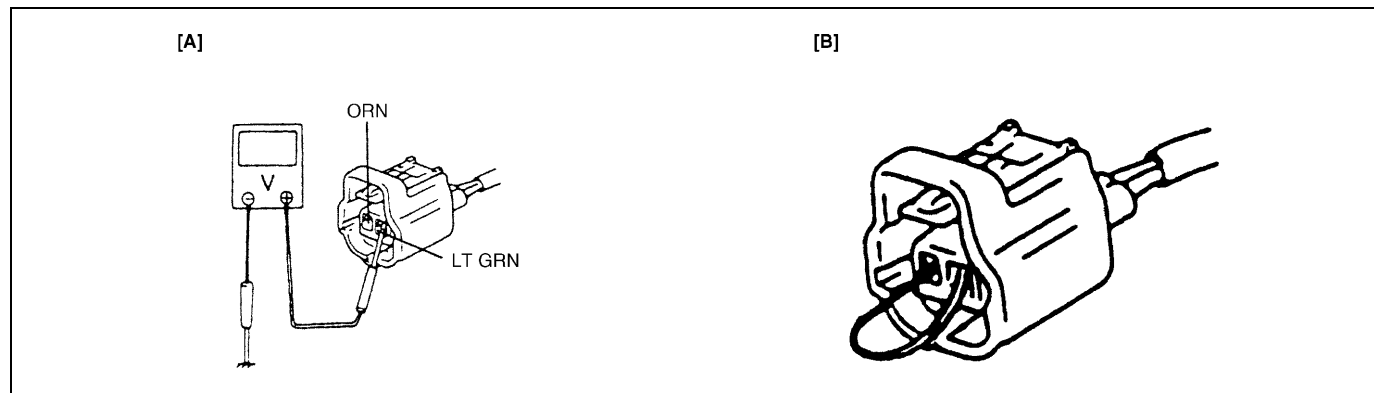
- Clear DTC, start engine and keep it at idle for 1 min.
- Select "DTC" mode no scan tool and check DTC.

#### INSPECTION

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".

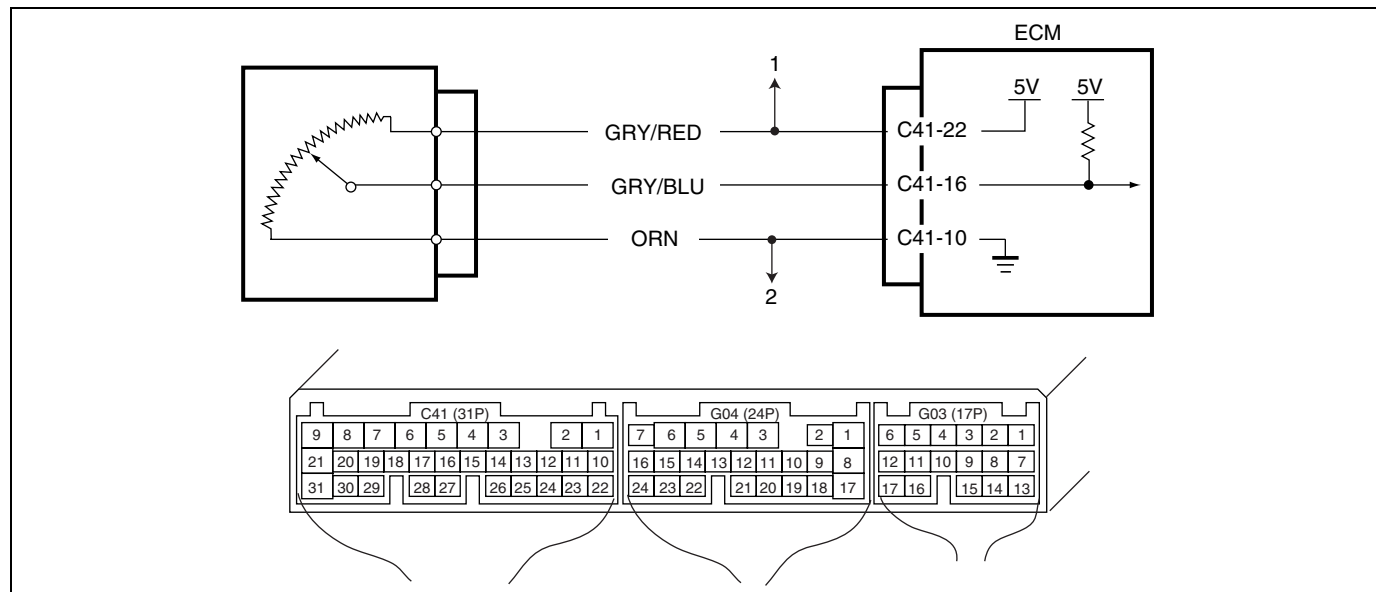
Step	Action	Yes	No
2	Check ECT Sensor and its Circuit. 1) Connect scan tool with ignition switch OFF. 2) Turn ignition switch ON. 3) Check engine coolant temp. displayed on scan tool. Is $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ ) or $119^{\circ}\text{C}$ ( $246^{\circ}\text{F}$ ) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0 A.
3	Check Wire Harness. 1) Disconnect ECT sensor connector. 2) Check engine coolant temp. displayed on scan tool. Is $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ ) indicated?	Replace ECT sensor.	"LT GRN" wire shorted to ground. If wire is OK, substitute a known-good ECM and recheck.
4	Does scan tool indicate $-40^{\circ}\text{C}$ ( $-40^{\circ}\text{F}$ ) at Step 2.	Go to Step 6.	Go to Step 5.
5	Check Wire Harness. 1) Disconnect ECT sensor connector with ignition switch OFF. 2) Check for proper connection to ECT sensor at "ORN" and "LT GRN" wire terminals. If OK, then with ignition switch ON, is voltage applied to "LT GRN" wire terminal about 4 – 6 V? See Fig. 1.	Go to Step 4.	"LT GRN" wire open or shorted to power, or poor C41-14 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
6	Check Wire Harness. 1) Using service wire, connect ECT sensor connector terminals. See Fig. 2. 2) Turn ignition switch ON and check engine coolant temp. displayed on scan tool. Is $119^{\circ}\text{C}$ ( $246^{\circ}\text{F}$ ) indicated?	Replace ECT sensor.	"ORN" wire open or poor C41-10 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

[A] Fig. 1 for Step 5 / [B] Fig. 2 for Step 6



## DTC P0120 (DTC No.13) Throttle Position Circuit Malfunction

### WIRING DIAGRAM / CIRCUIT DESCRIPTION



1. To MAP sensor and Co adjust resistor (if equipped)
2. From other sensors

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>Signal voltage high or</li> <li>Signal voltage low</li> </ul>	<ul style="list-style-type: none"> <li>“ORN” circuit open</li> <li>“GRY/BLU” circuit open or shorted to ground</li> <li>“GRY/RED” circuit open or shorted to power or ground</li> <li>TP sensor malfunction</li> <li>ECM malfunction</li> </ul>

#### NOTE:

- When DTC P0105 (No.11), P0110 (No.18), P0115 (No.19) and P0120 (No.13) are indicated together, it is possible that “ORN” or “GRY/RED” circuit be open.
- When this DTC and P1700 are stored together, also clear DTC stored in TCM after completion of repair.
- When this DTC and DTC P0105 (No.11) are indicated together, it is possible that “GRY/RED” circuit be open.

#### DTC CONFIRMATION PROCEDURE

- 1) Clear DTC, start engine and keep it at idle for 1 min.
- 2) Select “DTC” mode no scan tool and check DTC.

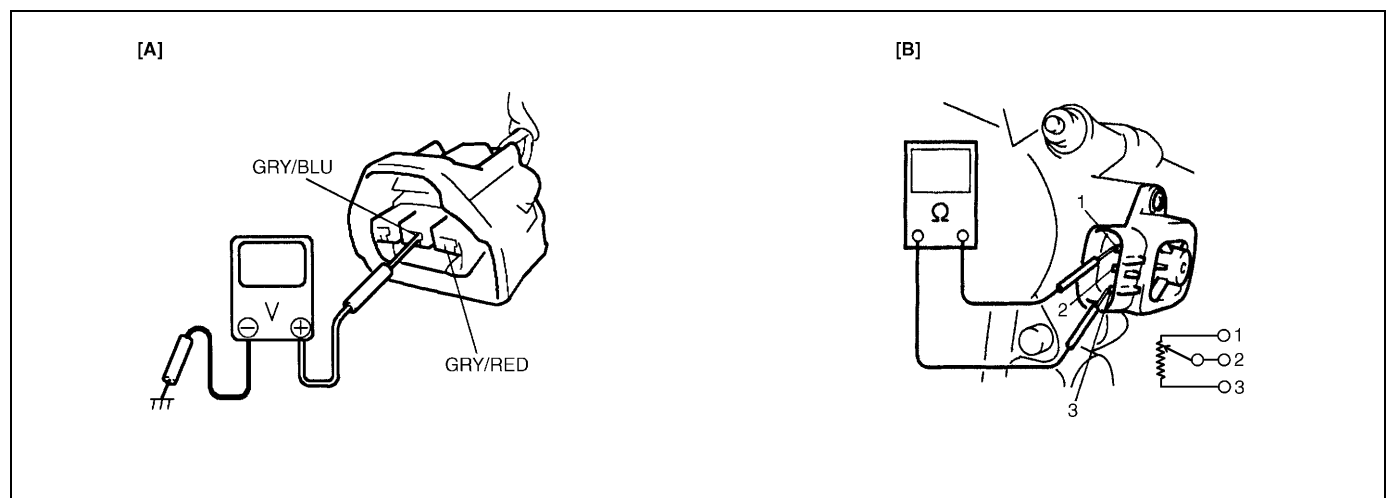
#### INSPECTION

Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.



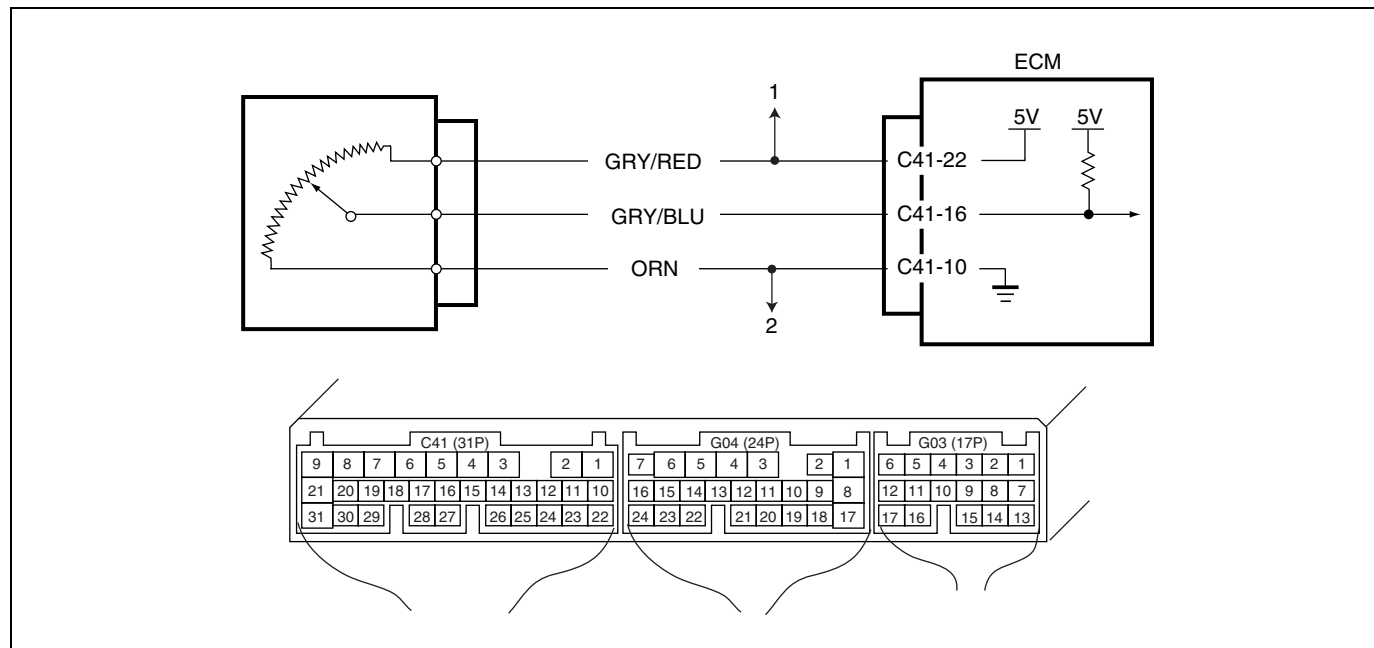
Step	Action	Yes	No
2	Check TP Sensor and Its Circuit. 1) Connect scan tool to DLC with ignition switch OFF and then turn ignition switch ON. 2) Check throttle valve opening percentage displayed on scan tool. Is it displayed 2% or less? 3) Check throttle valve opening percentage displayed on scan tool 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", "GRY/BLU" and "ORN" wire terminals. 3) If OK, then with ignition switch ON, check voltage between each of "GRY/RED" or "GRY/BLU" wire terminals and body ground. See Fig. 1. Is voltage about 4 – 6 V at each terminal?	Go to Step 4.	"GRY/RED" wire open, "GRY/RED" wire shorted to ground or power circuit or "GRY/BLU" wire, "ORN" wire open or shorted to ground circuit or poor C41-22 or C41-16 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. See Fig. 2. Between 1 and 2 : 2.5 – 6.0 k $\Omega$ Between 1 and 3 : 100 $\Omega$ – 20 k $\Omega$ varying according to throttle valve opening Are measured values within specifications?	"ORN" wire open or poor C41-10 connection. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace TP sensor.

[A] Fig. 1 for Step 3 / [B] Fig. 2 for Step 4



# DTC P0121 Throttle Position Circuit Range/Performance Problem

## WIRING DIAGRAM / CIRCUIT DESCRIPTION



1. To MAP sensor and Co adjust resistor (if equipped)
2. From other sensors

DTC DETECTING CONDITION	POSSIBLE CAUSE
<p>DTC will set when the following conditions are detected.</p> <ul style="list-style-type: none"> <li>• After engine warmed up.</li> <li>• While vehicle running at specified engine speed.</li> <li>• No change in intake manifold pressure (constant throttle opening)</li> <li>• Difference between actual throttle opening (detected from TP sensor) and opening calculated by ECM (obtained on the basis of engine speed and intake manifold pressure) is larger than specified value.</li> </ul> <p>*2 driving cycle detection logic, continuous monitoring</p>	<ul style="list-style-type: none"> <li>• TP sensor malfunction</li> <li>• High resistance in the circuit</li> <li>• ECM malfunction</li> </ul>

## DTC CONFIRMATION PROCEDURE

### WARNING:

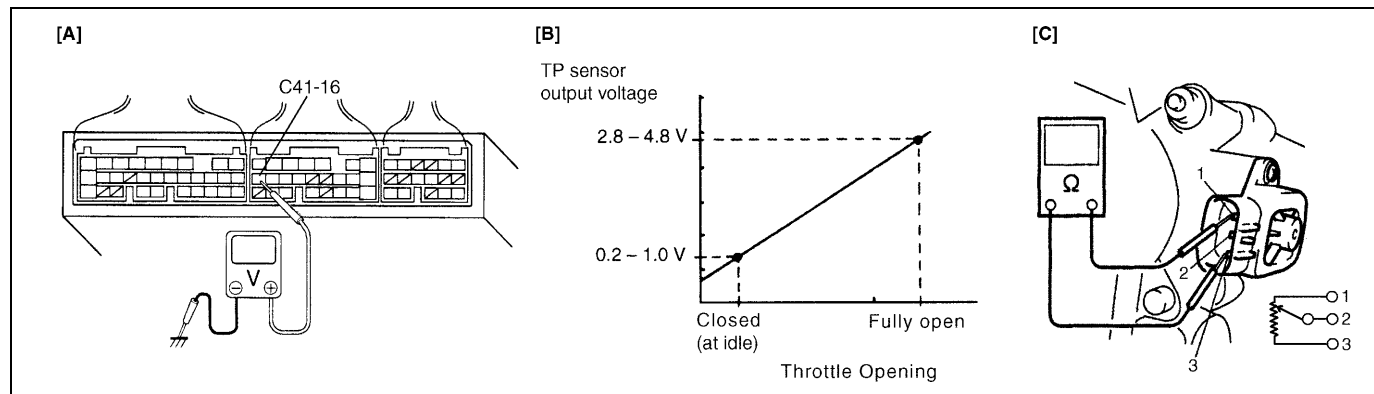
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) Turn ignition switch OFF. Clear DTC with ignition switch ON, check vehicle and environmental condition for :
  - Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
  - Ambient temp. : -10°C, 14°F or higher
  - Intake air temp. : 70°C, 158°F or lower
  - Engine coolant temp. : 70 – 110°C, 158 – 230°F
- 2) Warm up engine to normal operating temperature.
- 3) Increase vehicle speed to 50 – 60 km/h, 30 – 40 mph in 3rd gear or “D” range and hold throttle valve at that opening position for 1 min.
- 4) Stop vehicle.
- 5) Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode.

## INSPECTION

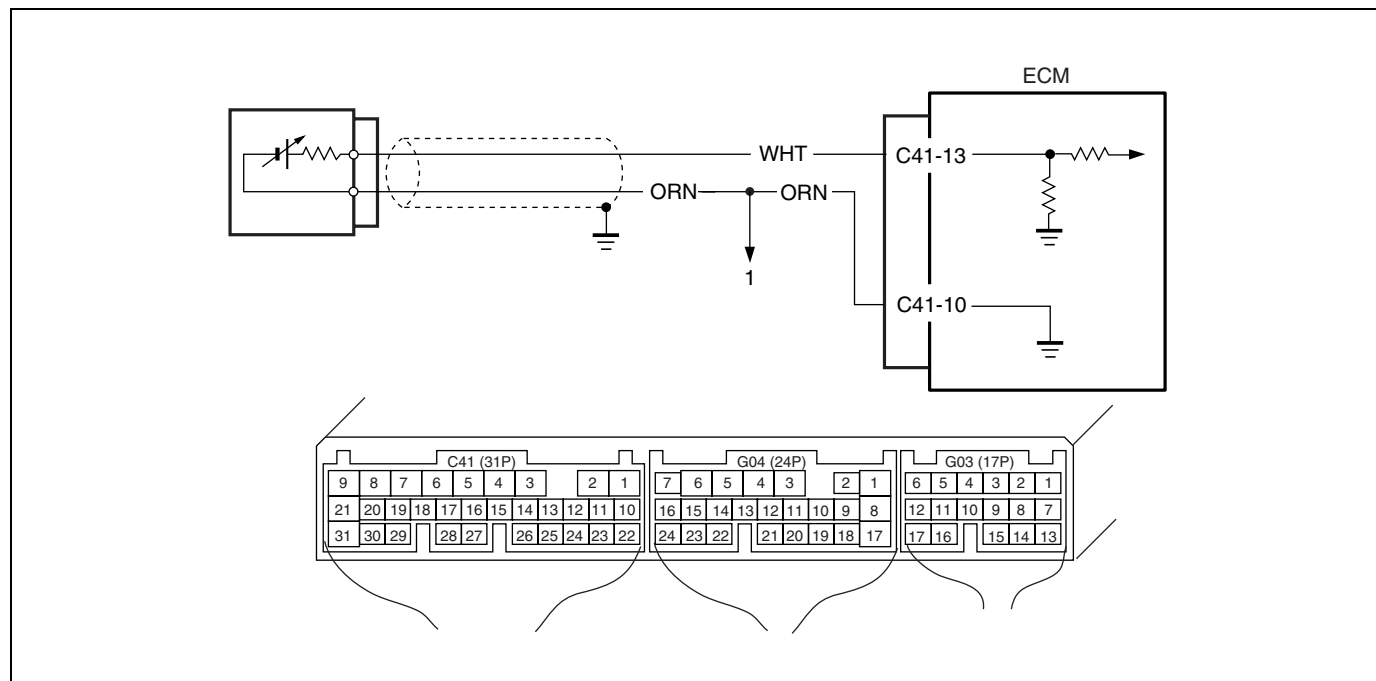
Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Is SUZUKI scan tool available?	Go to Step 3.	Go to Step 4.
3	Check TP Sensor and its Circuit. 1) Turn ignition switch OFF and connect SUZUKI scan tool to DLC. 2) Turn ignition switch ON and check TP sensor output voltage when throttle valve is at idle position and fully opened. See Fig. 2. Dose voltage vary within specified value linearly as shown in figure?	If voltmeter was used, check terminal C41-16 for poor connection. If OK, substitute a known-good ECM and recheck.	Go to Step 5.
4	Check TP Sensor and its Circuit. 1) Turn ignition switch ON. 2) Check voltage at terminal C41-16 of ECM connector connected, when throttle valve is at idle position and fully opened. See Fig. 1. Dose voltage vary within specified value linearly as shown in figure?	If voltmeter was used, check terminal C41-16 for poor connection. If OK, substitute a known-good ECM and recheck.	Go to Step 5.
5	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, then measure resistance between terminals and check if each measured value is as specified below. See Fig. 3. Between 1 and 2 : 4.0 – 6.0 k $\Omega$ Between 1 and 3 : 0.02 – 6.0 k $\Omega$ , varying according to throttle valve opening. Are measured values as specified?	High resistance in "GRY/RED", "GRY/BLU" or "ORN" circuit. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace TP sensor.

[A] Fig. 1 for Step 4 / [B] Fig. 2 for Step 3 and 4 / [C] Fig. 3 for Step 5



## DTC P0130 (DTC No.14) Heated Oxygen Sensor (HO2S) Circuit Malfunction (Sensor-1)

### WIRING DIAGRAM / CIRCUIT DESCRIPTION



1. From other sensors

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>When running at idle speed after engine warmed up and running at specified vehicle speed, HO2S-1 output voltage does not go below 0.3 V or over 0.6 V.</li> </ul> <p>*2 driving cycle detection logic, Monitoring once/1 driving.</p>	<ul style="list-style-type: none"> <li>Heated oxygen sensor-1 malfunction</li> <li>"WHT" or "ORN" circuit open (poor connection) or short</li> </ul>

### DTC CONFIRMATION PROCEDURE

#### WARNING:

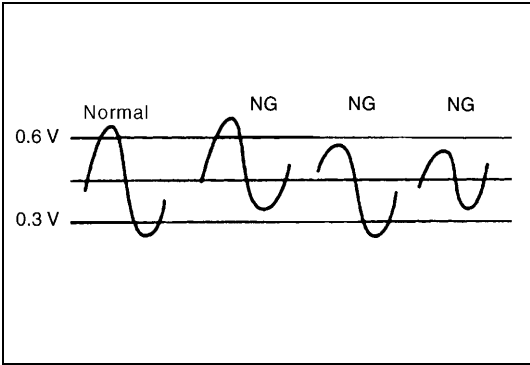
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester.

- Turn ignition switch OFF. Clear DTC with ignition switch ON, check vehicle and environmental condition for :
  - Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
  - Ambient temp. : -10°C, 14°F or higher
  - Intake air temp. : 70°C, 158°F or lower
- Warm up engine to normal operating temperature.
- Drive vehicle at 50 – 60 km/h, 30 – 40 mph for 2 min.
- Stop vehicle and run engine at idle for 2 min.
- Check DTC in "DTC" mode and pending DTC in "ON BOARD TEST" or "PENDING DTC" mode.

INSPECTION

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Is there DTC(s) other than HO2S-1 (DTC P0130)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	<p>Check HO2S-1 signal.</p> <p>1) Connect scan tool to DLC with ignition switch OFF.</p> <p>2) Warm up engine to normal operating temperature and keep it at 2000 r/min. for 60 sec.</p> <p>3) Repeat racing engine (Repeat depressing accelerator pedal 5 to 6 times continuously and take foot off from pedal to enrich and enlean A/F mixture). See Fig. 1.</p> <p>Does HO2S-1 output voltage deflect between 0.3 V and over 0.6 V repeatedly?</p>	<p>Intermittent trouble.</p> <p>Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.</p>	<p>Check "WHT" and "ORN" wires for open and short, and connections for poor connection.</p> <p>If wires and connections are OK, replace HO2S-1.</p>

Fig. 1 for Step 3



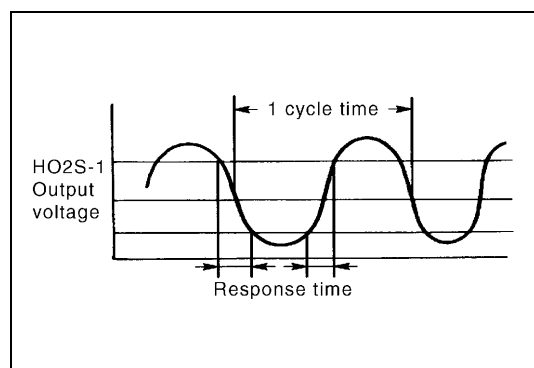
## DTC P0133 Heated Oxygen Sensor (HO2S) Circuit Slow Response (Sensor-1)

### WIRING DIAGRAM / CIRCUIT DESCRIPTION

Refer to DTC P0130 section.

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>When running at specified idle speed after engine warmed up and running at specified vehicle speed, response time (time to change from lean to rich or from rich to lean) of HO2S-1 output voltage is about 1 sec. at minimum or average time of 1 cycle is 5 sec. at minimum. See. Fig. 1</li> </ul> <p>*2 driving cycle detection logic, Monitoring once/1 driving.</p>	<ul style="list-style-type: none"> <li>Heated oxygen sensor-1 malfunction</li> </ul>

Fig. 1



### DTC CONFIRMATION PROCEDURE

Refer to DTC P0130 section.

### INSPECTION

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Is there DTC(s) other than HO2S-1 (DTC P0133)?	Go to applicable DTC Diag. Flow Table.	Replace HO2S-1.

## DTC P0134 Heated Oxygen Sensor (HO2S) Circuit No Activity Detected (Sensor-1)

### WIRING DIAGRAM / CIRCUIT DESCRIPTION

Refer to DTC P0130 section.

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>Engine warmed up.</li> <li>While running under other than high load and high engine speed conditions or at specified idle speed (engine is in closed loop condition), HO2S-1 output voltage is high or low continuously.</li> </ul> <p>*2 driving cycle detection logic, Continuous monitoring.</p>	<ul style="list-style-type: none"> <li>"WHT" or "ORN" circuit open or short</li> <li>Heated oxygen sensor malfunction</li> <li>Fuel system malfunction</li> <li>Exhaust gas leakage</li> </ul>

### DTC CONFIRMATION PROCEDURE

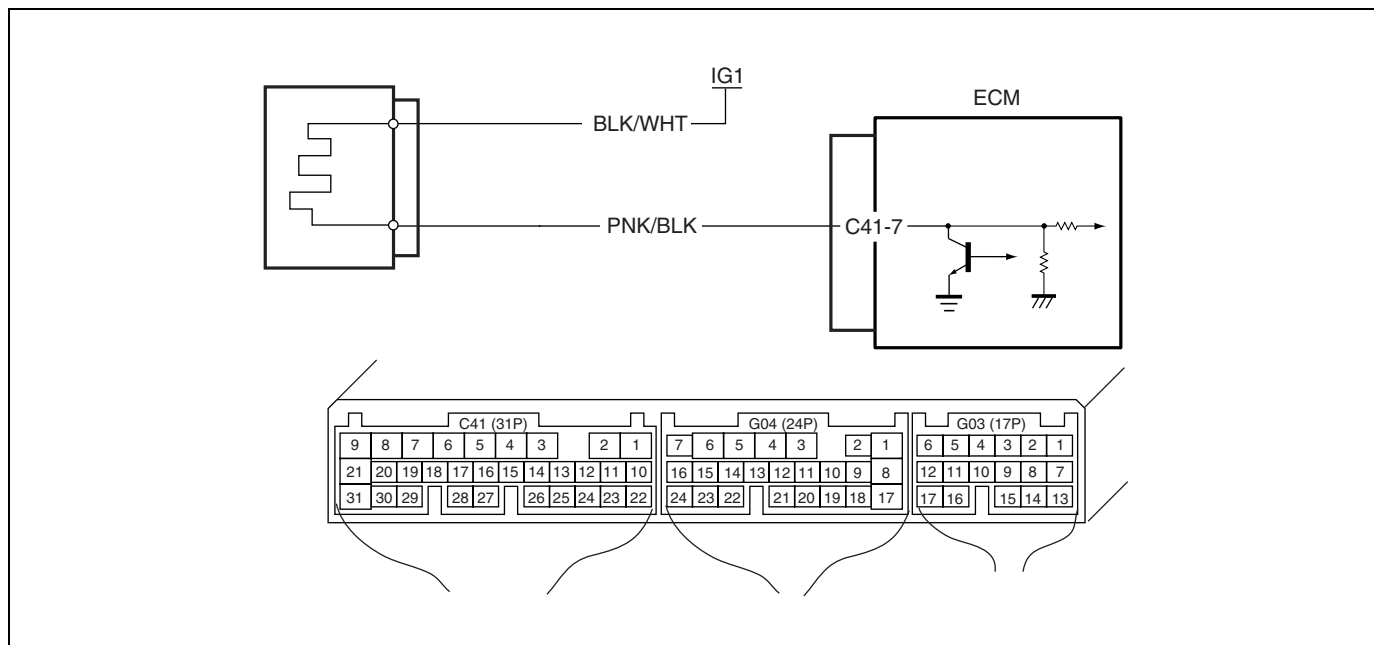
Refer to DTC P0130 section.

### INSPECTION

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Is there DTC(s) other than Fuel system (DTC P0171/P0172) and HO2S-1 (DTC P0134)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	Check HO2S-1 and Its Circuit. 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 and take foot off from pedal to enrich and enlean A/F mixture). Does HO2S-1 output voltage deflect between 0.3V and over 0.6V repeatedly?	Go to DTC P0171 and P0172 Diag. Flow Table (Fuel System Check).	Check "WHT" and "ORN" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-1.

## DTC P0135 (DTC No.14) Heated Oxygen Sensor (HO2S) Heater Circuit Malfunction (Sensor-1)

### WIRING DIAGRAM / CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC will set when one of the following conditions is met. <ul style="list-style-type: none"> <li>Low voltage at terminal C41-7 when engine is running at high load.</li> <li>High voltage at terminal C41-7 when engine is running under condition other than above.</li> </ul> *2 driving cycle detection logic, Continuous monitoring.	<ul style="list-style-type: none"> <li>HO2S-1 heater circuit open or shorted to ground</li> <li>ECM malfunction</li> </ul>

### 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.

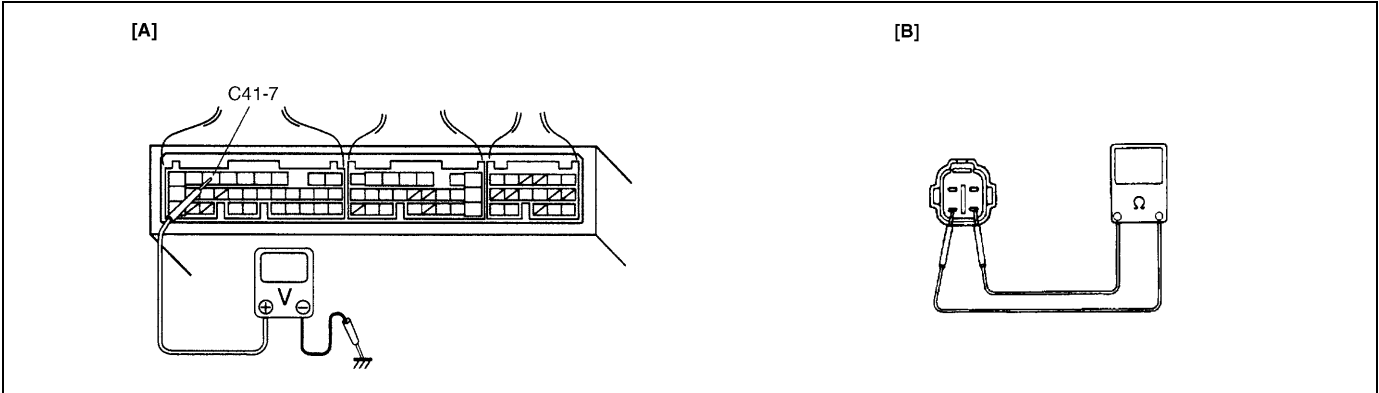
- Turn ignition switch OFF.
- Clear DTC with ignition switch ON, start engine and keep it at idle for 1 min.
- Start vehicle and depress accelerator pedal fully for 5 sec. or longer.
- Stop vehicle.
- Check DTC in "DTC" mode and pending DTC in "ON BOARD TEST" or "PENDING DTC" mode.



INSPECTION

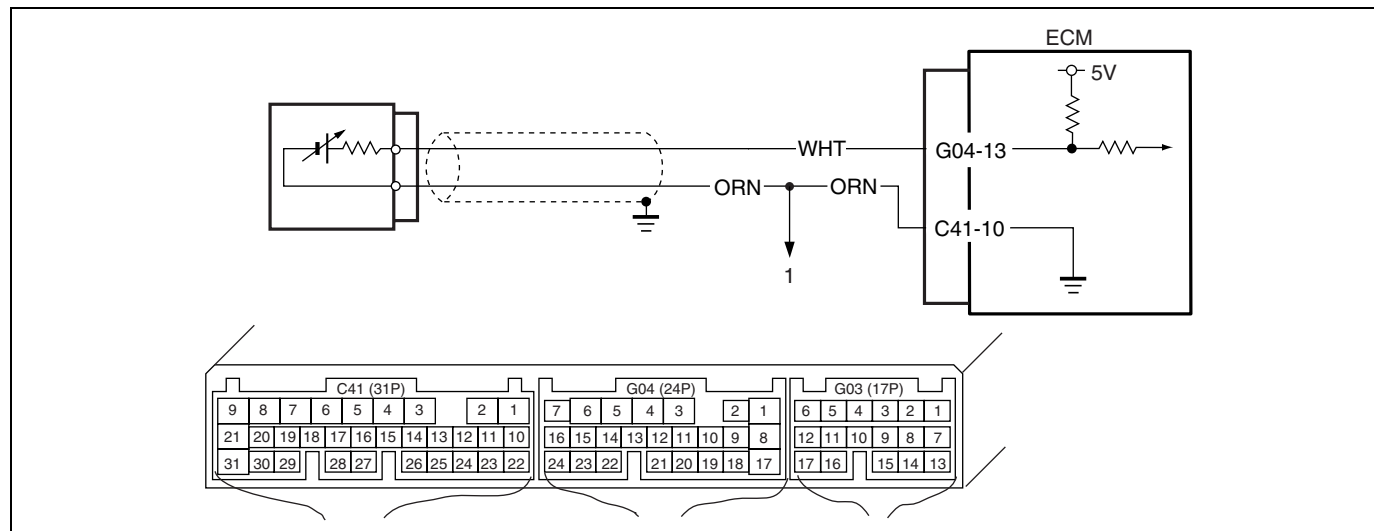
Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.
2	Check Heater for operation. 1) Check voltage at terminal C41-7. See Fig. 1. 2) Warm up engine to normal operating temperature. 3) Stop engine. 4) Turn ignition switch ON and Check voltage at terminal C41-7. See Fig. 1. Voltage should be over 10 V. 5) Start engine, run it at idle and check voltage at the same terminal. Voltage should be below 1.9 V. Are check results specified ones?	Intermittent trouble Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A.	Go to Step 3.
3	Check Heater of Sensor-1. 1) Disconnect HO2S-1 coupler with ignition switch OFF. 2) Check for proper connection to HO2S-1 at “BLK/WHT” and “PNK/BLK” wire terminals. 3) If OK, then check heater resistance. See Fig. 2. Is it 5.0 – 6.4 Ω at 20°C, 68°F?	“PNK/BLK” wire open or shorted to ground or poor connection at C41-7. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace HO2S-1.

[A] Fig. 1 for Step 2 / [B] Fig. 2 for Step 3



# DTC P0136 Heated Oxygen Sensor (HO2S) Circuit Malfunction (Sensor-2)

## WIRING DIAGRAM / CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<p>DTC will set when one of the following conditions is detected.</p> <ul style="list-style-type: none"> <li>Max. output voltage of HO2S-2 is lower than specified value or Min. output voltage is higher than specified value while vehicle driving.</li> <li>Engine is warmed up and HO2S-2 voltage is 4.5 V or more. (circuit open)</li> </ul> <p>*2 driving cycle detection logic, monitoring once/1 driving.</p>	<ul style="list-style-type: none"> <li>Exhaust gas leakage</li> <li>“WHT” or “ORN” circuit open or short</li> <li>Heated oxygen sensor-2 malfunction</li> <li>Fuel system malfunction</li> </ul>

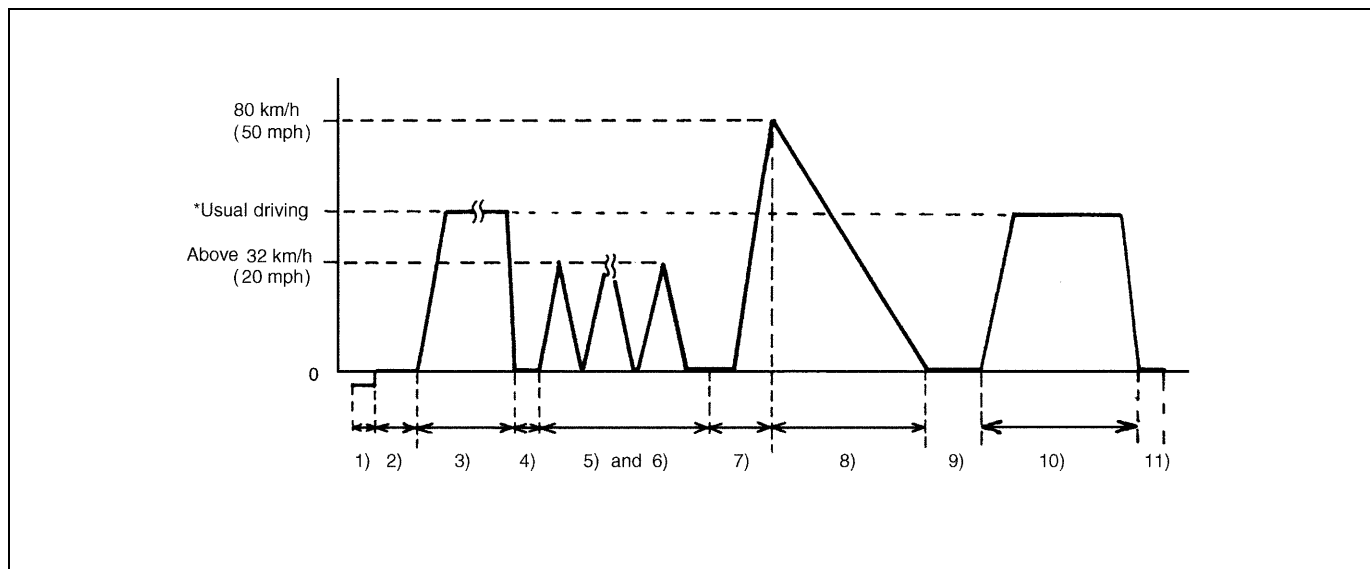
## DTC CONFIRMATION PROCEDURE

### 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.

- Turn ignition switch OFF.  
Clear DTC with ignition switch ON, check vehicle and environmental condition for :
  - Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
  - Ambient temp. : -10°C, 14°F or higher
  - Intake air temp. : 70°C, 158°F or lower
  - No exhaust gas leakage and loose connection
- Warm up engine to normal operating temperature.
- Drive vehicle under usual driving condition for 5 min. and check HO2S-2 output voltage and “short term fuel trim” with “Data List” mode on scan tool, and write it down.
- Stop vehicle (don’t turn ignition switch OFF).
- Increase vehicle speed to higher than 20 mph, 32 km/h and then stop vehicle.
- Repeat above steps 5) 4 times.
- Increase vehicle speed to about 80 km/h (50 mph) in 3rd gear or 2 range.
- Release accelerator pedal and with engine brake applied, keep vehicle coasting (fuel cut condition) for 10sec. or more.

- 9) Stop vehicle (do not turn ignition switch OFF) and run engine at idle for 2 min.  
After this step 9), if "Oxygen Sensor Monitoring TEST COMPLETED" is displayed in "READINESS TESTS" mode and DTC is not displayed in "DTC" mode, confirmation test is completed.  
If "TEST NOT COMPLTD" is still being displayed, proceed to next step 10).
- 10) Drive vehicle under usual driving condition for 10 min. (or vehicle is at a stop and run engine at idle for 10 min. or longer)
- 11) Stop vehicle (do not turn ignition switch OFF). Confirm test results according to "Test Result Confirmation Flow Table" in "DTC CONFIRMATION PROCEDURE" of DTC P0420.



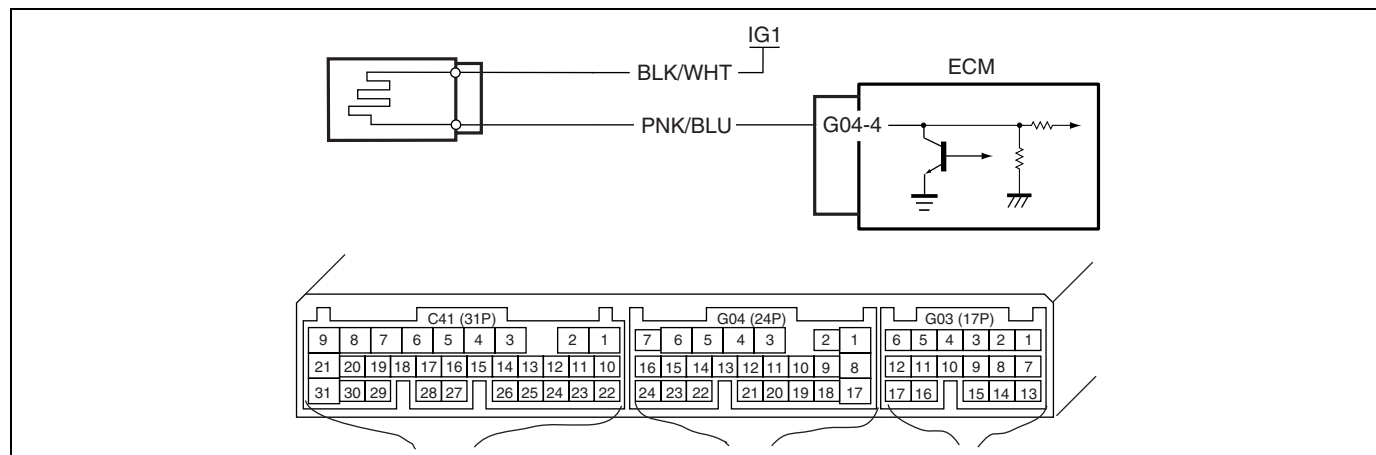
★Usual driving : Driving at 50 – 60 km/h, 30 – 40 mph including short stop according to traffic signal. (under driving condition other than high-load, high-engine speed, rapid accelerating and decelerating)

## INSPECTION

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Check Exhaust System for leakage, loose connection and damage. Is it good condition?	Go to Step 3.	Repair or replace.
3	Check HO2S-2 and Its Circuit. Was HO2S-2 output voltage indicated on scan tool in step 3) of DTC confirmation test less than 1.275 V?	Go to Step 4.	"WHT" or "ORN" circuit short to power supply circuit or HO2S-2 malfunction.
4	Check Short Term Fuel Trim. Did short term fuel trim vary within – 20 – + 20% range in step 3) of DTC confirmation test?	Check "WHT" or "ORN" wire for open and short, and connection for poor connection. If wire and connection are OK, replace HO2S-2.	Check fuel system. Go to DTC P0171/P0172 Diag. Flow Table.

## DTC P0141 Heated Oxygen Sensor (HO2S) Heater Circuit Malfunction (Sensor-2)

### WIRING DIAGRAM / CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
DTC will set when one of the following conditions is met. <ul style="list-style-type: none"> <li>Low voltage at terminal G04-4 for specified time after engine start or while engine running at high load.</li> <li>High voltage at terminal G04-4 while engine running under other than above condition.</li> </ul> *2 driving cycle detection logic, continuous monitoring.	<ul style="list-style-type: none"> <li>HO2S-2 heater circuit open or shorted to ground</li> <li>ECM malfunction</li> </ul>

### DTC CONFIRMATION PROCEDURE

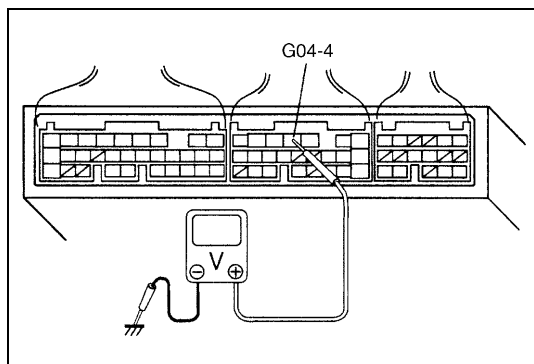
- 1) Turn ignition switch OFF once and then ON.
- 2) Clear DTC, start engine and warm up engine to normal operating temperature.
- 3) Keep it at 2000 r/min for 2 min.
- 4) Check pending DTC in "ON BOARD TEST" or "PENDING DTC" mode and DTC in "DTC" mode.

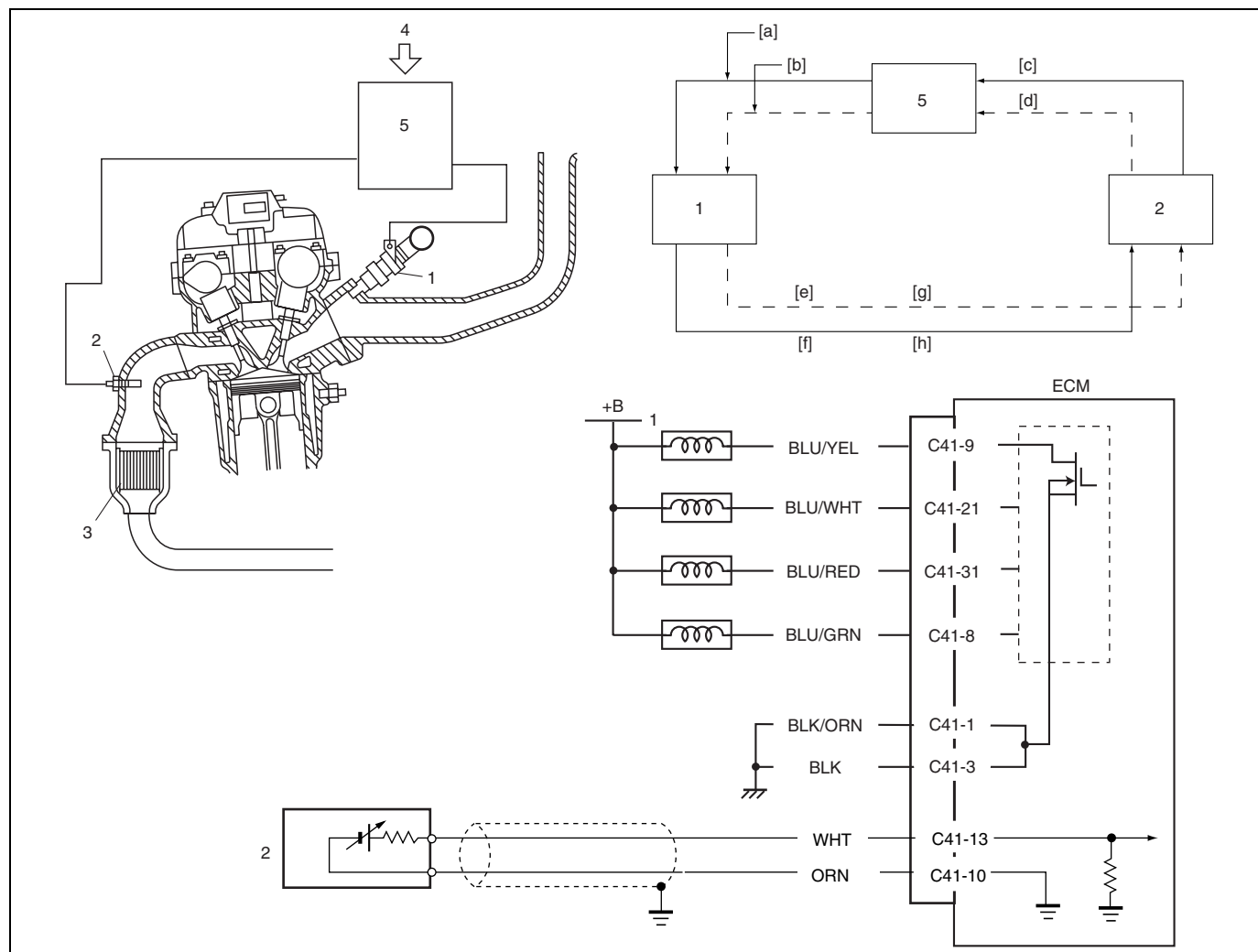
### INSPECTION

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Check HO2S-2 Heater and Its Circuit. <ol style="list-style-type: none"> <li>1) Warm up engine to normal operating temperature.</li> <li>2) Stop engine.</li> <li>3) Turn ignition switch ON and check voltage at terminal G04-4 See Fig. 1. Voltage should be over 10 V.</li> <li>4) Start engine, run it at idle and check voltage at the same terminal after 1 min. from engine start. Voltage should be below 1.9 V.</li> </ol> Are check result as specified?	Intermittent trouble. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.

Step	Action	Yes	No
3	Check Heater of Sensor-2. 1) Disconnect HO2S-2 coupler with ignition switch OFF. 2) Check for proper connection to HO2S-2 at “BLK/WHT” and “PNK/BLU” wire terminals. 3) If OK, then check heater resistance. Is it 12.0 – 14.3 $\Omega$ at 20°C, 68°F?	“PNK/BLU” wire open or shorted to ground or poor connection at G04-4. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace HO2S-2.

Fig. 1 for Step 2



**DTC P0171 Fuel System Too Lean****DTC P0172 Fuel System Too Rich****WIRING DIAGRAM / CIRCUIT DESCRIPTION**

1. Injector	[a] : Signal to decrease amount of fuel injection	[f] : A/F mixture becomes leaner
2. HO2S-1	[b] : Signal to increase amount of fuel injection	[g] : Oxygen concentration decreases
3. WU-TWC (Warm up-three way catalytic convector)	[c] : High voltage	[h] : Oxygen concentration increases
4. Sensed information	[d] : Low voltage	
5. ECM	[e] : A/F mixture becomes richer	

DTC DETECTING CONDITION	POSSIBLE CAUSE
<p>When one of the following conditions is met while engine running under closed loop condition.</p> <ul style="list-style-type: none"> <li>Air/fuel ratio too lean (Total fuel trim (short and long terms added) is more than 30%)</li> <li>Air/fuel ratio too rich (Total fuel trim is less than – 30%)</li> </ul> <p>*2 driving cycle detection logic, continuous monitoring.</p>	<ul style="list-style-type: none"> <li>Vacuum leaks (air drawn in).</li> <li>Exhaust gas leakage.</li> <li>Heated oxygen sensor-1 circuit malfunction.</li> <li>Fuel pressure out of specification.</li> <li>Fuel injector malfunction (clogged or leakage).</li> <li>MAP sensor poor performance.</li> <li>ECT sensor poor performance.</li> <li>IAT sensor poor performance.</li> <li>TP sensor poor performance.</li> <li>EVAP control system malfunction.</li> <li>PCV valve malfunction.</li> </ul>

**DTC CONFIRMATION PROCEDURE****WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Check vehicle and environmental condition for :
  - Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
  - Ambient temp. : -10°C, 14°F or higher
  - Intake air temp. : 70°C, 158°F or lower
- 4) Start engine and drive vehicle under usual driving condition (described in DTC confirmation procedure of DTC P0136) for 5 min. or longer and until engine is warmed up to normal operating temperature.
- 5) Keep vehicle speed at 50 – 60 km/h, 30 – 40 mph in 5th gear or “D” range for 5 min. or more.
- 6) Stop vehicle (do not turn ignition switch OFF).
- 7) Check pending DTC in “ON BOARD TEST” or “PENDING DTC” mode and DTC in “DTC” mode.

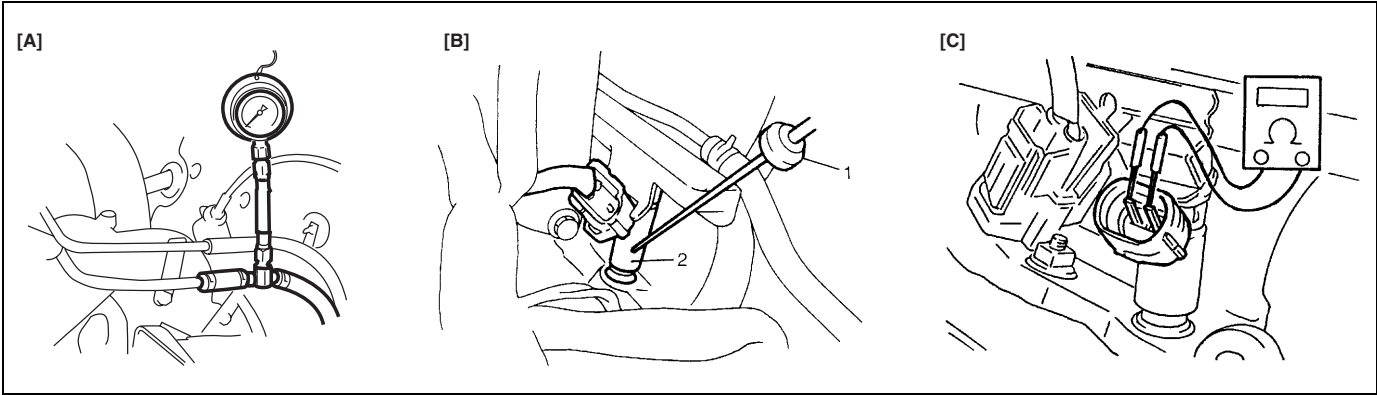
**INSPECTION**

Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.
2	Is there DTC(s) other than fuel system (DTC P0171/P0172)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	Check HO2S-1 Output Voltage. 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 and take foot off from pedal to enrich and enlean A/F mixture). Does HO2S-1 output voltage deflect between below 0.3 V and over 0.6 V repeatedly?	Go to Step 4.	Go to DTC P0130 Diag. Flow Table (HO2S-1 circuit check).
4	Check Fuel Pressure (Refer to section 6E1 for details). 1) Release fuel pressure from fuel feed line. 2) Install fuel pressure gauge. 3) Check fuel pressure. See Fig. 1. With fuel pump operating and engine at stop : 270 – 310 kPa, 2.7 – 3.1 kg/cm <sup>2</sup> , 38.4 – 44.0 psi. At specified idle speed : 270 – 310 kPa, 2.7 – 3.1 kg/cm <sup>2</sup> , 38.4 – 44.0 psi. Is measured value as specified?	Go to Step 5.	Go to Diag. Flow Table B-3 Fuel Pressure Check.

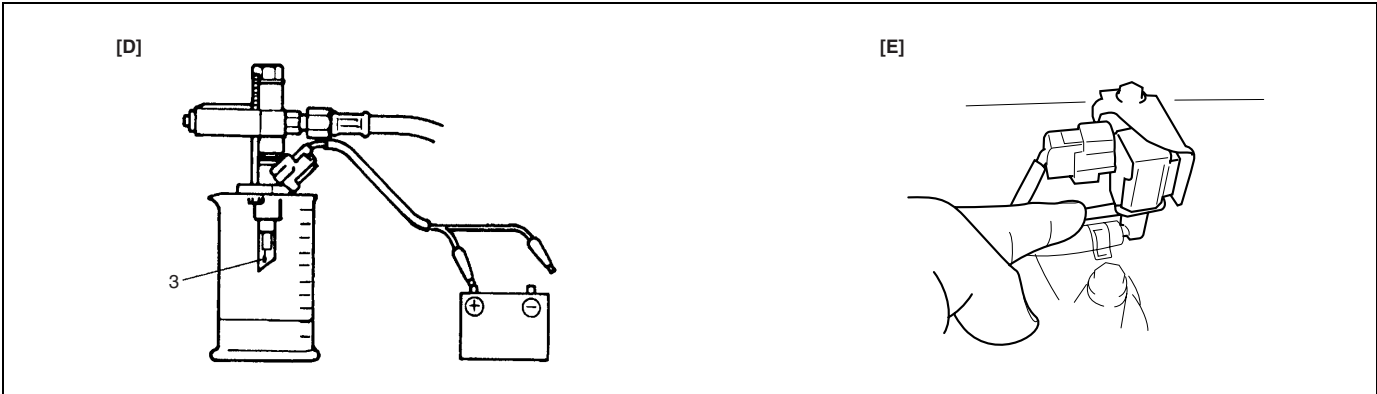
Step	Action	Yes	No
5	<p>Check Fuel Injectors and Circuit.</p> <ol style="list-style-type: none"> <li>1) Using sound scope (1) or such, check operating sound of each injector (2) when engine is running. Cycle of operating sound should vary according to engine speed. See Fig. 2. If no sound or an unusual sound is heard, check injector circuit (wire or coupler) or injector.</li> <li>2) Turn ignition switch OFF and disconnect a fuel injector connector.</li> <li>3) Check for proper connection to fuel injector at each terminal. See Fig. 3.</li> <li>4) If OK, then check injector resistance. Injector Resistance : 11.3 – 13.8 <math>\Omega</math> at 20°C (68°F)</li> <li>5) Carry out steps 1) and 3) on each injector.</li> <li>6) Check each injector for injected fuel volume (1) referring to Section 6E1. See Fig. 4. Injected Fuel Volume : 43 – 47 cc/15 sec 1.45/1.51 – 1.58/1.65 US/Imp.oz/15 sec</li> <li>7) Check each injector for fuel leakage after injector closed. Fuel Leakage : Less than 1 drop/min (3).</li> </ol> <p>Is check result in step 1) and 3) to 7) satisfactory?</p>	Go to Step 6.	Check injector circuit or replace fuel injector(s).
6	<p>Check EVAP Canister Purge Valve.</p> <ol style="list-style-type: none"> <li>1) Disconnect purge hose from EVAP canister purge valve.</li> <li>2) Place finger against the end of EVAP canister purge valve.</li> <li>3) Check that vacuum is not felt there when engine is cool and running at idle. See Fig. 5.</li> </ol> <p>Is vacuum felt?</p>	Check evaporative emission control system (See Section 6E1).	Go to Step 7.
7	<p>Check Intake Manifold Absolute Pressure Sensor for performance (See DTC P0105 (No.11) Diag. Flow Table).</p> <p>Is it in good condition?</p>	Go to Step 8.	Repair or replace.
8	<p>Check Engine Coolant Temp. Sensor for performance (See Section 6E1).</p> <p>Is it in good condition?</p>	Go to Step 9.	Replace engine coolant temp. sensor.
9	<p>Check Intake Air Temp. Sensor for performance (See Section 6E1).</p> <p>Is it in good condition?</p>	Go to Step 10.	Replace intake air temp. sensor.
10	<p>Check Throttle Position Sensor for performance (See Step 4 of DTC P0121 Diag. Flow Table).</p> <p>Is it in good condition?</p>	Go to Step 11.	Replace throttle position sensor.
11	<p>Check PCV Valve for valve clogging (See Section 6E1).</p> <p>Is it in good condition?</p>	Substitute a known-good ECM and recheck.	Replace PCV valve.

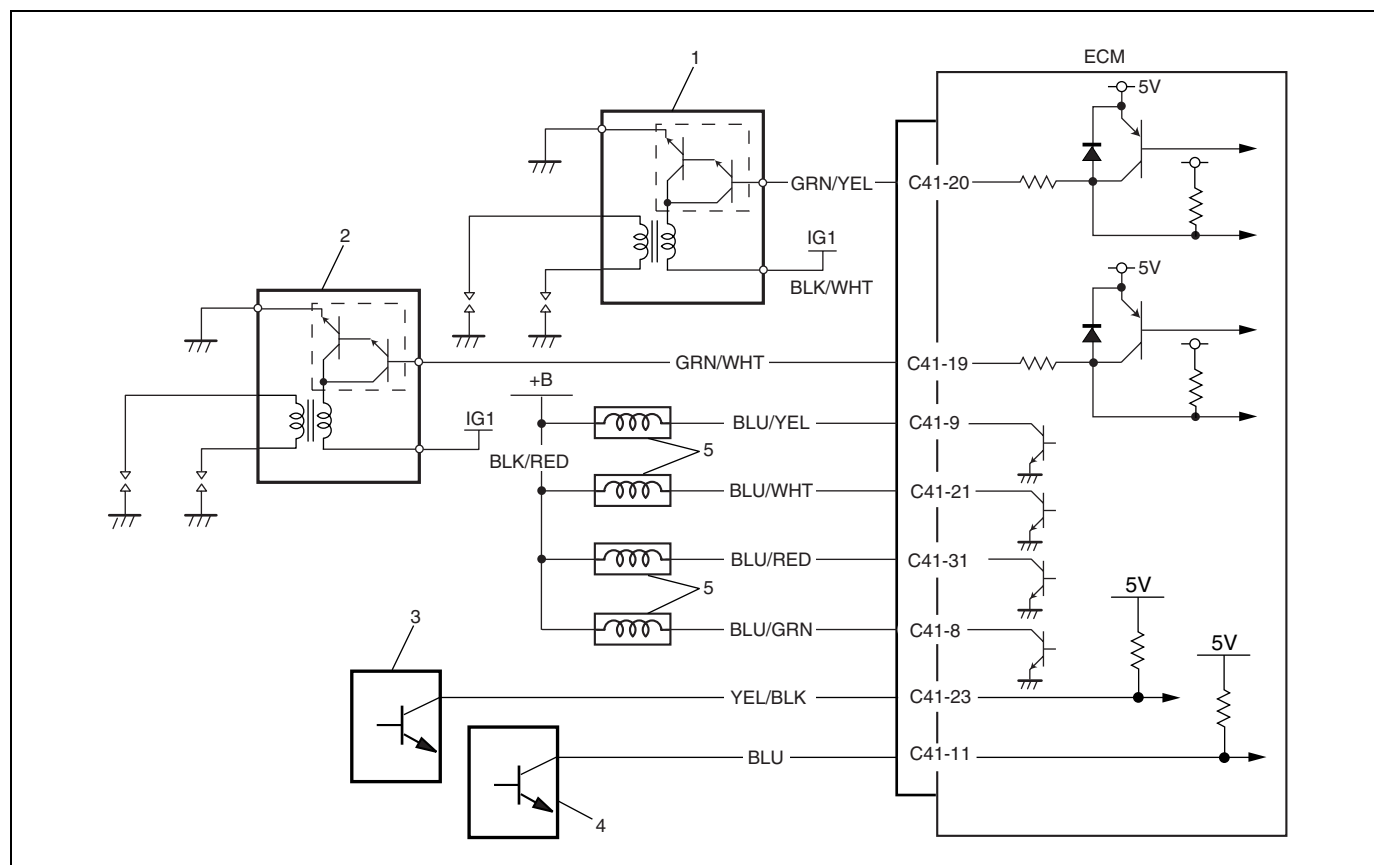


[A] Fig. 1 for Step 4 / [B] Fig. 2 for Step 5 / [C] Fig. 3 for Step 5



[D] Fig. 4 for Step 5 / [E] Fig. 5 for Step 6



**DTC P0300 Random Misfire Detected (Misfire Detected at 2 or More Cylinders)****DTC P0301 Cylinder 1 Misfire Detected****DTC P0302 Cylinder 2 Misfire Detected****DTC P0303 Cylinder 3 Misfire Detected****DTC P0304 Cylinder 4 Misfire Detected****WIRING DIAGRAM**

1. Ignition coil No. 1
2. Ignition coil No. 2
3. CKP sensor
4. CMP sensor
5. Fuel injector

**CIRCUIT DESCRIPTION**

ECM monitors crankshaft revolution speed and engine speed via the crankshaft position sensor and cylinder No. via the camshaft position sensor. Then it calculates the change in the crankshaft revolution speed and from how many times such change occurred in every 200 or 1000 engine revolutions, it detects occurrence of misfire. When ECM detects a misfire (misfire rate per 200 revolutions) which can cause overheating and damage to the three way catalytic converter, it makes the malfunction indicator lamp (MIL) flash as long as misfire occurs at that rate.

After that, however, when the misfire rate drops, MIL remains ON until it is judged as normal 3 times under the same driving conditions.

Also, when ECM detects a misfire (misfire rate per 1000 revolutions) which will not cause damage to three way catalytic converter but can cause exhaust emission to be deteriorated, it makes MIL light according to the 2 driving cycle detection logic.

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>• Engine under other than high revolution condition</li> <li>• Not on rough road</li> <li>• Engine speed changing rate (below specified value)</li> <li>• Manifold absolute pressure changing rate (below specified value)</li> <li>• Throttle opening changing rate (below specified value)</li> <li>• Misfire rate per 200 or 1000 engine revolutions (how much and how often crankshaft revolution speed changes) is higher than specified value</li> </ul>	<ul style="list-style-type: none"> <li>• Engine overheating</li> <li>• Vacuum leaks (air inhaling) from air intake system</li> <li>• Ignition system malfunction (spark plug(s), high-tension cord(s), ignition coil assembly)</li> <li>• Fuel pressure out of specification</li> <li>• Fuel injector malfunction (clogged or leakage)</li> <li>• Engine compression out of specification</li> <li>• Valve lash (clearance) out of specification</li> <li>• Manifold absolute pressure sensor malfunction</li> <li>• Engine coolant temp. sensor malfunction</li> <li>• PCV valve malfunction</li> <li>• EVAP control system malfunction</li> <li>• EGR system malfunction</li> </ul>

## DTC CONFIRMATION PROCEDURE

### NOTE:

Among different types of random misfire, if misfire occurs at cylinders 1 and 4 or cylinders 3 and 2 simultaneously, it may not possible to reconfirm DTC by using the following DTC confirmation procedure. When diagnosing the trouble of DTC P0300 (Random misfire detected) of the engine which is apparently misfiring, even if DTC P0300 cannot be reconfirmed by using the following DTC confirmation procedure, proceed to the following Diag. Flow Table.

### 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.

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Check vehicle and environmental condition for :
  - Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
  - Ambient temp. : -10°C, 14°F or higher
  - Intake air temp. : 70°C, 158°F or lower
  - Engine coolant temp. : - 10 – 110°C, 14 – 230°F
- 4) Start engine and keep it at idle for 2 min. or more.
- 5) Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode.
- 6) If DTC is not detected at idle, consult usual driving based on information obtained in “Customer complaint analysis” and “Freeze frame data check”.

## INSPECTION

### CAUTION:

For iridium spark plugs, do not adjust air gap or clean.

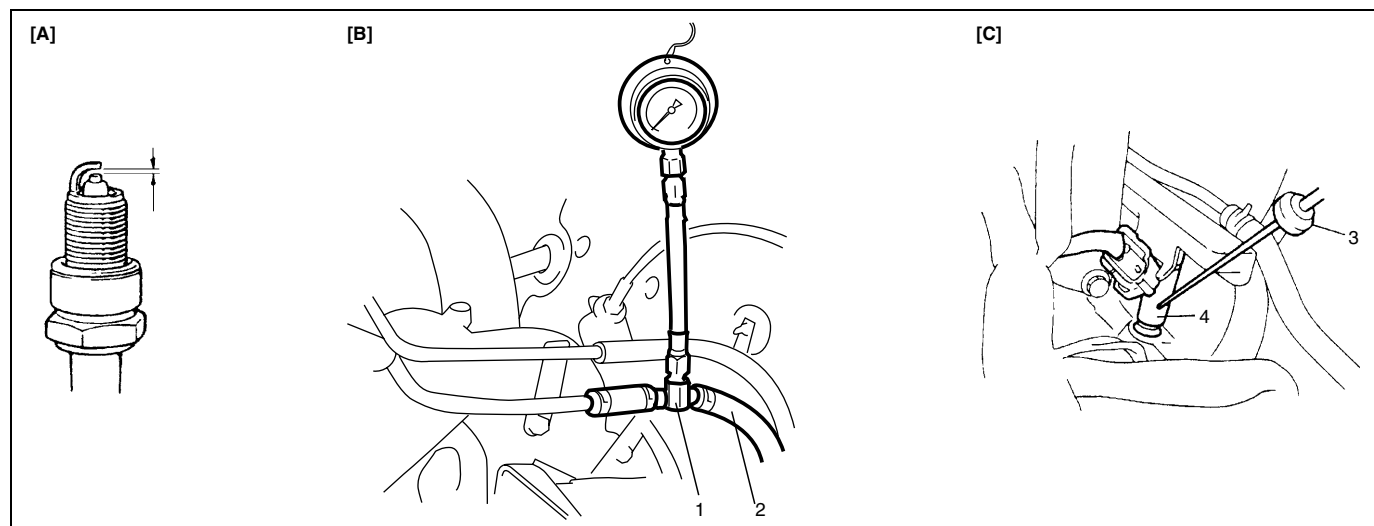
Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.

Step	Action	Yes	No
2	Is there DTC other than Fuel system (DTC P0171/P0172) and misfire (DTC P0300-P0304)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	<p>Check Ignition System.</p> <ol style="list-style-type: none"> <li>1) Remove spark plugs and check them for; <ul style="list-style-type: none"> <li>• Air gap : 1.0 – 1.1 mm (0.040 – 0.043 in.) See Fig. 1.</li> <li>• Carbon deposits/Insulator damage/Plug type</li> </ul> If abnormality is found, adjust, clean or replace.</li> <li>2) Disconnect all injector connectors.</li> <li>3) Connect spark plugs to high tension cords and then ground spark plugs.</li> <li>4) Crank engine and check that each spark plug sparks.</li> </ol> <p>Are above check results satisfactory?</p>	Go to Step 4.	Check ignition system parts (Refer to Section 6F1).
4	<p>Check Fuel Pressure (Refer to Section 6E1 for details).</p> <ol style="list-style-type: none"> <li>1) Release fuel pressure from fuel feed line.</li> <li>2) Install fuel pressure gauge. See Fig. 2.</li> <li>3) Check fuel pressure.</li> </ol> <p>With fuel pump operating and engine at stop : 270 – 310 kPa, 2.7 – 3.1 kg/cm<sup>2</sup>, 38.4 – 44.0 psi.</p> <p>At specified idle speed : 270 – 310 kPa, 2.7 – 3.1 kg/cm<sup>2</sup>, 38.4 – 44.0 psi.</p> <p>Is measured value as specified?</p>	Go to Step 5.	Go to Diag. Flow Table B-3 fuel pressure check.
5	<p>Check Fuel Injectors and Circuit.</p> <ol style="list-style-type: none"> <li>1) Using sound scope (3) or such, check operating sound of each injector (4) when engine is running. Cycle of operating sound should vary according to engine speed. See Fig 3.</li> <li>If no sound or an unusual sound is heard, check injector circuit (wire or connector) or injector.</li> <li>2) Turn ignition switch OFF and disconnect a fuel injector connector.</li> <li>3) Check for proper connection to fuel injector at each terminal. See Fig. 4.</li> <li>4) If OK, then check injector resistance.</li> </ol> <p>Injector Resistance : 11.3 – 13.8 <math>\Omega</math> at 20°C (68°F)</p> <ol style="list-style-type: none"> <li>5) Carry out steps 1) and 3) on each injector.</li> <li>6) Check each injector for injected fuel volume referring to Section 6E1. See Fig. 5.</li> </ol> <p>Injected Fuel Volume : 43 – 47 cc/15 sec (1.45/1.51 – 1.58/1.65 US/Imp. oz/15 sec)</p> <ol style="list-style-type: none"> <li>7) Check each injector for fuel leakage after injector closed.</li> </ol> <p>Fuel Leakage : Less than 1 drop/min.</p> <p>Is check result in step 1) and 3) to 7) satisfactory?</p>	Go to Step 6.	Check injector circuit or replace fuel injector(s).
6	<p>Check PCV Valve for clogging (See Section 6E1).</p> <p>Is it in good condition?</p>	Go to Step 7.	Replace PCV valve.

Step	Action	Yes	No
2	Is there DTC other than Fuel system (DTC P0171/P0172) and misfire (DTC P0300-P0304)?	Go to applicable DTC Diag. Flow Table.	Go to Step 3.
3	<p>Check Ignition System.</p> <ol style="list-style-type: none"> <li>1) Remove spark plugs and check them for; <ul style="list-style-type: none"> <li>• Air gap : 1.0 – 1.1 mm (0.040 – 0.043 in.) See Fig. 1.</li> <li>• Carbon deposits/Insulator damage/Plug type</li> </ul> If abnormality is found, adjust, clean or replace.</li> <li>2) Disconnect all injector connectors.</li> <li>3) Connect spark plugs to high tension cords and then ground spark plugs.</li> <li>4) Crank engine and check that each spark plug sparks.</li> </ol> <p>Are above check results satisfactory?</p>	Go to Step 4.	Check ignition system parts (Refer to Section 6F1).
4	<p>Check Fuel Pressure (Refer to Section 6E1 for details).</p> <ol style="list-style-type: none"> <li>1) Release fuel pressure from fuel feed line.</li> <li>2) Install fuel pressure gauge. See Fig. 2.</li> <li>3) Check fuel pressure.</li> </ol> <p>With fuel pump operating and engine at stop : 270 – 310 kPa, 2.7 – 3.1 kg/cm<sup>2</sup>, 38.4 – 44.0 psi.</p> <p>At specified idle speed : 270 – 310 kPa, 2.7 – 3.1 kg/cm<sup>2</sup>, 38.4 – 44.0 psi.</p> <p>Is measured value as specified?</p>	Go to Step 5.	Go to Diag. Flow Table B-3 fuel pressure check.
5	<p>Check Fuel Injectors and Circuit.</p> <ol style="list-style-type: none"> <li>1) Using sound scope (3) or such, check operating sound of each injector (4) when engine is running. Cycle of operating sound should vary according to engine speed. See Fig 3.</li> <li>If no sound or an unusual sound is heard, check injector circuit (wire or connector) or injector.</li> <li>2) Turn ignition switch OFF and disconnect a fuel injector connector.</li> <li>3) Check for proper connection to fuel injector at each terminal. See Fig. 4.</li> <li>4) If OK, then check injector resistance.</li> </ol> <p>Injector Resistance : 11.3 – 13.8 <math>\Omega</math> at 20°C (68°F)</p> <ol style="list-style-type: none"> <li>5) Carry out steps 1) and 3) on each injector.</li> <li>6) Check each injector for injected fuel volume referring to Section 6E1. See Fig. 5.</li> </ol> <p>Injected Fuel Volume : 43 – 47 cc/15 sec (1.45/1.51 – 1.58/1.65 US/Imp. oz/15 sec)</p> <ol style="list-style-type: none"> <li>7) Check each injector for fuel leakage after injector closed.</li> </ol> <p>Fuel Leakage : Less than 1 drop/min.</p> <p>Is check result in step 1) and 3) to 7) satisfactory?</p>	Go to Step 6.	Check injector circuit or replace fuel injector(s).
6	<p>Check PCV Valve for clogging (See Section 6E1).</p> <p>Is it in good condition?</p>	Go to Step 7.	Replace PCV valve.

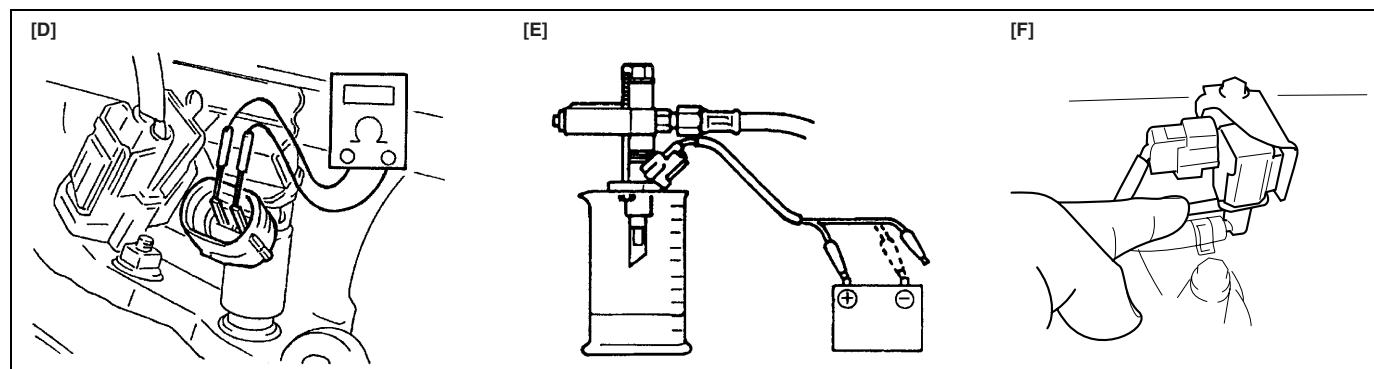
Step	Action	Yes	No
7	Check EVAP Canister Purge Valve for Closing. 1) Disconnect purge hose from EVAP canister purge valve. 2) Place finger against the end of EVAP canister purge valve. 3) Check that vacuum is not felt there, when engine is cool and running at idle. See Fig. 6. Is vacuum felt?	Check evaporative emission control system (See Section 6E1).	Go to Step 8.
8	Check MAP Sensor for performance (See DTC P0105 Diag. Flow Table). Is it in good condition?	Go to Step 9.	Repair or replace.
9	Check ECT Sensor for performance (See Section 6E1). Is it in good condition?	Go to Step 10.	Replace engine coolant temp. sensor.
10	Check Parts or System which can cause engine rough idle or poor performance. • Engine compression (See Section 6A1). • Valve lash (See Section 6A1). • Valve timing (Timing belt installation. See Section 6A1). Are they in good condition?	Check wire harness and connection of ECM ground, ignition system and fuel injector for intermittent open and short.	Repair or replace.

[A] Fig. 1 for Step 3 / [B] Fig. 2 for Step 4 / [C] Fig. 3 for Step 5



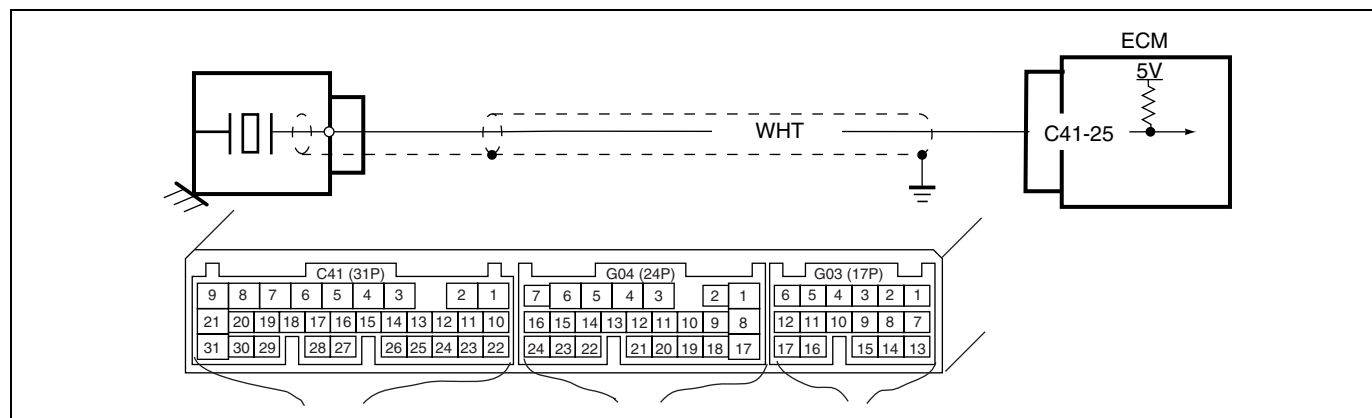
- |                                      |
|--------------------------------------|
| 1. Fuel pressure gauge & 3 way joint |
| 2. Fuel feed hose                    |

[D] Fig. 4 for Step 5 / [E] Fig. 5 for Step 5 / [F] Fig. 6 for Step 7



## DTC P0325 (DTC No.17) Knock Sensor Circuit Malfunction

### WIRING DIAGRAM / CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>Knock sensor voltage is 3.91 V or more or</li> <li>Knock sensor voltage is 1.23 V or less</li> </ul>	<ul style="list-style-type: none"> <li>“WHT” circuit open or shorted to ground</li> <li>Knock sensor malfunction</li> <li>ECM malfunction</li> </ul>

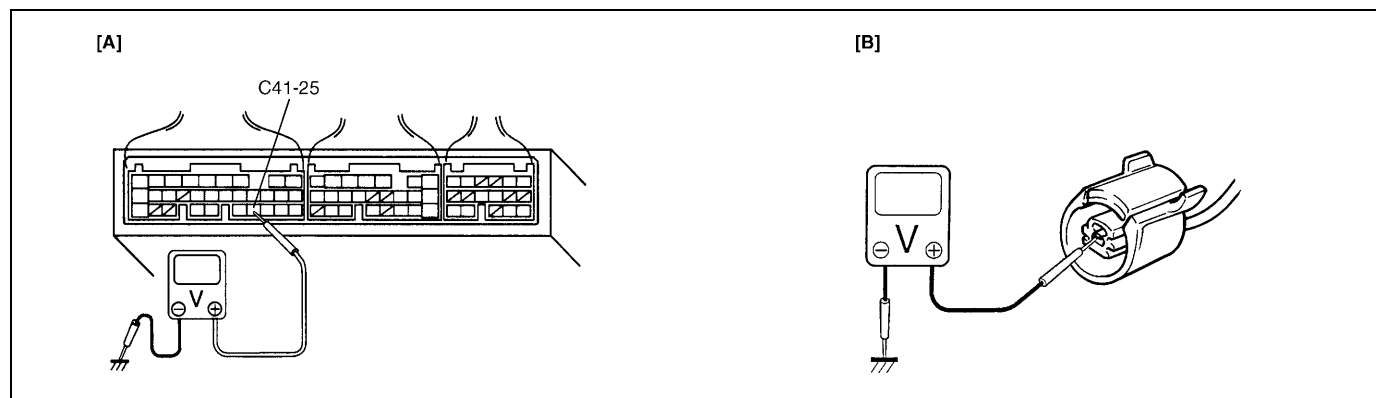
### DTC CONFIRMATION PROCEDURE

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

### INSPECTION

Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.
2	Check Knock Sensor Signal. 1) With engine running, check voltage from C41-25 terminal of ECM connector to body ground. See Fig. 1. Is voltage about 1.23 – 3.91 V?	Knock sensor and its circuit are in good condition. Intermittent trouble or faulty ECM. Recheck, referring to “Intermittent and Poor Connection” in Section 0A.	Go to Step 3.
3	Check Knock Sensor Output. 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” terminal of knock sensor connector to body ground. See Fig. 2. Is it 4 – 5 V?	Faulty knock sensor. Substitute a known-good knock sensor and recheck.	“WHT” wire open, shorted to ground circuit or poor C41-25 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

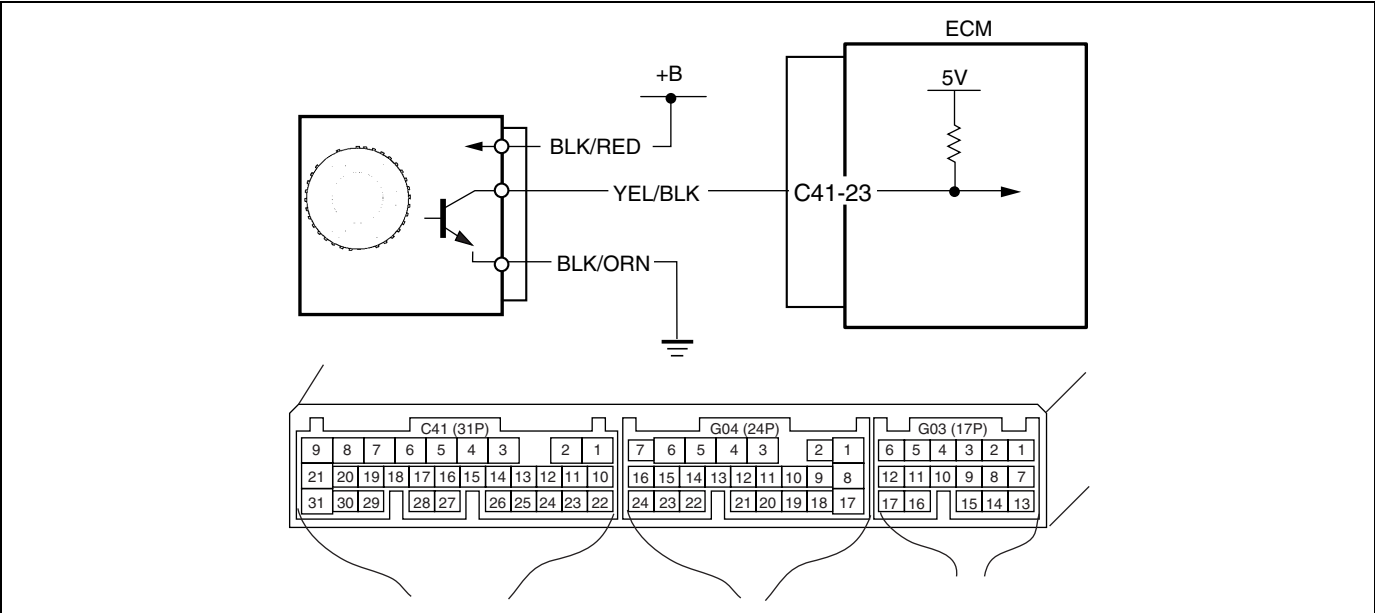
[A] Fig. 1 for Step 2 / [B] Fig. 2 for Step 3





DTC P0335 (DTC No.23) Crankshaft Position (CKP) Sensor Circuit Malfunction

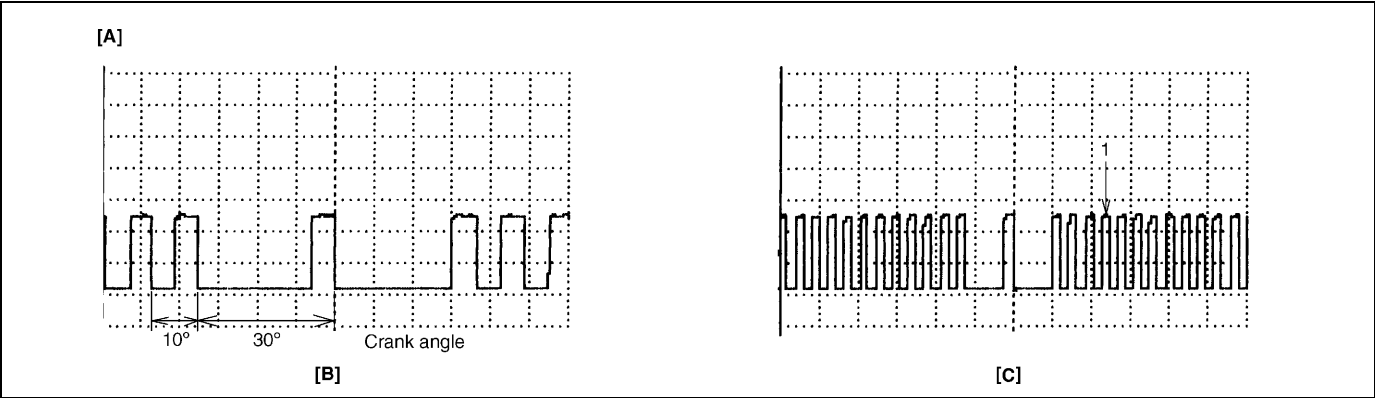
WIRING DIAGRAM / CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"><li>No CKP sensor signal for 2 seconds at engine cranking.</li></ul>	<ul style="list-style-type: none"><li>CKP sensor circuit open or short.</li><li>Crankshaft timing belt pulley teeth damaged.</li><li>CKP sensor malfunction, foreign material being attached or improper installation.</li><li>ECM malfunction.</li></ul>

REFERENCE

Connect oscilloscope between terminals C41-23 of ECM connector connected to ECM and ground and check CKP sensor signal.



1. BTDC 5° (Crank angle)	[B] : Waveforms at specified idle speed
[A] : Oscilloscope Waveforms	[C] : Waveforms at 2000 r/min

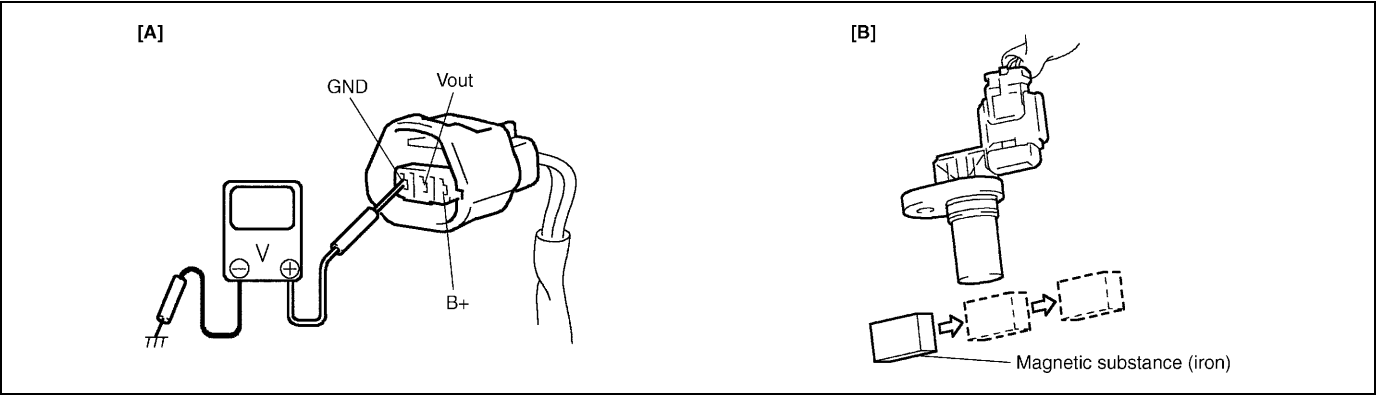
DTC CONFIRMATION PROCEDURE

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

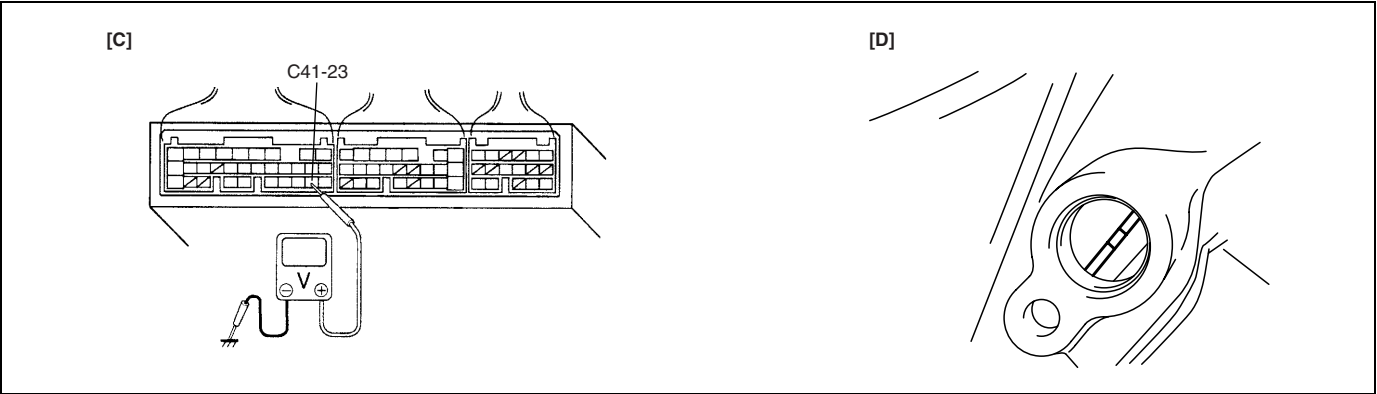
**INSPECTION**

<b>Step</b>	<b>Action</b>	<b>Yes</b>	<b>No</b>
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Check CKP Sensor and Connector for proper installation. Is CKP sensor installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check Wire Harness and Connection. 1) Disconnect connector from CKP sensor. 2) Check for proper connection to CKP sensor at each terminal. 3) If OK, turn ignition switch ON and check for voltage at each terminal of sensor connector disconnected. See Fig. 1. Terminal "B+" : 10 – 14 V Terminal "Vout" : 4 – 5 V Terminal "GND" : 0 – 1 V Is check result satisfactory?	Go to Step 5.	Go to Step 4.
4	Was terminal "Vout" voltage out of specification in Step 3 check?	"YEL/BLK" wire open, short or poor connection. If wire and connection are OK, substitute a known-good ECM and recheck.	"BLK/RED" or "BLK/ORN" wire open, short or poor connection.
5	Check Ground Circuit for open. 1) Turn ignition switch OFF. 2) Check for continuity between "GND" terminal of CKP sensor connector and engine ground. Is continuity indicated?	Go to Step 6.	"BLK/ORN" wire open or poor ground connection.
6	Check CKP Sensor for operation. 1) Remove CKP sensor from sensor case. 2) Remove metal particles on end face of CKP sensor, if any. 3) Connect each connector to ECM and CKP sensor. 4) Turn ignition switch ON. 5) Check for voltage at terminal C41-23 of connector connected to ECM by passing magnetic substance (iron) while keeping approximately 1 mm (0.03 in.) gap with respect to end face of CKP sensor. See Fig. 2 and 3. Does voltage vary from low (0 – 1 V) to high (4 – 5 V) or from high to low?	Go to Step 7.	Replace CKP sensor.
7	Check Signal Rotor for the following. See Fig. 4. • Damage • No foreign material attached Is it in good condition?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Clean rotor teeth or replace CMP sensor.

[A] Fig. 1 for Step 3 / [B] Fig. 2 for Step 6

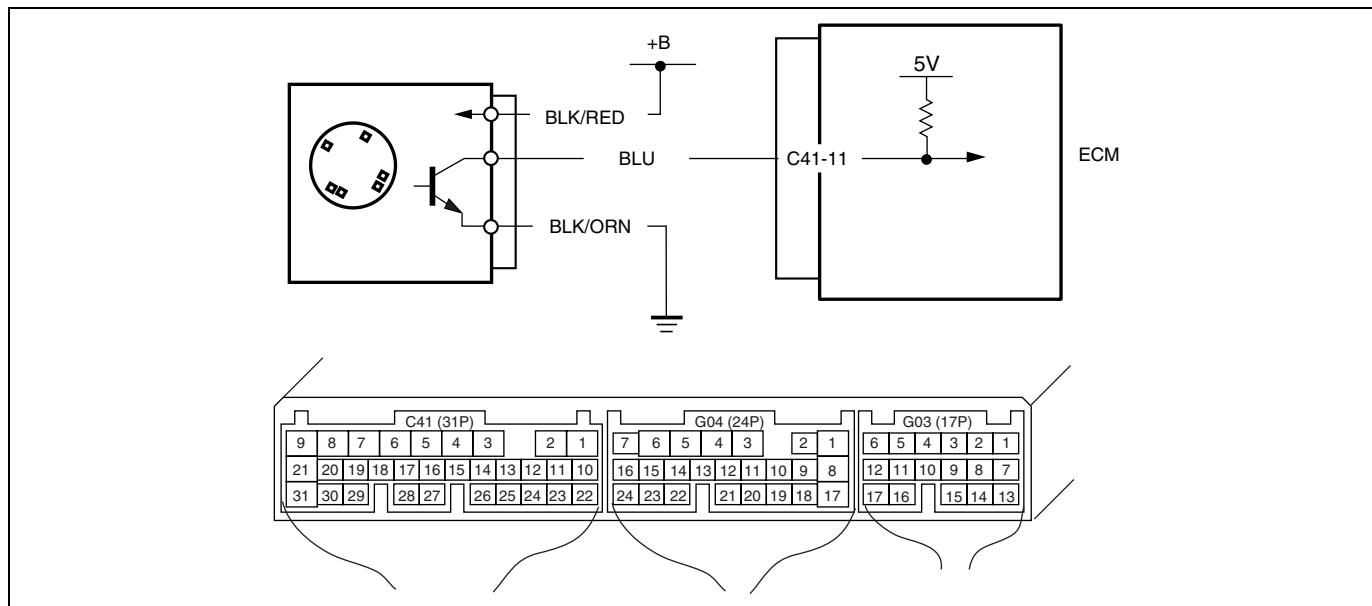


[C] Fig. 3 for Step 6 / [D] Fig. 4 for Step 7



# DTC P0340 (DTC No.15) Camshaft Position (CMP) Sensor Circuit Malfunction

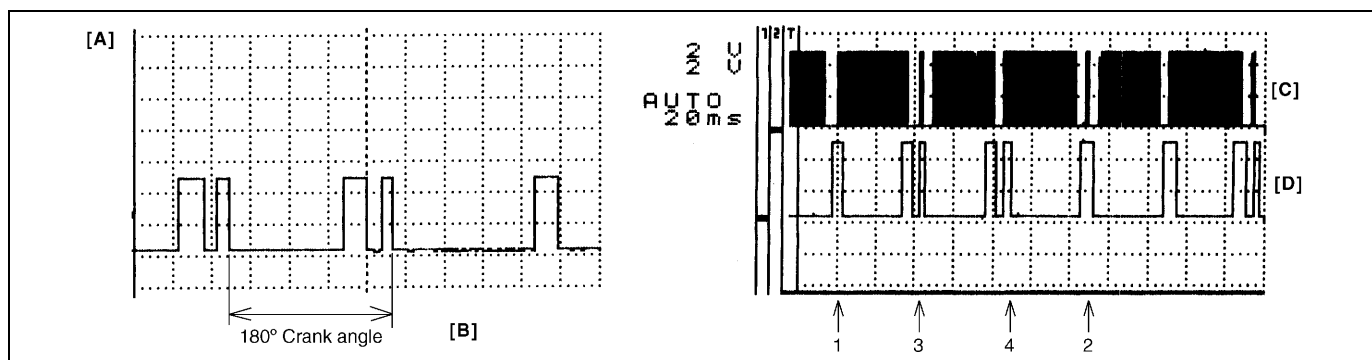
## WIRING DIAGRAM / CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>No CMP sensor signal during engine running (CKP sensor signal is inputted).</li> </ul>	<ul style="list-style-type: none"> <li>CMP sensor circuit open or short.</li> <li>Signal rotor teeth damaged.</li> <li>CMP sensor malfunction, foreign material being attached or improper installation.</li> <li>ECM malfunction.</li> </ul>

## REFERENCE

Connect oscilloscope between terminals C41-11 of ECM connector connected to ECM and body ground and check CMP sensor signal. When CKP circuit is failed (open or short), ECM identify the cylinder only by CMP sensor signal.



1. No.1 cylinder	3. No.3 cylinder	[A] : Oscilloscope Waveforms	[C] : CKP sensor signal
2. No.2 cylinder	4. No.4 cylinder	[B] : Waveforms at specified idle speed	[D] : CMP sensor signal

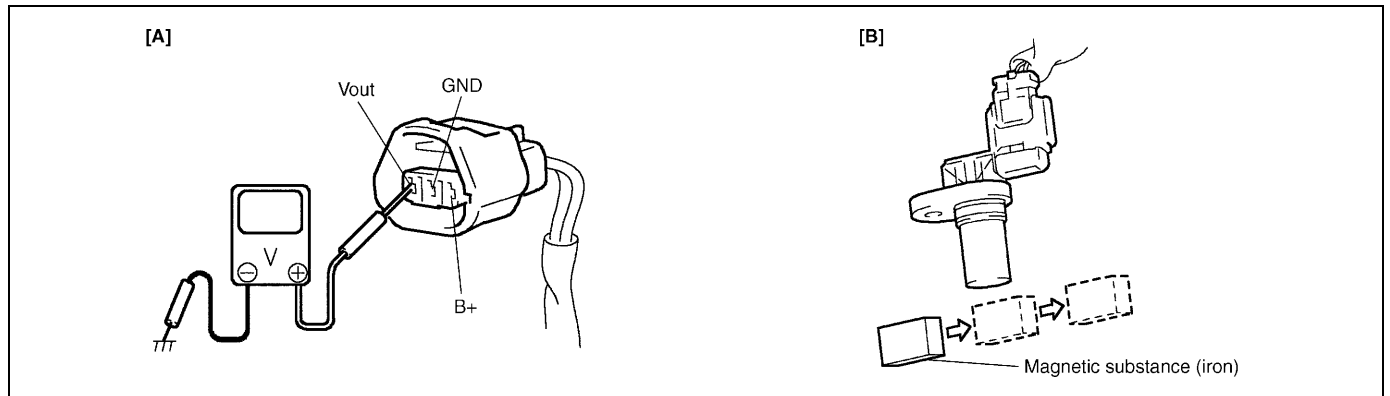
## DTC CONFIRMATION PROCEDURE

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

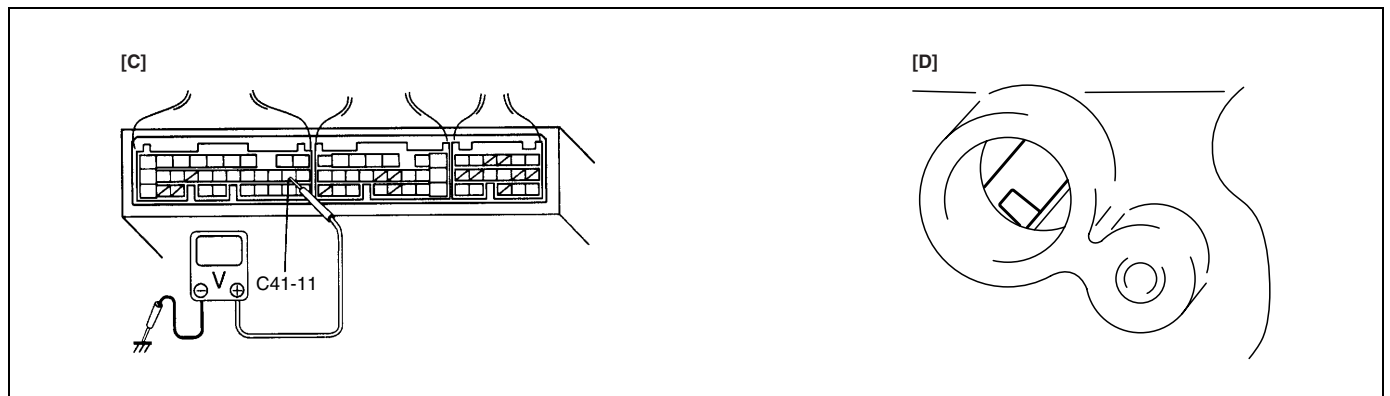
**INSPECTION**

<b>Step</b>	<b>Action</b>	<b>Yes</b>	<b>No</b>
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Check CMP Sensor and connector for proper installation. Is CMP sensor installed properly and connector connected securely?	Go to Step 3.	Correct.
3	Check Wire Harness and Connection. 1) Disconnect connector from CMP sensor. 2) Check for proper connection to CMP sensor at each terminal. 3) If OK, turn ignition switch ON and check for voltage at each terminal of sensor connector disconnected. See Fig. 1. Terminal "B+" : 10 – 14 V Terminal "Vout" : 4 – 5 V Terminal "GND" : 0 – 1 V Is check result satisfactory?	Go to Step 5.	Go to Step 4.
4	Was terminal "Vout" voltage out of specification in Step 3 check?	"BLU" wire open, short or poor connection. If wire and connection are OK, substitute a known-good ECM and recheck.	"BLK/RED" or "BLK/ORN" wire open, short or poor connection.
5	Check Ground Circuit for open. 1) Turn ignition switch OFF. 2) Check for continuity between "GND" terminal of CMP sensor connector and engine ground. Is continuity indicated?	Go to Step 6.	"BLK/ORN" wire open or poor ground connection.
6	Check CMP Sensor for operation. 1) Remove CMP sensor from sensor case. 2) Remove metal particles on end face of CMP sensor, if any. 3) Connect each connector to ECM and CMP sensor. 4) Turn ignition switch ON. 5) Check for voltage at terminal C41-11 of connector connected to ECM by passing magnetic substance (iron) while keeping approximately 1 mm (0.03 in.) gap with respect to end face of CMP sensor. See Fig. 2 and 3. Does voltage vary from low (0 – 1 V) to high (4 – 5 V) or from high to low?	Go to Step 7.	Replace CMP sensor.
7	Check Signal Rotor for the following. See Fig. 4. • Damage • No foreign material attached Is it in good condition?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Clean rotor teeth or replace CMP sensor.

[A] Fig. 1 for Step 3 / [B] Fig. 2 for Step 6

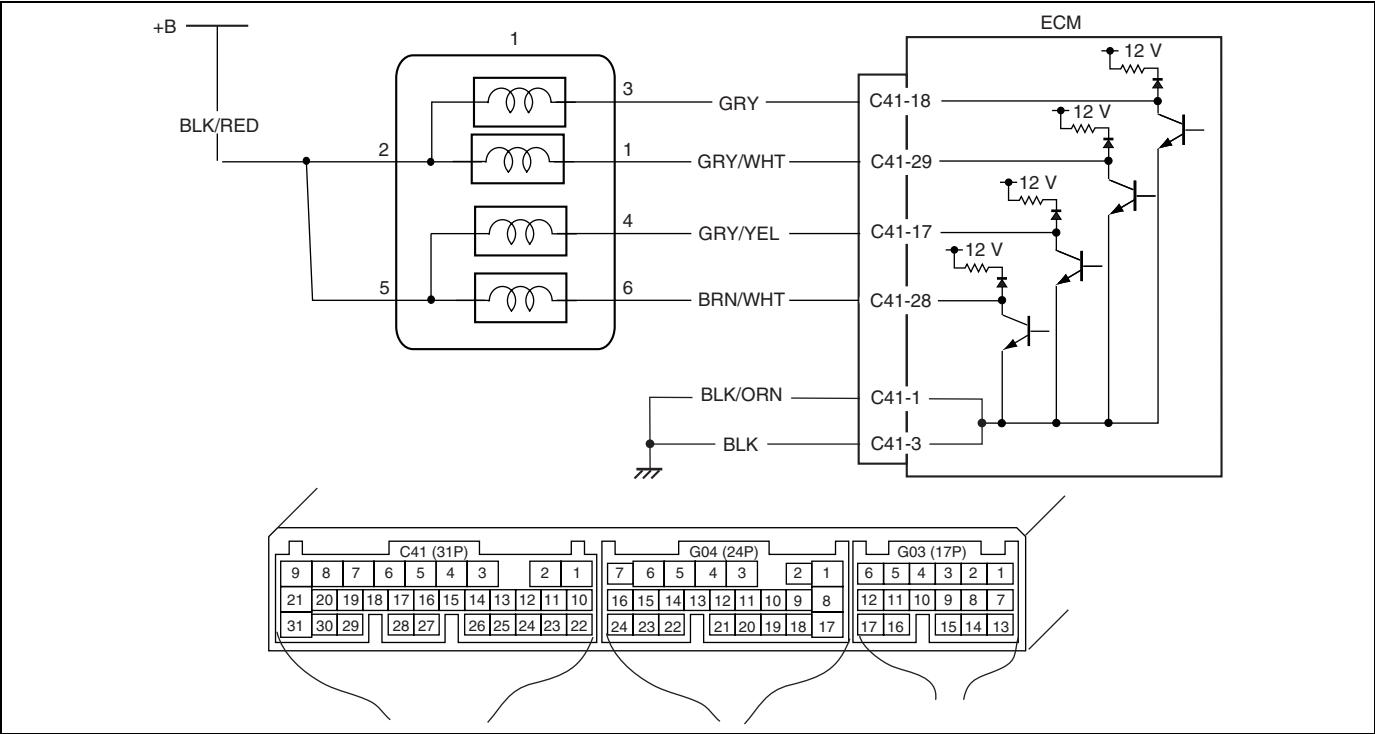


[C] Fig. 3 for Step 6 / [D] Fig. 4 for Step 7



DTC P0400 Exhaust Gas Recirculation Flow Malfunction

WIRING DIAGRAM / CIRCUIT DESCRIPTION



1. EGR valve

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"><li>While running at specified vehicle speed after engine warm-up</li><li>During deceleration (engine speed high with closed throttle position ON) in which fuel cut is involved, difference in intake manifold absolute pressure between when EGR valve is opened at specified value and when it is closed is larger or smaller than specified value.</li></ul> <p>*2 driving cycle detection logic, monitoring once/1 driving</p>	<ul style="list-style-type: none"><li>EGR valve or its circuit</li><li>EGR passage</li><li>ECM</li></ul>

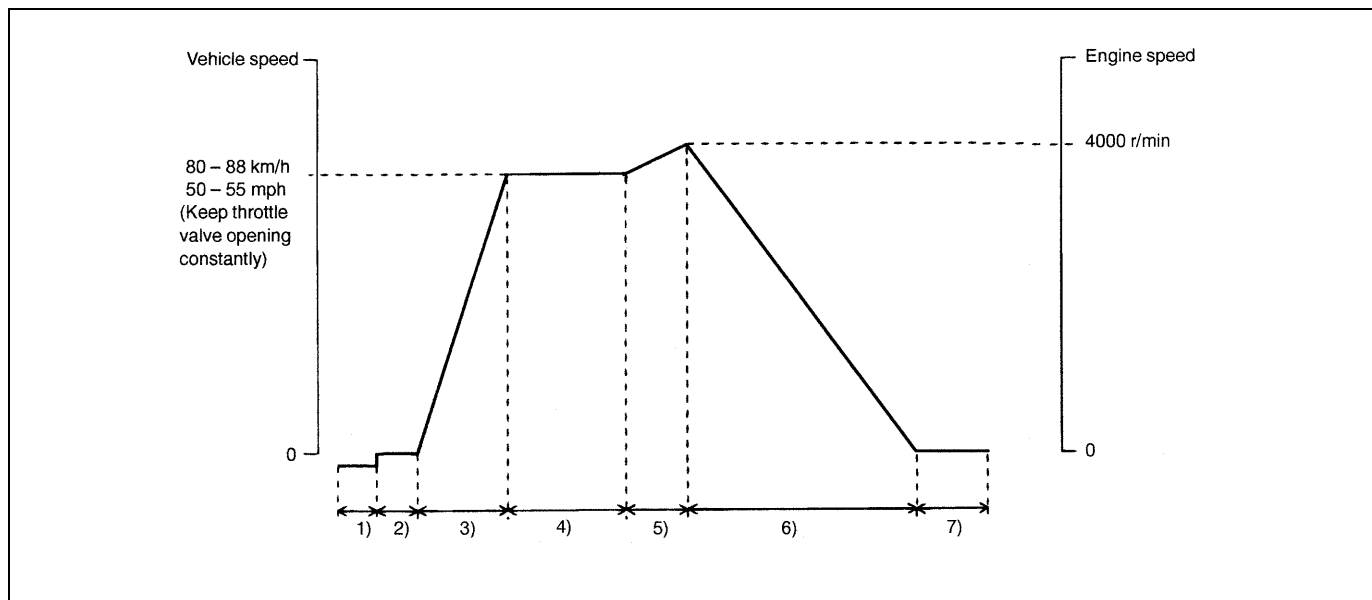
DTC CONFIRMATION PROCEDURE

**WARNING:**

- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and a tester, on a level road.

- 1) Turn ignition switch OFF.  
Clear DTC with ignition switch ON, check vehicle and environmental condition for :
  - Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
  - Ambient temp. : -10°C, 14°F or higher
  - Intake air temp. : 70°C, 122°F or lower
- 2) Start engine and warm it up to normal operating temperature (70 – 110°C, 158 – 230°F) and run it at idle for 5 min.
- 3) Increase vehicle speed to 80 – 88 km/h, 50 – 55 mph in 5th gear or in “D” range.
- 4) Hold throttle valve at that opening position for 2 min. or longer.
- 5) Increase engine speed to 4000 r/min. in 3rd gear or in “2” range.

- 6) Release accelerator pedal and with engine brake applied, keep vehicle coasting (fuel cut condition) till engine speed reaches 1500 r/min.
- 7) Stop vehicle (don't turn ignition switch OFF) and confirm test results according to following "Test Result Confirmation Flow Table".



### TEST RESULT CONFIRMATION FLOW TABLE

Step	Action	Yes	No
1	Check DTC in "DTC" mode and pending DTC in "ON BOARD TEST". Is DTC or pending DTC displayed?	Proceed to applicable DTC flow table.	Go to Step 2.
2	Set scan tool to "READINESS TESTS" mode and check if testing has been completed. Is test completed?	No DTC is detected. (Confirmation test is completed)	Repeat DTC confirmation procedure.

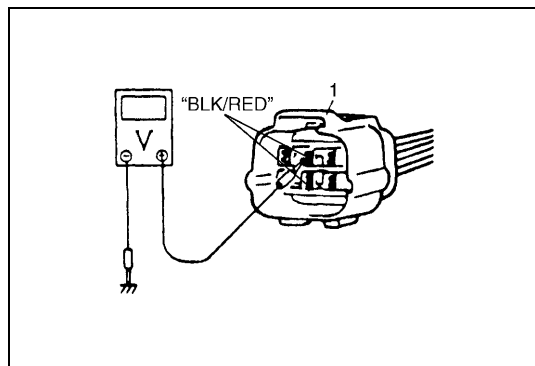
### INSPECTION

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Do you have SUZUKI scan tool?	Go to Step 4.	Go to Step 5.
3	EGR Valve Operation Check : 1) With ignition switch OFF, install SUZUKI scan tool. 2) Check EGR system referring to Section 6E1. Is it in good condition?	Go to Step 4.	Go to Step 5.
4	MAP Sensor Check : 1) Check MAP sensor for performance referring to Section 6E1. Is check result satisfactory?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Repair or replace.



Step	Action	Yes	No
5	EGR Valve Power Supply Circuit Check : 1) With ignition switch OFF, disconnect EGR valve coupler. 2) With ignition switch ON, check voltage between terminal 2 and terminal 5 of EGR valve connector and ground. See Fig.1. Is each voltage 10 – 14 V?	Go to Step 7.	Faulty "BLK/RED" wire.
6	EGR Valve Stepper Motor Coil Circuit Check : 1) With ignition switch OFF, connect EGR valve coupler and disconnect ECM couplers. 2) Check resistance between G04-5 and C41-18, 29, 17, 28. Is each resistance 20 – 24 $\Omega$ at 20°C, 68°F?	Go to Step 8.	Faulty "GRY", "GRY/WHT", "GRY/YEL", "BRN/WHT" wire or EGR valve.
7	MAP sensor Check : 1) Check MAP sensor for performance referring to Section 6E1. Is check result satisfactory?	EGR passage clogged or EGR valve malfunction. If all above are OK, intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Repair or replace.

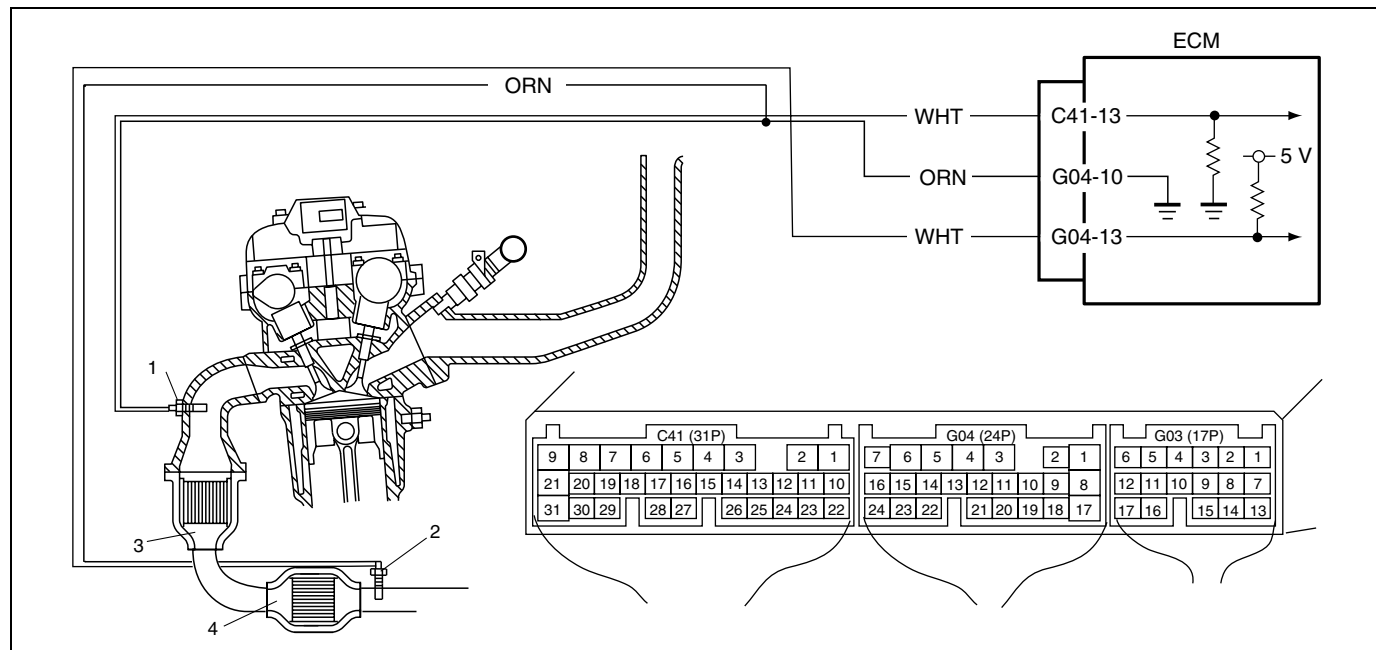
Fig. 1 for Step 5



1. EGR valve connector

# DTC P0420 Catalyst System Efficiency below Threshold

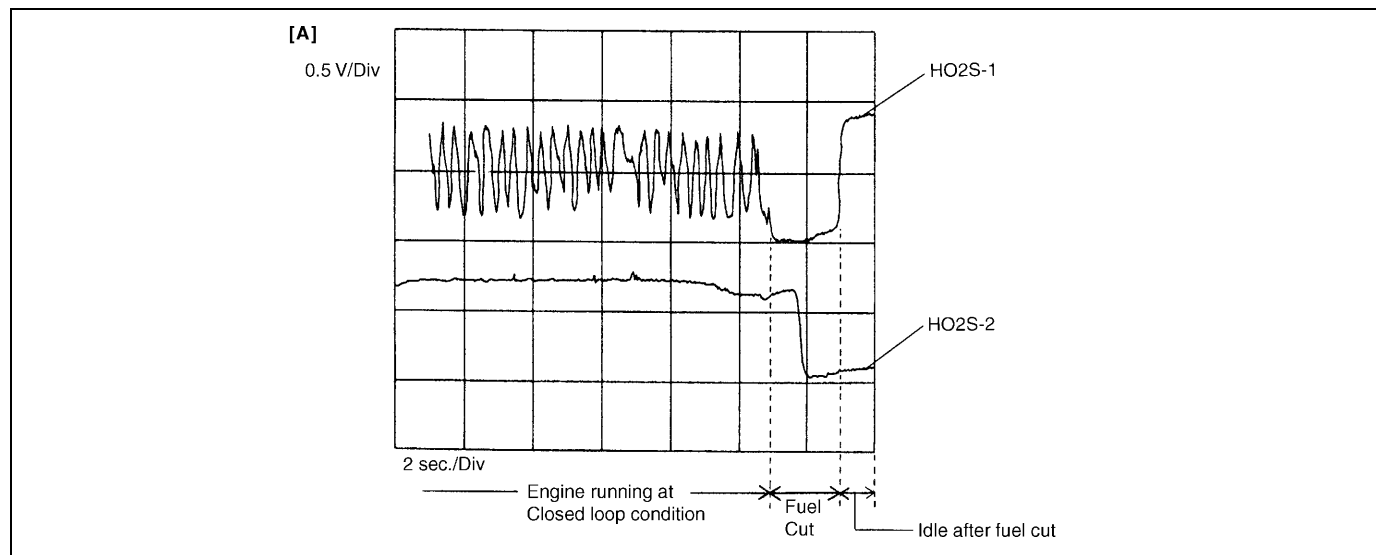
## WIRING DIAGRAM / CIRCUIT DESCRIPTION



ECM monitors oxygen concentration in the exhaust gas which has passed the three way catalytic converter by HO2S-2 (2).

When the catalyst is functioning properly, the variation cycle of HO2S-2 (2) output voltage (oxygen concentration) is slower than that of HO2S-1 (1) output voltage because of the amount of oxygen in the exhaust gas which has been stored in warm up three way catalytic converter (3) and three way catalytic converter (4).

## REFERENCE



[A] : Oscilloscope Waveforms

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>While vehicle running at constant speed under other than high load.</li> <li>Time from rich or lean switching command is output till HO2S-2 output voltage crosses 0.45 V is less than specified value.</li> </ul> <p>*2 driving cycle detection logic, monitoring once/1 driving</p>	<ul style="list-style-type: none"> <li>Exhaust gas leak</li> <li>Three way catalytic converter malfunction</li> <li>Fuel system malfunction</li> <li>HO2S-2 malfunction</li> <li>HO2S-1 malfunction</li> </ul>

## 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 tester, on a level road.

#### 1) Turn ignition switch OFF.

Clear DTC with ignition switch ON, check vehicle and environmental condition for :

- Altitude (barometric pressure) : 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
- Ambient temp. :  $-10^{\circ}\text{C}$ ,  $14^{\circ}\text{F}$  or higher
- Intake air temp. :  $70^{\circ}\text{C}$ ,  $158^{\circ}\text{F}$  or lower
- Engine coolant temp. :  $70 - 110^{\circ}\text{C}$ ,  $158 - 230^{\circ}\text{F}$

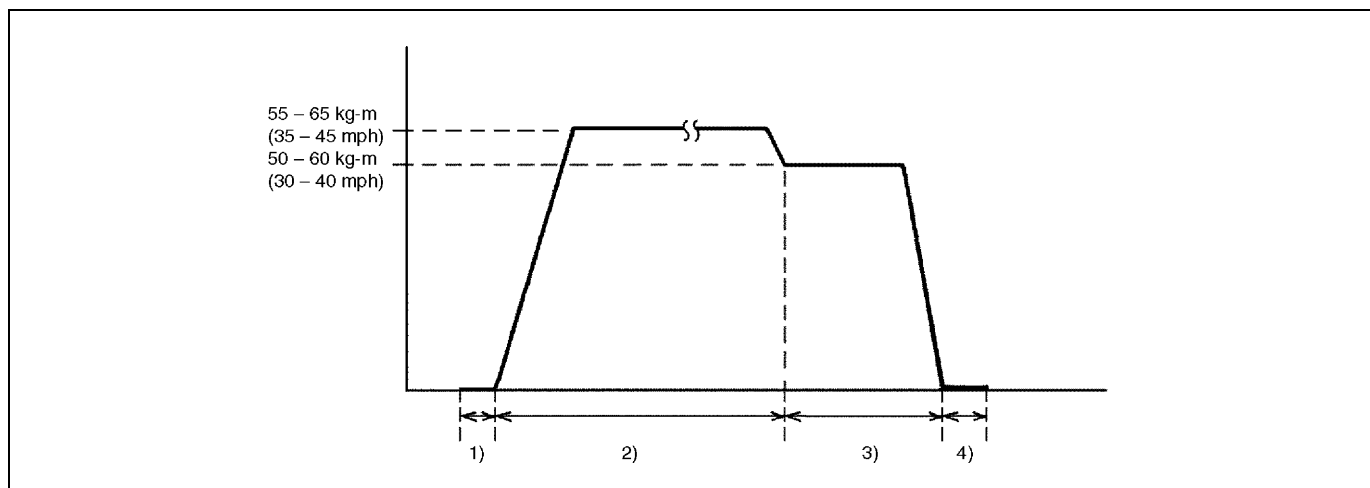
#### 2) Start engine and drive vehicle at 55 – 65 km/h, 35 – 45 mph for 8 min. or longer.

While this driving, if “Catalyst Monitoring TEST COMPLETED” is displayed in “READINESS TESTS” mode and DTC is not displayed in “DTC” mode, confirmation test is completed.

If “TEST NOT COMPLETE” is still being displayed, continue test driving.

#### 3) Decrease vehicle speed at 50 – 60 km/h, 30 – 40 mph, and hold throttle valve at that opening position for 2 min. and confirm that short term fuel trim vary within $-20\% - +20\%$ range.

#### 4) Stop vehicle (do not turn ignition switch OFF) and confirm test results according to following “Test Result Confirmation Flow Table”.



## TEST RESULT CONFIRMATION FLOW TABLE

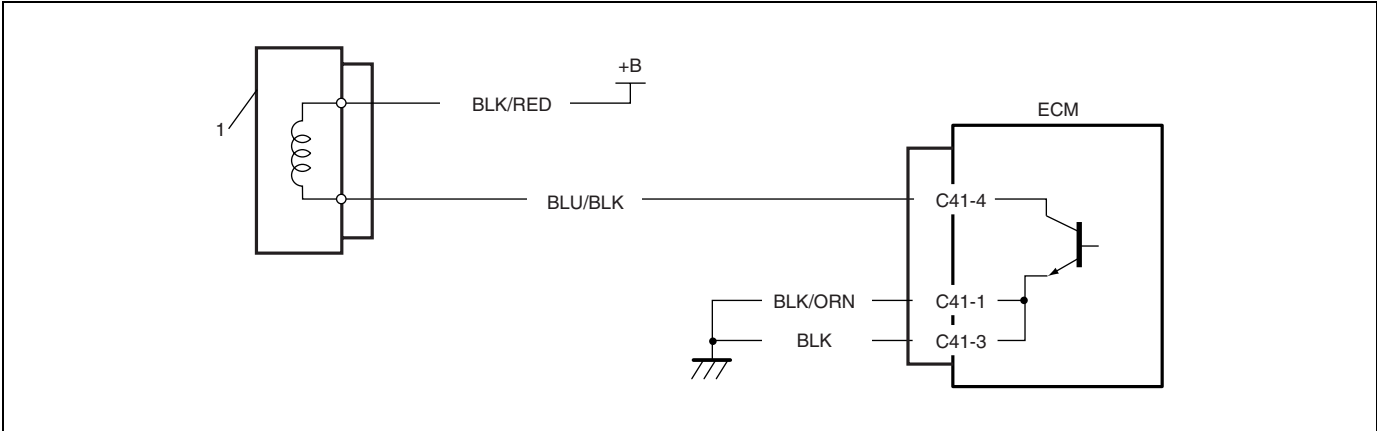
Step	Action	Yes	No
1	Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode. Is DTC or pending DTC displayed?	Proceed to applicable DTC Diag. Flow Table.	Go to Step 2.
2	Set scan tool to “READINESS TESTS” mode and check if testing has been completed. Is test completed?	No DTC is detected (confirmation test is completed).	Repeat DTC confirmation procedure.

**INSPECTION**

<b>Step</b>	<b>Action</b>	<b>Yes</b>	<b>No</b>
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Check Short Term Fuel Trim. Did short term fuel trim vary within – 20% – +20% range in step 3) of DTC confirmation test?	Go to Step 3.	Check fuel system. Go to DTC P0171/P0172 Diag. Flow Table.
3	Check HO2S-2 for Output Voltage. Perform steps 1) through 9) of DTC confirmation procedure for DTC P0136 (HO2S-2 malfunction) and check output voltage of HO2S-2 then. Is over 0.6 V and below 0.3 V indicated?	Replace three way catalytic converter.	Check "WHT" and "ORN" wires for open and short, and connections for poor connection. If wires and connections are OK, replace HO2S-2.

DTC P0443 Purge Control Valve Circuit Malfunction

WIRING DIAGRAM / CIRCUIT DESCRIPTION



1. EVAP canister purge valve

DTC DETECTING CONDITION	POSSIBLE CAUSE
Canister purge control valve circuit is opened or shorted.	<ul style="list-style-type: none"><li>• “BLU/BLK” circuit open or short</li><li>• “BLK/RED” circuit open or short</li><li>• Canister purge valve malfunction</li></ul>

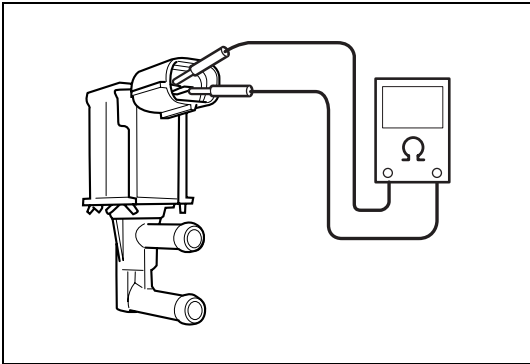
DTC CONFIRMATION PROCEDURE

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

INSPECTION

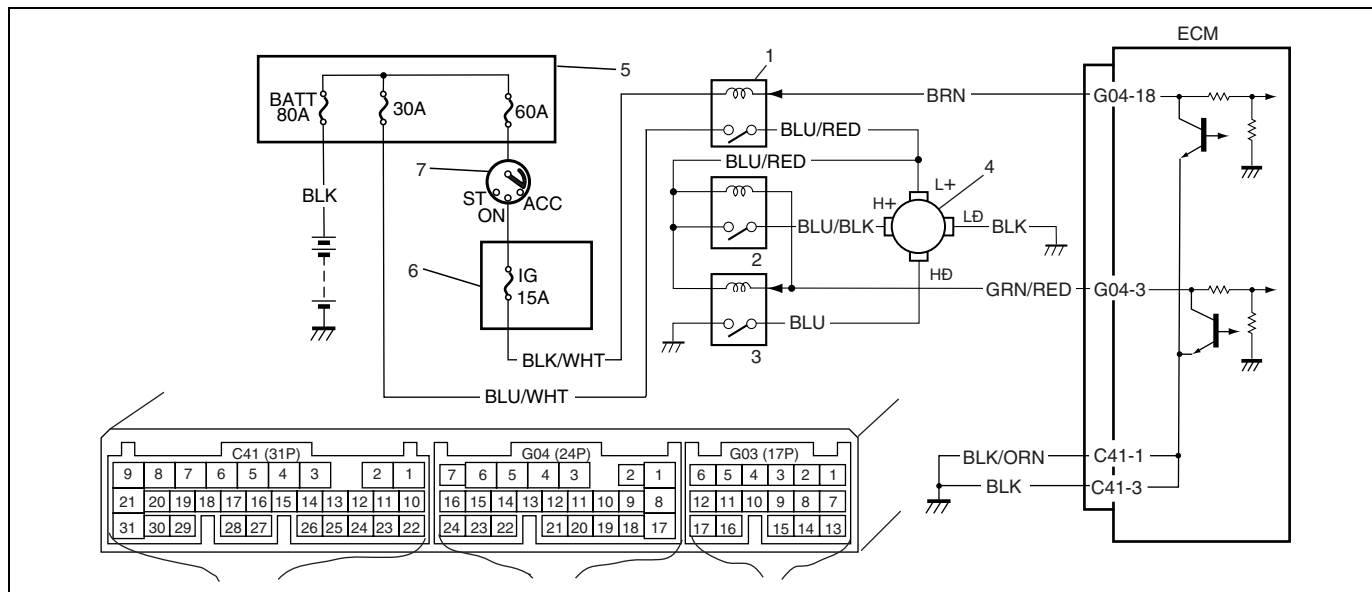
Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2	Go to “Engine Diag. Flow Table”.
2	Check EVAP Canister Purge Valve operation. 1) With ignition switch OFF, disconnect coupler from canister purge valve. 2) Check resistance of EVAP canister purge valve. Resistance between two terminals : 30 – 34 Ω at 20°C (68°F) Resistance between terminal and body : 1 MΩ or higher See Fig.1. Is it as specified?	“BLU/BLK” circuit open or short. “BLK/RED” circuit open or short.	Replace EVAP canister purge valve.

Fig. 1 for Step 2



# DTC P0480 Radiator Cooling Fan Control System Malfunction

## WIRING DIAGRAM / CIRCUIT DESCRIPTION



1. Radiator fan relay No.1	3. Radiator fan relay No.3	5. Main fuse	7. Ignition switch
2. Radiator fan relay No.2	4. Radiator fan motor	6. J/B	

DTC DETECTING CONDITION	POSSIBLE CAUSE
Low voltage at terminal C21-18 when engine coolant temp. is below 97.5°C, 207.5°F. *2 driving cycle detection logic, continuous monitoring.	<ul style="list-style-type: none"> <li>• “BLK/WHT” or “BRN” circuit open or short</li> <li>• Radiator cooling fan relay malfunction</li> <li>• ECM malfunction</li> </ul>

## DTC CONFIRMATION PROCEDURE

- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Warm up engine until radiator cooling fan starts to operate.
- 4) Check pending DTC in “ON BOARD TEST” or “PENDING DTC” mode and DTC in “DTC” mode.

## INSPECTION

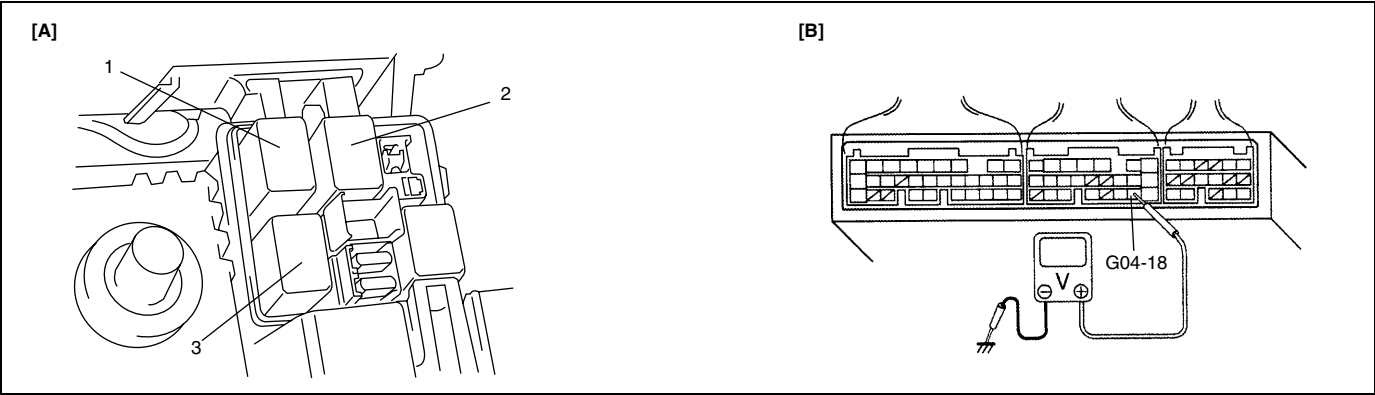
Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.
2	Check wire circuit. 1) Disconnect radiator fan control relay No.1 from relay box with ignition switch turned OFF. See Fig. 1. 2) Turn ON ignition switch, measure voltage between each engine ground to “BLK/WHT” and “BLU/WHT” wire terminal. Is voltage 10 – 14 V?	Go to Step 3.	“BLK/WHT” and/or “BLU/WHT” wire open circuit.

Step	Action	Yes	No
3	Check wire circuit. 1) Connect radiator fan control relay No.1 to relay box with ignition switch turned OFF. 2) Turn ON ignition switch, measure voltage between vehicle body ground and "G04-18" terminal wire. See Fig. 2. Is voltage 10 – 14 V?	Go to Step 7.	Go to Step 4.
4	Check wire circuit. 1) Disconnect connector from ECM with ignition switch turned OFF. 2) Disconnect radiator fan control relay No.1 from relay box. 3) Measure resistance between "G04-18" terminal wire and vehicle body ground. Is resistance infinity?	Go to Step 5.	"BRN" wire shorted to ground circuit.
5	Check wire circuit. 1) Turn ON ignition switch. 2) Check voltage between "G04-18" terminal wire and vehicle body ground. Is voltage 0 V?	Go to Step 6.	"BRN" wire shorted to power supply circuit.
6	Check radiator fan control relay No.1. 1) Check radiator fan control relay No.1, referring to "Radiator Fan Control Relay" in Section 6B. Is result in good condition?	"BRN" wire open circuit.	Replace relay.
7	Check radiator fan control No.1. 1) Connect connectors to ECM with ignition switch turned OFF. 2) Run engine until ECT is over 97°C, 207°F. 3) Measure voltage between vehicle body ground and "G04-18" terminal wire. Is voltage lower 1.5 V?	Go to Step 8.	Faulty ECM.
8	Check radiator fan control. 1) Disconnect radiator fan control relay No.2, and No.3 from relay box with ignition switch turned OFF. 2) Run engine until ECT is over 97°C, 207°F. 3) Measure voltage between vehicle body ground and each "BLU/RED" wire terminal. Is voltage lower 10 – 14 V?	Go to Step 9	"BLU/RED" wire open circuit.

Step	Action	Yes	No
9	Check wire circuit. 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Connect radiator fan control relay No.2 to relay box. 3) Turn ON ignition switch, measure voltage between vehicle body ground and "G04-3" terminal wire. Is voltage 10 – 14 V? 4) If OK, disconnect radiator fan control relay No.2 and then connect radiator fan control relay No.3 to relay box. 5) Turn ON ignition switch, measure voltage between vehicle body ground and "G04-3" terminal wire. Is voltage 10 – 14 V?	Go to Step 13.	Go to Step 10.
10	Check wire circuit. 1) Disconnect radiator fan control relay No.2, and No.3 from relay box. 2) Measure resistance between "G04-3" terminal wire and vehicle body ground. Is resistance infinity?	Go to Step 11.	"GRN/RED" wire shorted to ground circuit.
11	Check wire circuit. 1) Turn ON ignition switch. 2) Check voltage between "G04-3" terminal wire and vehicle body ground. Is voltage 0 V?	Go to Step 12.	"GRN/RED" wire shorted to power supply circuit.
12	Check radiator fan control relay No.2 and No.3. 1) Check radiator fan control relay No.1, referring to "RADIATOR FAN CONTROL RELAY" in Section 6B. Is result in good condition?	"GRN/RED" wire open circuit.	Replace relay.
13	Check radiator fan control No.2 and No.3. 1) Connect connectors to ECM with ignition switch turned OFF. 2) Run engine until ECT is over 107°C, 225°F. 3) Measure voltage between vehicle body ground and "G04-3" terminal wire. Is voltage lower 1.5 V?	Radiator cooling fan control system is good condition. Repeat DTC confirmation procedure. If DTC P0480 detected, substitute a known-good ECM and recheck.	Faulty ECM.



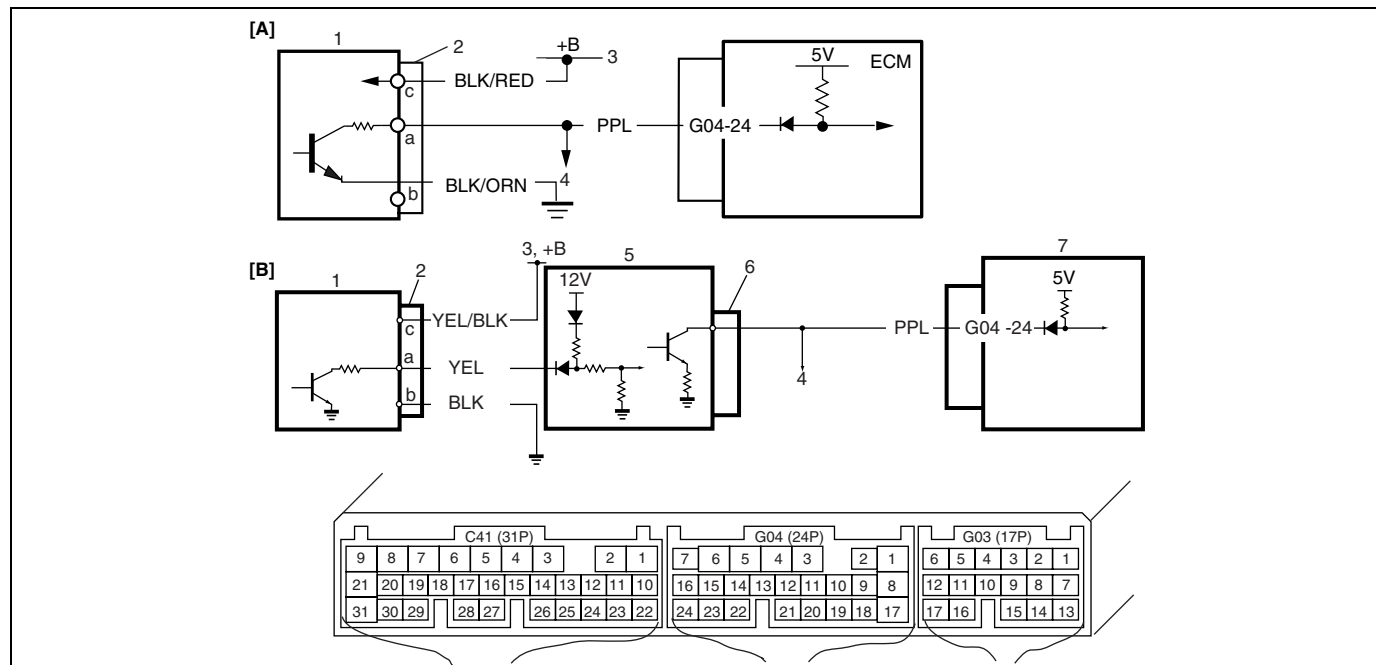
[A] Fig. 1 for Step 2 / [B] Fig. 2 for Step 3



- |                            |
|----------------------------|
| 1. Radiator fan relay No.1 |
| 2. Radiator fan relay No.2 |
| 3. Radiator fan relay No.3 |

# DTC P0500 (DTC No.16) Vehicle Speed Sensor (VSS) Malfunction

## WIRING DIAGRAM / CIRCUIT DESCRIPTION



1. VSS (vehicle speed sensor)	3. Power supply from ignition switch	5. TCM	[A] M/T vehicle
2. VSS connector	4. To speedometer	6. TCM connector	[B] A/T vehicle

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>VSS signal not inputted while vehicle running in "D" range or during fuel cut at deceleration.</li> <li>*2 driving cycle detection logic, continuous monitoring</li> </ul>	<ul style="list-style-type: none"> <li>"BLK/ORN" circuit open</li> <li>"PPL" or "BLK/RED" circuit open or short</li> <li>VSS malfunction</li> <li>ECM malfunction</li> <li>Speedometer malfunction</li> <li>TCM malfunction</li> </ul>

## 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.

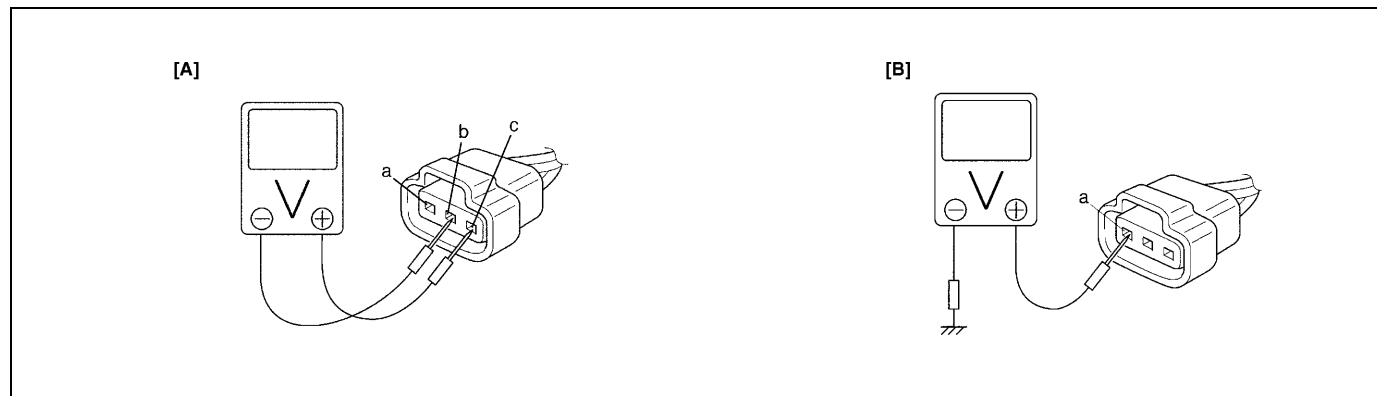
- Clear DTC and warm up engine to normal operating temperature.
- Increase vehicle speed to 80 km/h, 50 mph in 3rd gear or "2" range while observing vehicle speed displayed on scan tool.
- Release accelerator pedal and with engine brake applied, keep vehicle coasting (fuel cut condition) for 4 sec. or more.
- Check pending DTC and DTC.

**INSPECTION**

<b>Step</b>	<b>Action</b>	<b>Yes</b>	<b>No</b>
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Is vehicle equipped A/T?	Go to Step 9.	Go to Step 3.
3	Does speedometer indicate vehicle speed?	Go to Step 4.	Go to Step 6.
4	Check Vehicle Speed Signal. Is vehicle speed displayed on scan tool in step 2) and 3) of DTC confirmation procedure?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 5.
5	Check VSS Signal Circuit. 1) Turn ignition switch to OFF position. 2) Disconnect combination meter connectors. Refer to Section 8. 3) Turn ignition switch to ON position, without running engine. 4) Measure voltage from terminal "a" of VSS connector to ground. See Fig. 2. Is voltage within 4 – 5 V?	Faulty speedometer.	"PPL" wire open or short. Poor connection of ECM connector terminal. If OK, substitute a known-good ECM and recheck.
6	Check VSS Power Supply. 1) With ignition switch at OFF position, disconnect VSS connector. 2) Turn ignition switch to ON position, without running engine. 3) Measure voltage from terminal "b" to "c" of VSS connector. See Fig. 1. Is voltage within 10 – 14 V?	Go to Step 7.	"BLK/RED" or "BLK/ORN" wire open or short.
7	Check VSS Signal Circuit. 1) Measure voltage from terminal "a" of VSS connector to ground. See Fig. 2. Is voltage more than 4 V?	Go to Step 8.	"PPL" wire open or short. Poor connection of ECM connector terminal. If OK, substitute a known-good ECM and recheck.
8	Check Speedometer Drive Gear. 1) Remove VSS. 2) Visually inspect speedometer drive gear damage. Was any damage found?	Faulty speedometer drive gear.	Poor connection of VSS connector terminal. If OK, substitute a known-good VSS and recheck.
9	Does speedometer indicate vehicle speed?	Go to Step 10.	Go to Step 11.
10	Check Vehicle Speed Signal Circuit. 1) Turn ignition switch to OFF position. 2) Disconnect combination meter connectors. Refer to Section 8. 3) Turn ignition switch to ON position, without running engine. 4) Measure voltage from terminal "PPL" wire of TCM connector to ground. Is voltage within 4 – 5 V?	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A of the Service Manual mentioned in the FOREWORD of this manual.	"PPL" wire open. Poor connection of ECM connector terminal. If OK, substitute a known-good ECM and recheck.

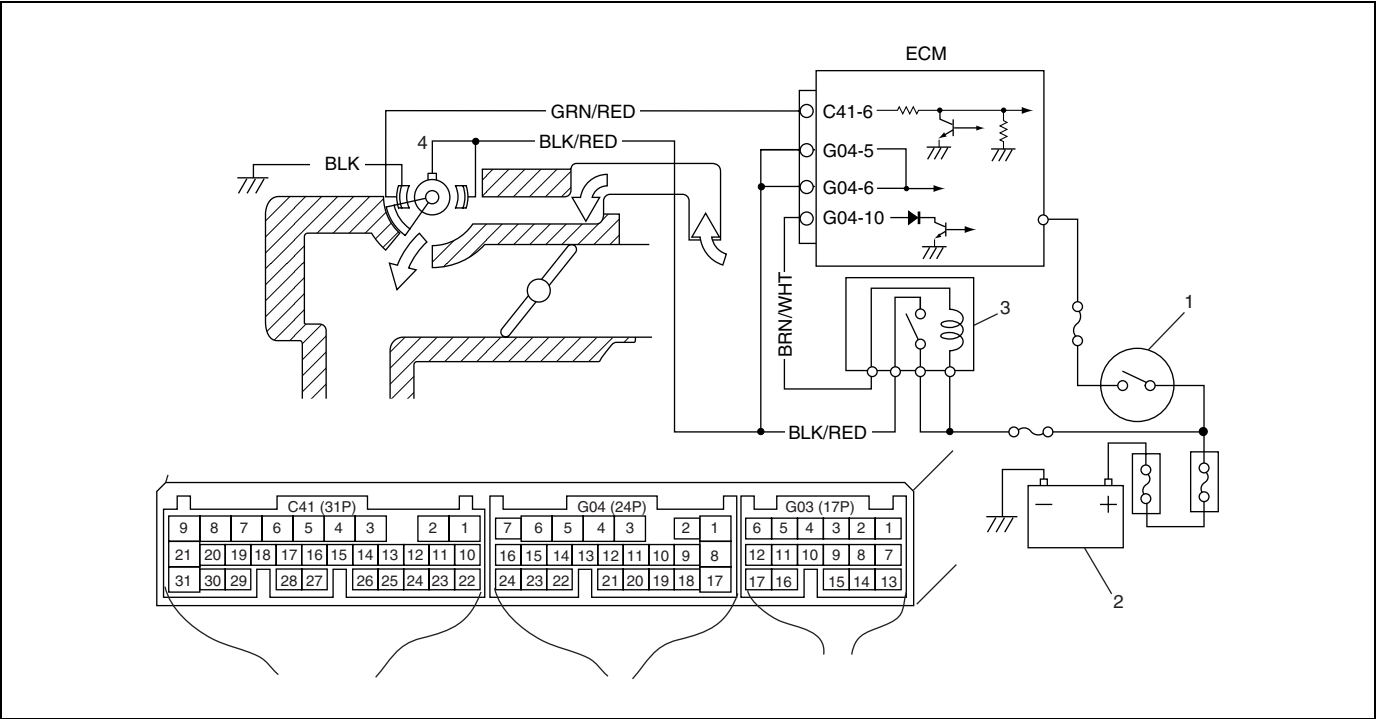
Step	Action	Yes	No
11	Check Vehicle Speed Signal Circuit. 1) Turn ignition switch OFF position. 2) Disconnect connector from TCM. 3) Turn ignition switch ON position without engine running. 4) Measure voltage from terminal “PPL” wire of TCM connector to ground. Is voltage more than 4 V?	Go to Step 12.	Go to Step 14.
12	Check Vehicle Speed Signal Circuit for Short. 1) Turn ignition switch OFF position. 2) Disconnect connector from ECM and combination meter. 3) Turn ignition switch ON position without engine running. 4) Measure voltage from terminal “PPL” wire of TCM connector to ground. Is voltage 0 V?	Go to Step 13.	“PPL” wire shorted to power supply.
13	Check VSS circuit. Check VSS circuit referring to “DTC P0720 Output Speed Sensor (VSS) Circuit Malfunction” in Section 7B1. Is it result satisfactory?	Go to Step 14.	Repair or replace for VSS circuit.
14	Check Vehicle Speed Signal Circuit for Short. 1) Turn ignition switch OFF position. 2) Disconnect connector from combination meter. 3) Turn ignition switch ON position without engine running. 4) Measure voltage from terminal “PPL” wire of TCM connector to ground. Is voltage 4 – 5 V?	Faulty speed meter.	“PPL” wire open or shorted to ground. Substitute a know-good ECM and recheck.

[A] Fig. 1 for Step 6 / [B] Fig. 2 for Step 5 and Step 7



# DTC P0505 (DTC No.26) Idle Control System Malfunction

## CIRCUIT DESCRIPTION



1. Ignition switch	3. Main relay
2. Battery	4. IAC valve

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"><li>No closed signal to IAC valve is detected after engine start.</li></ul> <p>*2 driving cycle detection logic, continuous monitoring.</p>	<ul style="list-style-type: none"><li>“BLK/RED”, “GRN/RED” or “BLK” circuit open or short</li><li>IAC valve malfunction</li><li>ECM malfunction</li></ul>

## DTC CONFIRMATION PROCEDURE

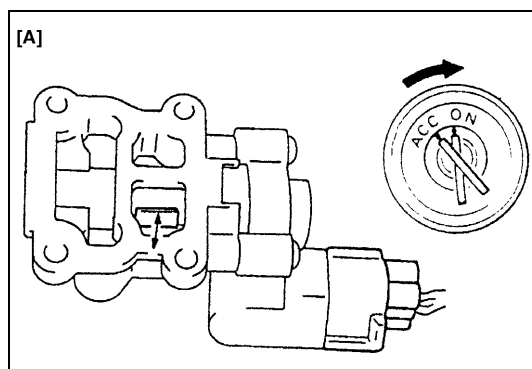
- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Start engine and run it at idle for 1 min.
- 4) Check DTC and pending DTC.

## INSPECTION

Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.
2	Is SUZUKI scan tool available?	Go to Step 3.	Go to Step 4.

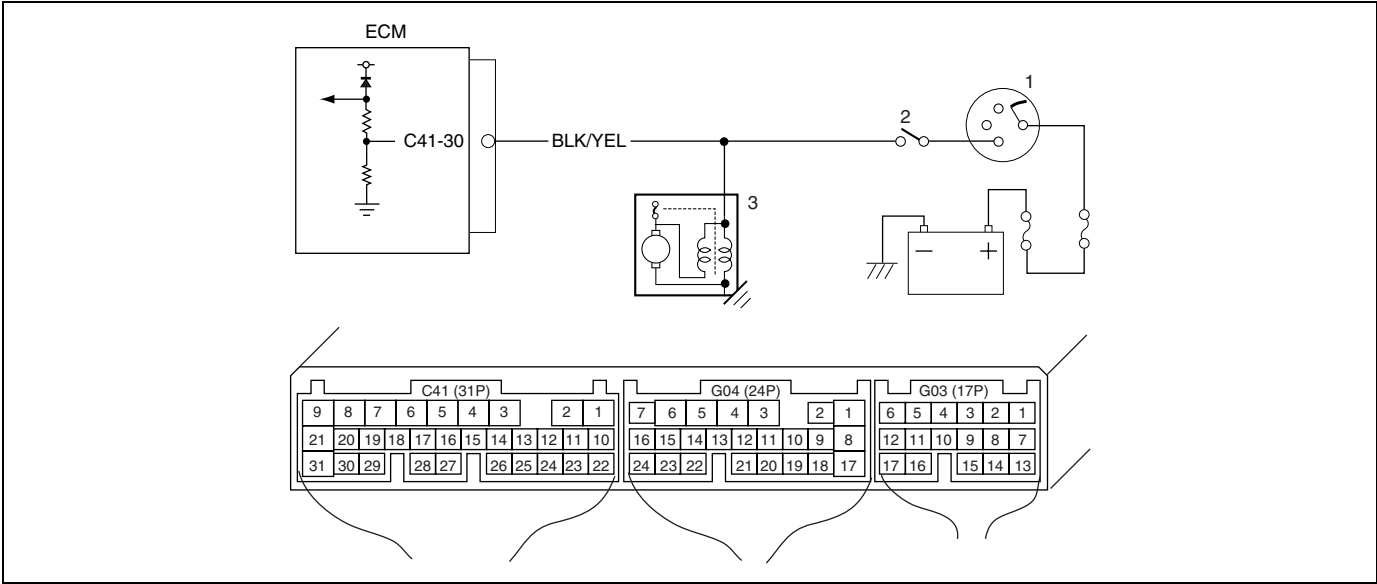
Step	Action	Yes	No
3	<p>Check Idle Air Control System.</p> <ol style="list-style-type: none"> <li>1) Connect SUZUKI scan tool to DLC with ignition switch OFF, set parking brake and block drive wheels.</li> <li>2) Warm up engine to normal operating temperature.</li> <li>3) Clear DTC and select "MISC TEST" mode on SUZUKI scan tool.</li> </ol> <p>Is it possible to control (increase and reduce) engine idle speed by using SUZUKI scan tool?</p>	<p>Intermittent trouble or faulty ECM.</p> <p>Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.</p>	Go to Step 5.
4	<p>Check Idle Air Control System.</p> <ol style="list-style-type: none"> <li>1) Remove IAC valve from throttle body referring to "IAC Valve Removal" in Section 6E1.</li> <li>2) Check IAC valve for operation referring to "IAC Valve Inspection" in Section 6E1. See Fig. 1.</li> </ol> <p>Is check result satisfactory?</p>	<p>Intermittent trouble or faulty ECM.</p> <p>Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.</p>	Go to Step 5.
5	<p>Check Wire Harness for open and short.</p> <ol style="list-style-type: none"> <li>1) Turn ignition switch OFF.</li> <li>2) Disconnect IAC valve connector.</li> <li>3) Check for proper connection to IAC valve at each terminals.</li> <li>4) If OK, disconnect ECM connector.</li> <li>5) Check for proper connection to ECM at C41-6 terminal.</li> <li>6) If OK, check "BLK/RED", "GRN/RED" and "BLK" circuit for open and short.</li> </ol> <p>Are they in good condition?</p>	<p>Replace IAC valve and recheck.</p>	Repair or replace.

Fig. 1 for Step 4



DTC P1500 Engine Starter Signal Circuit Malfunction

CIRCUIT DESCRIPTION



1. Ignition switch	2. Transmission range switch (A/T)	3. Starter motor
--------------------	------------------------------------	------------------

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"><li>Low voltage at terminal C41-30 when cranking engine or</li><li>High voltage at terminal C41-30 after starting engine.</li></ul> <p>*2 driving cycle detection logic, continuous monitoring.</p>	<ul style="list-style-type: none"><li>“BLK/YEL” circuit open</li><li>ECM malfunction</li></ul>

DTC CONFIRMATION PROCEDURE

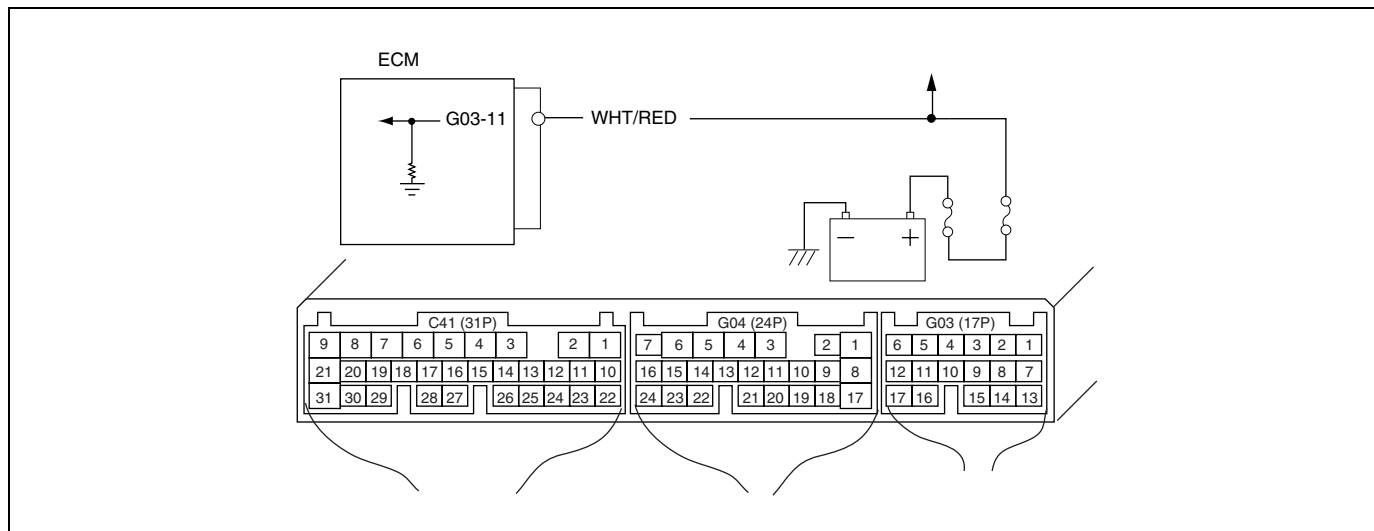
- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON, crank engine and run it at idle for 3 min.
- 3) Check pending DTC in “ON BOARD TEST” or “PENDING DTC” mode and DTC in “DTC” mode.

INSPECTION

Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.
2	<p>Check Terminal Voltage.</p> <p>1) Check for voltage at terminal C41-30 of ECM connector connected, under following condition.</p> <p><b>While engine cranking : 6 – 10 V</b></p> <p><b>After starting engine : 0 V</b></p> <p>Is voltage as specified?</p>	<p>Poor C41-30 connection or intermittent trouble.</p> <p>Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A.</p> <p>If wire and connections are OK, substitute a known-good ECM and recheck.</p>	“BLK/YEL” circuit open.

## DTC P1510 ECM Back-Up Power Supply Malfunction

### WIRING DIAGRAM / CIRCUIT DESCRIPTION



Battery voltage is supplied so that diagnostic trouble code memory, values for engine control learned by ECM, etc. are kept in ECM even when the ignition switch is turned OFF.

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"> <li>Low voltage at terminal G03-11 after starting engine.</li> </ul>	<ul style="list-style-type: none"> <li>"WHT/RED" circuit open</li> <li>ECM malfunction</li> </ul>

### DTC CONFIRMATION PROCEDURE

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

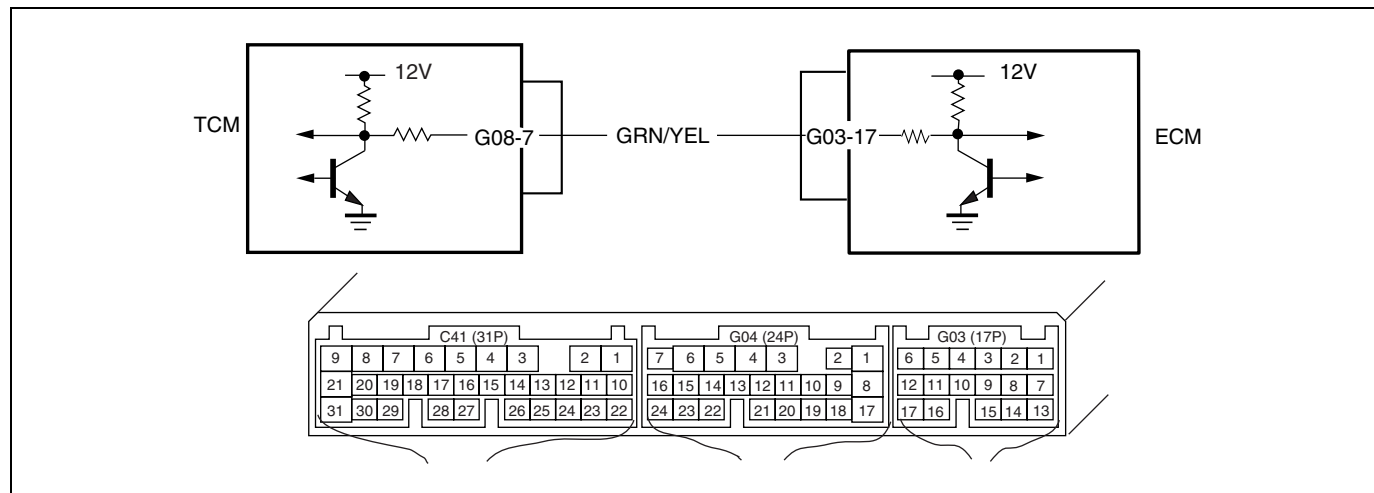
### INSPECTION

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table" in this section.
2	Check Terminal Voltage. 1) Check for voltage at terminal G03-11 of ECM connector connected, under each condition, ignition switch OFF and engine running. Is it 10 – 14 V at each condition?	Poor G03-11 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 and recheck.	"WHT/RED" circuit open.



## DTC P1600 Serial Communication Problem Between ECM and TCM

### WIRING DIAGRAM



### CIRCUIT DESCRIPTION

TCM constantly sends information while ignition switch is ON as to whether judgement was made or not with respect to all detectable DTCs as well as whether or not abnormality exists after judgement.

DTC DETECTING CONDITION	POSSIBLE CAUSE
No signal inputted from TCM to ECM or check sum error while engine running	<ul style="list-style-type: none"> <li>• “GRN/YEL” circuit open or short</li> <li>• TCM power or ground circuit open</li> <li>• TCM malfunction</li> <li>• ECM malfunction</li> </ul>

### DTC CONFIRMATION PROCEDURE

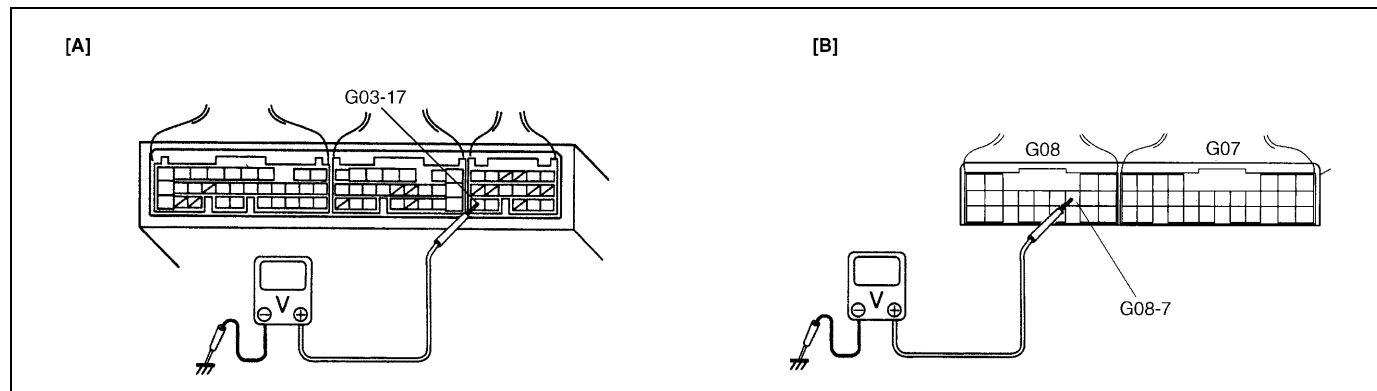
- 1) Turn ignition switch OFF.
- 2) Clear DTC with ignition switch ON.
- 3) Start engine and run it at idle for 1 min.
- 4) Select “DTC” mode on scan tool and check DTC.

### INSPECTION

Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.
2	Check DTC for TCM. 1) Check DTC for TCM. Is there any DTC?	Go to applicable DTC flow table.	Go to Step 3.
3	Signal voltage check. 1) Disconnect connector from ECM with ignition switch turned OFF. 2) Check proper connection at G03-17 terminal in ECM connector. 3) If OK, then connect connector to ECM. 4) Turn ON ignition switch. 5) Measure voltage between G03-17 and vehicle body. See Fig. 1. Is voltage 8 – 12 V?	Go to Step 7.	Go to Step 4.

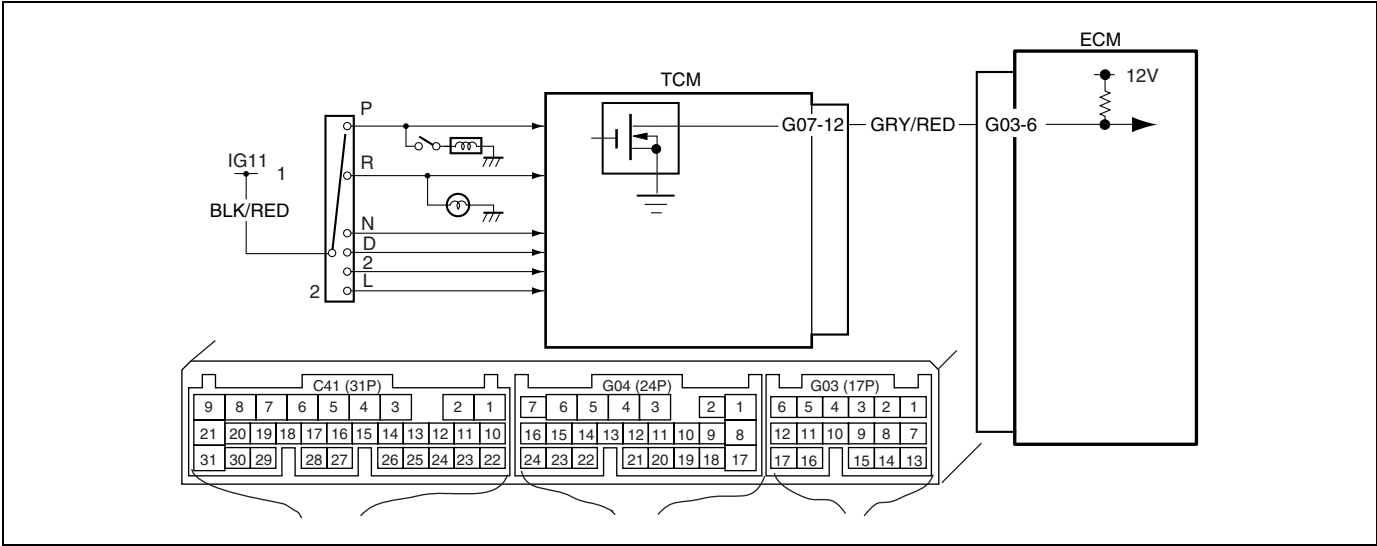
Step	Action	Yes	No
4	Signal circuit check. 1) Disconnect connectors from TCM with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Measure voltage between G03-17 and vehicle body. Is voltage 10 – 14 V?	Faulty TCM.	Go to Step 5.
5	Signal circuit check. 1) Turn OFF ignition switch. 2) Disconnect connectors from ECM. 3) Measure resistance between “G03-17” terminal and vehicle body ground. Is resistance infinity?	Go to Step 6.	“GRN/YEL” wire shorted to ground or other circuits.
6	Signal circuit check. 1) Connect connectors to ECM with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Measure voltage between G03-17 and vehicle body. Is voltage 10 – 14 V?	Go to Step 7.	Faulty ECM. Substitute a known-good ECM and recheck.
7	Signal circuit check. 1) Disconnect connectors from ECM and TCM with ignition switch turned OFF. 2) Measure resistance between “G03-17” terminal in ECM harness connector and “G08-7” terminal in TCM harness connector. Is resistance below 3 $\Omega$ ?	Go to Step 8.	“GRN/YEL” wire in open or high resistance circuit.
8	Signal circuit check. 1) Turn ON ignition switch. 2) Measure voltage between G03-17 and vehicle body. Is voltage 0 V?	Go to Step 9.	“GRN/YEL” wire shorted to ground or other circuits.
9	Signal circuit check. 1) Connect connectors to TCM with ignition switch turned OFF. 2) Turn ON ignition switch. 3) Measure voltage between G03-17 and vehicle body. See Fig. 2. Is voltage 10 – 14 V?	ECM and TCM voltage are OK. Check ECM and TCM ground. If they are OK, substitute a known-good ECM and recheck.	Faulty TCM. Substitute a known-good TCM and recheck.

[A] Fig. 1 for Step 3 / [B] Fig. 2 for Step 9



DTC P1717 A/T Drive Range (Park/Neutral Position) Signal Circuit Malfunction

WIRING DIAGRAM / CIRCUIT DESCRIPTION



- |                         |                              |
|-------------------------|------------------------------|
| 1. From ignition switch | 2. Transmission range switch |
|-------------------------|------------------------------|

DTC DETECTING CONDITION	POSSIBLE CAUSE
<ul style="list-style-type: none"><li>“D” range signal not inputted (Park/Neutral position signal inputted) to ECM while vehicle running</li><li>*2 driving cycle detection logic, continuous monitoring.</li></ul>	<ul style="list-style-type: none"><li>“GRY/RED” circuit open</li><li>Transmission range switch malfunction</li><li>“R”, “D”, “2” or “L” range signal circuit open</li><li>TCM power or ground circuit open</li><li>TCM or ECM malfunction</li></ul>

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.

- Turn ignition switch OFF.
- Clear DTC with ignition switch ON.
- Start engine and shift selector lever to “D” range.
- Increase vehicle speed to higher than 32 km/h, 20 mph and then stop vehicle.
- Repeat above step 4) 9 times.
- Shift selector lever to “2” range and repeat above step 4) and 5).
- Shift selector lever to “L” range and repeat above step 4) and 5).
- Check DTC in “DTC” mode and pending DTC in “ON BOARD TEST” or “PENDING DTC” mode.

INSPECTION

Step	Action	Yes	No
1	Was “Engine Diag. Flow Table” performed?	Go to Step 2.	Go to “Engine Diag. Flow Table”.
2	Is SUZUKI scan tool available?	Go to Step 3.	Go to Step 4.

Step	Action	Yes	No
3	Check PNP Signal ("D" range signal). 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check PNP signal ("P/N" or "D" range) on display when shifting selector lever to each range. Is "D" range on display (Is 0 – 1 V indicated) no matter which of "R", "D", "2" and "L" range positions selector lever may be at? See Table 1.	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and poor connection" in Section 0A.	Go to Step 5.
4	Check PNP Signal ("D" range signal). 1) Turn ignition switch ON. 2) Check voltage at terminal G03-6 of ECM connector connected. See Fig. 1. Is "D" range on display (Is 0 – 1 V indicated) no matter which of "R", "D", "2" and "L" range positions selector lever may be at? See Table 1.	Intermittent trouble or faulty ECM. Check for intermittent referring to "Intermittent and poor connection" in Section 0A.	Go to Step 5.
5	Is "P/N" range on display (Is 10 – 14 V indicated) when selector lever is at one of "R", "D", "2" and "L" range positions only?	Check transmission range sensor and circuits referring to section 7B1.	Go to Step 6.
6	Check PNP Signal Circuit. 1) Turn ignition switch OFF. 2) Disconnect TCM connectors. 3) Check for proper connection to TCM at terminal. 4) If OK, then check voltage at terminal in TCM connector disconnected, with ignition switch ON. Is it 10 – 14 V? See Fig. 2.	"BLK/RED" circuit open, poor transmission range switch connector connection, select cable maladjusted, transmission range sensor maladjusted or transmission range sensor malfunction. If all above are OK, substitute a known-good TCM and recheck.	"GRY/RED" circuit open or poor G03-6 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

[A] Fig. 1 for Step 4 / [B] Fig. 2 for Step 6

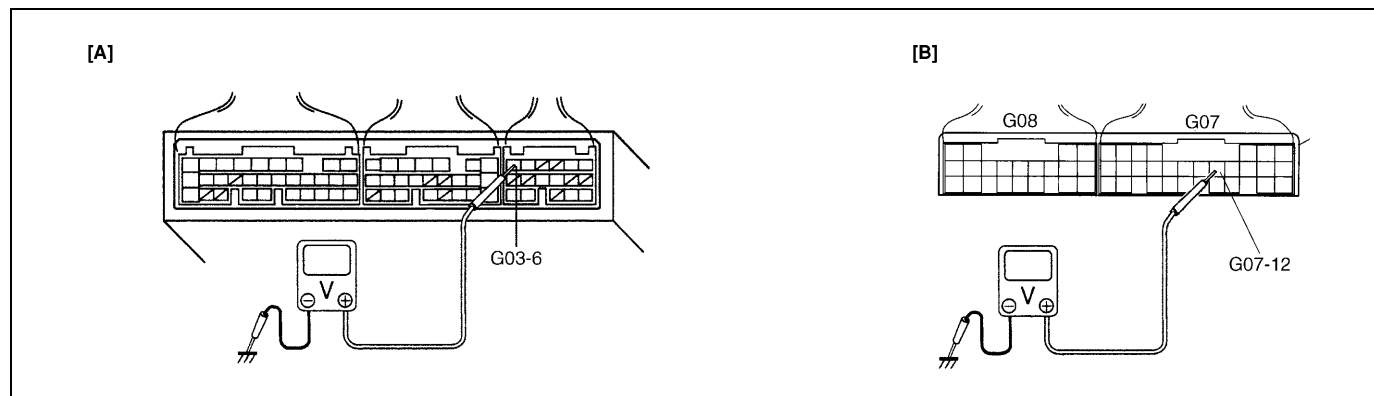
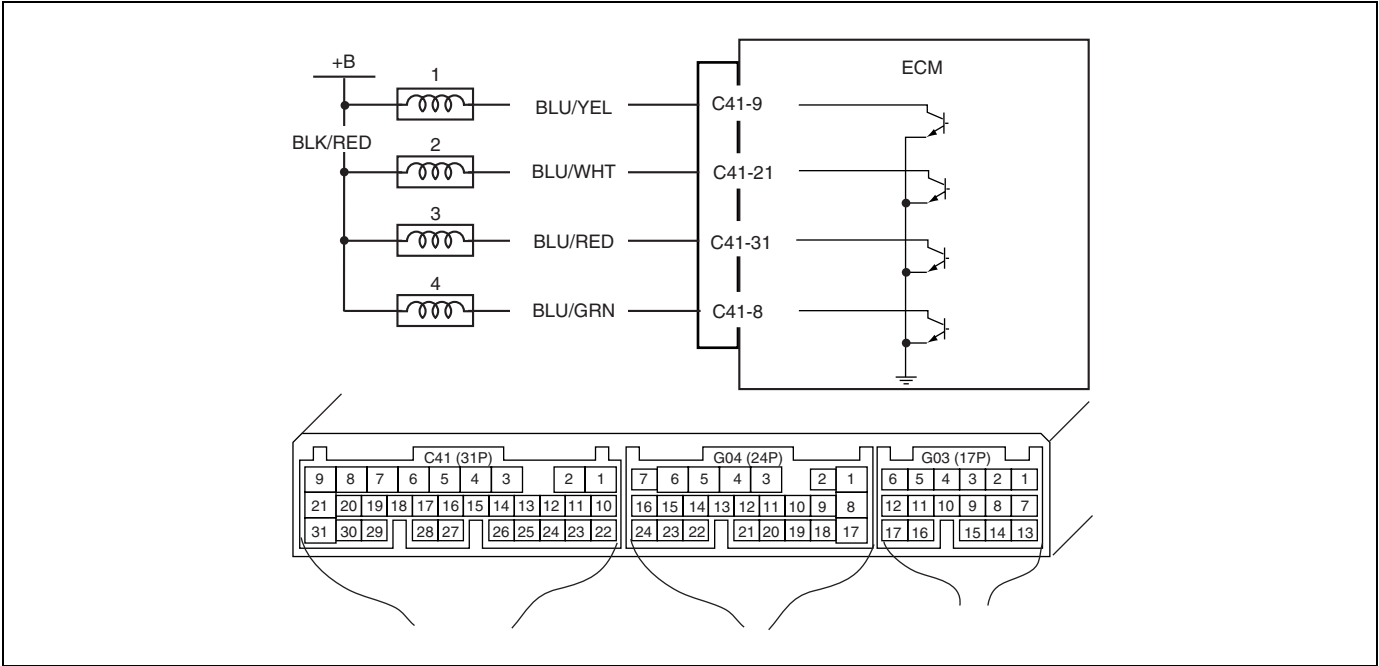


Table 1 for Step 3 and 4

		Scan tool or voltmeter	
		SUZUKI SCAN TOOL	VOLTAGE AT G03-6
Selector lever position	"P" and "N" range	P/N range	10 – 14V
	"R", "D", "2" and "L" range	D range	0 – 1V

Table B-1 Fuel Injector Circuit Check

WIRING DIAGRAM



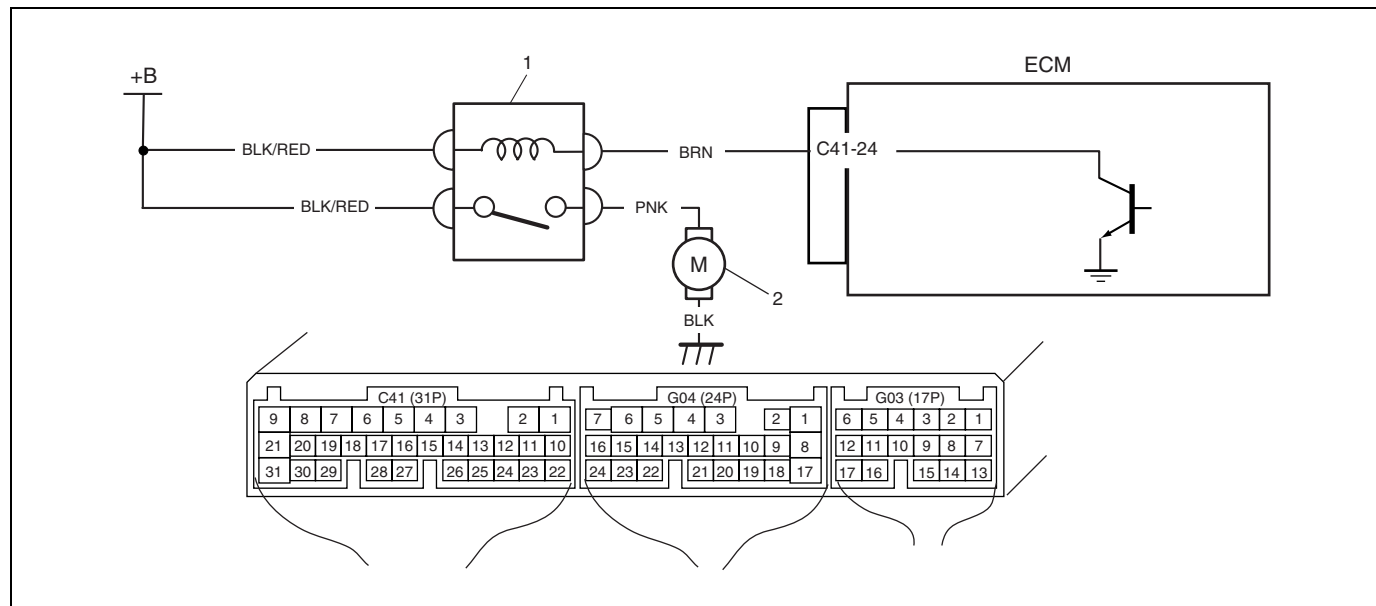
1. No.1 injector	3. No.3 injector
2. No.2 injector	4. No.4 injector

INSPECTION

Step	Action	Yes	No
1	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Check Injector for operating sound. Using sound scope, check each injector for operating sound at engine cranking. Do all 4 injectors make operating sound?	Fuel injector circuit is in good condition.	Go to Step 3.
3	Dose none of 4 injectors make operating sound at Step 2?	Go to Step 4.	Check coupler connec- tion and wire harness of injector not making oper- ating sound and injector itself (Refer to Section 6E1).
4	Check power circuit of injectors for open and short. Is it normal?	Check all 4 injectors for resistance respectively. If resistance is OK, substi- tute a known-good ECM and recheck.	Power circuit open or short.

## Table B-2 Fuel Pump and Its Circuit Check

### WIRING DIAGRAM



1. Fuel pump relay

2. Fuel pump

### INSPECTION

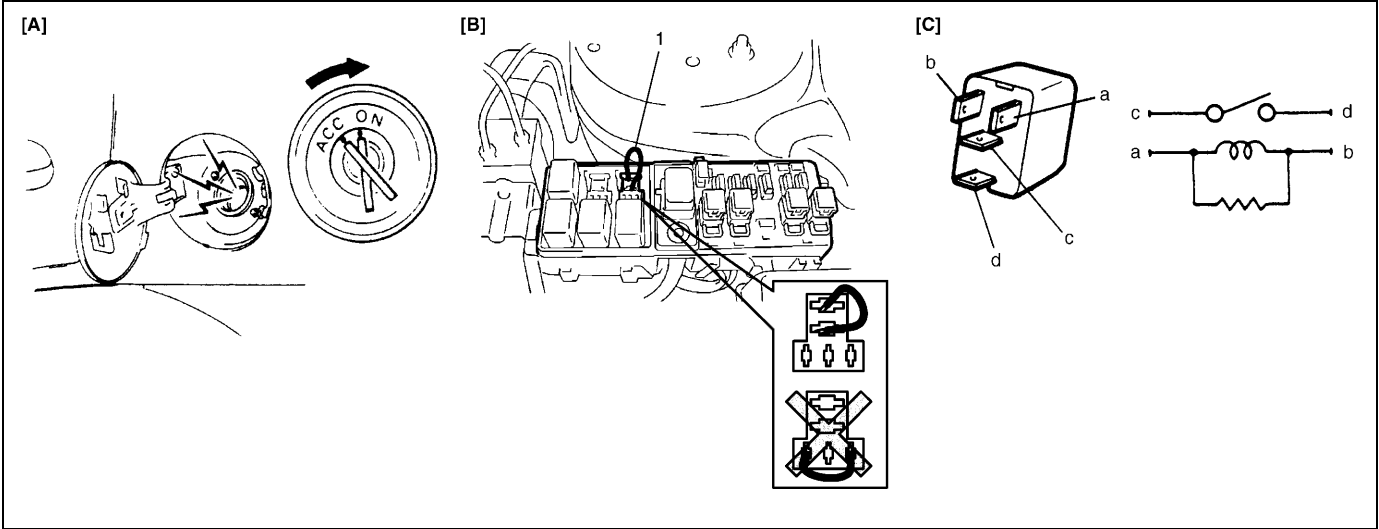
#### CAUTION:

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	Was "Engine Diag. Flow Table" performed?	Go to Step 2.	Go to "Engine Diag. Flow Table".
2	Check Fuel Pump Control System for operation. See Fig. 1. Is fuel pump heard to operate for 2 sec. after ignition switch ON?	Fuel pump circuit is in good condition.	Go to Step 3.
3	Check Fuel Pump for operation. 1) Remove fuel pump relay from relay box with ignition switch OFF. 2) Check for proper connection to relay at each terminals. 3) If OK, using service wire, connect terminals "BLK/RED" wire and "PNK" wire of relay connector. See Fig. 2. Is fuel pump heard to operate at ignition switch ON?	Go to Step 4.	"PNK", "BLK" or "BLK/RED" circuit open or fuel pump malfunction.

Step	Action	Yes	No
4	<p>Check Fuel Pump Relay for operation.</p> <p>1) Check resistance between each two terminals of fuel pump relay. See Fig.3.</p> <p><b>Between terminals “c” and “d” : Infinity</b></p> <p><b>Between terminals “a” and “b” : 56 – 146 Ω</b></p> <p>2) Check that there is continuity between terminals “c” and “d” when battery is connected to terminals “a” and “b”. See Fig. 3.</p> <p>Is fuel pump relay in good condition?</p>	<p>“BRN” circuit open or poor C41-24 connection.</p> <p>If wire and connection are OK, substitute a known-good ECM and recheck.</p>	<p>Replace fuel pump relay.</p>

[A] Fig. 1 for Step 2 / [B] Fig. 2 for Step 3 / [C] Fig. 3 for Step 4



1. Service wire





Step	Action	Yes	No
4	Is engine idle speed kept specified speed even with steering wheel turned to the right or left as far as it stops (vehicle with power steering system)?	System is in good condition.	Check power steering pressure switch signal circuit referring to TABLE B-8. If check result is OK, check IAC system for operation referring to Step 3 or Step 4 of DTC P0505 Diag. Flow Table.
5	Was idle speed higher than specification in Step 1?	Go to Step 6.	Go to Step 9.
6	Check A/C (input) signal circuit referring to Step 1 of Table B-5 A/C Signal Circuits Check, if equipped. (A/C signal can be also checked by using SUZUKI scan tool.) Is it in good condition?	Go to Step 7.	Repair or replace A/C signal circuit or A/C system.
7	Check IAC system referring to Step 3 or Step 4 of DTC P0505 Diag. Flow Table. Is check result satisfactory?	Go to Step 8.	Go to Step 5 of DTC P0505 Diag. Flow Table.
8	Was IAC duty less than about 3% (or more than about 97% for OFF duty meter) in Step 1 of this table?	Check abnormal air inhaling from air intake system, 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.
9	Is SUZUKI scan tool available?	Go to Step 10.	Go to Step 11.
10	Check PNP signal ("D" range signal). 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check PNP signal ("P/N" and "D" range) on display when shifting selector lever to each range. See Table 1. Is check result satisfactory?	Go to Step 12.	Repair or replace.
11	Check PNP signal ("D" range signal). 1) Turn ignition switch ON. 2) Check voltage at terminal G03-6 of ECM connector connected. See Fig. 1 and Table 1. Is check result satisfactory?	Go to Step 12.	Repair or replace.
12	Check IAC system referring to Step 3 or Step 4 of DTC P0505 Diag. Flow Table. Is check result satisfactory?	Go to Step 11.	Go to Step 5 of DTC P0505 Diag. Flow Table.
13	Was IAC duty more than about 30% (or less than 70% for OFF duty meter) in Step 1 of this table?	Check parts or system which can cause engine low idle. Accessory engine load Clog of air passage Etc.	Substitute a known-good ECM and recheck.

Fig. 1 for Step 11

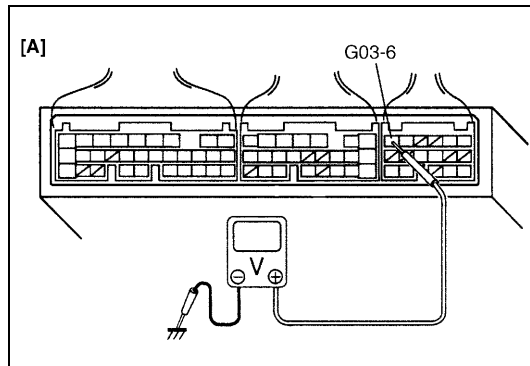
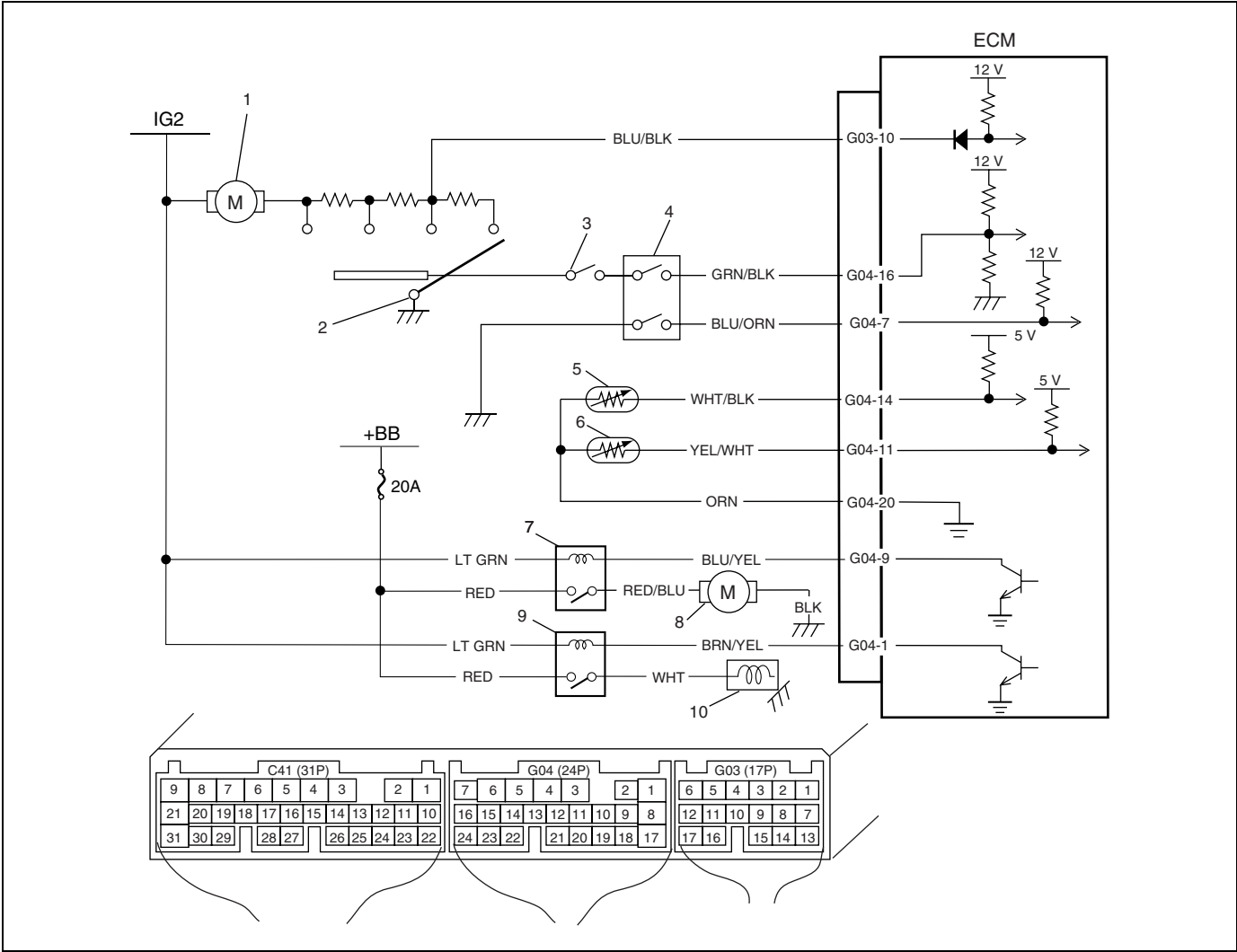


Table 1 for Step 10 and 11

		Scan tool or voltmeter	
		SUZUKI SCAN TOOL DISPLAY	VOLTAGE AT G03-6
Selector lever position	"P" and "N" range	P/N range	10 – 14V
	"R", "D", "2" and "L" range	D range	0 – 1V

Table B-5 A/C Signal Circuits Check (Vehicle with A/C)



1. Blower fan motor	4. A/C pressure switch	7. A/C condenser fan relay	10. A/C compressor
2. Blower fan switch	5. A/C evaporator outlet air temp. sensor	8. A/C condenser fan motor	
3. A/C switch	6. A/C evaporator inlet air temp. sensor	9. A/C compressor relay	

## INSPECTION

Step	Action	Yes	No
1	Check evaporator temp. sensor resistance. 1) Disconnect ECM connectors with ignition switch at OFF position. 2) Check resistance between terminals G04-14 and G04-20 and terminals G04-11 and G04-20. See Fig. 1. Is it within specification? <b>At 0°C 6.3 – 6.9 kΩ</b> <b>At 25°C 1.8 – 2.2 kΩ</b>	Go to Step 2.	Faulty A/C evaporator temp. sensor or its circuit.
2	Check A/C switch signal. 1) Check voltage at terminal G04-16 under each condition given below. <b>Ignition switch ON, A/C switch OFF</b> <b>: 10 – 14V</b> <b>Ignition switch ON, A/C switch ON and blower motor switch 1st speed position or more</b> <b>: 0 – 1V</b> Is check result satisfactory?	Go to Step 3.	“GRN/BLK” wire open or short Poor G04-16 terminal connection If wire and connection are OK, substitute a known-good ECM and recheck. Go to Step 3.
3	Check A/C Condenser Fan Control System. Is A/C cooling fan started when A/C switch and heater blower switch turned ON?	Go to Step 7.	Go to Step 4.
4	Check A/C Condenser Fan Control Relay and its Circuit. 1) Check voltage at terminal G04-9 under each condition given below. <b>Ignition switch ON A/C switch OFF</b> <b>: 10 – 14V</b> <b>Ignition switch ON A/C switch ON and blower motor switch 1st speed position or more</b> <b>: 0 – 1V</b> Is check result satisfactory?	Go to Step 5.	“BLU/YEL” wire open or short Poor G04-9 terminal connection If wire and connection are OK, substitute a known-good ECM and recheck. Go to Step 5.
5	Check A/C Condenser Fan Control Relay. 1) Turn ignition switch OFF and remove A/C condenser fan control relay. 2) Check for proper connection to relay at terminals “c” and “d”. 3) If OK, check that there is continuity between “c” and “d” when battery is connected to terminals “a” and “b”. See Fig.2. Is check result satisfactory?	Go to Step 6.	Replace A/C condenser fan control relay.

Step	Action	Yes	No
6	Check A/C Condenser Fan. 1) Turn ignition switch OFF. 2) Disconnect A/C condenser fan motor connector. 3) Check for proper connection to motor at "RED/BLU" and "BLK" terminals. 4) If OK, connect battery to motor and check for operation. See Fig. 3. Is it in good condition?	"RED/BLU" or "BLK" circuit open.	Replace A/C condenser fan motor.
7	Check A/C Compressor Control System. Is A/C compressor started when A/C switch and heater blower switch turned ON while engine running?	A/C control system is in good condition.	Go to Step 8.
8	1) Check voltage at G04-1 terminal under each condition given below. <b>While engine running, A/C switch OFF</b> <b>: 0 V</b> <b>While engine running, A/C switch ON</b> <b>: 10 – 14V</b> Is check result satisfactory?		"BRN/YEL" wire open or short Poor G04-1 terminal connection If wire and connection are OK, substitute a known-good ECM and recheck. Go to Step 9.
9	Check A/C Compressor Control Relay. 1) Turn ignition switch OFF and remove A/C compressor control relay. 2) Check for proper connection to relay at terminals "c" and "d". 3) If OK, check that there is continuity between "c" and "d" when battery is connected to terminals "a" and "b". See Fig. 2. Is check result satisfactory?	Check A/C compressor referring to Section 1B.	Replace A/C compressor control relay.

**NOTE:**

When A/C evaporator thermistor temp. is below 2.5°C (36.5°F), A/C remains OFF (G04-1 terminal voltage becomes 0 – 1 V). This condition is not abnormal.

[A] Fig. 1 for Step 1 / [B] Fig. 2 for Step 5 and 9

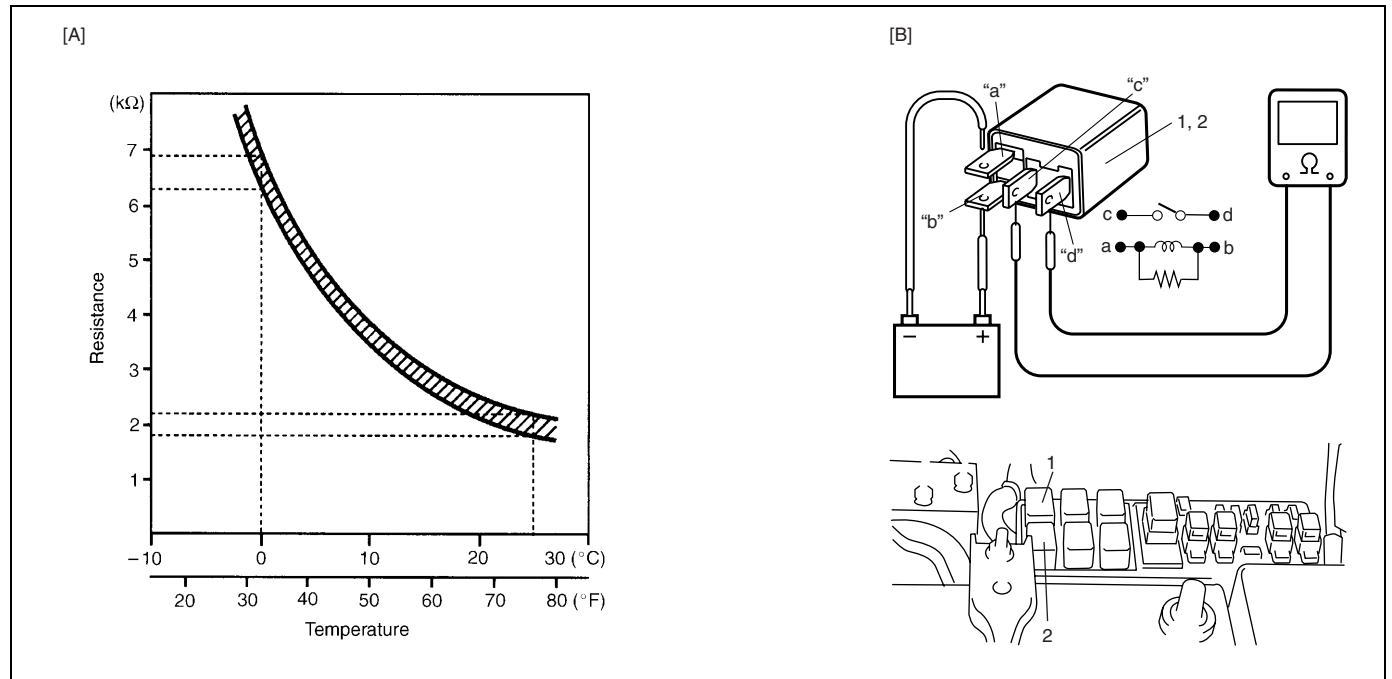


Fig. 3 for Step 6

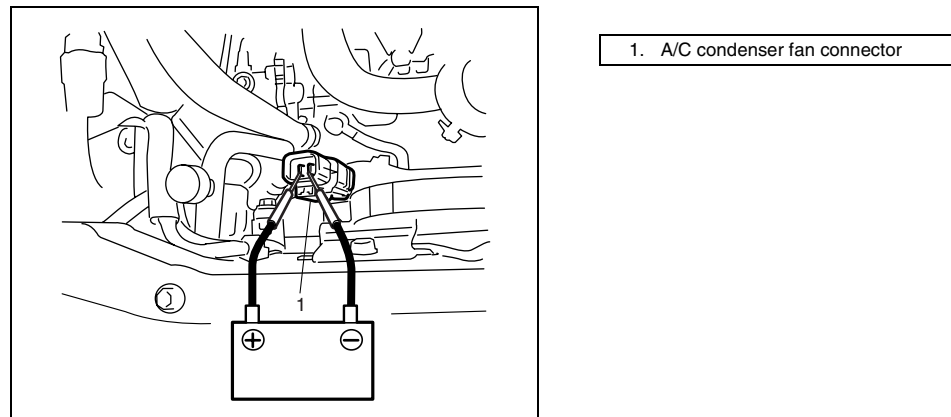
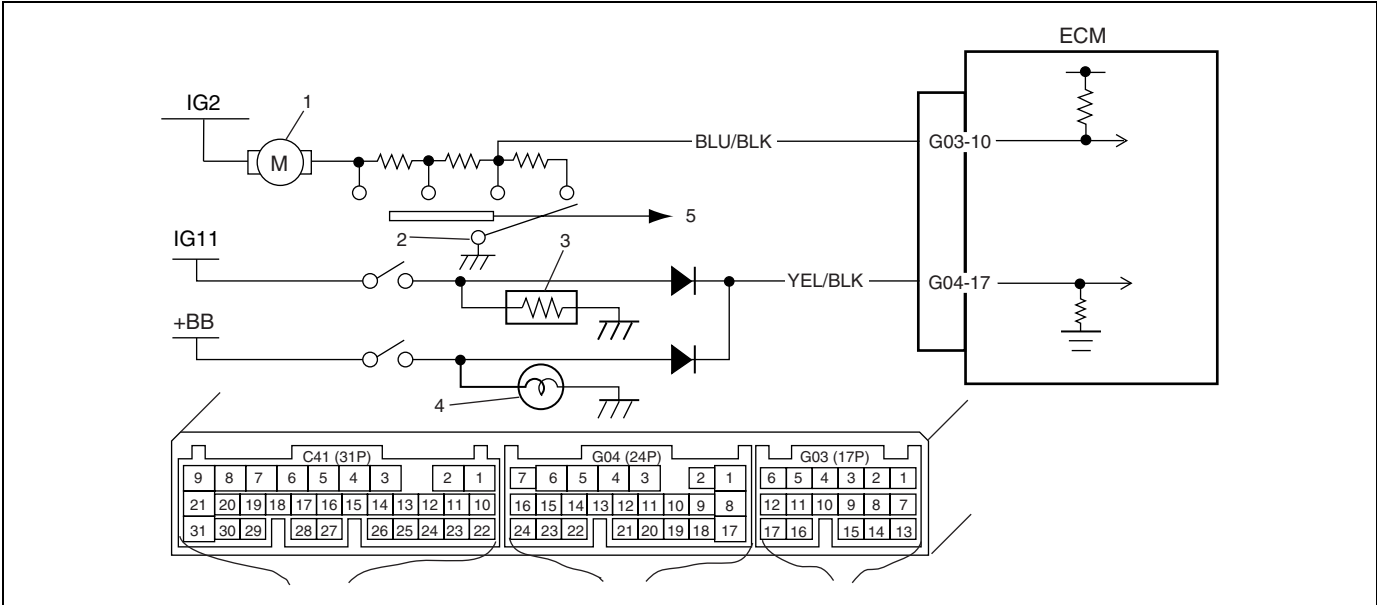


Table B-6 Electric Load Signal Circuit Check



1. Blower fan motor	3. Rear defogger	5. To A/C switch
2. Blower fan switch	4. Position lamp	

INSPECTION

Step	Action	Yes	No
1	Is SUZUKI scan tool available?	Go to Step 2.	Go to Step 3.
2	Check Electric Load Signal Circuit. 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Start engine and select "DATA LIST" mode on scan tool. 3) Check electric load signal under following each condition. See Table 1. Is check result satisfactory?	Electric load signal circuit is in good condition.	"YEL/BLK" and/or "BLU/BLK" circuit open or short, Electric load diodes malfunction or Each electric load circuit malfunction.
3	Check Electric Load Signal Circuit. 1) Turn ignition switch ON. 2) Check voltage at each terminals G04-17 and G03-10 of ECM connector connected, under above each condition. See Fig. 1 and Table 1. Is each voltage as specified?	Electric load signal circuit is in good condition.	"YEL/BLK" and/or "BLU/BLK" circuit open or short, Electric load diodes malfunction or Each electric load circuit malfunction.

Fig. 1 for Step 3

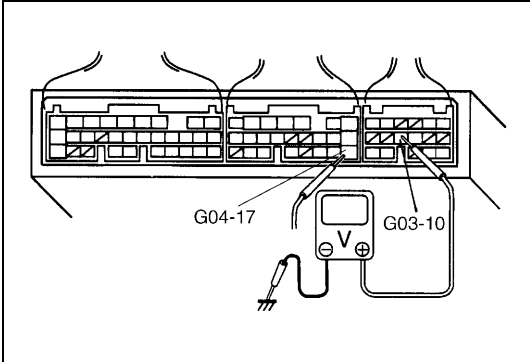
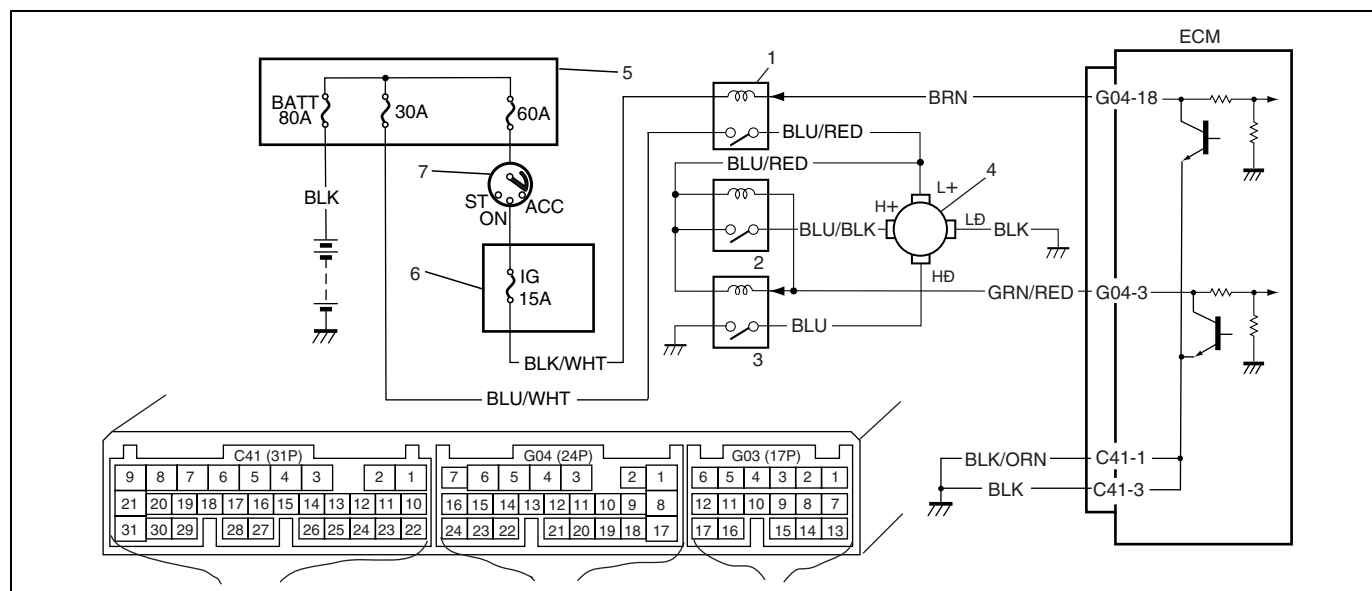


Table 1 for Step 2 and 3

		Scan tool or voltmeter		
		SUZUKI SCAN TOOL	VOLTAGE AT G04-17	VOLTAGE AT G03-10
Following items all turn ON. • Clearance light. • Rear defogger. • Blower motor to 2 <sup>nd</sup> speed position or more.	OFF	OFF	0V	10 – 14V
	ON	ON	10 – 14V	0V



**Table B-7 Radiator Fan Control System Check**

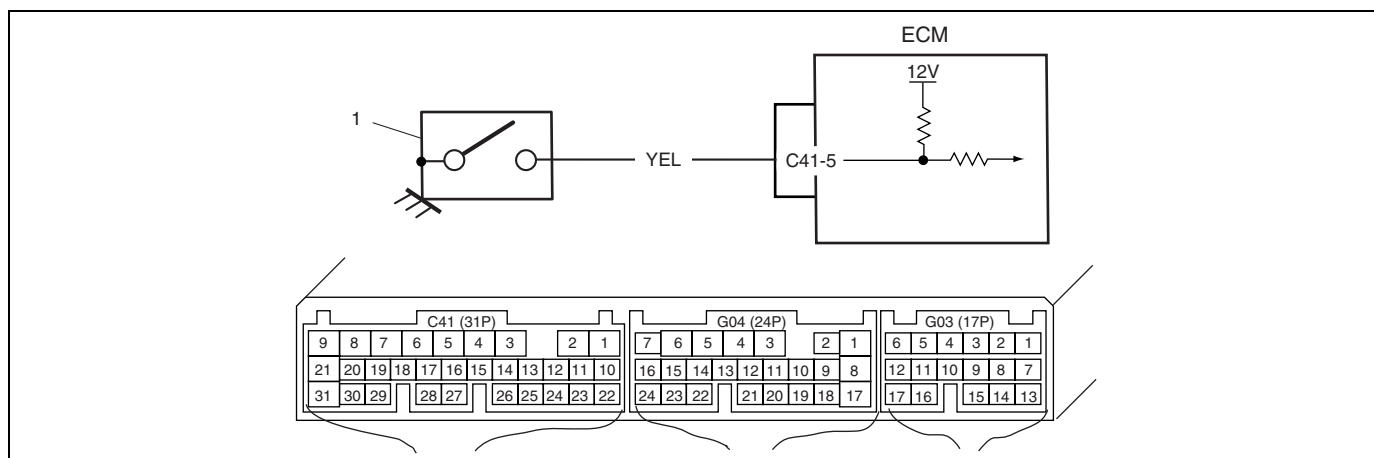
1. Radiator fan relay No.1	3. Radiator fan relay No.3	5. Main fuse box	7. Ignition switch
2. Radiator fan relay No.2	4. Radiator fan	6. Circuit fuse box	

**INSPECTION**

Step	Action	Yes	No
1	Is there DTC(s) ECT sensor circuit (DTC P0115 and/or radiator fan circuit (DTC P0480)?	Go to corresponding DTC Flow Table.	Go to Step 2.
2	Check low speed radiator fan control circuit. 1) Connect scan tool to DLC with ignition switch OFF. 2) Start engine and select "DATA LIST" mode on scan tool. 3) Warm up engine until coolant temp. is 97°C, 207°F or higher and A/C switch turn OFF. (If engine coolant temp. does not rise, check engine cooling system or ECT sensor.) Is radiator cooling fan started low speed when engine coolant temp. reached above temp.?	Go to Step 3.	Perform from step 2) to step 7) in DTC P0480 Diag Flow Table. If OK, go to Step 10.
3	Check high speed radiator fan control circuit. 1) Start engine and select "DATA LIST" mode on scan tool. 2) Warm up engine until coolant temp. is 102°C, 216°F or higher and A/C switch turn OFF. (If engine coolant temp. does not rise, check engine cooling system or ECT sensor.) Is radiator cooling fan started high speed when engine coolant temp. reaches above temp.?	Radiator cooling fan control system is in good condition.	Perform from step 8) to step 12) in DTC P0480 Diag Flow Table. If OK, go to Step 4.
4	Check radiator fan control No.2 and No.3. 1) Connect connectors to ECM with ignition switch turn OFF. 2) Run engine until ECT is over 102°C, 216°F. 3) Measure voltage between vehicle body ground and "G04-3" terminal wire. Is voltage lower 1.5 V?	Go to Step 5.	Faulty ECM.

Step	Action	Yes	No
5	Check radiator fan control No.2 wire circuit. 1) Disconnect connector from radiator fan with ignition switch turn OFF. 2) Measure resistance between "BLU/BLK" wire and vehicle body ground. Is resistance infinity?	Go to Step 6.	"BLU/BLK" wire shorted to ground circuit.
6	Check radiator fan No.2 wire circuit. 1) Turn ON ignition switch. 2) Measure voltage between "BLU/BLK" wire and vehicle body ground. Is voltage 0 V?	Go to Step 7.	"BLU/BLK" wire shorted to power supply circuit.
7	Check radiator fan control No.2. 1) Connect radiator fan control relay No.2 to relay box with ignition switch turn OFF. 2) Run engine until ECT is over 102°C, 216°F. 3) Measure voltage between vehicle body ground to "BLU/BLK" terminal wire in disconnected harness. Is voltage 10 – 14 V?	Go to Step 8.	"BLU/BLK" wire open circuit.
8	Check radiator fan No.3 wire circuit. 1) Measure resistance between vehicle body ground and "BLU" wire terminal in radiator fan No.3 connector in relay box. Is resistance below 1 Ω?	Go to Step 9.	"BLK" wire is open circuit or high resistance in circuit.
9	Check radiator fan control No.3. 1) Connect radiator fan control relay No.3 to relay box with ignition switch turn OFF. 2) Run engine until ECT is over 102°C, 216°F. 3) Measure resistance between vehicle body ground and "BLK" wire terminal in radiator fan harness connector. Is resistance below 2 Ω?	Go to Step 11.	"BLU" wire is open circuit or high resistance in circuit.
10	Check radiator fan control No.1. 1) Disconnect connector from radiator fan with ignition switch turn OFF. 2) Run engine until ECT is over 97°C, 207°F. 3) Measure voltage between vehicle body ground and "BLU/RED" wire terminal in radiator fan harness connector. Is voltage 10 – 14 V?	Go to Step 11.	"BLU/RED" wire open circuit.
11	Check radiator fan control. 1) Disconnect radiator fan control relay No.2, and No.3 from relay box with ignition switch turn OFF. 2) Disconnect connector from radiator fan. 3) Run engine until ECT is over 97°C, 207°F. 4) Measure voltage between vehicle body ground and "BLU/RED" wire terminal in radiator fan harness connector. Is voltage lower 10 – 14 V?	Go to Step 12.	"BLU/RED" wire open circuit.

Step	Action	Yes	No
12	Check radiator cooling fan. 1) Check radiator cooling fan referring to “Radiator Cooling Fan” in Section 6B. Is it good condition?	Substitute a known-good ECM and recheck.	Faulty radiator cooling fan.

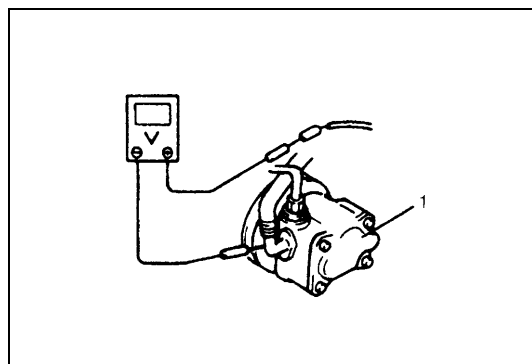
**Table B-8 Power Steering Pressure (PSP) Switch Signal Circuit Check**

1. Power steering pressure switch

**INSPECTION**

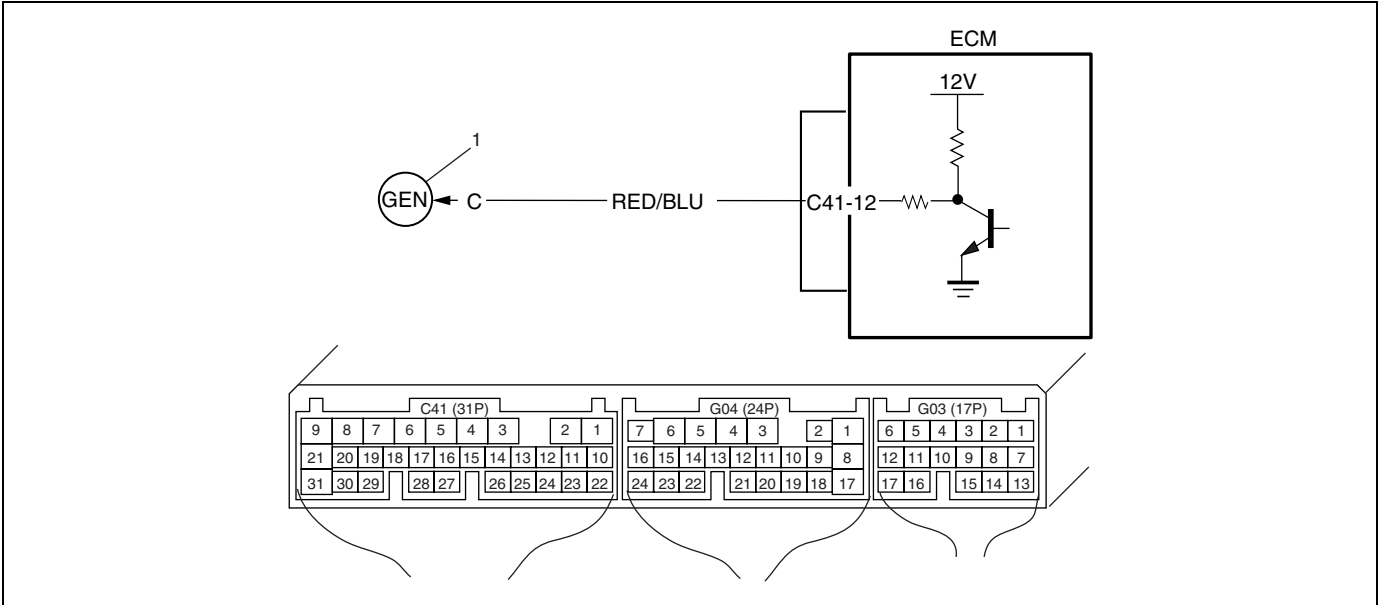
Step	Action	Yes	No
1	<p>Check PSP Switch Signal Circuit.</p> <p>1) Connect SUZUKI scan tool to DLC with ignition switch OFF.</p> <p>2) Start engine and select "DATA LIST" mode on scan tool.</p> <p>3) Check power steering pressure switch.</p> <p>Engine running and steering wheel at straight-ahead position : OFF</p> <p>Engine running and steering wheel turned to the right or left as far as it stops : ON</p> <p>Is it in good condition?</p> <p>Is each voltage as specified?</p>	Signal circuit is in good condition.	Go to Step 2.
2	<p>Check Wire Harness.</p> <p>1) Turn ignition switch OFF and disconnect PSP switch connector.</p> <p>2) Check for proper connection to PSP switch.</p> <p>3) If OK, then check voltage at "YEL" PSP switch wire terminal with ignition switch ON. See Fig. 1.</p> <p>Is it 10 – 14V?</p>	Power steering switch malfunction or power steering system malfunction.	<p>"YEL" wire open or shorted to ground or Poor C41-5 connection.</p> <p>If wire and connection are OK, Substitute a known-good ECM and recheck.</p>

Fig. 1 for Step 2



1. Power steering pump

Table B-9 Generator Control Signal Circuit Check



1. Generator

CIRCUIT DESCRIPTION

ECM sends signal (0 – 1V) to generator terminal C to suspend charging during vehicle take off or fast acceleration.

INSPECTION

Step	Action	Yes	No
1	<p>Check Generator Control Signal Circuit.</p> <p>1) Check voltage at terminal C41-12 under each condition given below (vehicle at stop).</p> <p><b>While engine idling</b> : 10 – 14 V</p> <p><b>While engine running at 2000 rpm or less and throttle valve is not totally closed</b> : 0 – 1 V</p> <p>Is check result satisfactory?</p>	<p>Generator Control signal circuit is in good condition.</p>	<p>“RED/BLU” wire open or short. Poor C41-12 terminal connection.</p> <p>If wire and connection are OK, substitute a known-good ECM and recheck.</p>

## SECTION 6A1

# ENGINE MECHANICAL (M13 AND M16 ENGINES)

### 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 items with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

6A1

## CONTENTS

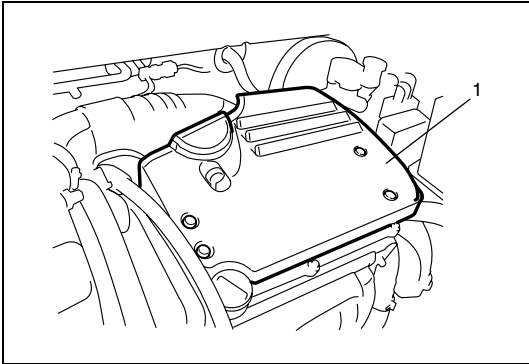
<b>General Description</b> .....	*	Engine Mountings .....	6A1-7
Engine .....	*	<b>Unit Repair Overhaul</b> .....	<b>6A1-8</b>
Engine Lubrication .....	*	Engine Assembly .....	*
<b>Diagnosis</b> .....	*	Timing Chain Cover .....	*
Diagnosis Table .....	*	Oil Pump .....	*
Compression Check .....	*	Timing Chain and Chain Tensioner .....	6A1-8
Engine Vacuum Check .....	*	Camshaft, Tappet and Shim .....	*
Oil Pressure Check .....	*	Valves and Cylinder Head .....	*
Valve Lash (Clearance) .....	*	Pistons, Piston Rings, Connecting Rods and Cylinders .....	*
<b>On-Vehicle Service</b> .....	<b>6A1-2</b>	Main Bearings, Crankshaft and Cylinder Block .....	*
Air Cleaner Element .....	*	<b>Required Service Material</b> .....	<b>6A1-12</b>
Knock Sensor .....	*	<b>Tightening Torque Specification</b> .....	<b>6A1-13</b>
Cylinder Head Cover .....	6A1-2	<b>Special Tool</b> .....	<b>6A1-14</b>
Throttle Body and Intake Manifold .....	*		
Exhaust Manifold .....	6A1-5		
Oil Pan and Oil Pump Strainer .....	*		

## On-Vehicle Service

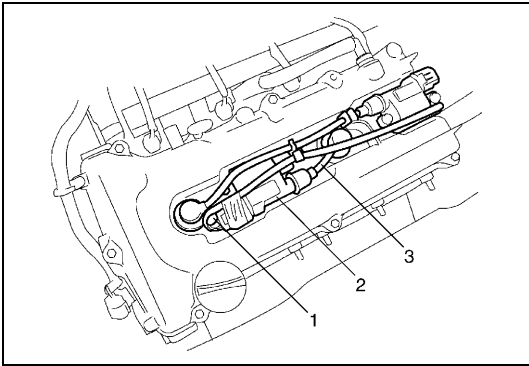
### Cylinder Head Cover

#### REMOVAL

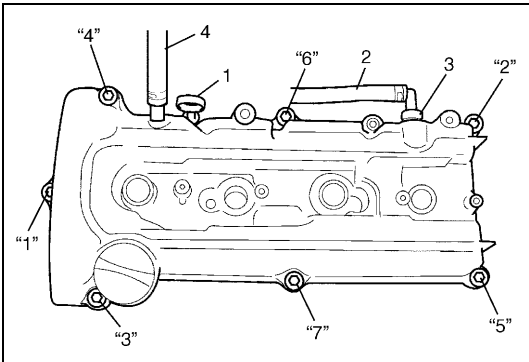
- 1) Disconnect negative cable at battery.
- 2) Remove engine cover (1).



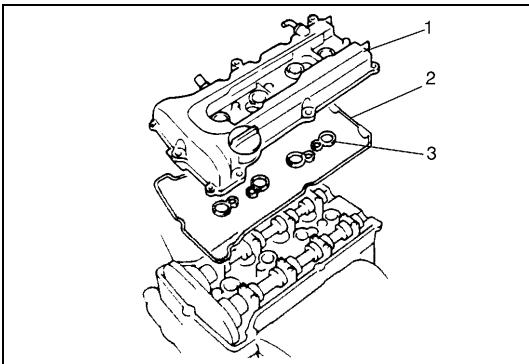
- 3) Disconnect ignition coil couplers (1).
- 4) Remove ignition coil assemblies (2) with high-tension cord (3).



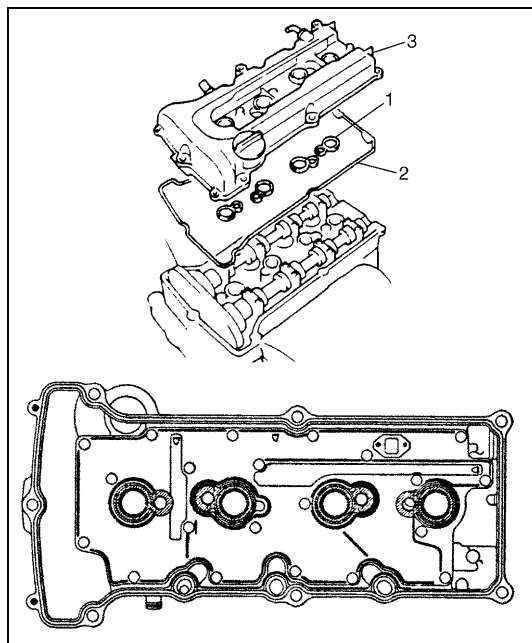
- 5) Remove oil level gauge (1).
- 6) Disconnect PCV hose (2) from PCV valve (3) and disconnect breather hose (4) from cylinder head cover.
- 7) Remove power steering hose bracket from cylinder head cover, if equipped.
- 8) Remove cylinder head cover mounting bolts in such order as indicated in figure.



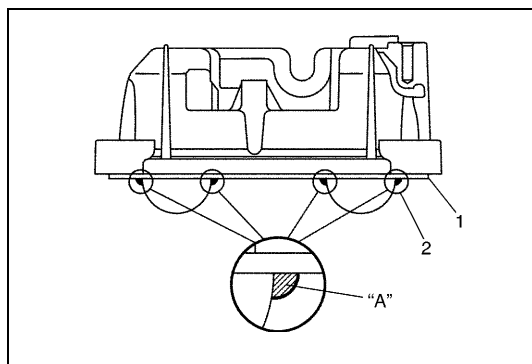
- 9) Remove cylinder head cover (1) with cylinder head cover gasket (2) and spark plug hole gasket (3).



## INSTALLATION



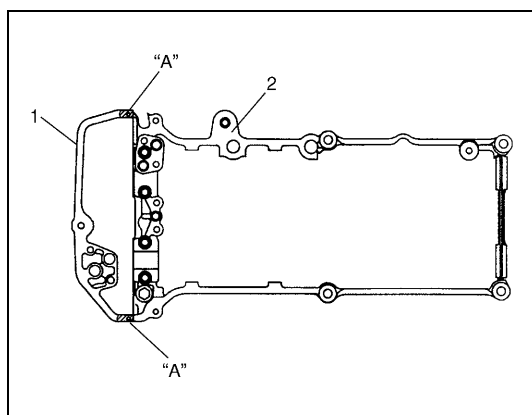
- 1) Install new spark plug hole gaskets (1) and new cylinder head cover gasket (2) to cylinder head cover (3) as shown in figure.



- 2) Remove oil, old sealant, and dust from sealing surface on cylinder head and cover. After cleaning, apply sealant "A" to the following point.

- Cylinder head cover gasket (1) sealing surface area (2) as shown.

**"A" : Sealant 99000-31150**



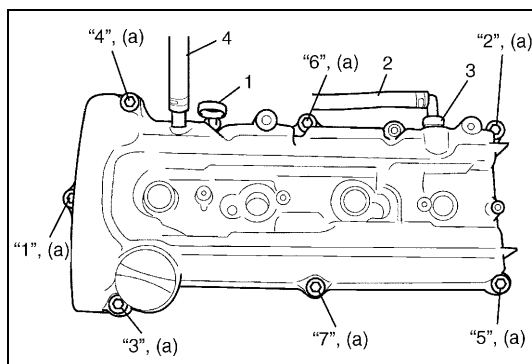
- Timing chain cover (1) and cylinder head (2) mating surface as shown.

**"A" : Sealant 99000-31150**

- 3) Install cylinder head cover to cylinder head.

### NOTE:

**When installing cylinder head cover, use care so that cylinder head cover gasket or spark plug hole gaskets will not get out of place or fall off.**



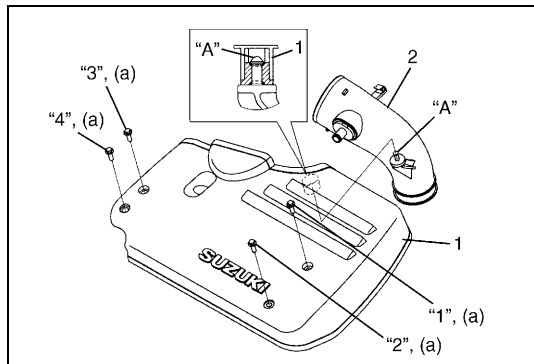
- 4) Tighten bolts in such order as indicated in figure a little at a time till they are tightened to specified torque.

### Tightening torque

**Cylinder head cover bolts (a) : 8 N·m (0.8 kg·m, 6.0 lb·ft)**

- 5) Connect PCV hose (2) to PCV valve (1).
- 6) Connect breather hose (4).
- 7) Install oil level gauge (3).





- 8) Install power steering hose bracket to cylinder head cover, if removed.
- 9) Install ignition coil assemblies with high-tension cord.
- 10) Connect ignition coil couplers and clamp harness securely.

11) Install engine cover (1) as follows.

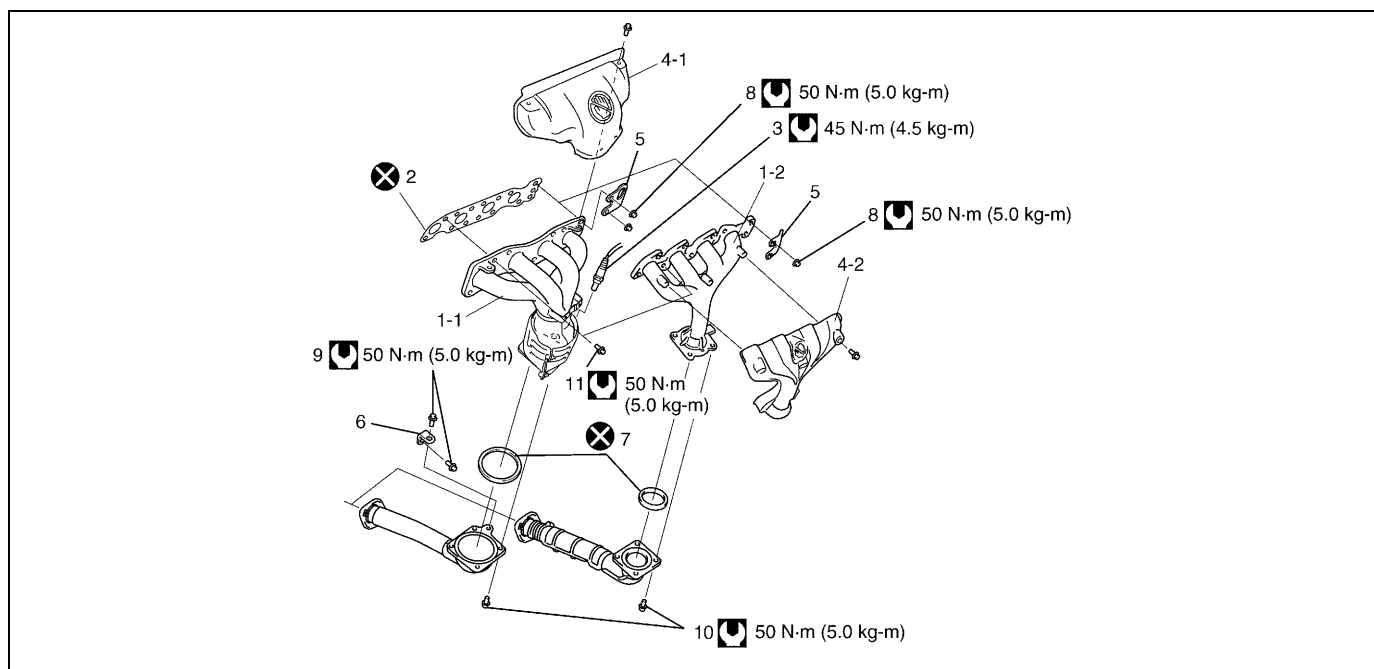
- a) Fit "A" part of air intake pipe (2) in engine cover securely.
- b) Tighten engine cover bolts in such order as indicated in the figure.



**Tightening torque**

**Engine cover bolts (a): 8 N·m (0.8 kg-m, 6.0 lb-ft)**

12) Connect negative cable at battery.

## Exhaust Manifold

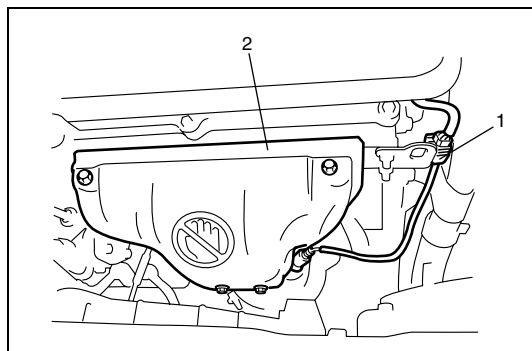


1-1. Exhaust manifold (with oxygen sensor)	4-2. Exhaust manifold cover (without oxygen sensor)	9. Exhaust manifold stiffener bolt
1-2. Exhaust manifold (without oxygen sensor)	5. Engine hook	10. Exhaust pipe bolt
2. Exhaust manifold gasket	6. Exhaust manifold stiffener	11. Exhaust manifold mounting bolt
3. Heated oxygen sensor (if equipped)	7. Gasket	 Tightening torque
4-1. Exhaust manifold cover (with oxygen sensor)	8. Exhaust manifold mounting nut	 Do not reuse.

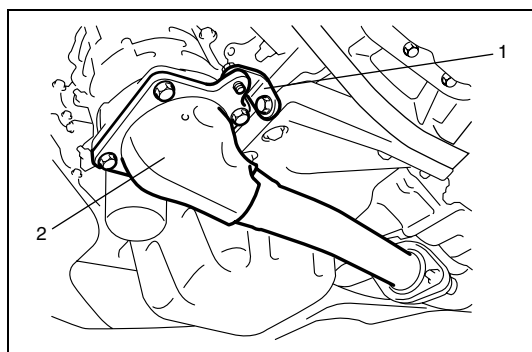
### WARNING:

**To avoid danger of being burned, do not service exhaust system while it is still hot. Service should be performed after system cools down.**

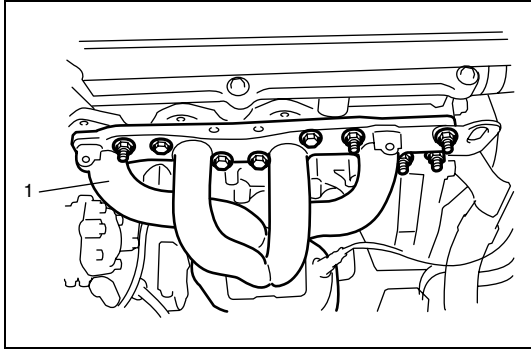
### REMOVAL



- 1) Disconnect negative cable at battery.
- 2) Disconnect heated oxygen sensor coupler (1) (if equipped) and detach it from its stay.
- 3) Remove exhaust manifold cover (2).

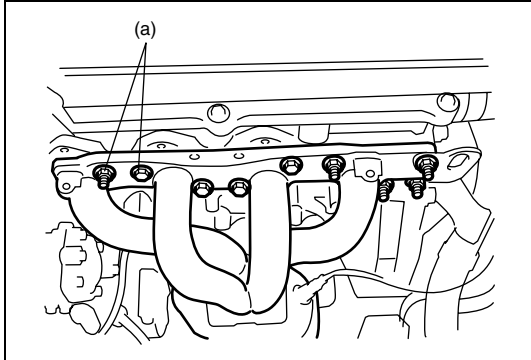


- 4) Remove exhaust manifold stiffener (1).
- 5) Disconnect exhaust No.1 pipe (2) from exhaust manifold.



- 6) Remove exhaust manifold (1) and its gasket from cylinder head.

## INSTALLATION

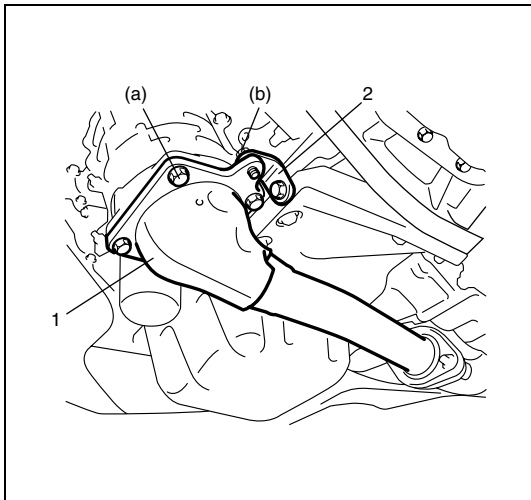


- 1) Install new gasket to cylinder head.  
Then install exhaust manifold.  
Tighten manifold bolts and nuts to specified torque.

### Tightening torque

#### Exhaust manifold bolts and nuts

(a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)



- 2) Install new gasket and connect exhaust No.1 pipe (1) to exhaust manifold.  
Tighten pipe fasteners to specified torque.

### Tightening torque

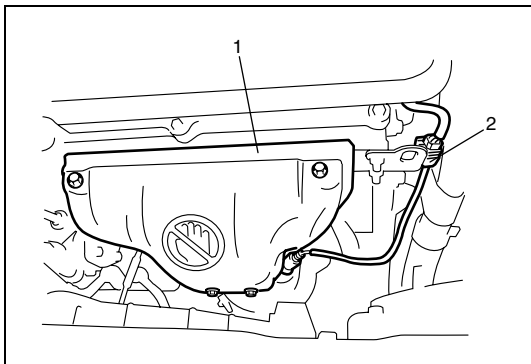
#### Exhaust No.1 pipe bolts (a) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

- 3) Install exhaust manifold stiffener (2).  
Tighten exhaust manifold stiffener bolts to specified torque.

### Tightening torque

#### Exhaust manifold stiffener bolts

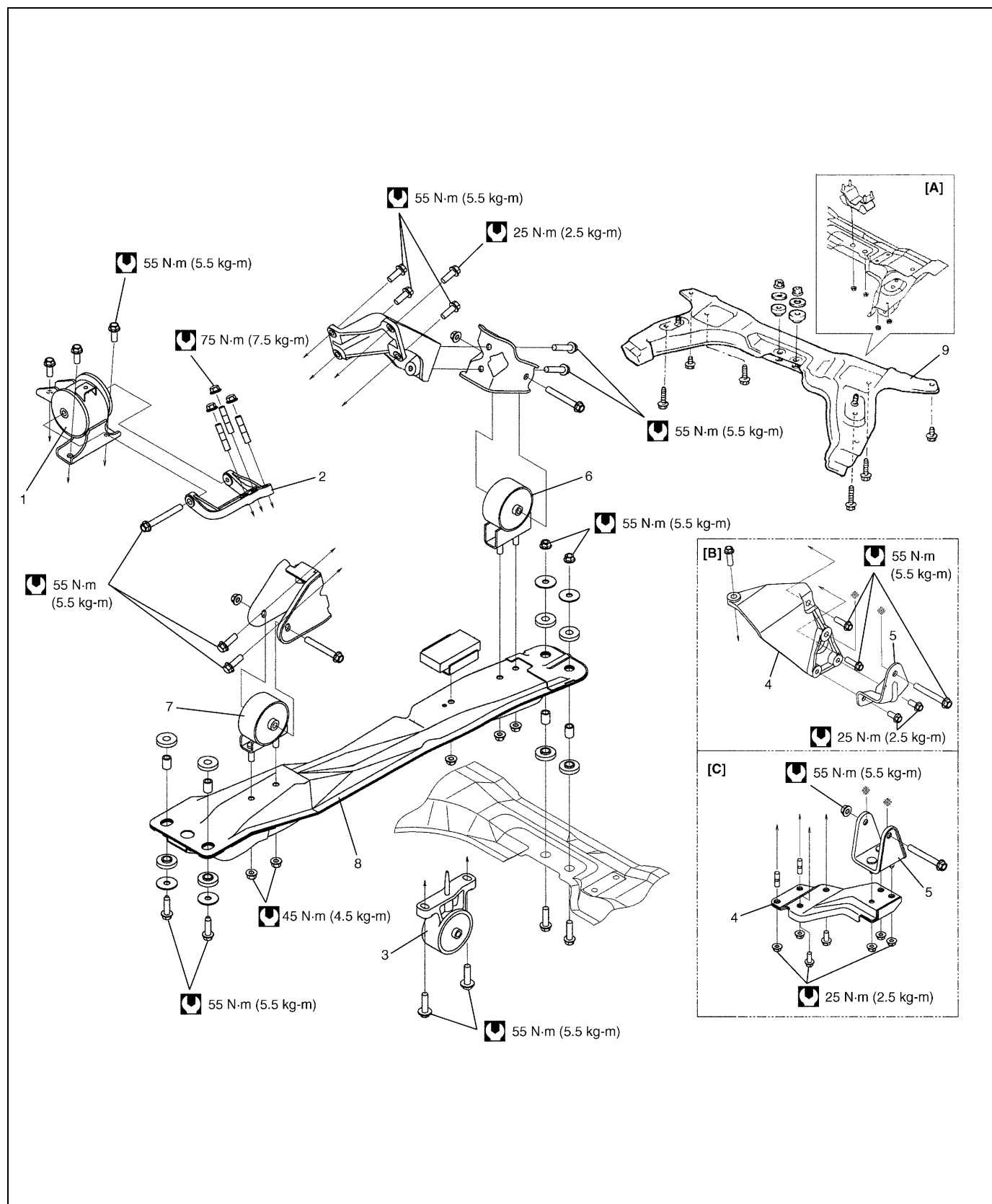
(b) : 50 N·m (5.0 kg-m, 36.5 lb-ft)



- 4) Install exhaust manifold cover (1) .
- 5) Connect heated oxygen sensor coupler (2) and fit coupler to bracket securely (if equipped).

- 6) Connect negative cable to battery.
- 7) Check exhaust system for exhaust gas leakage.

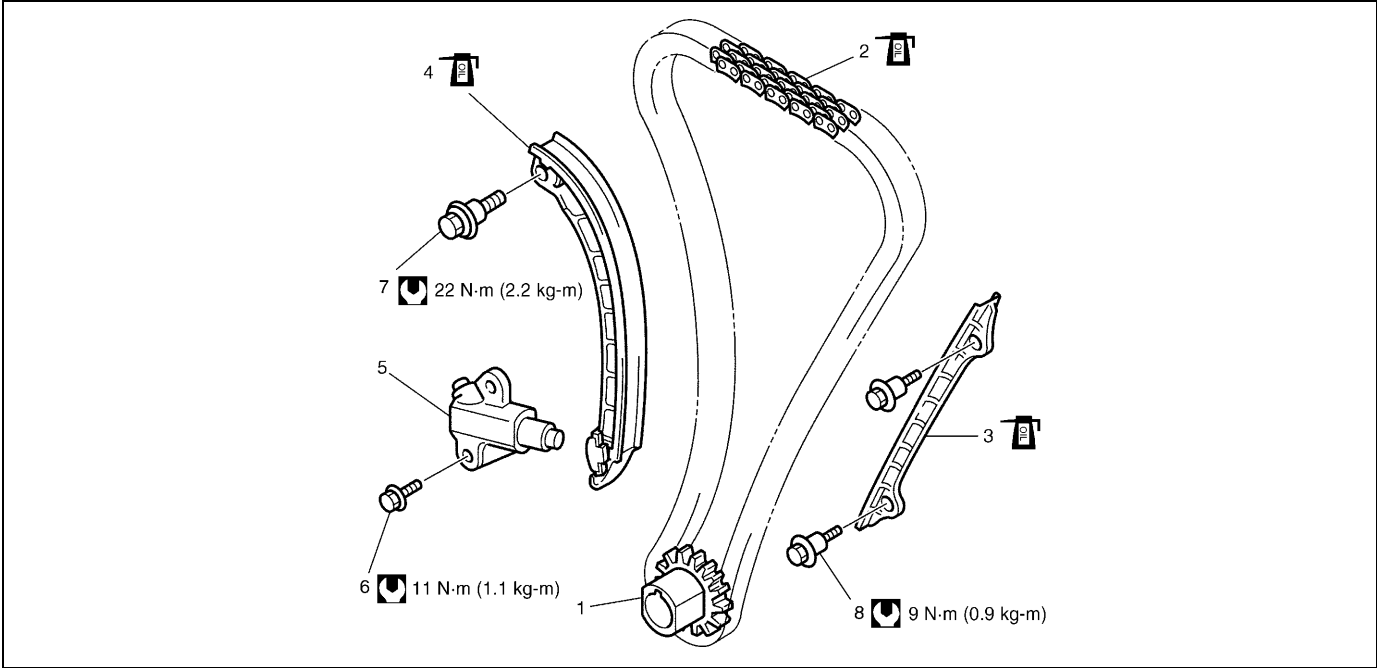
# Engine Mountings



[A]: 4WD model	3. Engine left mounting	8. Mounting member
[B]: A/T model	4. Engine left mounting bracket No.1	9. Suspension frame
[C]: M/T model	5. Engine left mounting bracket No.2	Tightening torque
1. Engine right mounting	6. Engine rear mounting	
2. Engine right mounting bracket	7. Engine front torque bush	

# Unit Repair Overhaul

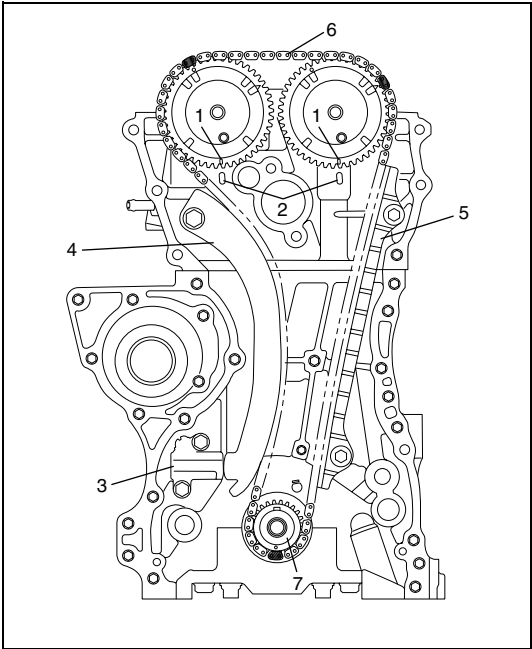
## Timing Chain and Chain Tensioner



1. Crankshaft timing sprocket	4. Timing chain tensioner : Apply engine oil to sliding surface.	7. Chain tensioner mounting bolt
2. Timing chain : Apply engine oil.	5. Timing chain tensioner adjuster assembly	8. Chain guide mounting bolt
3. Timing chain No.1 guide : Apply engine oil to sliding surface.	6. Chain tensioner adjuster mounting bolt	Tightening torque

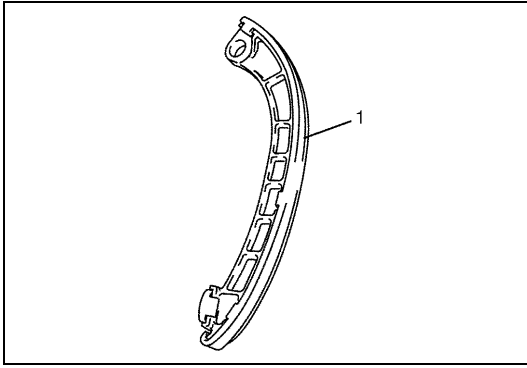
### REMOVAL

- 1) Remove timing chain cover referring to “TIMING CHAIN COVER”.
- 2) Align both intake and exhaust camshaft timing sprocket marks (1) with notches (2) of cylinder head respectively by turning crankshaft.
- 3) Remove timing chain tensioner adjuster assembly (3).
- 4) Remove timing chain tensioner (4).
- 5) Remove timing chain No.1 guide (5).
- 6) Remove timing chain (6) with crankshaft timing sprocket (7).

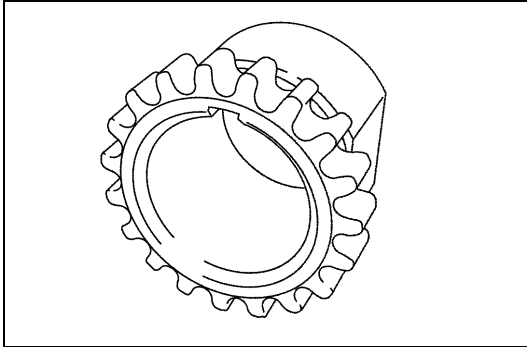


### CAUTION:

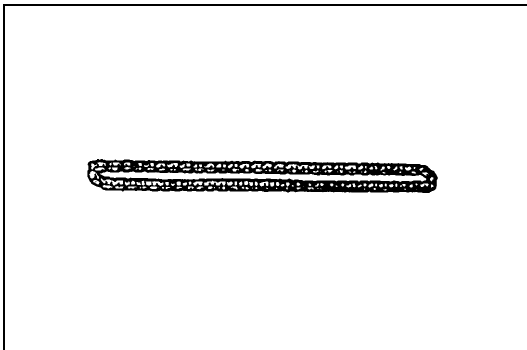
After timing chain is removed, never turn crankshaft and camshafts independently more than its allowable turning range described in “INSTALLATION” section.  
If turned, interference may occur between piston and valves and valves themselves, and parts related to piston and valves may be damaged.

**INSPECTION****Timing chain tensioner**

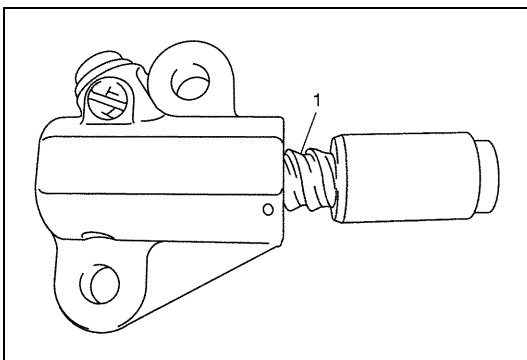
- Check shoe (1) for wear or damage.

**Crankshaft timing sprocket**

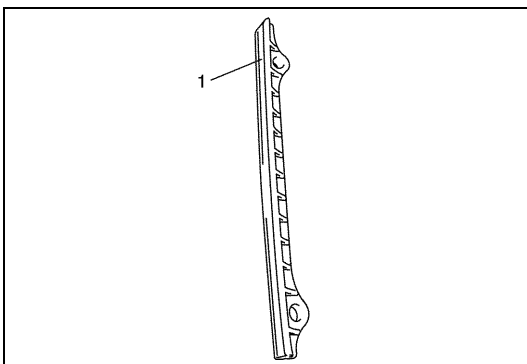
- Check teeth of sprocket for wear or damage.

**Timing chain**

- Check timing chain for wear or damage.

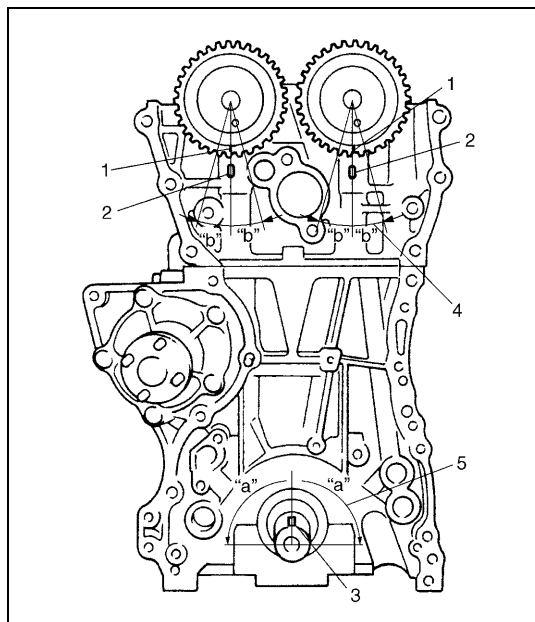
**Timing chain tensioner adjuster**

- Check that tooth surface (1) are free from damage.

**Timing chain No.1 guide**

- Check shoe (1) for wear or damage.

## INSTALLATION

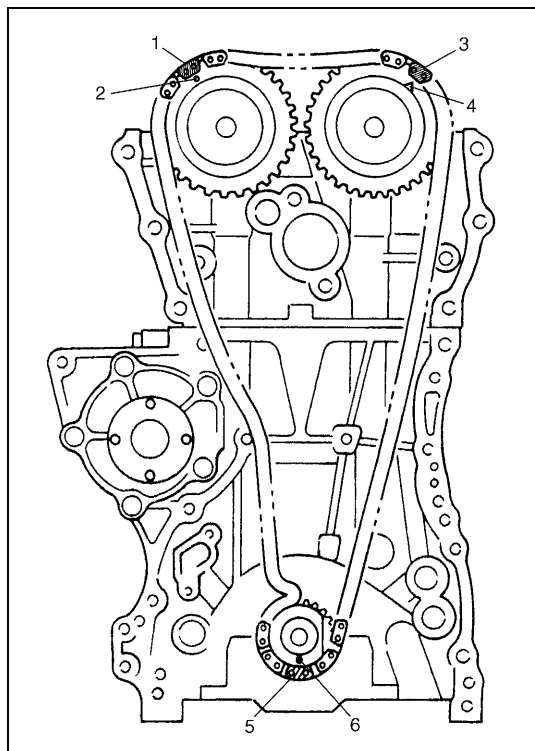
**CAUTION:**

**After timing chain is removed, never turn crankshaft and camshafts independently more than such an extent ("a", "b") as shown in figure.**

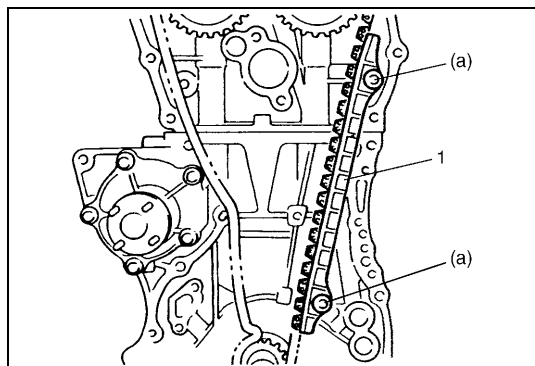
**If turned, interference may occur between piston and valves and valves themselves, and parts related to piston and valves may be damaged.**

- 1) Check that match marks (1) on intake and exhaust camshaft timing sprockets are in match with notches (2) on cylinder head as shown in figure.
- 2) Set key (3) and turn crankshaft to position key on upside of crankshaft.

"a" : 90°	5. Crankshaft allowable turning range. By key on crankshaft, within 90° from top on both right and left.
"b" : 15°	4. Camshaft (IN and EX) allowable turning range. By marks on camshaft timing sprocket within 15° from notches on cylinder head on both right and left.



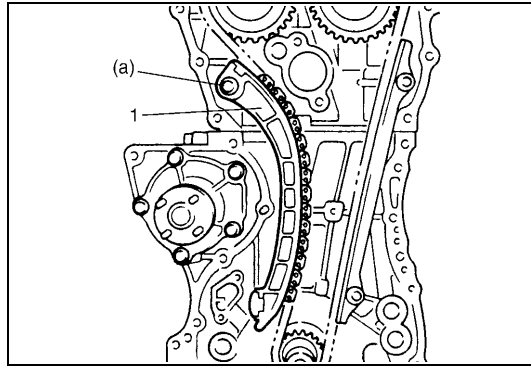
- 3) Install timing chain by aligning dark blue plate (1) of timing chain and mark (2) on camshaft timing sprocket and then aligning dark blue plate (3) and triangle mark (4) as shown in figure.
- 4) Fit crankshaft timing sprocket to timing chain by aligning gold plate (5) of timing chain and mark (6) on crankshaft timing sprocket. Then install crankshaft timing sprocket fitted with chain to crankshaft.



- 5) Apply engine oil to sliding surface of timing chain No.1 guide (1) and install it as shown in figure.  
Tighten guide bolts to specified torque.

**Tightening torque****Timing chain No.1 guide bolts**

**(a) : 9 N·m (0.9 kg-m, 6.5 lb-ft)**

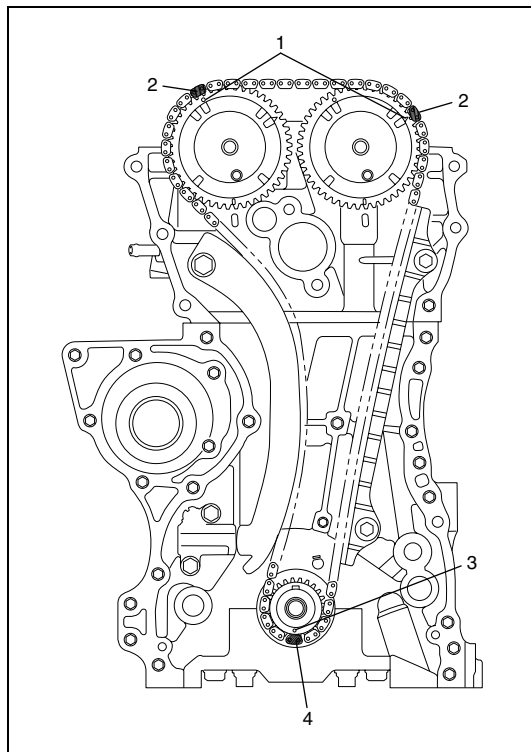


- 6) Apply engine oil to sliding surface of chain tensioner (1) and install chain tensioner and spacer.  
Tighten tensioner bolt to specified torque

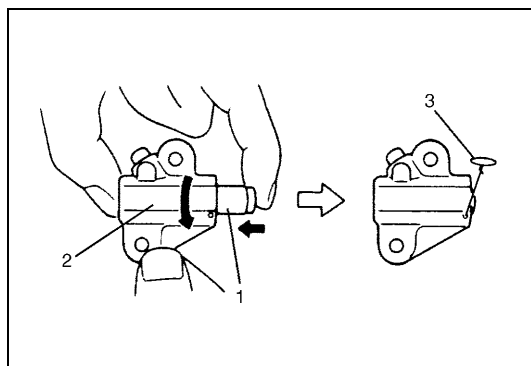
**Tightening torque**

**Timing chain tensioner bolt**

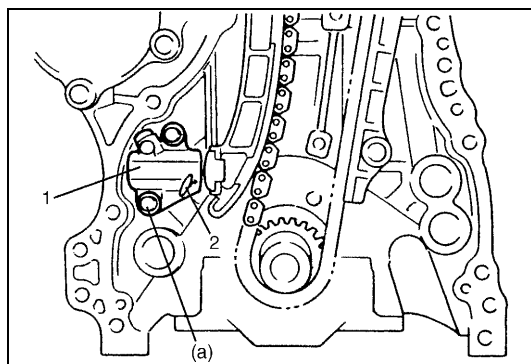
**(a) : 22 N·m (2.2 kg-m, 16.0 lb-ft)**



- 7) Check that match marks (1) on intake and exhaust camshaft timing sprockets are in match with dark blue plates (2) of timing chain and match mark (3) on crankshaft timing sprocket is in match with gold plate (4) of timing chain.



- 8) Screw in plunger (1) by turning timing chain tensioner adjuster (2) in arrow direction and install a retainer (3) (wire) to hold plunger in place.



- 9) Install timing chain tensioner adjuster assembly (1) with a retainer (2).

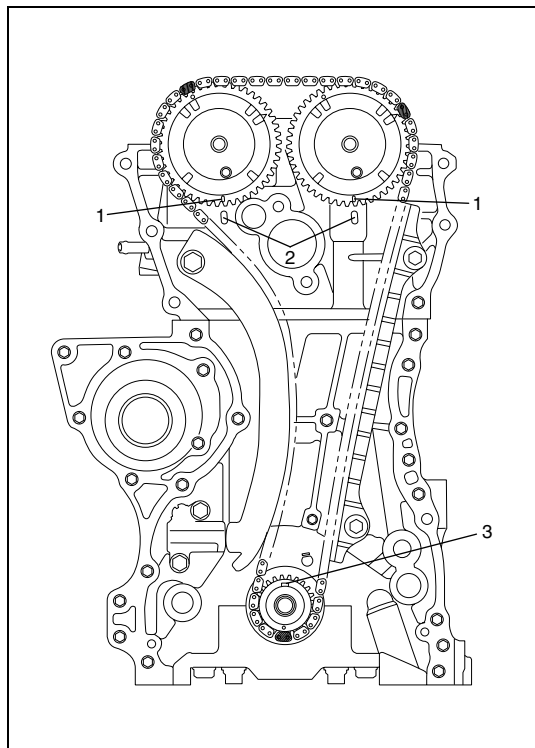
Tighten adjuster bolts to specified torque and then remove a retainer from chain tensioner adjuster assembly.

**Tightening torque**

**Timing chain tensioner adjuster bolts**

**(a) : 11 N·m (1.1 kg-m, 8.0 lb-ft)**





10) Apply engine oil to timing chain and then turn crankshaft clockwise by 2 revolutions and check that match marks (1) on intake and exhaust camshaft timing sprockets are in match with notches (2) on cylinder head and key (3) is on upside of crankshaft as shown in figure.

If each mark of timing chain and each match mark are no matches, adjust each sprocket and timing chain.

11) Install timing chain cover referring to “TIMING CHAIN COVER”.

12) Perform Steps 3) to 8) of “INSTALLATION” of “TIMING CHAIN COVER” in this section.

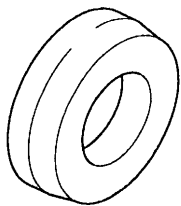
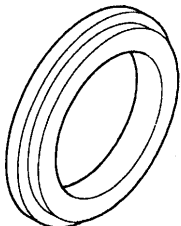
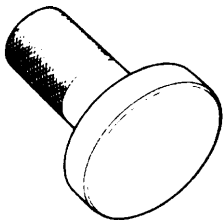




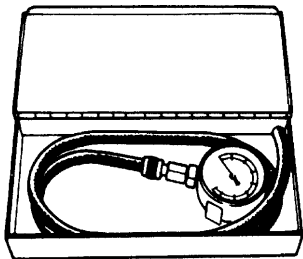
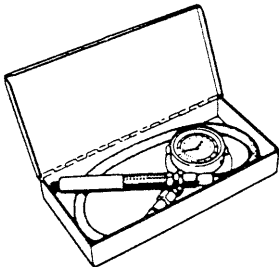
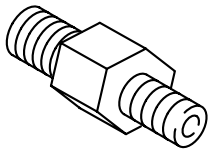
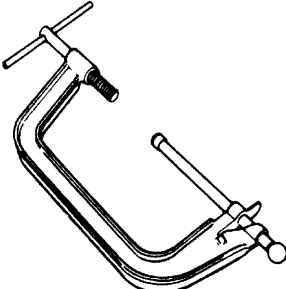

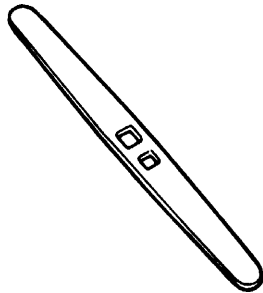
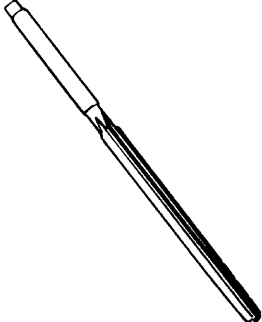
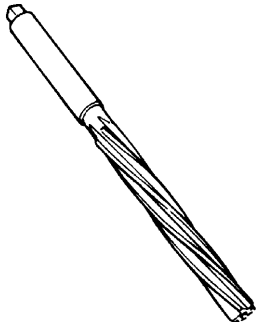
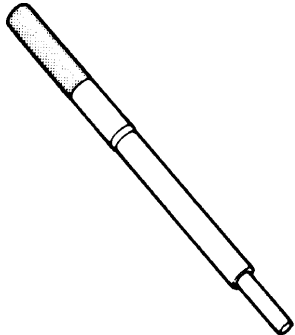
## Required Service Material

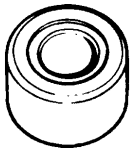
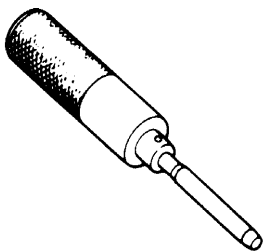
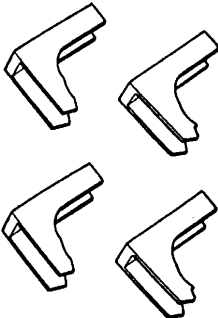
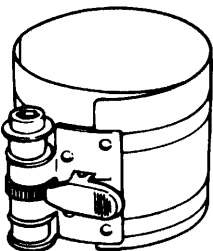
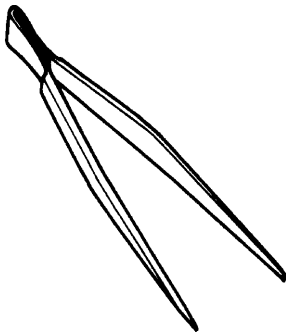
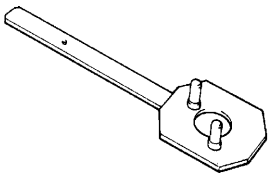

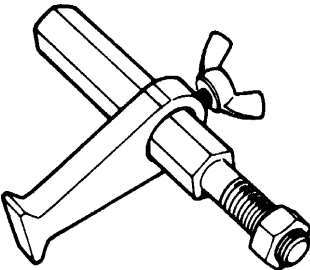

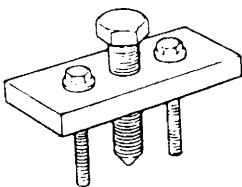
Material	Recommended SUZUKI product (Part Number)	Use
Sealant	Sealant 1207C (99000-31150)	<ul style="list-style-type: none"> <li>To apply to mating surfaces of cylinder block and oil pan.</li> <li>To apply to mating surfaces of cylinder block and timing chain cover.</li> <li>To apply to sealing surfaces of cylinder head cover.</li> <li>To apply to mating surfaces to rear oil seal housing.</li> </ul>
	Sealant 1207B (99000-31140)	<ul style="list-style-type: none"> <li>To apply to mating surface of cylinder block, cylinder head and timing chain cover.</li> </ul>
	Sealant 1215 (99000-31110)	<ul style="list-style-type: none"> <li>To flywheel (M/T) or drive plate (A/T) bolts.</li> </ul>

## Tightening Torque Specification

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Oil pressure switch	14.0	1.4	10.5
Camshaft housing bolts (for replacement of shim)	8.0	0.8	6.0
Camshaft housing bolts	11.0	1.1	8.0
Cylinder head cover bolts	8.0	0.8	6.0
Intake manifold bolts and nuts	25.0	2.5	18.0
Exhaust manifold bolts and nuts	50.0	5.0	36.5
Exhaust pipe bolts	50.0	5.0	36.5
Exhaust manifold stiffener bolts	50.0	5.0	36.5
Oil pump strainer bolt	11.0	1.1	8.0
Oil pump strainer bracket bolt	11.0	1.1	8.0
Oil pan bolts and nuts	11.0	1.1	8.0
Oil pan drain plug bolt	50.0	5.0	36.5
Timing chain cover bolts	23.0	2.3	17.0
Crank shaft pulley bolt	150.0	15.0	108.5
Oil pump rotor plate bolts	11.0	1.1	8.0
Timing chain No.1 guide bolts	9.0	0.9	6.5
Timing chain tensioner adjuster bolts	11.0	1.1	8.0
Venturi plug	5.0	0.5	3.5
Cylinder head bolt for M8	22.0	2.2	16.0
Cylinder head bolts for M10	a) Tighten 40 N·m b) Turn 60° c) Turn 60°	a) Tighten 4.0 kg-m b) Turn 60° c) Turn 60°	a) Tighten 29.0 lb-ft b) Turn 60° c) Turn 60°
Connecting rod bearing cap nuts	a) Tighten 15 N·m b) Turn 45° c) Turn 45°	a) Tighten 1.5 kg-m b) Turn 45° c) Turn 45°	a) Tighten 11.0 lb-ft b) Turn 45° c) Turn 45°
Engine mounting bolts and nuts for M10	55.0	5.5	40.0
Engine mounting bolts and nuts for M12	75.0	7.5	54.5
Crankshaft bearing cap No.1 bolts (for inspection of crankshaft thrust play)	50.0	5.0	36.5
Crankshaft bearing cap No.2 bolts	22.0	2.2	16.0
Sensor plate bolts	11.0	1.1	8.0
Crankshaft bearing cap No.1 bolts	a) Tighten 50 N·m b) Turn 60°	a) Tighten 5.0 kg-m b) Turn 60°	a) Tighten 36.5 lb-ft b) Turn 60°
Rear oil seal housing bolts	11.0	1.1	8.0
Flywheel or drive plate bolts	70.0	7.0	51.0
Transaxle stiffener bolts	50.0	5.0	36.5
Timing chain tensioner bolt	22.0	2.2	16.0

## Special Tool

 <p>09911-97720 Oil seal guide</p>	 <p>09911-97820 Oil seal installer</p>	 <p>09913-75810 Bearing installer</p>	 <p>09915-64510-001 Compression gauge</p>
 <p>09915-64510-002 Connector</p>	 <p>09915-64530 Hose</p>	 <p>09915-67010 Attachment</p>	 <p>09915-67310 Vacuum gauge</p>
 <p>09915-77310 Oil pressure gauge</p>	 <p>09915-78211 Oil pressure gauge attachment</p>	 <p>09916-14510 Valve lifter</p>	 <p>09916-14521 Valve lifter attachment</p>
 <p>09916-34542 Reamer handle</p>	 <p>09916-34550 Reamer (5.5 mm)</p>	 <p>09916-37320 Reamer (10.5 mm)</p>	 <p>09916-44910 Valve guide remover</p>

			
09916-56011 Valve guide installer	09916-58210 Valve guide installer handle	09916-67020 Tappet holder	09916-77310 Piston ring compressor
			
09916-84511 Forceps	09917-68221 Camshaft lock holder	09917-98221 Valve stem seal installer	09924-17810 Flywheel holder
			
09926-58010 Bearing puller attachment	09944-36011 Steering wheel remover		



## SECTION 6E1

# ENGINE AND EMISSION CONTROL SYSTEM (M13 AND M16 ENGINES)

**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 items with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

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

- EGR valve
- Heated oxygen sensor(s) or CO adjusting resistor
- Three way catalytic converter
- Immobilizer indicator lamp
- Knock sensor

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Engine & emission control		Fuel pressure regulator .....	*
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Air Intake System .....	*		

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<b>Tightening Torque Specification.....</b>	<b>*</b>

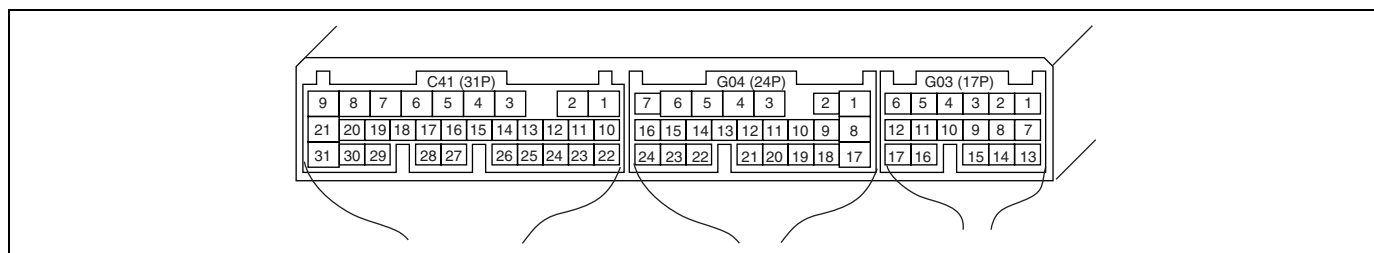
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**6E1-4 ENGINE AND EMISSION CONTROL SYSTEM (M13 AND M16 ENGINES)**

1. CKP sensor	22. A/C condenser fan relay	43. Monitor connector (vehicle without immobilizer indicator lamp)
2. CMP sensor	23. A/C condenser fan motor	44. Ignition coil assembly (for No.1 and No.4 spark plugs)
3. VSS	24. A/C compressor relay	45. Ignition coil assembly (for No.2 and No.3 spark plugs)
4. MAP sensor	25. A/C compressor magnet clutch	46. Stop lamp switch
5. Knock sensor (if equipped)	26. Power steering pressure switch	47. Stop lamp
6. TP sensor	27. Generator	48. Lighting switch
7. ECT sensor	28. Immobilizer control module (if equipped)	49. Position lamp
8. IAT sensor	29. Data link connector	50. Rear defogger switch
9. Heated oxygen sensor-1 (if equipped)	30. Injector No.1	51. Rear defogger
10. Heated oxygen sensor-2 (if equipped)	31. Injector No.2	52. Ignition switch
11. A/C evaporator outlet air temp. sensor	32. Injector No.3	53. Main relay
12. A/C evaporator inlet air temp. sensor	33. Injector No.4	54. Transmission range switch (A/T)
13. Fuel level sensor (vehicle with immobilizer indicator lamp)	34. IAC valve	55. Starting motor
14. TCM (A/T)	35. EVAP canister purge valve	56. Shield wire
15. Transmission range switch (A/T)	36. Fuel pump relay	57. Main fuse
16. ABS control module	37. Fuel pump	58. Barometric pressure sensor
17. CO adjusting resistor (if equipped)	38. Radiator fan relay	59. Immobilizer indicator lamp (if equipped)
18. Blower fan motor	39. Radiator fan motor	60. Engine ground
19. Blower fan switch	40. EGR valve (if equipped)	61. Body ground
20. A/C switch	41. Malfunction indicator lamp	
21. A/C pressure switch	42. Combination meter	

## Terminal arrangement of ECM coupler (viewed from harness side)



CONNEC-TOR	TERMINAL	WIRE COLOR	CIRCUIT	CONNEC-TOR	TERMINAL	WIRE COLOR	CIRCUIT
C41	1	BLK/ORN	Ground	G04	7	BLU/ORN	A/C triple pressure switch
	2	BLK	Ground		8	GRY/BLK	Engine coolant temp. signal for TCM (A/T)
	3	BLK	Ground		9	BLU/YEL	A/C condenser fan relay (if equipped)
	4	BLU/BLK	EVAP canister purge valve		10	BRN/WHT	Main relay
	5	YEL	Power steering pressure switch (if equipped)		11	YEL/WHT	A/C evaporator inlet air temp. sensor
	6	GRN/RED	Idle air control valve		12	—	—
	7	PNK/BLK	Heater of HO2S-1 (vehicle with EGR)		13	WHT	Heated oxygen sensor-2 (if equipped)
	8	BLU/GRN	Fuel injector No.4		14	WHT/BLK	A/C evaporator outlet air temp. sensor
	9	BLU/YEL	Fuel injector No.1		15	PNK/BLK	Test switch terminal (vehicle without immobilizer indicator lamp)
	10	ORN	Sensor ground		16	GRN/BLK	A/C input signal (if equipped)
	11	BLU	Camshaft position sensor		17	YEL/BLK	Electric load signal (+)
	12	RED/BLU	Generator control signal		18	BRN	Radiator fan relay 1
	13	WHT	Heated oxygen sensor-1 (vehicle with EGR) CO adjust resistor (vehicle without EGR)		19	PNK	Immobilizer indicator lamp (if equipped)
	14	LT GRN	Engine coolant temperature sensor		20	—	—
	15	LT GRN/BLK	Intake air temperature sensor		21	—	—
	16	GRY/BLU	Throttle position sensor		22	—	—
	17	GRY/YEL	EGR valve (stepper motor coil 3)		23	BLK/WHT	Ignition switch
	18	GRY	EGR valve (stepper motor coil 1)		24	PPL	Vehicle speed sensor
	19	GRN/WHT	Ignition coil No.2	G03	1	LT GRN/BLK	Tachometer
	20	GRN/YEL	Ignition coil No.1		2	—	—
	21	BLU/WHT	Fuel injector No.2		3	—	—
	22	GRY/RED	Power source for sensors		4	WHT/GRN	A/C compressor operation signal (if equipped)
	23	YEL/BLK	Crankshaft position sensor		5	BLU/RED	Engine torque output signal for TCM (A/T)
	24	BRN	Fuel pump relay		6	GRY/RED	D-range ID-up signal (A/T)
	25	RED	Knock sensor (if equipped)		7	PPL/YEL	Malfunction indicator lamp
	26	LT GRN/RED	Manifold absolute pressure sensor		8	YEL	Data link connector (SUZUKI serial data line)
	27	PPL/WHT	Diag. switch terminal (vehicle without immobilizer indicator lamp)		9	YEL/GRN	Engine coolant temp. signal for meter
	28	BRN/WHT	EGR valve (stepper motor coil 4)		10	BLU/BLK	Electric load signal (-)
	29	GRY/WHT	EGR valve (stepper motor coil 2)		11	WHT/RED	Power source for back-up
	30	BLK/YEL	Engine start switch (Engine start signal)		12	LT GRN/RED	Torque reduction input signal (A/T)
	31	BLU/RED	Fuel injector No.3		13	BLU	Data link connector
G04	1	BRN/YEL	A/C compressor relay (if equipped)		14	PPL/WHT	Throttle opening signal for TCM (A/T)
	2	GRN/WHT	Stop lamp switch		15	YEL	Fuel level sensor (gauge) (vehicle with immobilizer indicator lamp)
	3	GRN/RED	Radiator fan relay 2		16	—	—
	4	PNK/BLU	Heater of HO2S-2 (Vehicle with EGR)		17	GRN/YEL	Serial data for TCM
	5	BLK/RED	Power source			PNK/GRN	Monitor output (vehicle without immobilizer indicator lamp)
	6	BLK/RED	Power source				

**NOTE:**

For abbreviation of wire color, refer to Section 0A.

## On-Vehicle Service

### Idle speed / idle air control (IAC) duty inspection

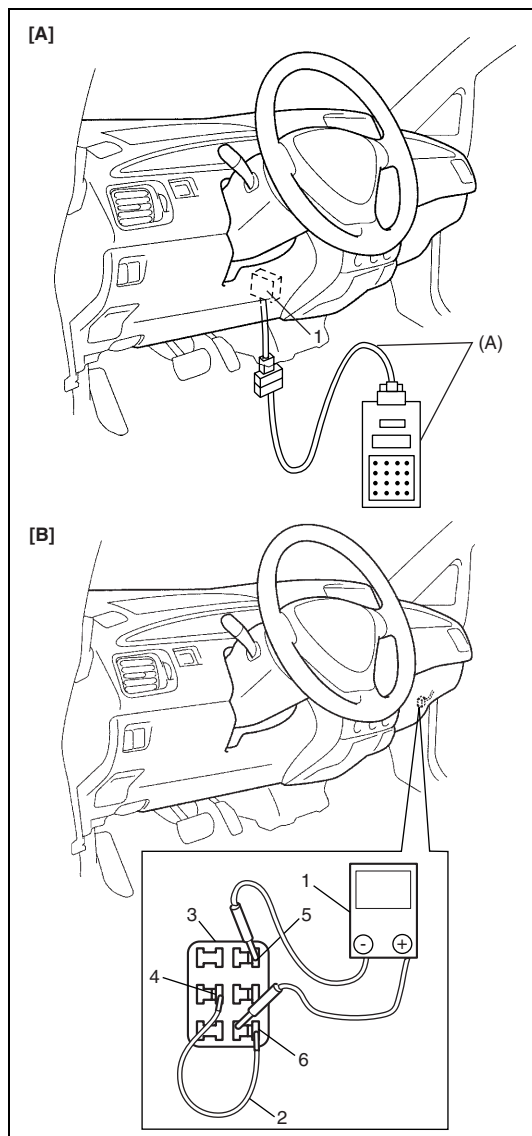
Before idle speed/IAC duty check, make sure of the following.

- Lead wires and hoses of Electronic Fuel Injection and engine emission control systems are connected securely.
- Accelerator cable has some play, that is, it is not tight.
- Valve lash is checked and adjusted according to maintenance schedule.
- 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.
- No abnormal air inhaling from air intake system.

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.**



Engine idle speed and IAC duty

- 1) Connect SUZUKI scan tool to DLC (1) with ignition switch OFF, if it is available.
- 2) Warm up engine to normal operating temperature.
- 3) Check engine idle speed and "IAC duty" as follows :

When using SUZUKI scan tool :

- a) Select "Data List" mode on scan tool to check "IAC duty".

**(A) : SUZUKI scan tool**

[A] : When using SUZUKI scan tool
[B] : When using duty meter (Vehicle without immobilizer indicator lamp)

When using duty meter (vehicle without immobilizer indicator lamp) :

**NOTE:**

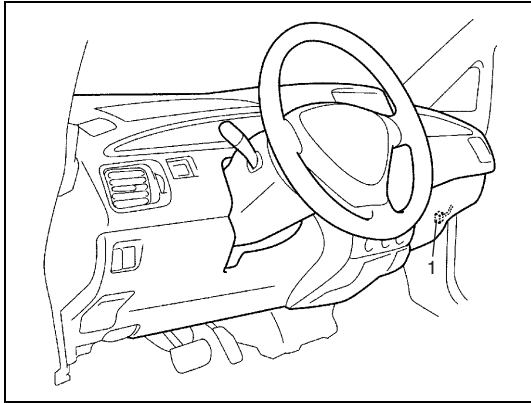
**IAC duty can be checked using monitor connector only for vehicle not equipped with immobilizer indicator lamp.**

- b) Set tachometer.
- c) Using service wire (2), ground "Diag. switch terminal" (4) in monitor connector (3) and connect duty meter between "Duty output terminal" (5) and "Ground terminal" (6) of monitor connector (3).
- 4) If duty and/or idle speed is out of specifications, inspect idle air control system referring to Diagnostic Flow Table B-4 IDLE AIR CONTROL SYSTEM CHECK in Section 6.

	M13 engine vehicle	M16 engine vehicle with A/T	M16 engine vehicle with M/T
All electric parts turned OFF and radiator cooling fan not operated	Transmission selector lever in neutral position	Transmission selector lever in "N" or "P" range position	Transmission selector lever in neutral position
	700 ± 50 r/min (rpm) IAC duty: 5 – 25%		660 ± 50 r/min (rpm) IAC duty: 5 – 25%
Following items all turned ON. • A/C switch. • Blower motor at max position. • Rear defogger. • Head light. • Radiator fan operated at high speed.	Transmission selector lever in neutral position	Transmission selector lever in "P" or "D" range position	Transmission selector lever in neutral position
	850 ± 50 r/min (rpm)		

**NOTE:**

**Above duty values are ON duty (low voltage rate) meter indications.**



- 5) Remove service wire from monitor connector (1).
- 6) 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, referring to Table B-5 A/C Signal Circuit Check and Table B-4 Idle Air Control System Check in Section 6.

## Electronic Control System

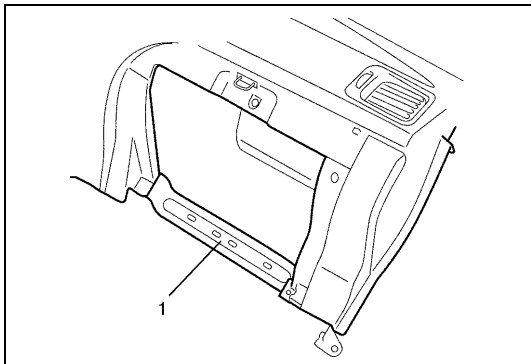
### Engine control module (ECM)

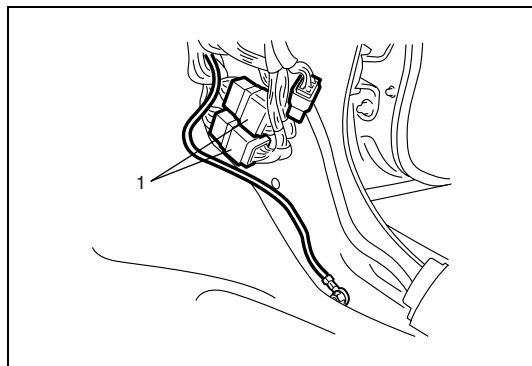
**CAUTION:**

**As ECM consists of precision parts, be careful not to expose it to excessive shock.**

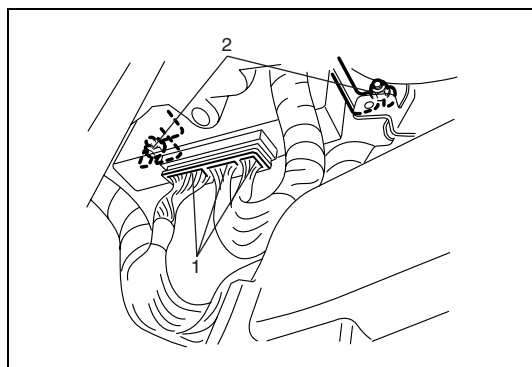
### REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disable air bag system, referring to "Disabling Air Bag System" in Section 10B if equipped.
- 3) Remove glove box, referring to Step 4) in "Instrument Panel Removal" in Section 9.
- 4) Remove instrument panel passenger lower member (1).





- 5) Remove right side dash side trim.
- 6) Disconnect instrument panel harness connectors clamp, engine harness connectors (1).



- 7) Disconnect connectors (1) from ECM while releasing connectors lock.
- 8) Remove ECM from body after removing its nuts (2).

**NOTE:**

**Be careful not to damage ventilation duct.**

## INSTALLATION

Reverse removal procedure noting the following:

- Connect connectors to ECM securely until a click is heard.
- When installing each part, be careful not to catch any cable or wiring harness.

## Heated oxygen sensor (HO2S-1 and HO2S-2)

### Oxygen sensor heater inspection

- 1) Disconnect sensor connector.
  - 2) Using ohmmeter, measure resistance between terminals "V<sub>B</sub>" and "GND" of sensor connector.
- If found faulty, replace oxygen sensor.

**NOTE:**

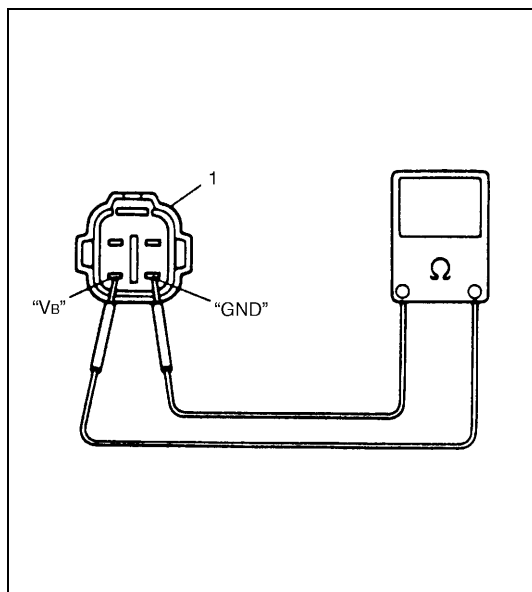
**Temperature of sensor affects resistance value largely.  
Make sure that sensor heater is at correct temperature.**

### Resistance of oxygen sensor heater

**HO2S-1 : 5.0 – 6.4  $\Omega$  at 20 °C (68 °F)**

**HO2S-2 : 11.7 – 14.3  $\Omega$  at 20 °C (68 °F)**

- 3) Connect sensor connector securely.

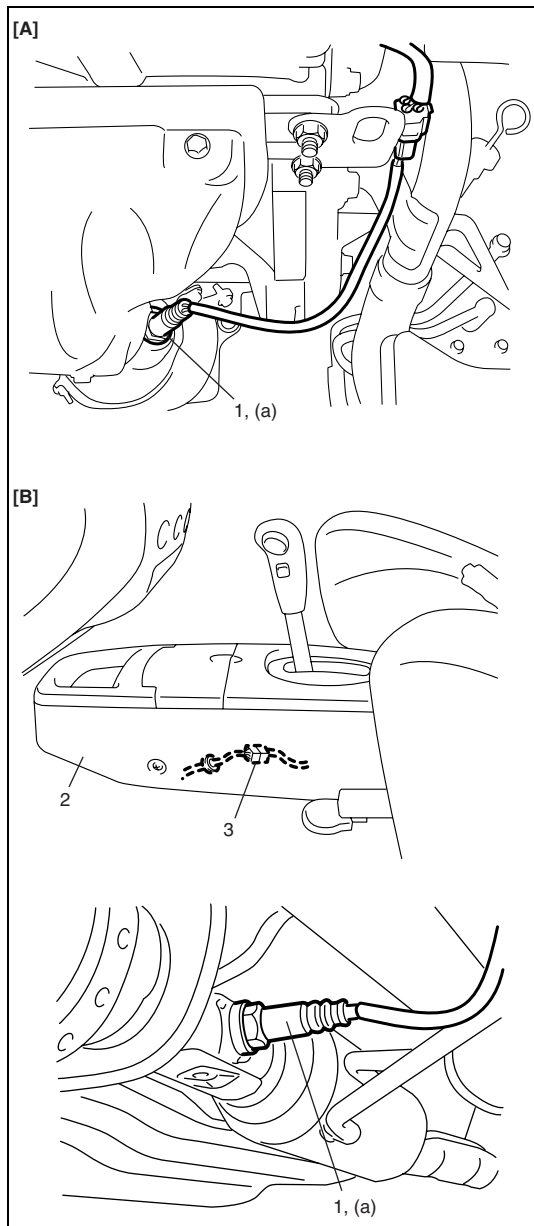


1. Viewed from terminal side

## 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 at battery.
- 2) For HO2S-1, disconnect connector of heated oxygen sensor and release its wire harness from clamp.
- 3) For HO2S-2.
  - a) Remove parking lever garnish and center console box (2).
  - b) Remove left front seat assembly and turn over floor carpet, if necessary.
  - c) Disconnect connector (3) of heated oxygen sensor and hoist vehicle.
- 4) Remove heated oxygen sensor (1) from exhaust manifold or exhaust pipe.

## INSTALLATION

Reverse removal procedure noting the following.

- Tighten heated oxygen sensor (1) to specified torque.

**Tightening torque**

**Heated oxygen sensor (a) : 45 N·m (4.5 kg-m, 32.5 lb-ft)**

- Connect connector of heated oxygen sensor (1) and clamp wire harness securely.
- Fit HO2S-2 harness grommet to vehicle floor securely.
- After installing heated oxygen sensor (1), start engine and check that no exhaust gas leakage exists.

[A] : HO2S-1
[B] : HO2S-2

## Vehicle speed sensor (VSS)

### INSPECTION

Check vehicle speed sensor referring to step 3 of DTC P0500 (No.16) Flow Table. If malfunction is found, replace.

### REMOVAL/INSTALLATION

Refer to Section 7A1. (For M/T vehicle)

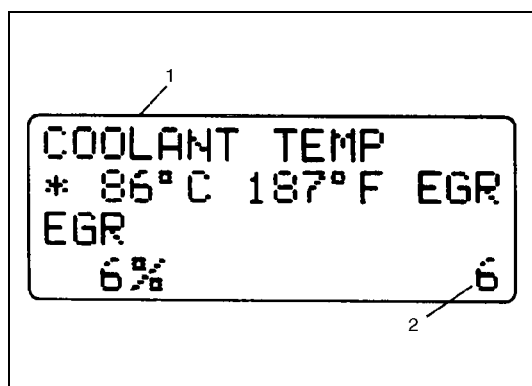
Refer to Section 7B1. (For A/T vehicle)

## Emission Control System

### EGR system

#### SYSTEM INSPECTION (USING SUZUKI SCAN TOOL)

- 1) Connect SUZUKI scan tool to DLC with ignition switch OFF.
- 2) Turn ignition switch ON and then select "DATA LIST" mode on scan tool.
- 3) Make sure that vehicle condition is as following.
  - Vehicle speed = 0 km/h (0 KPH)
  - Engine speed  $\leq$  3000 rpm
- 4) Clear DTC by using "CLEAR INFO" mode.
- 5) With engine idling (without depressing accelerator pedal), open EGR valve by using "STEP EGR" mode in "MISC TEST" menu. 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, poor performance of ECT sensor or TP sensor or DTC and/or pending DTC is (are) stored in ECM memory.

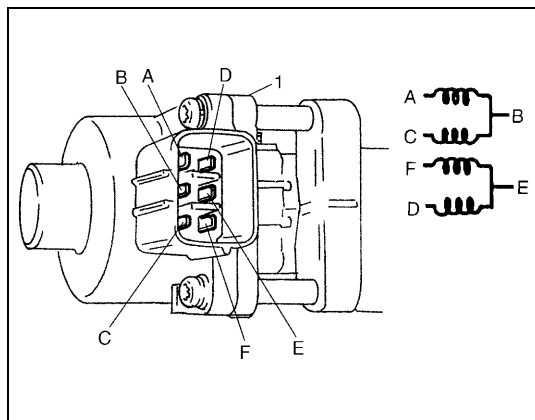


1. SUZUKI scan tool display
2. EGR valve opening (0: Close, 100: Full Open)

### REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Remove engine cover.
- 3) Remove EGR pipe.
- 4) Disconnect EGR valve connector.
- 5) Remove EGR valve and gasket from cylinder head.



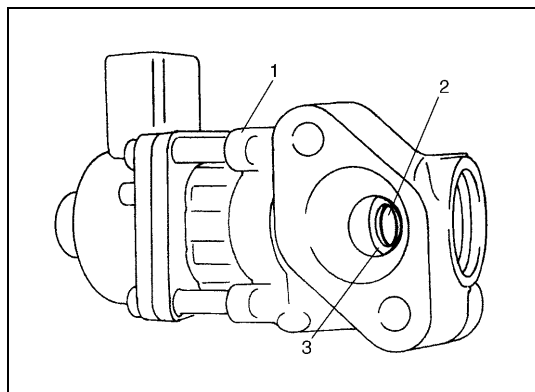
**INSPECTION**

- 1) Check resistance between following terminals of EGR valve (1) in each pair.

If found faulty, replace EGR valve assembly.

**EGR valve resistance**

Terminal	Standard resistance
A – B	20 – 24 $\Omega$
C – B	
F – E	
D – E	



- 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 (1), valve seat (2) and rod.**

- 3) Inspect valve (2), valve seat and rod for fault, cracks, bend or other damage.

If found faulty, replace EGR valve assembly.

**INSTALLATION**

Reverse removal procedure noting following.

- Clean mating surface of valve and intake manifold.
- Use new gaskets.

## SECTION 6K

# EXHAUST SYSTEM

**NOTE:**

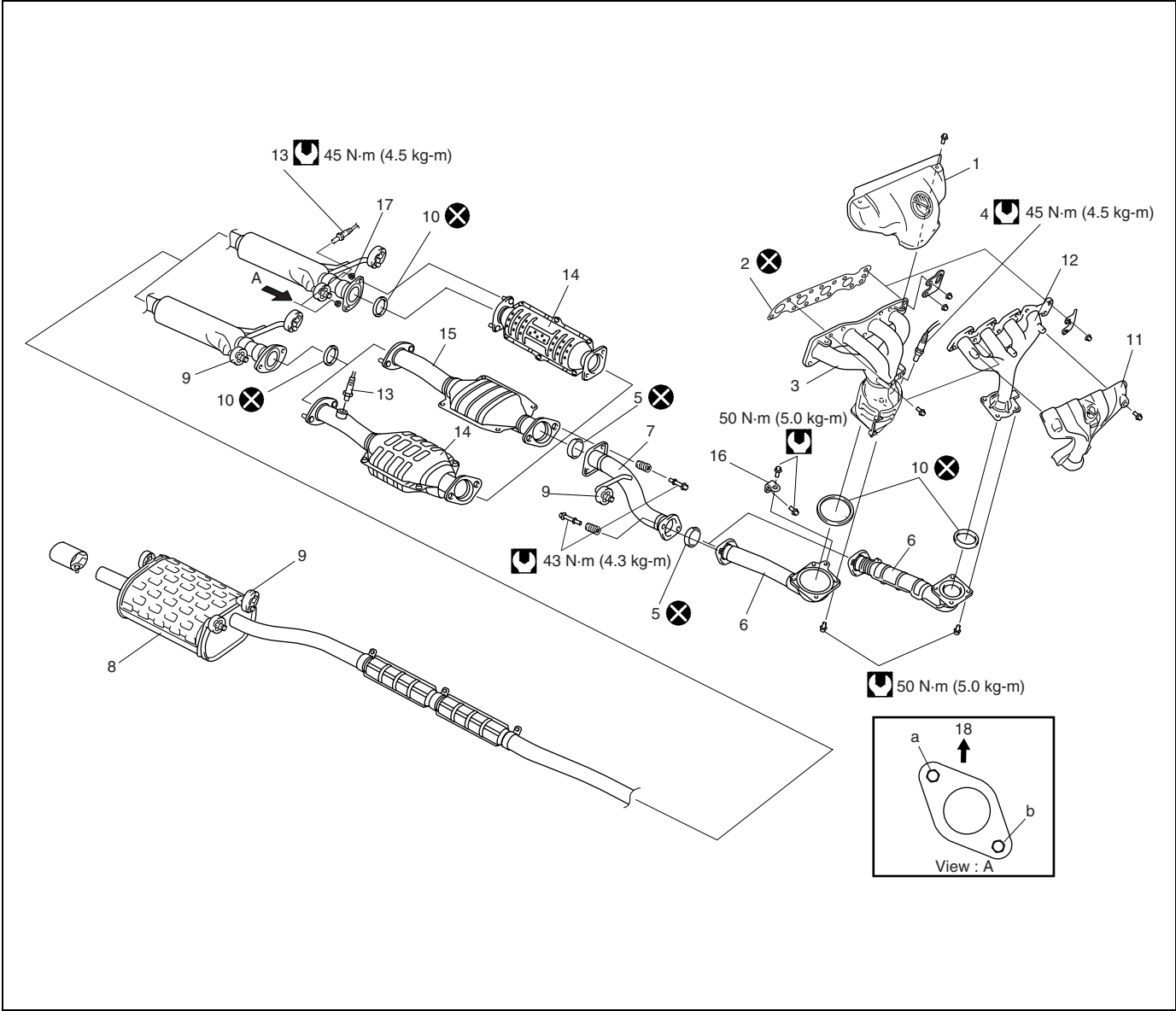
For the items with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.




### CONTENTS

<b>General Description</b> .....	*	<b>Exhaust Manifold</b> .....	*
<b>On-Vehicle Service</b> .....	<b>6K-2</b>	<b>Exhaust Pipe</b> .....	*
<b>Components</b> .....	<b>6K-2</b>		

On-Vehicle Service

Components



1. Exhaust manifold cover (with oxygen sensor)	8. Muffler	15. Exhaust chamber
2. Gasket	9. Muffler mounting	16. Exhaust manifold stiffener (with transmission stiffener)
3. Exhaust manifold (with oxygen sensor)	10. Gasket	 17. Exhaust pipe nut: Tighten exhaust pipe nut (a) first and next (b) as shown in View "A".
4. Oxygen sensor No.1	11. Exhaust manifold cover (without oxygen sensor)	18. Upper side
5. Seal ring	12. Exhaust manifold (without oxygen sensor)	 Tightening torque
6. Exhaust No.1 pipe	13. Oxygen sensor No.2	 Do not reuse.
7. Exhaust No.2 pipe	14. Catalyst case	

**WARNING:**

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

## SECTION 7A1

## MANUAL TRANSAXLE

7A1

**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 items with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD” of this manual.

## CONTENTS

<b>General Description</b> .....	<b>7A1-2</b>	Main shaft and countershaft.....	*
Construction and Servicing .....	7A1-2	Right case .....	*
Transaxle for 2WD model.....	7A1-3	Sub Assembly Service .....	7A1-13
Transaxle for 4WD model.....	7A1-4	Right case .....	*
Gear shift mechanism .....	*	Left case.....	*
5th & reverse gear shift cam .....	*	Input shaft assembly .....	*
<b>Diagnosis</b> .....	*	Counter shaft assembly .....	7A1-13
<b>On-Vehicle Service</b> .....	*	Gear shift & select shaft assembly.....	7A1-17
Oil Change .....	*	High speed and low speed gear shift	
Differential Side Oil Seal .....	*	shafts.....	*
Gear Shift Control Lever and Cable .....	*	5th & rev gear shift shafts .....	*
Vehicle Speed Sensor (VSS) .....	*	Transfer assembly.....	*
<b>Unit Repair Overhaul</b> .....	<b>7A1-5</b>	Differential assembly.....	*
Transaxle Unit .....	7A1-5	Assembling Unit .....	7A1-18
Transaxle Case .....	7A1-6	Differential to left case	
Input & Counter Shaft.....	7A1-7	(for 2WD model) .....	*
Gear Shifter .....	7A1-8	Left case.....	*
Differential .....	*	Fifth gears .....	7A1-18
Transfer .....	*	Gear shift and select shaft assembly ...	7A1-22
Transaxle Unit .....	7A1-9	Installation of transfer & differential	
Disassembling Unit .....	7A1-11	(for 4WD model) .....	*
Transfer and differential		<b>Tightening Torque Specification</b> .....	<b>7A1-23</b>
(for 4WD model) .....	*	<b>Required Service Material</b> .....	*
Gear shift and select shaft assembly		<b>Special Tool</b> .....	*
and fifth gears.....	7A1-11		

## General Description

### Construction and Servicing

The transaxle provides five forward speeds and one reverse speed by means of three synchronizer mesh devices and three shafts: input shaft, countershaft and reverse gear shaft. All forward gears are in constant mesh, and reverse uses a sliding idler gear arrangement.

The low speed synchronizer mesh device is mounted on countershaft and engaged with countershaft first gear or second gear, while the high speed synchronizer mesh device is done on input shaft and engaged with input shaft third gear or fourth gear.

The fifth speed synchronizer mesh device on input shaft is engaged with input shaft fifth gear mounted on the input shaft.

There are two types of the reverse shift braking device to prevent the reverse gear from emitting the cracking noise at shifting the gear into the reverse. One is the type which utilizes the 5th synchromesh and another is that which utilizes the 2nd synchromesh to apply the brake on input shaft rotation. Each type is identified whether the 5th synchronizer mesh device is the lever synchro type or the key synchro type.

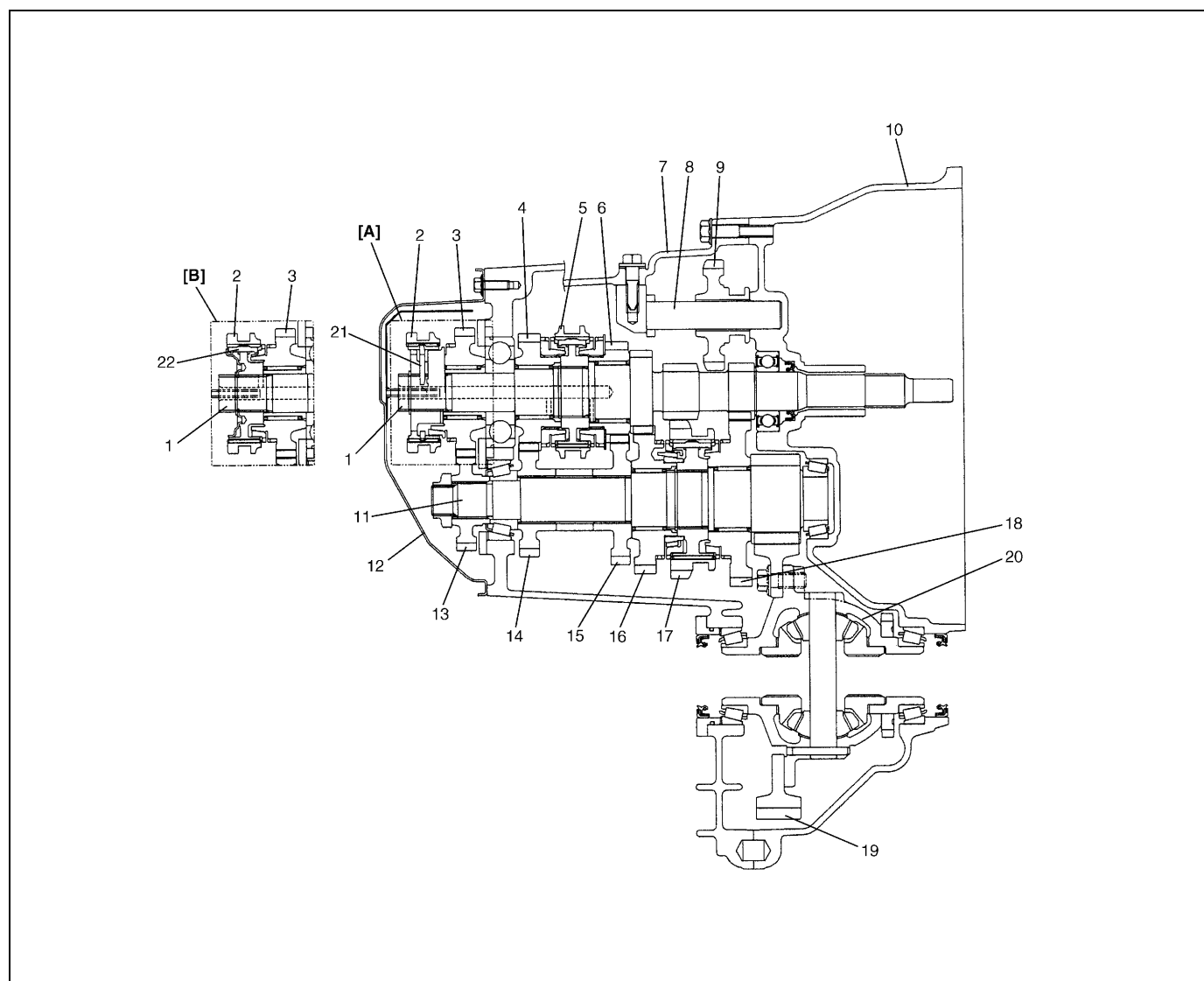
The countershaft turns the final gear and differential assembly, thereby turning the front drive shafts which are attached to the front wheels.

4WD model uses a full-time 4WD system in which a viscous coupling is installed between propeller shaft No.1 and No.2 so that optimum amount of drive force is distributed to the front and rear wheels according to the driving conditions.

For servicing, it is necessary to use genuine sealant or its equivalent on mating surfaces of transaxle case which is made of aluminum. The case fastening bolts must be tightened to specified torque by means of torque wrench. It is also important that all parts are thoroughly cleaned with cleaning fluid and air dried before reassembling.

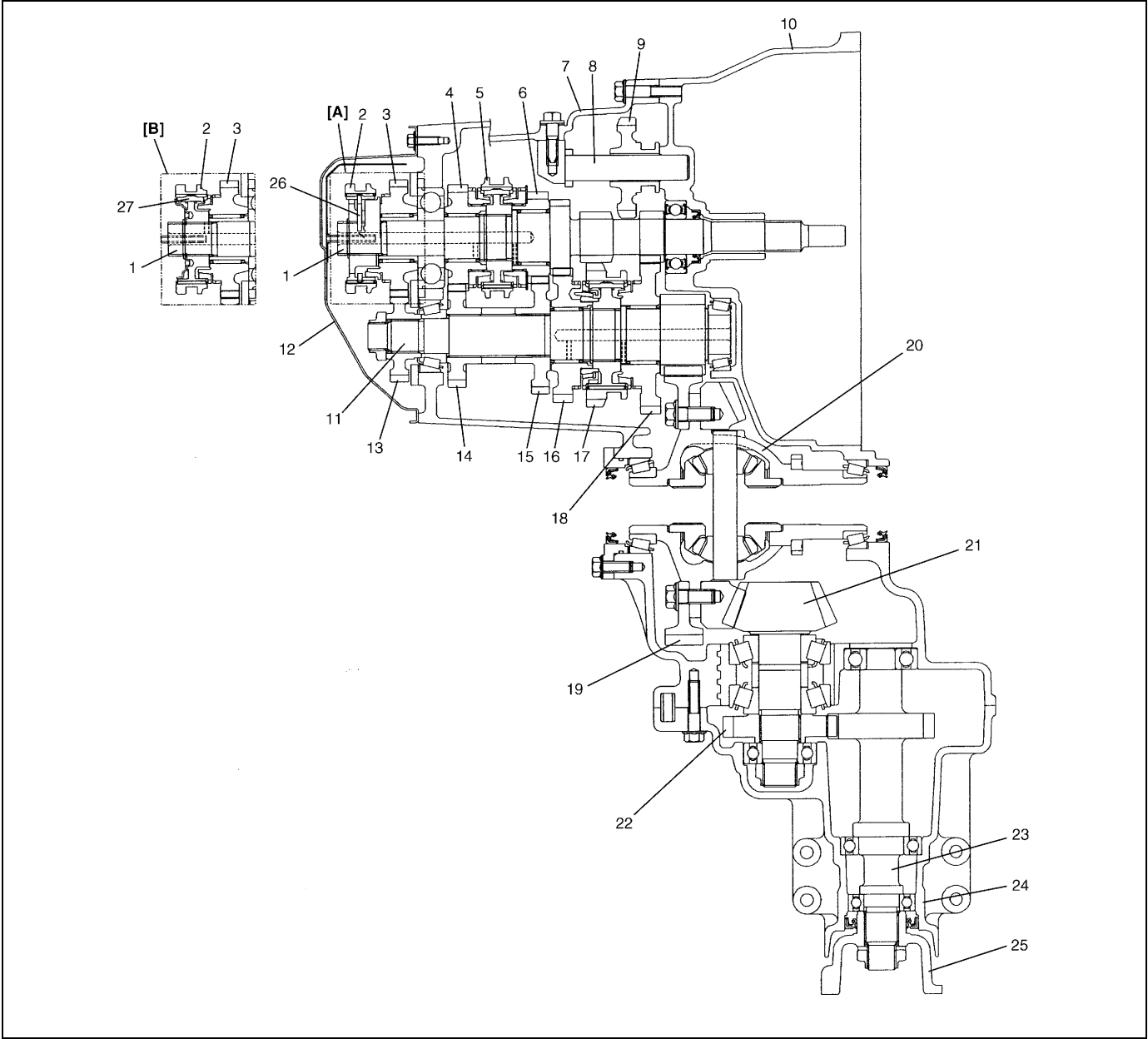
Further, care must be taken to adjust preload of countershaft taper roller bearings. New synchronizer rings are prohibited from being lapped with respective gear cones by using lapping compound before they are assembled.

## Transaxle for 2WD model



1. Input shaft	7. Left case	13. Countershaft 5th gear	19. Final gear
2. 5th speed sleeve & hub	8. Reverse gear shaft	14. Countershaft 4th gear	20. Differential case
3. Input shaft 5th gear	9. Reverse idler gear	15. Countershaft 3rd gear	21. 5th speed synchronizer lever
4. Input shaft 4th gear	10. Right case	16. Countershaft 2nd gear	22. Synchronizer key
5. High speed sleeve & hub	11. Countershaft	17. Low speed sleeve & hub	[A] Lever synchro type
6. Input shaft 3rd gear	12. Side cover	18. Countershaft 1st gear	[B] Key synchro type

Transaxle for 4WD model

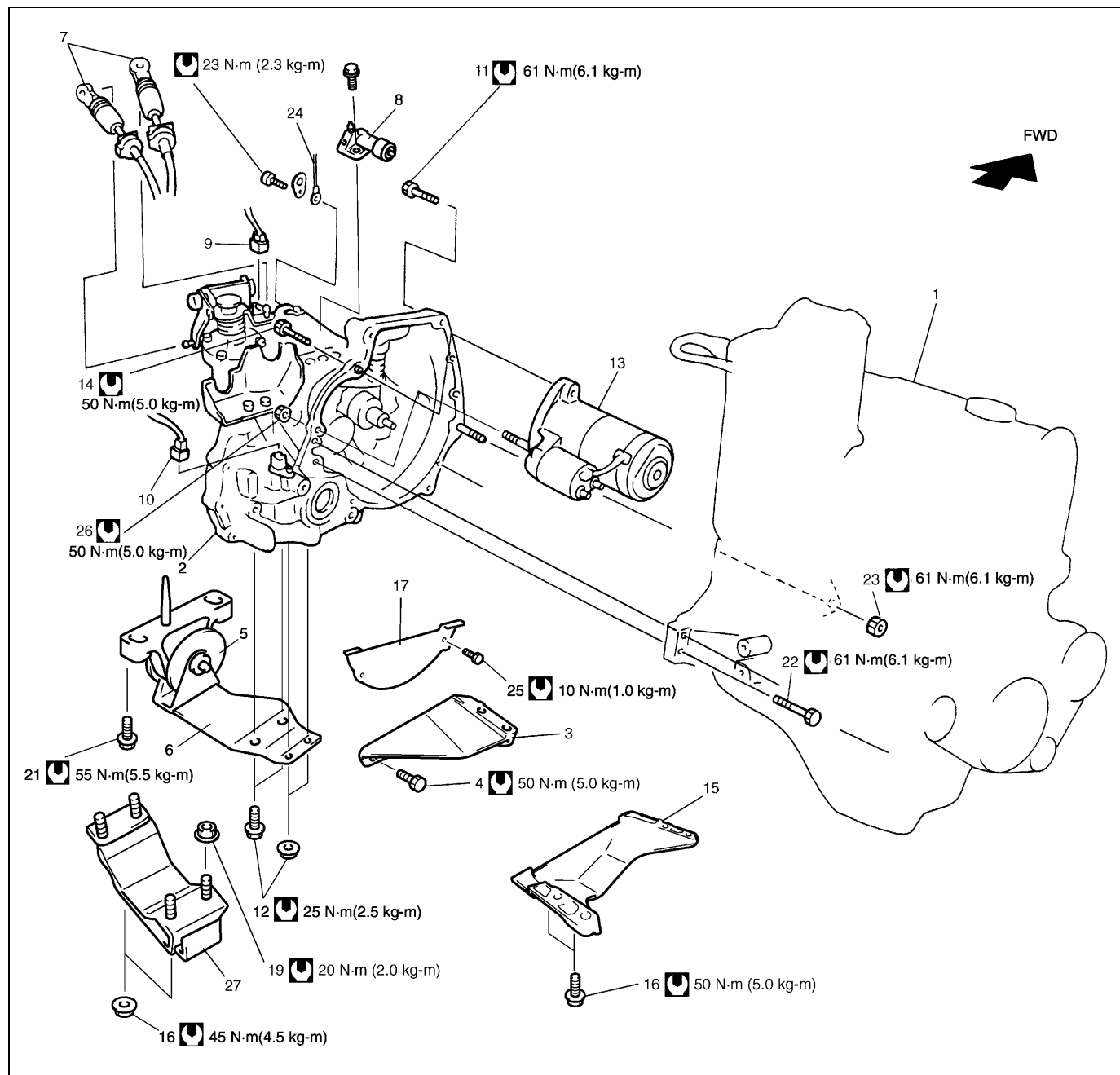



1. Input shaft	9. Reverse idler gear	17. Low speed sleeve & hub	25. Transfer output flange
2. 5th speed sleeve & hub	10. Right case	18. Countershaft 1st gear	26. 5th speed synchronizer lever
3. Input shaft 5th gear	11. Countershaft	19. Final gear	27. Synchronizer key
4. Input shaft 4th gear	12. Side cover	20. Front differential	[A] Lever synchro type
5. High speed sleeve & hub	13. Countershaft 5th gear	21. Transfer output pinion	[B] Key synchro type
6. Input shaft 3rd gear	14. Countershaft 4th gear	22. Transfer drive gear	
7. Left case	15. Countershaft 3rd gear	23. Transfer output shaft	
8. Reverse gear shaft	16. Countershaft 2nd gear	24. Transfer output case	

# Unit Repair Overhaul

## Transaxle Unit

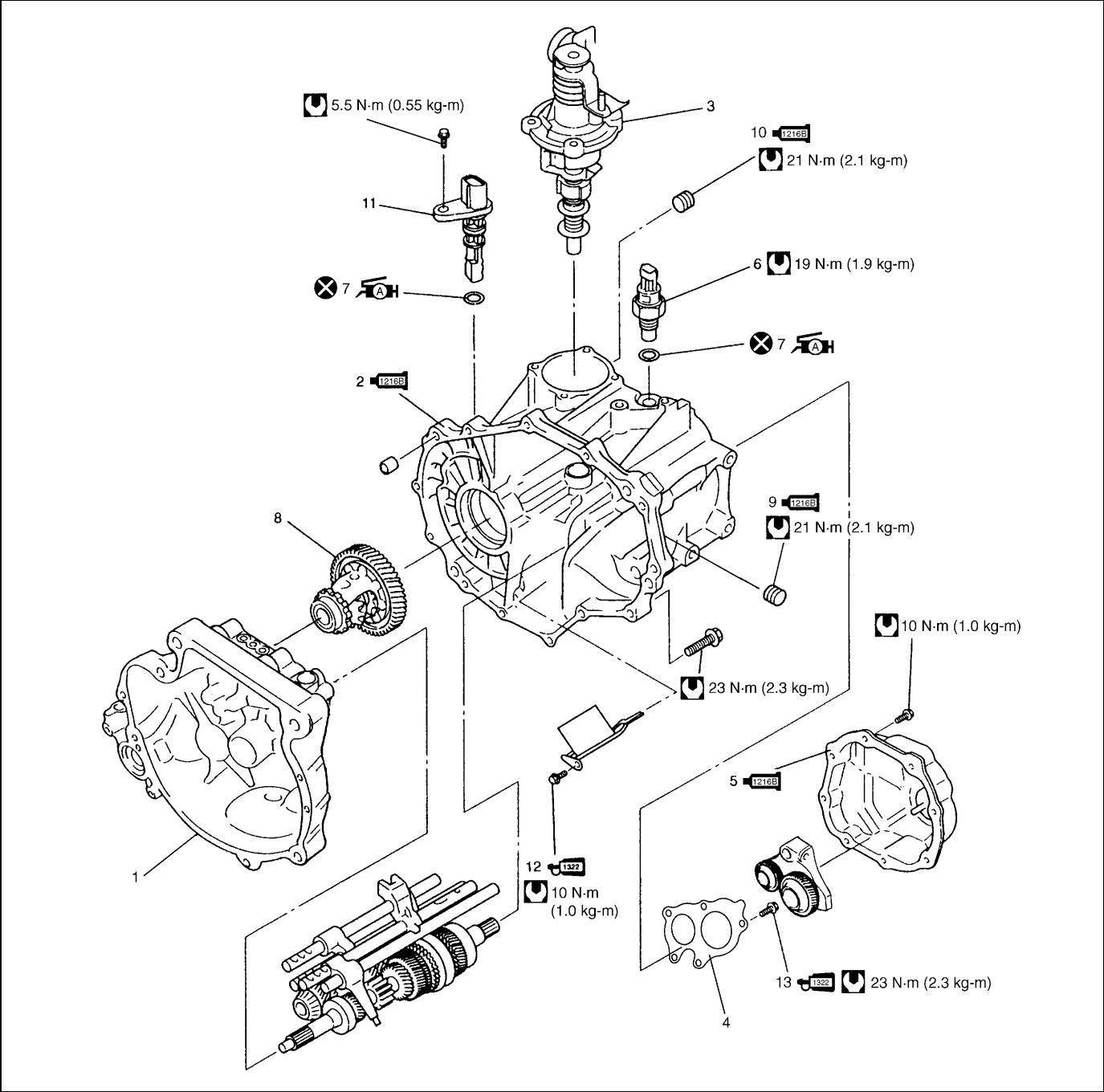
### COMPONENTS



1. Engine	11. Transaxle to engine bolts	21. Engine left mounting bolts
2. Transaxle	12. Engine left mounting bracket bolts and nuts	22. Engine to transaxle bolts
3. Lower stiffener for 4WD model	13. Starting motor	23. Transaxle to engine nut
4. Lower stiffener bolts	14. Starting motor bolt	24. Ground cable
5. Engine left mounting	15. Lower stiffener for 2WD model	25. Clutch housing lower plate bolts
6. Engine left mounting bracket	16. Lower stiffener bolts	26. Starting motor nut
7. Shift & select control cables	17. Clutch housing lower plate for 4WD model	27. Engine rear mounting for 4WD model
8. Clutch operating cylinder	18. Blank	 Tightening torque
9. Backup lamp switch connector	19. Engine rear mounting to transaxle nut for 4WD model	
10. VSS connector	20. Blank	



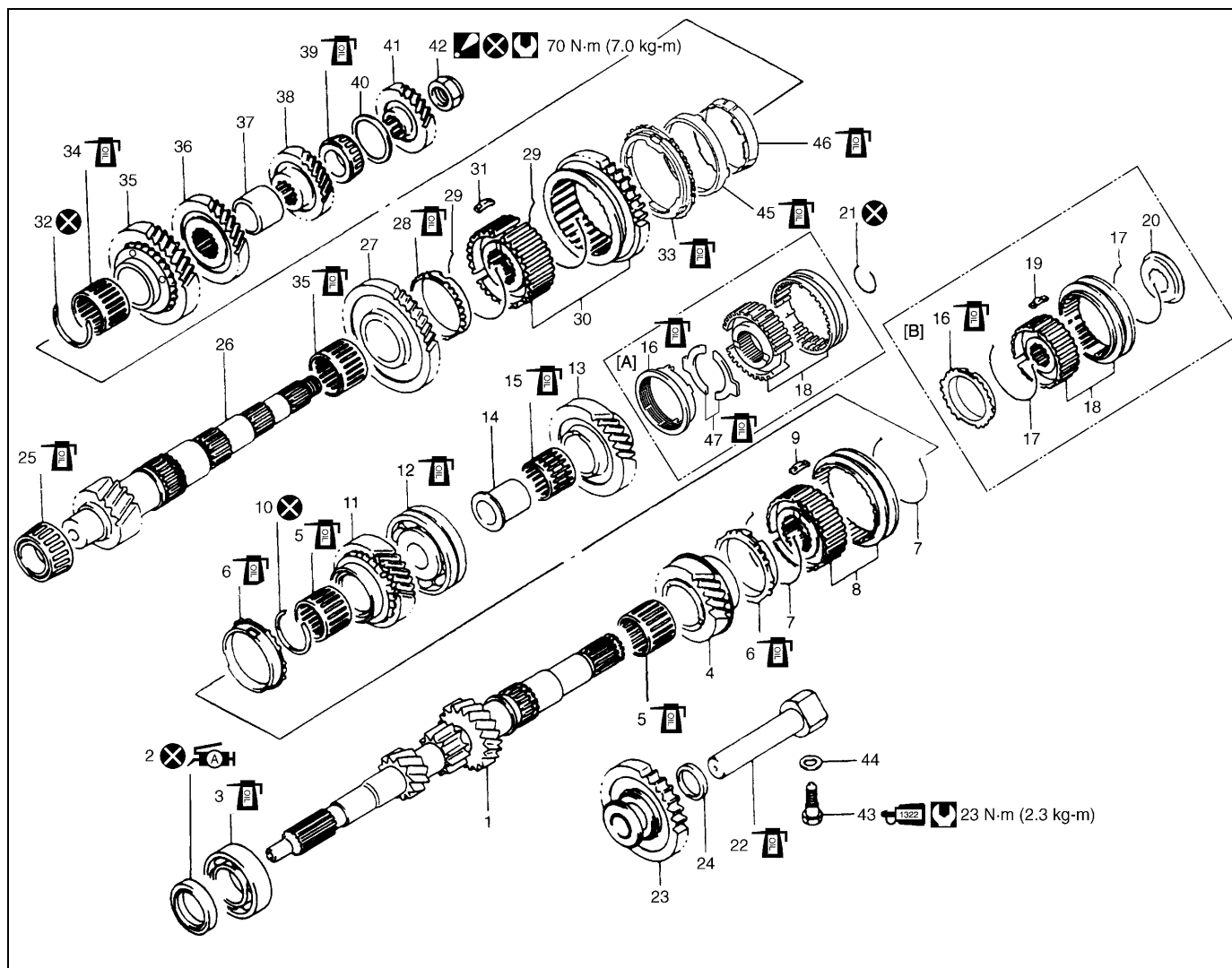
Transaxle Case  
 COMPONENTS



1. Transaxle right case	9. Oil level/filler plug : Apply sealant 99000-31230 to all around thread part of plug.
2. Transaxle left case : Apply sealant 99000-31230 to mating surface of left case and right case.	10. Oil drain plug : Apply sealant 99000-31230 to all around thread part of plug.
3. Gear shifter assembly	11. VSS
4. Transaxle left case plate	12. Oil gutter bolt : Apply thread lock 99000-32110 to all around thread part of bolt.
5. Transaxle side cover : Apply sealant 99000-31230 to mating surface of side cover and left case.	13. Left case plate bolt : Apply thread lock 99000-32110 to all around thread part of bolt.
6. Backup lamp switch	Tightening torque
7. O-ring : Apply SUZUKI SUPER GREASE A 99000-25010 to O-ring.	Do not reuse.
8. Differential assembly	

# Input & Counter Shaft

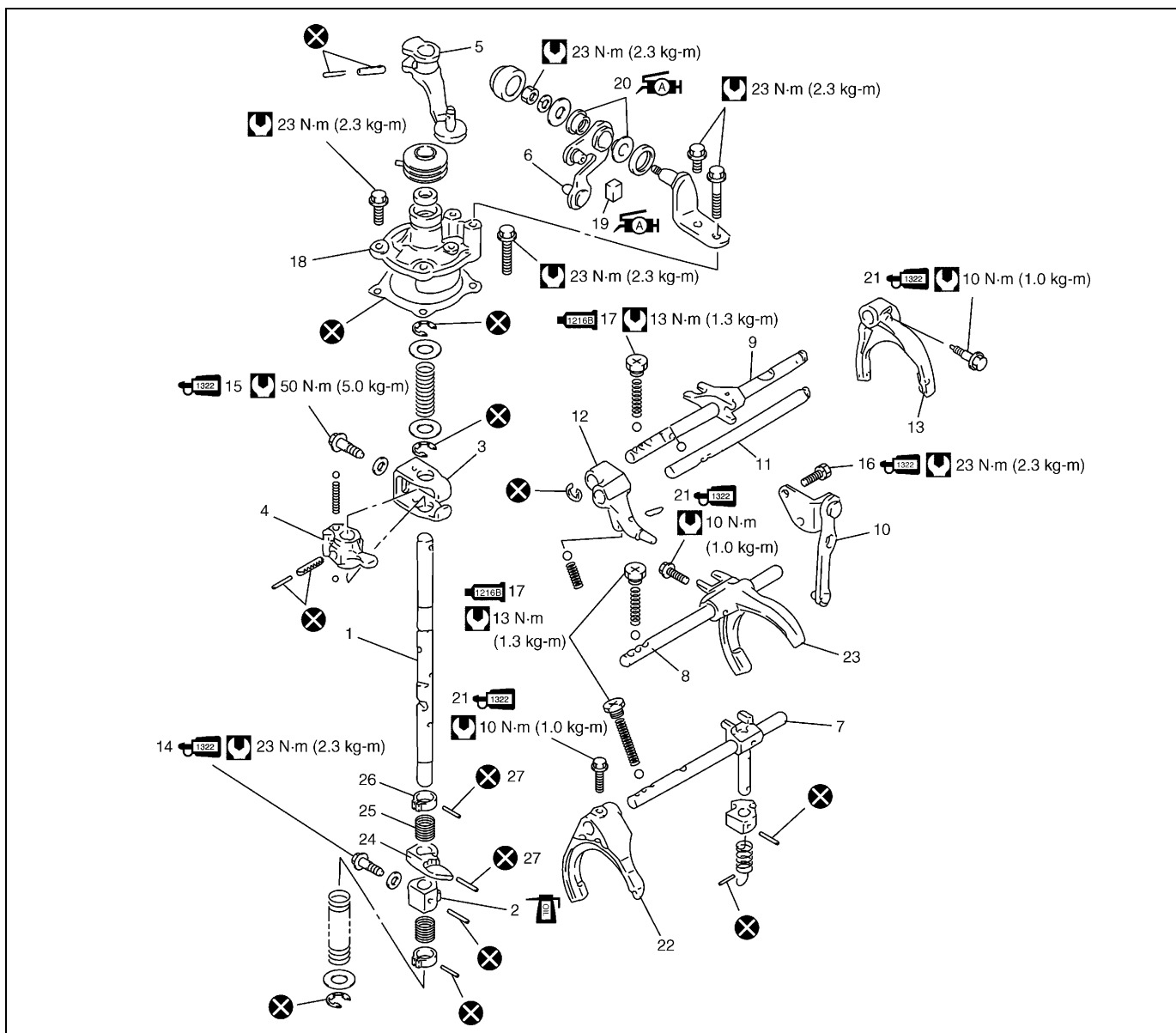
## COMPONENTS



1. Input shaft	19. 5th synchronizer key	37. 3rd & 4th gear spacer
2. Oil seal : Apply grease 99000-25010 to oil seal lip.	20. 5th synchronizer hub plate	38. Countershaft 4th gear
3. Input shaft right bearing	21. Circlip	39. Countershaft left bearing
4. Input shaft 3rd gear	22. Reverse gear shaft	40. Bearing set shim
5. Needle bearing	23. Reverse idler gear	41. Countershaft 5th gear
6. High speed synchronizer ring	24. Reverse shaft washer	42. Countershaft nut : After tightening nut to specified torque, caulk nut securely.
7. High speed synchronizer spring	25. Countershaft right bearing	43. Reverse shaft bolt : Apply thread lock cement 99000-32110 to thread part of bolt.
8. High speed sleeve & hub	26. Countershaft	44. Washer
9. High speed synchronizer key	27. Countershaft 1st gear	45. Center cone
10. Circlip	28. 1st gear synchronizer ring	46. 2nd gear synchronizer inner ring
11. Input shaft 4th gear	29. Low speed synchronizer spring	47. 5th speed synchronizer lever
12. Input shaft left bearing	30. Low speed sleeve & hub	[A] Lever synchro type
13. Input shaft 5th gear	31. Low speed synchronizer key	[B] Key synchro type
14. 5th gear spacer	32. Circlip	Tightening torque
15. 5th gear needle bearing	33. 2nd gear synchronizer outer ring	Do not reuse.
16. 5th speed synchronizer ring	34. Needle bearing	Apply transaxle oil.
17. 5th synchronizer spring	35. Countershaft 2nd gear	
18. 5th speed sleeve & hub	36. Countershaft 3rd gear	

# Gear Shifter

## COMPONENTS



1. Gear shift & select shaft	11. 5th & reverse gear shift guide shaft	21. Shift fork bolt : Apply thread lock 99000-32110 to bolt thread.
2. 5th & reverse gear shift cam	12. Reverse gear shift arm	22. Low speed gear shift fork
3. Gear shift interlock plate	13. 5th gear shift fork	23. High speed gear shift fork
4. Gear shift & select lever	14. 5th to reverse interlock guide bolt : Apply thread lock 99000-32110 to bolt thread.	24. Gear shift No.1 cam for key synchro type only
5. Shift cable lever	15. Gear shift interlock bolt : Apply thread lock 99000-32110 to bolt thread.	25. Cam guide return spring for key synchro type only
6. Select cable lever	16. Reverse gear shift lever bolt : Apply thread lock 99000-32110 to all around thread part of bolt.	26. Gear shift No.1 cam guide for key synchro type only
7. Low speed gear shift shaft	17. Gear shift locating bolt : Apply sealant 99000-31230 to bolt thread.	27. Spring pin for key synchro type only
8. High speed gear shift shaft	18. Guide case	Tightening torque
9. 5th & reverse gear shift shaft	19. Select lever shaft bush : Apply grease 99000-25010 to whole area of bush.	Do not reuse.
10. Reverse gear shift lever	20. Select lever boss : Apply grease 99000-25010 to internal and external diameter.	

## Transaxle Unit

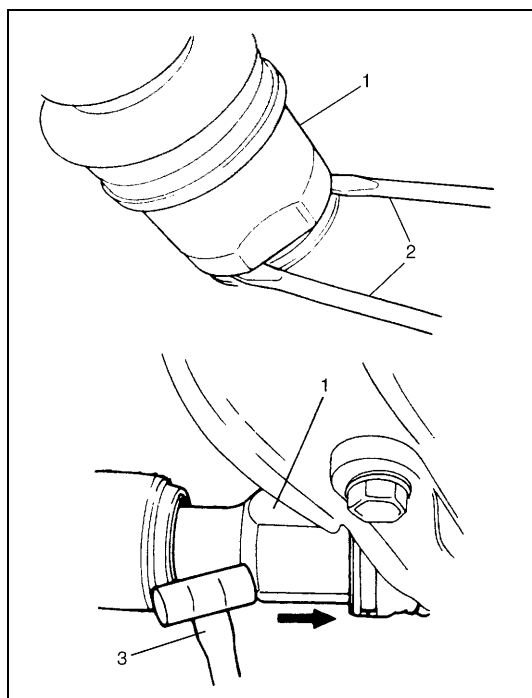
### DISMOUNTING

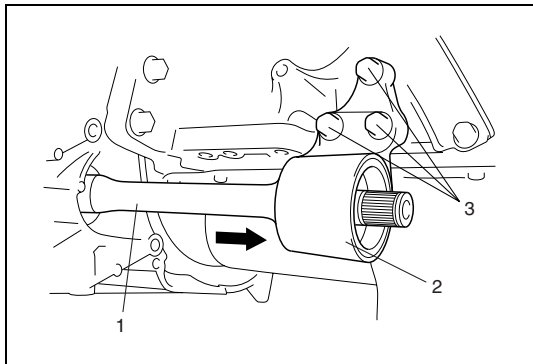
#### UNDER HOOD

- 1) Disconnect battery ground cable.
- 2) Remove clutch operating cylinder from transaxle with hose still attached.
- 3) Remove gear control cables.
- 4) Remove water intake pipe bolts.
- 5) Undo wiring harness clamps and connectors.
- 6) Remove ground cable from transaxle.
- 7) Remove starting motor taking out its bolt and nut.
- 8) Remove transaxle fastening bolts.
- 9) Support engine by using lifting device.

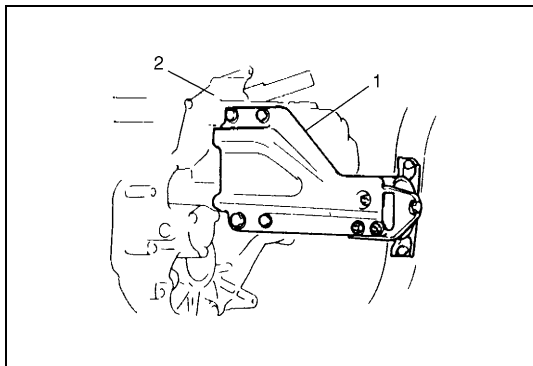
#### ON LIFT

- 1) Drain transaxle oil.
- 2) Remove engine under covers.
- 3) Remove exhaust No.1 pipe and exhaust No.2 pipe.
- 4) For 4WD model, remove propeller shaft No.1 referring to Section 4B.
- 5) Remove lower stiffener.
- 6) For 4WD model, Remove clutch housing lower plate.
- 7) Remove ball stud bolt from right and left knuckles, then disconnect each suspension arm.
- 8) Using flat head rod or the like (2), pull out drive shaft joint (1) at differential side so as to release snap ring fitting of joint (for LH drive shaft).  
Using plastic hammer (3), drive out drive shaft joint so as to release snap ring fitting of joint spline at center shaft (for RH drive shaft)





- 9) Remove center shaft support bolts (3) and remove center shaft support (2) with center shaft (1) from differential side gear.



- 10) For 2WD model, remove engine rear mounting No.1 bracket with No.2 bracket referring to Section 6A1.  
For 4WD model, remove suspension frame referring to "Front Suspension Frame" in Section 3.
- 11) Remove transaxle to engine bolts and nut.
- 12) Lower vehicle and support transaxle with transmission jack.
- 13) Remove engine LH mounting with bracket (1).

#### 2. Transaxle

- 14) Remove other attached parts from transaxle, if any.
- 15) Pull transaxle out so as to disconnect input shaft from clutch disc and then lower it.

### REMountING

#### CAUTION:

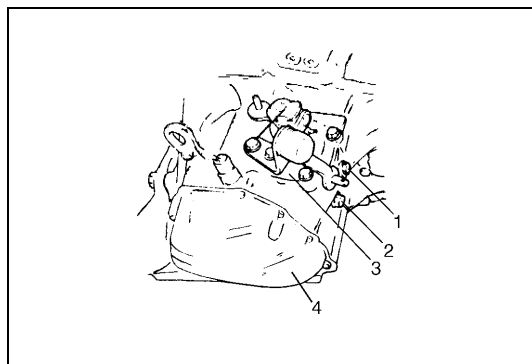
- Care should be taken not to scratch oil seal lip with drive shaft while raising transaxle.
- Do not hit drive shaft joint with hammer when installing it into differential gear.

For remounting, reverse dismounting procedure noting the followings.

- Push in drive shaft joints fully so as to engage snap ring of shaft with differential gear or center shaft.
- Set each clamp for wiring securely.
- Fill transaxle with oil as specified.
- Connect battery and check function of engine, clutch and transaxle.

## Disassembling Unit

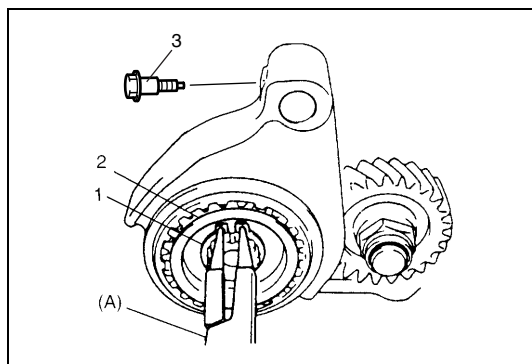
### Gear shift and select shaft assembly and fifth gears



- 1) Remove gear shift interlock bolt (1) and 5th to reverse interlock guide bolt (2) from transaxle case.
- 2) Remove gear shift & select shaft assembly (3).
- 3) Remove 9 bolts and take off transaxle side cover (4).

#### CAUTION:

Care should be taken not to distort side cover when it is removed from left case.

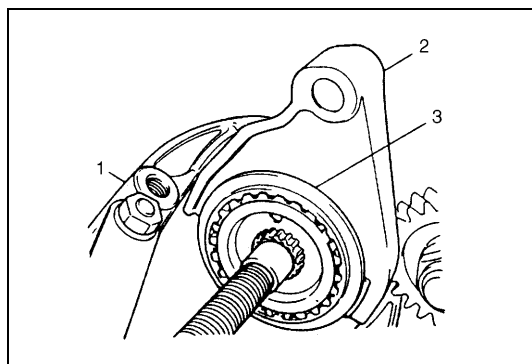


- 4) Using special tool, remove circlip (1) and then hub plate (2) if equipped.

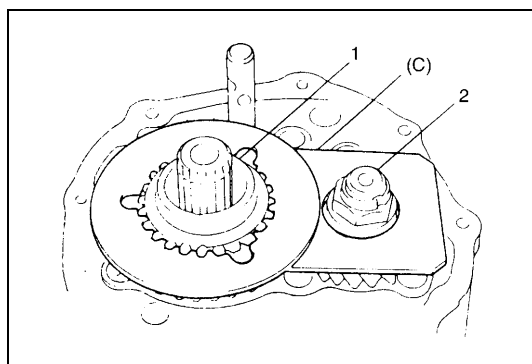
#### Special tool

(A) : 09900-06107

- 5) Remove 5th shift fork shaft bolt (3).



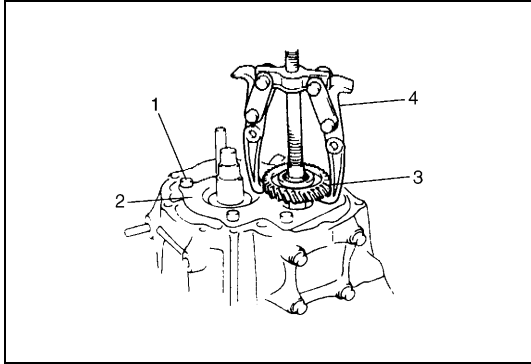
- 6) Remove gear shift fork (2), sleeve & hub assembly (3), synchronizer ring and 5th gear all together. Use gear puller (1) for removal if spline fitting of hub is tight.



- 7) Unfasten caulking of countershaft nut (2), install input shaft 5th gear (1) and special tool to stop rotation of shafts, and then remove countershaft nut (2).

#### Special tool

(C) : 09927-76060

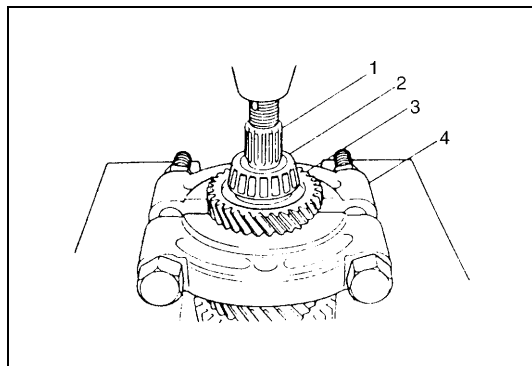


- 8) Remove input shaft 5th gear, needle bearing and then counter shaft 5th gear (3). Gear puller (4) would be necessary if spline fitting of countershaft 5th gear is tight.
- 9) Remove bolts (1) and take off left case plate (2), and then bearing set shim.

## Sub Assembly Service

### Counter shaft assembly

#### DISASSEMBLY

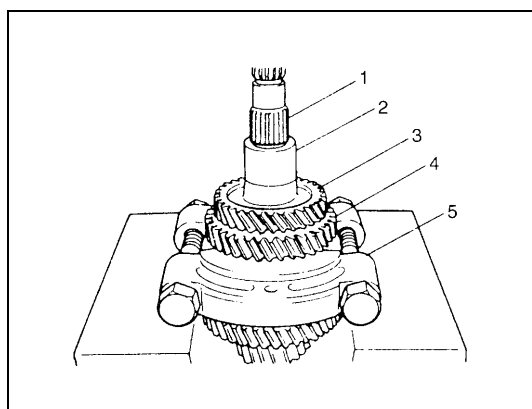


#### CAUTION:

- Use puller and hydraulic press that will bear at least 5 ton (11,000 lb) safely.
- To avoid tooth damage, support 4th gear at flat side of puller.

- 1) Drive out left bearing cone (2) with 4th gear (3) by using puller (4) and hydraulic press.

1 : Countershaft

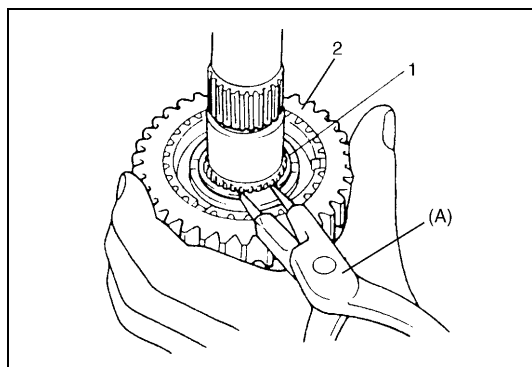


#### CAUTION:

If compression exceeds 5 ton (11,000 lb), release compression once, reset puller support and then continue press work again.

- 2) Apply puller (5) to 2nd gear (4) and drive out 3rd & 4th gear spacer (2) and 3rd gear (3) together with 2nd gear by using hydraulic press. Needle bearing would come out with 2nd gear.

1 : Countershaft



- 3) Take out 2nd synchronizer ring.

- 4) Using special tool, remove circlip (1).

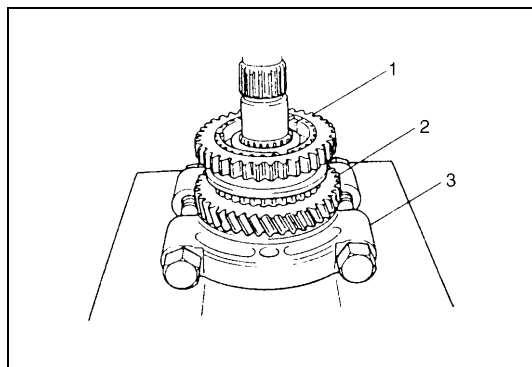
#### NOTE:

Correct tool tips to be flat to facilitate removal of circlip.

#### Special tool

(A) : 09900-06107

2 : Low speed synchronizer sleeve

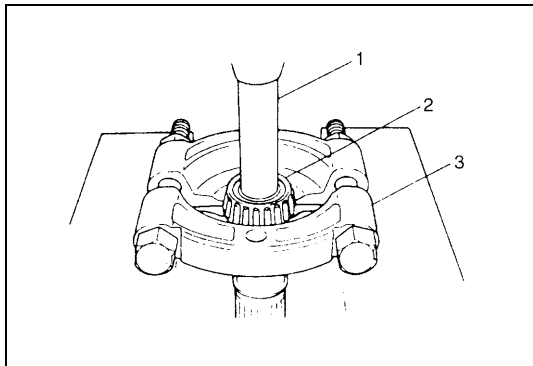


- 5) Apply puller (3) to 1st gear (2) and drive out low speed synchronizer sleeve & hub assembly (1) with gear by using hydraulic press.

- 6) Disassemble synchronizer sleeve & hub assembly.

- 7) Take out needle bearing from shaft.





- 8) Remove right bearing cone (2) by using puller (3), metal stick (1) and hydraulic press.

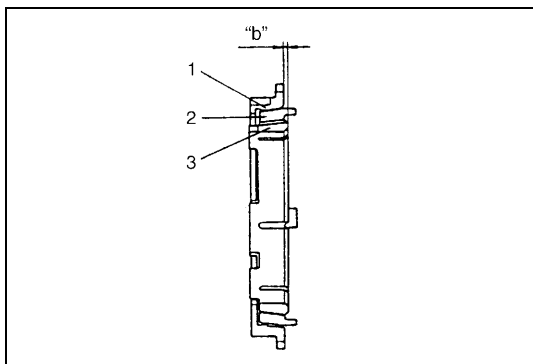
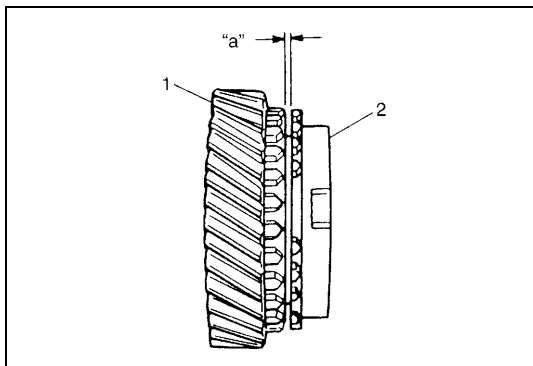
### INSPECTION AND ASSEMBLY

- 1) Clean all components thoroughly, inspect them for any abnormality and replace with new ones as necessary.
- 2) If synchronizer parts need to be repaired, check clearance "a" between ring (2) and gear (1), each chamfered tooth of gear, ring and sleeve, then determine parts replacement.

**Clearance "a" between synchronizer ring and gear**

**Standard : 1.0 - 1.4 mm (0.039 - 0.055 in.)**

**Service limit : 0.5 mm (0.019 in.)**

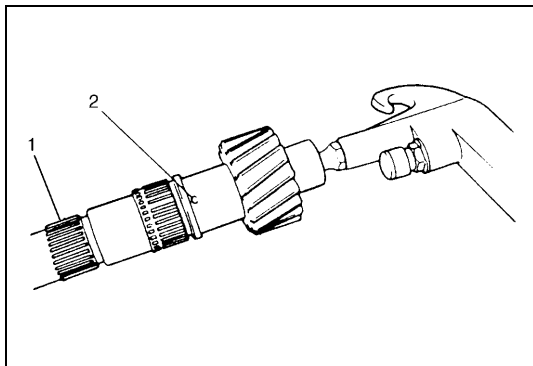


- 3) Put the synchronizer outer ring (1), inner ring (3) and the cone (2) together and then measure the step difference between the outer ring and the inner ring. And also check each chamfered tooth of gear and synchronizer ring and replace with new one, if necessary. Also, check gear tooth.

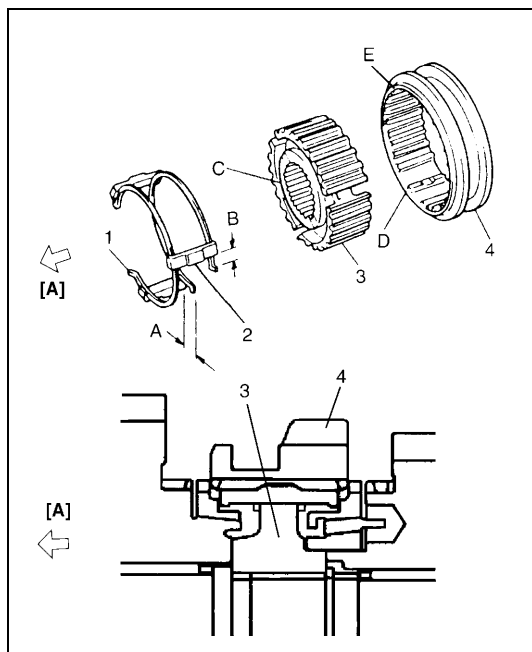
**Difference between synchronizer outer ring and inner ring**

**Standard "b" : 1.0 - 1.4 mm (0.039 - 0.055 in.)**

**Service limit "b" : 0.5 mm (0.019 in.)**



- 4) To ensure lubrication of countershaft (1), air blow oil holes (2) and make sure that they are free from any obstruction.



- 5) Fit low speed synchronizer sleeve (4) to hub (3), insert 3 keys (2) in it and then set springs (1) as shown in figure.

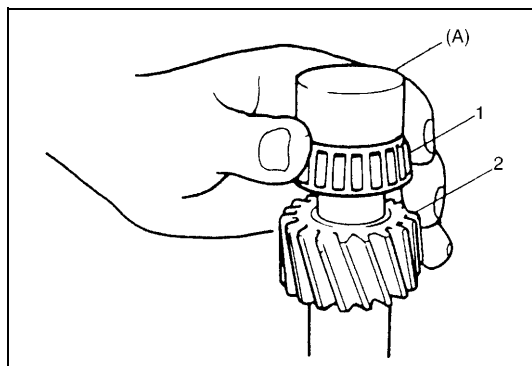
**NOTE:**

- No specific direction is assigned to each key but it is assigned as sleeve & hub assembly.
- Size of low speed synchronizer keys and springs are the largest compared with those of high speed and, if equipped, 5th speed ones.

**Synchronizer key installation position**

: A = B

[A] : 1st gear side
C : Key way

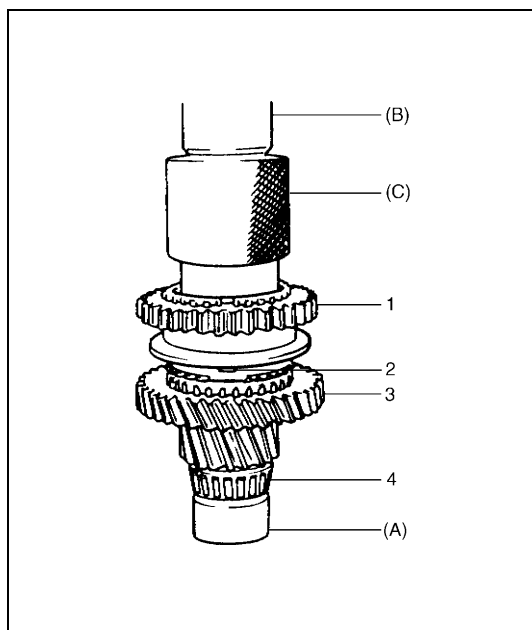


- 6) Install right bearing cone (1) by using special tool and hammer.

**Special tool**

(A) : 09923-78210

2 : Countershaft
------------------



- 7) Install needle bearing, apply oil to it, then install 1st gear and 1st gear synchronizer ring.

- 8) Drive in low speed sleeve & hub assembly (1) by using special tools and hammer.

**NOTE:**

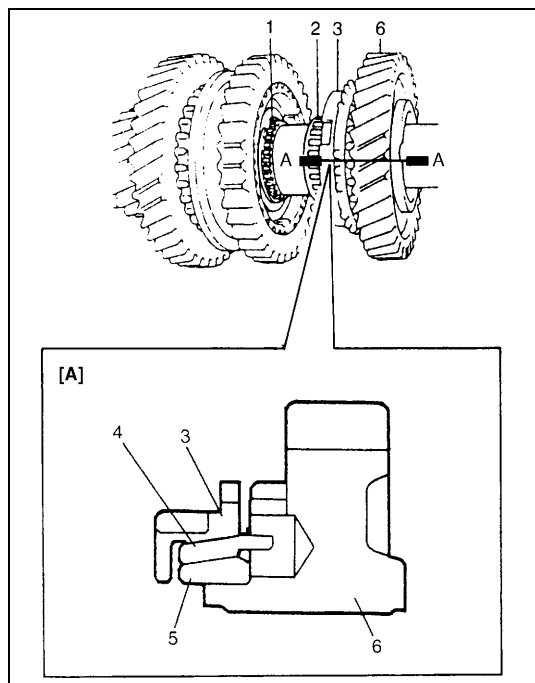
- Support shaft with special tool as shown in figure so that retainer of bearing cone (4) will be free from compression.
- Make sure that synchronizer ring key slots (2) are aligned with keys while press-fitting sleeve & hub assembly.
- Check free rotation of 1st gear (3) after press-fitting sleeve & hub assembly.

**Special tool**

(A) : 09923-78210

(B) : 09913-85210

(C) : 09940-54910

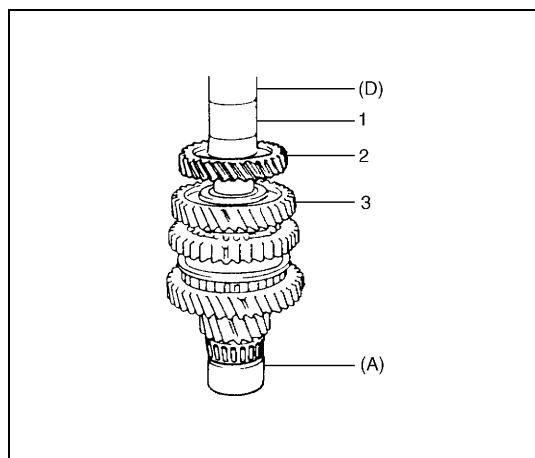


- 9) Install circlip (1) and confirm that circlip is installed in groove securely.

Install needle bearing (2) and apply oil to bearing.

With synchronizer outer ring (3), center cone (4) & inner ring (5) put together and install to 2nd gear (6) as shown in figure.

[A]: SECTION A - A



- 10) Press-fit 3rd gear (2) and spacer (1) by using special tool and hydraulic press.

**NOTE:**

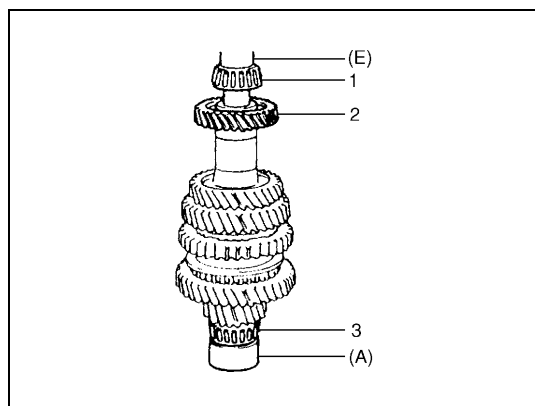
It is recommended to press-fit spacer and 3rd gear first, and then 4th gear later separately so that countershaft will not be compressed excessively.

**Special tool**

(A) : 09923-78210

(D) : 09913-85210

3. 2nd gear



- 11) Press-fit 4th gear (2) by using the same procedure as the above.

- 12) Install left bearing cone (1) by using special tool and hammer.

**NOTE:**

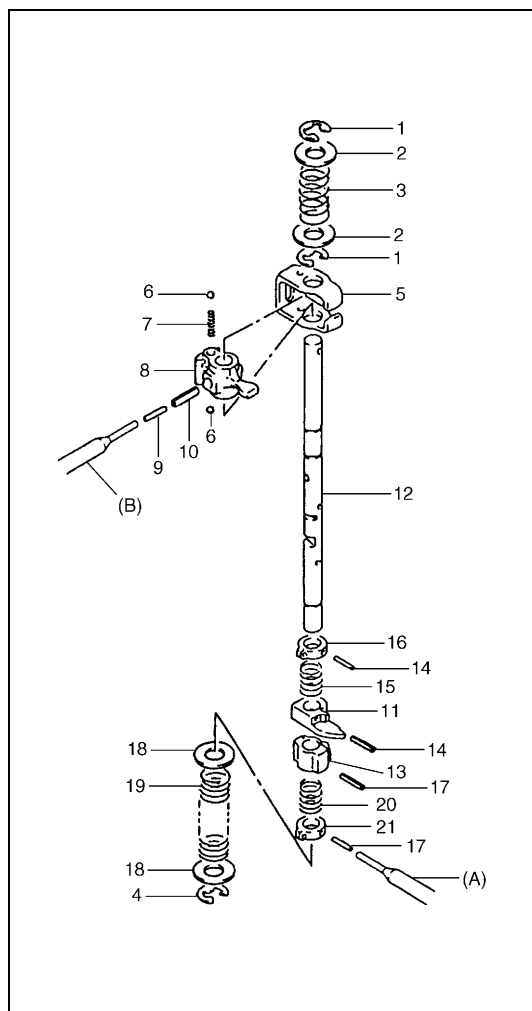
For protection of bearing cone (3), always support shaft with special tool as shown in figure.

**Special tool**

(A) : 09923-78210

(E) : 09913-80112

## Gear shift & select shaft assembly



- 1) To disassemble component parts, use special tools and 2.8-3.0 mm (0.11 in.) pin remover in addition.

### Special tool

(A) : 09922-85811 (4.5 mm)

(B) : 09925-78210 (6.0 mm)

- 2) Clean all parts thoroughly, inspect them and replace with new ones as required.
- 3) Assemble component parts by reversing removal procedure.

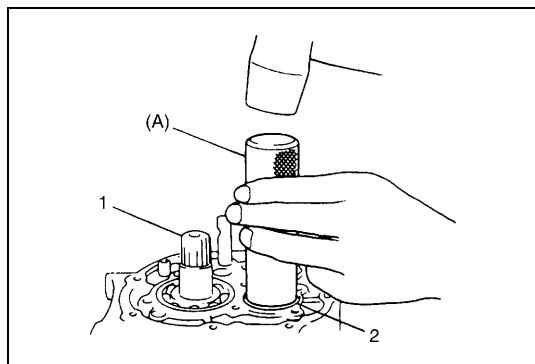
### NOTE:

- When driving in spring pins, prevent shaft from being bent by supporting it with wood block.
- Assemble 5th & reverse gear shift cam by winding cam guide return spring, and then drive in spring pin.
- Locate low speed select spring painted in white and reverse select spring painted in pink correctly.

1. E-ring	12. Gear shift select shaft
2. Thrust Washer	13. 5th/reverse gear shift cam
3. Reverse select spring	14. Spring pin for key synchro type only
4. E-ring	15. Cam guide return spring for key synchro type only
5. Gear shift interlock plate	16. Gear shift No.1 cam guide for key synchro type only
6. Ball	17. Spring pin
7. Gear shift interlock spring	18. Thrust washer
8. Gear shift select lever	19. Low select spring
9. Spring pin	20. Cam guide return spring
10. Spring pin	21. 5th/reverse gear shift cam guide
11. Gear shift No.1 cam for key synchro type only	

## Assembling Unit

### Fifth gears

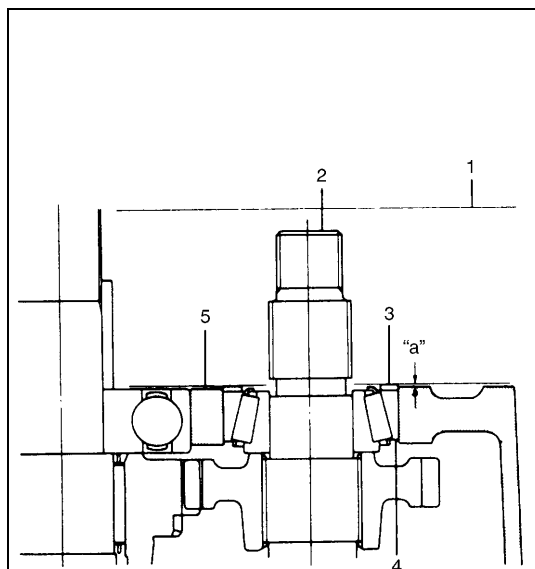


- 1) To seat countershaft left bearing cup (2) to bearing cone, tap cup by using special tool and plastic hammer.

#### Special tool

(A) : 09913-84510

1. Input shaft



- 2) Put a shim (3) on bearing cup (4) provisionally, place straight edge (1) over it and compress it by hand through straight edge, and then measure "a" which shows clearance between case surface (5) and straight edge by using feeler gauge (6).

#### Clearance between case surface and straight edge

"a" : 0.08 – 0.12 mm (0.0032 – 0.0047 in.)

- 3) By repeating above step, select a suitable shim which adjusts clearance "a" to specification and put it on bearing cup.

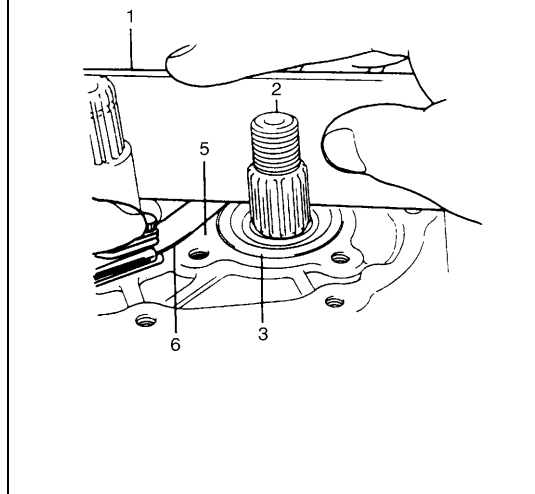
#### NOTE:

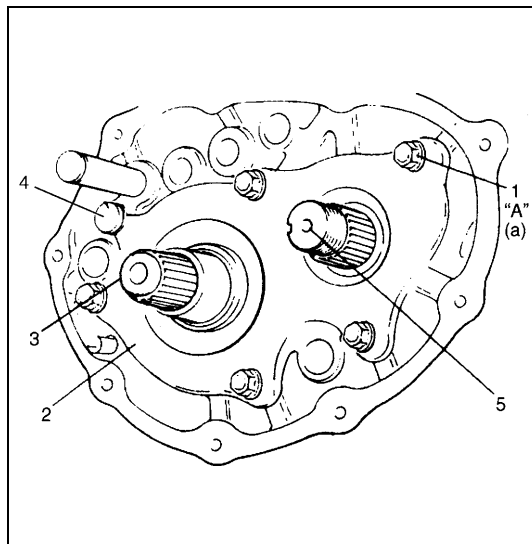
Insert 0.1 mm (0.004 in.) feeler to know whether or not a shim fulfills specification quickly.

#### Available countershaft 5th gear shim thickness

0.55 mm (0.021 in.)
0.6 mm (0.023 in.)
0.65 mm (0.025 in.)
0.7 mm (0.027 in.)
0.75 mm (0.029 in.)
0.8 mm (0.031 in.)
0.85 mm (0.033 in.)
0.9 mm (0.035 in.)
0.95 mm (0.037 in.)
1.0 mm (0.039 in.)
1.05 mm (0.041 in.)
1.1 mm (0.043 in.)

2. Counter shaft





- 4) Place left case plate (2) inserting its end in groove of shift guide shaft (4) and then tighten bolts (1) to which thread lock cement has been applied.

**NOTE:**

**After tightening bolts, make sure that countershaft can be rotated by hand feeling certain load.**

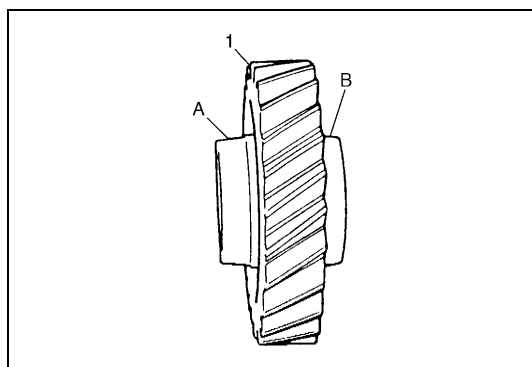
**“A” : Cement 99000-32110**

**Tightening torque**

**Left case plate bolts**

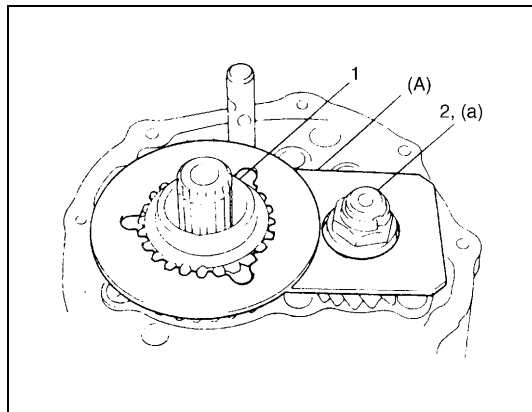
**(a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)**

3. Input shaft
5. Counter shaft



- 5) Install countershaft 5th gear (1) to countershaft facing machined boss A inward.

A. Machined boss (Inside)
B. No machining (Outside)



- 6) Install needle bearing to input shaft, apply oil then install input shaft 5th gear (1) and special tool to stop shaft rotation.

**Special tool**

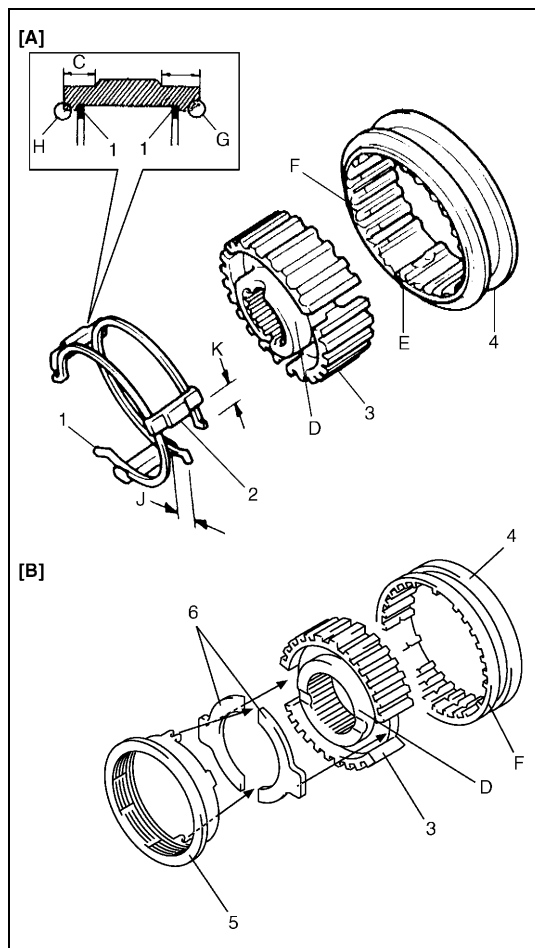
**(A) : 09927-76060**

- 7) Tighten new countershaft nut (2) to specified torque and caulk countershaft nut (2) securely.

**Tightening torque**

**Countershaft nut**

**(a) : 70 N·m (7.0 kg-m, 51.0 lb-ft)**



### 8) [For key synchro type]

Assemble 5th speed synchronizer sleeve (4), hub (3) with keys (2) and springs (1).

#### NOTE:

Short side C in keys, long boss D in hub and chamfered spline F in sleeve should face 5th gear side.

Synchronizer key installation position

: J = K

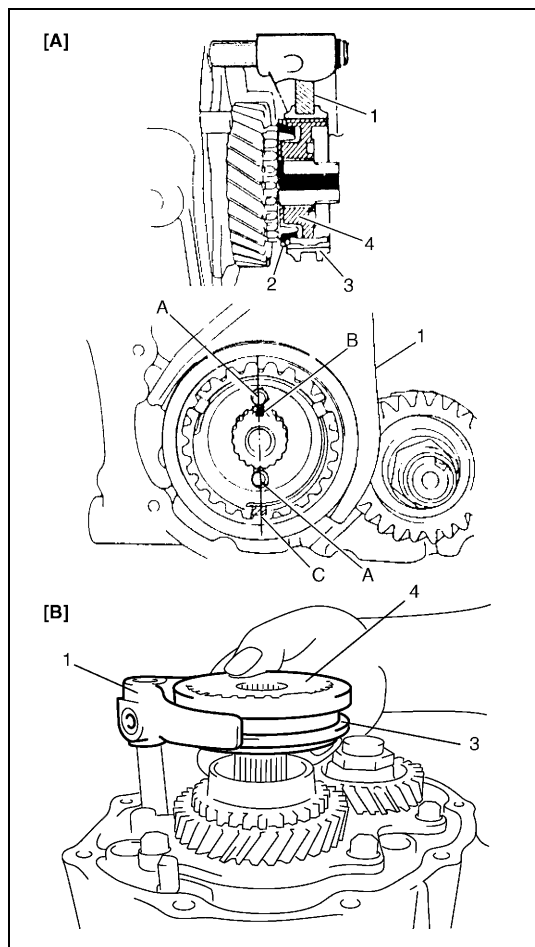
[A] : Key synchro type
[B] : Lever synchro type
C : Short side
D : Long boss
E : Key way
F : Chamfered spline
G : Cut
H : Non cut side

### [For lever synchro type]

Assemble 5th speed synchronizer sleeve (4), hub (3), 5th speed synchronizer levers (6) and synchronizer ring (5).

#### NOTE:

Be sure to install 5th speed synchronizer levers and synchronizer ring at the correct position as shown in figure.



### 9) [For key synchro type]

- Install synchronizer ring (2) to input shaft 5th gear.
- Fit 5th gear shift fork (1) to sleeve (3) & hub (4) assembly and install them into input shaft and gear shift shaft at once aligning hub depression A, shaft mark B and synchronizer key C.

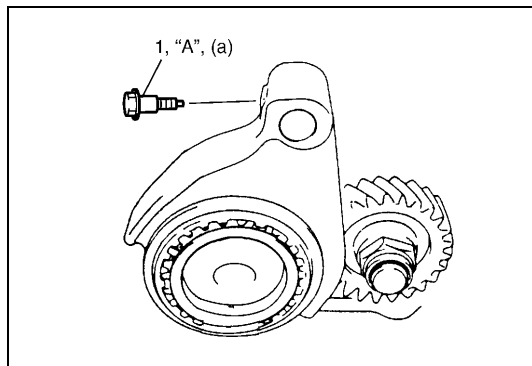
#### NOTE:

Long boss of hub faces gear side.

### [For lever synchro type]

Fit 5th gear shift fork (1) to sleeve (3) and hub (4) assembly and install them into input shaft and gear shift shaft.

[A] Key synchro type
[B] Lever synchro type



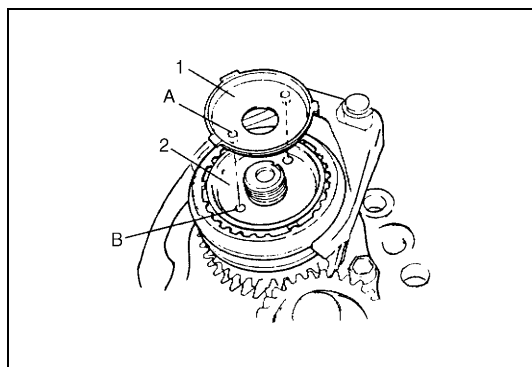
- 10) Tighten shift fork shaft bolt (1) to which thread lock cement has been applied.

**“A” : Cement 99000-32110**

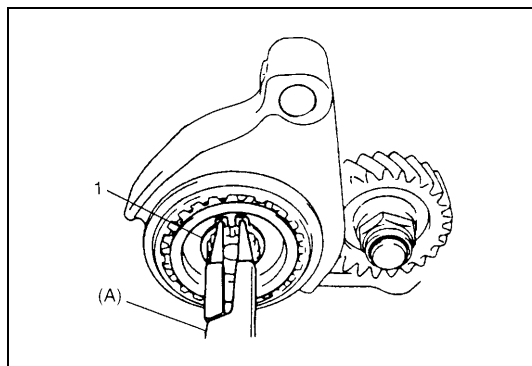
**Tightening torque**

**Shift fork bolt**

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



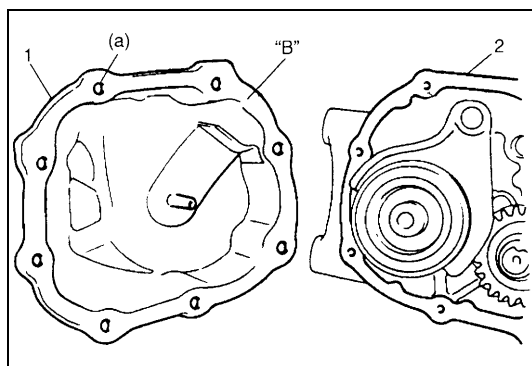
- 11) For key synchro type, install 5th synchronizer hub plate (1) to synchronizer hub (2) by positioning it so that its lugs A fit into their depression B in synchronizer hub.



- 12) Using special tool, install circlip (1).

**Special tool**

**(A) : 09900-06107**



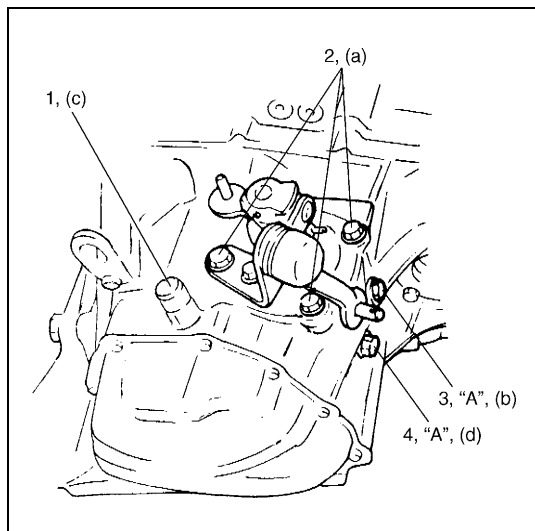
- 13) Clean mating surface of both left case (2) and side cover (1), coat mating surface with sealant evenly, mate it with left case and then tighten with bolts.

**“B” : Sealant 99000-31230**

**Tightening torque**

**Side cover bolts (a) : 10 N·m (1.0 kg-m, 7.5 lb-ft)**





## Gear shift and select shaft assembly

- 1) Clean mating surface of guide case.
- 2) Install gear shift and select shaft assembly with new gasket into transaxle.
- 3) Place breather hose bracket and tighten it together with gear shift guide case bolts (2) to specified torque.

### Tightening torque

#### Gear shift guide case bolts

(a) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 4) Install washer and gear shift interlock bolt (3) to which thread lock cement has been applied and then tighten it to specified torque.

“A” : Cement 99000-32110

### Tightening torque

#### Gear shift interlock bolt

(b) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

- 5) Install washer and 5th to reverse interlock guide bolt (4) to which thread lock cement has been applied and then tighten it to specified torque.

“A” : Cement 99000-32110

### Tightening torque

#### 5th to reverse interlock guide bolt

(d) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

- 6) Tighten backup lamp switch (1) to specified torque.

### Tightening torque

#### Backup lamp switch

(c) : 20 N·m (2.0 kg-m, 14.5 lb-ft)

- 7) Check input shaft for rotation in each gear position.
- 8) Also confirm function of backup lamp switch in reverse position by using ohmmeter.

## Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Oil filler/level plug	21	2.1	15.5
Oil drain plug	21	2.1	15.5
VSS bolt	5.5	0.55	4.0
Center shaft support bolts	55	5.5	40.0
Ball stud bolt and nut	60	6.0	43.5
Output flange nut	90	9.0	65.0
Bevel pinion nut	120	12.0	87.0
Transaxle case bolts	23	2.3	17.0
Shift fork bolts	10	1.0	7.5
Input oil gutter bolt	10	1.0	7.5
Side bearing retainer bolts	23	2.3	17.0
Final gear bolts (for 2WD model)	90	9.0	65.0
Final gear bolts (for 4WD model)	73	7.3	53.0
Gear shift locating bolts	13	1.3	9.5
Left case plate bolts	23	2.3	17.0
Countershaft nut	70	7.0	51.0
Side cover bolts	10	1.0	7.5
Gear shift guide case bolts	23	2.3	17.0
Gear shift interlock bolt	50	5.0	36.5
5th to reverse interlock guide bolt	23	2.3	17.0
Backup lamp switch	20	2.0	14.5
Reverse gear shift lever bolts	23	2.3	17.0
Reverse shaft bolt	23	2.3	17.0
Exhaust No.2 pipe to No.1 pipe bolts	43	4.3	31.5
Exhaust No.1 pipe to manifold bolts	50	5.0	36.5
Exhaust No.2 pipe to muffler bolts	43	4.3	31.5
Output case bolts	23	2.3	17.0
Rear case bolts	23	2.3	17.0
Rear mounting nuts	25	2.5	18.0
Lower stiffener bolts	50	5.0	36.5



## SECTION 7B1

## AUTOMATIC TRANSAXLE

7B1

**WARNING:**

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

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

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## General Description

This automatic transaxle is electronic control full automatic transaxle with forward 3-speed plus overdrive (O/D) and reverse 1-speed.

The torque converter is a 3-element, 1-step and 2-phase type and is equipped with an automatically controlled lock-up mechanism.

The gear change device consists of a ravigneau type planetary gear unit, 3 multiple disc type clutches, 3 multiple disc type brakes and 2 one-way clutches.

The hydraulic pressure control device consists of a valve body assembly, pressure control solenoid valve (linear solenoid), 2 shift solenoid valves, TCC (lock-up) solenoid valve and a timing solenoid valve. Optimum line pressure complying with engine torque is produced by the pressure control solenoid valve in dependence upon control signal from transmission control module (TCM). This makes it possible to control the line pressure with high accuracy in accordance with the engine power and running conditions to achieve smooth shifting characteristics and high efficiency.

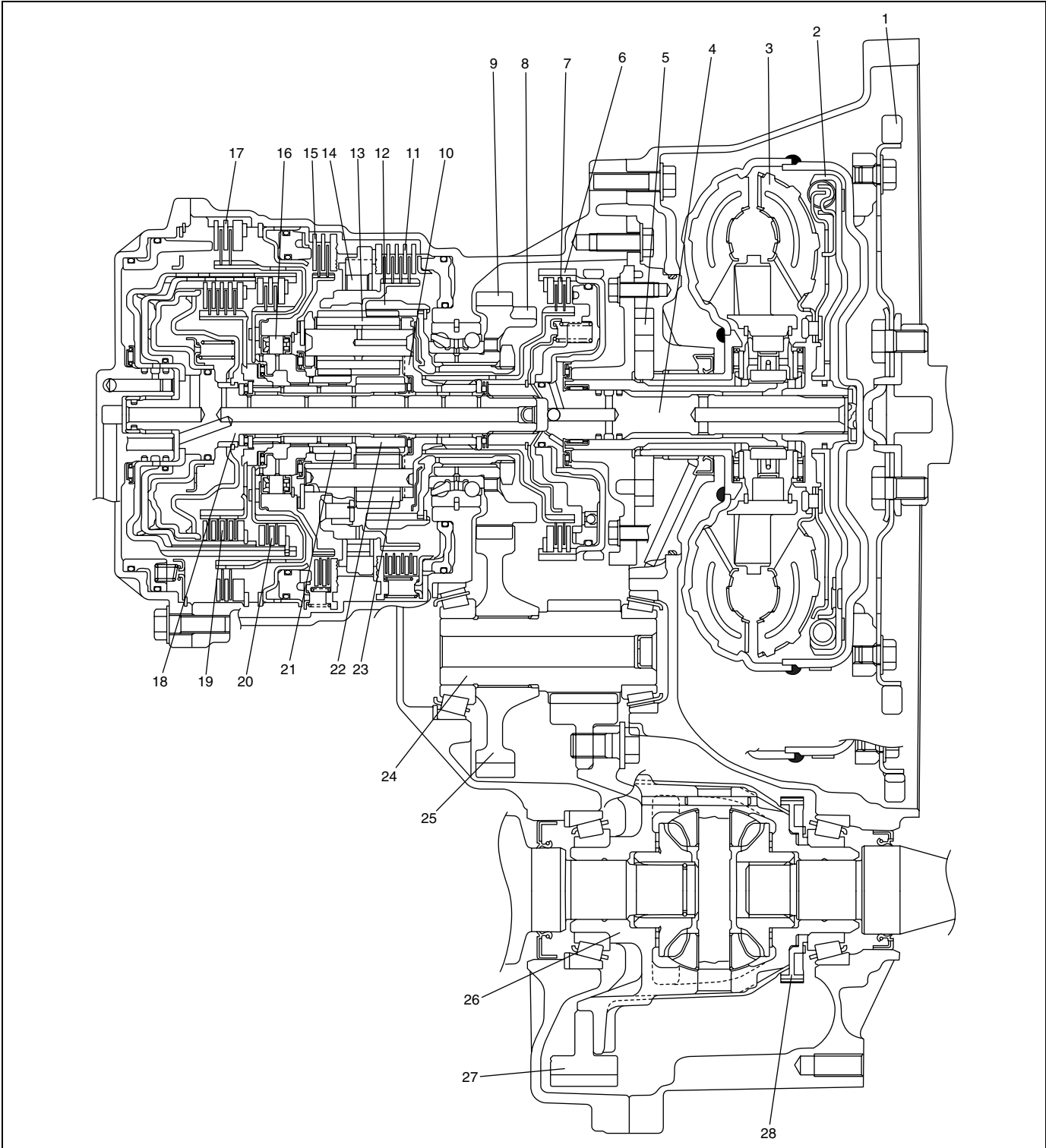
A clutch-to-clutch control system is provided for shifting between 3rd gear and 4th gear. This clutch-to-clutch control system is made to function optimally, so that hydraulic pressure controls such as shown below are conducted.

- When upshifting from 3rd gear to 4th gear, to adjust the drain hydraulic pressure at releasing the forward clutch, a timing solenoid valve is used to switch a hydraulic passage with an orifice to another during shifting.
- When downshifting from 4th gear to 3rd gear, to adjust the line pressure applied to the forward clutch at engaging the forward clutch, a timing solenoid valve is used to switch a hydraulic passage with an orifice to another during shifting.
- When upshifting from 3rd gear to 4th gear with engine throttle opened, to optimize the line pressure applied to the forward clutch at releasing the forward clutch, the learning control is processed to compensate the switching timing of the timing solenoid at every shifting.
- When downshifting from 4th gear to 3rd gear with engine throttle opened, to optimize the line pressure applied to the forward clutch at engaging the forward clutch, the learning control is processed to compensate the line pressure at every shifting.

Employing the ravigneau type planetary gear unit and this clutch-to-clutch control system greatly simplifies the construction to make possible a lightweight and compact transaxle.

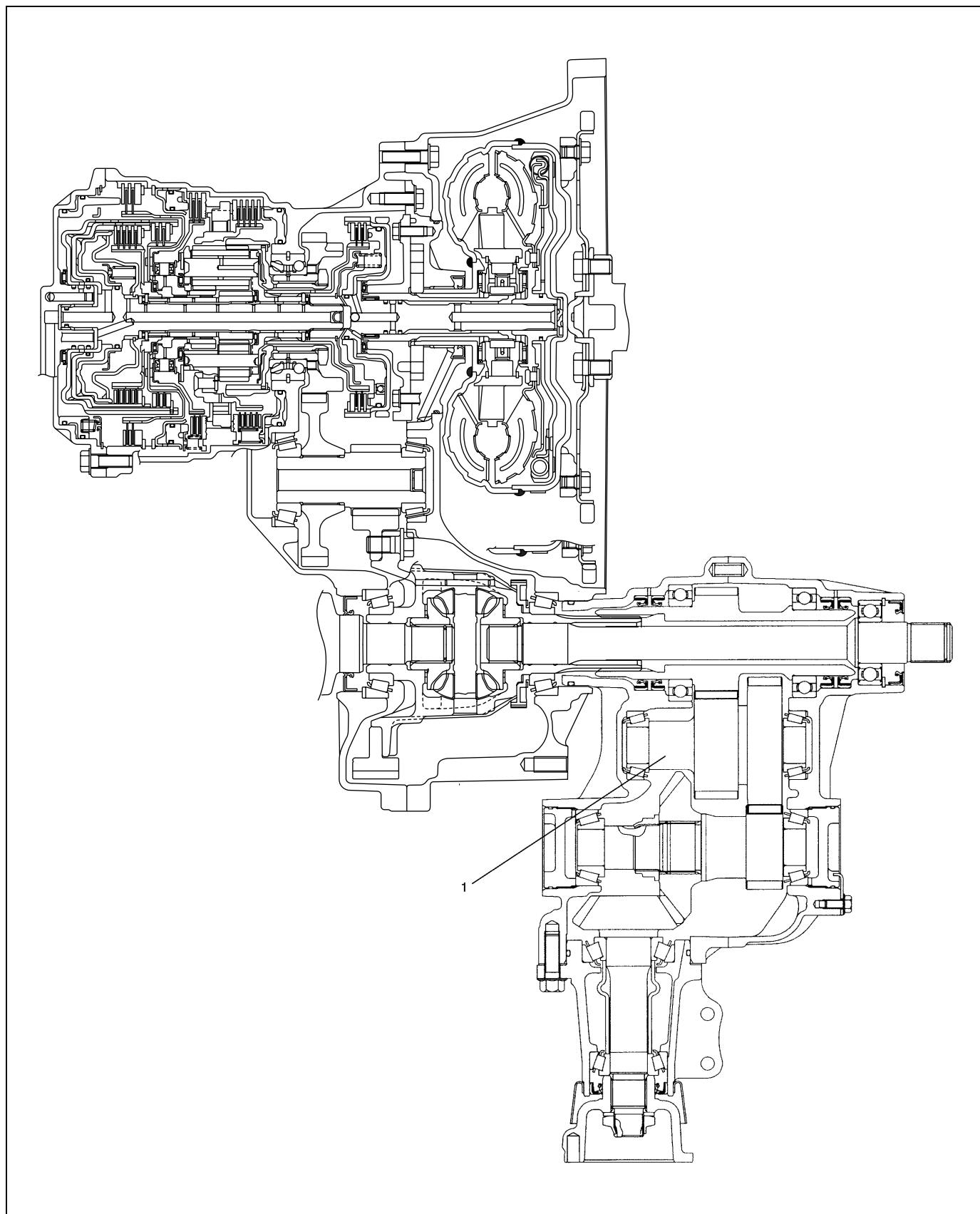
A line pressure learning control is conducted to provide optimum shifting time at every upshifting with engine throttle opened. If long upshifting time is detected, the subsequent line pressure applied during upshifting is intensified. On the contrary, if short upshifting time is detected, the subsequent line pressure applied during upshifting is weakened.

2WD



1. Drive plate	11. 1st and reverse brake	21. Rear sun gear
2. Torque converter clutch (TCC)	12. Ring gear	22. Front sun gear
3. Torque converter	13. Long planet pinion	23. Short planet pinion
4. Input shaft	14. One-way clutch No.2	24. Countershaft
5. Oil pump	15. Second brake	25. Reduction driven gear
6. Direct clutch drum which doubles as sensor rotor for input shaft speed sensor	16. One-way clutch No.1	26. Differential case assembly
7. Direct clutch	17. O/D and 2nd coast brake	27. Final gear
8. Parking lock gear	18. Intermediate shaft	28. Output shaft speed sensor/VSS drive gear
9. Reduction drive gear	19. Forward clutch	
10. Planet carrier	20. Reverse clutch	

## 4WD



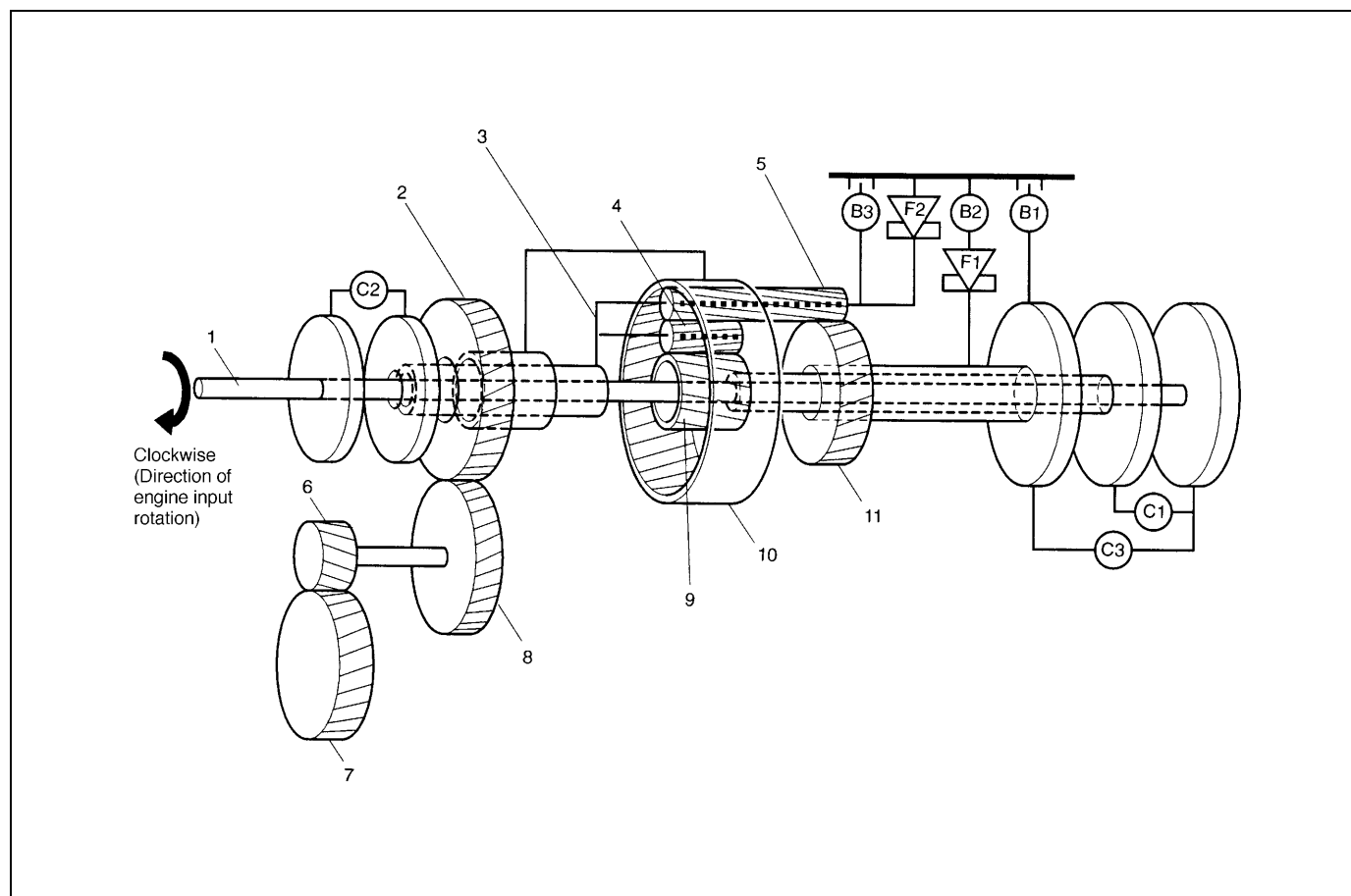
1. Transfer



## Specifications

Item			Specifications			
Torque converter	Type Stall torque ratio		3-element, 1-step, 2-phase type with TCC/lock-up mechanism 2.0 – 2.2			
Oil pump	Type Drive system		Internal involute gear and non crescent type oil pump Engine driven			
Gear change device	Type		Forward 4-step, reverse 1-step planetary gear type			
	Shift position		“P” range	Gear in neutral, output shaft fixed, engine start		
			“R” range	Reverse		
			“N” range	Gear in neutral, engine start		
			“D” range at O/D ON	Forward 1st ↔ 2nd ↔ 3rd ↔ 4th (O/D) automatic gear change		
			“D” range at O/D OFF	Forward 1st ↔ 2nd ↔ 3rd ← 4th automatic gear change		
			“2” range	Forward 1st ↔ 2nd ← 3rd automatic gear change		
			“L” range	Forward 1st ← 2nd ← 3rd reduction, and fixed at 1st gear		
	Gear ratio	1st	2.875	Number of teeth	Front sun gear : 24	
		2nd	1.568		Rear sun gear : 30	
		3rd	1.000		Long planet pinion : 20	
		4th (overdrive)	0.697		Short planet pinion : 19	
		Reverse	2.300		Ring gear : 69	
	Control elements		Wet type multiple-disc clutch ... 3 sets Wet type multiple-disc brake ... 3 sets One-way clutch ... 2 sets			
	Reduction gear ratio		1.019			
Final gear reduction ratio		4.277				
Lubrication	Lubrication system		Force feed system by oil pump			
Cooling	Cooling system		Radiator assisted cooling			
Fluid used			DEXRON®-III or DEXRON®-IIE			

## Clutch/Brake/Planetary Gear



1. Input shaft and intermediate shaft	8. Reduction driven gear	B1 : O/D and 2nd coast brake
2. Reduction drive gear	9. Front sun gear	B2 : 2nd brake
3. Planet carrier	10. Ring gear	B3 : 1st and reverse brake
4. Short planet pinion	11. Rear sun gear	F1 : One-way clutch No.1
5. Long planet pinion	C1 : Forward clutch	F2 : One-way clutch No.2
6. Final drive gear	C2 : Direct clutch	
7. Final driven gear	C3 : Reverse clutch	

## Functions

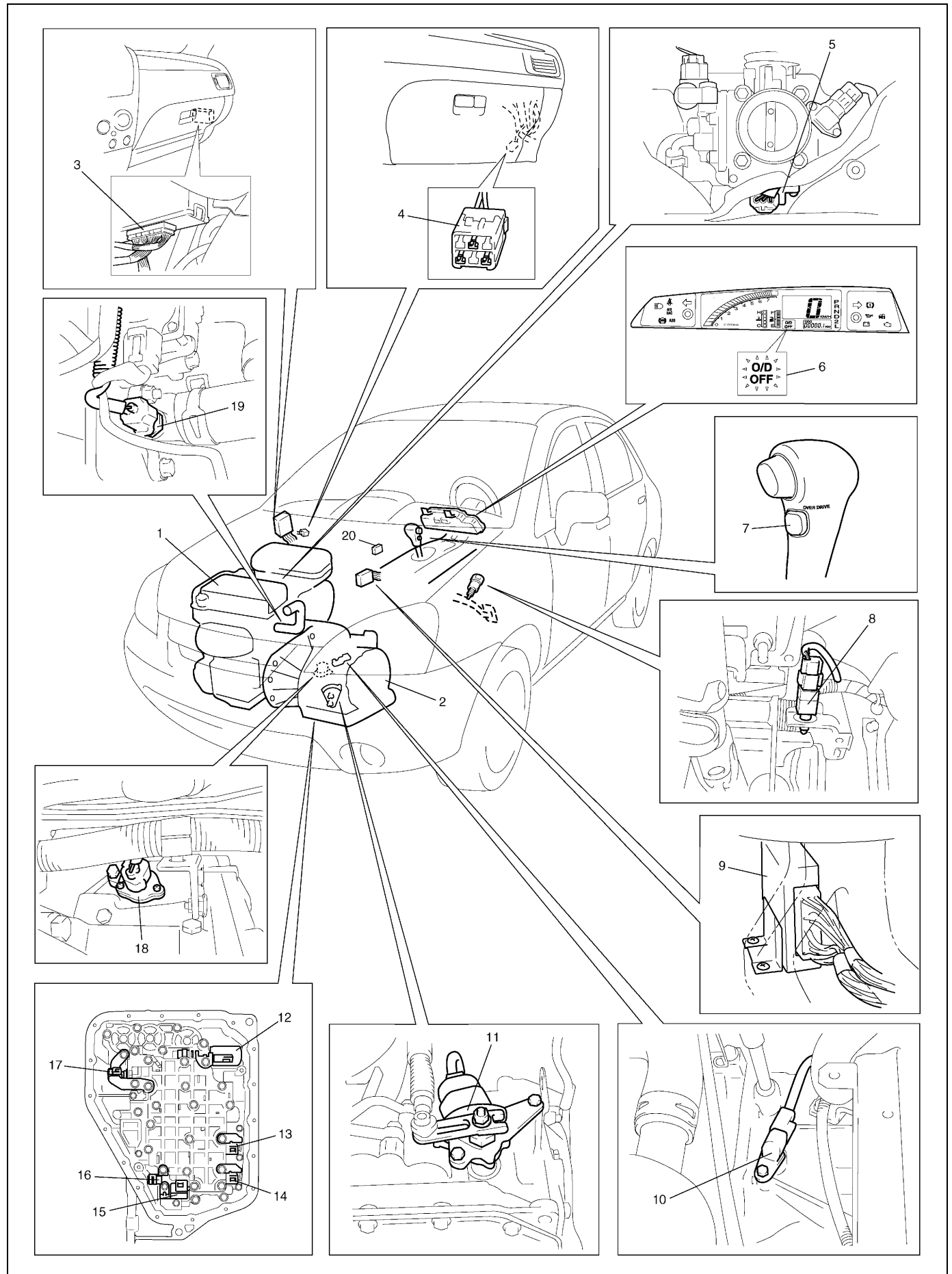
PART NAME	FUNCTION
Forward clutch	Meshes intermediate shaft and front sun gear
Direct clutch	Meshes input shaft and planet carrier
Reverse clutch	Meshes intermediate shaft and rear sun gear
O/D and 2nd coast brake	Fixes rear sun gear
2nd brake	Fixes rear sun gear
1st and reverse brake	Fixes planet carrier
One-way clutch No.1	Prevents rear sun gear from turning counterclockwise
One-way clutch No.2	Prevents planet carrier from turning counterclockwise

## Table of Component Operation

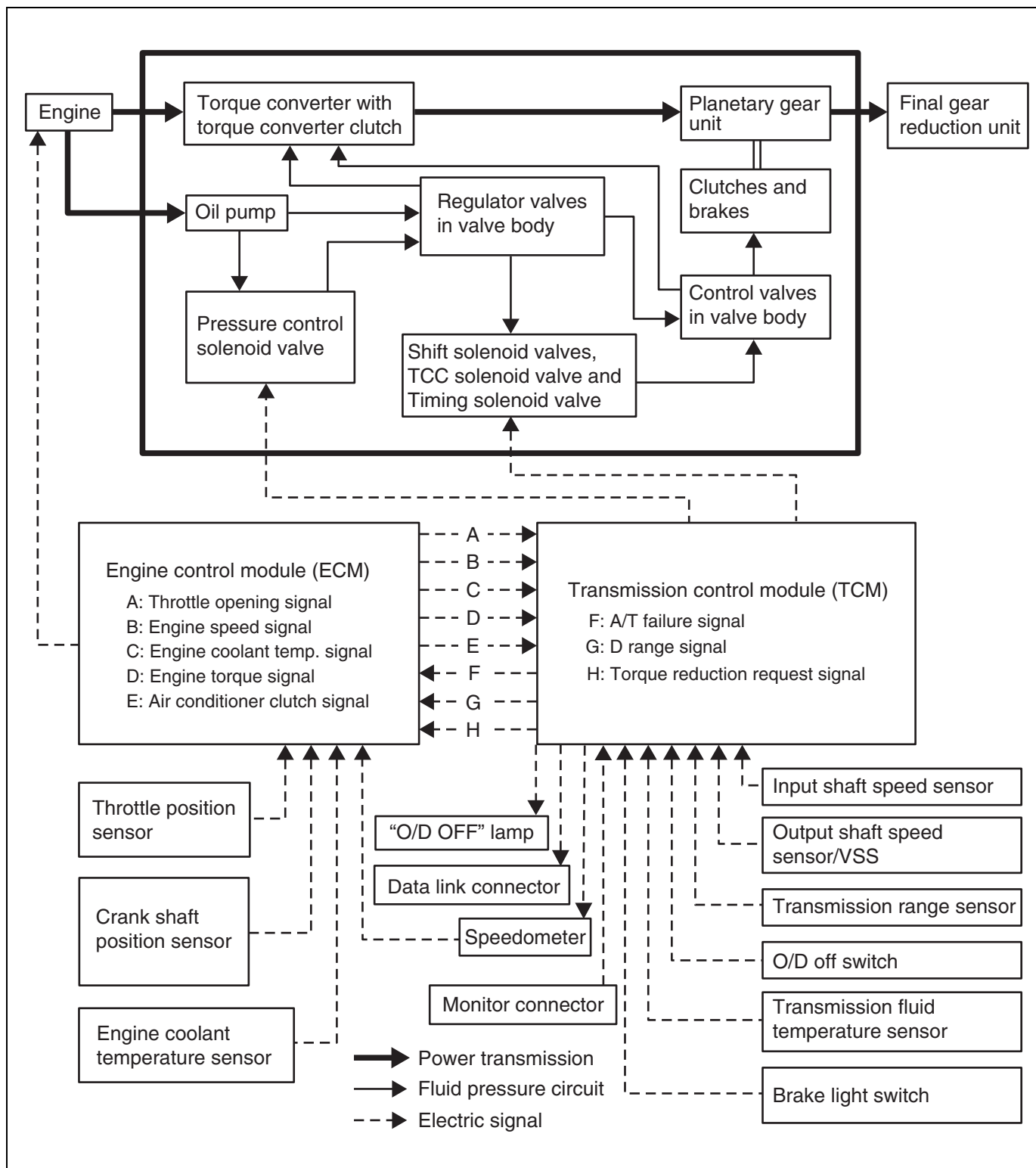
Selector position	Part Gear position	Shift solenoid valve-A/ No.1	Shift solenoid valve-B/ No.2	TCC solenoid valve	Forward clutch	Direct clutch	Reverse clutch	O/D and 2nd coast brake	2nd brake	1st and reverse brake	One-way clutch No.1	One-way clutch No.2
P	Parking	○	○	×	×	×	×	×	×	×	×	×
R	Reverse	○	○	×	×	×	○	×	×	○	×	×
N	Neutral	○	○	×	×	×	×	×	×	×	×	×
D	1st	○	○	×	○	×	×	×	×	×	×	○
	2nd	○	×	×	○	×	×	×	○	×	○	×
	3rd	×	×	△	○	○	×	×	○	×	×	×
	4th	×	○	△	×	○	×	○	○	×	×	×
2	1st	○	○	×	○	×	×	×	×	×	×	○
	2nd	○	×	×	○	×	×	○	○	×	○	×
L	1st	○	○	×	○	×	×	×	×	○	×	○

○ : ON      × : OFF      △ : ON only when TCC is operating

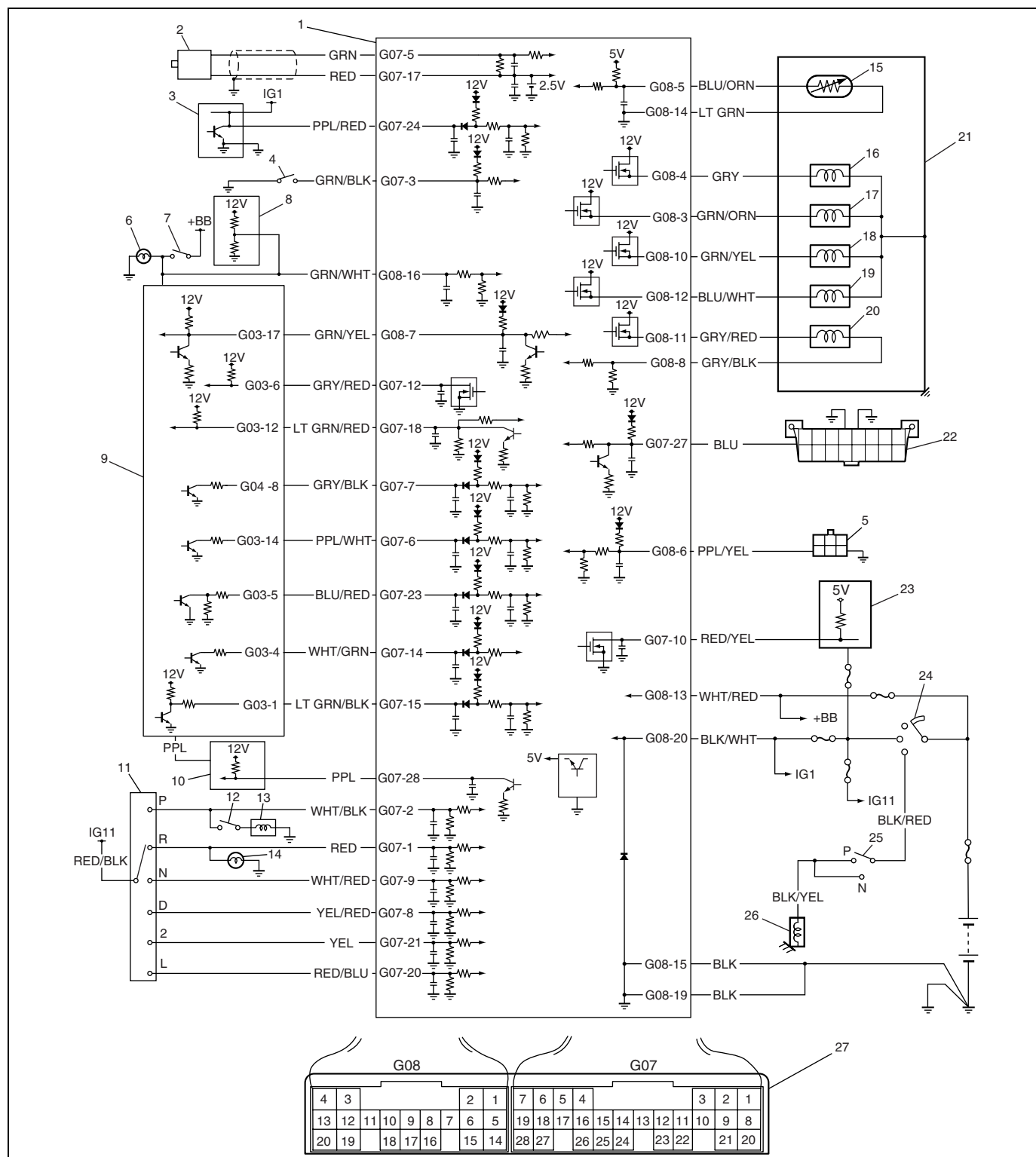
# Electronic Shift Control System



1. Engine	8. Brake light switch	15. Timing solenoid valve
2. Transaxle	9. TCM	16. Transmission fluid temperature sensor
3. ECM	10. Input shaft speed sensor	17. TCC/Lock-up solenoid valve
4. Monitor connector	11. Transmission range sensor	18. Output shaft speed sensor/VSS
5. Throttle position (TP) sensor	12. Pressure control solenoid valve	19. Engine coolant temperature (ECT) sensor
6. "O/D OFF" lamp	13. Shift solenoid valve-B/No.2	20. Data link connector (DLC)
7. O/D off switch	14. Shift solenoid valve-A/No.1	



# Transmission Control Module (TCM)



1. TCM	10. Speedometer in combination meter	19. TCC/Lock-up solenoid valve
2. Input shaft speed sensor	11. Transmission range sensor	20. Pressure control solenoid valve
3. Output shaft speed sensor/VSS	12. Brake light switch	21. A/T
4. O/D off switch	13. Shift lock solenoid, if equipped	22. Data link connector (DLC)
5. Monitor connector	14. Backup lamp	23. Combination meter
6. Brake light	15. Transmission fluid temperature sensor	24. Ignition switch
7. Brake light switch	16. Shift solenoid valve-A/No.1	25. Inhibitor switch
8. ABS control module	17. Shift solenoid valve-B/No.2	26. Starter motor relay
9. ECM	18. Timing solenoid valve	27. Terminal arrangement of TCM connector viewed from harness side

## Operation of shift solenoid valves, timing solenoid valve and TCC solenoid valve

Selector position	Solenoid Gear position	Shift solenoid valve-A/ No.1	Shift solenoid valve-B/ No.2	Timing solenoid valve	TCC solenoid valve	Condition
P	Parking	○	○	×	×	
R	Reverse	○	○	×	×	When vehicle is traveling forwards in less than 11 km/h, 7 mile/h vehicle speed.
		○	○	○	×	When vehicle is traveling forwards in 11km/h, 7mile/h or more vehicle speed.
		×	×	×	×	When fail safe function is operating.
N	Neutral	○	○	×	×	
D	Neutral → 1st			○		Timing solenoid is turned ON for about 0.5 sec. while on gear shifting
	1st	○	○	×	×	
	2nd	○	×	×	×	
	3rd	×	×	×	×	
	3rd ↔ 4th			○		Timing solenoid is turned ON for about 0.5 sec. while on gear shifting
	4th (O/D)	×	○	×	△	
	3rd	×	×	×	×	When fail safe function is operating.
2	1st	○	○	×	×	
	2nd	○	×	×	×	
	3rd	×	×	×	×	When fail safe function is operating.
L	1st	○	○	×	×	
	3rd	×	×	×	×	When fail safe function is operating.

○ : Power ON

× : Power OFF

△ : Power ON only when TCC is operating

	Valve status	
	Power ON	Power OFF
Shift solenoid valve-A/No.1	Close	Open
Shift solenoid valve-B/No.2	Close	Open
Timing solenoid	Open	Close
TCC/Lock-up solenoid	Close	Open

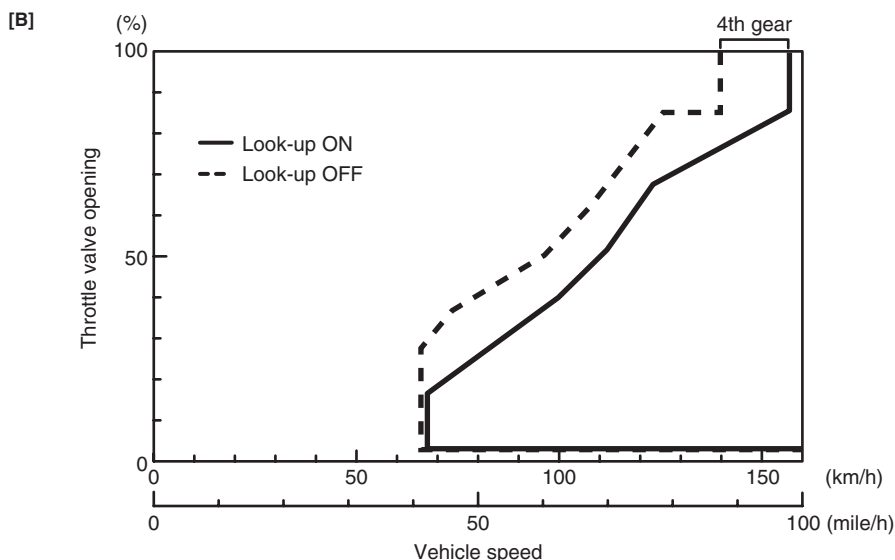
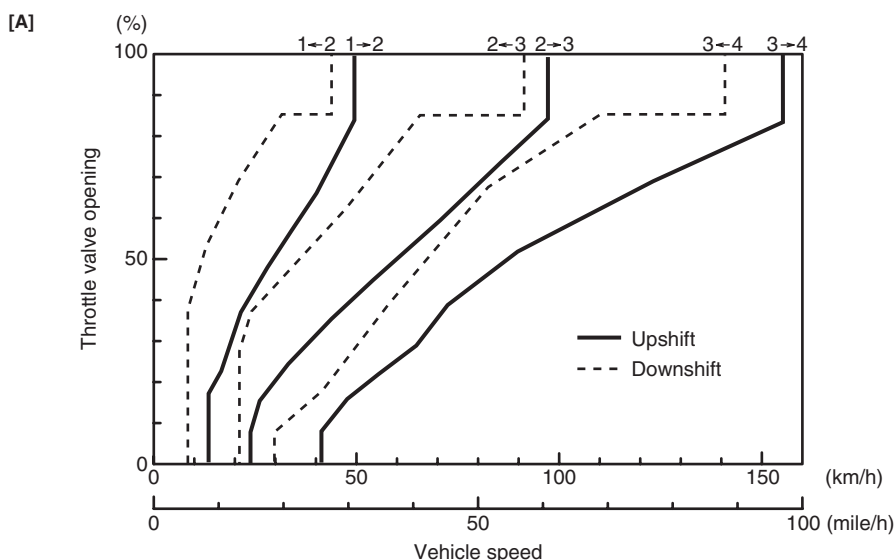
## Automatic gear shift diagram for 2WD

Automatic shift schedule as a result of shift control is shown below. In case that selector lever is shifted to “L” range at a higher than 50 km/h (31 mile/h) speed, 2nd gear is operated and then down shifts to 1st at a speed lower than that.

The same as, the select lever is shifted to “2” range at a higher than 97 km/h (60.5 mile/h) speed, 3rd gear is operated and then down shifts to 2nd at a speed lower than that.

	Shift					
Throttle opening	1→2	2→3	3→4	4→3	3→2	2→1
Full throttle km/h (mile/h)	50 (31)	97 (60.5)	155 (97)	140 (87.5)	91 (57)	44 (28)
Closed throttle km/h (mile/h)	13 (8)	24 (15)	42 (26)	30 (19)	21 (13)	9 (5.5)

## GEAR SHIFT DIAGRAM [A] AND TCC LOCK-UP DIAGRAM [B]





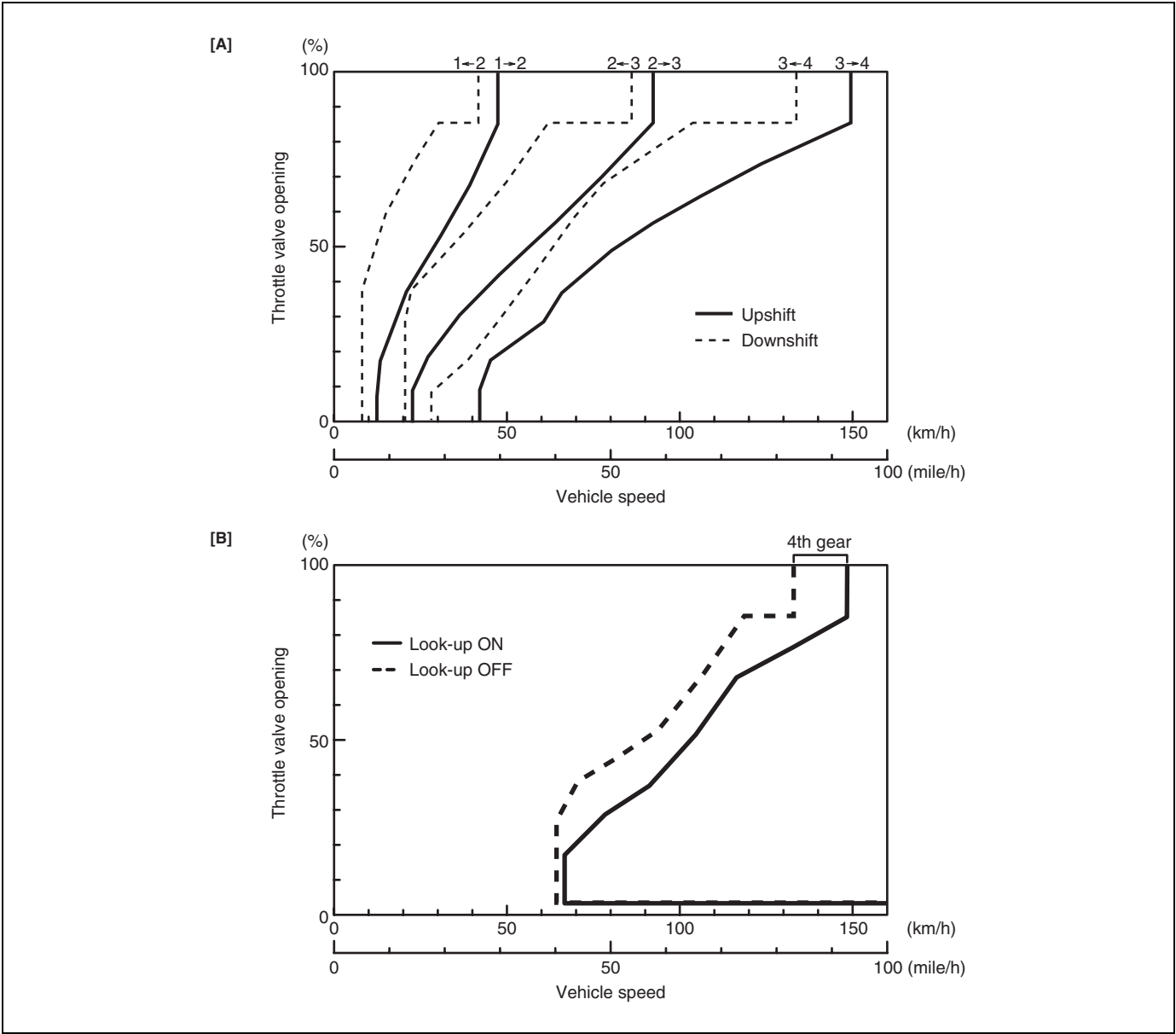
**Automatic gear shift diagram for 4WD**

Automatic shift schedule as a result of shift control is shown below. In case that selector lever is shifted to “L” range at a higher than 47 km/h (29.5 mile/h) speed, 2nd gear is operated and then down shifts to 1st at a speed lower than that.

The same as, the select lever is shifted to “2” range at a higher than 92 km/h (57.5 mile/h) speed, 3rd gear is operated and then down shifts to 2nd at a speed lower than that.

	Shift					
Throttle opening	1→2	2→3	3→4	4→3	3→2	2→1
Full throttle km/h (mile/h)	47 (29.5)	92 (57.5)	149 (93)	133 (83)	86 (54)	42 (26)
Closed throttle km/h (mile/h)	12 (8)	22 (14)	42 (26)	28 (17.5)	20 (12.5)	8 (5)

**GEAR SHIFT DIAGRAM [A] AND TCC LOCK-UP DIAGRAM [B]**



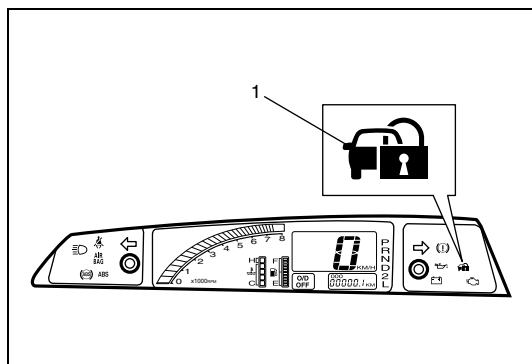
## Diagnosis

### General Description

This vehicle is equipped with an electronic transaxle control system, which controls the automatic shift up and shift down timing, TCC operation, etc. suitably to vehicle driving conditions.

TCM has an On-Board Diagnostic System which detects a malfunction in this system and abnormality of those parts that influence the engine exhaust emission.

When diagnosing a trouble in transaxle 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 Transaxle Diagnostic Flow Table" given below to obtain correct result smoothly.



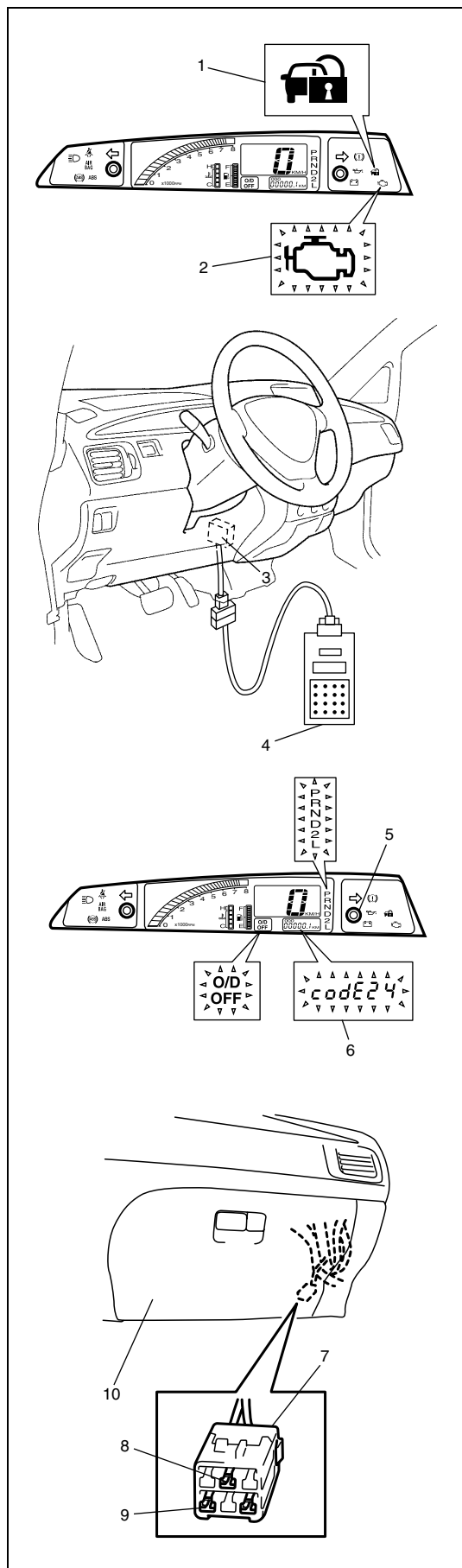
#### NOTE:

There are two types of On-Board Diagnostic System depending on vehicle specifications. The type of system for vehicle being serviced can be identified by whether equipped with immobilizer lamp (1) as indicator in combination meter or not. Identify the type of system by confirming whether equipped with immobilizer lamp (1) in combination meter turning ignition switch ON with leaving engine OFF.

### On-board Diagnostic System

#### [For vehicle with immobilizer lamp]

For automatic transaxle control system, TCM has following functions.



- When TCM detects a malfunction in A/T control system, it stores malfunction DTC and at the same time transmits DTC of that malfunction to ECM. Based on this signal, ECM turns ON malfunction indicator lamp (MIL) (2) and stores DTC/freeze frame data in its memory.
- If no malfunction is detected after detecting above malfunction, TCM immediately halts to transmit DTC of that malfunction to ECM, however, DTC stored in TCM memory will remain. If ECM receives no DTC of malfunction for 3 driving cycles continuously, it turns MIL off although DTC stored in ECM memory will also remain.
- It is possible to communicate with ECM and/or TCM through data link connector (DLC) (3) by using SUZUKI scan tool (4). Diagnostic information can be checked and erased by using scan tool.
- It is also possible to check DTC stored in TCM memory by displaying DTC on digital display odometer (6). DTC is displayed on odometer by connecting diagnosis switch terminal (8) with ground terminal (9) of blue monitor connector (7), with reset button (5) pressed. If no malfunction DTC is stored in TCM memory, DTC No.12 is displayed. If one or more DTCs are stored in TCM memory, they are displayed 3 seconds each sequentially. After all DTCs are displayed, they are displayed in the same manner as above again.

1. Immobilizer lamp

10. Glove box

## 2 driving cycle detection logic

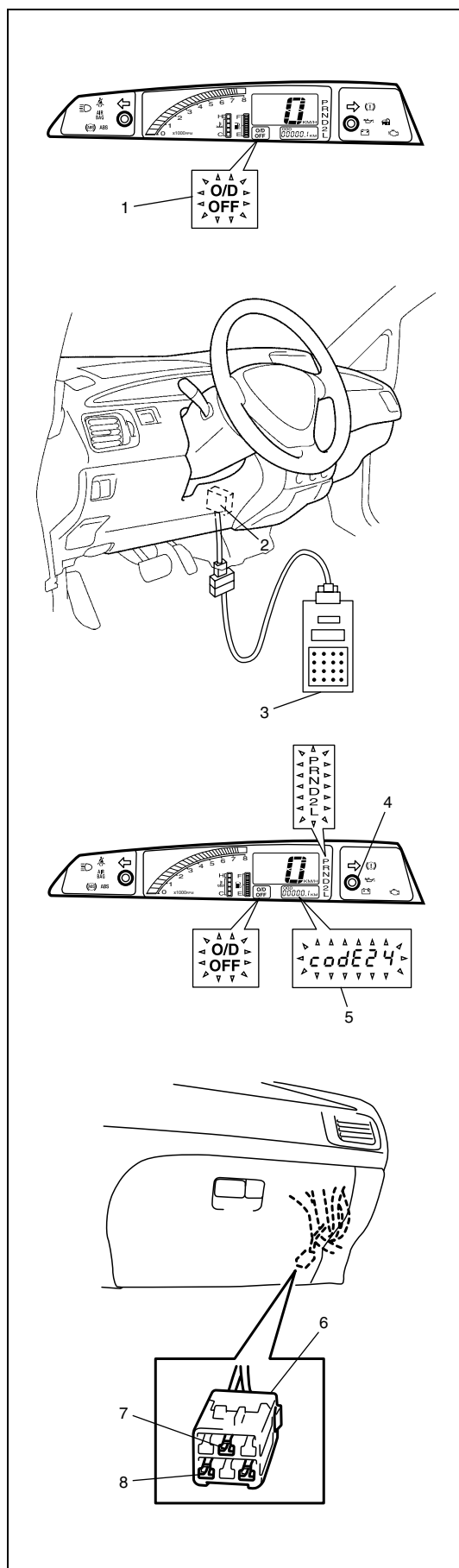
When a malfunction is detected during initial driving cycle, TCM transmits a data to inform ECM of malfunction occurrence. At this time, ECM stores a corresponding pending DTC in its memory, but MIL does not light. If the same malfunction is also detected in next driving cycle, ECM lights MIL when it receives a data informing occurrence of a malfunction from TCM.

## Freeze frame data

Refer to Section 6 for details.

**[For vehicle without immobilizer lamp]**

For automatic transaxle control system, TCM has following functions.



- When ignition switch is turned ON with O/D off switch turned OFF and no malfunction in A/T control system is detected, "O/D OFF" lamp (1) lights for about 2 seconds after ignition switch is turned ON and then goes OFF for bulb check. If O/D off switch is ON at this time, however, "O/D OFF" lamp remains ON to let driver know that gear is not shifted to overdrive gear.
- When TCM detects a malfunction in A/T control system, it flashes "O/D OFF" lamp (1) and stores malfunction DTC in its memory.
- It is possible to communicate with TCM through data link connector (DLC) (2) by using SUZUKI scan tool (3). Diagnostic information can be checked and erased by using scan tool.
- It is also possible to check DTC stored in TCM memory by displaying DTC on digital display odometer (5). DTC is displayed on odometer by connecting diagnosis switch terminal (7) with ground terminal (8) of blue monitor connector (6) while reset button (4) is pressed. If no malfunction DTC is stored in TCM memory, DTC No.12 is displayed. If one or more DTCs are stored in TCM memory, they are displayed 3 seconds each sequentially. After all DTCs are displayed, they are displayed in the same manner as above repeatedly.

## Precaution in Diagnosing Trouble

- Don't disconnect couplers from TCM and/or ECM, battery cable from battery, TCM and/or ECM ground wire harness from engine or main fuse before checking the diagnosis information, such as DTC, freeze frame data, etc., stored in TCM and/or ECM memory.

Such disconnection will clear memorized information in TCM and/or ECM memory.

- Using SUZUKI scan tool the diagnostic information stored in ECM memory can be checked and cleared as well. Before its use, be sure to read Operator's Manual supplied with it carefully to have good understanding of its functions and usage.
- DTC stored in TCM can not be cleared by using ECM application of SUZUKI scan tool in mass storage cartridge. Be sure to follow "Diagnostic Trouble Code Clearance" in this section when cleaning it.
- Priorities for diagnosing troubles

If two or more diagnostic trouble codes (DTCs) are stored, proceed to flow table of DTC which was detected earliest in order and follow instruction in that table. If no instructions are given, troubleshoot diagnostic trouble codes according to the following priorities.

- 1) Diagnostic trouble codes (DTCs) other than DTC P0171/P0172 Fuel system too lean/too rich, DTC P0300/P0301/P0302/P0303/P0304 Misfire detected and DTC P0400 EGR flow malfunction
- 2) DTC P0171/P0172 Fuel system too lean/too rich and DTC P0400 EGR flow malfunction
- 3) DTC P0300/P0301/P0302/P0303/P0304 Misfire detected

- Be sure to read "Precaution for Electrical Circuit Service" in Section 0A before inspection and observe what is written there.
- When substituting a known-good TCM and/or ECM, check for following conditions.  
Neglecting this check may result in damage to good TCM and/or ECM.
  - All relays and actuators have resistance of specified value.
  - MAP sensor and TP sensor are in good condition. Also, the power circuit of these sensors is not shorted to the ground.
- When replacing TCM with used one, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized after replacement referring to "Learning Control Initialization" in this section.

Neglecting this initialization may cause excessive shift shock.

## Automatic Transaxle Diagnostic Flow Table

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

Step	Action	Yes	No
1	Customer Complaint Analysis 1) Perform customer complaint analysis referring to the next page. Was customer complaint analysis performed according to instruction on the next page?	Go to Step 2.	Perform customer complaint analysis.
2	Diagnostic Trouble Code (DTC) and Freeze Frame Data Check, Record and Clearance 1) Check for DTC and pending DTC referring to the next page. Is there any DTC(s)?	1) Print DTC and freeze frame data or write them down and clear them by referring to "DTC Clearance" in this section. 2) Go to Step 3.	Go to Step 4.
3	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	Go to Step 5.
4	Visual Inspection 1) Perform visual inspection referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part. 2) Go to Step 11.	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 and 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 and 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 Transaxle 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.	1) Check and repair malfunction part(s). 2) Go to Step 11.
9	Troubleshooting for DTC 1) Check and repair according to applicable DTC Flow Table. Are check and repair complete?	Go to Step 11.	1) Check and repair malfunction part(s). 2) Go to Step 11.

Step	Action	Yes	No
10	Check for Intermittent Problems 1) Check for intermittent problems referring to the next page. Is there any faulty condition?	1) Repair or replace malfunction part(s). 2) Go to Step 11.	Go to Step 11.
11	Final Confirmation Test 1) Clear DTC if any. 2) Perform final confirmation test referring to the next page. Is there any problem symptom, DTC or abnormal condition?	Go to Step 6.	End.

### 1. Customer Complaint Analysis –See Customer Problem Inspection Form–

Record details of the problem such as failure, complaint and how it occurred as described by the customer.

For this purpose, use of such an inspection form will facilitate collecting information to the point required for proper analysis and diagnosis.

### 2. Diagnostic Trouble Code (DTC) and Freeze Frame Data Check, Record and Clearance

First, referring to “DTC Check” in this section, check DTC and pending DTC. If DTC exists, print or write down DTC and freeze frame data and then clear malfunction DTC(s) by referring to “DTC Clearance” in this section. Malfunction DTC indicates malfunction in the system but it is not possible to know from it whether the malfunction is occurring now or it occurred in the past and normal condition has been restored. In order to know that, check symptom in question according to Step 5 and then recheck DTC according to Step 6.

Diagnosing a trouble based on the DTC in this step only or failure to clear the DTC in this step may result in a faulty diagnosis, trouble diagnosis of a normal circuit or difficulty in troubleshooting which is otherwise unnecessary.

### 3 and 4. Visual Inspection

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

### 5. Trouble Symptom Confirmation

Check trouble symptoms based on information obtained in Step 1 Customer Complaint Analysis and Step 2 DTC / Freeze Frame Data Check.

Also, reconfirm DTC according to “DTC Confirmation Procedure” described in each DTC Flow Table.

### 6 and 7. Rechecking and Record of DTC and Freeze Frame Data

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

### 8. Automatic Transmission Basic Check and Trouble Diagnosis Table

Perform basic check of A/T according to flow table of “Automatic Transaxle Basic Check” 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, which are obtained through steps of customer complaint analysis, trouble symptom confirmation and/or A/T basic check, appearing on the vehicle and repair or replace faulty parts, if any.

### 9. Diagnostic Trouble Code Flow Table –See each DTC Flow Table–

Based on the DTC indicated in Step 6/7 and referring to Diagnostic Trouble Code Flow Table in this section, locate the cause of the trouble, namely in a sensor, switch, wire harness, connector, actuator, TCM or other part and repair or replace faulty parts.

**10. Check for Intermittent Problem**

Check parts where an intermittent trouble is easy to occur, e.g. wire harness, connector, etc., referring to “Intermittent and Poor Connection” in Section 0A and related circuit of DTC recorded in Step 2.

**11. Final Confirmation Test**

Confirm that the problem symptom has gone and the vehicle is free from any abnormal conditions. If what has been repaired is related to the malfunction DTC, clear the DTC once and check to ensure that no malfunction DTC is indicated.



**Customer Problem Inspection Form (Example)**

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

PROBLEM SYMPTOMS
<input type="checkbox"/> Vehicle does not move (R, D, 2, L or any range) <input type="checkbox"/> No upshift automatically ( <input type="checkbox"/> 1st to 2nd <input type="checkbox"/> 2nd to 3rd <input type="checkbox"/> 3rd to 4th (O/D) <input type="checkbox"/> 2 range <input type="checkbox"/> D range) <input type="checkbox"/> No downshift automatically ( <input type="checkbox"/> 3rd to 2nd <input type="checkbox"/> 2nd to 1st <input type="checkbox"/> 4th (O/D) to 3rd <input type="checkbox"/> 2 range <input type="checkbox"/> D range) <input type="checkbox"/> No gear change manually ( <input type="checkbox"/> 1st ↔ 3rd <input type="checkbox"/> 3rd ↔ 4th) <input type="checkbox"/> TCC no lock-up <input type="checkbox"/> TCC no lock-up off <input type="checkbox"/> Automatic shift point too high or too low <input type="checkbox"/> Excessive gear change shock (1st/2nd/3rd/4th (O/D)/Reverse) <input type="checkbox"/> No kickdown <input type="checkbox"/> Transmission slipping in (1st/2nd/3rd/4th (O/D)/Reverse) <input type="checkbox"/> Others _____

VEHICLE/ENVIRONMENTAL CONDITION WHEN PROBLEM OCCURS	
<b>Environmental Condition</b>	
Weather Temperature Frequency Road	<input type="checkbox"/> Fair <input type="checkbox"/> Cloudy <input type="checkbox"/> Rain <input type="checkbox"/> Always <input type="checkbox"/> Other _____ (   °F/   °C) <input type="checkbox"/> Hot <input type="checkbox"/> Warm <input type="checkbox"/> Cool <input type="checkbox"/> Cold <input type="checkbox"/> always <input type="checkbox"/> Always <input type="checkbox"/> Sometimes (   times/   day, month) <input type="checkbox"/> Only once <input type="checkbox"/> Under certain condition <input type="checkbox"/> Urban <input type="checkbox"/> Suburb <input type="checkbox"/> Highway <input type="checkbox"/> Mountainous <input type="checkbox"/> Uphill <input type="checkbox"/> Downhill <input type="checkbox"/> Tarmacadam <input type="checkbox"/> Gravel <input type="checkbox"/> Other _____
<b>Vehicle Condition</b>	
Engine & transmission condition	<input type="checkbox"/> Cold/ <input type="checkbox"/> Warming up phase/ <input type="checkbox"/> Warmed up Engine speed (   r/min.) Throttle opening ( <input type="checkbox"/> Idle/ <input type="checkbox"/> About   % <input type="checkbox"/> full) O/D cut switch ( <input type="checkbox"/> ON/ <input type="checkbox"/> OFF)
Vehicle condition	<input type="checkbox"/> At stop/ <input type="checkbox"/> During driving ( <input type="checkbox"/> Constant speed <input type="checkbox"/> Accelerating <input type="checkbox"/> Decelerating <input type="checkbox"/> Braking) <input type="checkbox"/> Right hand corner <input type="checkbox"/> Left hand corner <input type="checkbox"/> Vehicle speed (   km/h   mile/h) <input type="checkbox"/> Other _____

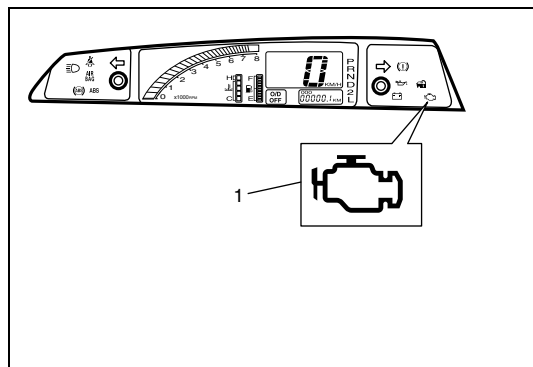
"O/D OFF" lamp	<input type="checkbox"/> Blink <input type="checkbox"/> Always ON <input type="checkbox"/> Sometimes ON <input type="checkbox"/> Always OFF <input type="checkbox"/> Good condition
Malfunction indicator lamp	<input type="checkbox"/> Blink <input type="checkbox"/> Always ON <input type="checkbox"/> Sometimes ON <input type="checkbox"/> Always OFF <input type="checkbox"/> Good condition
Diagnostic trouble code	First check: <input type="checkbox"/> No code <input type="checkbox"/> Malfunction code (   ) Second check: <input type="checkbox"/> No code <input type="checkbox"/> 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 for checking procedure.

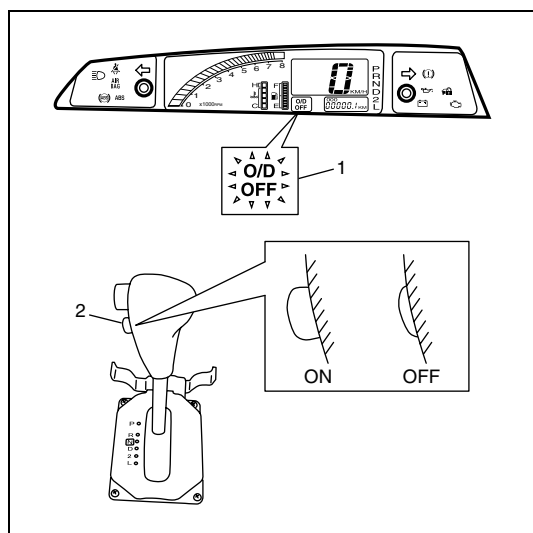


1. MIL

## “O/D OFF” Lamp Check

- 1) Check that O/D off switch button (2) is at OFF position.
- 2) Turn ignition switch ON.
- 3) Check that “O/D OFF” lamp (1) lights for about 2 sec. and then goes OFF.

If anything faulty is found, advance to “Diagnostic Flow Table A-3”.



## Diagnostic Trouble Code (DTC) Check

Automatic transaxle DTC can be checked using any one of the following 3 methods.

### Reading DTC from ECM using SUZUKI scan tool – method-1

Refer to the same item in Section 6 for reading procedure.

#### NOTE:

The method is available only for the vehicle with immobilizer lamp.

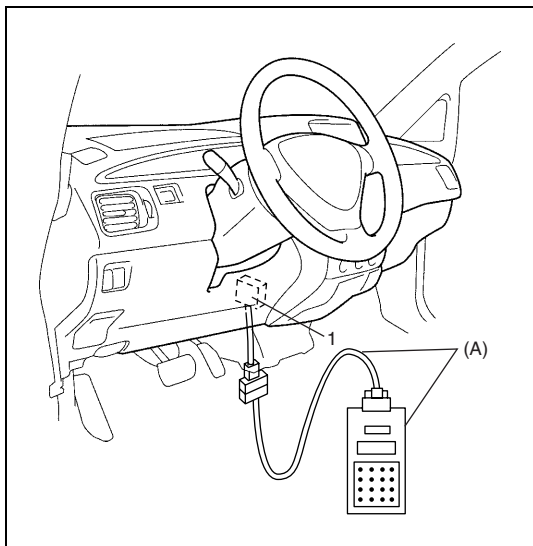
## Reading DTC from TCM using SUZUKI scan tool – method-2

- 1) Turn ignition switch OFF.
- 2) After setting cartridge, connect SUZUKI scan tool to data link connector (DLC) (1) located in underside of instrument panel at driver's seat side.

### Special tool

**(A) : SUZUKI scan tool**

- 3) Turn ignition switch ON.
- 4) Read DTC according to instructions displayed on SUZUKI scan tool and print it down. Refer to SUZUKI scan tool operator's manual for further details.
- 5) After completing the check, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC) (1).

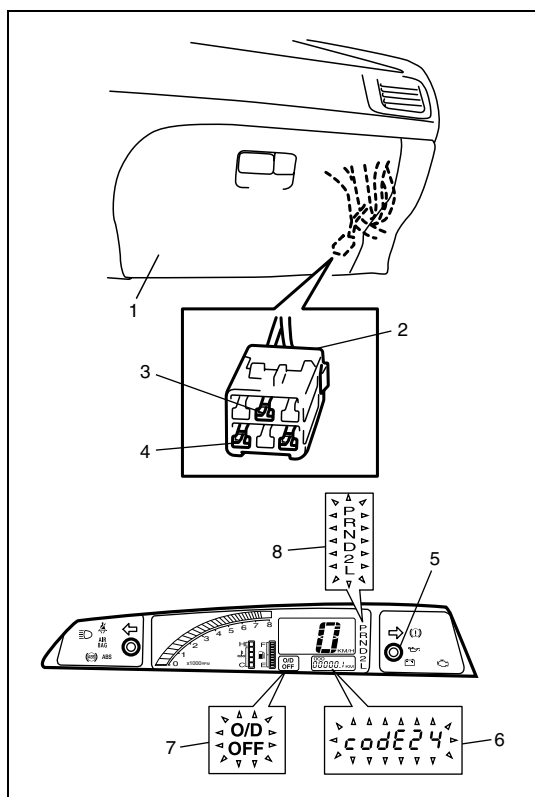


## Displaying DTC on odometer – method-3

- 1) Turn ignition switch OFF.
- 2) Remove glove box (1) from instrument panel.
- 3) Using service wire, connect diagnosis switch terminal (3) with ground terminal (4) of blue monitor connector (2).
- 4) Turn ignition switch ON.
- 5) Press reset button (5) and hold on pressing it.
- 6) Read DTC displayed on odometer (6). For example, DTC No. 24 is displayed on odometer in the figure.
- 7) After completing the check, release reset switch, turn ignition switch OFF and disconnect service wire from monitor connector (2).

### NOTE:

**While DTC is displayed on odometer, “O/D OFF” lamp (7) and shift indicator (8) light together.**



## Diagnostic Trouble Code (DTC) Clearance

As automatic transaxle DTC is stored in memory of ECM and TCM respectively, be sure to clear it from both ECM and TCM by using either method-1 and method-2 or method-1 and method-3 of the following 3 methods.

### NOTE:

**For vehicle without immobilizer lamp, method-1 is not necessary to be performed, because automatic transmission DTC is not stored in memory of ECM.**

### To clear DTC stored in ECM with scan tool – method-1

Refer to the same item in Section 6 for reading procedure.

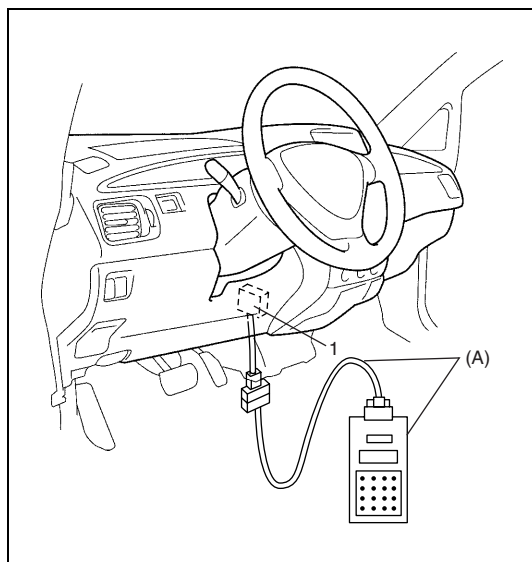
### To clear DTC stored in TCM with scan tool – method-2

- 1) Turn ignition switch OFF.
- 2) After setting cartridge, connect SUZUKI scan tool to data link connector (DLC) (1) located in underside of instrument panel at driver's seat side.

#### Special tool

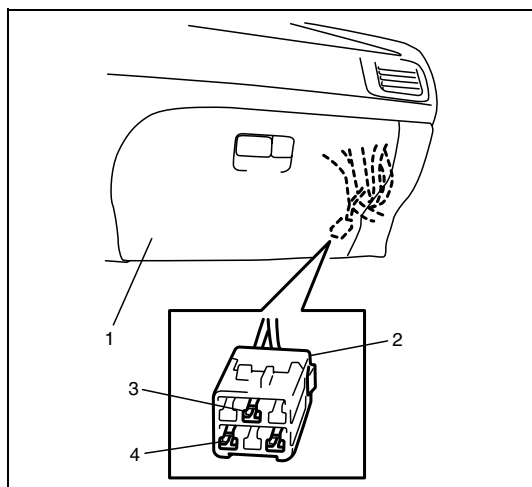
**(A) : SUZUKI scan tool**

- 3) Turn ignition switch ON.
- 4) Clear DTC according to instructions displayed on SUZUKI scan tool. Refer to SUZUKI scan tool operator's manual for further details.
- 5) After completing the clearance, turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC) (1).



### To clear DTC stored in TCM without scan tool – method-3

- 1) Remove glove box (1) from instrument panel.
- 2) Turn ignition switch ON.
- 3) After 6 seconds or more, repeat connecting and disconnecting diagnosis switch terminal (3) and ground terminal (4) of blue monitor connector (2) 5 times at about 1 second interval within 10 seconds, using service wire.
- 4) Check TCM that no malfunction DTC remains in memory of it.



## Diagnostic Trouble Code (DTC) Table

### NOTE:

- Confirmation available table of automatic transaxle related DTC is shown below.

	Vehicle with immobilizer Lamp				Vehicle without immobilizer Lamp			
	DTC in ECM		DTC in TCM		DTC in ECM		DTC in TCM	
	Code type I	Code type II	Code type I	Code type II	Code type I	Code type II	Code type I	Code type II
SUZUKI scan tool	○	×	○	×	×	×	○	×
Generic scan tool	○	×	×	×	×	×	×	×
Not using scan tool (Displaying on odometer)	×	×	×	○	×	×	×	○

○ :Available-DTC can be confirmed

× :Not available-DTC can not be confirmed

- A:** Driving cycles when MIL lightening and storing DTC in ECM and TCM memory for vehicle with immobilizer lamp
- B:** Driving cycles when “O/D OFF” light flashing and storing DTC in TCM memory for vehicle without immobilizer lamp
- \*1:** Trouble and DTC is not detected for vehicle without immobilizer lamp.
- \*2:** MIL does not light and DTC is not stored in ECM although trouble is detected and DTC is stored in TCM for vehicle with immobilizer lamp.
- \*3:** “O/D OFF” lamp does not flash although DTC is detected and stored for vehicle without immobilizer lamp.
- \*4:** If circuit open is detected, MIL lights on 2 driving cycles.

DTC NO.		DETECTING ITEM	DETECTING CONDITION	A	B
Type I	Type II				
—	12	No malfunction is detected	—	—	—
P0705	34	Transmission range sensor circuit malfunction	<ul style="list-style-type: none"> <li>No sensor signal is inputted.</li> <li>or</li> <li>Multiple signals are inputted simultaneously.</li> </ul>	*4 1 driving cycle	*3 1 driving cycle
P0710	36	Transmission fluid temperature sensor circuit malfunction	Sensor output voltage is too high	*2 1 driving cycle	*3 1 driving cycles
	38		Sensor output voltage is too low		
P0715	14	Input/Turbine speed sensor circuit malfunction	No sensor signal is detected although output shaft speed sensor signal is detected.	1 driving cycle	1 driving cycle
P0720	31	Output speed sensor/VSS circuit malfunction	No sensor signal is inputted although input shaft speed sensor signal is inputted.	1 driving cycle	1 driving cycle

DTC NO.		DETECTING ITEM	DETECTING CONDITION	A	B
Type I	Type II				
P0725	35	Engine speed input circuit malfunction	No engine speed signal is inputted although engine is running and engine coolant temperature sensor signal is in normal condition.	1 driving cycle	1 driving cycle
*1 P0741	*1 29	Torque converter clutch circuit performance or stuck off	<ul style="list-style-type: none"> <li>• Difference in revolution between engine and input shaft is too large although TCM is commanding TCC solenoid to turn ON.</li> </ul> or <ul style="list-style-type: none"> <li>• Difference in revolution between engine and input shaft is too small although TCM is commanding TCC solenoid to turn OFF.</li> </ul>	2 driving cycles	Not applicable
P0743	25	Torque converter clutch system electrical	Voltage of TCC solenoid terminal is high although TCM is commanding TCC solenoid to turn OFF.	1 driving cycle	*3 1 driving cycle
	26		Voltage of TCC solenoid terminal is low although TCM is commanding TCC solenoid to turn ON.		
P0748	41	Pressure control solenoid electrical	No electric flow is detected on solenoid circuit.	1 driving cycle	1 driving cycle
	42		Too much electric flow is detected on pressure control solenoid circuit.		
*1 P0751	*1 17	Shift solenoid-A/No.1 performance or stuck off	<ul style="list-style-type: none"> <li>• Actual gear position is 2nd gear although TCM command is for 3rd gear.</li> </ul> or <ul style="list-style-type: none"> <li>• Actual gear position is 3rd gear although TCM command is for 2nd gear.</li> </ul>	2 driving cycles	Not applicable
P0753	21	Shift solenoid-A/No.1 electrical	Voltage of shift solenoid terminal is high although TCM is commanding shift solenoid to turn OFF.	1 driving cycle	1 driving cycle
	22		Voltage of shift solenoid terminal is low although TCM is commanding shift solenoid to turn ON.		
*1 P0756	*1 28	Shift solenoid-B/No.2 performance or stuck off	<ul style="list-style-type: none"> <li>• Actual gear position is 4th gear although TCM command is for 3rd gear.</li> </ul> or <ul style="list-style-type: none"> <li>• Actual gear position is 3rd gear although TCM command is for 4th gear.</li> </ul>	2 driving cycles	Not applicable

DTC NO.		DETECTING ITEM	DETECTING CONDITION	A	B
Type I	Type II				
P0758	23	Shift solenoid-B/No.2 electrical	Voltage of shift solenoid terminal is high although TCM is commanding shift solenoid to turn OFF.	1 driving cycle	1 driving cycle
	24		Voltage of shift solenoid terminal is low although TCM is commanding shift solenoid to turn ON.		
P0785	13	Timing solenoid	<ul style="list-style-type: none"> <li>Voltage of timing solenoid terminal is high although TCM is commanding timing solenoid to turn OFF.</li> </ul> or <ul style="list-style-type: none"> <li>Voltage of timing solenoid terminal is low although TCM is commanding timing solenoid to turn ON.</li> </ul>	1 driving cycle	1 driving cycle
P1700	32	Throttle position signal circuit malfunction	Too short low signal of pulse signal from ECM to TCM continues out of specification.	1 driving cycle	1 driving cycle
	33		Too long low signal of pulse signal from ECM to TCM continues out of specification.		
P1702	52	Internal malfunction of TCM	Calculation of current data stored in TCM is not correct comparing with pre-stored checking data in TCM.	1 driving cycle	1 driving cycle
P1705	51	Engine coolant temperature signal circuit malfunction	<ul style="list-style-type: none"> <li>Too long high signal of pulse signal from ECM to TCM continues out of specification.</li> </ul> or <ul style="list-style-type: none"> <li>Too long low signal of pulse signal from ECM to TCM continues out of specification.</li> </ul> or <ul style="list-style-type: none"> <li>Too long or short low signal of pulse signal from ECM to TCM is detected in continuous 8 pulses.</li> </ul>	1 driving cycle	1 driving cycle
P1730	64	Engine torque signal circuit malfunction	<ul style="list-style-type: none"> <li>Too short low signal of pulse signal from ECM to TCM continues out of specification.</li> </ul> or <ul style="list-style-type: none"> <li>Too long low signal of pulse signal from ECM to TCM continues out of specification.</li> </ul>	1 driving cycle	1 driving cycle
P1895	27	Torque reduction signal circuit malfunction	Voltage of torque reduction signal circuit terminal is low although TCM does not require ECM to reduce engine torque	*2 1 driving cycle	1 driving cycle

## Fail Safe Table

This function is provided by the safe mechanism that assures safe driveability even when the solenoid valve, sensor or its circuit fails.

The table below shows the fail safe function for each fail condition of solenoid, solenoid or its circuit.

DTC NO.		TROUBLE AREA	FAIL SAFE OPERATION
P0705	34	Transmission range sensor or its circuit	<ul style="list-style-type: none"> <li>Selected range is set as range shown below.               <ul style="list-style-type: none"> <li>In case of circuit open, selected range is assumed to be "D" range.</li> <li>In case of circuit short, selected range is set in priority order shown below. D&gt;2&gt;L&gt;R&gt;N&gt;P</li> </ul> </li> <li>Lock-up function is inhibited to operate.</li> <li>Reverse control operation, which inhibit reverse driving at "R" range while vehicle runs forward more than 11 km/h (7 mile/h), is inhibited.</li> <li>Learning control is inhibited.</li> </ul>
P0710	36 38	Transmission fluid temperature sensor or its circuit	<ul style="list-style-type: none"> <li>A/T fluid temperature is assumed to be 200 °C (392 °F).</li> <li>Upshifting to O/D is inhibited.</li> <li>Lock-up function is inhibited to operate.</li> <li>Learning control is inhibited.</li> </ul>
P0715	14	Input shaft speed sensor or its circuit	<ul style="list-style-type: none"> <li>Upshifting to O/D is inhibited.</li> <li>Lock-up function is inhibited to operate.</li> <li>Line pressure control at gear shifting is inhibited.</li> <li>Torque reduction control, which request ECM to reduce to generate torque, is inhibited.</li> <li>Learning control is inhibited.</li> </ul>
P0720	31	Output shaft speed sensor or its circuit	<ul style="list-style-type: none"> <li>Vehicle speed which is calculated by input shaft speed sensor signal is used for gear shifting control instead of vehicle speed calculated by output shaft speed sensor/VSS signal.</li> <li>Upshifting to O/D is inhibited.</li> <li>Lock-up function is inhibited to operate.</li> <li>Line pressure control at gear shifting is inhibited.</li> <li>Torque reduction control, which request ECM to reduce to generate torque, is inhibited.</li> <li>Learning control is inhibited.</li> </ul>
P0725	35	Engine speed signal circuit	<ul style="list-style-type: none"> <li>Upshifting to O/D is inhibited.</li> <li>Line pressure control at gear shifting is inhibited.</li> <li>Torque reduction control, which request ECM to reduce to generate torque, is inhibited.</li> <li>Learning control is inhibited.</li> <li>Lock-up function is inhibited to operate.</li> </ul>
P0743	25 26	TCC solenoid valve or its circuit	<ul style="list-style-type: none"> <li>Lock-up function is inhibited to operate.</li> <li>When TCC solenoid circuit is shorted to power circuit and vehicle speed is slower than 15 km/h (9 mile/h), gear position is fixed in 1st gear for prevention of engine stall.</li> </ul>



DTC NO.		TROUBLE AREA	FAIL SAFE OPERATION
P0748	41	Pressure control solenoid valve or its circuit	<ul style="list-style-type: none"> <li>Power supply for all solenoid valves is cut.</li> <li>Gear position is fixed in 3rd gear.</li> <li>Torque reduction control, which request ECM to reduce to generate torque, is inhibited.</li> <li>Learning control is inhibited.</li> </ul>
	42		
P0753	21	Shift solenoid-A valve or its circuit	
	22		
P0758	23	Shift solenoid-B valve or its circuit	
	24		
P0785	13	Timing solenoid valve or its circuit	<ul style="list-style-type: none"> <li>Power supply for all solenoid valves is cut.</li> <li>Gear position is fixed in 3rd gear.</li> </ul>
P1700	32	Throttle position signal circuit	<ul style="list-style-type: none"> <li>Throttle opening used for line pressure control is assumed to be 100%.</li> <li>Throttle opening used for gear shifting control is assumed to be 0%.</li> <li>Upshifting to O/D is inhibited.</li> <li>Learning control is inhibited.</li> <li>Lock-up function is inhibited to operate.</li> </ul>
	33		
P1702	52	TCM	<ul style="list-style-type: none"> <li>Power supply for all solenoid valves is cut.</li> <li>Gear position is fixed in 3rd gear.</li> </ul>
P1705	51	Engine coolant temperature signal circuit	After 15 minutes pass from detecting malfunction, engine coolant temperature is assumed to be normal operating temperature, and controls of overdrive and lock-up is released from inhibition.
P1730	64	Engine torque signal circuit	<ul style="list-style-type: none"> <li>Engine torque is assumed to be that of last value before detecting malfunction.</li> <li>Upshifting to O/D is inhibited.</li> <li>Line pressure control at gear shifting is inhibited.</li> <li>Torque reduction control, which request ECM to reduce to generate torque, is inhibited.</li> <li>Learning control is inhibited.</li> </ul>
P1895	27	Torque reduction signal circuit	Torque reduction control, which request ECM to reduce to generate torque, is inhibited.

## Visual Inspection

Visually check the following parts and systems.

INSPECTION ITEM	REFERRING SECTION
<ul style="list-style-type: none"> <li>• A/T fluid ----- level, leakage, color</li> <li>• A/T fluid hoses ----- disconnection, looseness, deterioration</li> <li>• Throttle cable ----- play under warm engine, installation</li> <li>• A/T select cable ----- installation</li> <li>• Engine oil ----- level, leakage</li> <li>• Engine coolant ----- level, leakage</li> <li>• Engine mountings ----- play, looseness, damage</li> <li>• Suspension ----- play, looseness</li> <li>• Drive shafts ----- damage</li> <li>• Battery ----- indicator condition, corrosion of terminal</li> <li>• Connectors of electric wire harness ----- disconnection, friction</li> <li>• Fuses ----- burning</li> <li>• Parts ----- installation, damage</li> <li>• Bolts ----- looseness</li> <li>• Other parts that can be checked visually</li> </ul> <p>Also check the following items at engine start, if possible.</p> <ul style="list-style-type: none"> <li>• "O/D OFF" lamp ----- Operation</li> <li>• Malfunction indicator lamp ----- Operation</li> <li>• Charge warning lamp ----- Operation</li> <li>• Engine oil pressure warning lamp ----- Operation</li> </ul>	<p>Section 0B</p> <p>Section 7B</p> <p>Section 6E1</p> <p>Section 7B</p> <p>Section 0B</p> <p>Section 0B</p> <p>Section 6A1</p> <p>Section 3</p> <p>Section 4A</p> <p>Section 6E1</p> <p>Section 8</p> <p>Section 6E1</p> <p>Section 6H</p> <p>Section 8</p> <p>Section 6A1 for pressure check</p>
<ul style="list-style-type: none"> <li>• Engine coolant temp. meter ----- Operation</li> <li>• Other parts that can be checked visually</li> </ul>	

## Automatic Transaxle Basic Check

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

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" preformed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table".
2	Perform "Road Test" in this section. Is it OK?	Go to Step 3.	Proceed to "Troubleshooting" in "Road Test".
3	Perform "Manual Road Test" in this section. Is it OK?	Go to Step 4.	Proceed to "Troubleshooting" in "Manual Road Test".
4	Perform "Engine Brake Test" in this section. Is it OK?	Go to Step 5.	Proceed to "Troubleshooting" in "Engine Brake Test".
5	Perform "Stall Test" in this section. Is it OK?	Go to Step 6.	Proceed to "Troubleshooting" in "Stall Test".
6	Perform "Time Lag Test" in this section. Is it OK?	Go to Step 7.	Proceed to "Troubleshooting" in "Time Lag Test".
7	Perform "Line Pressure Test" in this section. Is it OK?	Go to Step 8.	Proceed to "Troubleshooting" in "Line Pressure Test".
8	Proceed to "Trouble Diagnosis Table-1" in this section. Is trouble identified?	Repair or replace faulty parts.	Go to Step 9.
9	Proceed to "Trouble Diagnosis Table-2" in this section. Is trouble identified?	Repair or replace faulty parts.	Proceed to "Trouble Diagnosis Table-3" in this section.

# Trouble Diagnosis Table

## Trouble diagnosis table-1

### Electrical repair

Condition	Possible Cause	Correction
Excessive shift shock	Shift solenoid valve-A and/or-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	Timing solenoid valve circuit faulty only when N→D or 3↔O/D shifting	
	Output shaft speed sensor/VSS circuit faulty	
	Input shaft speed sensor circuit faulty	
	Transmission fluid temperature sensor circuit faulty	
	Throttle position signal circuit faulty	
	Engine speed signal circuit faulty	
	Engine torque signal circuit faulty	
	Torque reduction request signal circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	Crank position sensor circuit faulty	Substitute a known-good TCM and recheck.
	TCM	Substitute a known-good ECM and recheck.
	ECM	Initialize learning control and perform learning referring to "Learning Control Initialization" and "Brief learning" in this section.
	Improper learning control of TCM when O/D↔3 shifting and any upshifting	
No gear shift as 3rd gear	Shift solenoid valve-A and/or-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	Timing solenoid valve circuit faulty	
	TCM	Substitute a known-good TCM and recheck.
Poor 1→2 shift	Shift solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Output shaft speed sensor/VSS circuit faulty	
	Transmission range sensor circuit faulty	
	Throttle position signal circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Poor 2→3 shift	Shift solenoid valve-A circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Output shaft speed sensor/VSS circuit faulty	
	Transmission range sensor circuit faulty	
	Throttle position signal circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.

Condition	Possible Cause	Correction
Poor 3→O/D shift	Shift solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	Timing solenoid valve circuit faulty	
	Output shaft speed sensor/VSS circuit faulty	
	Input shaft speed sensor circuit faulty	
	Transmission range sensor circuit faulty	
	Transmission fluid temperature sensor circuit faulty	
	Throttle position signal circuit faulty	
	Engine coolant temperature signal circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	Engine speed signal circuit faulty	
	Throttle position sensor circuit faulty	
	Engine coolant temperature sensor circuit faulty	Refer to "Diagnostic Flow Table A-1" in this section.
	Crank position sensor circuit faulty	
	O/D off switch circuit faulty	
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Poor O/D→3 shift	Shift solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	Timing solenoid valve circuit faulty	
	Output shaft speed sensor/VSS circuit faulty	
	Input shaft speed sensor circuit faulty	
	Throttle position signal circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	O/D off switch circuit faulty	Refer to "Diagnostic Flow Table A-1" in this section.
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Poor 3→2 shift	Shift solenoid valve-A circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Output shaft speed sensor/VSS circuit faulty	
	Throttle position signal circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Poor 2→1 shift	Shift solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Output shaft speed sensor/VSS circuit faulty	
	Throttle position signal circuit faulty	
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.

Condition	Possible Cause	Correction
Incorrect gear shift point	Output shaft speed sensor/VSS circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Pressure control solenoid valve circuit faulty	
	Throttle position signal circuit faulty	
	Pressure control solenoid valve circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	Throttle position sensor circuit faulty	
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Non operate TCC/lock-up system	TCC solenoid valve-B circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	Shift solenoid valve-A and/or-B circuit faulty	
	Pressure control solenoid valve circuit faulty	
	Output shaft speed sensor/VSS circuit faulty	
	Input shaft speed sensor circuit faulty	
	Transmission range sensor circuit faulty	
	Transmission fluid temperature sensor circuit faulty	
	Engine coolant temperature signal circuit faulty	
	Throttle position signal circuit faulty	
	Brake light switch circuit faulty	Refer to "Diagnostic Flow Table A-2" in this section.
	Throttle position sensor circuit faulty	Inspect circuit for open, short and intermittent referring to Section 6. If NG, repair.
	Engine coolant temperature sensor circuit faulty	
	TCM	Substitute a known-good TCM and recheck.
	ECM	Substitute a known-good ECM and recheck.
Higher or lower stall speed	Pressure control solenoid valve circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
Excessive "N"→"D" or "N"→"R" time lag	Pressure control solenoid valve circuit faulty	Inspect circuit for open, short and intermittent. if NG, repair
	Transmission fluid temperature sensor circuit faulty	
	TCM	Substitute a known-good TCM and recheck.
Higher or lower line pressure	Pressure control solenoid valve circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.
Excessive slip-page in all range	Pressure control solenoid valve circuit faulty	Inspect circuit for open, short and intermittent. If NG, repair.
	TCM	Substitute a known-good TCM and recheck.

## Trouble diagnosis table-2

### On-vehicle repair

Condition	Possible Cause	Correction
Unable to run in all range	Faulty valve body component	Replace valve body assembly
Excessive shift shock	Engine abnormal condition	Inspect and repair engine
	Malfunction of shift solenoid valve-A and/or-B	Inspect. If NG, replace
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of input shaft speed sensor	
	Malfunction of transmission range sensor	
	Malfunction of Transmission fluid temperature sensor	
	Malfunction of timing solenoid valve only when N→D or 3↔O/D shifting	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Malfunction of brake light switch except N→D or N→R shifting	Inspect referring to Section 5. If NG, replace.
	Malfunction of crank position sensor	Inspect referring to Section 6E1. If NG, replace.
	Malfunction of throttle position sensor	
	Faulty valve body component	Replace valve body assembly.
Poor 1→2 shift	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of transmission range sensor	
	Malfunction of throttle position sensor	Inspect referring to Section 6E1. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Poor 2→3 shift	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of transmission range sensor	
	Malfunction of throttle position sensor	Inspect referring to Section 6E1. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Poor 3→O/D shift	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of timing solenoid valve	
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of input shaft speed sensor	
	Malfunction of transmission range sensor	
	Malfunction of Transmission fluid temperature sensor	
	Malfunction of O/D off switch	
	Malfunction of engine coolant temperature sensor	Inspect referring to Section 6E1. If NG, replace.
	Malfunction of throttle position sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.

Condition	Possible Cause	Correction
Poor O/D→3 shift	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of timing solenoid valve	
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of input shaft speed sensor	
	Malfunction of O/D off switch	Inspect referring to Section 6E1. If NG, replace.
	Malfunction of throttle position sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
Poor 3→2 shift	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of throttle position sensor	Inspect referring to Section 6E1. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Poor 2→1 shift	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of throttle position sensor	Inspect referring to Section 6E1. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Incorrect shift point	Engine abnormal condition	Inspect and repair engine
	Malfunction of output shaft speed sensor/VSS	Inspect. If NG, replace.
	Malfunction of throttle position sensor	Inspect referring to Section 6E1. If NG, replace.
Non operate TCC/ lock-up system	Malfunction of TCC solenoid valve	Inspect. If NG, replace.
	Malfunction of shaft solenoid valve-A and/or-B	
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of input shaft speed sensor	
	Malfunction of transmission range sensor	
	Malfunction of transmission fluid temperature sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Malfunction of brake light switch	Inspect referring to Section 5. If NG, replace.
	Malfunction of throttle position sensor	Inspect referring to Section 6E1. If NG, replace.
	Malfunction of engine coolant temperature sensor	
	Malfunction of brake light switch	Inspect referring to Section 5. If NG, replace.
	Faulty valve body component	Replace valve body assembly.
Excessive “N”→“D” or “N”→“R” time lag	Malfunction of transmission fluid temperature sensor	Inspect. If NG, replace.
	Pressure control solenoid valve circuit faulty	Inspect. If NG, replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty valve body component	Replace valve body assembly.



### Trouble diagnosis table-3

#### Off-vehicle repair

Condition	Possible Cause	Correction
Unable to run in all range	Faulty oil pump	Inspect. If NG, replace.
	Seized or broken planetary gear	
	Faulty one-way clutch No.2	
	Damaged drive plate	
	Faulty forward clutch	
	Faulty reverse clutch	
	Faulty 1st and reverse brake	
	Faulty torque converter	Replace
Excessive "N"→"D" shift shock	Faulty forward clutch	Inspect. If NG, replace.
Excessive "N"→"R" shift shock	Faulty reverse clutch	Inspect. If NG, replace.
	Faulty 1st and reverse brake	
Poor 1→2 shift, excessive shock or slippage	Faulty 2nd brake	Inspect. If NG, replace.
	Faulty one-way clutch No.1	
Poor 2→3 shift, excessive shock or slippage	Faulty direct clutch	Inspect. If NG, replace.
Poor 3↔O/D shift, excessive shock or slippage	Faulty forward clutch	Inspect. If NG, replace.
	Faulty O/D and 2nd coast brake	
Poor 3→2 shift, excessive shock or slippage	Faulty direct clutch	Inspect. If NG, replace.
	Faulty one-way clutch No.1	
Poor 2→1 shift, excessive shock or slippage	Faulty 2nd brake	Inspect. If NG, replace.
	Faulty one-way clutch No.2	
Non operate TCC/lock-up system	Faulty torque converter	Replace.
Excessive "N"→"D" time lag	Faulty oil pump	Inspect. If NG, replace.
	Faulty forward clutch	
	Faulty one-way clutch No.2	
	Leakage from "D" range fluid pressure circuit	Overhaul or replace valve body assembly.
Excessive "N"→"R" time lag	Faulty oil pump	Inspect. If NG, replace.
	Faulty reverse clutch	
	Faulty 1st and reverse brake	
	Leakage from "R" range fluid pressure circuit	Overhaul or replace valve body assembly.
Poor engine brake in downshift to "2" range	Faulty O/D and 2nd coast brake	Inspect. If NG, replace.
Poor engine brake in downshift to "L" range	Faulty 1st and reverse brake.	Inspect. If NG, replace.

## Road Test

This test is to check if upshift, downshift and lock-up take place at specified speeds while actually driving vehicle on a level road.

**WARNING:**

- Carry out test in very little traffic area to prevent an accident.
- Test requires 2 persons, a driver and a tester.

- 1) Warm up engine.
- 2) With engine running at idle, shift selector lever to “D” range.
- 3) Accelerate vehicle speed by depressing accelerator pedal gradually.
- 4) While driving in “D” range, check if gear shift and lock-up occur properly as shown in “Gear Shift Diagram and Lock-Up Diagram”. Refer to “Automatic Gear Shift Diagram” in this section.

## Troubleshooting

Condition	Possible Cause	Correction
Unable to run in all range	Faulty valve body component	Replace valve body assembly
	Faulty oil pump	Inspect. If NG, replace.
	Seized or broken planetary gear	
	Faulty one-way clutch No.2	
	Faulty forward clutch	
	Faulty reverse clutch	
	Faulty 1st and reverse brake	
	Damaged drive plate	
	Faulty torque converter	Replace.
	Malfunction of TCM	Replace.
No gear shift as 3rd gear	Malfunction of shift solenoid valve-A and/or-B	Inspect. If NG, replace.
	Malfunction of timing solenoid valve	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
1→2 upshift fails to occur	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of throttle position sensor	
	Malfunction of transmission range sensor	
	Faulty valve body component	Replace valve body assembly
	Faulty 2nd/4th brake	Inspect. If NG, replace.
	Faulty one-way clutch No.1	
2→3 upshift fails to occur	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of throttle position sensor	
	Malfunction of transmission range sensor	
	Faulty valve body component	Replace valve body assembly.
	Faulty direct clutch	Inspect. If NG, replace.

Condition	Possible Cause	Correction
3→O/D upshift fails to occur	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of O/D off switch	
	Malfunction of engine coolant temperature sensor	
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of input shaft speed sensor	
	Malfunction of throttle position sensor	
	Malfunction of transmission range sensor	
	Malfunction of crankshaft position sensor	
	Malfunction of timing solenoid valve	
	Malfunction of transmission fluid temperature sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Faulty O/D and 2nd coast brake	Inspect. If NG, replace.
O/D→3 downshift fails to occur	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of O/D off switch	
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of input shaft speed sensor	
	Malfunction of throttle position sensor	
	Malfunction of timing solenoid valve	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Faulty forward clutch	Inspect. If NG, replace.
3→2 downshift fails to occur	Malfunction of shift solenoid valve-A	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of throttle position sensor	
	Faulty valve body component	Replace valve body assembly.
	Faulty one-way clutch No.1	Inspect. If NG, replace.
2→1 downshift fails to occur	Malfunction of shift solenoid valve-B	Inspect. If NG, replace.
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of throttle position sensor	
	Faulty valve body component	Replace valve body assembly.
	Faulty one-way clutch No.2	Inspect. If NG, replace.
Gear shift point is incorrect	Abnormal engine condition	Inspect and repair engine.
	Malfunction of output shaft speed sensor/VSS	Inspect. If NG, replace.
	Malfunction of throttle position sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.

Condition	Possible Cause	Correction
TCC/Lock-up function does not operate	Malfunction of TCC solenoid valve	Inspect. If NG, replace.
	Malfunction of shift solenoid valve-A and/or-B	
	Malfunction of brake light switch	
	Malfunction of engine coolant temperature sensor	
	Malfunction of output shaft speed sensor/VSS	
	Malfunction of input shaft speed sensor	
	Malfunction of throttle position sensor	
	Malfunction of transmission range sensor	
	Malfunction of transmission fluid temperature sensor	
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Faulty torque converter	Replace.

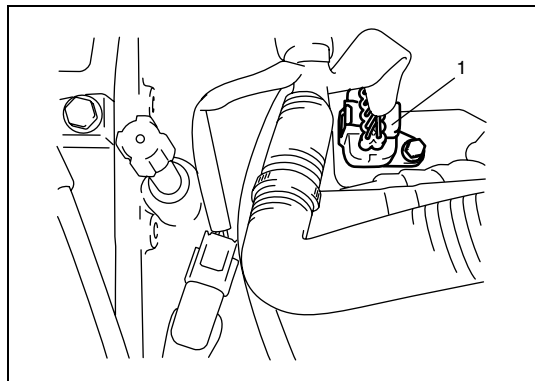
## Manual Road Test

This test checks the gears being used in “L”, “2” or “D” range when driven with unoperated gear shift control system. Test drive vehicle on a level road.

### NOTE:

**Before this test, check diagnostic trouble code (DTC).**

- 1) With select lever in “P”, start engine and warm it up.
- 2) After warming up engine, turn ignition switch OFF and disconnect valve body harness connector (1).



- 3) With select lever in “L” range, start vehicle and check that 3rd gear is being used referring to V1000 table shown below.

### Vehicle speed per 1000 rpm in engine speed for 2WD vehicle

Gear position	Vehicle speed
1st	9.1 km/h (5.7 mile/h)
2nd	16.7 km/h (10.4 mile/h)
3rd	26.2 km/h (16.4 mile/h)
4th/OD	37.6 km/h (23.5 mile/h)
Reverse	11.4 km/h (7.1 mile/h)

### Vehicle speed per 1000 rpm in engine speed for 4WD vehicle

Gear position	Vehicle speed
1st	8.6 km/h (5.4 mile/h)
2nd	15.8 km/h (9.9 mile/h)
3rd	24.8 km/h (15.5 mile/h)
4th/OD	35.6 km/h (22.3 mile/h)
Reverse	10.8 km/h (6.8 mile/h)

- 4) While vehicle is running, shift select lever to “2” range and check that 3rd gear is being used.
- 5) While vehicle is running, shift select lever to “D” range and check that 3rd gear is being used.
- 6) After above checks, stop vehicle then turn ignition switch OFF, and connect valve body harness connector.
- 7) Clear DTC.

**Troubleshooting**

Condition	Possible Cause	Correction
<b>Operated gear is not correct</b>	Faulty valve body component	Replace valve body assembly.
	Faulty clutch or brake	Inspect clutch and brake. If any parts are faulty, replace them.

**Engine Brake Test****WARNING:**

**Before test, make sure that there is no vehicle behind so as to prevent rear-end collision.**

- 1) While driving vehicle in 3rd gear of “D” range, shift select lever down to “2” range and check if engine brake operates.
- 2) In the same way as in Step 1), check engine brake for operation when select lever is shifted down to “L” range.
- 3) Engine brake should operate in above test.

**Troubleshooting**

Condition	Possible Cause	Correction
<b>Failure to operate when shifted down to “2” range</b>	Faulty valve body component	Replace valve body assembly.
	Faulty O/D and 2nd coast brake	Inspect. If NG, replace.
<b>Failure to operate when shifted down to “L” range</b>	Faulty valve body component	Replace valve body assembly.
	Faulty 1st and reverse brake	Inspect. If NG, replace.

## Stall Test

This test is to check overall performance of automatic transaxle and engine by measuring stall speed at “D” and “R” ranges. Be sure to perform this test only when transaxle 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, or fluid temperature may rise excessively high.
- After performing stall test, be sure to leave engine running at idle for longer than 1 minute before another stall test.

- 1) Apply parking brake and block wheels.
- 2) Install tachometer.
- 3) Start engine with select lever shifted to “P” range.
- 4) Depress brake pedal fully.
- 5) Shift select lever to “D” range and depress accelerator pedal fully while watching tachometer. Read engine rpm quickly when it has become constant with stall speed.
- 6) Release accelerator pedal immediately after stall speed is checked.
- 7) In the same way, check stall speed in “R” range.
- 8) Stall speed should be within following specification.

### Engine stall speed

Standard : 2,450 – 2,750 rpm

## Troubleshooting

Condition	Possible Cause	Correction
<b>Lower than standard level in both “D” and “R” range</b>	Engine output torque failure	Inspect and repair engine.
	Faulty one-way clutch of torque converter	Replace torque converter.
	Malfunction of TCM	Replace.
<b>Higher than standard level in “D” range</b>	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Slippery forward clutch	Inspect. If NG, replace.
	Faulty one-way clutch No.2	
	Leakage from “D” range fluid pressure circuit	Overhaul or replace valve body assembly.
<b>Higher than standard level in “R” range</b>	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Slippery reverse clutch	Inspect. If NG, replace.
	Slippery 1st and reverse brake	
	Leakage from “R” range fluid pressure circuit	Overhaul or replace valve body assembly.
<b>Higher than standard level in both “D” and “R” range</b>	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty oil pump	Inspect. If NG, replace.
	Leakage from both “D” and “R” range fluid pressure circuit	Overhaul or replace valve body assembly.
	Malfunction of TCM	Replace.

## Time Lag Test

This test is to check conditions of clutch, brake and fluid pressure. "Time lag" means time elapsed since selector 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.

### Gear shifting time lag

"N" → "D" : Less than 0.7 sec.

"N" → "R" : Less than 1.2 sec.

### NOTE:

- When repeating this test, be sure to wait at least one minute after select lever is shifted back to "N" range.
- Engine should be warmed up fully for this test.
- Repeat test 3 times and take average of those data for final time lag data.

### Troubleshooting

Condition	Possible Cause	Correction
<b>"N" → "D" time lag exceeds specification</b>	Malfunction of transmission fluid temperature sensor	Inspect. If NG, replace.
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty oil pump	Inspect. If NG, replace.
	Faulty forward clutch	
	Faulty one-way clutch No.2	
	Leakage from "D" range fluid pressure circuit	Overhaul or replace valve body assembly.
<b>"N" → "R" time lag exceeds specification</b>	Malfunction of transmission fluid temperature sensor	Inspect. If NG, replace.
	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty oil pump	Inspect. If NG, replace.
	Faulty reverse clutch	
	Faulty 1st and reverse brake	
	Leakage from "R" range fluid pressure circuit	Overhaul or replace valve body assembly.



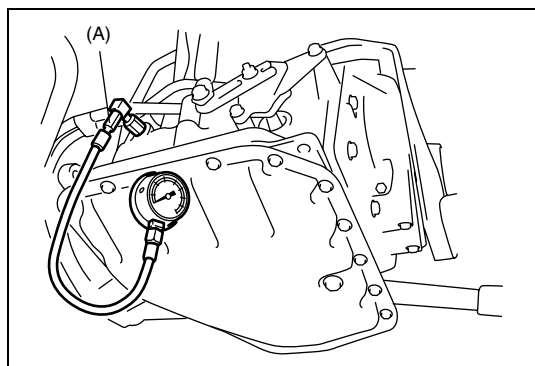
## Line Pressure Test

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 – 80 °C / 158 – 176 °F).
- Fluid is replenished to proper level between FULL and LOW on dipstick.
- Air conditioner switch is turned OFF.

- 1) Apply parking brake securely and place chocks against wheels.
- 2) Remove right side engine under cover.
- 3) Remove fluid pressure check hole plug bolt.
- 4) Attach oil pressure gauge to fluid pressure check hole in transaxle case.



### Special tool

(A) : 09925-37811-001

### CAUTION:

After attaching oil pressure gauge, check that no fluid leakage exists.

- 5) Depress foot brake fully, run engine at idle and stall then check fluid pressure in “D” or “R” range.

### CAUTION:

- Do not continue running engine at stall speed longer than 5 seconds.
- After performing line pressure test, be sure to leave engine running at idle for longer than one minute before performing another line pressure test.

## Automatic transmission line pressure

	"D" range	"R" range
At idle speed	3.7 – 4.1 kg/cm <sup>2</sup> 53 – 58 psi	7.2 – 8.2 kg/cm <sup>2</sup> 102 – 117 psi
At stall speed	12.5 – 13.7 kg/cm <sup>2</sup> 178 – 195 psi	18.2 – 20.8 kg/cm <sup>2</sup> 259 – 296 psi

## Troubleshooting

Condition	Possible Cause	Correction
Higher than standard level in each range	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
Lower than standard level in each range	Malfunction of pressure control solenoid valve	Inspect. If NG, replace valve body assembly.
	Faulty valve body component	Replace valve body assembly.
	Clogged oil strainer	Replace.
	Faulty oil pump	Inspect. If NG, replace.
	Leakage from both "D" and "R" range fluid pressure circuit	Overhaul or replace valve body assembly.
Lower than standard level only in "D" range	Leakage from "D" range fluid pressure circuit	Overhaul or replace valve body assembly.
Lower than standard level only in "R" range	Leakage from "R" range fluid pressure circuit	Overhaul or replace valve body assembly.

**"P" Range Test**

- 1) Stop vehicle on a slope of 5 degrees or more, shift select lever to "P" range and at the same time apply parking brake.
- 2) After stopping engine, depress brake pedal and release parking brake.
- 3) Then, release brake pedal gradually and check that vehicle remains stationary.
- 4) Depress brake pedal and shift select lever to "N" range.
- 5) Then, release brake pedal gradually and check that vehicle moves.

**WARNING:**

Before test, make sure no one is around vehicle or down on a slope and keep watchful for safety during test.

## Troubleshooting

Condition	Possible Cause	Correction
Vehicle moves at "P" range or remains stationary at "N" range	Defective parking lock pawl or spring	Inspect. If NG, repair.

## Diagnostic Flow Table A-1: No Gear Shift to O/D

### System description

TCM does not shift to O/D gear under any of the following conditions.

- O/D off switch is turned ON, that is, "O/D OFF" lamp lights
- Engine coolant temperature is less than 50 °C, 122 °F
- A/T fluid temperature is less than 20 °C, 68 °F
- Input shaft speed sensor or its circuit is in faulty condition
- Output shaft speed sensor/VSS or its circuit is in faulty condition
- Engine speed signal circuit is in faulty condition
- Pressure control solenoid valve or its circuit is in faulty condition
- Engine torque signal circuit is in faulty condition

### Troubleshooting

#### 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 tester, on a level road.

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" in this section performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check DTC. Is DTC P0715, P0720, P0725, P0748 or P1730 detected?	Perform DTC Flow table to repair and retry.	Go to Step 3.
3	Perform running test under the following conditions and measure voltage between terminal G08-4 of TCM connector and ground, terminal G08-3 of TCM connector and ground. <ul style="list-style-type: none"> <li>• O/D off switch is turned OFF</li> <li>• Engine coolant temperature is in normal operating temperature</li> <li>• Selector lever is in "D" range</li> <li>• Drive vehicle with 4th gear condition referring to "Automatic Gear Shift Diagram" in this section.</li> </ul> Do results satisfy the value as follows? Voltage between terminal G08-4 of TCM connector and ground : 0 – 1 V Voltage between terminal G08-3 of TCM connector and ground : 9 – 14 V	Faulty shift solenoid valve, circuit or transaxle.	"GRY" circuit shorted to power circuit or open, or "GRN/ORN" circuit shorted to ground. If wire is OK, go to Step 4.
4	O/D off switch signal inspection. With ignition switch ON, check voltage between terminal G07-3 of TCM connector and ground. O/D off switch OFF : 8 – 14 V O/D off switch ON : 0 – 1 V	Substitute a known-good TCM and recheck.	Faulty O/D off switch or its circuit. If OK, substitute a known good TCM and recheck.

## Diagnostic Flow Table A-2: No Lock-Up Occurs

### System description

TCM turns TCC solenoid OFF under any of the following conditions.

- Brake light switch is turned ON, that is, brake pedal is depressed
- Engine coolant temperature is less than 60 °C, 140 °F
- Throttle opening is as much as 0%
- Transmission range sensor or its circuit is in faulty condition
- Transmission fluid temperature sensor or its circuit is in faulty condition
- Input shaft speed sensor or its circuit is in faulty condition
- Output shaft speed sensor/VSS or its circuit is in faulty condition
- TCC/Lock-up solenoid valve or its circuit is in faulty condition
- Pressure control solenoid valve or its circuit is in faulty condition
- Shift solenoid valve-A or its circuit is in faulty condition
- Shift solenoid valve-B or its circuit is in faulty condition
- Throttle position signal circuit is in faulty condition

### Troubleshooting

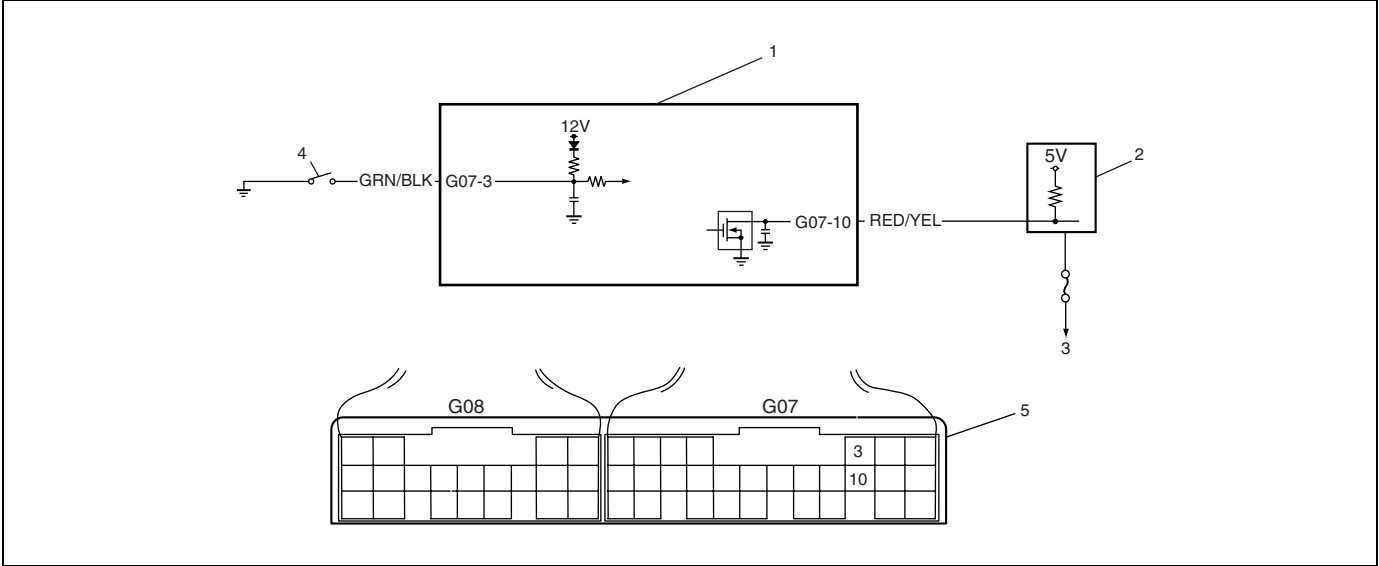
#### WARNING:

- 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 tester, on a level road.

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" in this section performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check DTC. Is DTC P0705, P0710, P0715, P0720, P0743, P0748, P0753, P0758 or P1700 detected?	Perform DTC Flow Table to repair and retry.	Go to Step 3.
3	Perform running test under the following conditions and check voltage between terminal G08-12 of TCM connector and ground. <ul style="list-style-type: none"> <li>• Engine coolant temperature is in normal operating temperature.</li> <li>• O/D off switch is turned OFF.</li> <li>• Selector lever is in "D" range.</li> <li>• Brake pedal is released.</li> <li>• Drive vehicle with 4th gear and TCC ON condition referring to "Automatic Gear Shift Diagram" in this section.</li> </ul> Is terminal voltage about 9 – 14 V?	Faulty TCC solenoid valve, circuit or transaxle.	"GRN/WHT" circuit shorted to ground. If wire is OK, go to Step 4.
4	Brake light switch signal inspection With ignition switch ON, check voltage between terminal G08-16 of TCM connector and ground. Brake pedal is released: 0 – 1 V Brake pedal is depressed: 8 – 14 V Is result as specified?	Substitute a known-good TCM and recheck.	Mis-adjusted brake light switch, faulty brake light switch or its circuit. If OK, substitute a known-good TCM and recheck.

# Diagnostic Flow Table A-3: “O/D OFF” Lamp Circuit Check

## Wiring Diagram



1. TCM	4. O/D off switch
2. “O/D OFF” lamp	5. Terminal arrangement of TCM connector viewed from harness side
3. To ignition switch	

### Circuit Description

“O/D OFF” lamp operation of ON/OFF is controlled by transmission control module (TCM) and combination meter.

When ignition switch is turned ON with O/D off switch OFF and malfunction is not detected, TCM turn “O/D OFF” lamp ON only for 2 seconds to check bulb and turns it OFF.

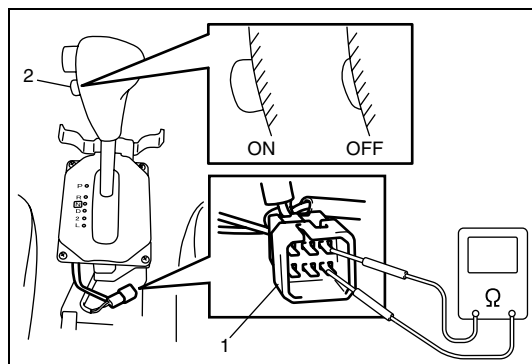
For vehicle without immobilizer lamp, when ignition switch is turned ON regardless of engine running or not and malfunction is detected, “O/D OFF” lamp is blinked by TCM and combination meter while malfunction is detected to warn driver of such occurrence of trouble. “O/D OFF” lamp also blinks only for 10 seconds when communication circuit between TCM and combination meter break down.

### Troubleshooting

Step	Action	Yes	No
1	Does “O/D OFF” lamp light steady?	Go to Step 2.	Go to Step 5.
2	Check O/D off switch position. Is O/D off switch turned OFF?	Go to Step 3.	Turn O/D off switch OFF.
3	Check O/D off switch circuit. 1) Turn ignition switch OFF and disconnect TCM connectors. 2) Check resistance between terminal G07-3 of disconnected harness side connector and ground with O/D off switch OFF. Is continuity indicated?	Go to Step 4.	Faulty combination meter or TCM. Inspect combination meter referring to Section 8. If OK, substitute a know-good TCM and recheck.

Step	Action	Yes	No
4	Check O/D off switch for operation. 1) Disconnect O/D off switch coupler. 2) Check continuity between switch terminals under each condition below. See figure. O/D off switch OFF: No continuity O/D off switch ON: Continuity Is check result satisfactory?	"GRN/BLK" circuit shorted to ground.	Replace O/D off switch.
5	Does not "O/D OFF" lamp light or blink even passing 60 seconds after turning ignition switch ON?	Faulty combination meter or TCM. Inspect combination meter referring to Section 8. If OK, substitute a know-good TCM and recheck.	Go to Step 6.
6	Does "O/D OFF" lamp blink for 10 seconds and then go out?	"RED/YEL" circuit open or shorted to ground. If circuit is OK, faulty combination meter or TCM. Inspect combination meter referring to Section 8. If OK, substitute a know-good TCM and recheck.	Go to Step 7.
7	Is "O/D OFF" lamp blinking steady for over 10 seconds?	Go to Step 8.	System is OK.
8	Check DTC. Check DTC referring to "DTC Check" in this section. Are there any DTC(s)?	Proceed to "Automatic Transaxle Diagnostic Flow Table".	Faulty combination meter or TCM. Inspect combination meter referring to Section 8. If OK, substitute a know-good TCM and recheck.

Fig. for Step 2 and Step 4

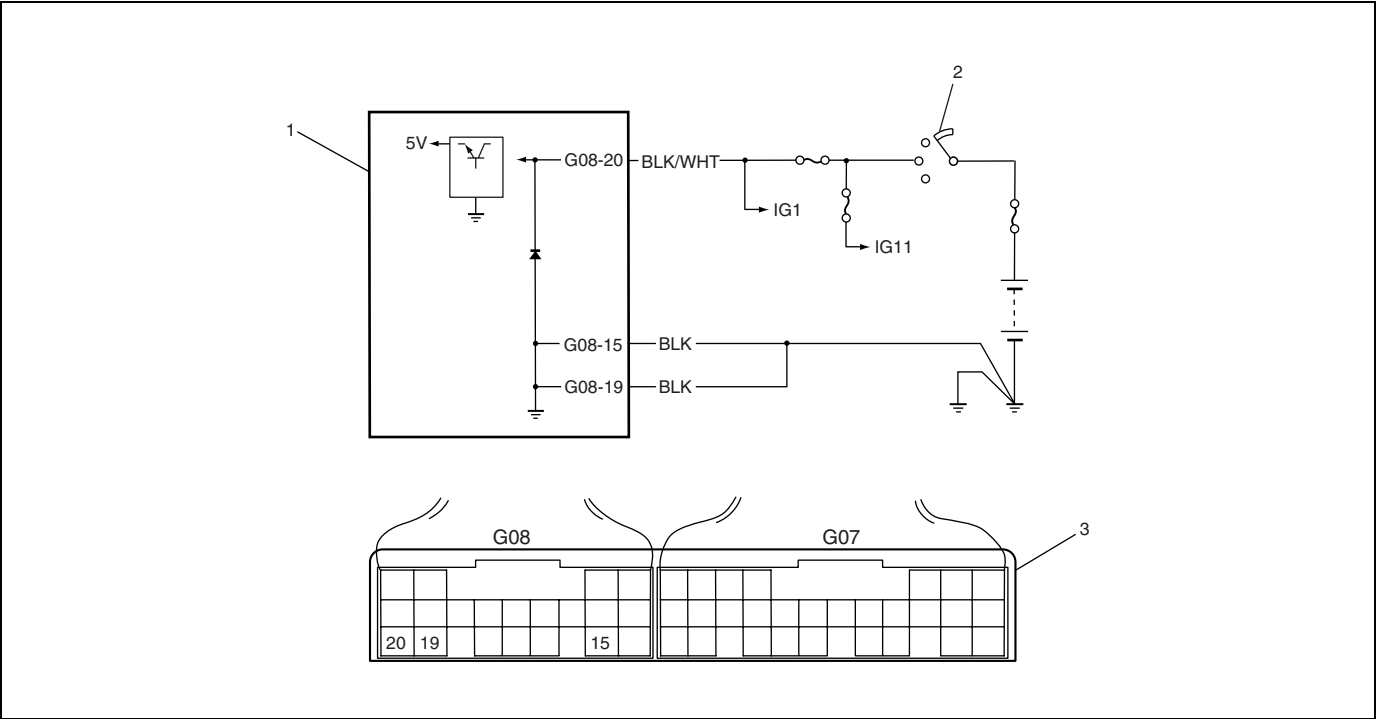


1. O/D off switch coupler

2. O/D off switch button

Diagnostic Flow Table A-4: TCM Power and Ground Circuit Check

Wiring diagram



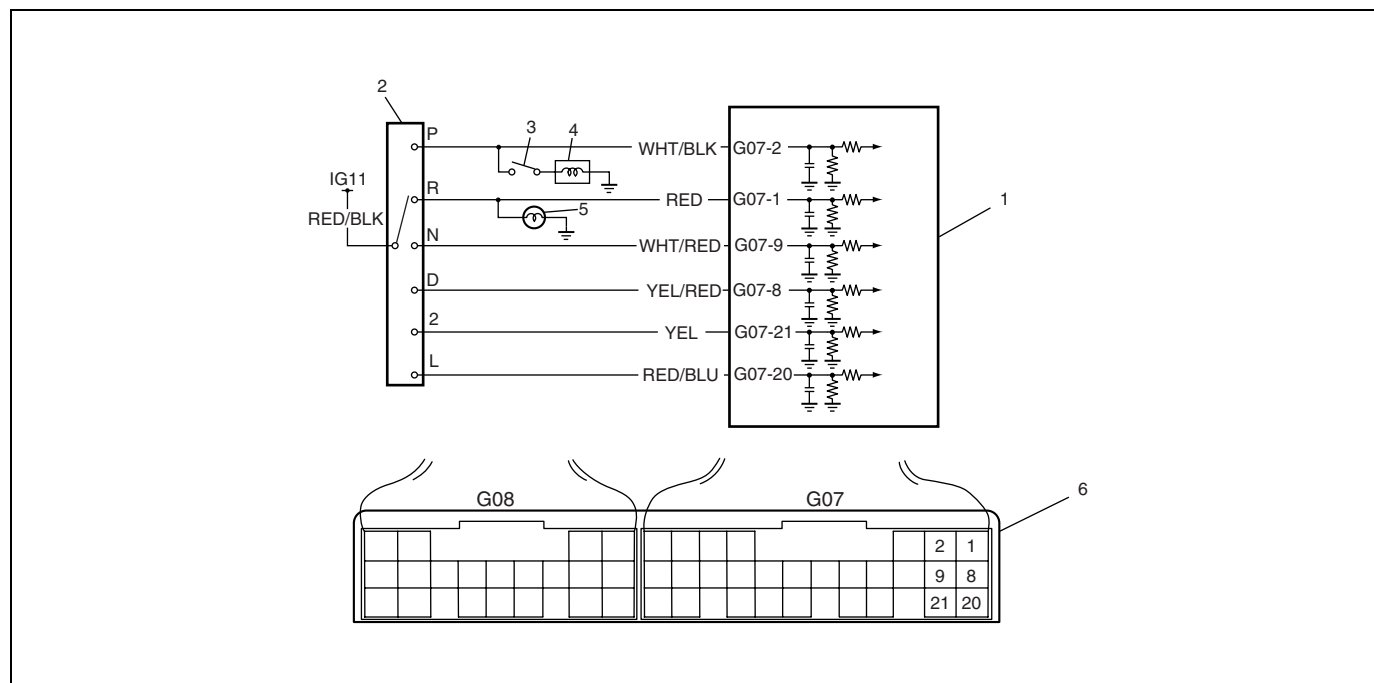
1. TCM	2. Ignition switch	3. Terminal arrangement of TCM connector viewed from harness side
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Troubleshooting

Step	Action	Yes	No
1	Check TCM Power Circuit. 1) Disconnect TCM connector with ignition switch OFF. 2) Check for proper connection to TCM at G08-20 terminal. 3) If OK, turn ignition switch ON and check voltage at terminal G08-20 of disconnected TCM connector. Is it 10 – 14 V?	Go to Step 2.	“BLK/WHT” circuit open.
2	Check TCM Ground Circuit. 1) Turn ignition switch OFF. 2) With TCM connectors disconnected, check for proper connection to TCM at G08-15/ G08-19 terminal. 3) If OK, check resistance between G08-15/ G08-19 terminal of disconnected TCM connector and body ground. Is continuity indicated?	TCM power and ground circuits are in good condition.	“BLK” circuit for TCM ground open.

# DTC P0705/DTC No.34 Transmission Range Sensor Circuit Malfunction

## Wiring diagram



1. TCM	3. Brake light switch	5. Backup lamp
2. Transmission range sensor	4. Shift lock solenoid if equipped	6. Terminal arrangement of TCM connector viewed from harness side

## DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>Transmission range switch signal, that is, P, R, N, D, 2, or L is not inputted for more than 32 seconds when vehicle speed is faster than 30 km/h (19 mile/h) and engine speed is faster than 1500 rpm.</li> </ul> or <ul style="list-style-type: none"> <li>Two or more signals are inputted simultaneously for 12 seconds.</li> </ul>	<ul style="list-style-type: none"> <li>Transmission range sensor maladjusted.</li> <li>Transmission range sensor or its circuit malfunction.</li> <li>TCM</li> </ul>

## 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 tester, on a level road.

- Connect scan tool to DLC with ignition switch OFF.
- Clear DTCs in TCM and ECM memories by using scan tool and start engine.
- Shift selector lever to each of "L", "2", "D", "N", "R" and "P" ranges for 20 seconds each.
- Start vehicle and increase vehicle speed to 60 km/h (37.5 mile/h) or faster in "D" range.
- Keep driving above vehicle speed for 40 seconds.
- Release accelerator pedal, decrease vehicle speed and stop vehicle.
- Check DTC, pending DTC and freeze frame data if available.



## Troubleshooting

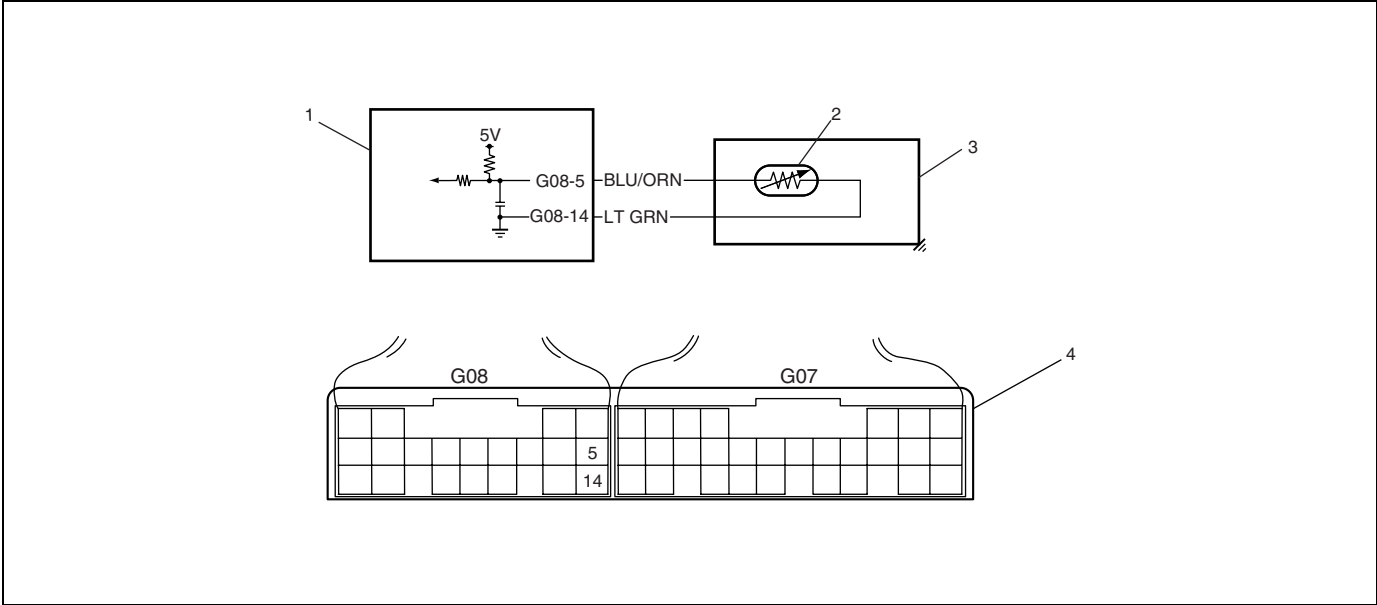
Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Do you have SUZUKI scan tool?	Go to Step 3.	Go to Step 4.
3	Check Transmission range sensor circuit for operation. Check by using SUZUKI scan tool: 1) Connect SUZUKI scan tool to DLC with ignition switch OFF. 2) Turn ignition switch ON and check transmission range signal, that is, 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 sensor circuit for operation. Check by not using SUZUKI scan tool: 1) Turn ignition switch ON. 2) Check voltage at terminals G07-1, G07-2, G07-8, G07-9, G07-20 and G07-21 respectively with select lever shifted to each range. Taking terminal G07-21 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 table below? 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.
6	Check transmission range sensor for installation position. 1) Shift select lever to "N" range. 2) Check that "N" reference line on sensor and needle direction shaped on lock washer are aligned. Are they aligned?	Go to Step 7.	Adjust.
7	Check Transmission range sensor referring to "Transmission Range Sensor" in this section. Are check results satisfactory?	"RED/BLK", "WHT/BLK", "RED", "WHT/RED", "YEL/RED", "YEL" or "RED/BLU" circuit open or short. If wires and connections are OK, substitute a know-good TCM and recheck.	Replace Transmission range sensor.

Table for Step 4

		Terminal					
		G07-2	G07-1	G07-9	G07-8	G07-21	G07-20
Select lever position	P	8 – 14 V	0 V	0 V	0 V	0 V	0 V
	R	0 V	8 – 14 V	0 V	0 V	0 V	0 V
	N	0 V	0 V	8 – 14 V	0 V	0 V	0 V
	D	0 V	0 V	0 V	8 – 14 V	0 V	0 V
	2	0 V	0 V	0 V	0 V	8 – 14 V	0 V
	L	0 V	0 V	0 V	0 V	0 V	8 – 14 V

DTC P0710/DTC No.36 or 38 Transmission Fluid Temperature Sensor Circuit Malfunction

Wiring diagram



1. TCM	3. A/T	5. Terminal arrangement of TCM connector viewed from harness side
2. Transmission fluid temperature sensor	4. Valve body connector	

DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>Transmission temperature sensor terminal voltage is less than 0.05 V for 5 minutes or more after turning ignition switch ON.</li> </ul> or <ul style="list-style-type: none"> <li>Transmission temperature sensor terminal voltage is more than 4.6 V and shift range is in “R”, “D”, “2” or “L” for 15 minutes after starting engine.</li> </ul>	<ul style="list-style-type: none"> <li>Transmission fluid temperature sensor or its circuit malfunction.</li> <li>TCM</li> </ul>

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 tester, on a level road.

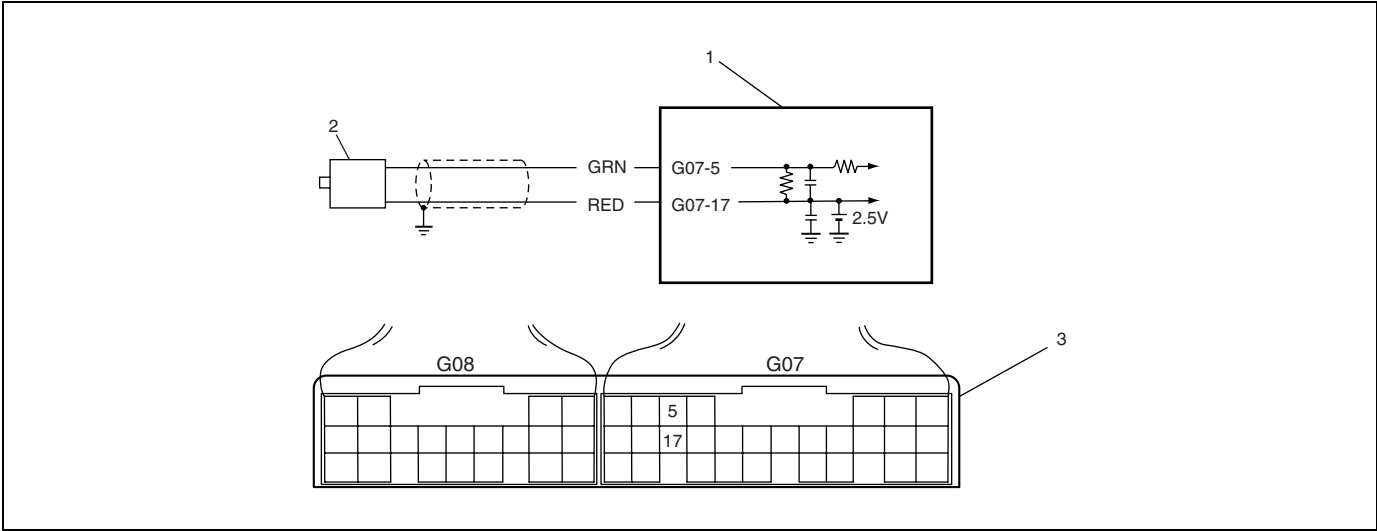
- Connect scan tool to DLC with ignition switch OFF.
- Clear DTCs in TCM and ECM memories by using scan tool and start engine.
- Shift selector lever to “D” range and drive vehicle for 20 minutes.
- Stop vehicle and check DTC, pending DTC and freeze frame data if available.

## Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Transmission Fluid Temperature Circuit for Open. 1) Turn ignition switch OFF. 2) Disconnect TCM connectors from TCM. 3) Check for proper connection to transmission fluid temperature sensor at terminals G08-5 and G08-14. 4) If OK, check continuity between terminals G08-5 and G08-14 of disconnected harness side TCM connector. Is continuity indicated?	Go to Step 3.	"BLU/ORN" or "LT GRN" circuit open.
3	Check Transmission Fluid Temperature Circuit for Ground Short. Check continuity between terminal G08-5 of disconnected harness side TCM connector and ground. Is continuity indicated?	"BLU/ORN" circuit shorted to ground.	Go to Step 4.
4	Check Transmission Fluid Temperature Circuit for IG Short. 1) Cool down A/T fluid temperature under ambient temperature. 2) Connect TCM connectors to TCM with ignition switch OFF. 3) Turn ignition switch ON. 4) Measure voltage between terminal G08-5 of TCM connector and ground. Is it 4.6 V or more?	"BLU/ORN" circuit shorted to power circuit. If circuit is OK, go to Step 5.	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.
5	Inspect Transmission Fluid Temperature Sensor. Inspect transmission temperature sensor referring to "Transmission Fluid Temperature Sensor Inspection" in this section. Is result satisfactory?	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	Replace transmission fluid temperature sensor.

DTC P0715/DTC No.14 Input/Turbine Speed Sensor Circuit Malfunction

Wiring diagram



1. TCM      2. Input shaft speed sensor      3. Terminal arrangement of TCM connector viewed from harness side

DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
No input shaft speed sensor signal is detected although output shaft speed sensor signals are detected.	<ul style="list-style-type: none"> <li>Input shaft speed sensor or its circuit malfunction.</li> <li>Improper input shaft speed sensor installation.</li> <li>Damaged direct clutch drum.</li> <li>Foreign material attachment to sensor or drum.</li> <li>TCM</li> </ul>

DTC confirmation procedure

**WARNING:**

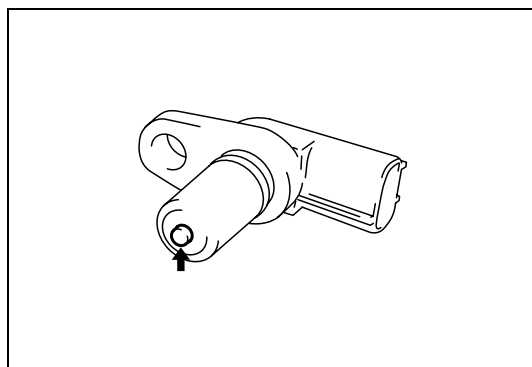
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool and start engine.
- 3) Shift selector lever to “D” range and drive vehicle at 50 km/h (31 mile/h) or more with 3rd gear at least for 5 minutes.
- 4) Stop vehicle and check DTC, pending DTC and freeze frame data if available.

## Troubleshooting

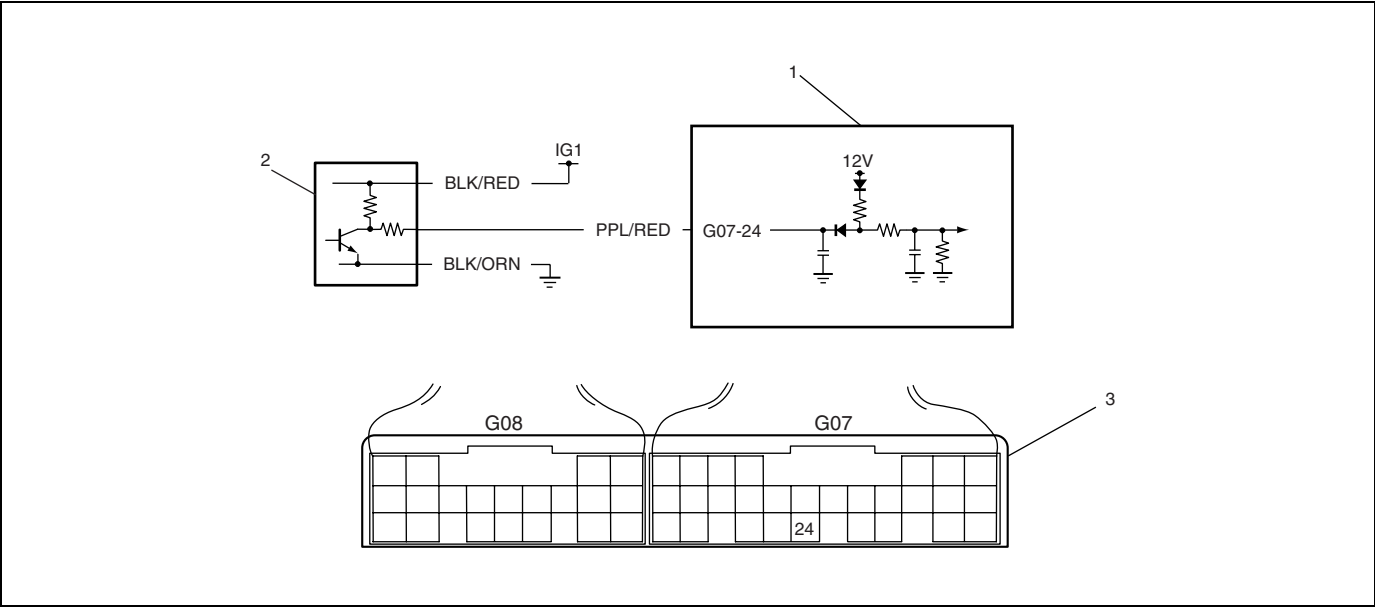
Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	<p>Check Input Shaft Speed Sensor Circuit.</p> <p>1) Disconnect TCM connectors with ignition switch OFF.</p> <p>2) Check for proper connection to input shaft speed sensor at G07-5 and G07-17 terminals.</p> <p>3) If OK, check resistance of sensor circuit. Resistance between terminals G07-5 and G07-17 of disconnected harness side TCM connector: 560 – 680 <math>\Omega</math> at 20 °C (68 °F) Continuity between terminal G07-5/G07-17 of disconnected harness side TCM connector and ground: No continuity</p> <p>Are check result satisfactory?</p>	Go to Step 4.	Go to Step 3.
3	<p>Inspect Input Shaft Speed Sensor.</p> <p>Inspect input shaft speed sensor referring to "Input Shaft Speed Sensor Inspection" in this section.</p> <p>Is result satisfactory?</p>	"GRN" or "RED" circuit open or short.	Replace input shaft speed sensor.
4	<p>Check visually input shaft speed sensor and direct clutch drum for the followings. See Fig.</p> <ul style="list-style-type: none"> <li>• No damage</li> <li>• No foreign material attached</li> <li>• Correct installation</li> </ul> <p>Are they in good condition?</p>	<p>Intermittent trouble or faulty TCM.</p> <p>Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.</p> <p>If OK, substitute a known-good TCM and recheck.</p>	Clean, repair or replace.

Fig. for Step 4



DTC P0720/DTC No.31 Output Speed Sensor/VSS Circuit Malfunction

Wiring diagram



1. TCM      2. Output shaft speed sensor/VSS      3. Terminal arrangement of TCM connector viewed from harness side

DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
No output shaft speed sensor signal is detected although input shaft speed sensor signals are detected while vehicle is running at 5 km/h (3 mile/h) or more vehicle speed with “D”, “2” or “L” range.	<ul style="list-style-type: none"> <li>Output shaft speed sensor or its circuit malfunction.</li> <li>Damaged sensor gear/driven gear.</li> <li>Damaged output shaft speed sensor/VSS drive gear.</li> <li>TCM</li> </ul>

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 tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool and start engine.
- 3) Shift selector lever to “D” range and drive vehicle at 50 km/h (31 mile/h) or more vehicle speed at least for 3 minutes.
- 4) Stop vehicle check DTC, pending DTC and freeze frame data if available.

**Troubleshooting**

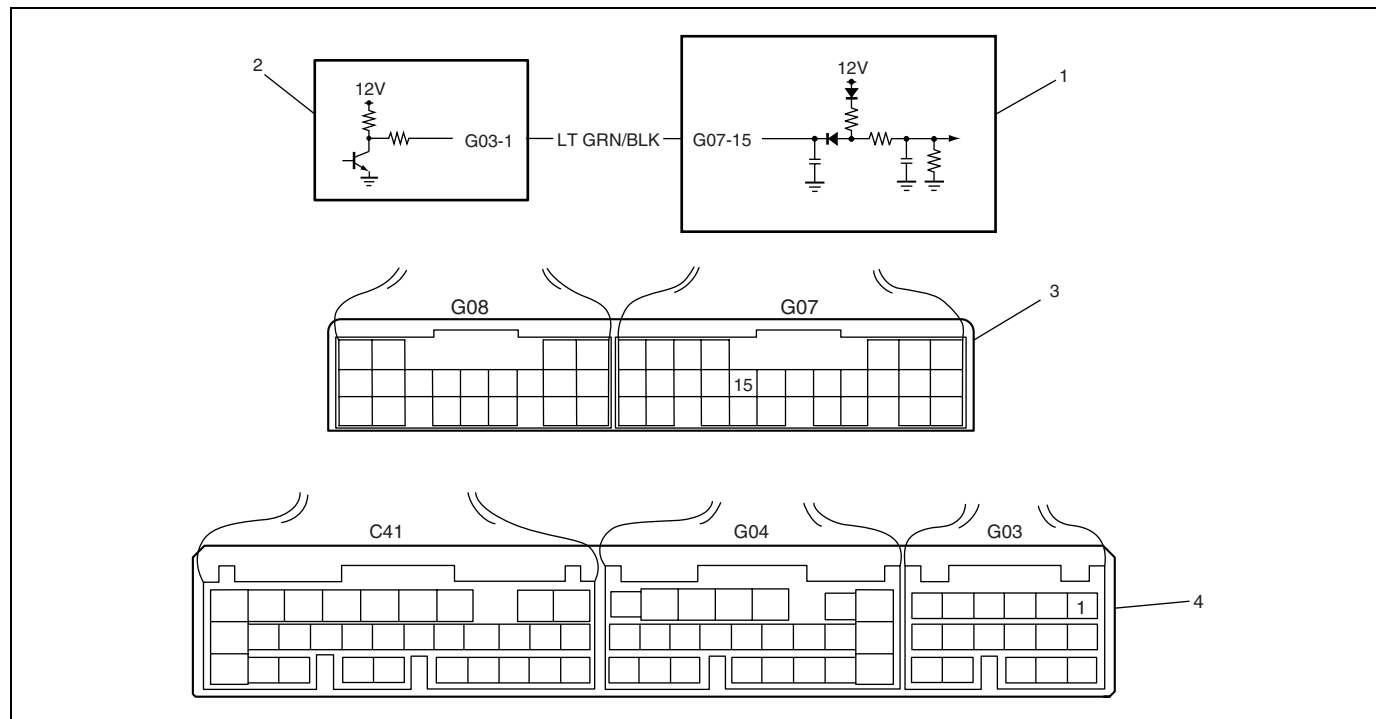
<b>Step</b>	<b>Action</b>	<b>Yes</b>	<b>No</b>
1	Was "Automatic Transaxle Diagnostic Flow Table" in this section performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Output Shaft Speed Sensor/VSS Power Circuit. 1) Turn ignition switch OFF. 2) Disconnect output shaft speed sensor connector. 3) Turn ignition switch ON. 4) Measure voltage between "BLK/RED" wire terminal of disconnected output shaft speed sensor harness side connector and ground. Is it 10 – 14 V?	Go to Step 3.	"BLK/RED" wire open or shorted to ground.
3	Check Output Shaft Speed Sensor/VSS Ground Circuit. 1) Turn ignition switch OFF. 2) Check continuity between "BLK/ORN" wire terminal of disconnected output shaft speed sensor harness side connector and ground. Is continuity indicated?	Go to Step 4.	"BLK/ORN" wire open.
4	Check Output Shaft Speed Sensor/VSS Signal Circuit for short. 1) Disconnect TCM connectors. 2) Check continuity between "PPL/RED" wire terminal of disconnected output shaft speed sensor harness side connector and ground. Is continuity indicated?	"PPL/RED" wire shorted to ground.	Go to Step 5.
5	Check Output Shaft Speed Sensor/VSS Signal Circuit for open. 1) Check continuity between "PPL/RED" wire terminal of disconnected output shaft speed sensor harness side connector and terminal G07-24 of disconnected harness side TCM connector. Is continuity indicated?	Go to Step 6.	"PPL/RED" wire open.
6	Inspect Output Shaft Speed Sensor/VSS. Inspect output shaft speed sensor referring to "Output Shaft Speed Sensor Inspection" in this section. Is check result satisfactory?	Go to Step 7.	Replace output shaft speed sensor/VSS.



Step	Action	Yes	No
7	<p>Check Output Shaft Speed Sensor/VSS Gears Visually.</p> <p>Check output shaft speed sensor gears for the followings.</p> <ul style="list-style-type: none"><li>• No damage in drive gear on differential case</li><li>• No damage in driven gear in output shaft speed sensor</li></ul> <p>Is result satisfactory?</p>	<p>Intermittent trouble or Faulty TCM.</p> <p>Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A.</p> <p>If OK, substitute a known-good TCM and recheck.</p>	<p>Replace drive gear and/or driven gear of output shaft speed sensor.</p>

## DTC P0725/DTC No.35 Engine Speed Input Circuit Malfunction

### Wiring diagram



1. TCM	3. Terminal arrangement of TCM connector viewed from harness side
2. ECM	4. Terminal arrangement of ECM connector viewed from harness side

### DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
No engine speed signal is inputted for 5 seconds although input shaft speed sensor signals are detected.	<ul style="list-style-type: none"> <li>Engine speed input signal circuit malfunction.</li> <li>TCM</li> <li>ECM</li> </ul>

### DTC confirmation procedure

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Start engine and raise engine speed to 2500 rpm.
- 4) Keep engine speed of 2500 rpm for 10 seconds.
- 5) Release accelerator pedal and check DTC, pending DTC and freeze frame data if available.

## Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Engine Speed Input Signal Circuit for Open. 1) Turn ignition switch OFF. 2) Disconnect TCM and ECM connectors from TCM and ECM. 3) Check for proper connection to TCM at terminal G07-15 and to ECM at terminal G03-1. 4) If OK, check continuity between terminals G07-15 and G03-1 of disconnected harness side TCM and ECM connectors. Is continuity indicated?	Go to Step 3.	"LT GRN/BLK" circuit open.
3	Check Engine Speed Input Signal Circuit for Short. 1) Check continuity between terminal G07-15 of disconnected harness side TCM connector and ground. Is continuity indicated?	"LT GRN/BLK" circuit shorted to ground.	Go to Step 4.
4	Check TCM Terminal Voltage. 1) Connect TCM connectors to TCM with ignition switch OFF. 2) Turn ignition switch ON. 3) Measure voltage between terminal G07-15 of connected harness side ECM connector and ground. Is it 8 – 14 V?	Go to Step 5.	Substitute a known-good TCM and recheck.
5	Check ECM Terminal Voltage. 1) Turn ignition switch OFF. 2) Connect ECM connectors to ECM. 3) Turn ignition switch ON. 4) Measure voltage between terminal G03-1 of connected harness side ECM connector and ground. Is it 0 – 1 V?	Intermittent trouble or faulty TCM or ECM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and/or ECM recheck.	Substitute a known-good ECM and recheck.

## DTC P0741/DTC No.29 TCC Circuit Performance or Stuck Off

### DTC Detecting Condition and Trouble Area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>When driving vehicle with 4th gear in "D" range, difference in revolution between engine and A/T input is larger than specification although TCM commanded TCC solenoid to turn ON.</li> <li>When driving vehicle with 3th gear in "D" range, difference in revolution between engine and A/T input is smaller than specification although TCM commanded TCC solenoid to turn OFF.</li> </ul>	<ul style="list-style-type: none"> <li>Mechanical malfunction of TCC solenoid valve.</li> <li>Malfunction of valve body assembly.</li> <li>Fluid passage clogged or leaking.</li> <li>Torque converter clutch malfunction.</li> </ul>

### 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 tester, on a level road.

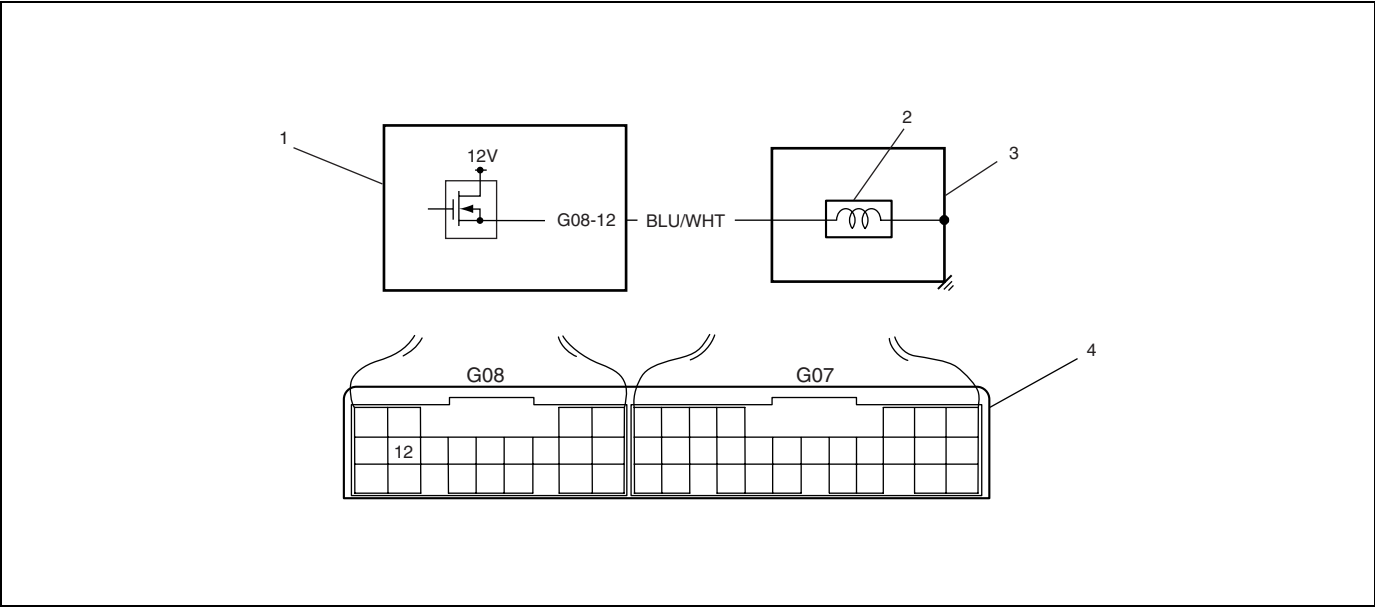
- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Turn O/D off switch OFF and confirm "O/D OFF" lamp does not light.
- 5) Shift selector lever to "D" range and keep it for 20 seconds or longer.
- 6) Drive vehicle with 4th gear in "D" range, more than 10% throttle opening and lock-up ON for 10 seconds or longer referring to "Automatic Gear Shift Diagram" in this section. – Reference: less than 20% throttle opening and at vehicle speed of 80 km/h (50 mile/h) or more
- 7) Turn O/D off switch ON keeping on driving in "D" range. Confirm "O/D OFF" lamp lights.
- 8) Drive vehicle with 3th gear in "D" range, more than 10% throttle opening and at vehicle speed of 30 – 40 km/h (19 – 25 mile/h) for 10 seconds or longer.
- 9) Stop vehicle and turn ignition switch OFF.
- 10) Repeat step 3) to 8).
- 11) Stop vehicle.
- 12) Check DTC, pending DTC and freeze frame data if available.

### Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check TCC Solenoid Valve for Operation referring to "Solenoid Valves Inspection" in this section. Is it in good condition?	Clean fluid passage or replace torque converter or valve body assembly.	Replace TCC solenoid valve.

DTC P0743/DTC No.25 or No.26 TCC Circuit Electrical

Wiring diagram



1. TCM	2. TCC solenoid valve	3. A/T	4. Terminal arrangement of TCM connector viewed from harness side
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DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>Voltage of TCC solenoid valve TCM terminal is low although TCM is commanding TCC solenoid to turn ON.</li> </ul> or <ul style="list-style-type: none"> <li>Voltage of TCC solenoid valve TCM terminal is high although TCM is commanding TCC solenoid to turn OFF.</li> </ul>	<ul style="list-style-type: none"> <li>TCC solenoid valve circuit shorted to ground.</li> <li>TCC solenoid valve circuit open or shorted to power circuit.</li> <li>TCC solenoid valve malfunction.</li> <li>TCM</li> </ul>

DTC confirmation procedure

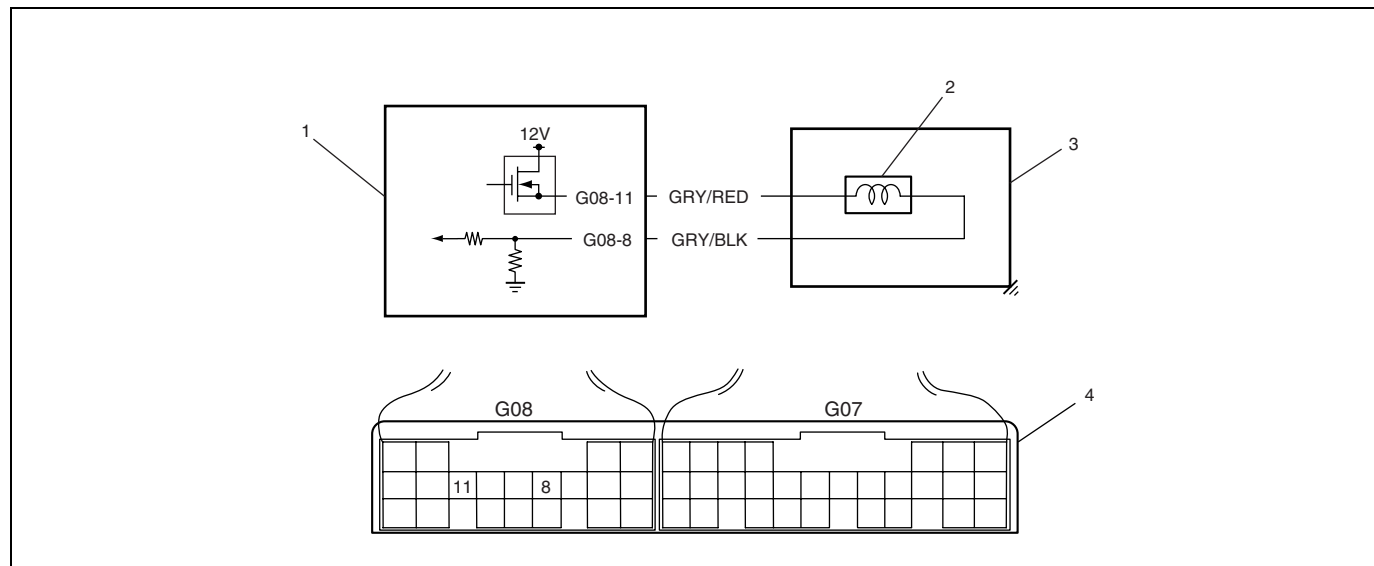
**WARNING:**

- 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.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Turn O/D off switch OFF and confirm “O/D OFF” lamp does not light.
- 5) Drive vehicle in “D” range and repeat lock-up ON and OFF operations 2 times each referring to “Automatic Gear Shift Diagram” in this section. In brief, 75 km/h (47 mile/h) with 4th gear, repeat accelerator pedal depressing so as throttle opening to be 15% or less and releasing for 2 times each.
- 6) Decrease vehicle speed gradually and stop vehicle.
- 7) Check DTC, pending DTC and freeze frame data if available.

## DTC P0748/DTC No.41 or No.42 Pressure Control Solenoid Electrical

### Wiring diagram



1. TCM      2. Pressure control solenoid valve      3. A/T      4. Terminal arrangement of TCM connector viewed from harness side

### DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>Too much electric flow is detected on pressure control solenoid valve circuit.</li> </ul> or <ul style="list-style-type: none"> <li>No electric flow is detected on pressure control solenoid valve circuit.</li> </ul>	<ul style="list-style-type: none"> <li>Pressure control solenoid valve circuit shorted to power circuit.</li> <li>Pressure control solenoid valve circuit open or shorted to ground.</li> <li>Pressure control solenoid valve malfunction.</li> <li>TCM</li> </ul>

### DTC confirmation procedure

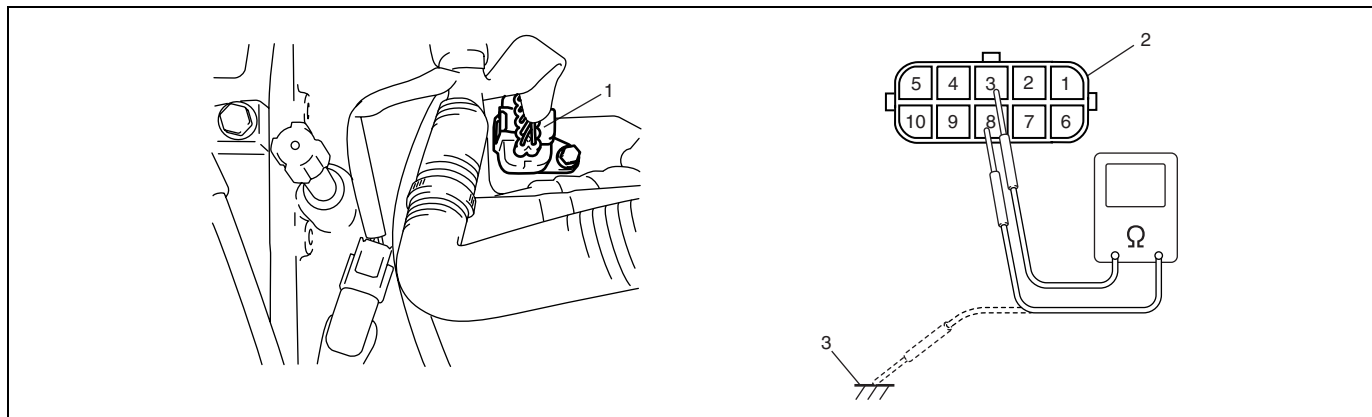
- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Start engine and run if for 1 minute.
- 4) Check DTC, pending DTC and freeze frame data if available.

### Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Pressure Control Solenoid Valve Circuit for IG Short. <ol style="list-style-type: none"> <li>1) Turn ignition switch OFF and disconnect TCM connectors.</li> <li>2) Check for proper connection to TCM at terminals G08-11 and G08-8.</li> <li>3) If OK, turn ignition switch ON and measure voltage between terminal G08-11 of disconnected harness side TCM connector and ground.</li> </ol> Is it 0 – 1 V?	Go to Step 3.	"GRY/RED" or "GRY/BLK" circuit shorted to power circuit.

Step	Action	Yes	No
3	<p>Check Pressure Control Solenoid Valve Resistance.</p> <ol style="list-style-type: none"> <li>1) Turn ignition switch OFF.</li> <li>2) Disconnect valve body harness connector on transaxle.</li> <li>3) Check for proper connection to solenoid valve at "GRY/RED" and "GRN/BLK" circuits.</li> <li>4) Check resistance of solenoid valve. See Fig.</li> </ol> <p>Resistance between terminals of transaxle side valve body harness connector: 5.0 – 5.6 <math>\Omega</math> at 20 °C (68 °F) Resistance between terminal of transaxle side valve body harness connector and transaxle: Infinity</p> <p>Is check results satisfactory?</p>	Go to Step 4.	Replace pressure control solenoid valve or lead wire.
4	<p>Check Pressure Control Solenoid Valve Circuit for Ground Short.</p> <ol style="list-style-type: none"> <li>1) Connect valve body harness connector.</li> <li>2) Check continuity between terminal G08-11 of disconnected harness side TCM connector and ground.</li> </ol> <p>Is continuity indicated?</p>	"GRY/RED" or "GRY/BLK" circuit shorted to ground.	Go to Step 5.
5	<p>Check Pressure Control Solenoid Valve Circuit for Open.</p> <p>Check resistance between terminals G08-11 and G08-8 of disconnected harness side TCM connector.</p> <p>Is it infinity?</p>	"GRY/RED" or "GRY/BLK" circuit open.	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.

Fig. for Step 3



- |  |
|--|
| 1. Valve body harness connector on harness   |
| 2. Valve body harness connector on transaxle |
| 3. Ground on Transaxle                       |

**DTC P0751/DTC No.17 Shift Solenoid-A/No.1 Performance or Stuck Off****DTC P0756/DTC No.28 Shift Solenoid-B/No.2 Performance or Stuck Off****DTC Detecting Condition and Trouble Area****[DTC P0751/DTC NO.17]**

DTC DETECTING CONDITION	TROUBLE AREA
When one of the following condition is detected while driving at 15 km/h (10 mile/h) or more in "D" range after engine being warmed up. <ul style="list-style-type: none"> <li>• Transaxle gear ratio is detected as same as that of 2nd gear although TCM command is for 3rd gear.</li> <li>• Transaxle gear ratio is detected as same as that of 3rd gear although TCM command is for 2nd gear.</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanical malfunction of shift solenoid valve-A/No.1.</li> <li>• Malfunction of valve body assembly.</li> <li>• Fluid passage clogged or leaking.</li> <li>• Mechanical malfunction of transaxle.</li> </ul>

**[DTC P0756/DTC NO.28]**

DTC DETECTING CONDITION	TROUBLE AREA
When one of the following condition is detected while driving at 15 km/h (10 mile/h) or more in "D" range after engine being warmed up. <ul style="list-style-type: none"> <li>• Transaxle gear ratio is detected as same as that of 3rd gear although TCM command is for 4th gear.</li> <li>• Transaxle gear ratio is detected as same as that of 4th gear although TCM command is for 3rd gear.</li> </ul>	<ul style="list-style-type: none"> <li>• Mechanical malfunction of shift solenoid valve-B/No.2.</li> <li>• Malfunction of valve body assembly.</li> <li>• Fluid passage clogged or leaking.</li> <li>• Mechanical malfunction of transaxle.</li> </ul>

**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 tester, on a level road.**

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Start engine and warm it up to normal operating temperature.
- 4) Turn O/D off switch OFF and confirm "O/D OFF" lamp does not light.
- 5) Shift selector lever to "D" range and hold it for 20 seconds or longer.
- 6) Drive vehicle with 2nd, 3rd and 4th gear in "D" range in that order for 5 seconds or longer each referring to "Automatic Gear Shift Diagram" in this section.
- 7) Stop vehicle and turn ignition switch OFF.
- 8) Report Step 3) to 6) one time.
- 9) Stop vehicle.
- 10) Check DTC, pending DTC and freeze frame data if available.

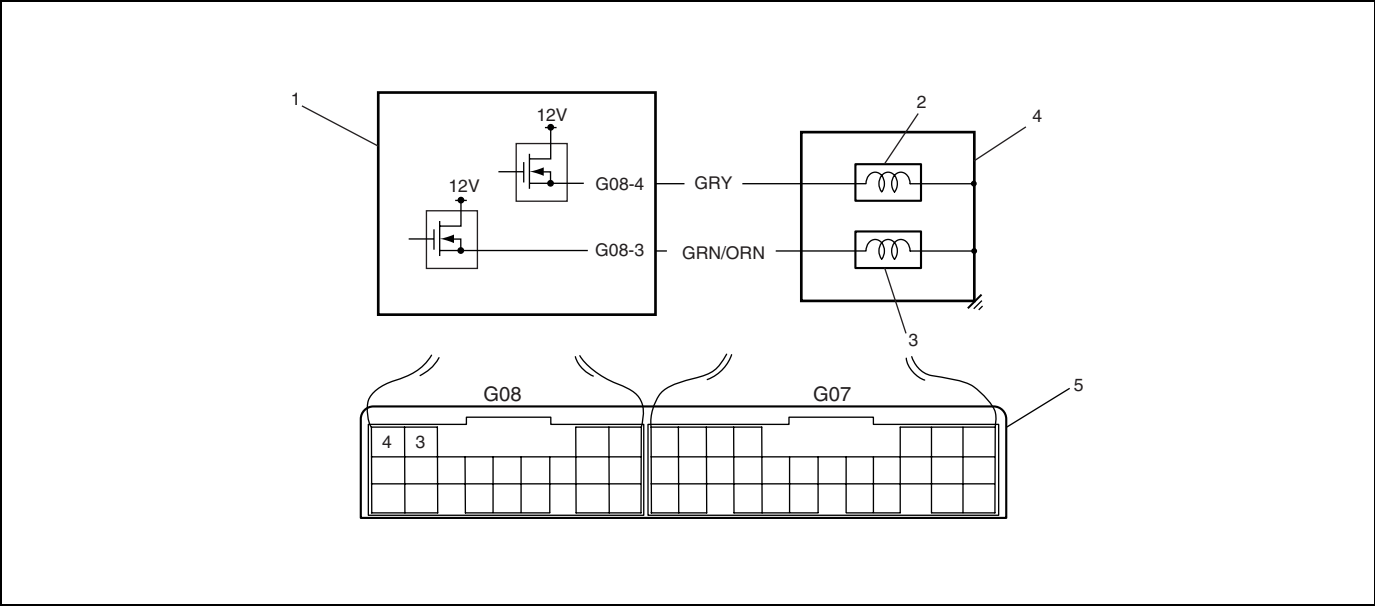
**Troubleshooting**

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Shift Solenoid valve-A or -B for Operation referring to "Solenoid Valve Inspection" in this section. Are they in good condition?	Clean fluid passage or replace valve body assembly.	Replace shift solenoid valve-A or -B.



DTC P0753/DTC No.21 or No.22 Shift Solenoid-A/No.1 Electrical  
DTC P0758/DTC No.23 or No.24 Shift Solenoid-B/No.2 Electrical

Wiring diagram



1. TCM	4. A/T
2. Shift solenoid valve-A/No.1	5. Terminal arrangement of TCM connector viewed from harness side
3. Shift solenoid valve-B/No.2	

DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>Voltage of shift solenoid valve TCM terminal is low although TCM is commanding shift solenoid valve to turn ON.</li> </ul> or <ul style="list-style-type: none"> <li>Voltage of shift solenoid valve TCM terminal is high although TCM is commanding shift solenoid valve to turn OFF.</li> </ul>	<ul style="list-style-type: none"> <li>Shift solenoid valve circuit shorted to ground.</li> <li>Shift solenoid valve circuit open or shorted to power circuit.</li> <li>Shift solenoid valve malfunction.</li> <li>TCM</li> </ul>

DTC confirmation procedure

**WARNING:**

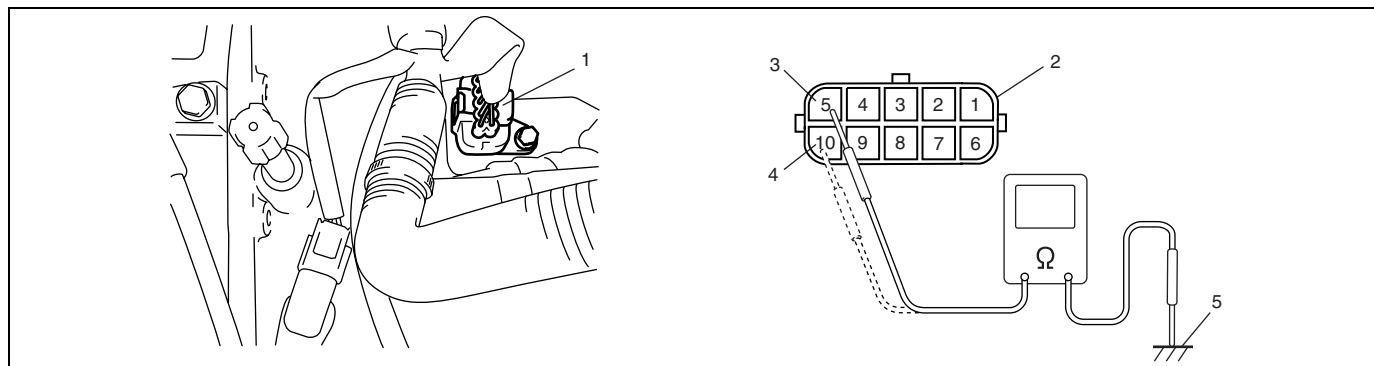
- When performing a road test, select a place where there is no traffic or possibility of a traffic accident and be very careful during testing to avoid occurrence of an accident.
- Road test should be carried out with 2 persons, a driver and tester, on a level road.

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Start engine and shift selector lever to “D” range.
- 4) Start vehicle and increase vehicle speed until gear position reaches 3rd or 4th gear.
- 5) Decrease vehicle speed and stop vehicle.
- 6) Repeat Step 4) to Step 5) 2 times or more.
- 7) Check DTC, pending DTC and freeze frame data if available.

## Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Shift Solenoid Valve Circuit for IG Short. 1) Turn ignition switch OFF and disconnect TCM connectors. 2) Check for proper connection to TCM at terminal G08-4 or G08-3 of TCM connector. 3) If OK, turn ignition switch ON and measure voltage between terminal G08-4 or G08-3 of disconnected harness side TCM connector and ground. Is it 0 – 1 V?	Go to Step 3.	"GRY" or "GRN/ORN" circuit shorted to power circuit.
3	Check Shift Solenoid Valve Resistance. 1) Turn ignition switch OFF. 2) Disconnect valve body harness connector on transaxle. 3) Check for proper connection to solenoid valve at "GRY" or "GRN/ORN" circuit. 4) Check resistance of solenoid valves. See Fig. Resistance between terminal of transaxle side valve body harness connector and transaxle: 11 – 15 $\Omega$ at 20 °C (68 °F) Is check result satisfactory?	Go to Step 4.	Replace shift solenoid valve or lead wire.
4	Check Shift Solenoid Valve Circuit for Ground Short or Open. 1) Connect valve body harness connector. 2) Measure resistance between terminal G08-4 or G08-3 of disconnected harness side TCM connector and ground. Is it 11 – 15 $\Omega$ at 20 °C (68 °F)?	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	"GRY" or "GRN/ORN" circuit shorted to ground or open.

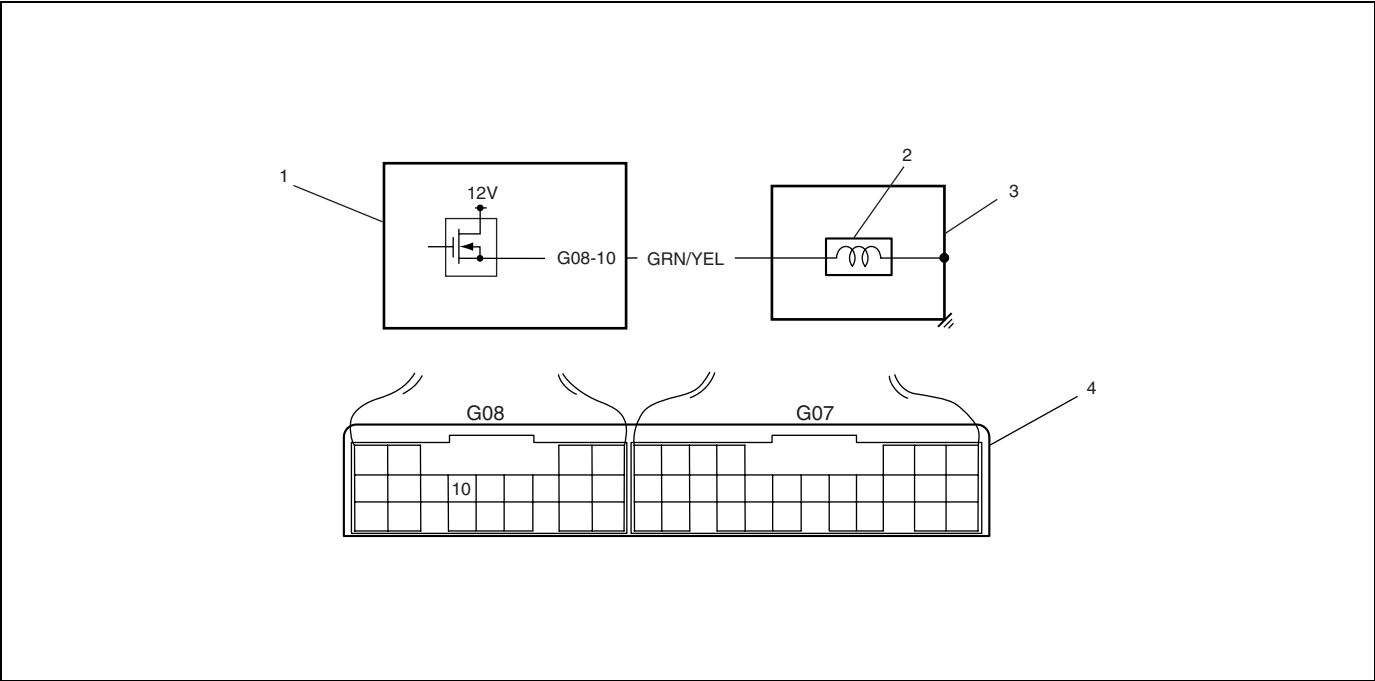
Fig. for Step 3



1. Valve body harness connector on harness
2. Valve body harness connector on transaxle
3. Shift solenoid valve-A/No.1 terminal
4. Shift solenoid valve-B/No.2 terminal
5. Ground on Transaxle

DTC P0785/DTC No.13 Timing Solenoid

Wiring diagram



1. TCM	3. A/T
2. Timing solenoid valve	4. Terminal arrangement of TCM connector viewed from harness side

DTC detecting condition and trouble area

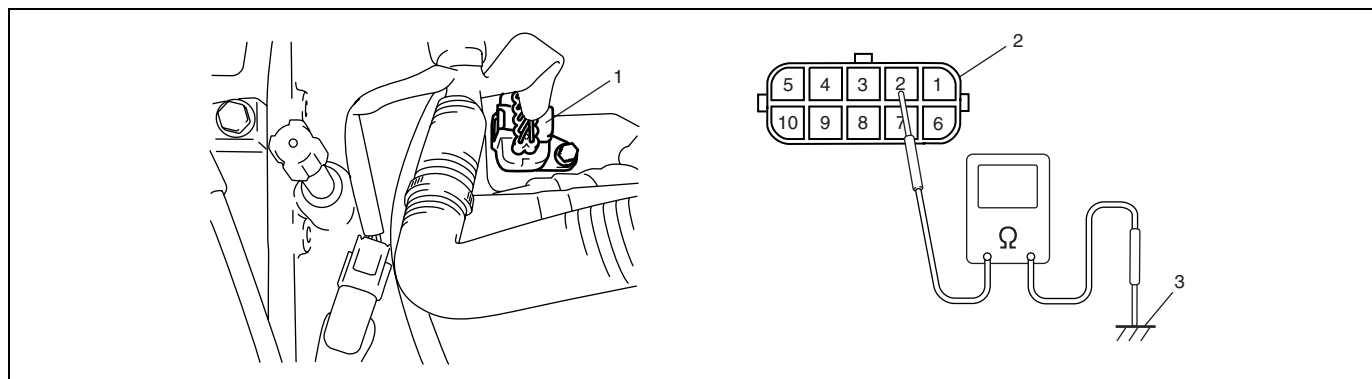
DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>Voltage of timing solenoid valve TCM terminal is low although TCM is commanding timing solenoid valve to turn ON.</li> </ul> or <ul style="list-style-type: none"> <li>Voltage of timing solenoid valve TCM terminal is high although TCM is commanding timing solenoid valve to turn OFF.</li> </ul>	<ul style="list-style-type: none"> <li>Timing solenoid valve circuit shorted to ground.</li> <li>Timing solenoid valve circuit open or shorted to power circuit.</li> <li>Timing solenoid valve malfunction.</li> <li>TCM</li> </ul>

DTC confirmation procedure

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Start engine and shift selector lever to “N” range.
- 4) Repeat shifting selector lever from “N” range to “D” range and vice versa for 3 times.
- 5) Check DTC, pending DTC and freeze frame data if available.

## Troubleshooting

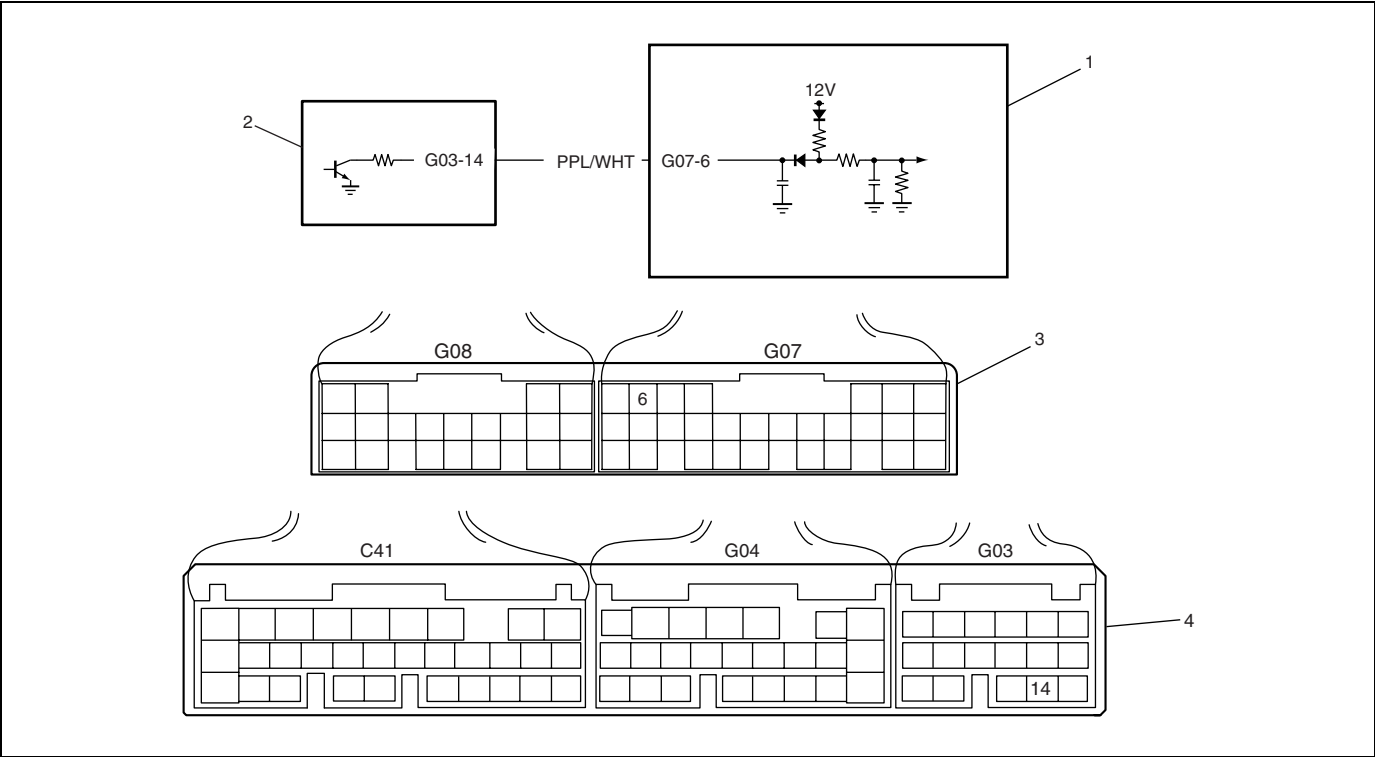
Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Timing Solenoid Valve Circuit for IG Short or Open. 1) Turn ignition switch ON and measure voltage between terminal G08-10 of harness side TCM connector and ground. 2) Is it 0 – 1 V?	Go to Step 3.	"GRN/YEL" circuit shorted to power circuit or open.
3	Check Timing Solenoid Valve Resistance 1) Turn ignition switch OFF. 2) Disconnect valve body harness connector on transaxle. 3) Check for proper connection to solenoid valve at "GRN/YEL" circuit. 4) Check resistance of solenoid valve. See Fig. Resistance between terminal of transaxle side valve body harness connector and transaxle: 11 – 15 $\Omega$ at 20 °C (68 °F) Is check result satisfactory?	Go to Step 4.	Replace timing solenoid valve or lead wire.
4	Check Timing Solenoid Valve Circuit for Ground Short. 1) Connect valve body harness connector. 2) Disconnect TCM connectors. 3) Measure resistance between terminal "G08-10" of disconnected harness side TCM connector and ground. Is it 11 – 15 $\Omega$ at 20 °C (68 °F)	Intermittent trouble or faulty TCM. Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A. If OK, substitute a known-good TCM and recheck.	"GRN/YEL" circuit shorted to ground.



- |  |
|--|
| 1. Valve body harness connector on harness   |
| 2. Valve body harness connector on transaxle |
| 3. Ground on Transaxle                       |

DTC P1700/DTC No.32 or No.33 Throttle Position Signal Circuit Malfunction

Wiring diagram



1. TCM	3. Terminal arrangement of TCM connector viewed from harness side
2. ECM	4. Terminal arrangement of ECM connector viewed from harness side

DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>Too short low signal of pulse signal from ECM to TCM continues out of specification.</li> <li>Too long low signal of pulse signal from ECM to TCM continues out of specification.</li> </ul>	<ul style="list-style-type: none"> <li>Throttle position sensor or its circuit malfunction.</li> <li>Throttle position signal circuit from ECM to TCM open or short.</li> <li>TCM</li> <li>ECM</li> </ul>

DTC confirmation procedure

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) Turn ignition switch ON.
- 4) Depress accelerator pedal fully and keep it for 10 seconds.
- 5) Release accelerator pedal and keep it for 10 seconds.
- 6) Check DTC, pending DTC and freeze frame data if available.

Troubleshooting

Step	Action	Yes	No
1	Was “Automatic Transaxle Diagnostic Flow Table” performed?	Go to Step 2.	Go to “Automatic Transaxle Diagnostic Flow Table” in this section.
2	Is there DTC related to throttle position sensor?	Go to corresponding DTC Flow Table in Section 6.	Go to Step 3.

Step	Action	Yes	No
3	Check Throttle Position Signal Circuit for IG Short. 1) Turn ignition switch OFF. 2) Disconnect TCM and ECM connectors from TCM and ECM. 3) Check proper connection to TCM at terminal G07-6 and to ECM at terminal G03-14. 4) If OK, turn ignition switch ON and measure voltage between terminal G07-6 of disconnected harness side TCM connector and ground. Is it 10 – 14 V?	“PPL/WHT” circuit shorted to power circuit.	Go to Step 4.
4	Check Throttle Position Signal Circuit for Open. 1) Turn ignition switch OFF. 2) Check continuity between terminal G07-6 of disconnected harness side TCM connector and terminal G03-14 of disconnected harness side ECM connector. Is continuity indicated?	Go to Step 5.	“PPL/WHT” circuit open.
5	Check Throttle Position Signal Circuit for Ground Short. Check continuity between terminal G07-6 of disconnected harness side TCM connector and ground. Is continuity indicated?	“PPL/WHT” circuit shorted to ground.	Intermittent trouble or faulty TCM or ECM. Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A. If OK, substitute a known-good TCM or ECM and recheck.

## DTC P1702/DTC No.52 Internal Malfunction of TCM

### DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
Calculation of current data stored in TCM is not correct comparing with pre-stored checking data in TCM.	TCM

### DTC confirmation procedure

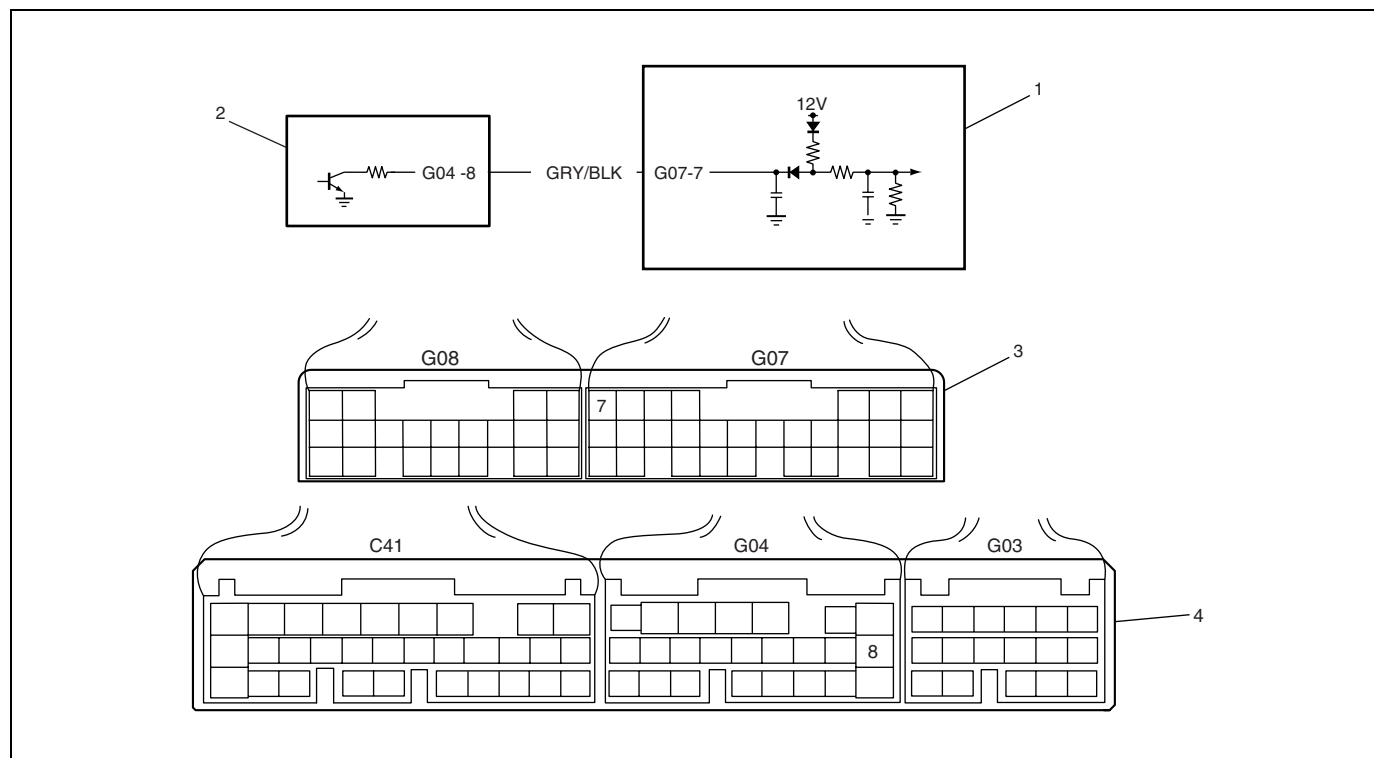
- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTC in TCM memory.
- 3) After 10 seconds passed from turning ignition switch ON, check DTC.

### Troubleshooting

Step	Action	Yes	No
1	Is DTC P1702/DTC No.52 detected after performing "DTC Confirmation Procedure"?	Faulty TCM. Replace TCM.	Could be a temporary malfunction of TCM.

# DTC P1705/DTC No.51 Engine Coolant Temperature Signal Circuit Malfunction

## Wiring diagram



1. TCM	3. Terminal arrangement of TCM connector viewed from harness side
2. ECM	4. Terminal arrangement of ECM connector viewed from harness side

## DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>Too long high signal of pulse signal from ECM to TCM continues out of specification.</li> </ul> or <ul style="list-style-type: none"> <li>Too long low signal of pulse signal from ECM to TCM continues out of specification.</li> </ul> or <ul style="list-style-type: none"> <li>Too long or short low signal of pulse signal from ECM to TCM is detected in continues 8 pulses.</li> </ul>	<ul style="list-style-type: none"> <li>Engine coolant temperature sensor or its circuit malfunction.</li> <li>Engine coolant temperature signal circuit from ECM to TCM open or short.</li> <li>TCM</li> <li>ECM</li> </ul>

## DTC confirmation procedure

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) After 2 minutes passed from turning ignition switch ON, check DTC, pending DTC and freeze frame data if available.

## Troubleshooting

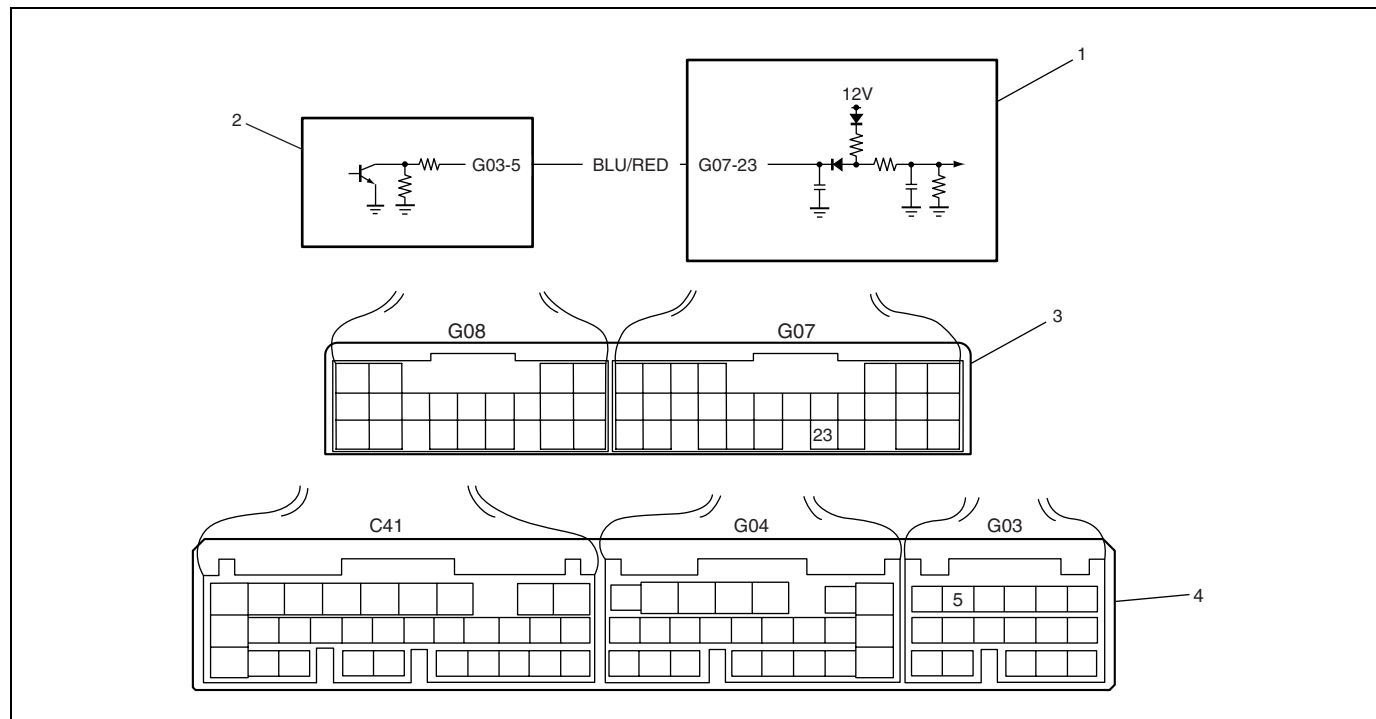
Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Is there DTC related to throttle position sensor?	Go to corresponding DTC Flow Table in Section 6.	Go to Step 3.



Step	Action	Yes	No
3	<p>Check Engine Coolant Temperature Signal Circuit for IG Short.</p> <ol style="list-style-type: none"> <li>1) Turn ignition switch OFF.</li> <li>2) Disconnect TCM and ECM connectors from TCM and ECM.</li> <li>3) Check proper connection to TCM at terminal G07-7 and to ECM at terminal G04-8.</li> <li>4) If OK, turn ignition switch ON and measure voltage between terminal G07-7 of disconnected harness side TCM connector and ground.</li> </ol> <p>Is it 10 – 14 V?</p>	“GRY/BLK” circuit shorted to power circuit.	Go to Step 4.
4	<p>Check Engine Coolant Temperature Signal Circuit for Open.</p> <ol style="list-style-type: none"> <li>1) Turn ignition switch OFF.</li> <li>2) Check continuity between terminal G07-7 of disconnected harness side TCM connector and terminal G04-8 of disconnected harness side ECM connector.</li> </ol> <p>Is continuity indicated?</p>	Go to Step 5.	“GRY/BLK” circuit open.
5	<p>Check Engine Coolant Temperature Signal Circuit for Ground Short.</p> <p>Check continuity between terminal G07-7 of disconnected harness side TCM connector and ground.</p> <p>Is continuity indicated?</p>	“GRY/BLK” circuit shorted to ground.	Go to Step 6.
6	<p>Inspect Engine Coolant Temperature Sensor.</p> <p>Inspect engine coolant temperature sensor referring to “Engine Coolant Temperature Sensor Inspection”.</p> <p>Is inspection result OK?</p>	<p>Intermittent trouble or faulty TCM or ECM.</p> <p>Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A.</p> <p>If OK, substitute a known-good TCM or ECM and recheck.</p>	Replace engine coolant temperature sensor.

## DTC P1730/DTC No.64 Engine Torque Signal Circuit Malfunction

### Wiring diagram



1. TCM	3. Terminal arrangement of TCM connector viewed from harness side
2. ECM	4. Terminal arrangement of ECM connector viewed from harness side

### DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>Too short low signal of pulse signal from ECM to TCM continues out of specification.</li> </ul> or <ul style="list-style-type: none"> <li>Too long low signal of pulse signal from ECM to TCM continues out of specification.</li> </ul>	<ul style="list-style-type: none"> <li>Engine torque signal circuit malfunction.</li> <li>TCM</li> <li>ECM</li> </ul>

### DTC confirmation procedure

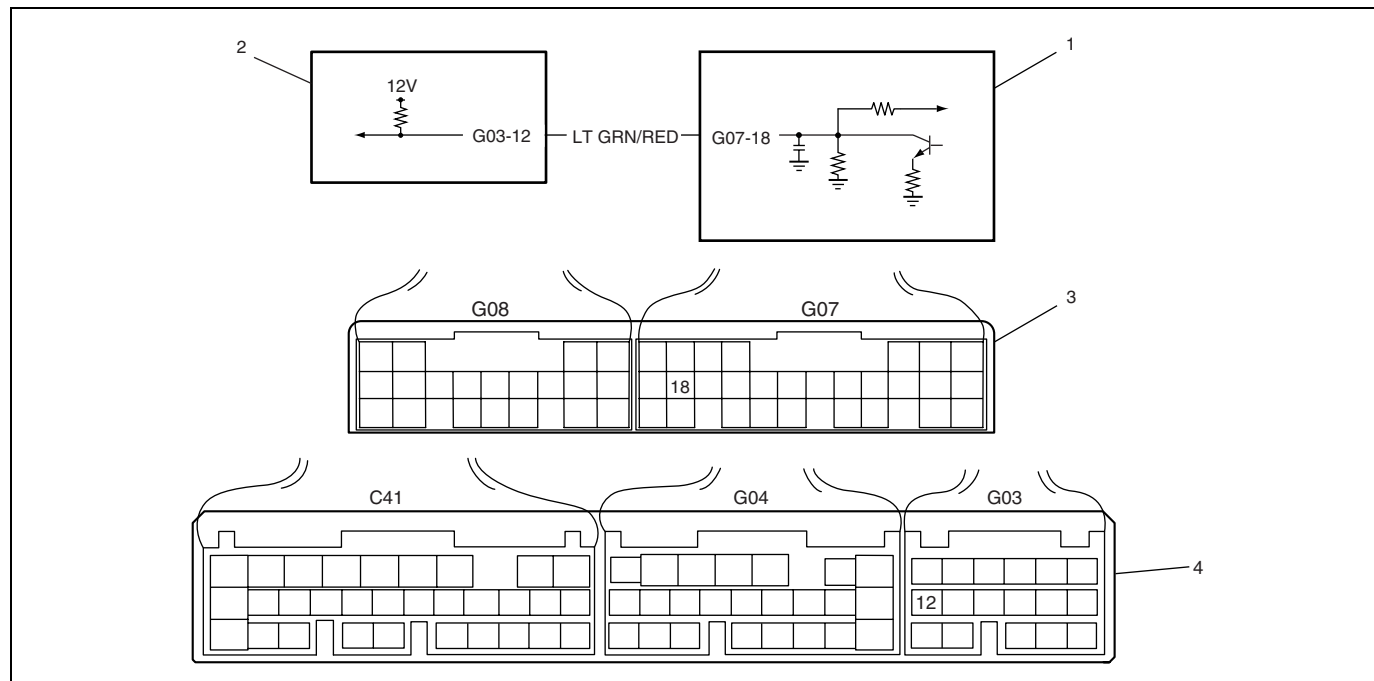
- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) After 1 minute passed from turning ignition switch ON, check DTC, pending DTC and freeze frame data if available.

## Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	<p>Check Engine Torque Signal Circuit for IG Short.</p> <p>1) Turn ignition switch OFF.</p> <p>2) Disconnect TCM and ECM connectors from TCM and ECM.</p> <p>3) Check proper connections to TCM at terminal G07-23 and to ECM at terminal G03-5.</p> <p>4) If OK, turn ignition switch ON and measure voltage between terminal G07-23 of disconnected harness side TCM connector and ground.</p> <p>Is it 10 – 14 V?</p>	"BLU/RED" circuit shorted to power circuit.	Go to Step 3.
3	<p>Check Engine Torque Signal Circuit for Open.</p> <p>1) Turn ignition switch OFF.</p> <p>2) Check continuity between terminal G07-23 of disconnected harness side TCM connector and terminal G03-5 of disconnected harness side ECM connector.</p> <p>Is continuity indicated?</p>	Go to Step 4.	"BLU/RED" circuit open.
4	<p>Check Engine Torque Signal Circuit for Ground Short.</p> <p>Check continuity between terminal G07-23 of disconnected harness side TCM connector and ground.</p> <p>Is continuity indicated?</p>	"BLU/RED" circuit shorted to ground.	<p>Intermittent trouble or faulty TCM or ECM.</p> <p>Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.</p> <p>If OK, substitute a known-good TCM or ECM and recheck.</p>

# DTC P1895/DTC No.27 Torque Reduction Signal Circuit Malfunction

## Wiring diagram



1. TCM	3. Terminal arrangement of TCM connector viewed from harness side
2. ECM	4. Terminal arrangement of ECM connector viewed from harness side

## DTC detecting condition and trouble area

DTC DETECTING CONDITION	TROUBLE AREA
Voltage of torque reduction signal circuit TCM terminal is low although TCM does not require ECM to reduce engine torque.	<ul style="list-style-type: none"> <li>• Torque reduction signal circuit malfunction.</li> <li>• TCM</li> <li>• ECM</li> </ul>

## DTC confirmation procedure

- 1) Connect scan tool to DLC with ignition switch OFF.
- 2) Clear DTCs in TCM and ECM memories by using scan tool.
- 3) After 1 minute passed from turning ignition switch ON. Check DTC, pending DTC and freeze frame data if available.

## Troubleshooting

Step	Action	Yes	No
1	Was "Automatic Transaxle Diagnostic Flow Table" performed?	Go to Step 2.	Go to "Automatic Transaxle Diagnostic Flow Table" in this section.
2	Check Torque Reduction Signal Circuit for Open. <ol style="list-style-type: none"> <li>1) Turn ignition switch OFF.</li> <li>2) Disconnect TCM and ECM connectors from TCM and ECM.</li> <li>3) Check continuity between terminal G07-18 of disconnected harness side TCM connector and terminal G03-12 of disconnected harness side ECM connector.</li> </ol> Is continuity indicated?	Go to Step 3.	"LT GRN/RED" circuit open.

Step	Action	Yes	No
3	Check Torque Reduction Signal Circuit for Ground Short. Check continuity between terminal G07-18 of disconnected harness side TCM connector and ground. Is continuity indicated?	“LT GRN/RED” circuit shorted to ground.	Go to Step 4.
4	Check Power Supply from ECM. 1) Connect ECM connectors to ECM. 2) Turn ignition switch ON. 3) Measure voltage between terminal G03-12 of connected harness side ECM connector and ground. Is it 9 – 14 V?	Intermittent trouble or faulty TCM or ECM. Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A. If OK, substitute a known-good TCM or ECM and recheck.	Faulty ECM.

## 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, condition in the below table that can be checked by the scan tool are those detected by TCM and output from TCM as commands and there may be cases where the automatic transaxle or actuator is not operating in the condition as indicated by the scan tool.

### NOTE:

The following scan tool data related to automatic transaxle can be checked only by communicating with TCM.

SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/REFERENCE VALUES
GEAR POSITION	Ignition switch ON	Selector lever is in "P" position	P or N
		Selector lever is in "R" position	R
		Selector lever is in "N" position	P or N
		Selector lever is in "D" position	1ST
		Selector lever is in "2" position	1ST
		Selector lever is in "L" position	1ST
ENGINE SPEED	At engine idle speed		Engine idle speed is displayed
INPUT SHAFT REV	Ignition switch ON and engine stop		0 RPM
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear at "D" range		2250 RPM for 2WD vehicle 2400 RPM for 4WD vehicle displayed in increments of 50 rpm
OUTPUT SHAFT REV	At vehicle stop		0 RPM
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		2250 RPM for 2WD vehicle 2400 RPM for 4WD vehicle displayed in increments of 50 rpm
BATTERY VOLT.	Ignition switch ON and engine stop		8 – 16 V Battery voltage is displayed
ATF TEMP.	After driving at 60 km/h (37.5 mile/h) for 15 minutes or more, and A/T fluid temperature around sensor reaches 70 – 80 °C (158 – 176 °F)		70 – 80 °C, 158 – 176 °F
SHIFT SOL #1 COM	At vehicle stop		ON
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		OFF
SHIFT SOL #1 MON	At vehicle stop		ON
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		OFF
SHIFT SOL #2 COM	At vehicle stop		ON
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		OFF
SHIFT SOL #2 MON	At vehicle stop		ON
	At 60 km/h (37.5 mile/h) constant speed, O/D off switch ON, 20% or less throttle opening and 3rd gear		OFF
SHIFT TIMING SOL COM	Ignition switch ON and selector lever is in "N" range		OFF
	For about 0.5 sec. while on gear shifting between 3rd and 4th		ON

SCAN TOOL DATA	VEHICLE CONDITION		NORMAL CONDITION/REFERENCE VALUES
SHIFT TIMING SOL MON	Ignition switch ON and selector lever is in "N" range		OFF
	For about 0.5 sec. while on gear shifting between 3rd and 4th		ON
TCC SOLENOID COM	At 5 km/h (3 mile/h) constant speed, O/D off switch ON, closed throttle and 1st gear		OFF
	At 100 km/h (62.5 mile/h) constant speed, O/D off switch OFF, 20% or less throttle opening and 4th gear		ON
TCC SOLENOID MON	At 5 km/h (3 mile/h) constant speed, O/D off switch ON, closed throttle and 1st gear		OFF
	At 100 km/h (62.5 mile/h) constant speed, O/D off switch OFF, 20% or less throttle opening and 4th gear		ON
PRESS CONT SOL	At vehicle stop, closed throttle, engine idle speed and 1st gear		0%
VEHICLE SPEED	At vehicle stop		0 km/h, 0 MPH
O/D OFF SWITCH (MON)	Ignition switch ON	O/D off switch OFF	OFF
		O/D off switch ON	ON
TRANS. RANGE	Ignition switch ON	Selector lever is in "P" position	P
		Selector lever is in "R" position	R
		Selector lever is in "N" position	N
		Selector lever is in "D" position	D
		Selector lever is in "2" position	2
		Selector lever is in "L" position	L
D RANGE SIGNAL	Ignition switch ON	Selector lever is in "P" position	P/N RANGE
		Selector lever is in "R" position	D RANGE
		Selector lever is in "N" position	P/N RANGE
		Selector lever is in "D" position	D RANGE
		Selector lever is in "2" position	D RANGE
		Selector lever is in "L" position	D RANGE
THROTTLE POSITION	Ignition switch ON	Accelerator pedal is released	0%
		Accelerator pedal is depressed	0 – 100% Varies depending on depressed value
BRAKE SWITCH	Ignition switch ON	Brake pedal is depressed	ON
		Brake pedal is released	OFF
TORQ REDUC-TION SIG	While on gear upshifting with 10% or more throttle opening		ON
	Under condition of not shifting gear		OFF
COOLANT TEMP.	Ignition switch ON		Engine coolant temperature is displayed
A/C SWITCH	Ignition switch ON and air conditioner switch OFF		OFF
ENGINE TORQUE	Ignition switch ON and engine stop		0 N·m

**SCAN TOOL DATA DEFINITIONS:****GEAR POSITION**

Current gear position computed by throttle position coming from ECM and vehicle speed.

**ENGINE SPEED (RPM)**

Engine speed computed by reference pulses from crankshaft position sensor.

**INPUT SHAFT REV (RPM)**

Input shaft revolution computed by reference pulses coming from input shaft speed sensor on transaxle case.

**OUTPUT SHAFT REV (RPM)**

Output shaft revolution computed by reference pulses coming from output shaft speed sensor/VSS on transaxle case.

**BATTERY VOLT (V)**

Battery voltage read by TCM as analog input signal by TCM.

**ATF TEMP (°C, °F)**

ATF temperature decided by signal from transmission fluid temperature sensor installed on valve body.

**SHIFT SOL #1 COM**

ON : ON command being outputted to shift solenoid valve-A/No.1

OFF : ON command not being outputted to shift solenoid valve-A/No.1

**SHIFT SOL #1 MON**

ON : Electricity being passed to shift solenoid valve-A/No.1

OFF : Electricity not being passed to shift solenoid valve-A/No.1

**SHIFT SOL #2 COM**

ON : On command being outputted to shift solenoid valve-B/No.2

OFF : ON command not being outputted to shift solenoid valve-B/No.2

**SHIFT SOL #2 MON**

ON : Electricity being passed to shift solenoid valve-B/No.2

OFF : Electricity not being passed to shift solenoid valve-B/No.2

**SHIFT TIMING SOL COM**

ON : ON command being outputted to timing solenoid valve

OFF : ON command not being outputted to timing solenoid valve

**SHIFT TIMING SOL MON**

ON : Electricity being passed to timing solenoid valve

OFF : Electricity not being passed to timing solenoid valve

**TCC SOLENOID COM**

ON : ON command being outputted to TCC solenoid valve

OFF : ON command not being outputted to TCC shift solenoid valve

**TCC SOLENOID MON**

ON : Electricity being passed to TCC solenoid valve

OFF : Electricity not being passed to TCC solenoid valve

**PRESS CONT SOL (%)**

Electric current value ratio between electric current value being outputted from TCM to solenoid and maximum value can be outputted by TCM.

**VEHICLE SPEED (MPH)**

Vehicle speed computed by reference pulse signals coming from vehicle speed sensor on transaxle case.



### **O/D OFF SWITCH (MON)**

Inputted signal from O/D off switch on selector knob.

ON : O/D off switch ON

OFF : O/D off switch OFF

### **TRANS. RANGE**

Transaxle range detected by signal fed from transmission range sensor.

### **D RANGE SIGNAL**

ON : Signal which TCM require ECM to increase idle speed

OFF : Signal which TCM does not require ECM to increase idle speed

### **THROTTLE POSITION (%)**

Throttle opening ratio computed by duty pulse signal from ECM.

### **BRAKE SWITCH**

Inputted signal from brake light switch on pedal bracket.

ON : Brake pedal depressed

OFF : Brake pedal released

### **TORQ REDUCTION SIG**

ON : Signal which TCM require ECM to reduce output torque at shifting gear

OFF : Signal which TCM does not require ECM to reduce output torque

### **COOLANT TEMP (°C, °F)**

Engine coolant temperature computed by duty pulse signal from ECM.

### **A/C SWITCH**

ON : Signal which inform that air conditioner compressor is turned ON.

OFF : Signal which inform that air conditioner compressor is not turned ON.

### **ENGINE TORQUE (N·m)**

Engine torque computed by duty pulse signal outputted from ECM.

## Inspection of TCM and Its Circuits

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

### CAUTION:

**TCM cannot be checked by itself, it is strictly prohibited to connect voltmeter or ohmmeter to TCM with connector disconnected from it.**

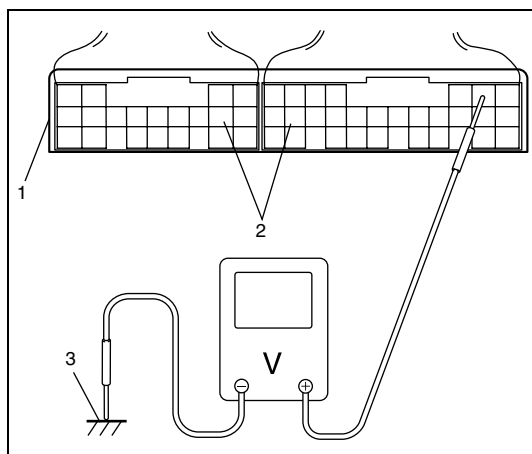
### INSPECTION

- 1) Remove TCM (1) from vehicle referring to “Transmission Control Module” in this section.
- 2) Connect TCM connectors (2) to TCM.
- 3) Check voltage at each terminal of connectors connected.

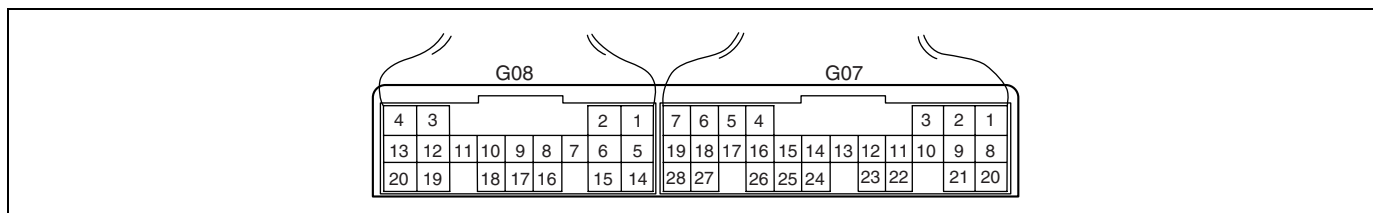
### NOTE:

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

3. Body ground



Terminal arrangement of TCM coupler viewed from harness side



TERMINAL		CIRCUIT	STANDARD VOLTAGE	CONDITION
G07	1	Transmission range sensor "R" range	8 – 14 V	Ignition switch ON, selector lever in "R" range
			0 – 1 V	Ignition switch ON, selector lever in other than "R" range
	2	Transmission range sensor "P" range	8 – 14 V	Ignition switch ON, selector lever in "P" range
			0 – 1 V	Ignition switch ON, selector lever in other than "P" range
	3	O/D off switch	0 – 1 V	O/D off switch ON
			8 – 14 V	O/D off switch OFF
	4	Blank	—	—
	5	Input shaft speed sensor (+)	2 – 3 V	Ignition switch ON, engine at stop
	6	Throttle opening signal from ECM	0 – 1 V	Ignition switch ON
			8 – 14 V	Signal from ECM is 128 Hz active low duty pulse. Duty ratio varies as throttle valve is opened gradually. Duty On time : 0.78 ms at throttle opening 0% 6.24 ms at throttle opening 100%

TERMINAL		CIRCUIT	STANDARD VOLTAGE	CONDITION
G07	7	Engine coolant temperature signal from ECM	0 – 1 V ⇕ 8 – 14 V	Ignition switch ON Signal from ECM is active low duty pulse. Duty ratio varies depending on engine coolant temperature. Duty On time : 850 ms at 20 °C, 68 °F 1450 ms at 80 °C, 176 °F
	8	Transmission range sensor “D” range	8 – 14 V	Ignition switch ON, selector lever in “D” range
			0 – 1 V	Ignition switch ON, selector lever in other than “D” range
	9	Transmission range sensor “N” range	8 – 14 V	Ignition switch ON, selector lever in “N” range
			0 – 1 V	Ignition switch ON, selector lever in other than “N” range
	10	“O/D OFF” lamp	0 – 1 V	Ignition switch ON and lamp turned ON
			9 – 14 V	Ignition switch ON and lamp turned OFF
	11	Blank	–	–
	12	D range signal	9 – 14 V	Ignition switch ON, selector lever in “P” or “N” range
			0 – 1 V	Ignition switch ON, selector lever in “R”, “D”, “2” or “L” range
	13	Blank	–	–
	14	Air conditioner compressor signal	0 – 1 V	Ignition switch ON, A/C compressor turned ON
			8 – 14 V	Ignition switch ON, A/C compressor turned OFF
	15	Engine speed signal	0 – 1 V	Ignition switch ON, engine at stop
			0 – 1 V	While engine running
			⇕ 8 – 14 V	Signal from ECM is pulse. Pulse frequency varies depending on engine speed. (3000 rpm = 100 Hz)
	16	Blank	–	–
	17	Input shaft speed sensor (–)	2 – 3 V	Ignition switch ON
	18	Torque reduction signal	9 – 14 V	Ignition switch ON
	19	Blank	–	–
	20	Transmission range sensor “L” range	8 – 14 V	Ignition switch ON, selector lever in “L” range
			0 – 1 V	Ignition switch ON, selector lever in other than “L” range
	21	Transmission range sensor “2” range	8 – 14 V	Ignition switch ON, selector lever in “2” range
			0 – 1 V	Ignition switch ON, selector lever in other than “2” range
	22	Blank	–	–
	23	Engine torque signal	0 – 1 V	Ignition switch ON
			⇕ 8 – 14 V	Signal from ECM is 128 Hz duty pulse. Duty ratio varies depending on engine torque.
	24	Output shaft speed sensor	0 – 1 V	Ignition switch ON and vehicle running
			⇕ 8 – 14 V	Signal from sensor is pulse. Pulse frequency varies depending on vehicle speed. 4 pulses are generated per 1 sensor shaft revolution.)
	25	Blank	–	–
	26	Blank	–	–

TERMINAL		CIRCUIT	STANDARD VOLTAGE	CONDITION
G07	27	Data link connector	0 – 1 V ⇕ 8 – 14 V	Ignition switch ON
	28	Vehicle speed output	0 – 1 V ⇕ 8 – 14 V	Ignition switch ON and vehicle running Output signal is pulse. Pulse frequency varies depending on vehicle speed.
G08	1	Blank	–	–
	2	Blank	–	–
	3	Shift solenoid valve-B/No.2	9 – 14 V	Ignition switch ON, selector lever in “P” range
	4	Shift solenoid valve-A/No.1	9 – 14 V	Ignition switch ON, selector lever in “P” range
	5	Transmission temperature sensor (+)	4.5 – 4.9 V	Ignition switch ON, fluid temperature is –30 °C, –22 °F
			3.3 – 3.7 V	Ignition switch ON, fluid temperature is 10 °C, 50 °F
			0.3 – 0.5 V	Ignition switch ON, fluid temperature is 110 °C, 230 °F
			0.1 – 0.3 V	Ignition switch ON, fluid temperature is 145 °C, 293 °F
	6	Diagnosis switch	8 – 14 V	Ignition switch ON
	7	Serial data line to ECM	0 – 1 V ⇕ 8 – 14 V	Ignition switch ON
	8	Pressure control solenoid valve (ground)	0 – 2.5 V	Ignition switch ON Signal is duty pulse. Duty ratio varies as throttle valve opening.
	9	Blank	–	–
	10	Timing solenoid valve	0 – 1 V	Ignition switch ON
	11	Pressure control solenoid valve (+)	0 – 1 V ⇕ 9 – 14 V	Ignition switch ON Output signal is duty pulse. Duty ratio varies as throttle valve opening.
	12	TCC solenoid valve	0 – 1 V	Ignition switch ON
	13	Power source for back-up	10 – 14 V	Constantly
	14	Transmission temperature sensor (ground)	0 – 1 V	Ignition switch ON
	15	Ground	0 – 1 V	Ignition switch ON
	16	Brake light switch	8 – 14 V	Ignition switch ON, brake pedal depressed
			0 – 1 V	Ignition switch ON, brake pedal released
	17	Blank	–	–
	18	Blank	–	–
	19	Ground	0 – 1 V	Ignition switch ON
	20	Power source	10 – 14 V	Ignition switch ON

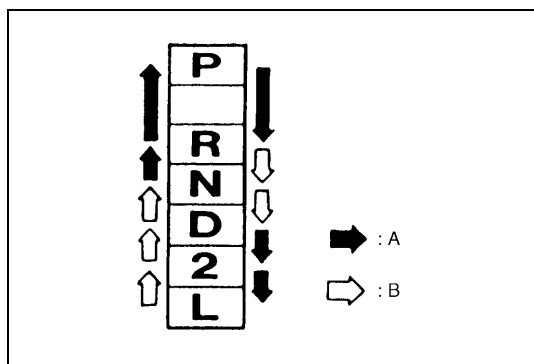
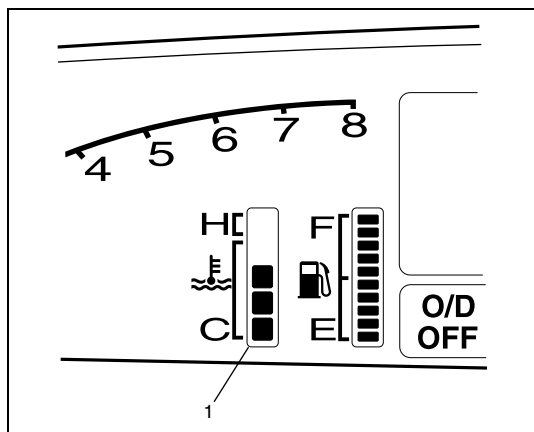
## On-Vehicle Service

### Maintenance Service

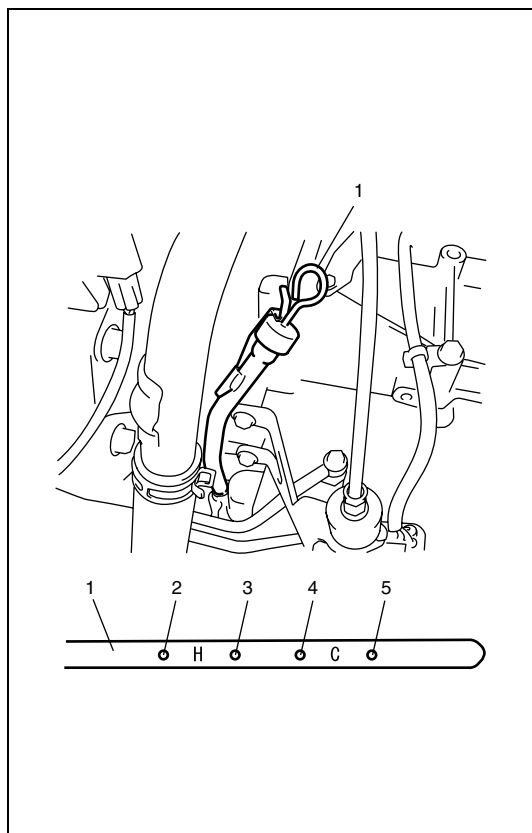
#### Fluid level check at normal operating temperature – Hot check

##### INSPECTION

- 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 (1) indicates up to 2nd or 3rd segment from lowest segment as shown in figure.
- 5) Keep engine idling and shift selector slowly to L and back to P position.
- 6) With engine idling, pull out fluid level gauge, wipe it off with a clean cloth and put it back into place.



- |    |  |
|----|--|
| A. | Shift the select lever with its button pushed in.  |
| B. | Shift the select lever without pushing its button. |



- 7) Pull out fluid level gauge (1) again and check fluid level indicated on it. The lowest fluid level should be between FULL HOT and LOW HOT. If it is below LOW HOT, add an equivalent of DEXRON®-III or DEXRON®-IIE up to FULL HOT.

#### Automatic transaxle fluid

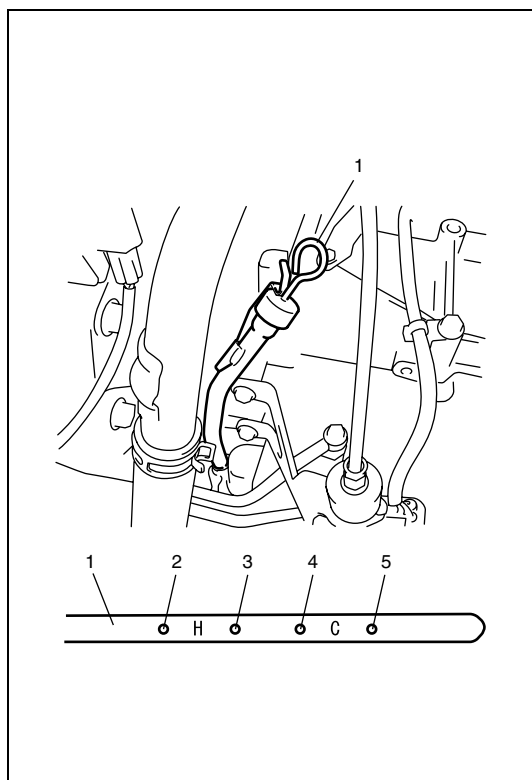
: An equivalent of DEXRON®-III or DEXRON®-IIE

#### NOTE:

- Do not race engine while checking fluid level, even after the engine start.
- Do not overfill. Overfilling can cause foaming and loss of fluid through breather. Then slippage and transaxle failure can result.
- Bringing the level from LOW HOT to FULL HOT requires 0.4 liters (0.85/0.70 US/Imp. pt).
- If vehicle was driven under high load such as pulling a trailer, fluid level should be checked about half an hour after it is stopped.

2.	"FULL HOT" mark
3.	"LOW HOT" mark
4.	"FULL COLD" mark
5.	"LOW COLD" mark

### Fluid level check at room temperature – Cold check INSPECTION



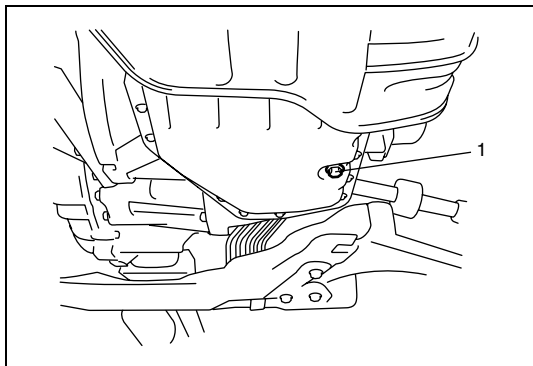
Fluid level can be checked temporarily at room temperature which correspond to 20 – 30 °C (68 – 86 °F). This level check is considered to be preparation before performing level check under normal operating temperature. Checking procedure itself is the same as that described in "Fluid Level Check at Normal Operating Temperature – Hot Check". If fluid level is between FULL COLD and LOW COLD, proceed to test drive. And when fluid temperature has reached normal operating temperature, check fluid level again and adjust it as necessary.

#### CAUTION:

**Fluid level check at room temperature is recommended only for preparation of level check under normal operating condition.**

**Failure to perform fluid level check under normal operating temperature may result in damage to transaxle.**

1.	Fluid level gauge
2.	"FULL HOT" mark
3.	"LOW HOT" mark
4.	"FULL COLD" mark
5.	"LOW COLD" mark

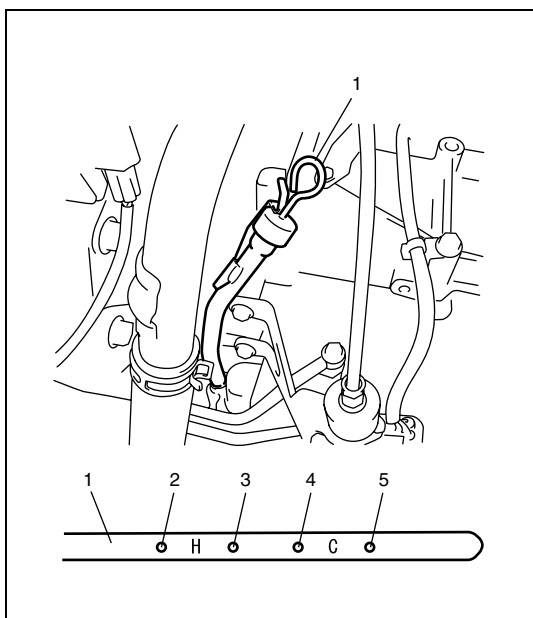


## Fluid change

- 1) Lift up vehicle.
- 2) When engine is cool, remove drain plug (1) and drain A/T fluid.
- 3) Install drain plug (1).

### Tightening torque

**A/T fluid drain plug (a) : 17 N·m (1.7 kg-m, 12.5 lb-ft)**



- 4) Lower vehicle and pour proper amount of an equivalent of DEXRON®-III or DEXRON®-IIE
- 5) Check fluid level referring to "Fluid level check" in this section.

### Automatic transaxle fluid

**: An equivalent of DEXRON®-III or DEXRON®-IIE**

### Automatic transaxle fluid capacity

**When draining from drain plug hole :**

**3.3 liters (6.97/5.81 US/Imp. pt.)**

**When overhauling :**

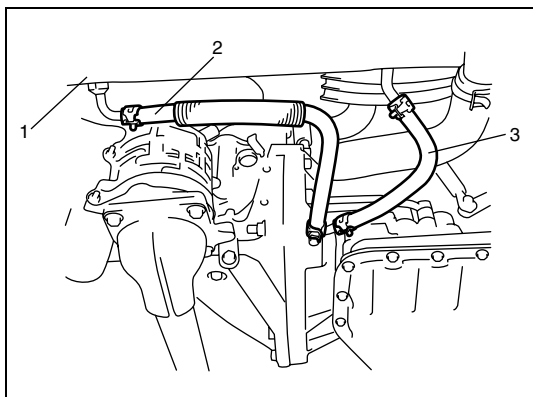
**5.6 liters (11.83/9.86 US/Imp. pt.)**

1.	Fluid level gauge
2.	"FULL HOT" mark
3.	"LOW HOT" mark
4.	"FULL COLD" mark
5.	"LOW COLD" mark

## A/T fluid cooler hoses

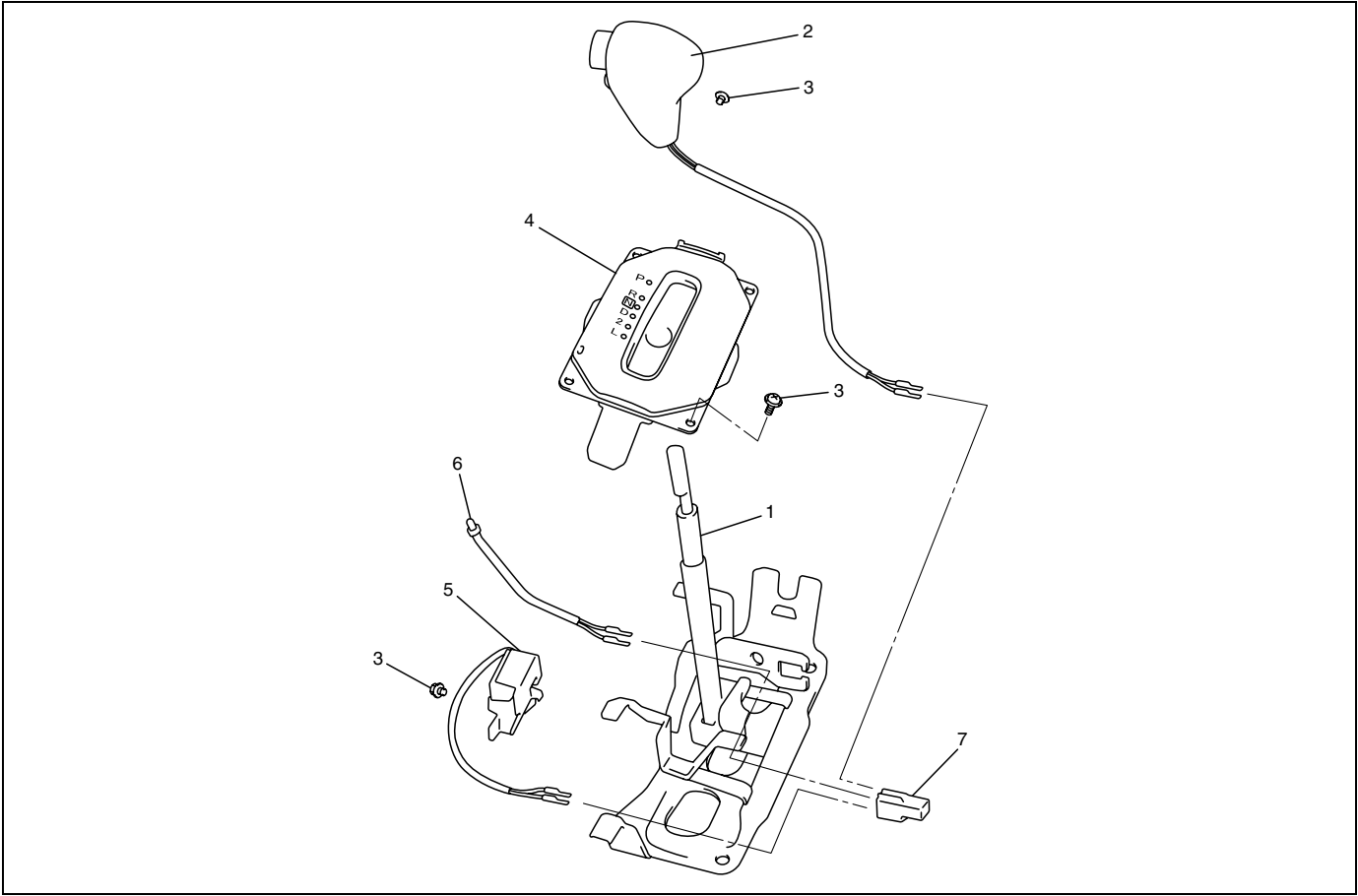
The rubber hoses for the A/T fluid cooler should be checked at specified interval. If replacing them, be sure to note the following.

- to replace clamps at the same time
- to insert hose as far as its limit mark
- to clamp clamps securely



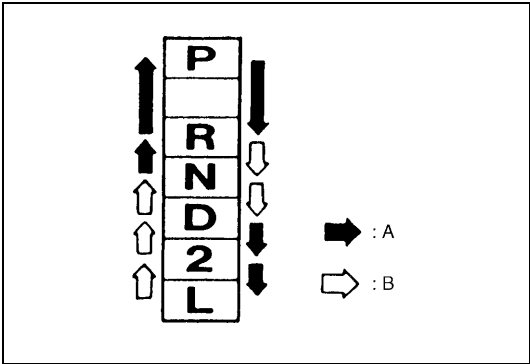
1.	Radiator
2.	Inlet hose (Outlet from A/T fluid cooler)
3.	Outlet hose (Inlet to A/T fluid cooler)

Selector Lever



1. Selector lever assembly	4. Indicator assembly	7. Connector
2. Knob assembly	5. Shift lock solenoid if equipped	
3. Screw	6. Illumination lamp assembly	

INSPECTION

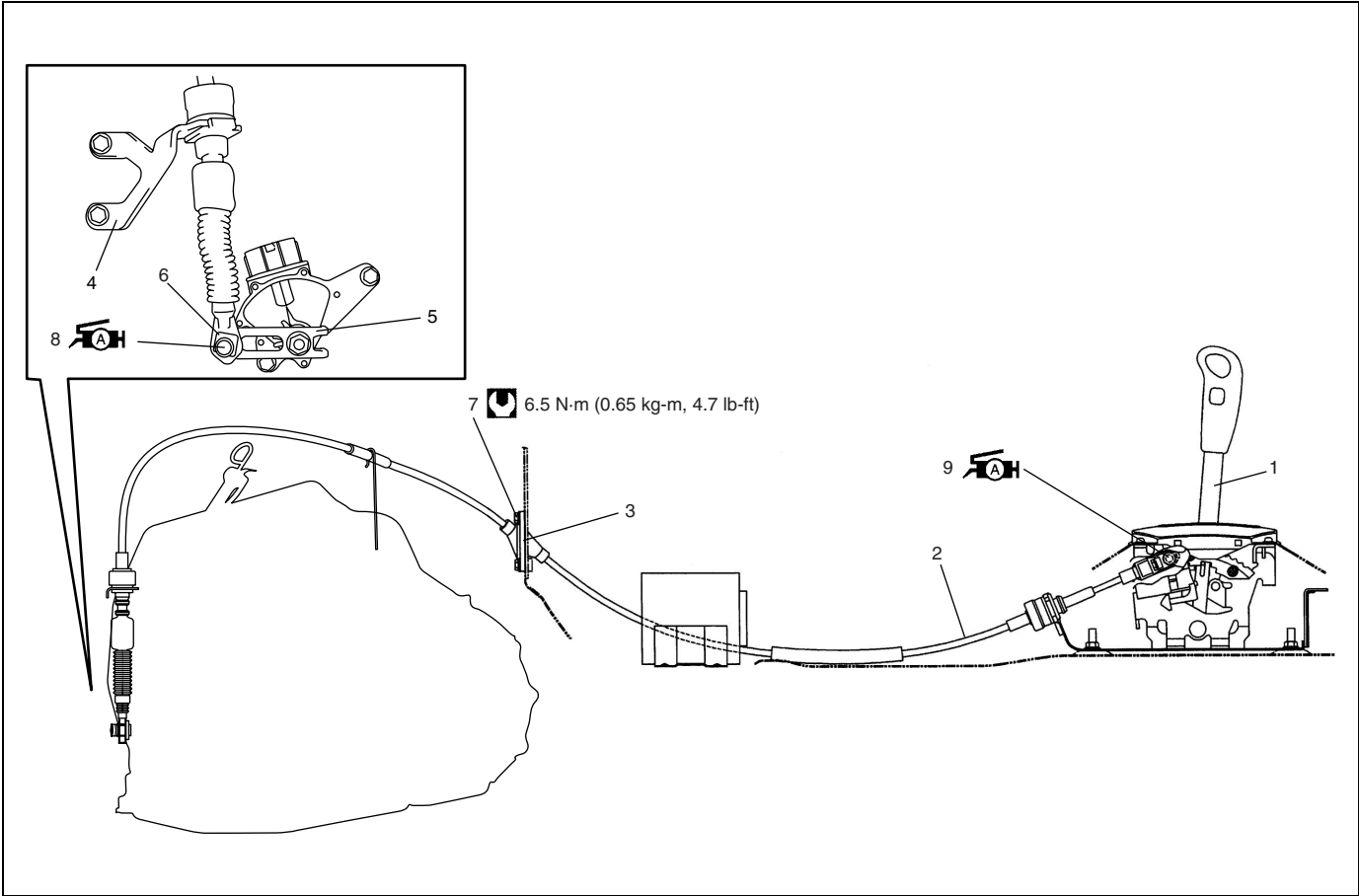


Check select lever for smooth and clear-cut movement and position indicator for correct indication.  
For operation of select lever, refer to the figure.

A. Shift the select lever with its button pushed in.
B. Shift the select lever without pushing its button.



# Select Cable



1. Selector lever assembly	6. Clip
2. Select cable	7. Select cable retainer bolt
3. Select cable retainer	8. Manual shift lever pin : Apply lithium grease 99000-25010 to all around pin with amount of 0.15 g
4. Cable bracket	9. Selector lever pin : Apply lithium grease 99000-25010 to all around pin with amount of 0.15 g
5. Manual shift lever	Tightening torque

**REMOVAL**

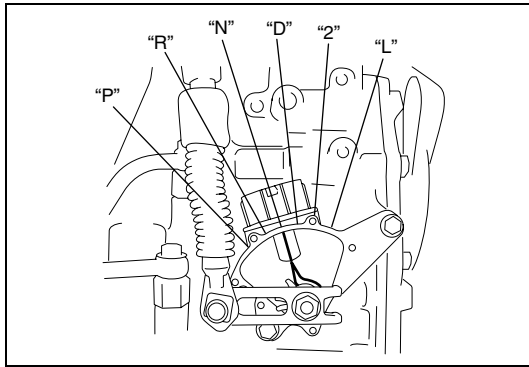
- 1) Remove parking brake lever cover.
- 2) Remove console box.
- 3) Disconnect select cable from selector lever and then detach from bracket.
- 4) Remove clip and disconnect select cable from manual shift.
- 5) Remove select cable retainer from dash panel.

**INSTALLATION**

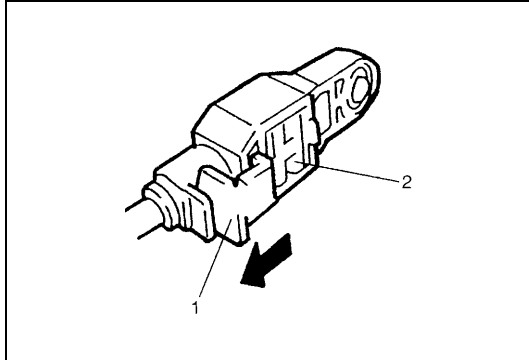
Install select cable by reversing removal procedure.

The important steps in installation are as follows.

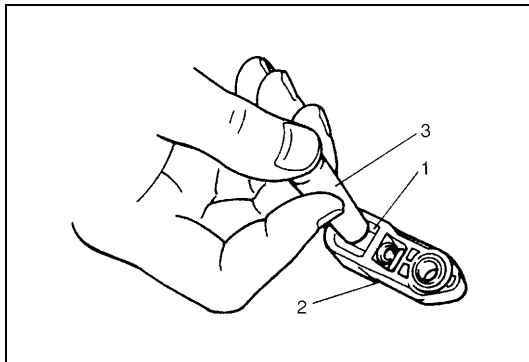
- Apply grease to pin and cable joint.
- Tighten bolts in upper figure to specified torque.
- Adjusting procedure is as follows.

**ADJUSTMENT**

- 1) Shift manual shift lever to transmission range sensor "N" range.
- 2) Remove adjuster/cable end from selector lever pin of selector lever assembly.

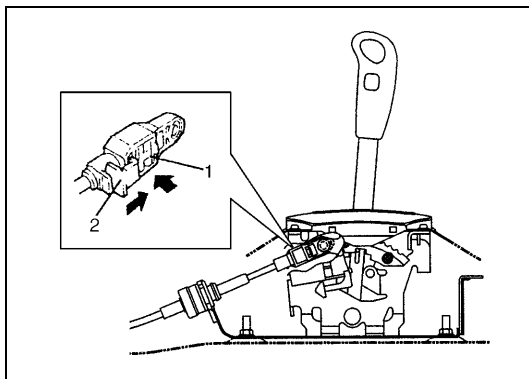


- 3) Release lock plate (1) which restrict moving of cable end holder (2).



- 4) Push cable end holder (1) out from eye-end (2) using an appropriate tool (3) to disengage cable.

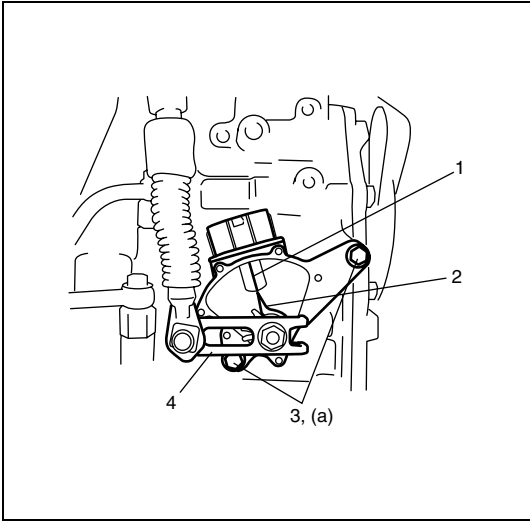
- 5) Shift selector lever to "N" position.
- 6) Apply grease to selector lever pin and install adjuster/cable end to it.

**Grease 99000-25010**

- 7) With both selector lever and transmission range sensor kept each "N" position, drive cable end holder (1) in until it locks cable.
- 8) Slide lock plate (2) to secure cable end holder in position.
- 9) After select cable was installed, check for the following.
  - Push vehicle with selector lever shifted to "P" range. Vehicle should not move.
  - Vehicle can not be driven in "N" range.
  - Vehicle can be driven in "D", "2" and "L" ranges.
  - Vehicle can be backed in "R" range.

Transmission Range Sensor

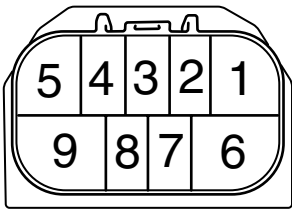
ADJUSTMENT AND INSPECTION



- 1) Shift manual select lever (4) to “N” range.
- 2) Check that needle direction shaped on lock washer (2) and “N” reference line (1) on transmission range sensor are aligned. If not, loosen sensor bolts (3) and align them.
- 3) Check that engine starts in “N” and “P” ranges but it does not start in “D”, “2”, “L” or “R” range. Also, check that back-up lamp lights in “R” range.

**Tightening torque**  
**Transmission range sensor bolts**  
**(a) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)**

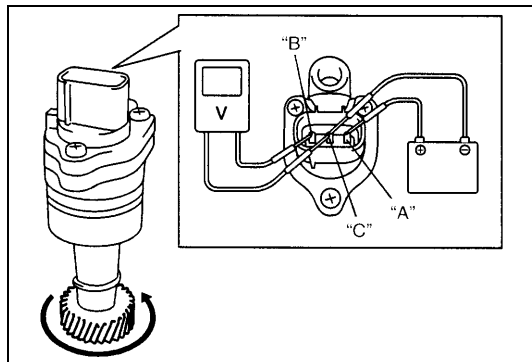
If faulty condition cannot be corrected by adjustment, disconnect transmission range sensor connector and check that continuity exists as shown by moving manual select lever.



		Terminal No.								
		1	2	3	4	5	6	7	8	9
Sensor Position	P									
	R									
	N									
	D									
	2									
	L									

## Output Shaft Speed Sensor/VSS

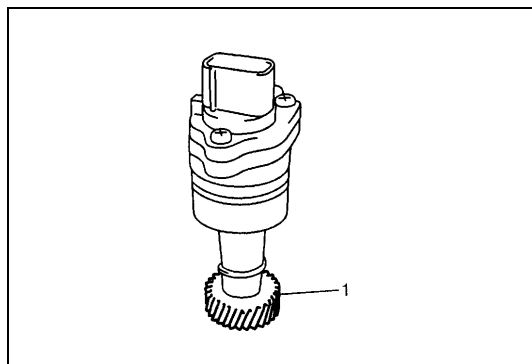
### INSPECTION



- 1) Connect positive cable of 12 volt battery to "A" terminal of sensor and ground cable to "C" terminal. Then using voltmeter, check voltage between "B" terminal and "C" terminal with output shaft speed sensor/VSS driven gear rotated.

If measured voltage of pulse signal is not as specified, replace sensor.

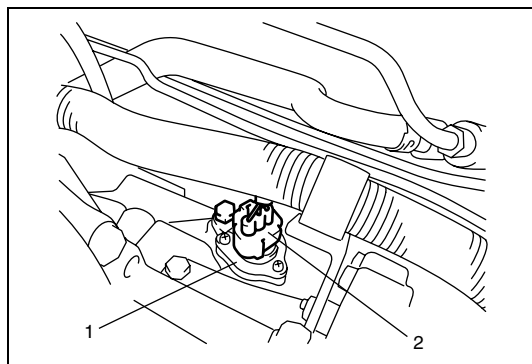
**Output shaft speed sensor/VSS output voltage**  
**Pulse signal of alternating 0 – 1 V and 10 – 14 V**



- 2) Check output shaft speed sensor/VSS driven gear (1) for wear.  
 Replace if necessary.

### REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disconnect output shaft speed sensor connector (2).
- 3) Remove output shaft speed sensor/VSS (1) by removing its bolt.



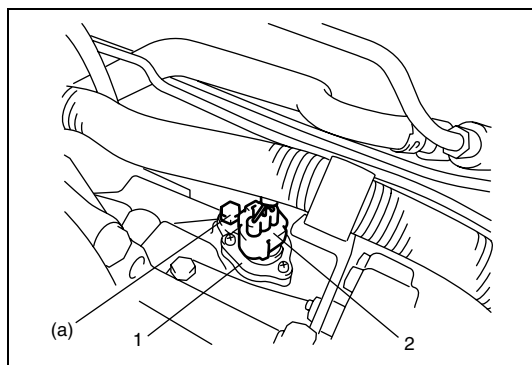
### INSTALLATION

- 1) Apply A/T fluid to output shaft speed sensor O-ring.
- 2) Install output shaft speed sensor/VSS (1) to A/T case and tighten bolt to specified torque.

#### Tightening torque

**Output shaft speed sensor/VSS bolt**  
**(a) : 13 N·m (1.3 kg-m, 9.5 lb-ft)**

- 3) Connect output shaft speed sensor connector (2) to output shaft speed sensor/VSS (1).



- 4) Connect negative cable to battery.

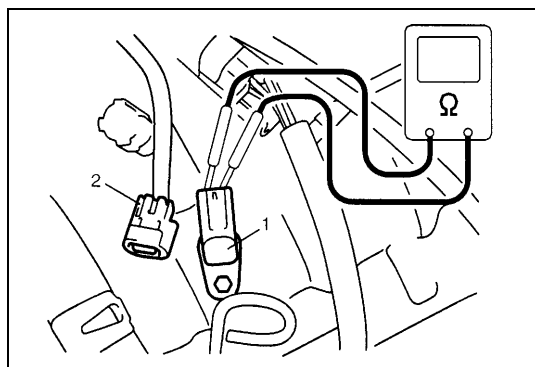
## Input Shaft Speed Sensor

### INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Disconnect input shaft speed sensor connector (2).
- 3) Check resistance between input shaft speed sensor terminals.

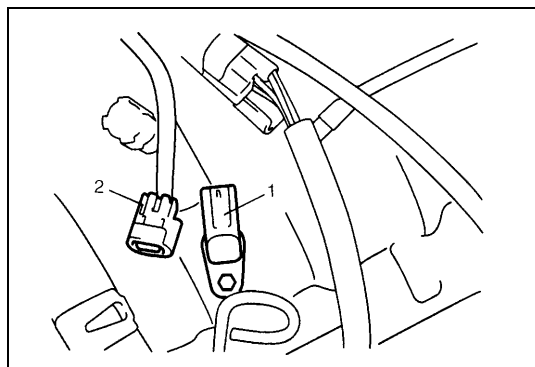
**Input shaft speed sensor resistance**  
**Standard : 560 – 680  $\Omega$  at 20 °C (68 °F)**

1. Input shaft speed sensor



### REMOVAL

- 1) Disconnect negative cable at battery.
- 2) Disconnect input shaft speed sensor connector (2).
- 3) Remove input shaft speed sensor (1) by removing its bolt.



### INSTALLATION

- 1) Apply A/T fluid to input shaft speed sensor O-ring.
- 2) Install input shaft speed sensor (1) to A/T case and tighten bolt to specified torque.

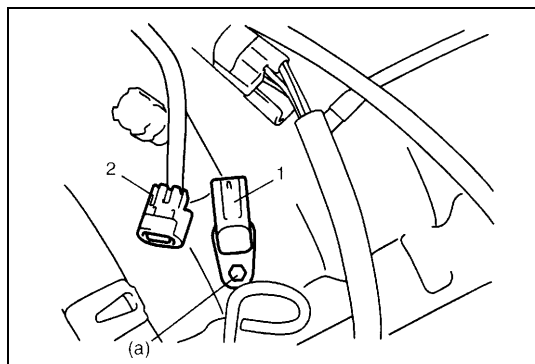
#### Tightening torque

**Input shaft speed sensor bolt**

**(a) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)**

- 3) Connect input shaft speed sensor connector (2) to input shaft speed sensor (1).

- 4) Connect negative cable to battery.



## Throttle Position Sensor

### INSPECTION

Check throttle position sensor referring to Section 6E1.

## Engine Coolant Temperature Sensor

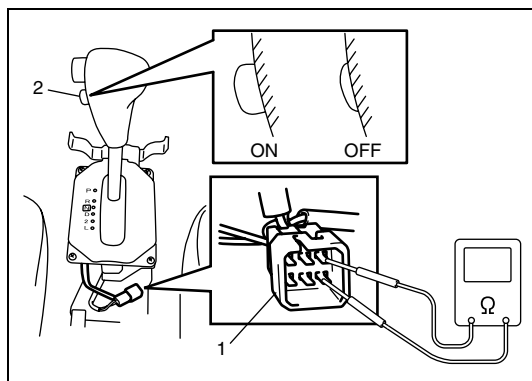
### INSPECTION

Check engine coolant temperature sensor referring to Section 6E1.

## O/D OFF Switch

### INSPECTION

- 1) Remove console box.
- 2) Disconnect O/D off switch connector (1).
- 3) Check continuity between O/D off switch terminals.



O/D off switch (2)	ON	OFF
Continuity	Continuity	No continuity

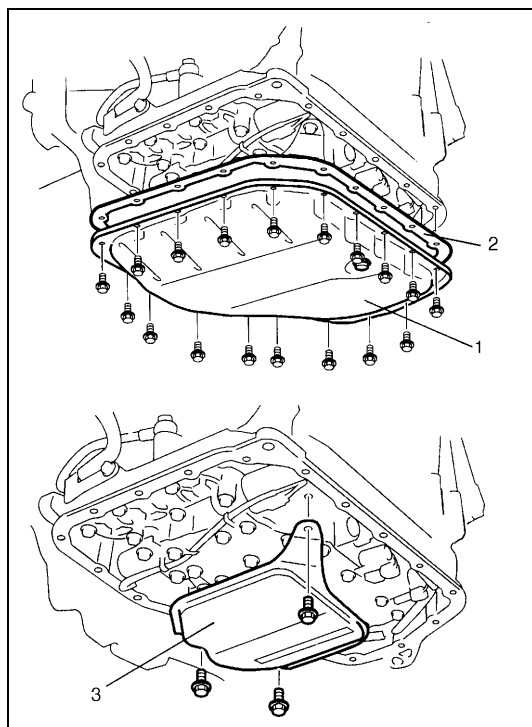
## Shift Solenoid Valves, TCC Solenoid Valve and Timing Solenoid Valve

### REMOVAL

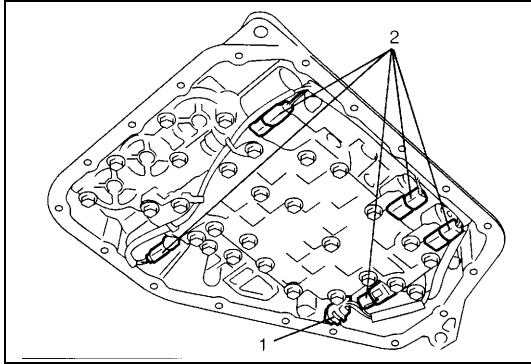
- 1) Disconnect negative cable at battery.
- 2) Lift up vehicle.
- 3) Remove engine under covers.
- 4) Remove drain plug and drain A/T fluid.
- 5) Install drain plug.

#### Tightening torque

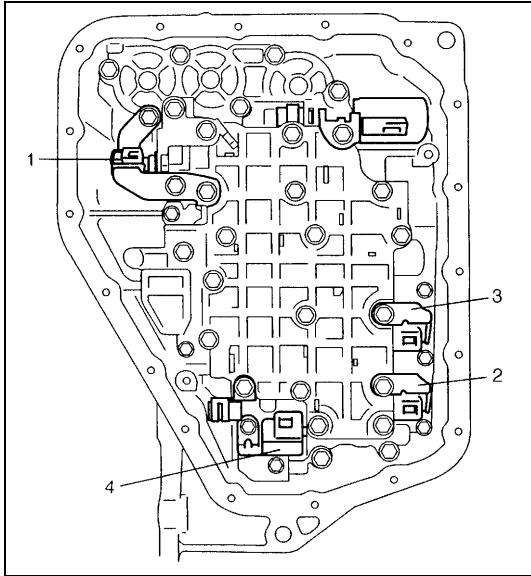
**A/T fluid drain plug : 17 N·m (1.7 kg-m, 12.5 lb-ft)**



- 6) Remove A/T oil pan (1) and oil pan gasket (2).
- 7) Remove oil strainer assembly (3).



- 8) Remove transmission fluid temperature sensor (1) from sensor clamp.
- 9) Disconnect solenoid connectors (2).



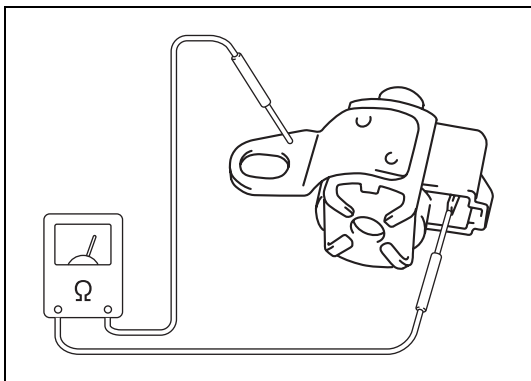
- 10) Remove TCC solenoid valve (1), shift solenoid valve-A/No.1 (2), shift solenoid valve-B/No.2 (3) and timing solenoid valve (4) by removing bolts.

## INSPECTION

### Resistance check

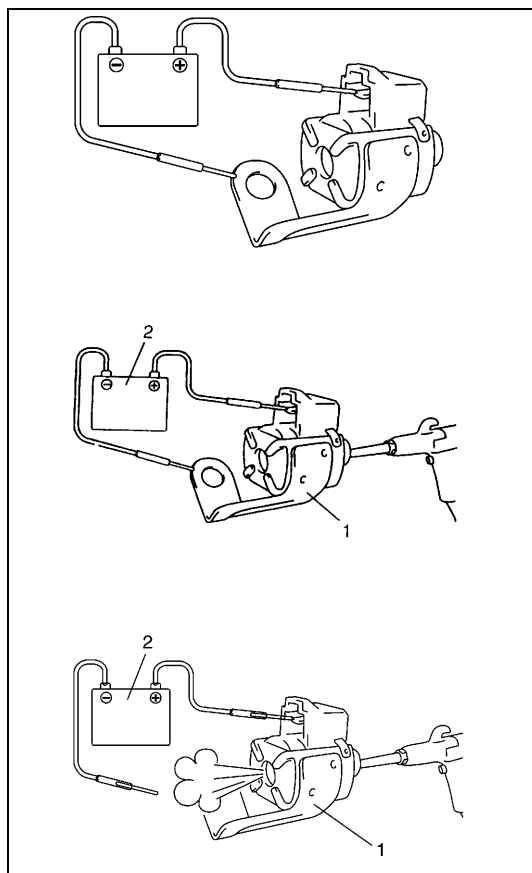
**Shift solenoid valves, Timing solenoid valve and TCC solenoid valve resistance**

**Standard : 11 – 15  $\Omega$  at 20 °C (68 °F)**



## Operation check

### Shift solenoid valve-A/No.1, -B/No.2 and TCC solenoid valve



#### CAUTION:

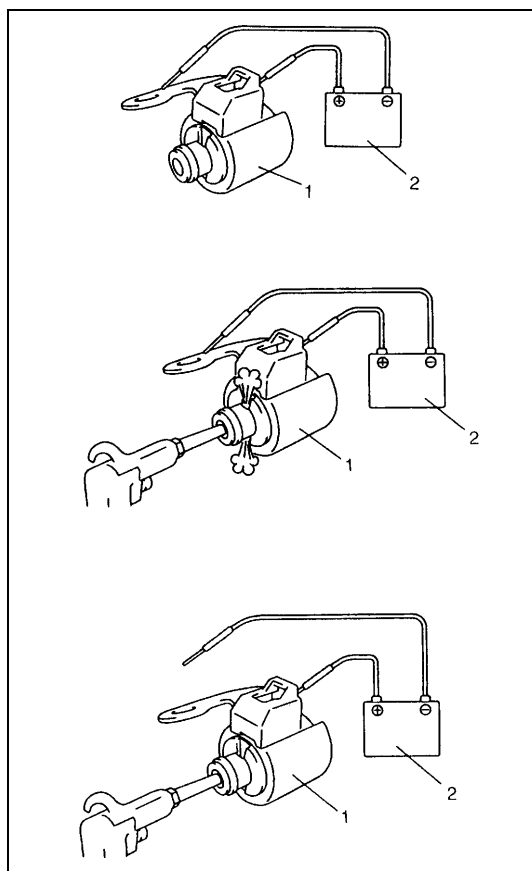
**Do not insert air gun against strainer installed on inlet of solenoid valve too deeply, when blowing air into solenoid valve. If not, the strainer will be damaged.**

- Check that solenoid valve (1) actuate with click sound when battery voltage is conducted.
- When solenoid valve (1) is connected to battery (2), confirm that solenoid valve is close condition by blowing air (50 – 200 kpa, 0.5 – 2.0 kg/cm<sup>2</sup>, 7 – 28.5 psi) into solenoid valve as shown in the figure.
- When solenoid valve (1) is not connected to battery (2), confirm that solenoid valve is open condition by blowing air (50 – 200 kpa, 0.5 – 2.0 kg/cm<sup>2</sup>, 7 – 28.5 psi) into solenoid valve as shown in the figure.

#### NOTE:

**Do not fail to inspect with air to prevent mistaken checking because return spring for valve is not installed into solenoid valve.**

### Timing solenoid valve



#### CAUTION:

**Do not insert air gun against strainer installed on inlet of solenoid valve too deeply, when blowing air into solenoid valve. If not, the strainer will be damaged.**

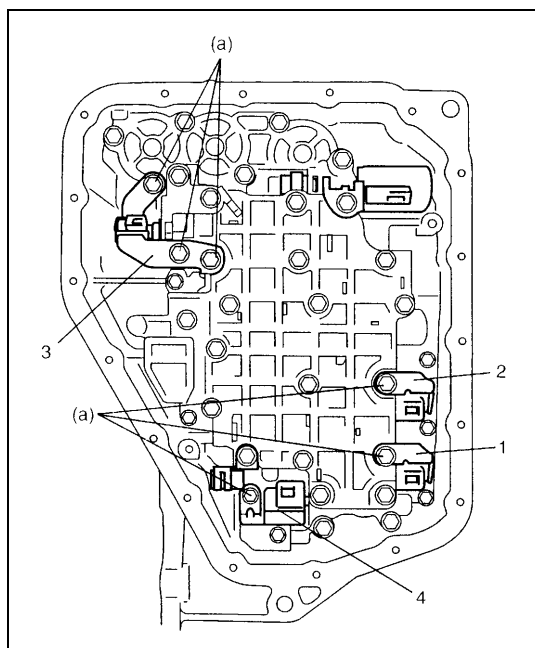
- Check that solenoid valve (1) actuate with click sound when battery voltage is conducted.
- When timing solenoid valve (1) is connected to battery (2), confirm that timing solenoid valve is open condition by blowing air (50 – 200 kpa, 0.5 – 2.0 kg/cm<sup>2</sup>, 7 – 28.5 psi) into solenoid valve as shown in the figure.
- When timing solenoid valve (1) is not connected to battery (2), confirm that timing solenoid valve is close condition by blowing air (50 – 200 kpa, 0.5 – 2.0 kg/cm<sup>2</sup>, 7 – 28.5 psi) into solenoid valve as shown in the figure.

#### NOTE:

**Do not fail to inspect with air to prevent mistaken checking because return spring for valve is not installed into solenoid valve.**



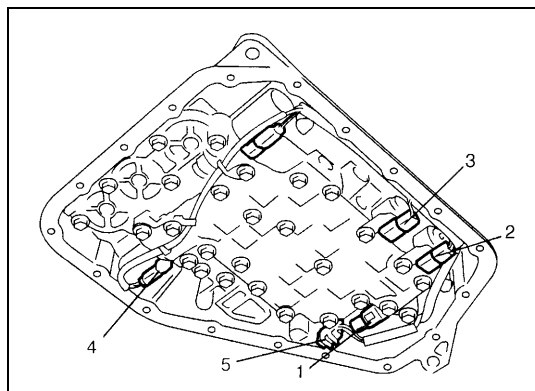
## INSTALLATION



- 1) Install shift solenoid valve-A/No.1 (1), shift solenoid valve-B/No.2 (2), TCC solenoid valve (3) and timing solenoid valve (4).

### Tightening torque

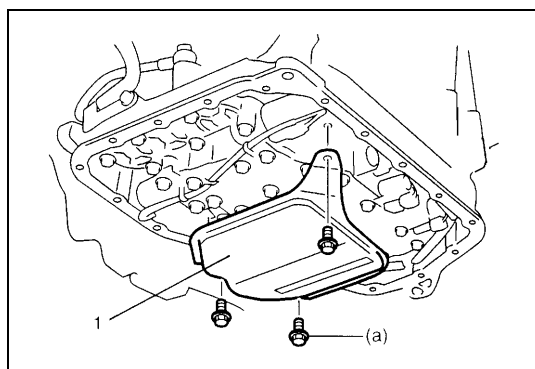
**Solenoid valve bolts (a) : 11 N·m (1.1 kg-m, 8.0 lb-ft)**



- 2) Connect solenoid connectors identifying their installing positions by wire color.

Solenoid coupler	Wire color
Shift solenoid valve-A/No.1 (2)	White
Shift solenoid valve-B/No.2 (3)	Black
Timing solenoid valve (1)	Yellow
TCC solenoid valve (4)	Light Green

- 3) Install transmission fluid temperature sensor (5) to sensor clamp.

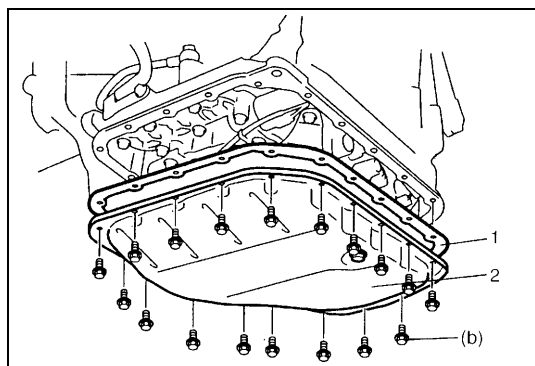


- 4) Install oil strainer assembly (1).

### Tightening torque

#### Oil strainer bolts

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



- 5) Install new oil pan gasket (1) and oil pan (2).

### Tightening torque

#### Oil pan bolts

**(b) : 7.0 N·m (0.7 kg-m, 5.0 lb-ft)**

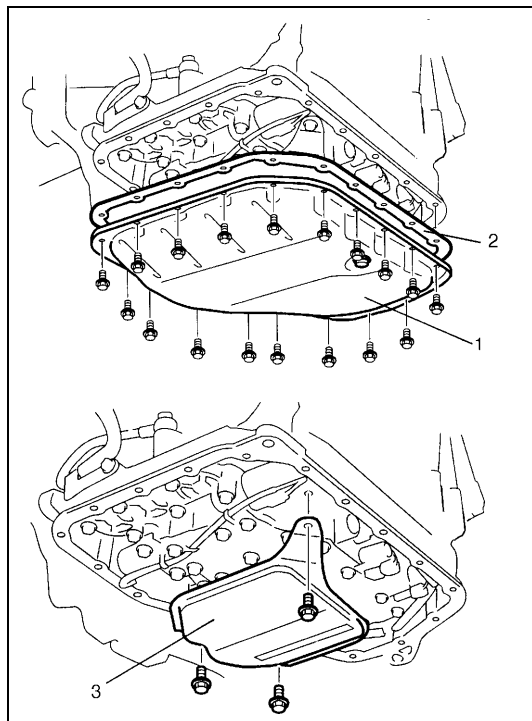
## Pressure Control Solenoid Valve

### REMOVAL

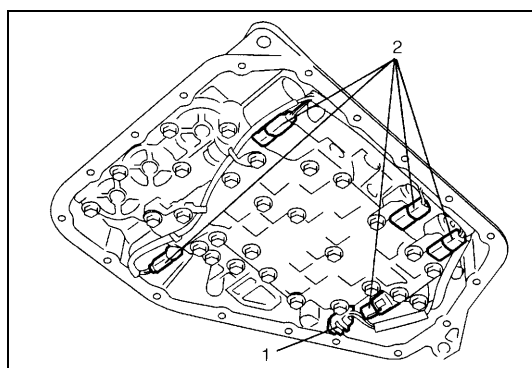
- 1) Disconnect negative cable at battery.
- 2) Lift up vehicle.
- 3) Remove drain plug and drain A/T fluid.
- 4) Install drain plug.

#### Tightening torque

**A/T fluid drain plug : 17 N·m (1.7 kg-m, 12.5 lb-ft)**



- 5) Remove A/T oil pan (1) and oil pan gasket (2).
- 6) Remove oil strainer assembly (3).

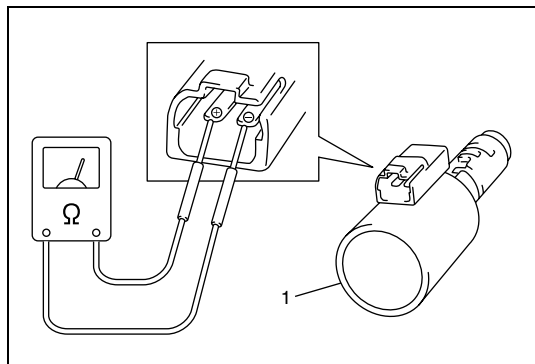


- 7) Remove transmission fluid temperature sensor (1) from sensor clamp.
- 8) Disconnect solenoid connectors (2).

- 9) Remove valve body assembly referring to "Unit Disassembly" in this section.
- 10) Remove pressure control solenoid valve referring to "Valve Body Assembly" in this section.

## INSPECTION

### Resistance check



Measure resistance between pressure control solenoid valve (1) terminals.

#### Pressure control solenoid valve resistance

**Standard : 5.0 – 5.6  $\Omega$  at 20 °C (68 °F)**

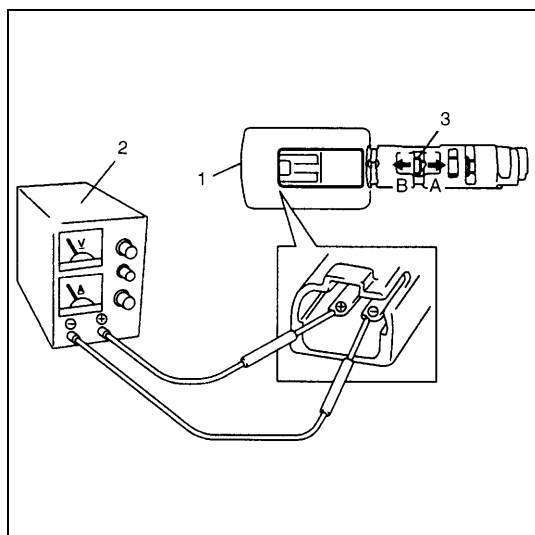
### Operation check

Check pressure control solenoid valve operation in the either manner of the followings.

#### [Using regulated DC power supply]

##### CAUTION:

**Do not pass current 1.0 A or more, or pressure control solenoid is burned out.**

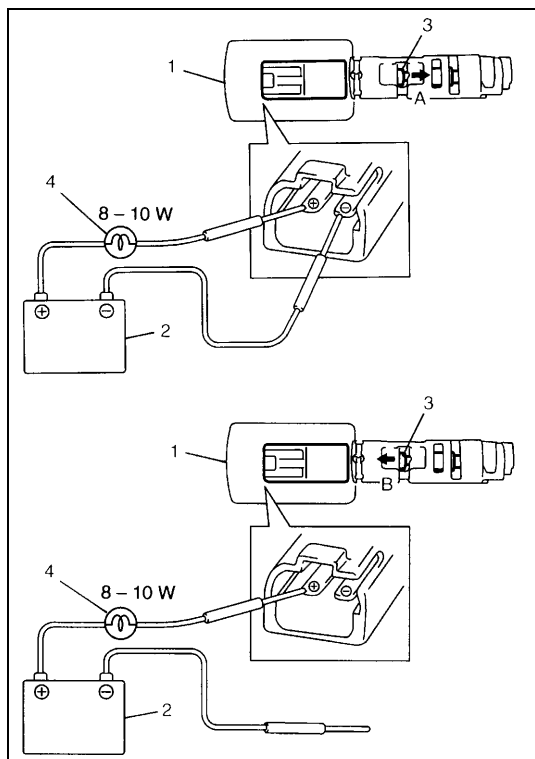


- 1) Connect pressure control solenoid valve (1) with regulated DC power supply (2) as shown in the figure.
- 2) Turn regulated DC power supply switch ON, increase voltage of power supply keeping current within 1.0 A.
- 3) Check for gradual movement of valve (3) in the direction of arrow "A" as voltage is increased.
- 4) Check movement of valve (3) in the direction of arrow "B" as voltage is decreased.
- 5) Turn power supply switch OFF.

#### [Not using regulated DC power supply]

##### CAUTION:

**Set 8-10 W bulb on the way, or pressure control solenoid valve is burned out.**



- 1) Connect pressure control solenoid valve (1) to battery (2) setting the 8 – 10 W bulb (4) on the way as shown in the figure.
- 2) Check for movement of valve (3) in the direction of arrow "A".
- 3) Disconnect pressure control solenoid valve (1) from battery (2) and check movement of valve (3) in the direction of arrow "B" as shown in the figure.

## INSTALLATION

Reverse removal procedure to install pressure control solenoid valve and valve body assembly noting the following points.

- For detail of pressure control solenoid valve installation, refer to “Valve Body Assembly” in this section.
- For detail of valve body assembly installation, refer to “Unit Assembly” in this section.
- For detail of installing wire harness for solenoid valves and sensor, refer to “Unit Assembly” in this section. Use new O-rings.
- For detail of A/T oil pan and oil strainer assembly installation, refer to “Unit Assembly” in this section. Use new oil pan gasket.
- Pour A/T fluid and check fluid level according to procedure described in “Fluid Change” in this section.
- Check for fluid leakage after warming up A/T.

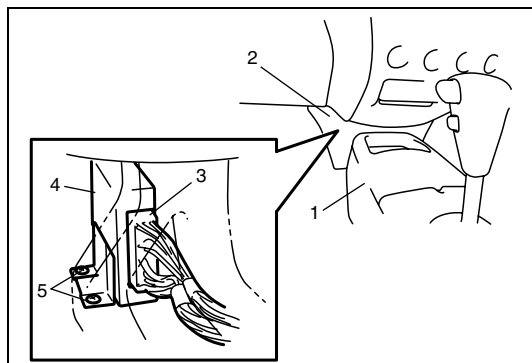
## Transmission Control Module (TCM)

### CAUTION:

**TCM consists of highly precise parts, therefore when handling it, be careful not to expose to excessive shock.**

### REMOVAL

- 1) Disconnect negative cable at battery.
- 2) If the vehicle is equipped with air bag system, disable air bag system. Refer to “Disabling Air Bag System” in Section 10B.
- 3) Remove parking brake cover, console box (1) and console covers (2).
- 4) Disconnect connectors (3) from TCM (4).
- 5) Remove TCM (4) by removing its bolts (5).

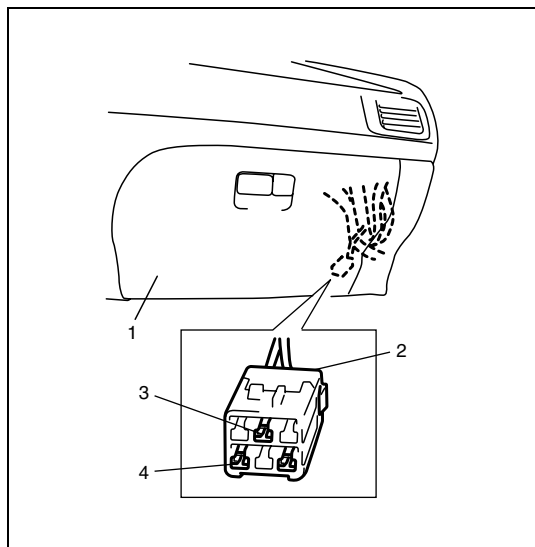


### INSTALLATION

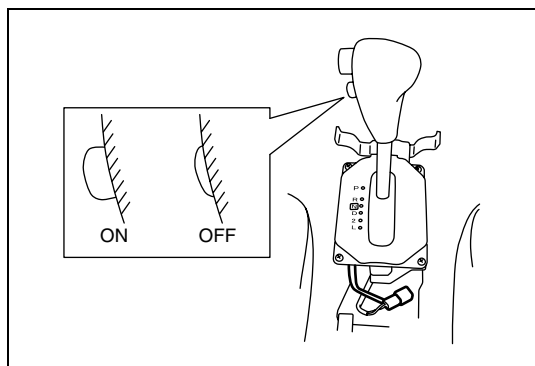
Reverse removal procedure noting the following.

- Connect TCM connectors securely.
- If the vehicle is equipped with air bag system, be sure to enable air bag system after TCM is back in place. Refer to “Enabling Air Bag System” in Section 10B.

## Learning control initialization



- 1) Remove glove box (1) from instrument panel.
- 2) Using service wire, connect diagnosis switch terminal (3) and ground terminal (4) of blue monitor connector (2).



- 3) Turn ignition switch ON leaving engine OFF.
- 4) Turn O/D off switch OFF and confirm "O/D OFF" light in combination meter does not light.

- 5) Shift selector lever to "L" range.
- 6) With brake pedal and accelerator pedal depressed fully, repeat turning O/D off switch to ON position and vice versa for 5 times within 10 seconds to complete memory initialization.

### NOTE:

When initialization is achieved, "O/D OFF" lamp neither light nor flash unless diagnosis switch terminal is once disconnected from ground terminal of monitor connector. If initialization is failed, re-try initializing procedure.

## Brief learning

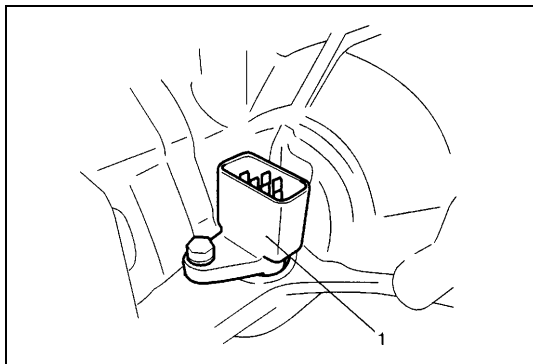
This method is effective to be learned quickly when learned condition which is suitable for automatic transaxle is necessary immediately. For example, at the time when shift shock at downshifting 4th gear to 3rd gear or any upshifting become worse than shift shock before replacing TCM.

- 1) Turn ignition switch ON, turn O/D off switch OFF and confirm "O/D OFF" light in combination meter does not light.
- 2) Start engine and raise transaxle fluid up to normal operating temperature.
- 3) Start vehicle and repeat kickdown of 4th gear to 3rd gear for 10 times each in the vehicle speed ranges shown below.
  - – 40 km/h ( – 25 mile/h)
  - 40 – 50 km/h (25 – 31 mile/h)
  - 50 – 65 km/h (31 – 41 mile/h)
  - 65 – 90 km/h (41 – 56 mile/h)
  - 90 – km/h (56– mile/h) if necessary
- 4) Referring to "Automatic Gear Shift Diagram" in this section, perform upshifting of 3rd gear to 4th gear for 10 times each in the throttle opening ranges shown below.
  - 0 – 20 %
  - 20 – 40 %
  - 40 – 60 %
  - 60 – 80 % if necessary
  - 80 – 100 % if necessary
- 5) At "D" range, perform upshifting for 10 times each in the vehicle speed ranges shown below.
  - 20 – 55 km/h (12 – 34 mile/h)
  - 55 – 70 km/h (34 – 44 mile/h)
  - 70 – 90 km/h (44 – 56 mile/h)
  - 90 – 125 km/h (56 – 78 mile/h) if necessary
  - 125 – km/h (78 – mile/h) if necessary

## Transmission Fluid Temperature Sensor

### INSPECTION

- 1) Disconnect negative cable at battery.
- 2) Lift up vehicle.
- 3) Remove engine under covers.
- 4) With engine is cool, remove drain plug and drain A/T fluid.
- 5) Install drain plug. Refer to "Fluid Change" in this section.
- 6) Remove A/T oil pan.
- 7) Remove oil strainer assembly.
- 8) Remove valve body assembly referring to "Unit Disassembly" in this section.

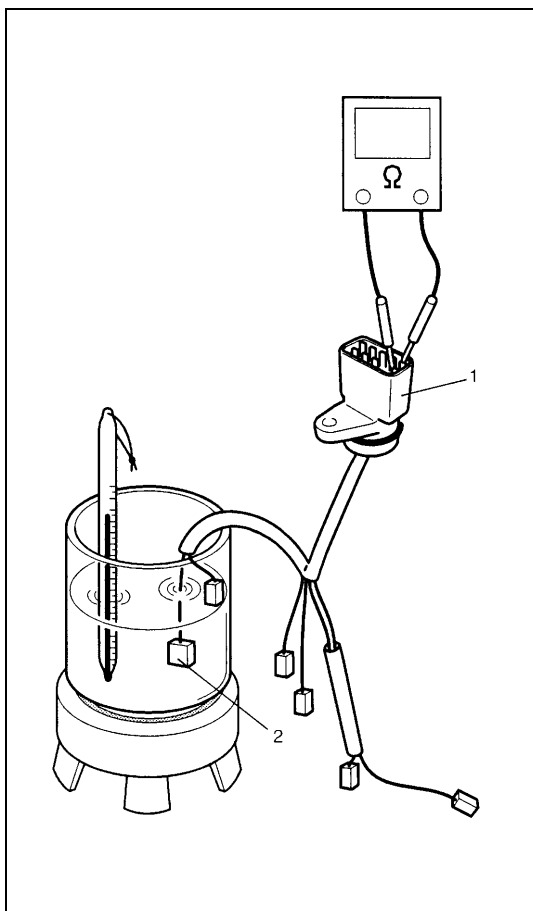


#### CAUTION:

**When pulling solenoid wire harness out of transaxle case, take care not to damage transmission fluid temperature sensor at narrow exit of case.**

**Careless sensor treatment might cause sensor malfunction.**

- 9) Remove solenoid wire harness (1).



- 10) Warm up transmission fluid temperature sensor (2). Check resistance between terminals of valve body harness connector (1). Thus make sure its resistance decrease as its temperature increase.

#### Transmission fluid temperature sensor resistance

Temperature	Resistance
10 °C (50 °F)	5.8 – 7.1 kΩ
110 °C (230 °F)	231 – 263 Ω
145 °C (293 °F)	105 – 117 Ω

## INSTALLATION

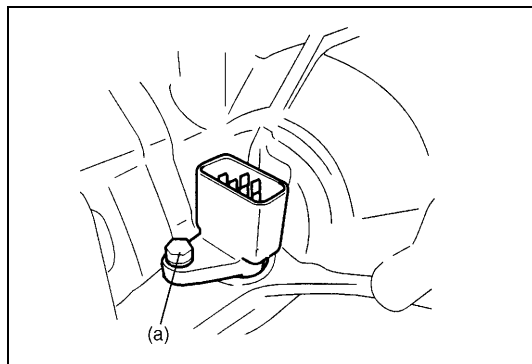
Reverse removal procedure to install solenoid wire harness and valve body assembly noting the following points.

- For details of valve body assembly and their connectors installation, refer to “Unit Assembly” in this section.
- For details of A/T oil pan installation, refer to “Unit Assembly” in this section. Use new oil pan gasket.
- Tighten valve body harness connector bolt to specified torque.

### Tightening torque

#### Valve body harness connector bolt

(a) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)



- Pour A/T fluid and check fluid level according to procedure described in “Fluid Change” in this section.
- Check for fluid leakage after warming up A/T.

## Differential Side Oil Seal

### REPLACEMENT

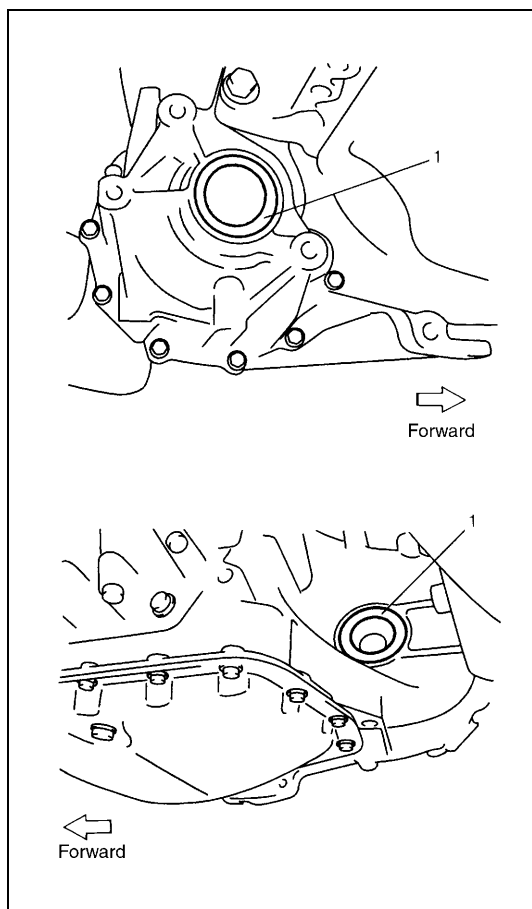
- 1) Lift up vehicle and drain automatic transaxle fluid.
- 2) Remove drive shaft joints from differential gear of transaxle. Refer to Section 4A for procedure to disconnect drive shaft joints.  
For differential side oil seal removal, it is not necessary to remove drive shafts from steering knuckle.

### NOTE:

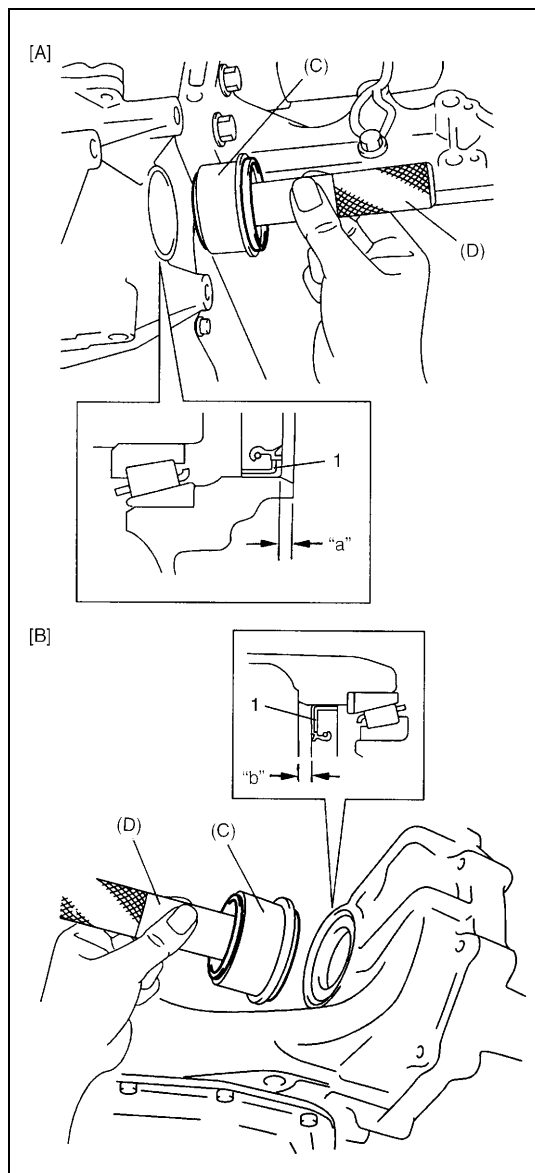
**For 4WD model, transaxle is not equipped with differential right side oil seal.**

- 3) Remove differential side oil seal(s) (1) by using screw driver or like.
- 4) Apply grease to new differential side oil seal lip(s) (1).

**Grease 99000-25030**







5) Install new differential side oil seals (1) by using special tool.

**Special tool**

(C) : 09944-88220

(D) : 09924-74510

**Differential side oil seal installing depth**

Right side "a" : 2.6 – 3.6 mm (0.10 – 0.14 in)

Left side "b" : 3.8 – 4.8 mm (0.15 – 0.19 in)

[A] : Right side for 2WD model only
-------------------------------------

[B] : Left side
-----------------

6) Install drive shaft referring to Section 4A.

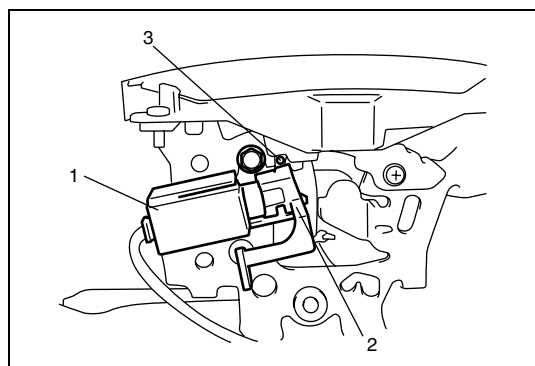
7) Pour A/T fluid referring to "Fluid Change" in this section.

## Shift Lock Solenoid, If Equipped

1) Remove parking brake cover and console box.

2) Replace shift lock solenoid (1).

3) Install covers as they were.



**NOTE:**

- Check that detent pin (3) is locked at "P" position by solenoid cam (2).
- Check to confirm that lock plate (2) is pulled in when ignition key is turned to "ON" and brake pedal is depressed, so allowing detent pin (3) to be pushed down.

## Brake Interlock System, If Equipped

### Shift lock solenoid control

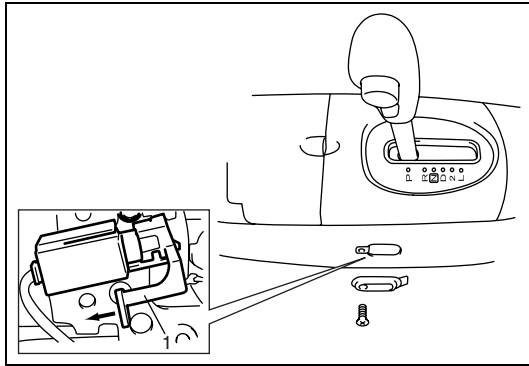
This system consists of shift lock solenoid control system and interlock cable control system.

The shift lock solenoid control system is so designed that the selector lever can not be shifted from "P" range position unless ignition switch is turned ON and the brake pedal is depressed.

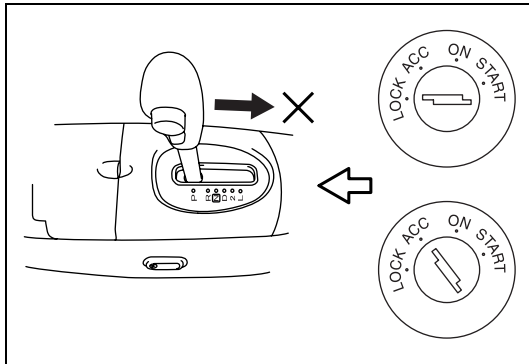
And interlock cable control system is so designed that select lever cannot be shifted from "P" range position unless ignition switch is turned to "ACC" or "ON" position. Also, ignition key cannot be pulled out of key slot unless selector lever is in "P" range.

### Shift lock solenoid manual release

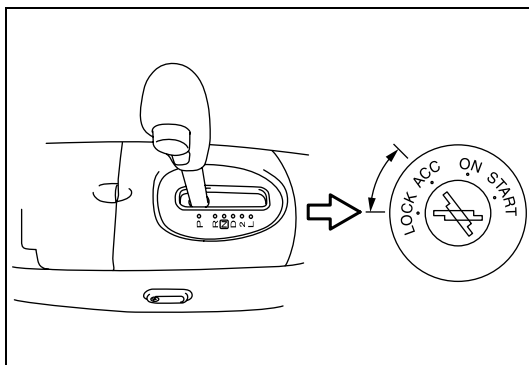
Without using brake pedal, shift lock plate be moved by pushing shift lock solenoid plate (1) with screw driver or like through hole (2). To shift selector lever from "P" range to any other position, turn ignition switch to "ACC" or "ON" position.



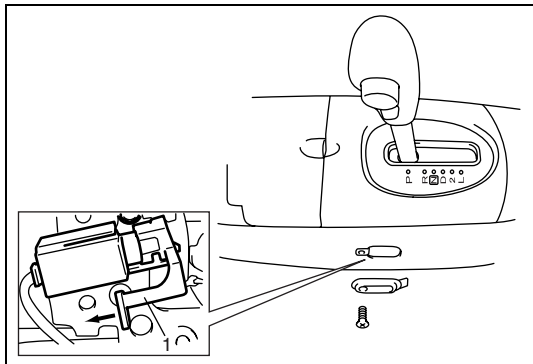
## INSPECTION



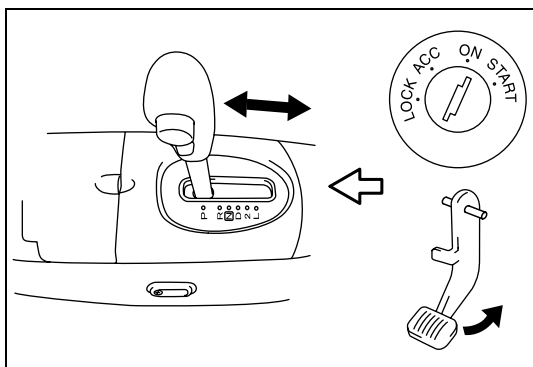
- 1) Check that selector lever cannot be moved to any other range from "P" range position when ignition switch key is at "ACC" position, at "LOCK" position or removed from keyhole of ignition switch, or brake pedal is not depressed.



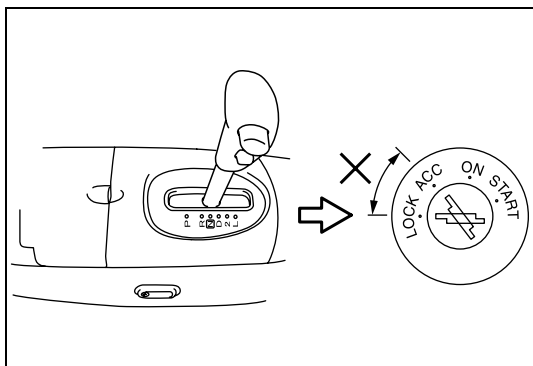
- 2) Shift selector lever to "P" range position, release knob button and check for the following.
  - Ignition key can be turned between "LOCK" and "ACC" positions back and forth and also it can be removed from ignition switch.



- With shift lock solenoid cam (1) moved in arrow direction and ignition key turned to “ACC” position, selector lever can be shifted from “P” range position to any other range.
- With shift lock solenoid cam (1) moved in arrow direction and ignition key turned to “LOCK” position, selector lever can not be shifted from “P” range position to any other range.



- When ignition switch is turned “ON” and brake pedal is depressed, selector lever can be shifted from “P” range position to any other range.



- 3) With ignition lever shifted to any position other than “P” range, check that ignition key cannot be turned “LOCK” position and it cannot be removed from ignition switch unless it is at “LOCK” position.

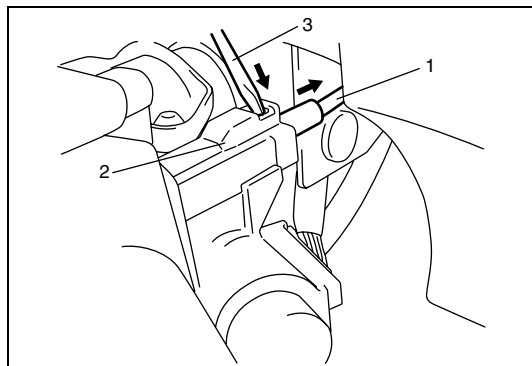
## Key Interlock Cable, If Equipped

### NOTE:

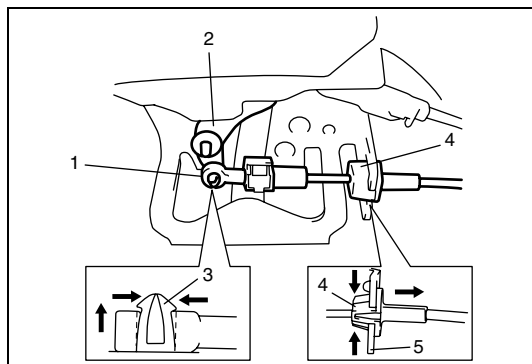
**Don't bend interlock cable excessively when removing and installing it, or system will not operate correctly.**

### REMOVAL

- 1) If the vehicle is equipped with air bag system, disconnect negative cable at battery and disable air bag system, referring to “Disabling Air Bag Systems” in Section 10B.
- 2) Remove steering column cover.
- 3) Turn ignition switch to “ACC” position.

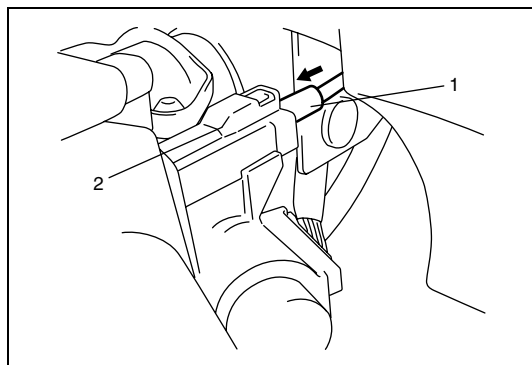


- 4) Pull out key interlock cable (1) from key cylinder cover (2) while pressing checkhook with slotted screwdriver (3) or the like.

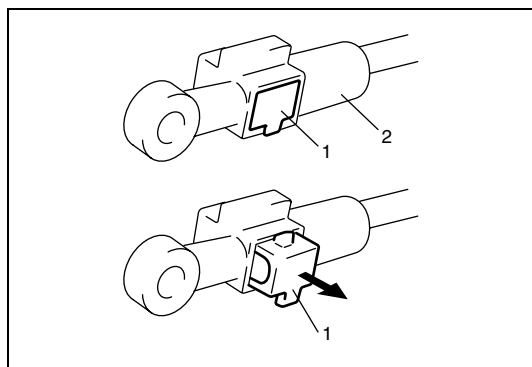


- 5) Turn ignition switch to "LOCK" position.
- 6) Remove parking brake cover and console box.
- 7) Detach cable end (1) from interlock cam (2) while pressing claws (3) of interlock cam boss.  
At this time, be careful not to cause damage to its claws.  
Detach cable casing cap (4) from selector bracket (5) while pressing checkhook.
- 8) Remove interlock cable.

## INSTALLATION



- 1) Lay interlock cable to its original cabling route.
- 2) Turn ignition switch to "ACC" position.
- 3) Insert cable casing cap (1) into key cylinder cover (2) securely.

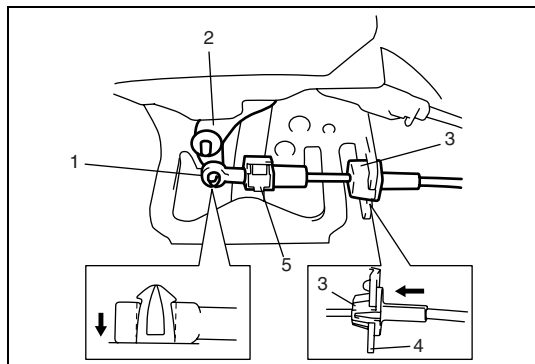


- 4) Pull out lock button (1) of selector side cable end (2).

- 5) Shift selector lever to "N" position.

**NOTE:**

If selector lever is in “P” position, shift selector lever referring to “Shift Lock Solenoid Manual Release” in this section.



- 6) Install cable casing cap (3) to selector bracket (4).
- 7) Connect cable end (1) to interlock cam (2) with ignition switch turned to “ACC” position.
- 8) Drive lock button (5) in cable end until it locks cable expansion and contraction.
- 9) With selector lever set at “P” position, turn ignition key to “ACC” position and then check for the following conditions.
  - With knob button released, ignition key can be turned from “ACC” position to “LOCK” position.
  - With knob button pressed, ignition key cannot be turned from “ACC” position to “LOCK” position.
- 10) Install steering column cover.
- 11) If the vehicle is equipped with air bag system, connect negative cable at battery and enable air bag system, referring to “Enabling Air Bag System” in Section 10B.

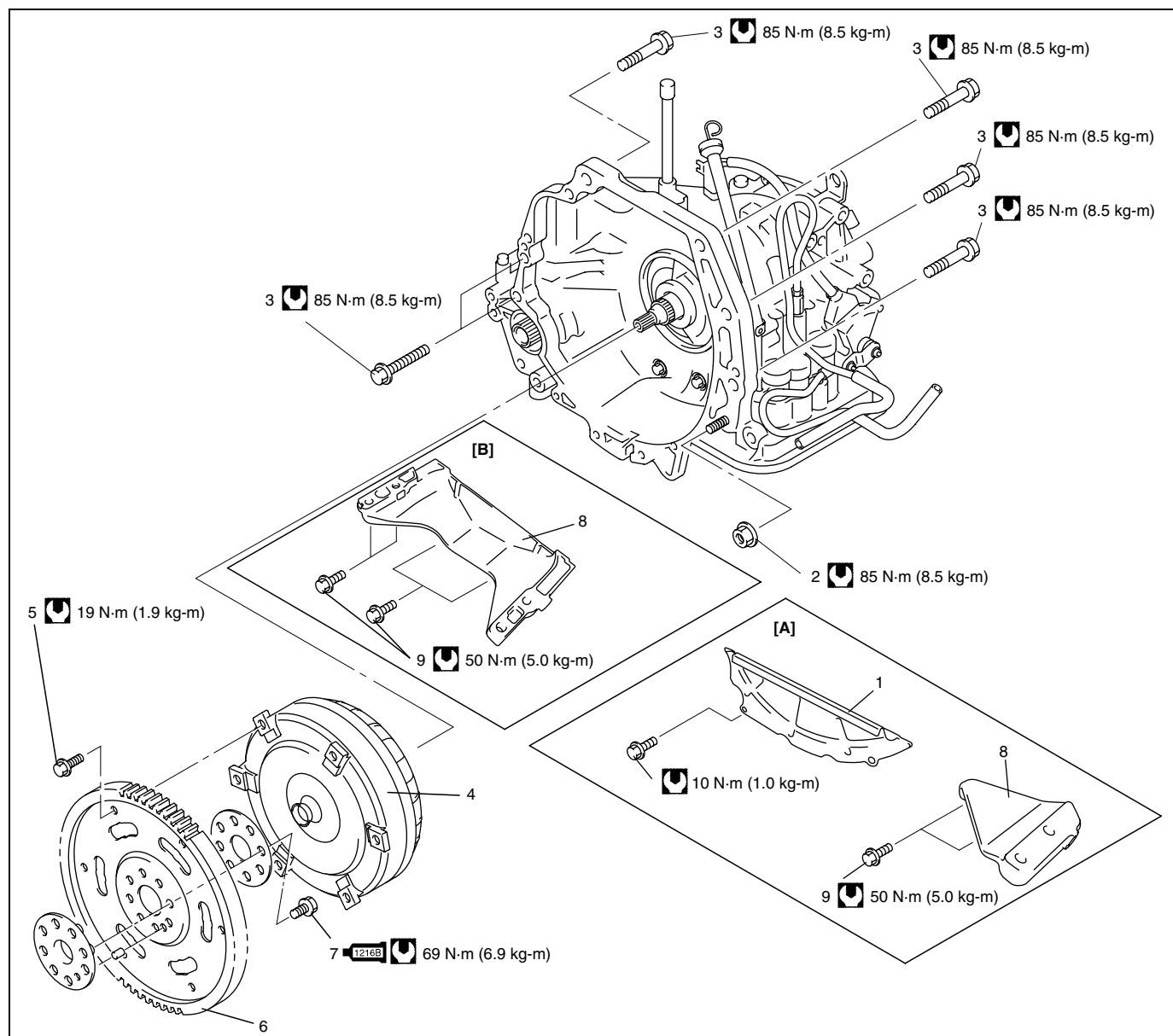
## Automatic Transmission Assembly

### CAUTION:

When transaxle have been replaced, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized referring to “Learning Control Initialization” in this section.

Neglecting this initialization may cause excessive shift shock.

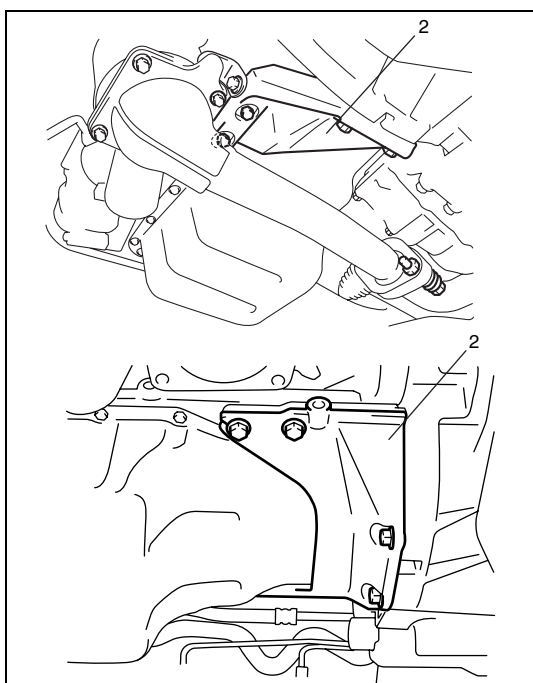
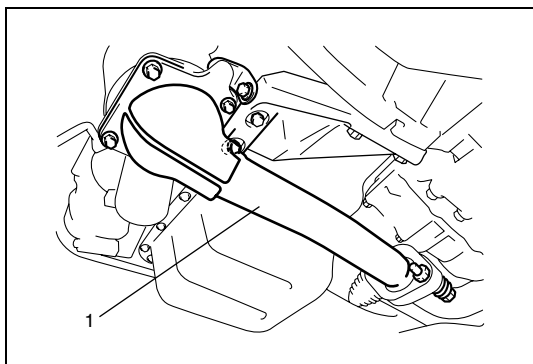
### Components



1. Transaxle housing lower plate	5. Drive plate to torque converter bolt	9. Lower stiffener bolt
2. Transaxle and engine fastening nut	6. Drive plate	[A] 4WD model
3. Transaxle and engine fastening bolt	7. Drive plate bolt : Apply sealant 99000-31230 to thread.	[B] 2WD model
4. Torque converter	8. Lower stiffener	Tightening torque

**DISMOUNTING**

- 1) Disconnect negative cable at battery and transaxle.
- 2) Disconnect connector for valve body harness, transmission range sensor, input shaft speed sensor and output shaft speed sensor/VSS.
- 3) Undo wiring harness clamps.
- 4) Disconnect select cable from transaxle.
- 5) Remove water intake pipe bolts.
- 6) Remove transaxle and engine fastening bolts.
- 7) Remove starting motor.
- 8) Support engine to prevent it from being declined excessively at removal of mountings.
- 9) Check around transaxle for any other parts required to be removed or disconnected for dismounting of transaxle and remove or disconnect whatever necessary.
- 10) Drain automatic transaxle fluid.
- 11) Remove engine under covers.
- 12) Disconnect fluid cooler hoses.
- 13) For 2WD model, remove mounting member.
- 14) Remove exhaust No.1 pipe (1).

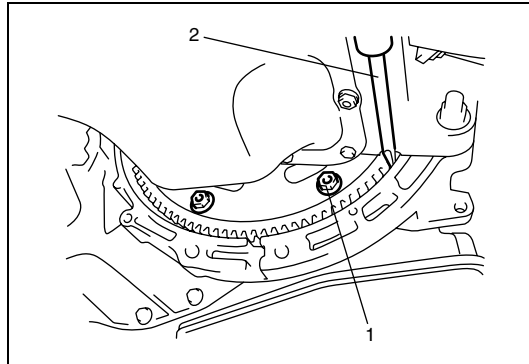


- 15) Remove lower stiffener (2).

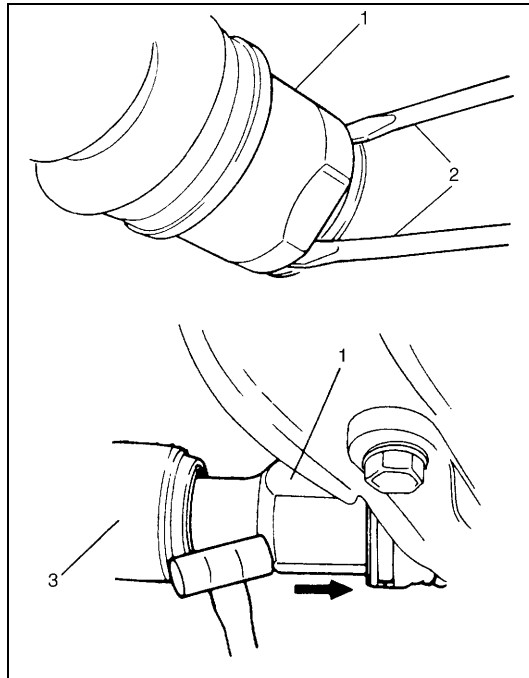
[A] 4WD model
---------------

[B] 2WD model
---------------

- 16) For 4WD model, remove transaxle housing lower plate.



- 17) Holding drive plate with a flat head rod or the like (2) against rotation, remove drive plate to torque converter bolts (1).



- 18) For 4WD model, remove transfer referring to Section 7D.
- 19) Using flat head rod or the like (2), pull out drive shaft joints (1) at differential side so as to release snap ring fitting. For right side of 4WD model, using plastic hammer, drive out drive shaft joint (1) so as to release snap ring fitting of joint spline at intermediate shaft of transfer (3).

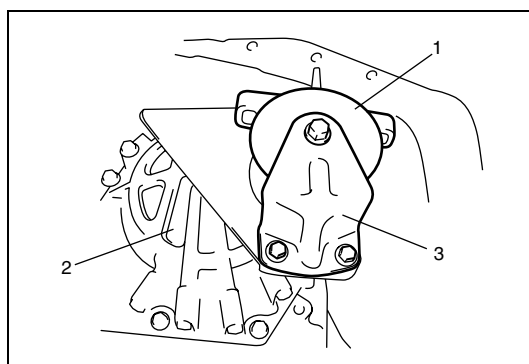
- 20) Remove ball stud bolts and lock nuts from both knuckles and detach suspension arms and then pull out both drive shaft joints from differential.

- 21) For 2WD vehicle, remove engine rear mounting (1) with its brackets (2).

- 22) Remove transaxle and engine fastening bolts and nut.

- 23) Support transaxle with transmission jack.

- 24) Remove engine LH mounting (1) and its bracket (3).



2. Transaxle



**WARNING:**

**Be sure to keep transaxle with torque converter horizontal or facing up through out the work. Should it be tilted with torque converter down, converter may fall off and cause personal injury.**

- 25) Remove transaxle with torque converter from engine compartment.

## REMountING

For remounting, reverse dismounting procedure. Use following specified torques and note points listed below.

### Tightening torque

#### Transaxle and engine fastening bolts and nut

(a) : 85 N·m (8.5 kg-m, 61.5 lb-ft)

#### Drive plate to torque converter bolts

(b) : 19 N·m (1.9 kg-m, 14.0 lb-ft)

#### Steering knuckle ball stud lock nuts

(c) : 60 N·m (6.0 kg-m, 43.5 lb-ft)

#### Exhaust No.1 pipe to manifold bolts

(d) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

#### Exhaust No.2 pipe to No.1 pipe bolts

(e) : 43 N·m (4.3 kg-m, 31.5 lb-ft)

#### Engine front mounting nuts

(f) : 45 N·m (4.5 kg-m, 32.5 lb-ft)

#### Engine rear mounting nuts

(g) : 45 N·m (4.5 kg-m, 32.5 lb-ft)

#### Mounting member bolts

(h) : 55 N·m (5.5 kg-m, 40.0 lb-ft)

#### Suspension frame bolts

(i) : 90 N·m (9.0 kg-m, 65.0 lb-ft)

#### Engine rear mounting No.2 bracket M10 bolt

(j) : 55 N·m (5.5 kg-m, 40.0 lb-ft)

#### Engine rear mounting No.2 bracket M8 bolt

(k) : 25 N·m (2.5 kg-m, 18.0 lb-ft)

#### Engine LH mounting No.1 bolt

(l) : 55 N·m 5.5 kg-m, 40.0 lb-ft)

#### Engine LH mounting No.2 bolts

(m) : 55 N·m (5.5 kg-m, 40.0 lb-ft)

#### Lower stiffener bolts

(n) : 50 N·m (5.0 kg-m, 36.5 lb-ft)

#### Ground cable bolt

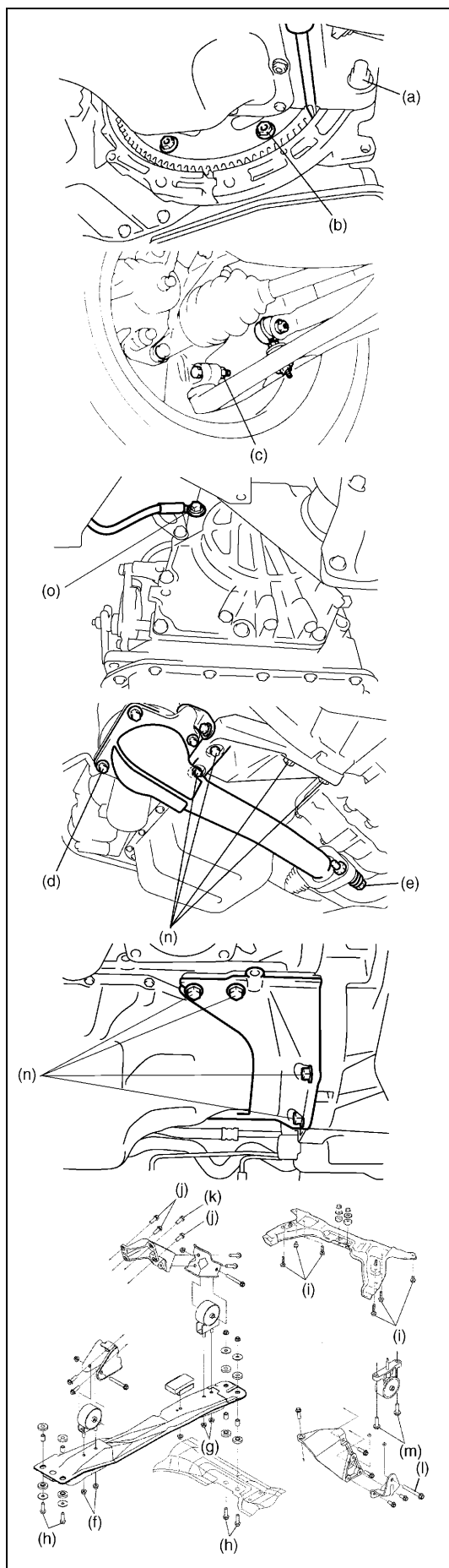
(o) : 23 N·m (2.3 kg-m, 17.0 lb-ft)

- Push in each drive shaft joint fully so that snap ring engages with differential gear or intermediate shaft of transfer.

### CAUTION:

- Care should be taken not to scratch oil seal lip with drive shaft while inserting drive shaft joint into transaxle.
- Do not hit drive shaft joint with hammer when installing it.

- Set each clamp for wiring securely.
- Adjust select cable.
- Refill fluid and adjust its level at normal operating temperature.
- Check that engine and transaxle function properly.
- Make sure that there is no evidence of fluid leakage.



## Unit Repair

When repairing automatic transaxle, it is necessary to conduct the on-vehicle test to investigate where the cause of the trouble lies first.

Then whether overhaul should be done or not is determined. If the transaxle is disassembled without such preliminary procedure, not only the cause of the trouble would be unknown, but also a secondary trouble may occur and often time would be wasted.

### Precautions

As the automatic transaxle consists of high precision component, the following cautions should be strictly observed when handling its parts in disassembly and reassembly.

- Disassembling valve body assembly is prohibited essentially. However, a few parts can be disassembled. When disassembling valve body component parts, confirm whether their parts are allowed to disassemble or not referring to "Valve Body Assembly" in this section.
- When component part of forward clutch, direct clutch, 2nd brake and/or O/D and 2nd coast brake, namely clutch disc, brake disc, retaining plate and/or separator plate, have been replaced, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized referring to "Learning Control Initialization" in this section.
- Make sure to wash dirt off from the transaxle so that no such dirt will enter the transaxle during dismounting and remounting.
- Select a clean place free from dust and dirt for overhauling.
- Place a rubber mat on the work bench to protect parts from damage.
- Work gloves or shop cloth should not be used. Use a nylon cloth or a paper towel.
- When separating the case joint, do not pry with a screwdriver or such but tap with a plastic hammer lightly.
- Make sure to wash dirt off from the transaxle so that no such dirt will enter the transaxle during disassembly and reassembly.
- Wash the disassembled parts in ATF (Automatic Transaxle Fluid) or kerosene and confirm that each fluid passage is not clogged by blowing air into it. But do not use kerosene to wash the discs, resin washers and rubber parts. Take care not to allow ATF or kerosene to get on your face, etc.
- Replace each gasket, oil seal and O-ring with a new one.
- Apply ATF to sliding or rotating parts before reassembly.
- A new discs should be soaked in ATF at least 2 hours before use.

## Part Inspection and Correction Table

Part	Inspect for	Correction
Casted part, machined part	Small flaw, burr	Remove with oil stone.
	Deep or grooved flaw	Replace part.
	Clogged fluid passage	Clean with air or wire.
	Flaw on installing surface, residual gasket	Remove with oil stone or replace part.
	Crack	Replace part.
Bearing	Unsmooth rotation	Replace.
	Streak, pitting, flaw, crack	Replace.
Bushing, thrust washer	Flaw, burr, wear, burning	Replace.
Oil seal, gasket	Flawed or hardened seal ring	Replace.
	Worn seal ring on its periphery or side	Replace.
	Piston seal ring, oil seal, gasket, etc.	Replace.
Gear	Flaw, burr	Replace.
	Worn gear tooth	Replace.
Splined part	Burr, flaw, torsion	Correct with oil stone or replace.
Snap ring	Wear, flaw, distortion	Replace.
	No interference	Replace.
Thread	Burr	Replace.
	Damage	Replace.
Spring	Settling, sign of burning	Replace.
Friction plate	Wear, burning, distortion, damaged claw	Replace.
Separator plate, retaining plate	Wear, burning, distortion, damaged claw	Replace.
Sealing surface where lip contacts	Flaw, rough surface, stepped wear, foreign material	Replace.

## Unit Disassembly

**CAUTION:**

- Thoroughly clean transaxle exterior before overhauling it.
- Keep working table, tools and hands clean while overhauling.
- Use special care to handle aluminum parts so as not to damage them.
- Do not expose removed parts to dust. Keep them always clean.











### Components

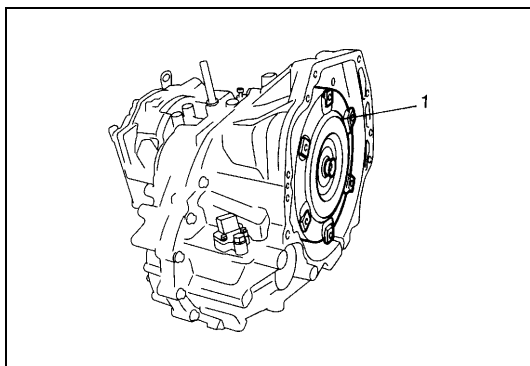
**NOTE:**

Oil pump assembly, direct clutch assembly, forward and reverse clutch assembly, 2nd brake piston assembly, O/D and 2nd coast brake piston and return spring, differential assembly, countershaft assembly and valve body assembly are not shown in figure below.

For the detail of these components, refer to “Disassembly/Assembly of Subassembly” in this section.

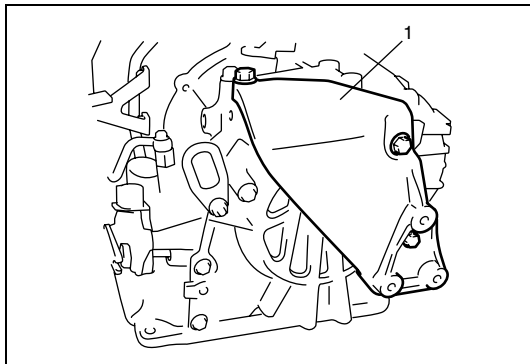


1. Torque converter	34. A/T fluid drain plug	67. 2nd brake separator plate
 2. Torque converter housing : Apply sealant 99000-31230 to mating surface to transaxle case.	35. Manual select lever	68. 2nd brake return spring subassembly
 3. Oil strainer assembly : Replace oil strainer when overhauling.	36. Lock washer	69. Front sun gear thrust bearing race
4. Parking lock pawl shaft	37. Transmission range sensor	70. Front planetary sun gear
5. Parking lock pawl	38. Cooler check valve	71. Planetary gear thrust bearing
6. Parking lock pawl return spring	39. Spring	72. One-way clutch No.1 assembly
7. Parking lock pawl rod	40. Transaxle case plug	73. Rear planetary sun gear subassembly
8. Parking lock pawl bracket	41. Fluid filler tube	74. Rear sun gear thrust bearing race
9. Manual detent spring	42. Fluid level gauge	75. Rear sun gear thrust bearing
10. Manual valve lever	43. Fluid cooler inlet pipe	76. Forward clutch hub
11. Manual valve lever pin	44. Fluid cooler outlet pipe	77. Intermediate shaft thrust bearing race
12. Manual shift shaft	45. 2nd brake gasket	78. Intermediate shaft thrust bearing
 13. Manual shift shaft oil seal : Apply grease 99000-25030 to oil seal lip.	46. Brake drum gasket	79. 2nd brake piston snap ring
 14. Differential side oil seal : Apply grease 99000-25030 to oil seal lip.	47. Fluid outlet union	80. O/D and 2nd coast brake retaining plate snap ring
15. Torque converter housing plug	 48. Reduction drive gear nut : After tightening nut so as rotational torque of reduction drive gear to be in specified value, caulk nut securely.	81. O/D and 2nd coast brake retaining plate
16. Lubrication LH tube	49. Reduction drive gear	82. O/D and 2nd coast brake disc
17. Lubrication RH tube	50. Planetary ring gear subassembly	83. O/D and 2nd coast brake separator plate
18. Fluid reservoir RH plate	51. Breather hose	84. O/D and 2nd coast brake rear plate
19. Input shaft front thrust bearing	52. Breather union	85. Rear cover seal ring
20. Input shaft rear thrust bearing	53. Input shaft speed sensor	86. Reverse clutch drum thrust bearing
21. Input shaft rear thrust bearing race	54. Valve body harness	87. Rear cover plug
22. Direct clutch hub	55. 1st and reverse brake piston	 88. Transaxle rear cover : Apply sealant 99000-31230 to mating surface.
23. Lubrication tube clamp	56. O-ring	89. Harness bracket
24. Fluid reservoir LH plate	57. 1st and reverse brake return spring subassembly	90. Select cable clamp
25. Governor apply No.2 gasket	58. 1st and reverse brake disc	91. Governor apply No.1 gasket
26. Automatic transaxle case	59. 1st and reverse brake separator plate	92. Output shaft speed sensor/VSS
27. Accumulator piston O-ring	60. 1st and reverse brake retaining plate	93. One-way clutch outer race retainer
28. Accumulator spring	61. 1st and reverse brake snap ring	94. Select cable bracket
29. C2 accumulator piston	62. Planetary gear assembly	95. Engine mounting LH bracket
30. C1 accumulator piston	 63. Planetary carrier thrust washer : Apply grease 99000-25030 to slide contact face.	 Do not reuse.
31. B1 accumulator piston	64. One-way clutch No.2 assembly	 Apply automatic transaxle fluid.
32. Oil pan gasket	65. 2nd brake retaining plate	 Tightening torque
33. Oil pan	66. 2nd brake disc	

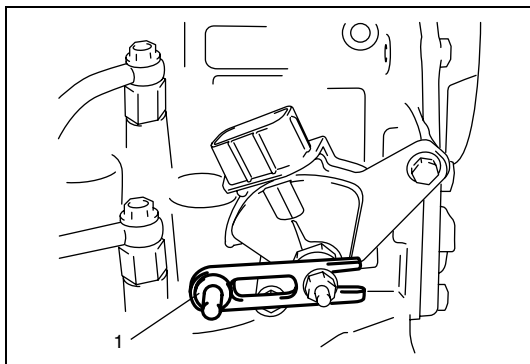
**DISASSEMBLY****CAUTION:**

**Remove torque converter as much straight as possible. Leaning it may cause to damage oil seal lip.**

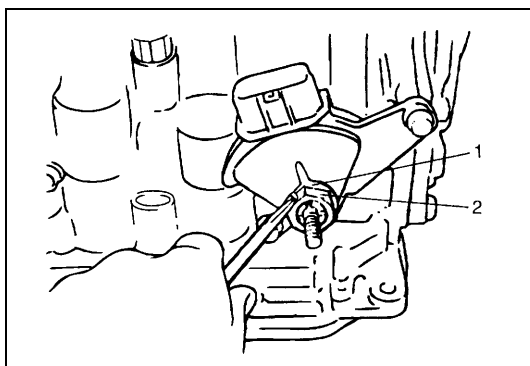
1) Remove torque converter (1).



2) Remove engine mounting LH bracket (1).

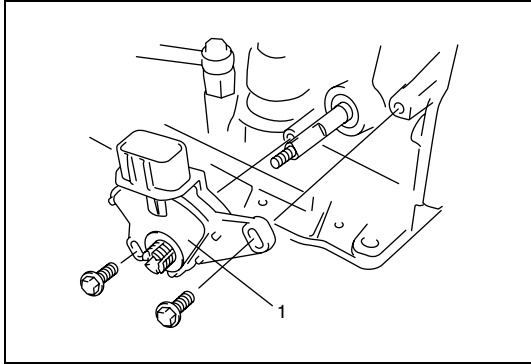


3) Remove manual select lever (1).

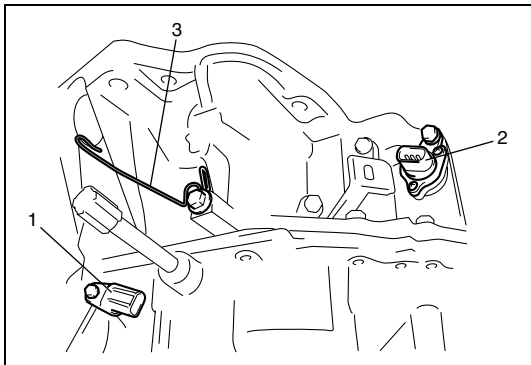


4) Uncaulk lock washer (1), then remove lock nut (2) and lock washer (1).



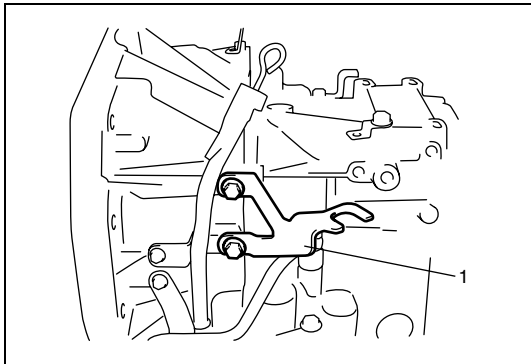


5) Remove transmission range sensor (1).

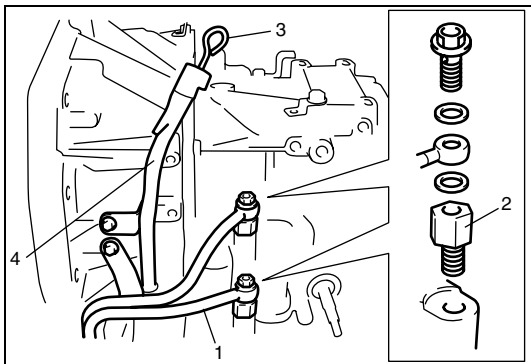


6) Remove input shaft speed sensor (1) and output shaft speed sensor/VSS (2).

7) Remove select cable clamp (3).

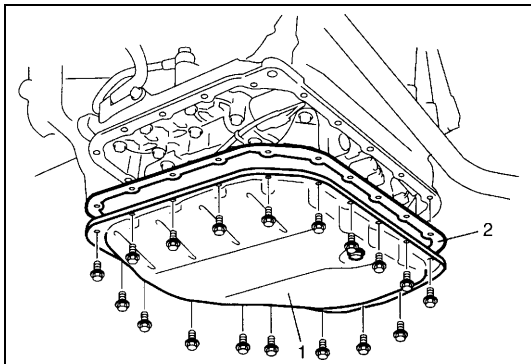


8) Remove select cable bracket (1).



9) Remove fluid cooler pipes (1) and fluid cooler pipe unions (2).

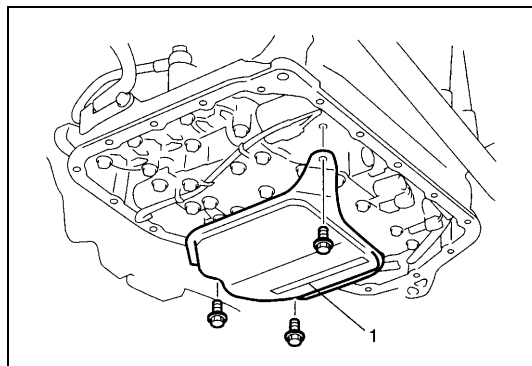
10) Remove fluid level gauge (3) and fluid filler tube (4).



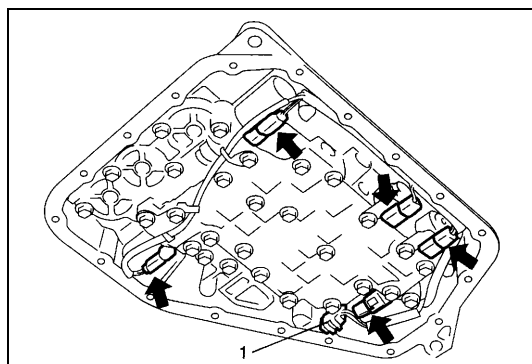
#### NOTE:

- For removal of oil pan, do not turn transaxle over as this will contaminate valve body with foreign materials in bottom of oil pan.
- When removing oil pan, tap around it lightly with plastic hammer. Do not force it off by using screwdriver or the like.

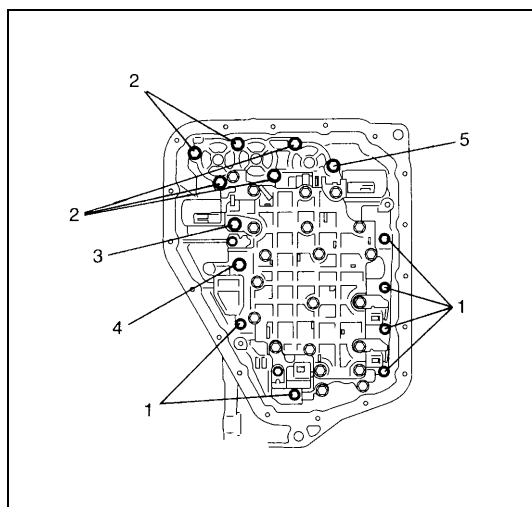
11) Remove oil pan (1) and oil pan gasket (2).



12) Remove oil strainer assembly (1).



13) Disconnect connectors from solenoid valves, and transmission fluid temperature sensor (1).



**CAUTION:**

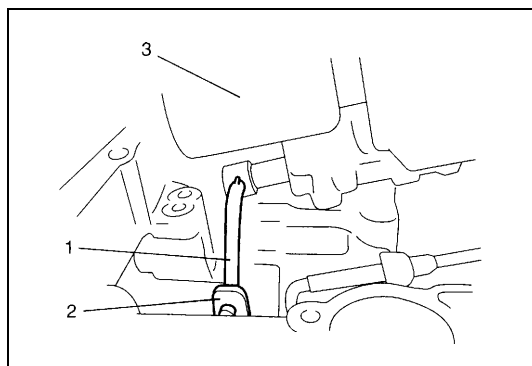
**Be careful not to let manual valve fall off when removing valve body assembly.**

**NOTE:**

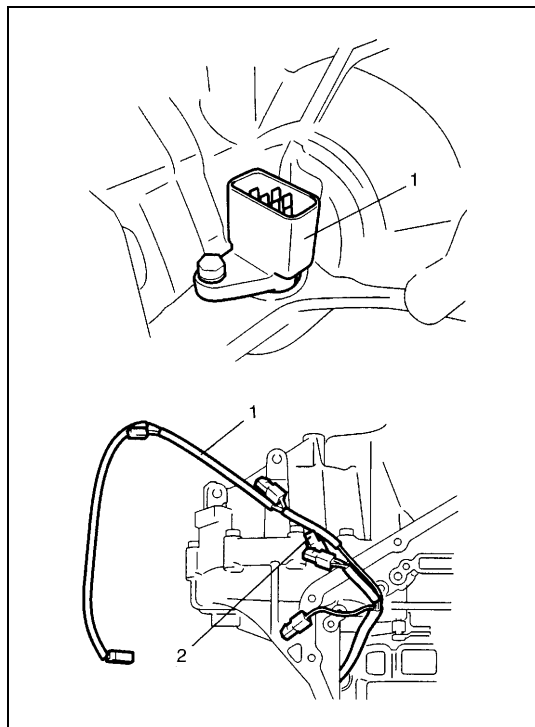
**There are five kinds of bolts fixing valve body assembly**

1. Bolt A
2. Bolt B
3. Bolt C
4. Bolt D
5. Bolt E

14) Remove valve body assembly bolts.



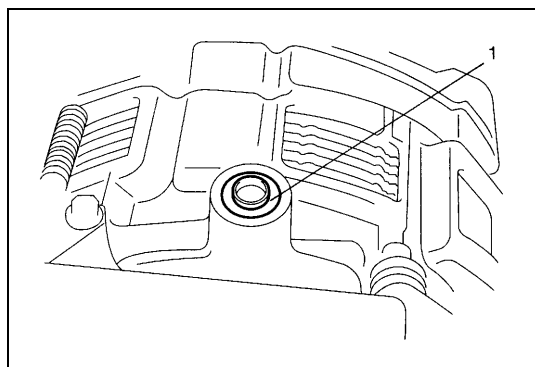
15) Remove manual valve rod (1) from manual valve lever (2), then remove valve body assembly (3).

**CAUTION:**

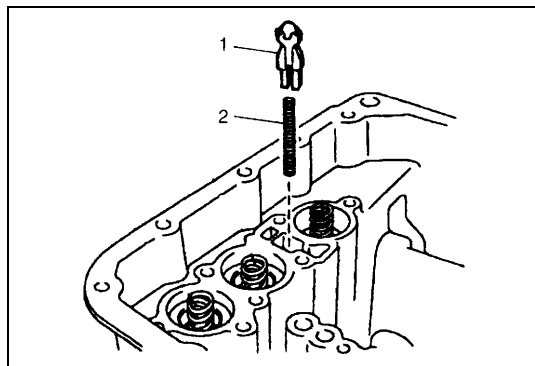
When pulling valve body harness (1) out of transaxle case, take care not to damage transmission fluid temperature sensor (2) at narrow exit of case.

Careless sensor treatment might cause sensor malfunction.

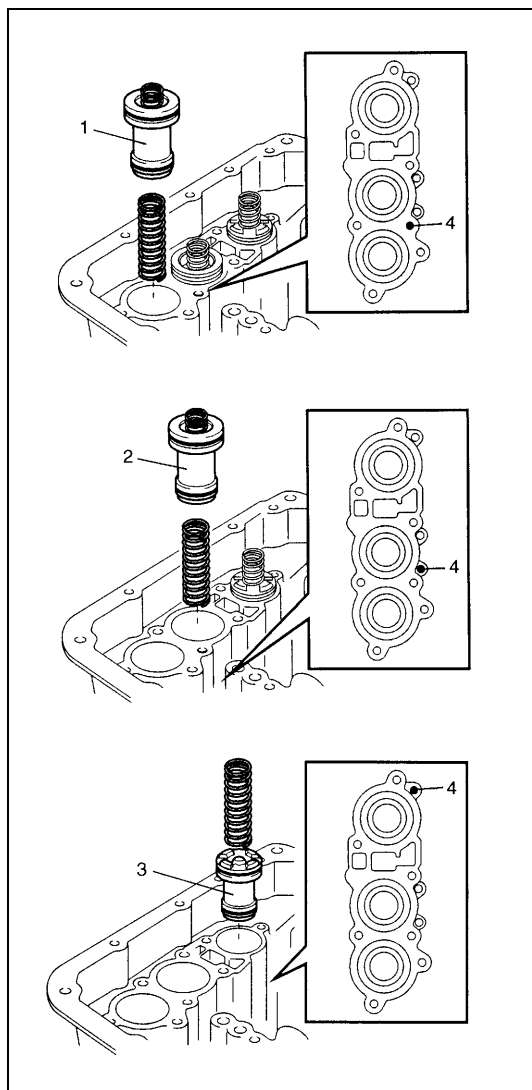
16) Remove valve body harness (1).



17) Remove governor apply No.1 gasket (1).



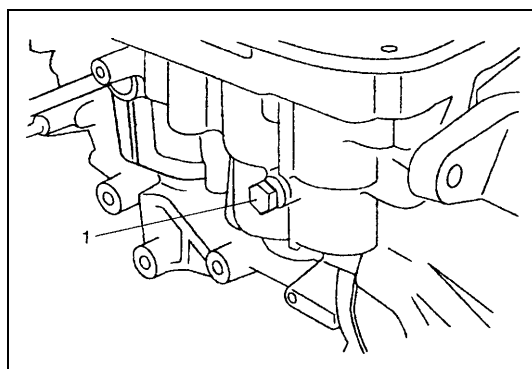
18) Remove cooler check valve (1) and spring (2).

**NOTE:**

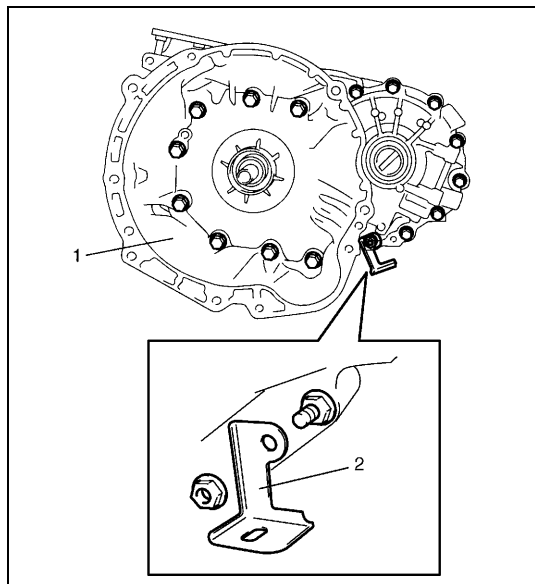
**Do not push accumulator pistons with fingers or anything before removing them. Pushing them may cause compressed fluid in accumulator to spew out of hole and get to your face and clothes.**

- 19) Remove accumulator pistons and springs.

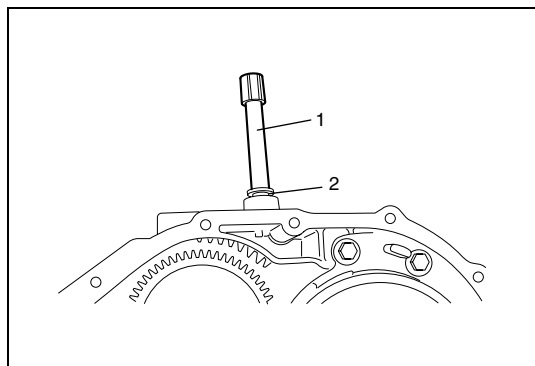
To remove C2 (1), C1 (2) and B1 (3) accumulator pistons and springs, position rag on pistons to catch each piston. To remove pistons, force low-pressure compressed air ( $1\text{kg}/\text{cm}^2$ , 15 psi, 100 kPa, max) into hole (4) as shown in figure, and pop each piston into rag.



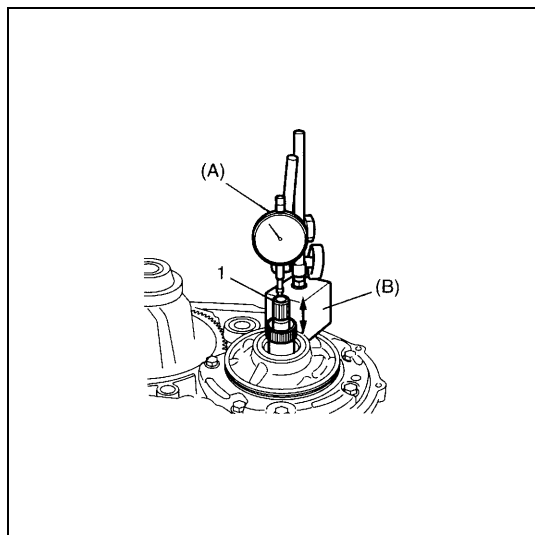
- 20) Remove transaxle case plug (1).



- 21) Remove harness bracket (2) and torque converter housing bolts.
- 22) Remove torque converter housing (1) while tapping around it lightly with plastic hammer.



- 23) Remove breather hose (1).
- 24) Remove breather union (2).



- 25) Measure input shaft thrust play.  
Apply dial gauge onto input shaft end (1) and measure thrust play of input shaft.

**Special tool**

(A) : 09900-20607

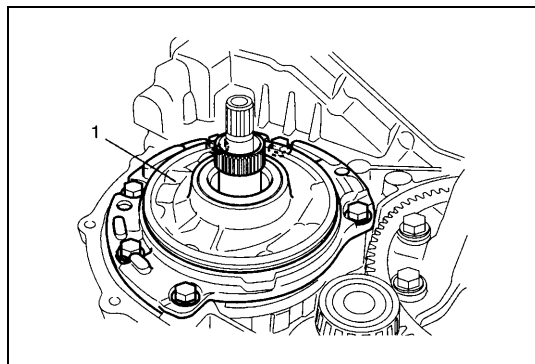
(B) : 09900-20701

**Input shaft thrust play : 0.3 – 0.9 mm (0.012 – 0.035 in.)**

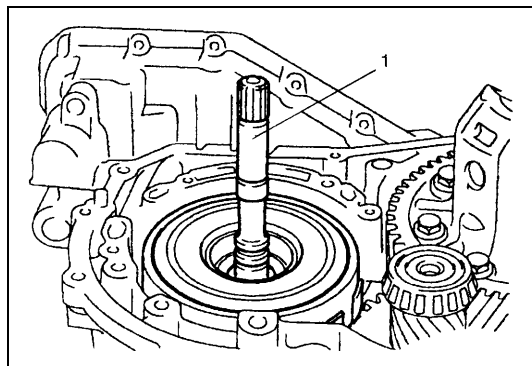
When input shaft thrust play is out of specification, select input shaft front thrust bearing with proper thickness from among the list below and replace it.

**Available input shaft front thrust bearing thickness**

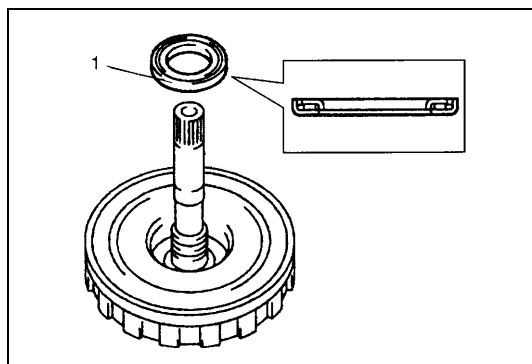
**0.8, 1.4 mm (0.032, 0.055 in.)**



- 26) Remove oil pump assembly (1).



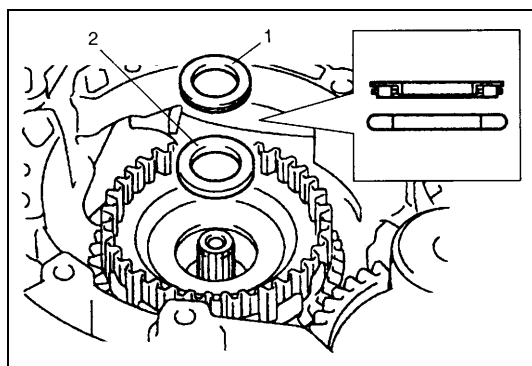
27) Remove direct clutch assembly (1).



28) Remove input shaft front thrust bearing (1).

**NOTE:**

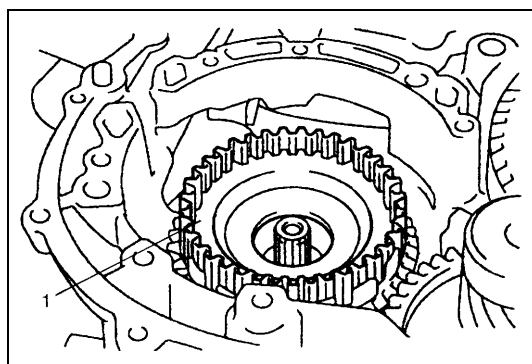
If input shaft front thrust bearing is not found, it may have been taken out with oil pump assembly.



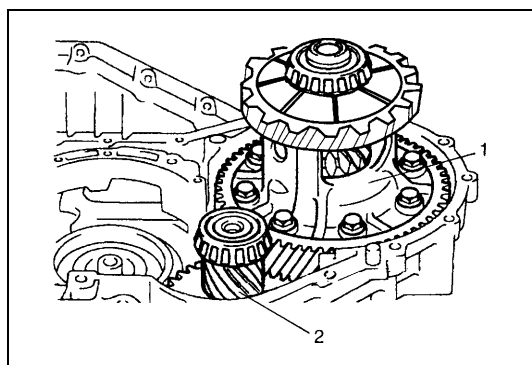
29) Remove input shaft rear thrust bearing (1) and thrust bearing race (2).

**NOTE:**

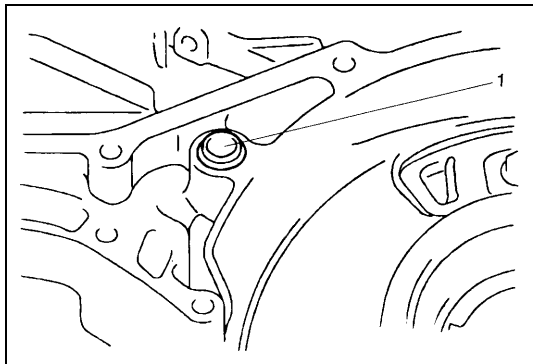
If input shaft rear thrust bearing is not found, it may have been taken out with direct clutch assembly.



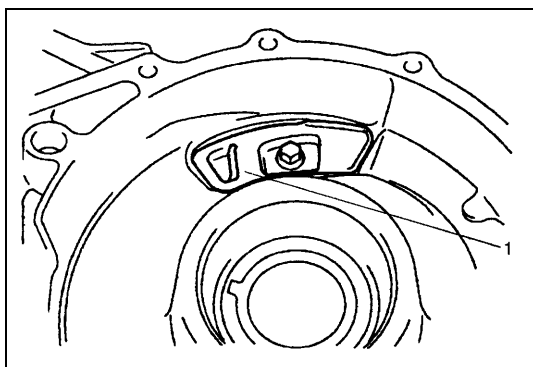
30) Remove direct clutch hub (1).



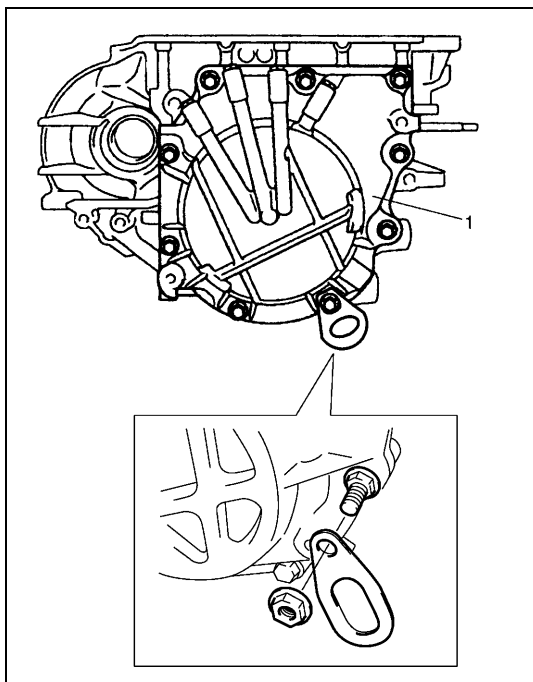
31) Remove differential assembly (1) and counter shaft assembly (2).



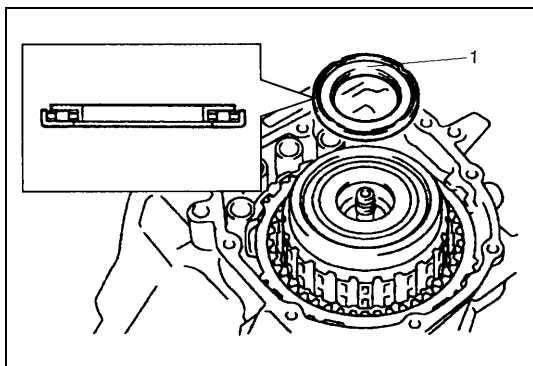
32) Remove governor apply No.2 gasket (1).



33) Remove fluid reservoir LH plate (1).



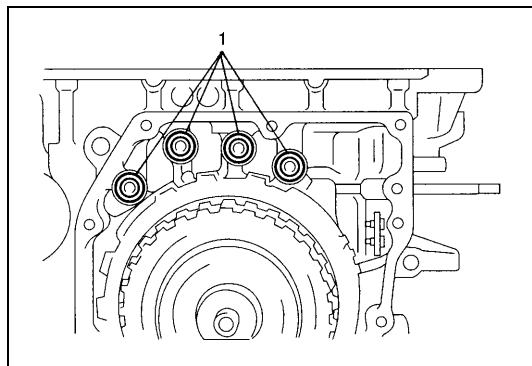
34) Turn over transaxle and remove rear cover assembly (1).



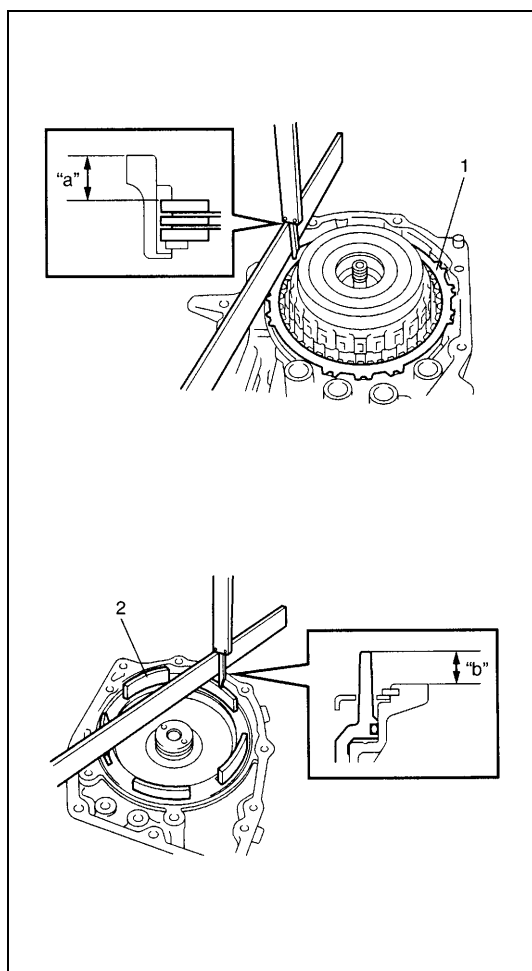
35) Remove reverse clutch drum thrust bearing (1).

**NOTE:**

If reverse clutch drum thrust bearing is not found, it may have been taken out with rear cover assembly.



36) Remove 2nd brake gasket (1).



37) Measure O/D and 2nd coast brake piston stroke.

- Measure dimension "a" from mating surface of transaxle case to O/D and 2nd coast brake rear plate (1) using straightedge and micrometer caliper.
- Measure dimension "b" from O/D and 2nd coast brake piston (2) to rear cover assembly mating surface using straightedge and micrometer caliper.
- Calculate piston stroke from measured value of dimensions "a" and "b".
- Piston stroke = "a" – "b"

#### O/D and 2nd coast brake piston stroke

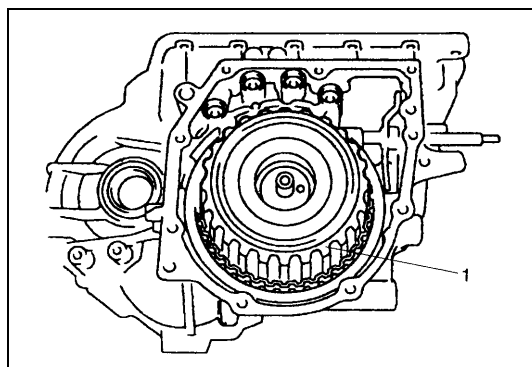
**Standard : 0.65 – 1.05 mm (0.026 – 0.041 in.)**

If piston stroke exceeds specification above, inspect and replace plates and discs.

#### CAUTION:

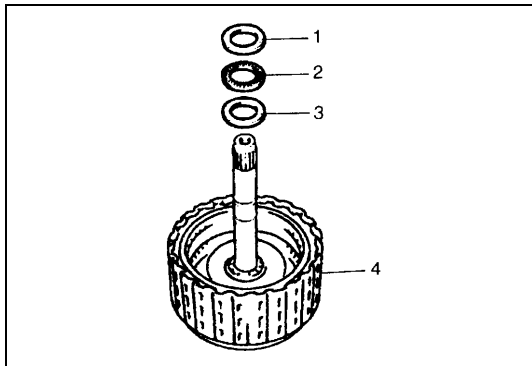
When brake disc, retaining plate, separator plate and/or rear plate of O/D and 2nd coast brake have been replaced, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized referring to "Learning Control Initialization" in this section.

Neglecting this initialization may cause excessive shift shock.



38) Remove forward and reverse clutch assembly (1).

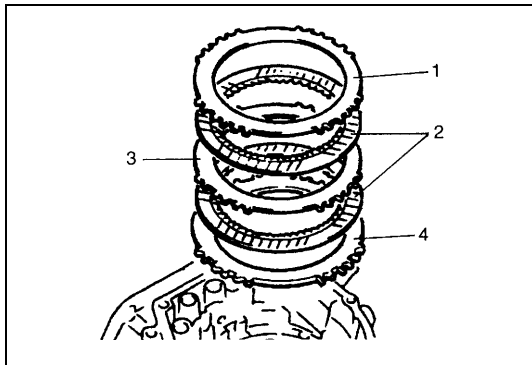




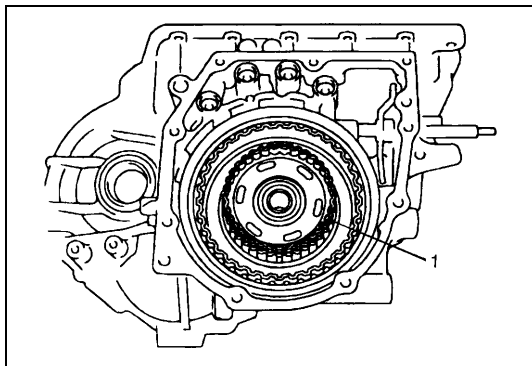
- 39) Remove intermediate shaft thrust bearing front race (1), thrust bearing (2) and rear race (3) from forward and reverse clutch assembly (4).

**NOTE:**

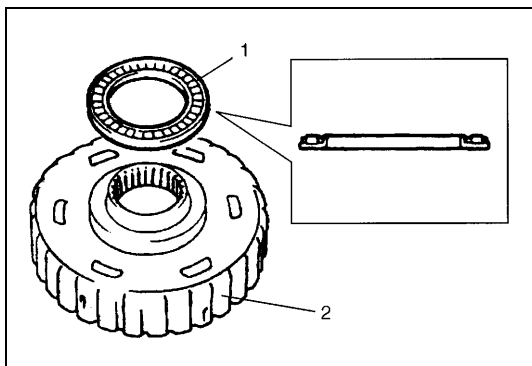
If intermediate shaft thrust bearing and/or races are not found on forward and reverse clutch assembly, they may have been left in transaxle.



- 40) Remove O/D and 2nd coast brake rear plate (1), discs (2), separator plate (3) and retaining plate (4).



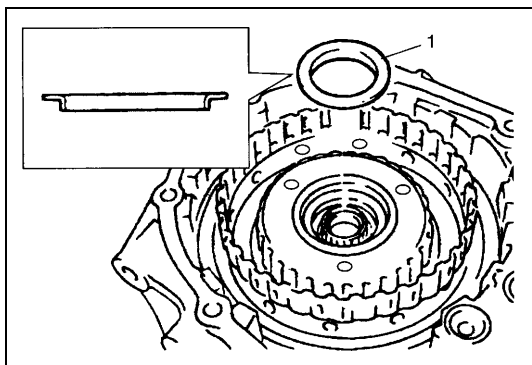
- 41) Remove forward clutch hub (1).



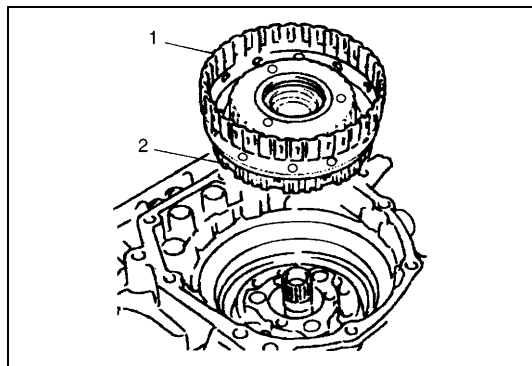
- 42) Remove rear sun gear thrust bearing (1) from forward clutch hub (2).

**NOTE:**

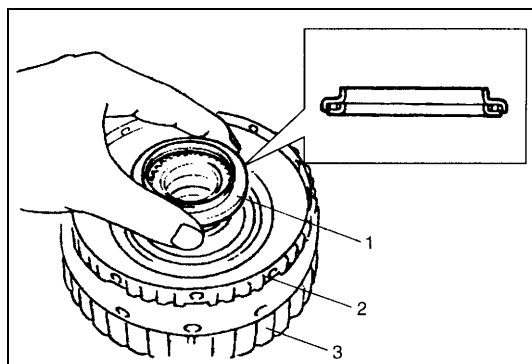
If rear sun gear thrust bearing is not found on forward clutch hub, it may have been left in transaxle.



- 43) Remove rear sun gear thrust bearing race (1).



- 44) Remove rear planetary sun gear subassembly (1) and one-way clutch No.1 assembly (2).

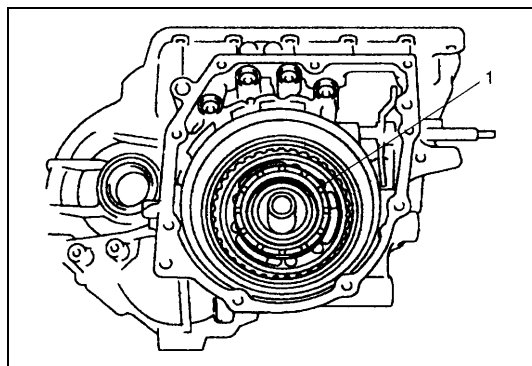


- 45) Remove planetary gear thrust bearing (1).

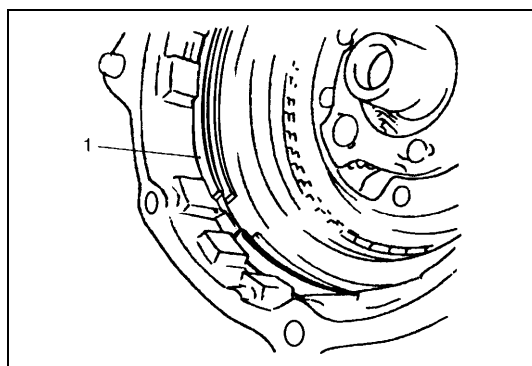
**NOTE:**

**If planetary gear thrust bearing is not found on one-way clutch No.1 assembly, it may have been left in transaxle.**

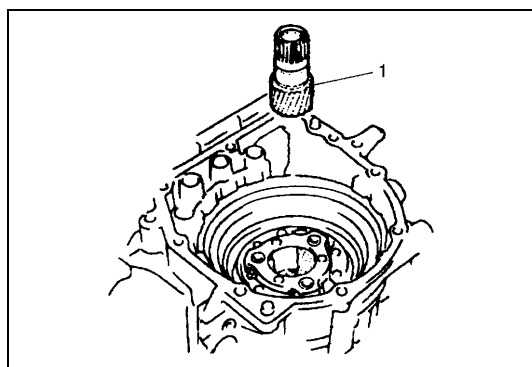
- 46) Remove one-way clutch No.1 assembly (2) from rear planetary sun gear subassembly (3).



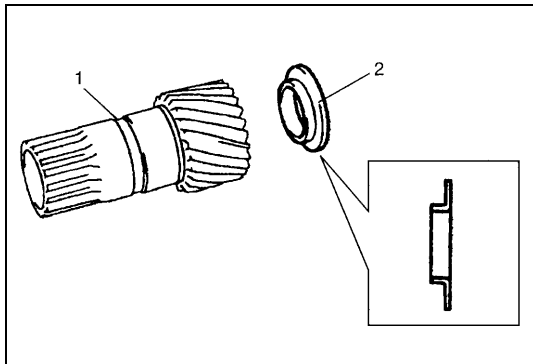
- 47) Remove planetary carrier thrust washer (1).



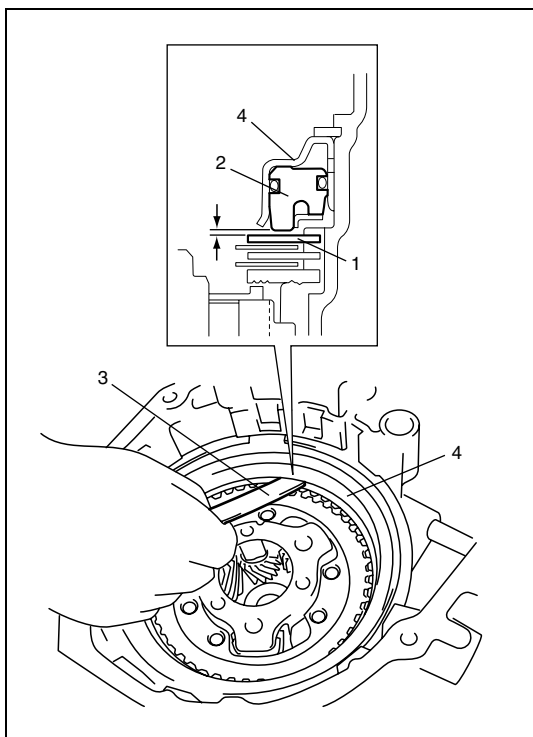
- 48) Remove O/D and 2nd coast brake retaining plate snap ring (1).



- 49) Remove front planetary sun gear (1).



- 50) Remove front sun gear thrust bearing race (2) from front planetary sun gear (1).



- 51) Before disassembling 2nd brake piston assembly (4), check 2nd brake piston stroke by measuring clearance between 2nd brake separator plate (1) and piston (2) with feeler gauge (3).

If clearance, that is, piston stroke is out of specification, replace brake discs and plates with new ones.

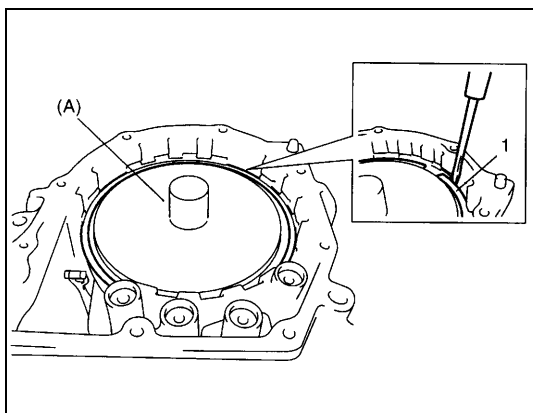
#### 2nd brake piston stroke

“a” : 0.40 – 1.25 mm (0.016 – 0.049 in.)

#### CAUTION:

When brake disc, retaining plate and/or separator plate of 2nd brake have been replaced, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized referring to “Learning Control Initialization” in this section.

Neglecting this initialization may cause excessive shift shock.



#### CAUTION:

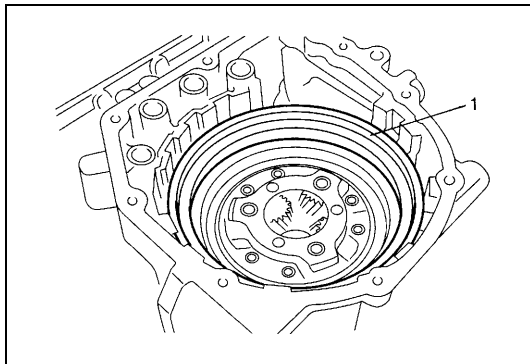
Do not press 2nd brake piston assembly in over 0.4 mm (0.016 in.).

Excessive compression may cause damage to piston assembly, return spring, plates and/or discs.

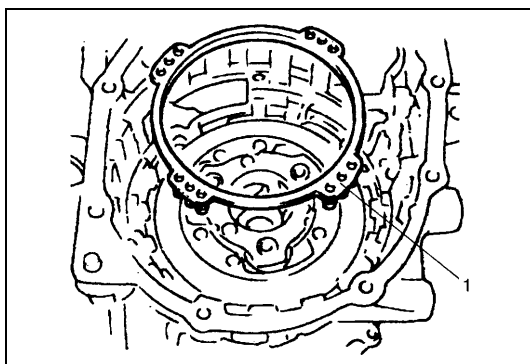
- 52) Using special tool and hydraulic press, remove 2nd brake piston snap ring (1).

#### Special tool

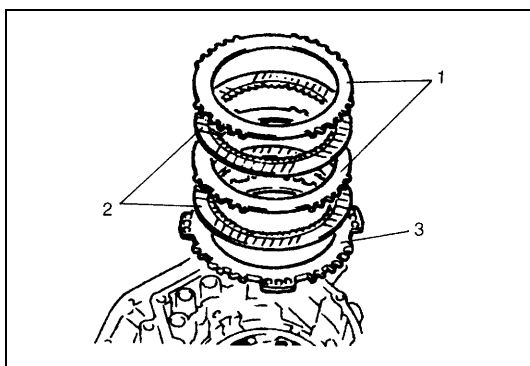
(A) : 09926-96050



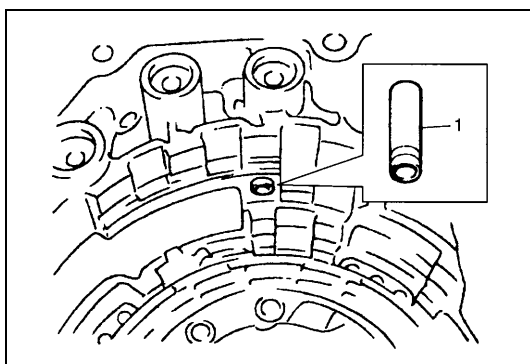
53) Remove 2nd brake piston assembly (1).



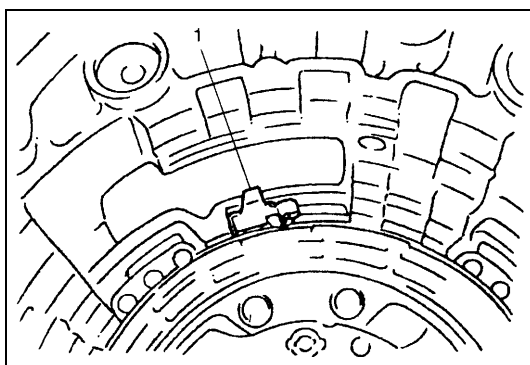
54) Remove 2nd brake return spring subassembly (1).



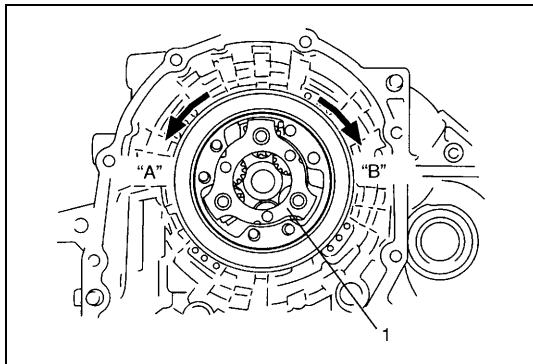
55) Remove 2nd brake separator plates (1) discs (2) and retaining plate (3).



56) Remove brake drum gasket (1).

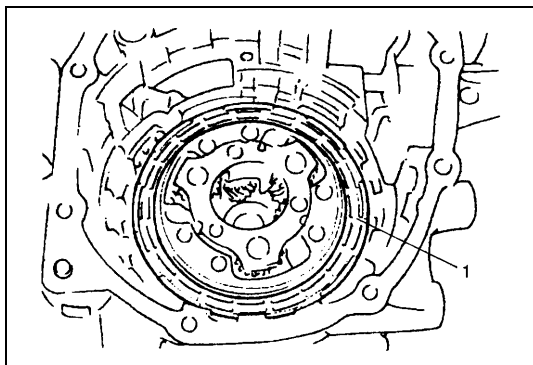


57) Remove one-way clutch outer race retainer (1).

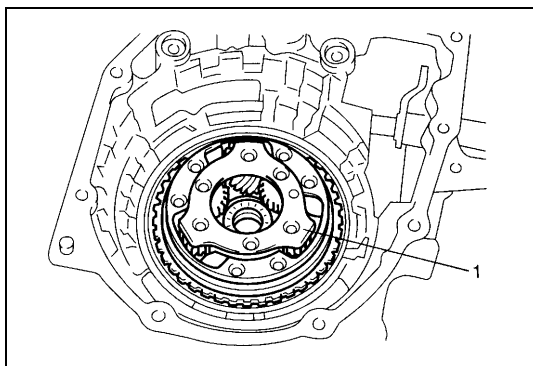


58) Check one-way clutch No.2 as follows.

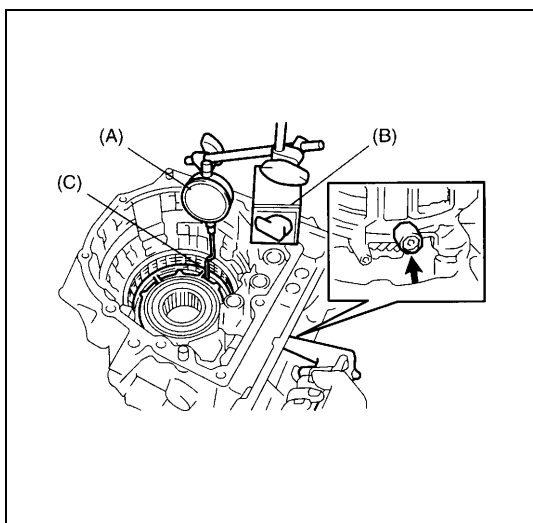
- Ensure planetary carrier (1) rotates only in counterclockwise direction “A”, never in clockwise direction “B”.
- If the planetary carrier rotates both ways or does not rotate either way, one-way clutch No.2 assembly will need to be replaced with new one-way clutch No.2 assembly.



59) Remove one-way clutch No.2 assembly (1).



60) Remove planetary gear assembly (1).



61) Measure 1st and reverse brake piston stroke

- Using special tool, measure 1st and reserve brake piston stroke when compressed air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) is blown through oil hole.

**Special tool**

(A) : 09900-20607

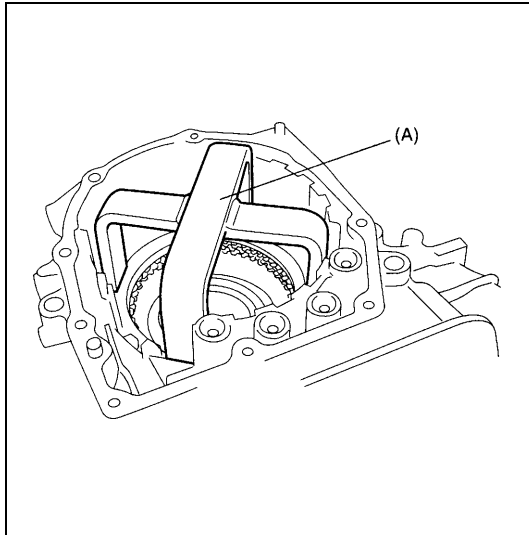
(B) : 09900-20701

(C) : 09952-06020

**1st and reverse brake piston stroke**

**Standard : 0.79 – 1.49 mm (0.031 – 0.059 in.)**

If piston stroke exceeds specified value, disassemble, inspect and replace discs and plates.

**CAUTION:**

**Do not press 1st and reverse brake return spring subassembly in over 0.8 mm (0.031 in.).**

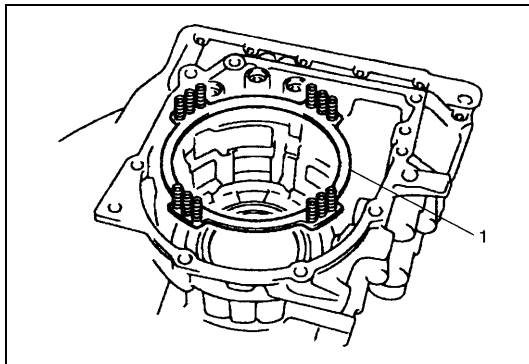
**Excessive compression may cause damage to return spring subassembly, discs, plates and/or piston.**

- 62) Remove snap ring while the 1st and reverse brake piston return springs are compressed using special tool and hydraulic press.

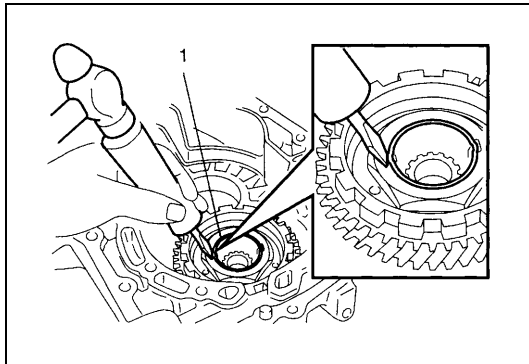
**Special tool**

**(A) : 09926-97620**

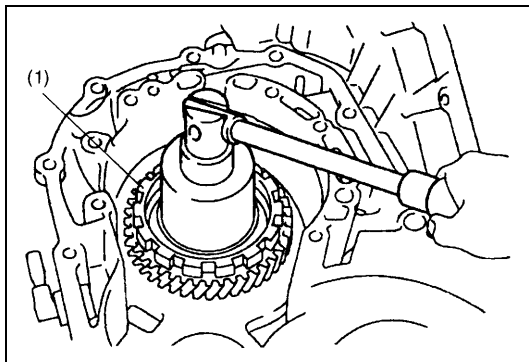
- 63) Remove 1st and reverse brake retaining plate, discs and separator plates.



- 64) Remove 1st and reverse brake return spring subassembly (1).

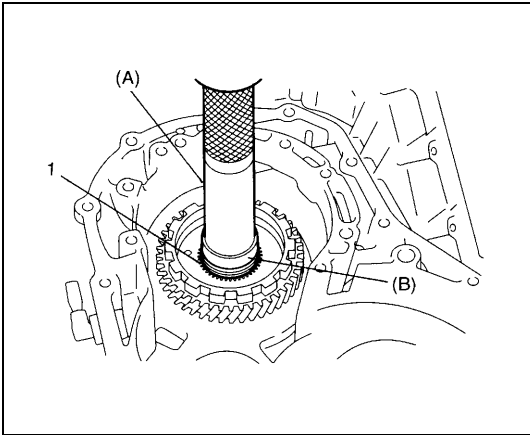


- 65) Turn over transaxle and uncaulk reduction drive gear nut (1).

**CAUTION:**

- It is recommended that this operation should be carried out on rubber mat to prevent damaging transaxle case.
- Never reuse removed nut.

- 66) Secure reduction drive gear (1) with parking lock pawl, then remove reduction drive gear nut.



67) Using special tools and hydraulic press, remove planetary ring gear subassembly (1).

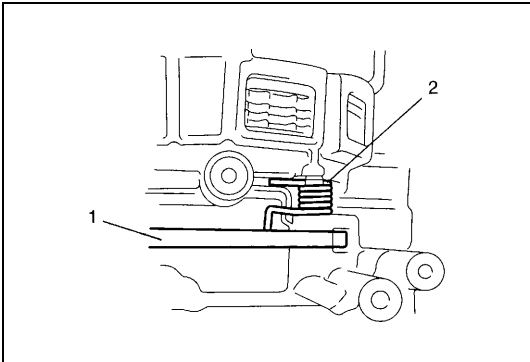
**Special tool**

**(A) : 09913-84510**

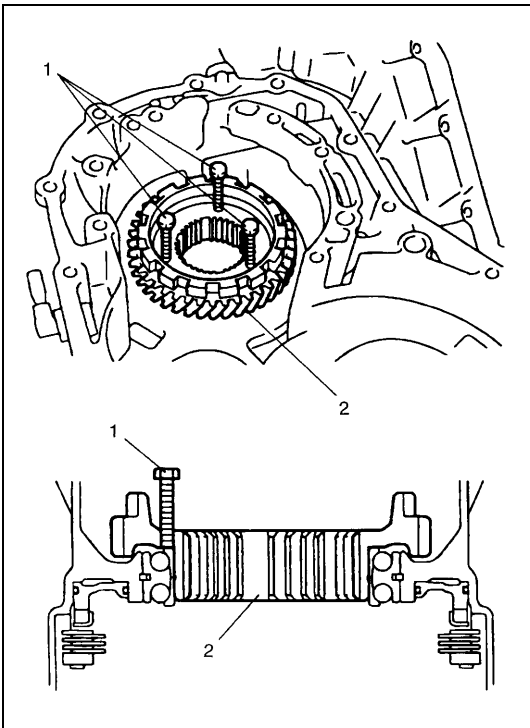
**(B) : 09923-78210**

**CAUTION:**

**Do not reuse planetary ring gear subassembly. Otherwise it may cause damage to planetary gear unit and/or reduction gears.**



68) Remove parking lock pawl shaft, then spring (2) and parking lock pawl (1).

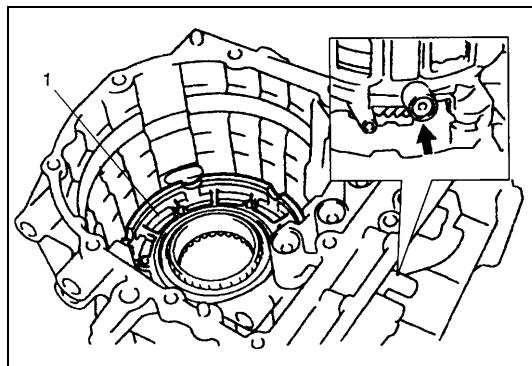


**CAUTION:**

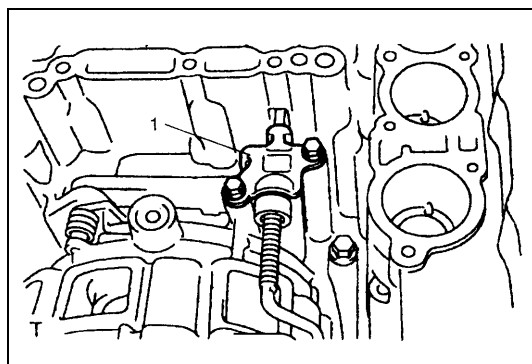
**Screw 3 bolts into reduction drive gear uniformly, or reduction drive gear, bearing and transaxle case may be damaged.**

69) Screwing 3 bolts (1), remove reduction drive gear (2).

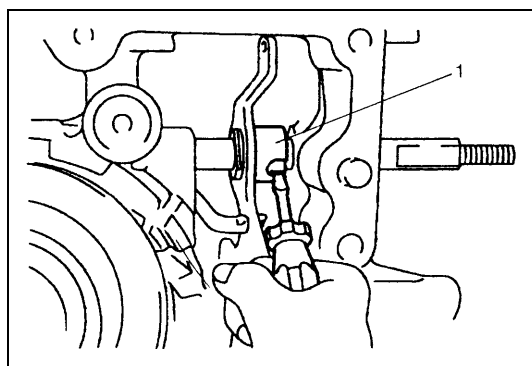
Bolt	Length
1	30 mm (1.20 in.)



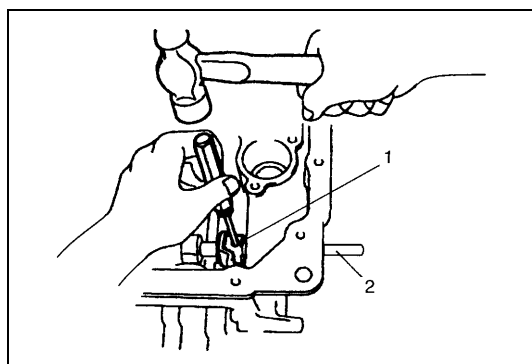
- 70) Blowing compressed air from oil hole of oil pump, remove 1st and reverse brake piston (1).



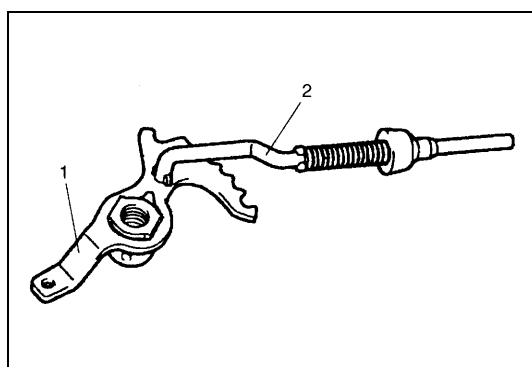
- 71) Remove parking lock pawl bracket (1).



- 72) With slotted screw driver, cut and unfold manual valve lever spacer (1) and proceed to remove manual valve lever spacer.

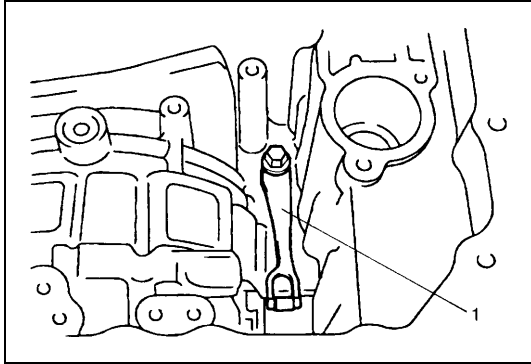


- 73) Using spring pin remover with 3 mm (0.12 in.) in diameter and hammer, drive out manual valve lever pin (1).  
74) Remove manual shift shaft (2).

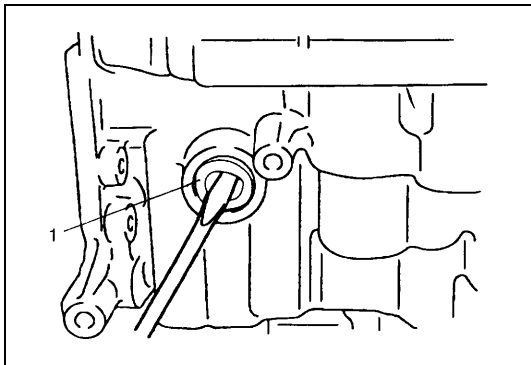


- 75) Remove parking lock pawl rod (2) from manual valve lever (1).





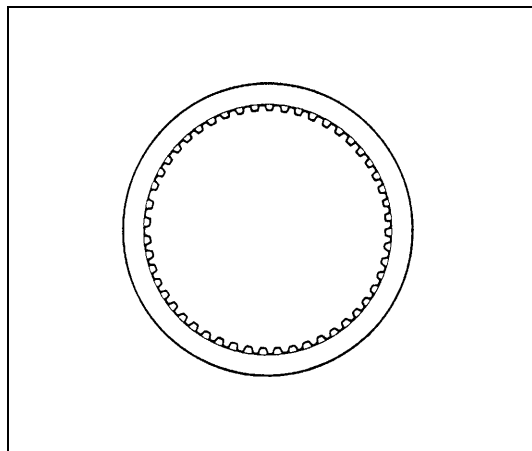
76) Remove manual detent spring (1).



77) Remove manual shift shaft oil seal (1).

## INSPECTION

### Brake discs



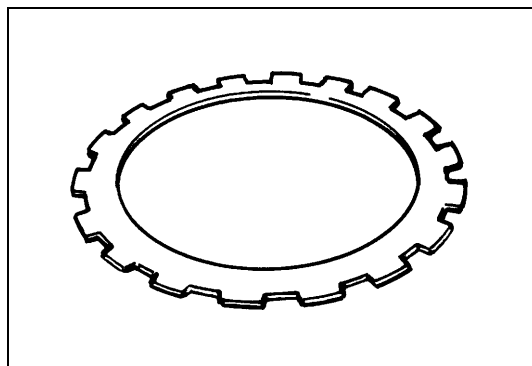
Dry and inspect them for pitting, burn flaking, significant wear, glazing, cracking, charring and chips or metal particles imbedded in lining.

If discs show any of the above conditions, replacement is required.

#### NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.

### Brake separator plates and retaining plates



Dry plates and check for discoloration. If plate surface is smooth and even color smear is indicated, plate should be reused. If severe heat spot discoloration or surface scuffing is indicated, plate must be replaced.

### Brake return spring subassembly

Measure brake return springs.

#### Free length of 1st & reverse brake return spring

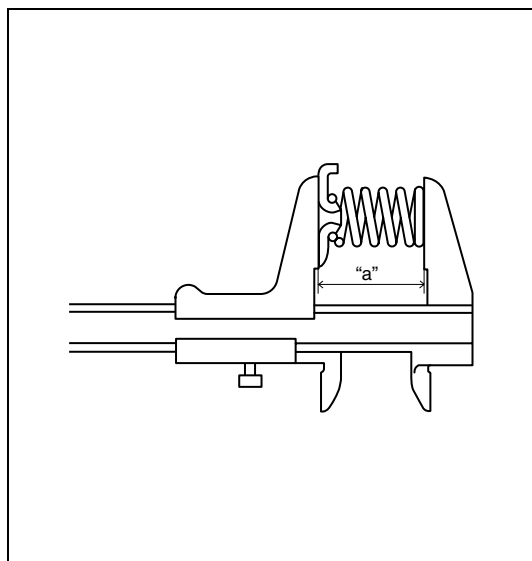
"a" : 21.71 mm (0.855 in.)

#### Free length of 2nd brake return spring

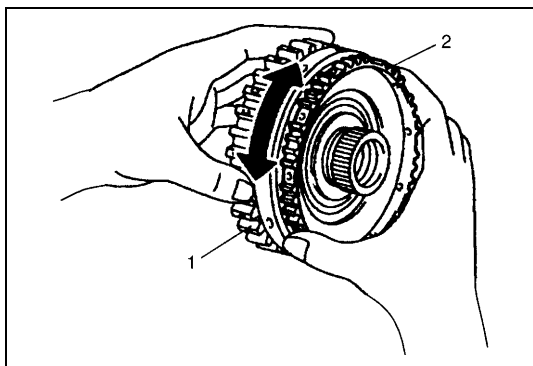
"a" : 15.85 mm (0.624 in.)

#### NOTE:

- Do not apply excessive force when measuring spring free length
- Perform measurement at several points.



Evidence of extreme heat or burning in the area of clutch may have caused springs to take heat set and would require their replacement.

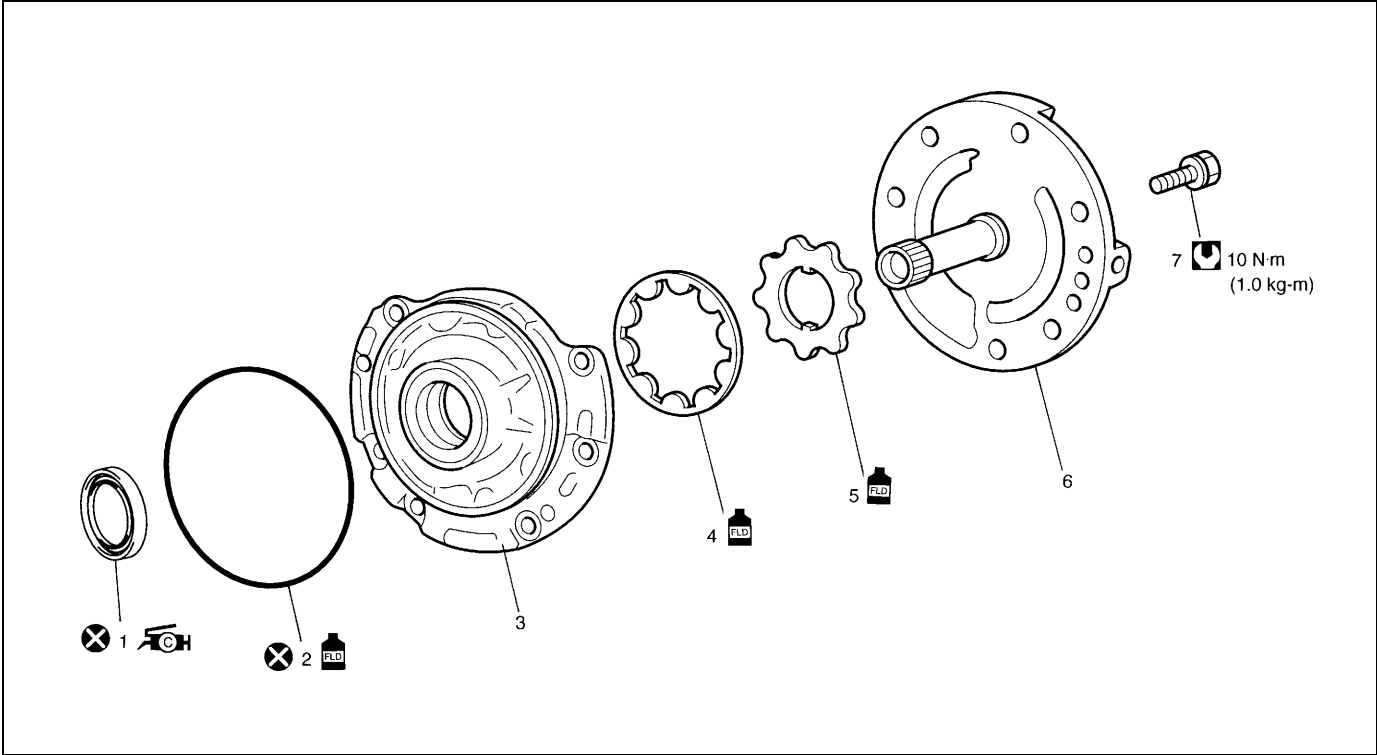
**One-way clutch No.1 assembly**





- 1) Install one-way clutch No.1 assembly (2) to rear planetary sun gear subassembly (1).
- 2) Securing rear planetary sun gear subassembly, ensure that one-way clutch No.1 assembly rotates only in one direction. If the one-way clutch rotates in both directions or it does not rotate in either direction, replace it with new one.

**Disassembly/Assembly of Subassembly****CAUTION:**

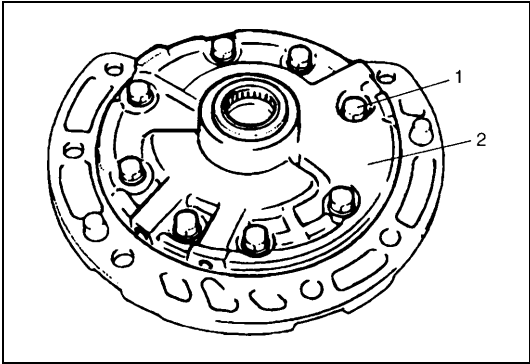
- Keep component parts in group for each subassembly and avoid mixing them up.
- Clean all parts with cleaning solvent thoroughly and air dry them.
- Use kerosene or automatic transaxle fluid as cleaning solvent.
- Do not use wiping cloths or rags to clean or dry parts.
- All oil passages should be blown out and checked to make sure that they are not obstructed.
- Keep face and eyes away from solvent spray while air blowing parts.
- Check mating surface for irregularities and remove them, if any, and clean it again.
- Soak new clutch discs and brake discs in transaxle fluid for at least 2 hours before assembly.
- Replace all gaskets and O-ring with new ones.
- Apply automatic transaxle fluid to all O-rings.
- When installing seal ring, be careful so that it is not expanded excessively, extruded or caught.
- Replace oil seals that are removed and apply grease to their lips.
- Before installing, be sure to apply automatic transaxle fluid to sliding, rolling and thrusting surface of all component part. Also after installation, make sure to check each part for proper operation.
- Always use torque wrench when tightening bolts.

Oil pump assembly

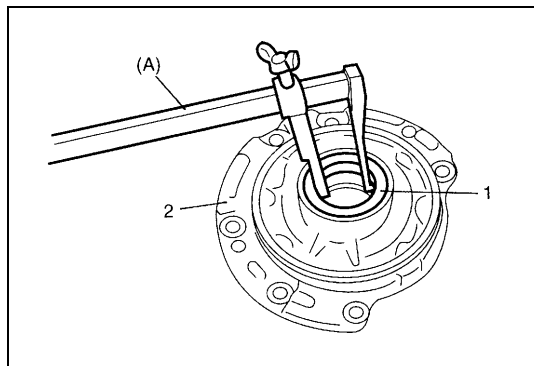


 1. Oil seal : Apply grease 99000-25030 to oil seal lip.	7. Oil pump subassembly bolts
2. O-ring	 Apply automatic transaxle fluid.
3. Oil pump body	 Tightening torque
4. Oil pump driven gear	 Do not reuse.
5. Oil pump drive gear	
6. Stator shaft assembly	

DISASSEMBLY



- 1) Remove O-ring from pump body.
- 2) Remove 8 oil pump subassembly bolts (1) and stator shaft assembly (2).



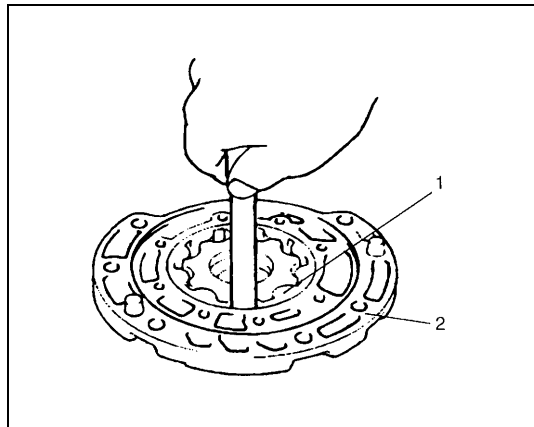
3) Remove oil seal (1) using special tool.

#### Special tool

(A) : 09913-50121

2. Oil pump body
------------------

### INSPECTION



1) Check body clearance of driven gear.

Push driven gear to one side of body Using feeler gauge, measure clearance between driven gear and body.

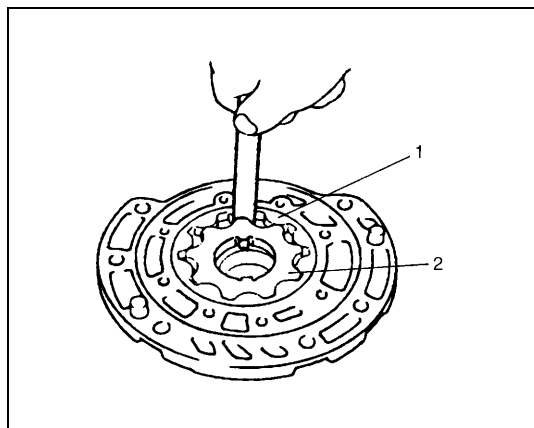
If clearance exceeds its standard value, replace oil pump assembly.

#### Clearance between oil pump driven gear and oil pump body

**Standard : 0.1 – 0.17 mm (0.0039 – 0.0067 in.)**

1. Oil pump driven gear
-------------------------

2. Oil pump body
------------------



2) Check tip clearance between drive and driven gear.

Using a feeler gauge, measure clearance between drive and driven gear tips.

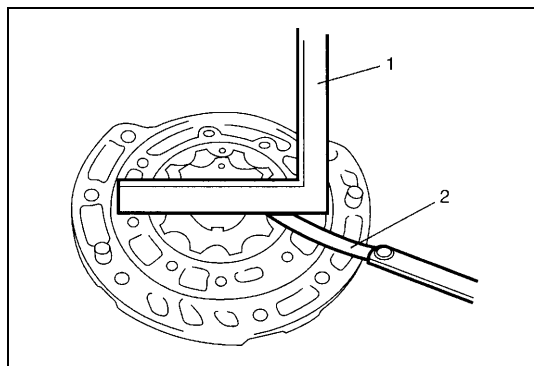
If clearance exceeds its standard value, replace oil pump assembly.

#### Tip clearance between oil pump drive gear and oil pump driven gear

**Standard : 0.07 – 0.15 mm (0.0028 – 0.0059 in.)**

1. Oil pump driven gear
-------------------------

2. Oil pump drive gear
------------------------



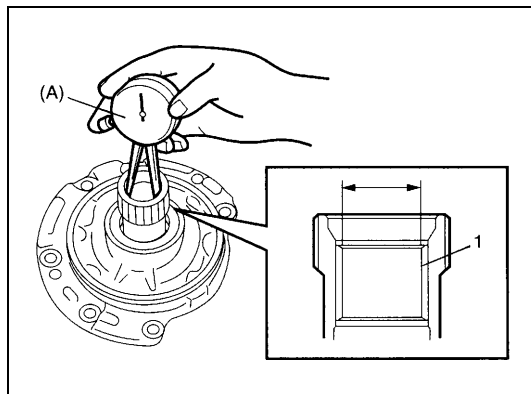
3) Check side clearance of both gears.

Using straightedge (1) and feeler gauge (2), measure side clearance between gears and pump body.

If clearance exceeds its standard value, replace oil pump assembly.

#### Side clearance between gears and oil pump body

**Standard : 0.02 – 0.05 mm (0.0008 – 0.0019 in.)**



- 4) Using special tool, measure stator shaft bush bore.  
If measured stator shaft bush bore is out of specifications, replace oil pump assembly with new one.

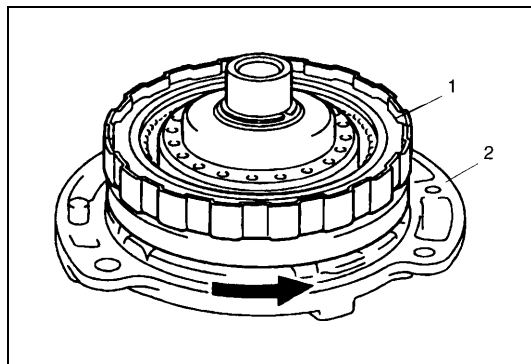
**Special tool**

**(A) : 09900-20605**

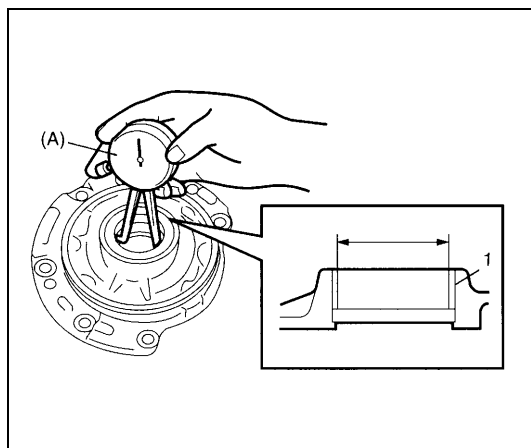
**Stator shaft bush bore**

**Standard : 18.424 – 18.450 mm (0.7254 – 0.7264 in.)**

1. Stator shaft bush



- 5) Install direct clutch assembly (1) to stator shaft assembly (2), then ensure that direct clutch assembly turns smoothly.  
If unsmooth rotation or noise are found in oil pump assembly, replace oil pump assembly with new one. This check should also be done to input shaft assembly and replace input shaft assembly if necessary.



- 6) Using special tool, measure oil pump body bush bore.

**Special tool**

**(A) : 09900-20605**

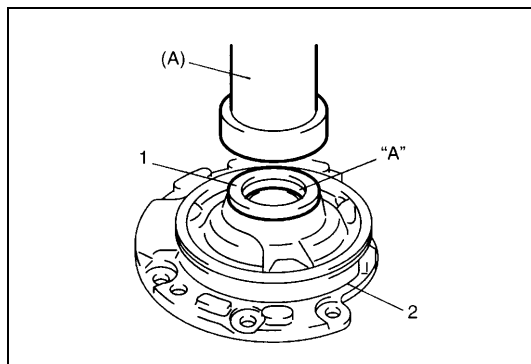
**Oil pump body bush bore**

**Standard : 38.113 – 38.138 mm (1.5005 – 1.5015 in.)**

If measured oil pump body bush bore is out of specifications, replace oil pump assembly with new one. Torque converter also needs to be checked. Replace torque converter, if necessary.

1. Oil pump body bush

## ASSEMBLY



- 1) Install new oil pump body oil seal (1).  
Use special tool and hammer to install it, and then apply grease to its lip.

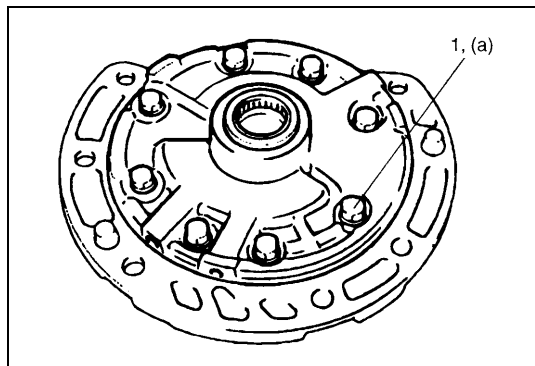
**Special tool**

**(A) : 09913-85210**

**“A” : Grease 99000-25030**

1. Oil pump body

- 2) Install driven gear and drive gear to oil pump body after applying A/T fluid.

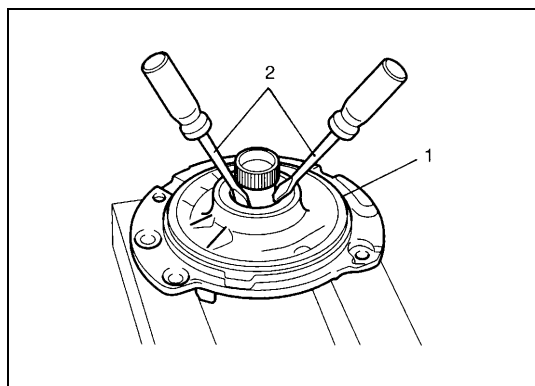


- 3) Install stator shaft assembly to oil pump body and tighten 8 pump subassembly bolts (1) to specification.

**Tightening torque**

**Oil pump subassembly bolts**

(a) : 10 N·m (1.0 kg·m, 7.5 lb·ft)



- 4) After applying A/T fluid to new O-ring, install it to oil pump body.

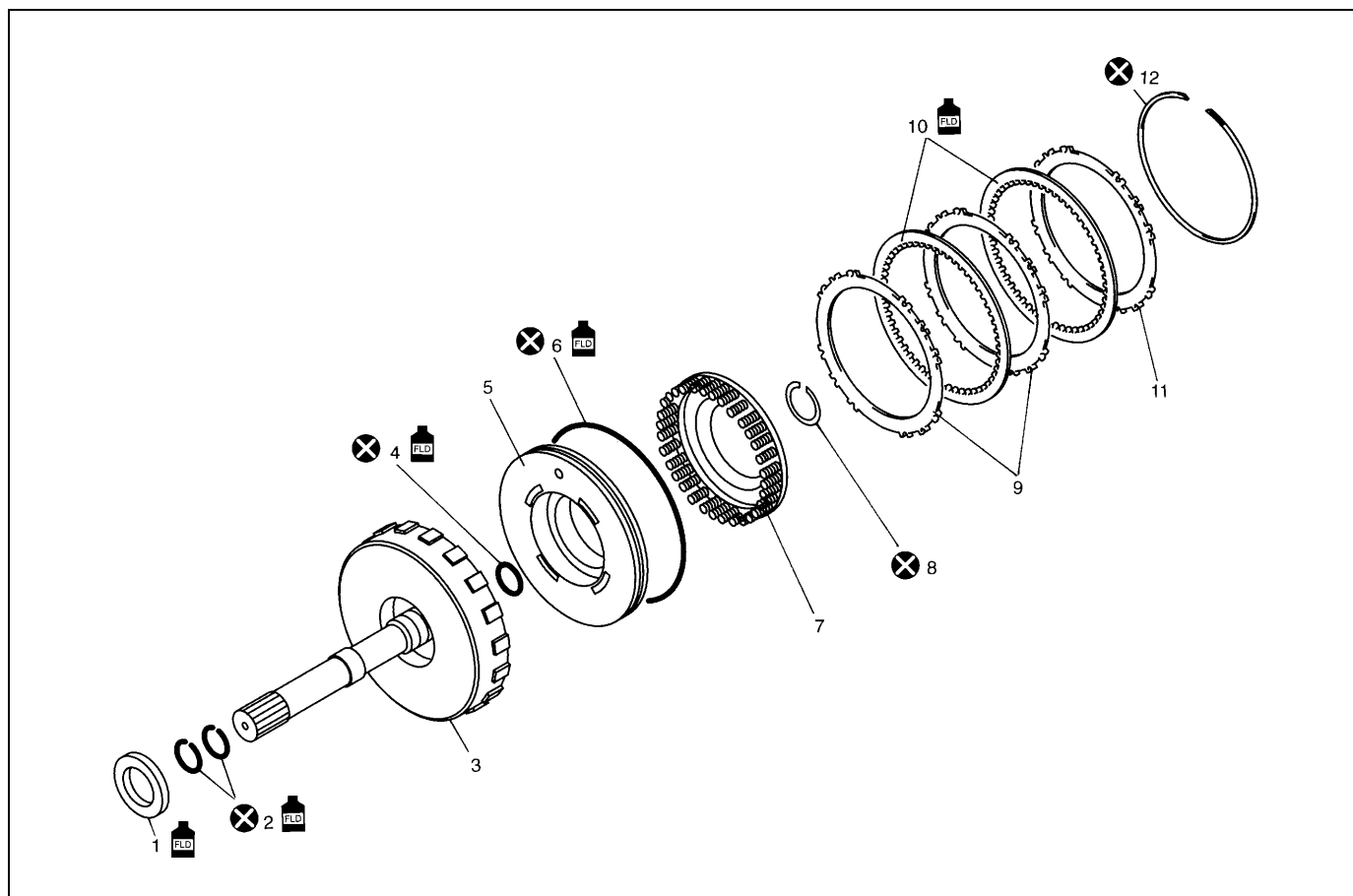
**CAUTION:**



**Do not damage oil seal with slotted screw driver.**

- 5) Check drive gear for smooth rotation by using slotted screw driver.

- |                         |
|-------------------------|
| 1. Oil pump assembly    |
| 2. Slotted screw driver |

## Direct clutch assembly

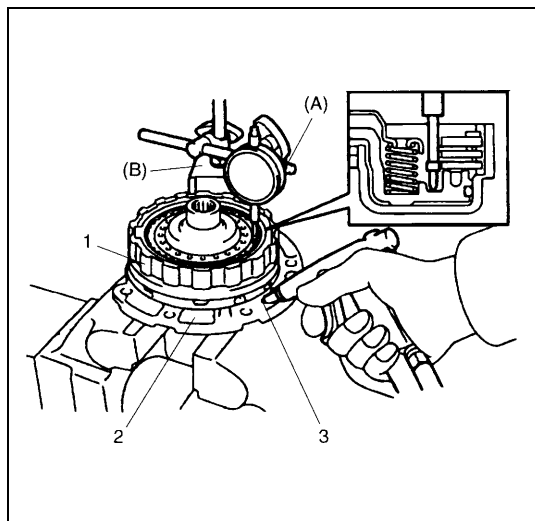


1. Input shaft front thrust bearing	8. Shaft snap ring
2. Input shaft seal ring	9. Direct clutch separator plate
3. Input shaft subassembly	10. Direct clutch disc
4. Inner O-ring	11. Direct clutch retaining plate
5. Direct clutch piston	12. Plate snap ring
6. Outer O-ring	 Apply automatic transaxle fluid.
7. Direct clutch return spring subassembly	 Do not reuse.

### CAUTION:

When clutch disc, retaining plate and/or separator plate of direct clutch have been replaced, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized referring to “Learning Control Initialization” in this section. Neglecting this initialization may cause excessive shift shock.

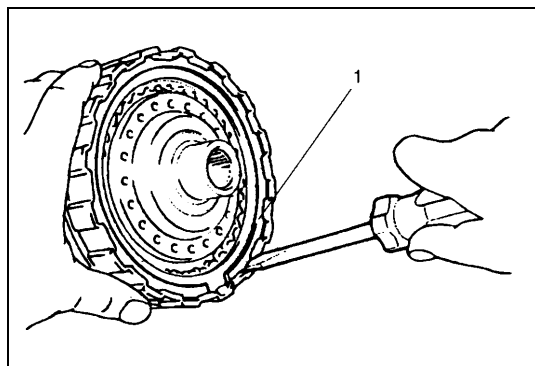


**PRELIMINARY CHECK**

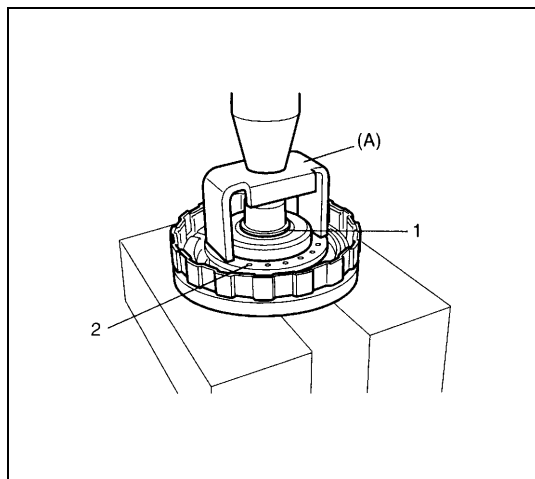
- 1) Install direct clutch assembly (1) to oil pump assembly (2), blow in air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) through oil hole (3) of oil pump assembly with special tool attached on upper surface of direct clutch piston, and measure piston stroke of direct clutch.

**Special tool****(A) : 09900-20607****(B) : 09900-20701****Direct clutch piston stroke : 0.4 – 0.7 mm (0.016 – 0.027 in.)**

If piston stroke exceeds specified value, disassemble, inspect and replace inner parts.

**DISASSEMBLY**

- 1) Remove plate snap ring (1), then remove direct clutch retaining plate, discs and separator plates.

**CAUTION:**

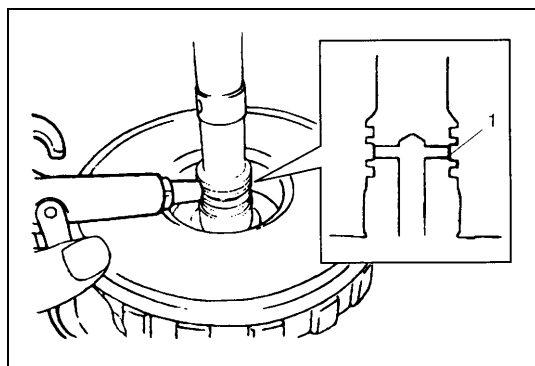
**Do not press direct clutch return spring subassembly in over 0.7 mm (0.027 in.).**

**Excessive compression may cause damage to direct clutch return spring subassembly and/or piston.**

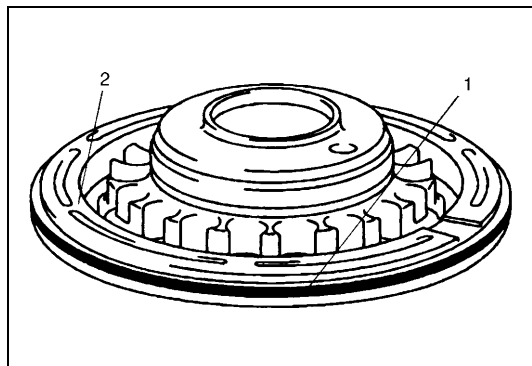
- 2) Using special tool and hydraulic press, remove shaft snap ring (1).

**Special tool****(A) : 09926-98310**

- 3) Remove direct clutch return spring assembly(2).

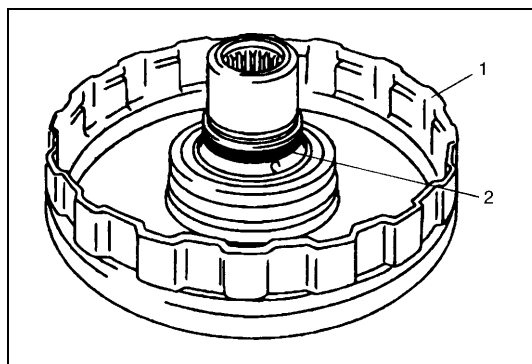


- 4) Using a finger to block oil hole (1), apply compressed air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) to opposite hole, which will assist in removal of the clutch piston.



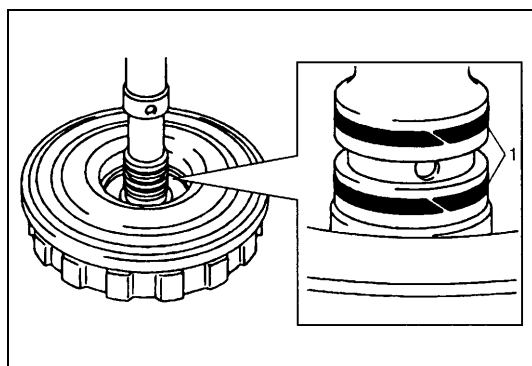
5) Remove outer O-ring (1).

2. Direct clutch piston



6) Remove inner O-ring (2).

1. Input shaft subassembly



7) Remove input shaft seal rings (1).

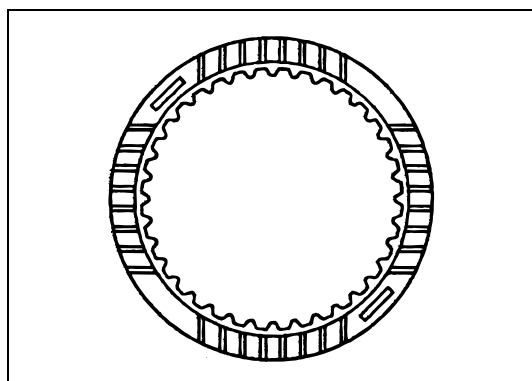
## INSPECTION

### Clutch discs, plates and retaining plate

Check that sliding surfaces of discs, separator plates and retaining plate are not worn hard or burnt. If necessary, replace.

#### NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.



### Direct clutch return spring subassembly

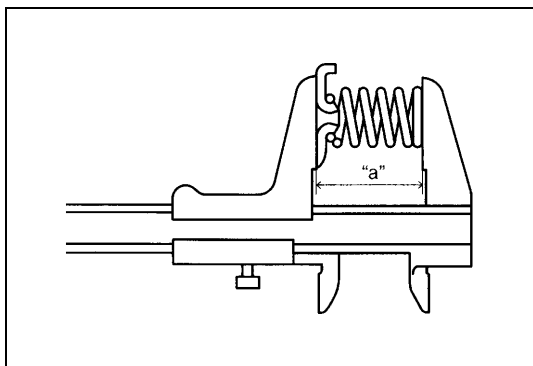
Measure free length of direct clutch return spring.

#### Free length of direct clutch return spring

“a” : 36.04 mm (1.419 in.)

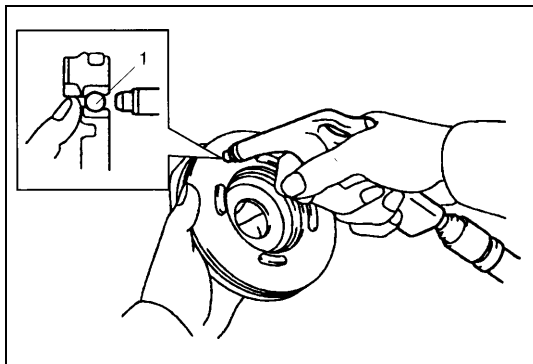
#### NOTE:

- Do not apply excessive force when measuring spring free length.
- Perform measurement at several points.



### Direct clutch piston

Shake direct clutch piston lightly and check that check ball (1) is not stuck. Blow in low-pressure air (Max 100 kPa, 1 kg/cm<sup>2</sup>, 15 psi) to check ball to check that there is no air leakage.



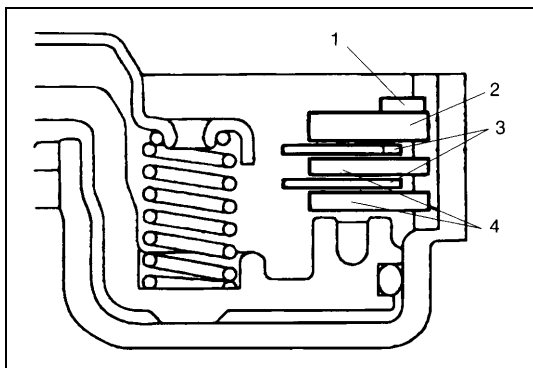
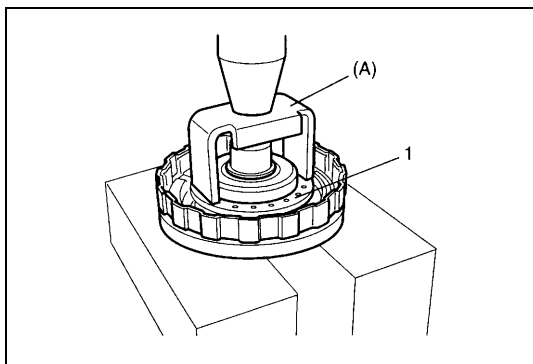
### ASSEMBLY

Reverse disassembly procedure for assembly, noting the following points.

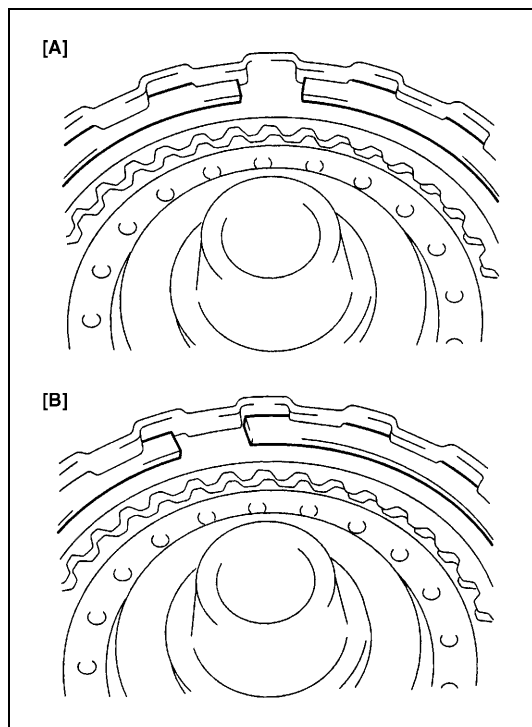
- Use new seal ring and O-ring. Apply A/T fluid before installation.
- Do not damage direct clutch return spring subassembly (1) and piston by pressing in direct clutch return spring subassembly passing through its original installing position over 0.7 mm (0.027 in.).

#### Special tool

(A) : 09926-98310

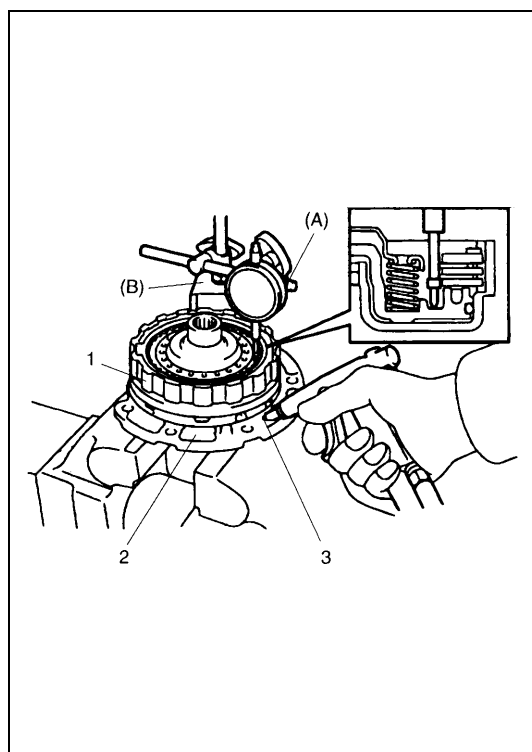


- Apply A/T fluid to direct clutch separator plates (4), discs (3) and retaining plate (2).
- Install direct clutch separator plates (4) discs (3) retaining plate (2) and snap ring (1) to input shaft subassembly.



- Install plate snap ring so that its both ends would be positioned in correct locations as shown in figure.

[A] Correct
[B] Incorrect



- After assembly, measure direct clutch piston stroke.

#### Special tool

(A) : 09900-20607

(B) : 09900-20701

**Direct clutch piston stroke : 0.4 – 0.7 mm (0.016 – 0.027 in.)**

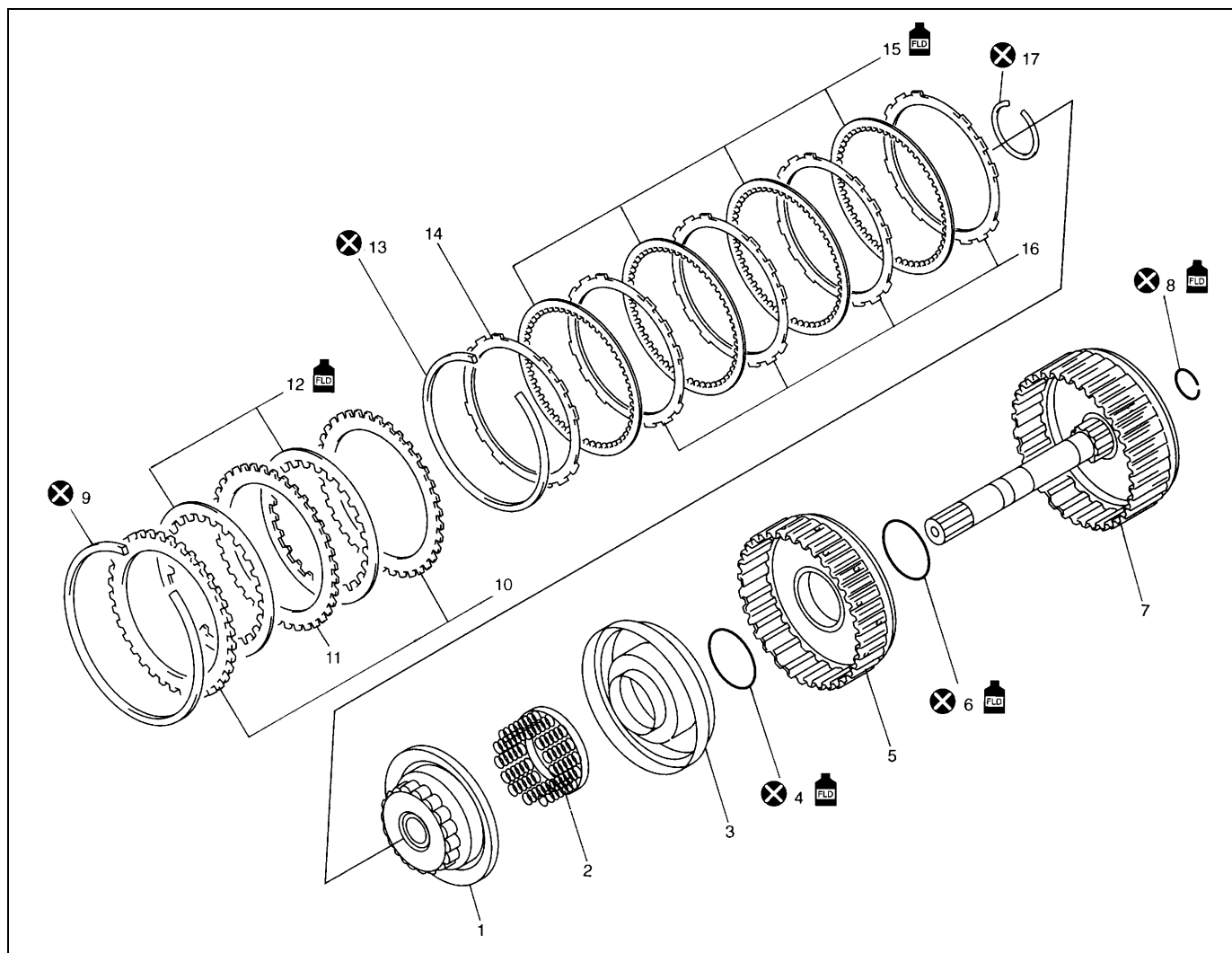
When piston strike is out of specification, select direct clutch retaining plate with suitable thickness from among the list below and replace it.



#### Available direct clutch retaining plate thickness

Thickness	Identification mark
3.0 mm (0.118 in.)	1
3.2 mm (0.126 in.)	2
3.4 mm (0.134 in.)	3

1. Direct clutch assembly
2. Oil pump assembly
3. Oil hole

## Forward and reverse clutch assembly

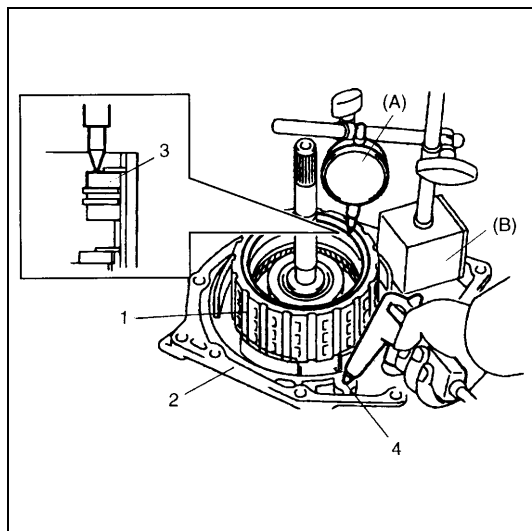


1. Forward clutch balancer	11. Reverse clutch separator plate
2. Forward clutch return spring subassembly	12. Reverse clutch disc
3. Forward clutch piston	13. Forward clutch plate snap ring
4. Forward clutch piston O-ring	14. Forward clutch retaining plate
5. Forward clutch drum	15. Forward clutch disc
6. Forward clutch drum O-ring	16. Forward clutch separator plate
7. Intermediate shaft subassembly	17. Balancer snap ring
8. Inter mediate shaft seal ring	 Apply automatic transaxle fluid.
9. Reverse clutch plate snap ring	 Do not reuse.
10. Reverse clutch retaining plate	

### CAUTION:

When clutch disc, retaining plate and/or separator plate of forward clutch have been replaced, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized referring to “Learning Control Initialization” in this section.

Neglecting this initialization may cause excessive shift shock.

**PRELIMINARY CHECK**

- 1) Install forward and reverse clutch assembly (1) to transaxle rear cover (2), blow in compressed air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) through oil hole (4) of transaxle rear cover with the special tool attached on the upper surface of reverse clutch retaining plate (3), and measure reverse clutch piston stroke.

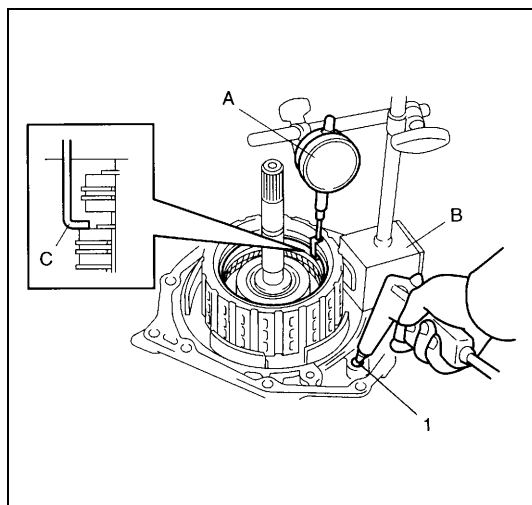
If piston stroke exceeds specified value, disassemble, inspect and replace inner parts.

**Special tool**

(A) : 09900-20607

(B) : 09900-20701

**Reverse clutch piston stroke : 0.86 – 1.26 mm (0.034 – 0.050 in.)**



- 2) Blow compressed air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) through oil hole (1) of transaxle rear cover with the special tool attached on the upper surface of forward clutch retaining plate, and measure forward clutch piston stroke.

If piston stroke exceeds specified value, disassemble, inspect and replace inner parts.

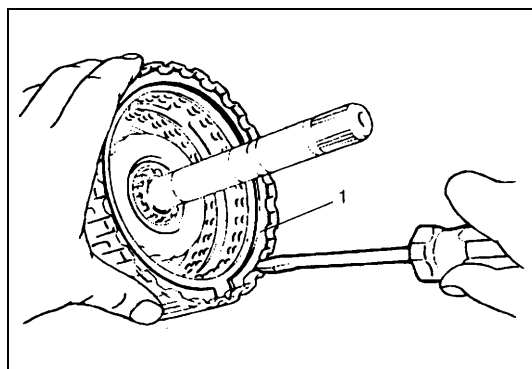
**Special tool**

(A) : 09900-20607

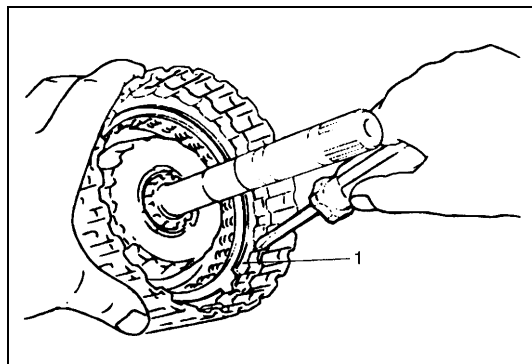
(B) : 09900-20701

(C) : 09952-06020

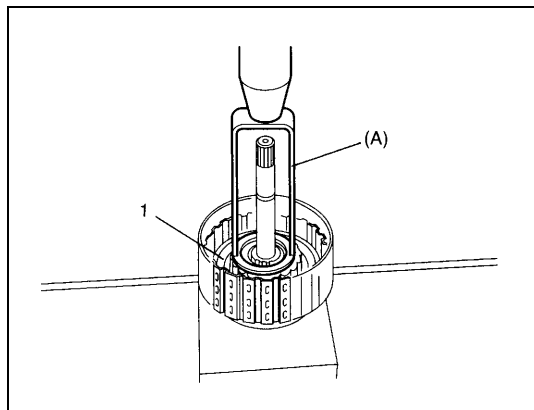
**Forward clutch piston stroke : 1.30 – 1.50 mm (0.051 – 0.059 in.)**

**DISASSEMBLY**

- 1) Remove reverse clutch plate snap ring (1) and take out reverse clutch retaining plate, discs and separator plates from intermediate shaft subassembly.



- 2) Remove forward clutch plate snap ring (1) and take out forward clutch retaining plate, discs and separator plates from forward clutch drum.

**CAUTION:**

**Do not press forward clutch return spring subassembly in over 1.5 mm (0.059 in.).**

**Excessive compression may cause damage to return spring subassembly and/or balancer.**

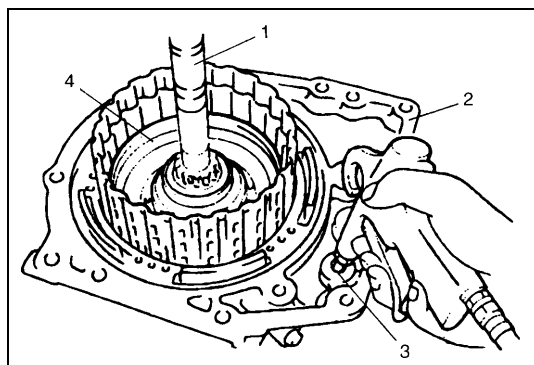
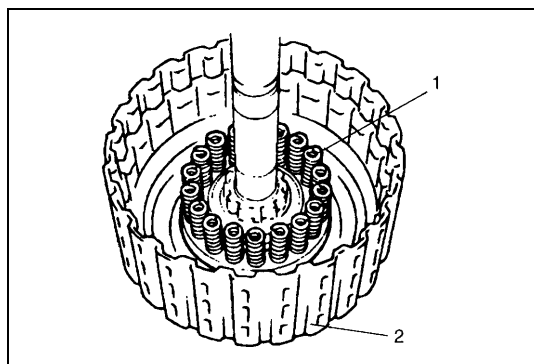
- 3) Remove balancer snap ring by using special tool and hydraulic press.
- 4) Remove forward clutch balancer (1).

**Special tool**

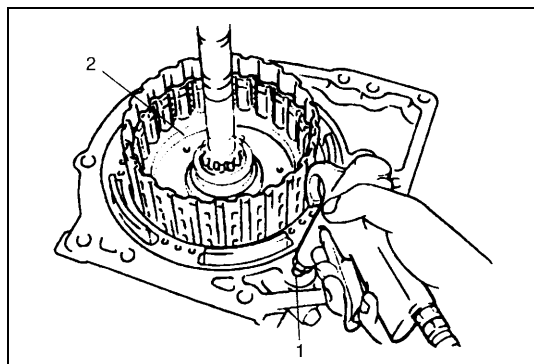
**(A) : 09926-97610**

- 5) Remove forward clutch return spring subassembly (1).

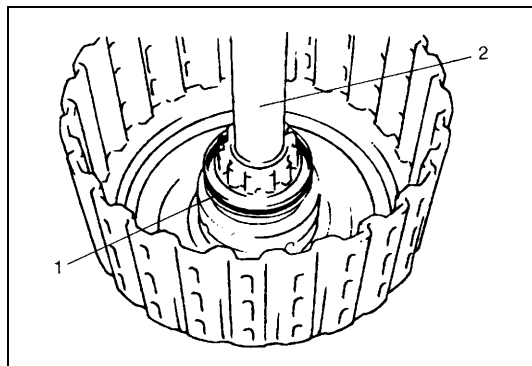
2. Intermediate shaft subassembly



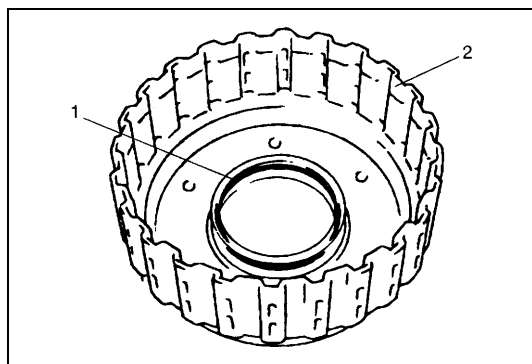
- 6) Install intermediate shaft subassembly (1) to transaxle rear cover (2). Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) to oil hole (3) of transaxle rear cover to remove forward clutch piston (4).



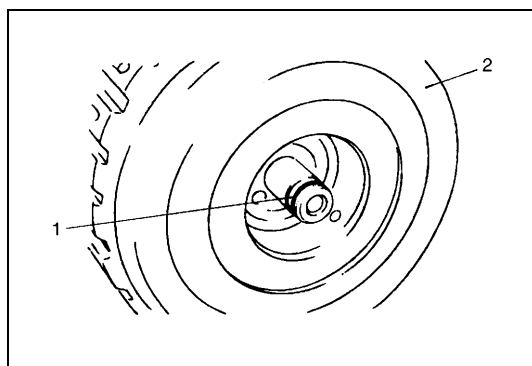
- 7) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) to oil hole (1) of transaxle rear cover to remove forward clutch drum (2).



- 8) Remove forward clutch piston O-ring (1) from intermediate shaft subassembly (2).



- 9) Remove forward clutch drum O-ring (1) from forward clutch drum (2).



- 10) Remove intermediate shaft seal ring (1) from intermediate shaft subassembly (2).

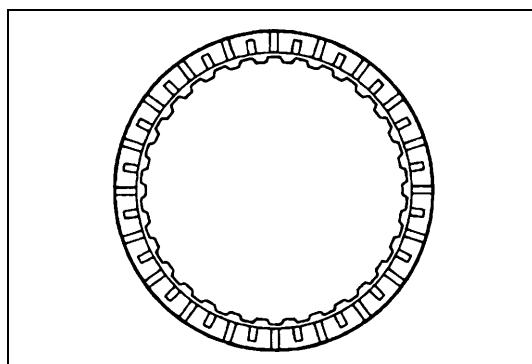
## INSPECTION

### Clutch discs, separator plates and retaining plate

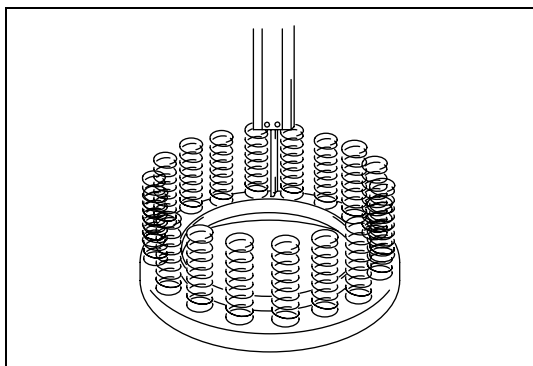
Check that sliding surfaces of discs, separator plates and retaining plate are not worn hard or burnt. If necessary, replace.

#### NOTE:

- If disc lining is exfoliated or discolored, replace all discs.
- Before assembling new discs, soak them in A/T fluid for at least two hours.







### Forward clutch return spring subassembly

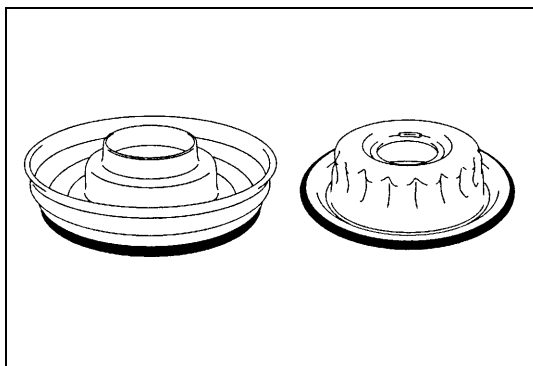
Measure free length of forward clutch return spring.

#### Free length of forward clutch return spring

: 23.04 mm (0.907 in.)

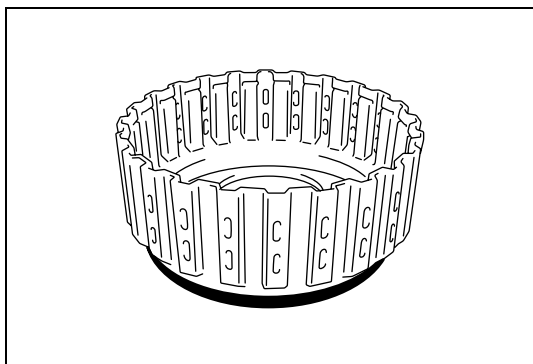
#### NOTE:

- Do not apply excessive force when measuring spring free length.
- Perform measurement at several points.



### Forward clutch piston lip and forward clutch balancer lip

Check each lip for wear, deformation, cut, and/or hardening. If necessary, replace.



### Forward clutch drum lip

Check each lip for wear, deformation, cut, and/or hardening. If necessary, replace.

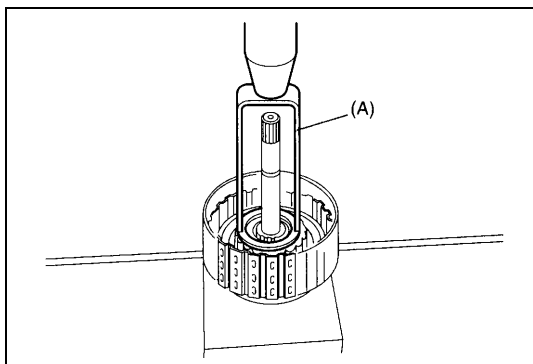
## ASSEMBLY

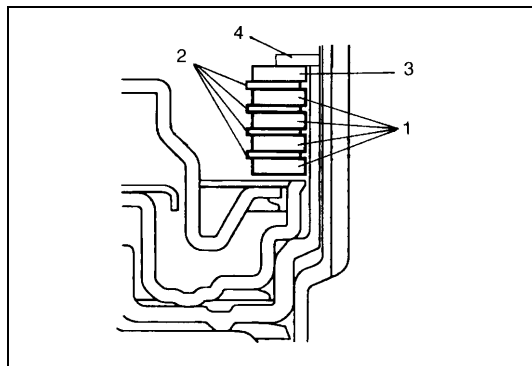
Reverse disassembly procedure for assembly, noting the following points.

- Before assembling, apply automatic transaxle fluid to component parts.
- Replace O-rings and seal ring with new ones.
- Do not damage forward clutch return spring subassembly and balancer by pressing in forward clutch return spring subassembly passing through its original installing position over 1.5 mm (0.059 in.).

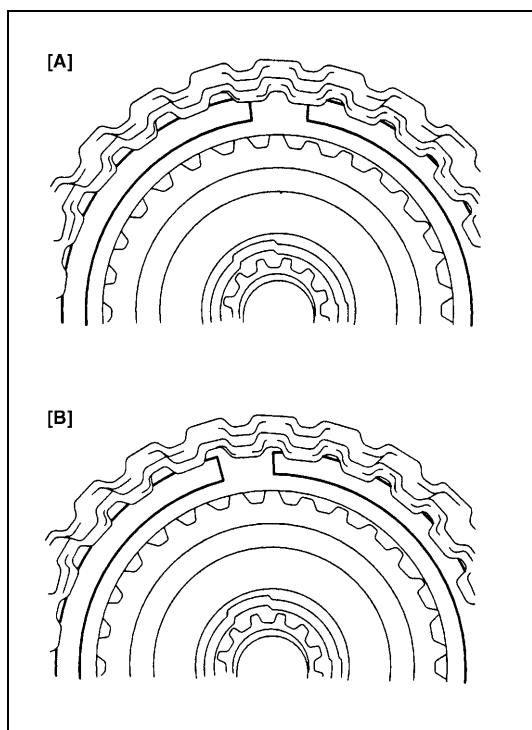
#### Special tool

(A) : 09926-97610



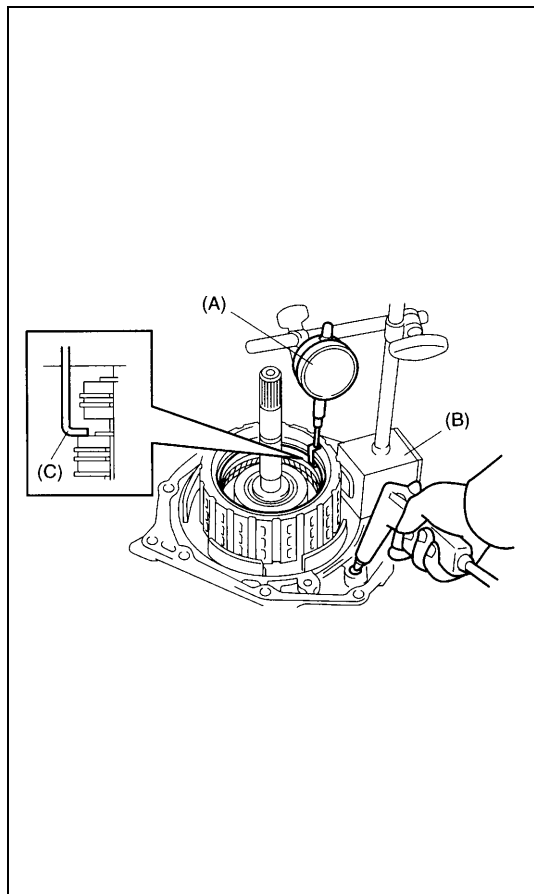


- Apply A/T fluid to forward clutch separator plates (1), discs (2) and retaining plate (3).
- Install forward clutch separator plates (1), discs (2) and retaining plate (3), then snap ring (4) to forward clutch drum.



- Install forward clutch plate snap ring so that its both ends would be positioned in correct locations as shown in figure.

[A]	Correct
[B]	Incorrect



- Measure forward clutch piston stroke in the same manner as “Preliminary Check”.

#### Special tool

(A) : 09900-20607

(B) : 09900-20701

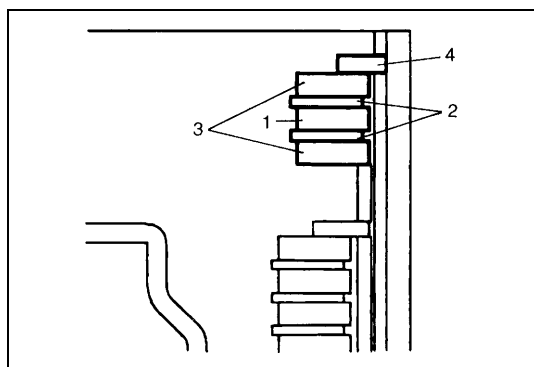
(C) : 09952-06020

**Forward clutch piston stroke : 1.30 – 1.50 mm (0.051 – 0.059 in.)**

When piston stroke is out of specification, select forward clutch retaining plate with proper thickness from among the list below and replace it.

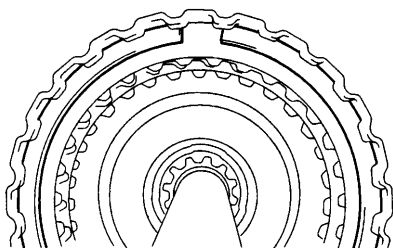
#### Available forward clutch retaining plate thickness

Thickness	Identification mark
3.0 mm (0.118 in.)	1
3.1 mm (0.122 in.)	5
3.2 mm (0.126 in.)	2
3.3 mm (0.130 in.)	6
3.4 mm (0.134 in.)	3
3.5 mm (0.138 in.)	7
3.6 mm (0.142 in.)	4

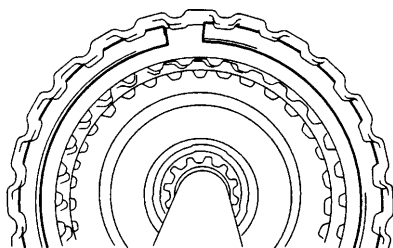


- Apply A/T fluid to reverse clutch separator plate (1) discs (2) and retaining plate (3).
- Install reverse clutch separator plate (1) discs (2) retaining plate (3) and then snap ring (4) to intermediate shaft subassembly.

[A]



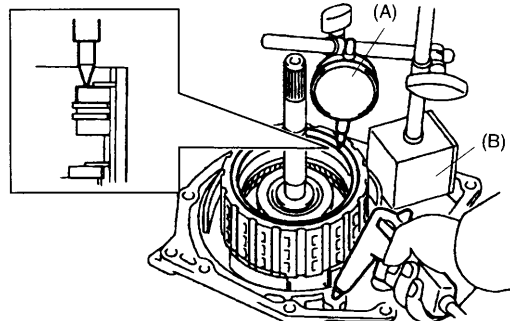
[B]



- Install reverse clutch plate snap ring so that its both ends would be positioned in correct locations as shown in figure.

[A] : Correct

[B] : Incorrect



- Measure reverse clutch piston stroke in the same manner as “Preliminary Check”.

**Special tool**

(A) : 09900-20607

(B) : 09900-20701

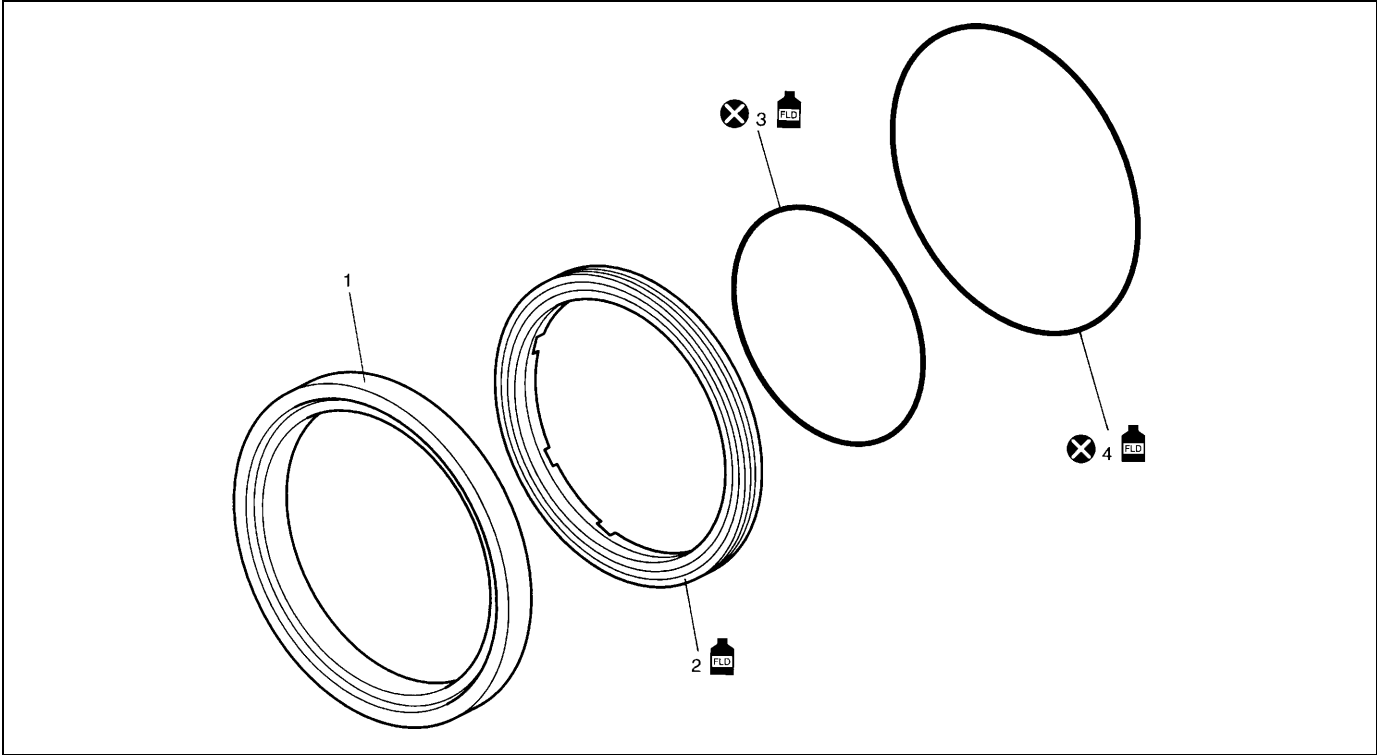
**Reverse clutch piston stroke : 0.86 – 1.26 mm (0.034 – 0.050 in.)**



When piston stroke is out of specification, select reverse clutch retaining plate with proper thickness from among the list below and replace it.

**Available reverse clutch retaining plate thickness**

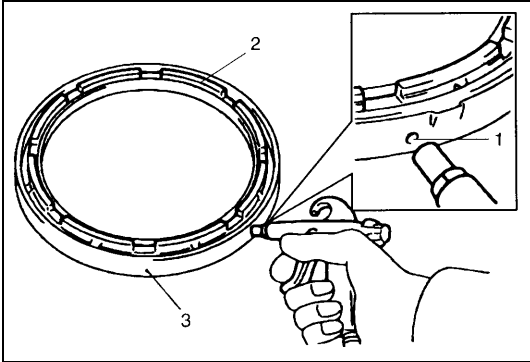
Thickness	Identification mark
3.0 mm (0.118 in.)	1
3.2 mm (0.126 in.)	2
3.4 mm (0.134 in.)	3
3.6 mm (0.142 in.)	4

2nd brake piston assembly

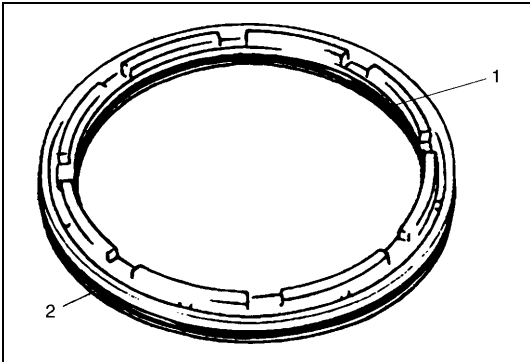


1. 2nd brake cylinder	4. Outer O-ring
2. 2nd brake piston	 Apply automatic transaxle fluid.
3. Inner O-ring	 Do not reuse.

DISASSEMBLY



- 1) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) to oil hole (1) of 2nd brake cylinder (3) to remove 2nd brake piston (2).

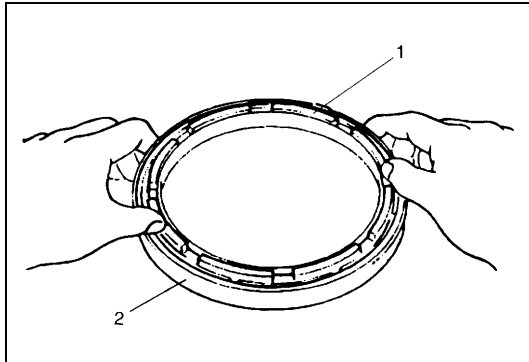


- 2) Remove inner O-ring (1) and outer O-ring (2).

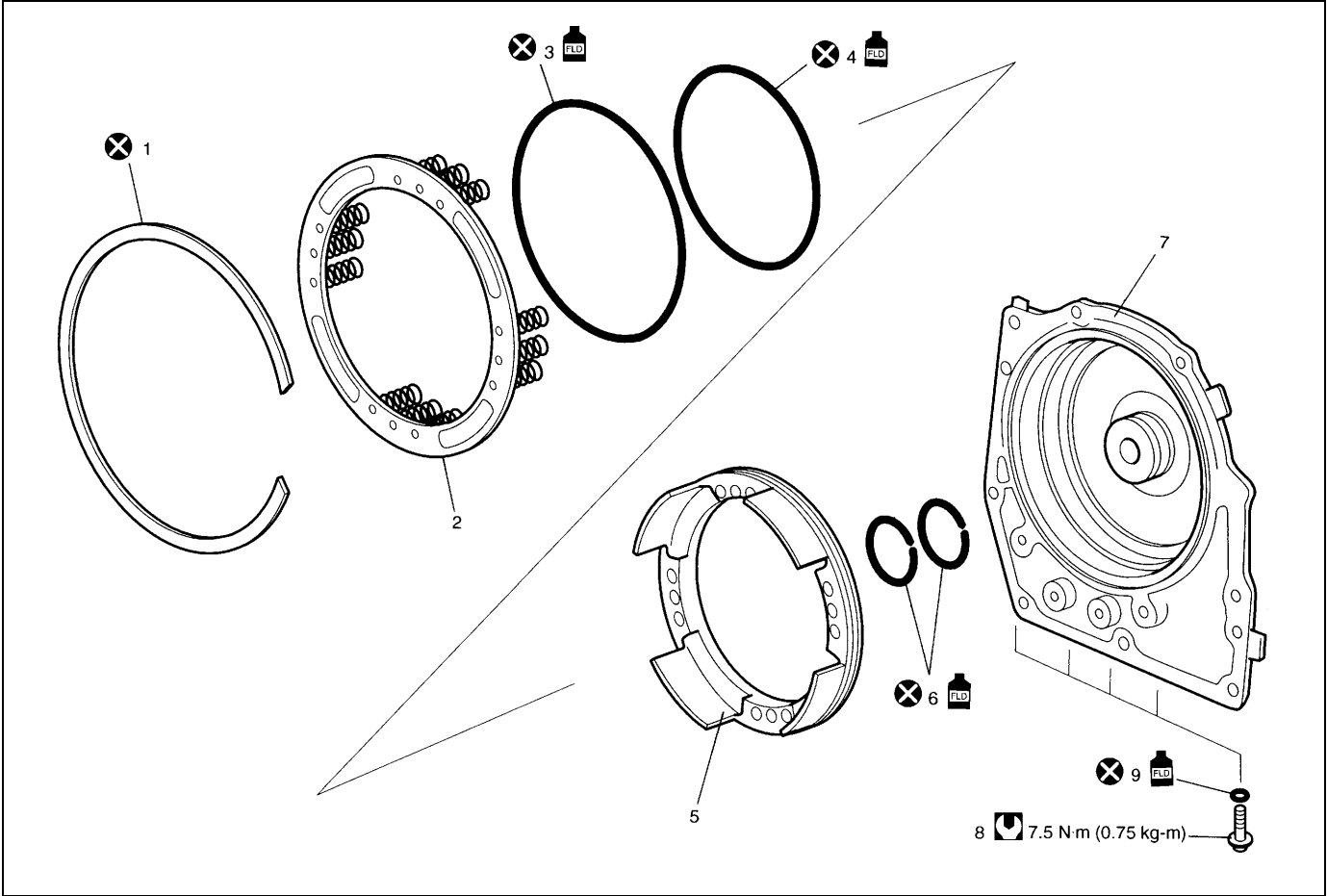
**ASSEMBLY**




Reverse disassembly procedure for assembly, noting the following points.

- Use new O-rings. Apply A/T fluid to the O-rings, before installation.
- Install 2nd brake piston (1) to which A/T fluid is applied to 2nd brake cylinder (2).  
Do not damage O-ring when installing 2nd brake piston.

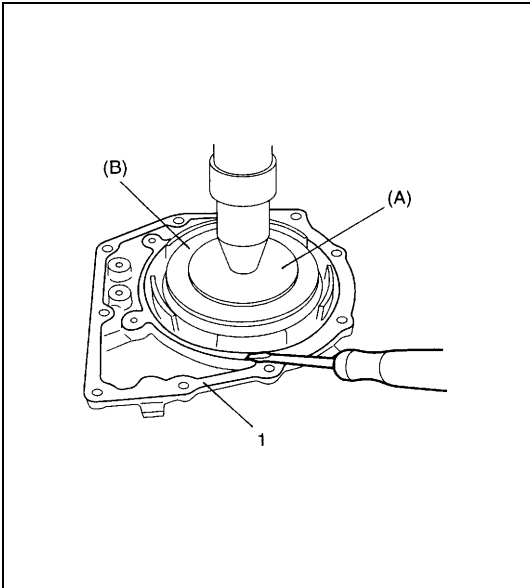


Transaxle rear cover and O/D and 2nd coast brake piston assembly



1. Snap ring	7. Transaxle rear cover
2. O/D and 2nd coast brake return spring subassembly	8. Rear cover plug
3. O/D and 2nd coast brake piston front O-ring	9. Rear cover plug O-ring
4. O/D and 2nd coast brake piston rear O-ring	 Apply automatic transaxle fluid.
5. O/D and 2nd coast brake piston	 Do not reuse.
6. Rear cover seal ring	 Tightening torque

DISASSEMBLY



CAUTION:

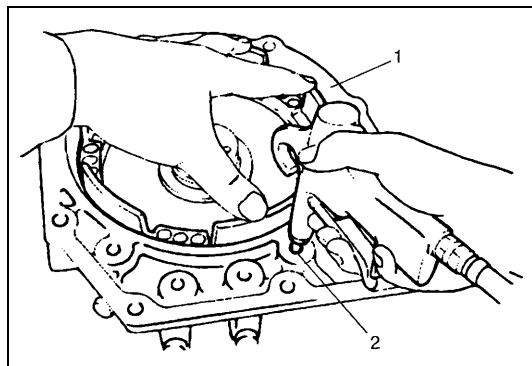
Do not press O/D and 2nd coast brake return spring sub-assembly in over 1.0 mm (0.039 in.). Excessive compression may cause damage to O/D and 2nd coast brake return spring subassembly and/or piston.

1) Remove snap ring by using special tools and hydraulic press.

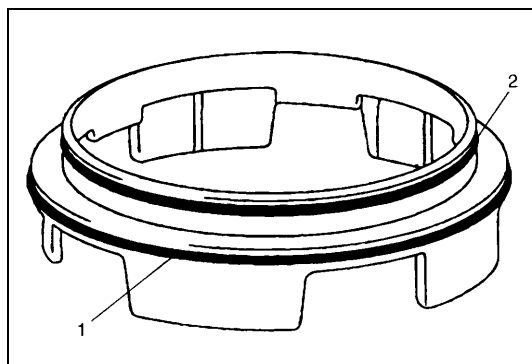
**Special tool**  
 (A) : 09926-96030  
 (B) : 09946-06710

2) Remove O/D and 2nd coast brake return spring assembly.

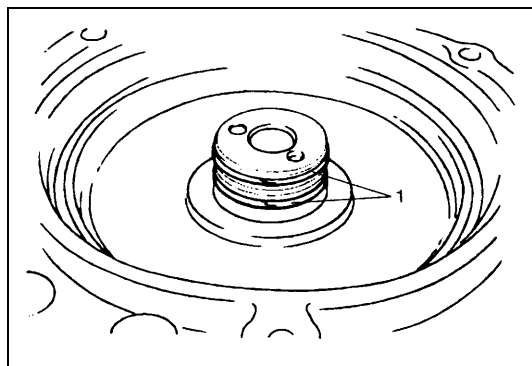
1. Transaxle rear cover



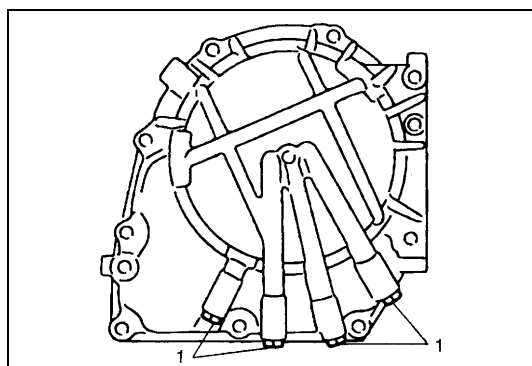
- 3) Apply compressed air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) to oil hole (2) of transaxle rear cover (1) to remove O/D and 2nd coast brake piston.



- 4) Remove O/D and 2nd coast brake piston front O-ring (1) and rear O-ring (2).

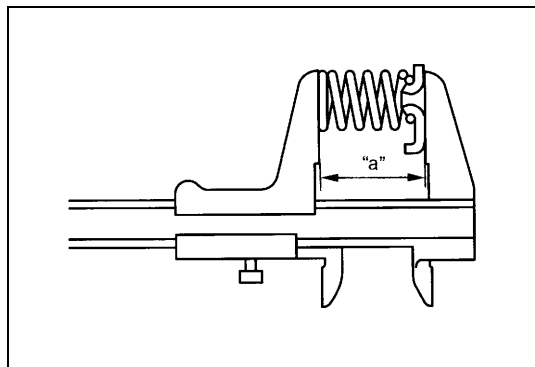


- 5) Remove rear cover seal rings (1).



- 6) Remove rear cover plugs (1).



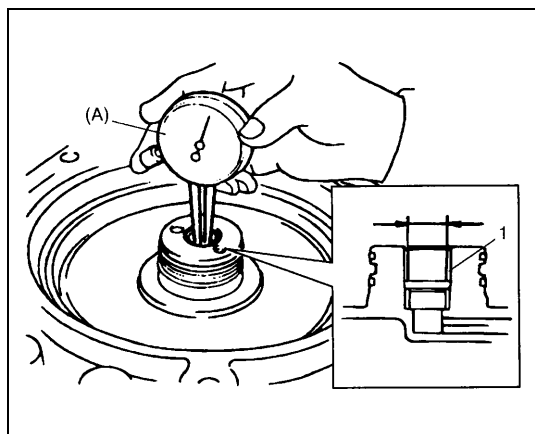
**INSPECTION****O/D and 2nd coast brake return spring subassembly**

Measure free length of O/D and 2nd coast brake return spring.

**Free length of O/D and 2nd coast brake return spring**  
**“a” : 18.99 mm (0.748 in.)**

**NOTE:**

- Do not apply excessive force when measuring spring free length.
- Perform measurement at several points.

**Transaxle rear cover bush**

- 7) Measure transaxle rear cover bush bore by using special tool.

**Special tool**

**(A) : 09900-20605**

**Transaxle rear cover bush bore**

**Standard : 13.94 – 14.00 mm (0.549 – 0.551 in.)**

If measured transaxle rear cover bush bore is out of specifications, replace transaxle rear cover with new one. In replacement, intermediate shaft subassembly also needs to be checked. Replace intermediate shaft subassembly, if necessary.

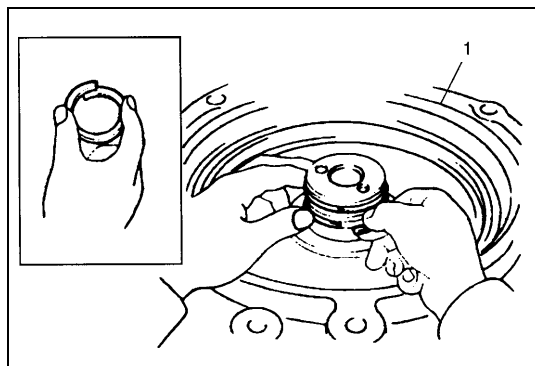
**ASSEMBLY**

Reverse disassembly procedure for assembly, noting the following points.

- Use new seal rings and O-rings. Apply A/T fluid to seal rings and O-rings before installation.
- Tighten rear cover plugs to specified torque.

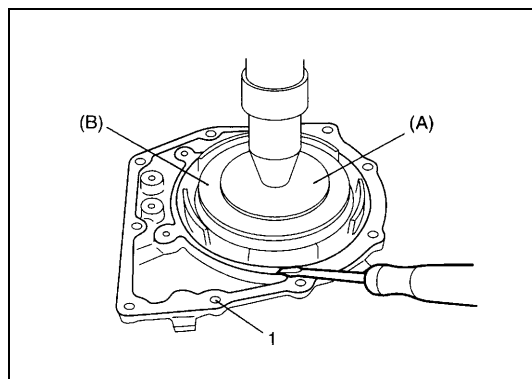
**Tightening torque**

**Rear cover plugs : 7.5 N·m (0.75 kg-m, 5.5 lb-ft)**



- Before installing rear cover seal ring, apply A/T fluid to ring. First, tighten seal ring to 5 mm (0.197 in.), then install seal ring.
- Do not open rear cover seal ring too wide to attach.

1. Transaxle rear cover



- Do not damage O/D and 2nd coast brake return spring sub-assembly and piston by pressing in O/D and 2nd coast brake return spring subassembly passing through its original installing position over 1.0 mm (0.039 in.).

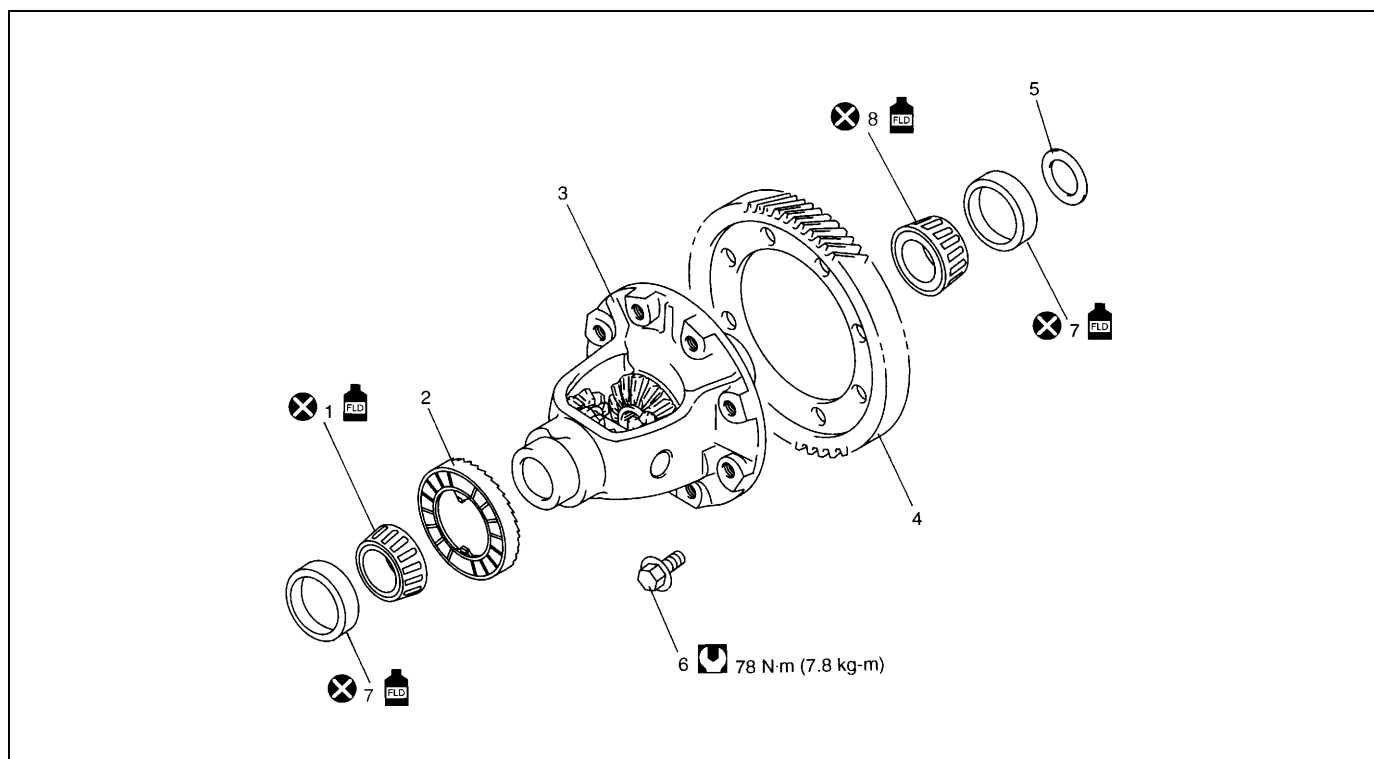
### Special tool




(A) : 09926-96030

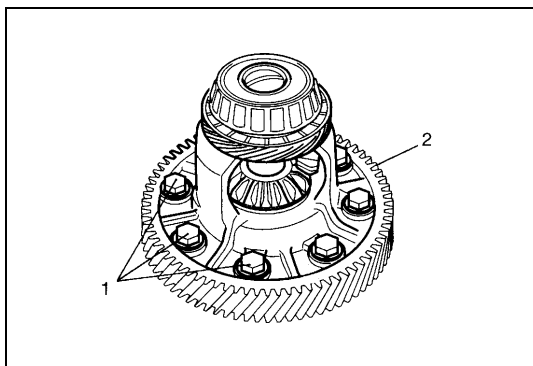
(B) : 09946-06710

1. Transaxle rear cover

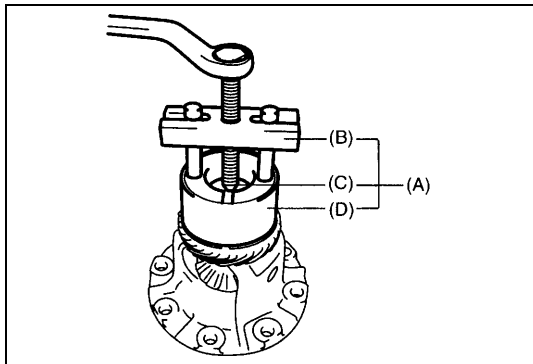
## Differential Assembly



1. Differential side RH bearing	7. Side bearing cup
2. Output shaft speed sensor/VSS drive gear	8. Differential side LH bearing
3. Differential case subassembly	 Apply automatic transaxle fluid.
4. Final gear	 Tightening torque
5. Side bearing shim	 Do not reuse.
6. Final gear bolt	

**DISASSEMBLY**

- 1) Remove final gear bolts (1), and then final gear (2).



- 2) Remove differential side RH bearing by using special tools.

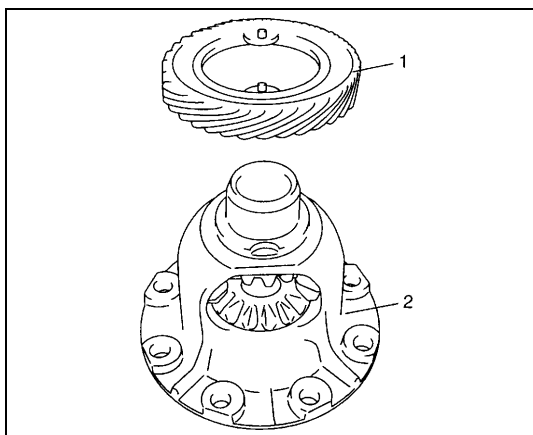
**Special tool**

(A) : 09926-37610

(B) : 09926-37610-001

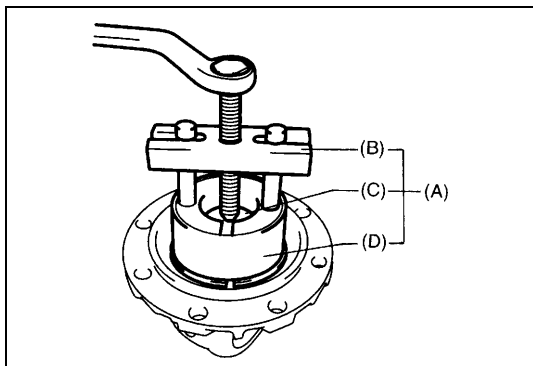
(C) : 09926-37610-003

(D) : 09926-47610-002



- 3) Remove output shaft speed sensor/VSS drive gear (1).

2. Differential case subassembly



- 4) Remove differential side LH bearing by using special tools.

**Special tool**

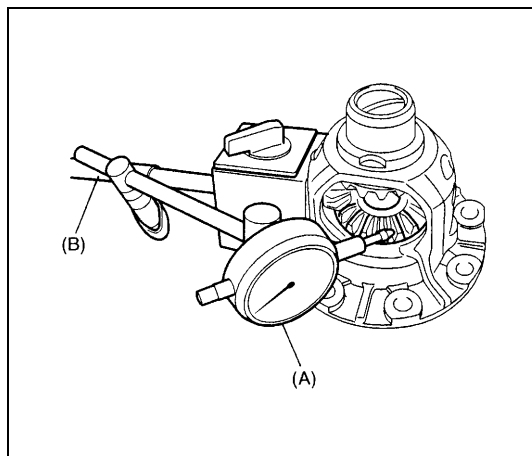
(A) : 09926-37610

(B) : 09926-37610-001

(C) : 09926-37610-003

(D) : 09926-37610-002

## INSPECTION



- 1) Hold differential case subassembly with soft jawed vice and set special tools as shown.

### Special tool

(A) : 09900-20607

(B) : 09900-20701

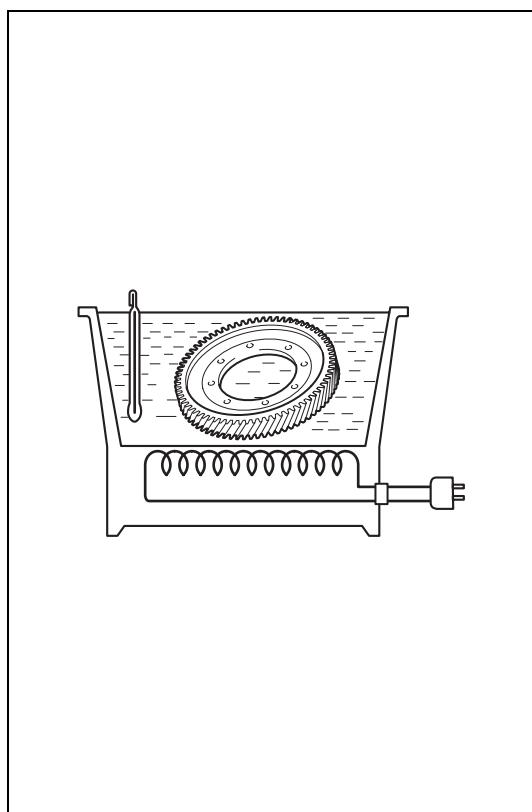
- 2) Measure differential gear thrust play.

### Differential gear thrust play:

0.05 – 0.20 mm (0.002 – 0.008 in.)

- 3) If thrust play is out of specification, replace differential case subassembly.

## ASSEMBLY



### WARNING:

- When taking warmed final driven gear out of vessel, use tongs or the like. Taking out it with bare hand will cause severe burn.
- While installing warmed final driven gear, use oven glove such as leather glove. Picking up it with bare hand may cause burn.

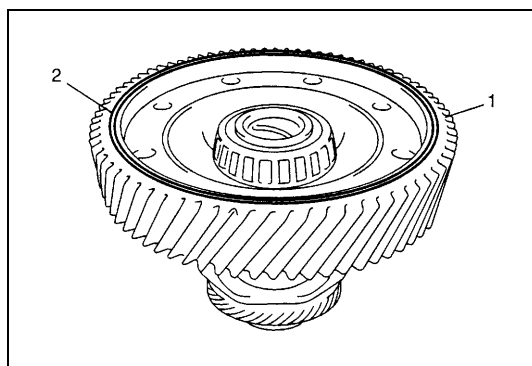
### CAUTION:

Do not leave final driven gear in boiling water for longer than 5 min. Overheating the gear may cause strength reduction of gear.

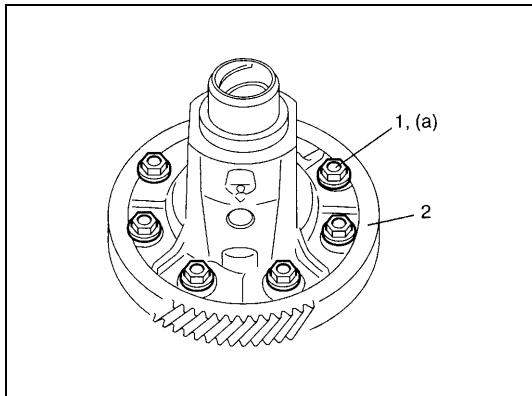
- 1) Put final driven gear in water vessel, heat and remove when it boils, then remove moisture.

### NOTE:

After removing moisture on final driven gear, install final driven gear to differential case as quickly as possible.



- 2) As shown in figure, facing groove (2) side upward, install final driven gear (1) to differential case.



- 3) Tighten final gear bolts (1) to specified torque.

#### Tightening torque

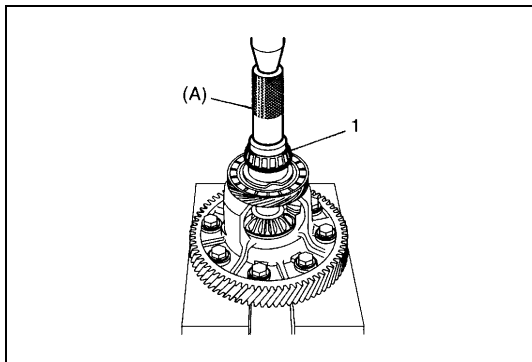
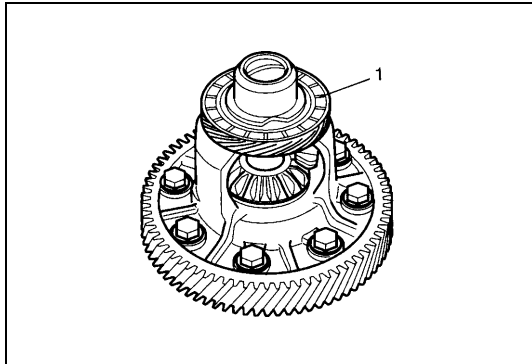
#### Final gear bolts

(a) : 78 N·m (7.8 kg-m, 56.5 lb-ft)

2. Final driven gear

#### NOTE:

- To avoid rust, apply A/T fluid to final driven gear after installation.
- 4) After applying A/T fluid to output shaft speed sensor/VSS drive gear (1), install output shaft speed sensor drive gear.



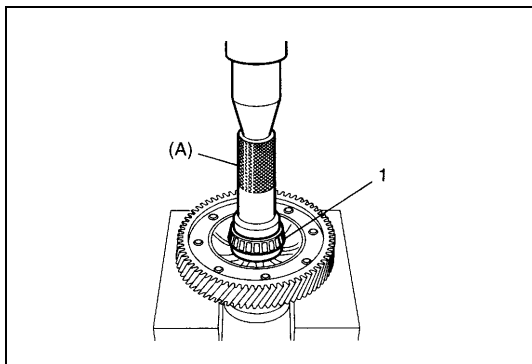
- 5) Install new differential side RH bearing (1) by using special tool and hydraulic press.

#### Special tool

(A) : 09913-70123

#### NOTE:

Replace differential side RH bearing together with bearing cup as a set.



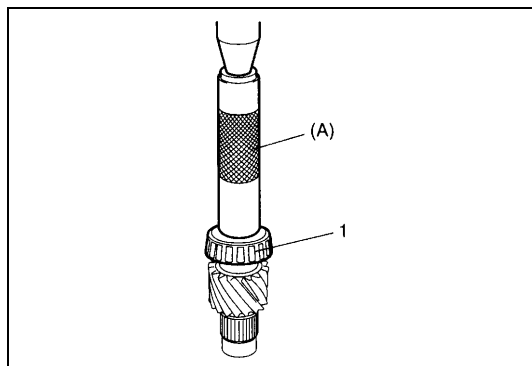
- 6) Install new differential side LH bearing (1) by using special tool and hydraulic press.

#### Special tool

(A) : 09913-70123

#### NOTE:

Replace differential side LH bearing together with bearing cup as a set.

**ASSEMBLY**

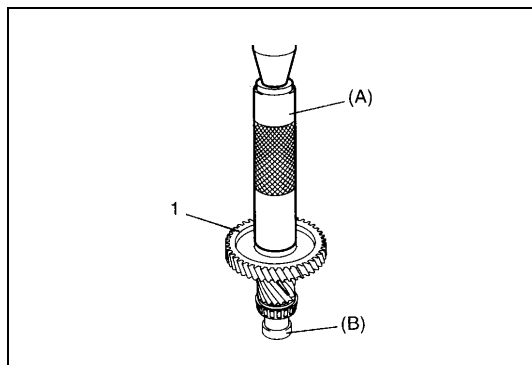
- 1) Install new countershaft RH bearing (1) by using special tool and hydraulic press.

**Special tool**

(A) : 09913-84510

**NOTE:**

**Replace countershaft RH bearing together with bearing cup as a set.**

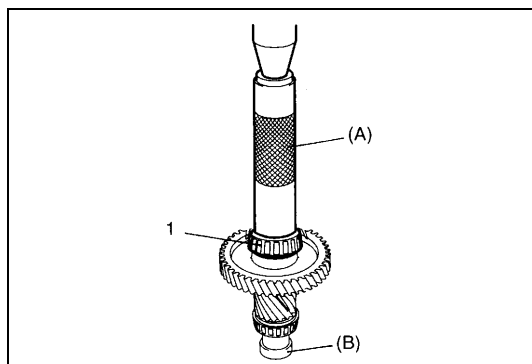


- 2) Install reduction driven gear (1) with special tools and hydraulic press.

**Special tool**

(A) : 09913-84510

(B) : 09925-88210



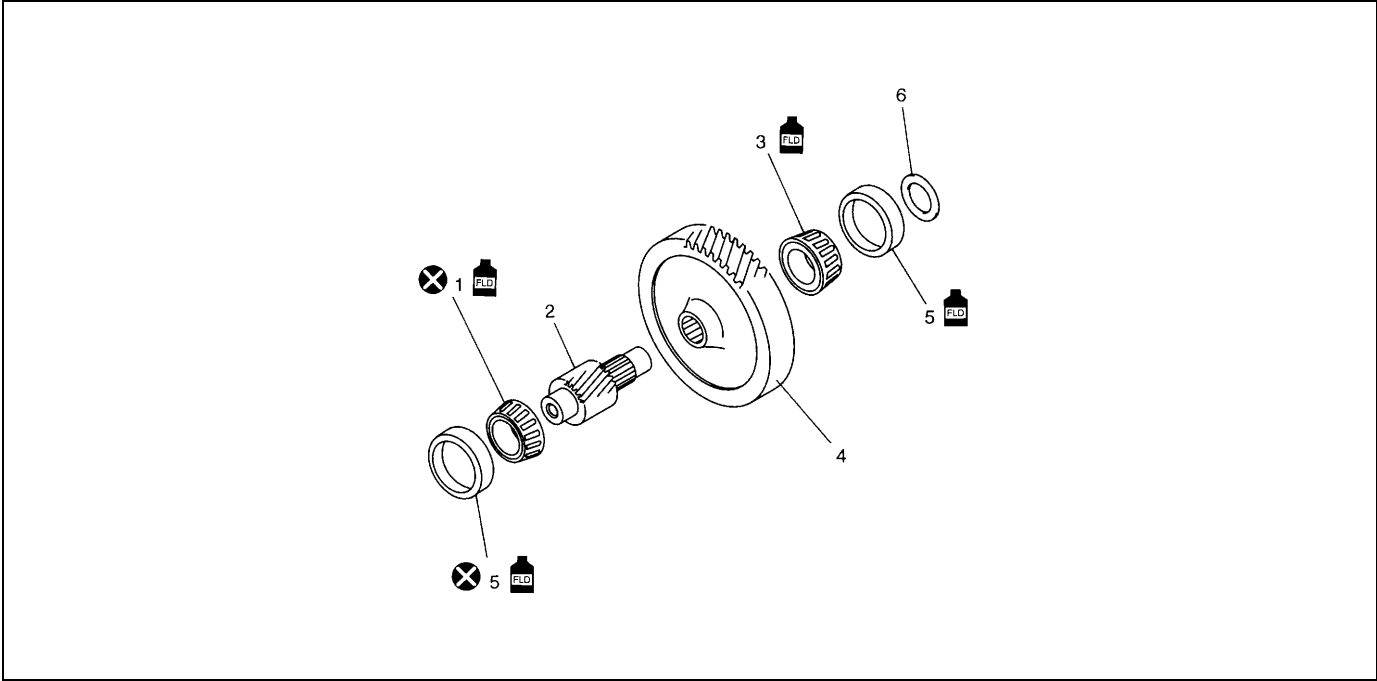
- 3) Install countershaft LH bearing (1) with special tools and hydraulic press.



**Special tool**

(A) : 09913-84510

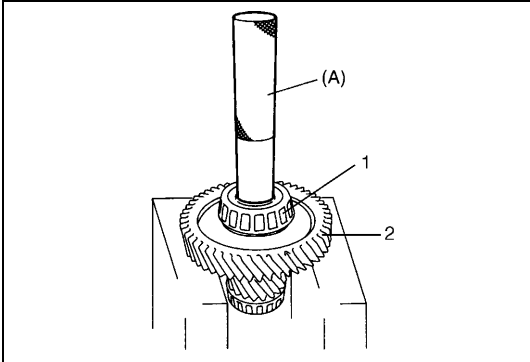
(B) : 09925-88210

Countershaft assembly



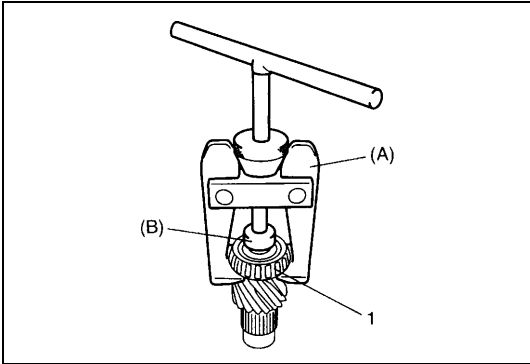
1. Countershaft RH bearing	5. Bearing cap
2. Countershaft	6. Countershaft bearing shim
3. Countershaft LH bearing	 Apply automatic transaxle fluid.
4. Reduction driven gear	 Do not reuse.

DISASSEMBLY



1) Remove countershaft LH bearing (1) and reduction driven gear (2) at once by using special tool and hydraulic press.

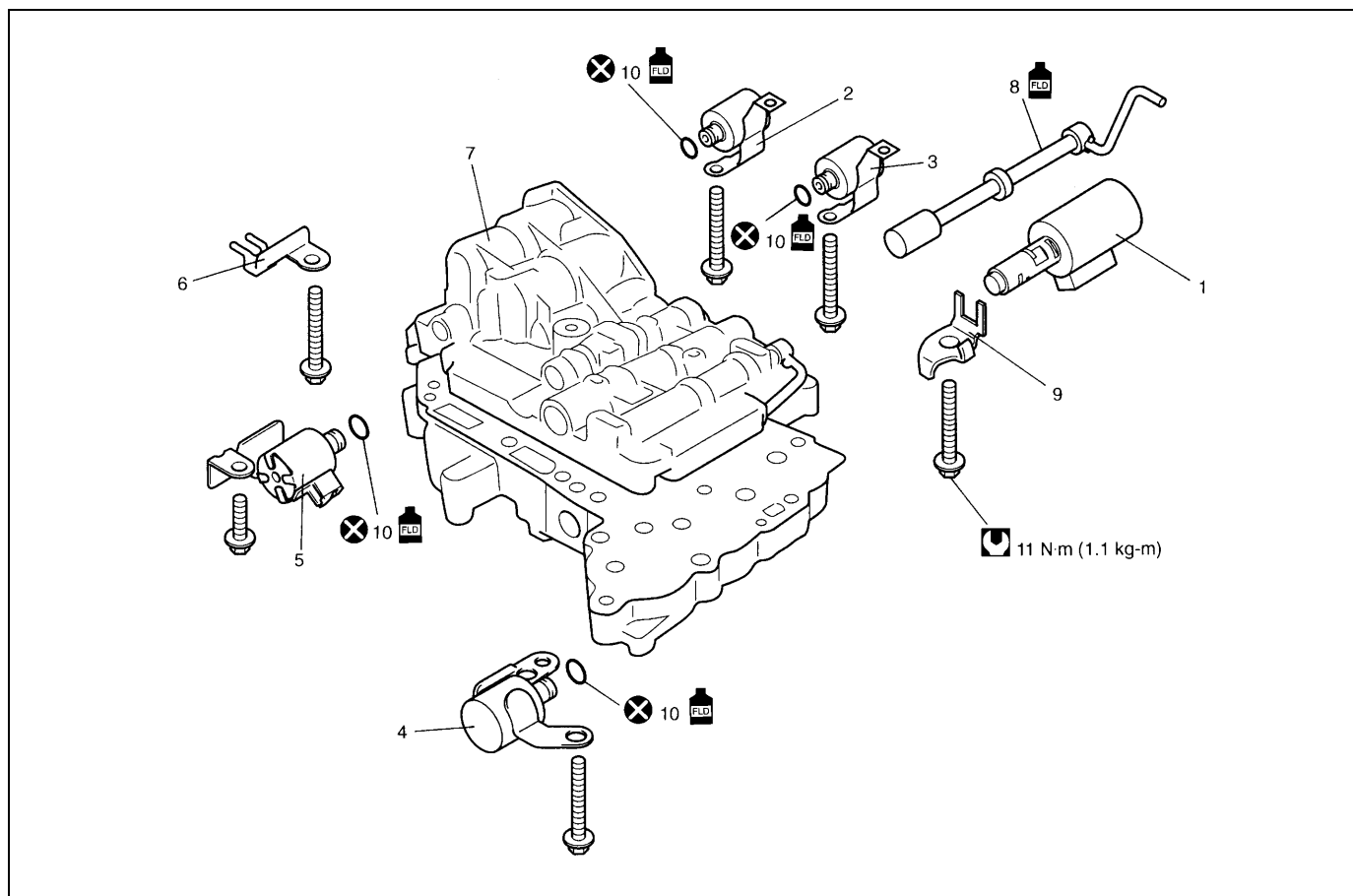
**Special tool**  
**(A) : 09925-98221**






2) Remove countershaft RH bearing (1) by using special tools.

**Special tool**  
**(A) : 09913-61510**  
**(B) : 09926-58010**

## Valve body assembly

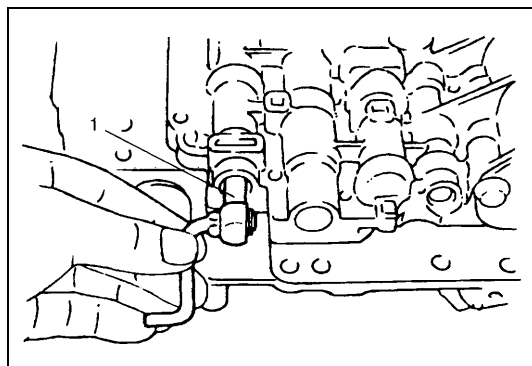


1. Pressure control solenoid valve	8. Manual valve
2. Shift solenoid valve-A/No.1	9. Solenoid lock plate
3. Shift solenoid valve-B/No.2	10. O-ring
4. TCC/Lock-up solenoid valve	 Apply automatic transaxle fluid.
5. Timing solenoid valve	 Tightening torque
6. Temperature sensor clamp	 Do not reuse.
7. Valve body assembly	

### CAUTION:

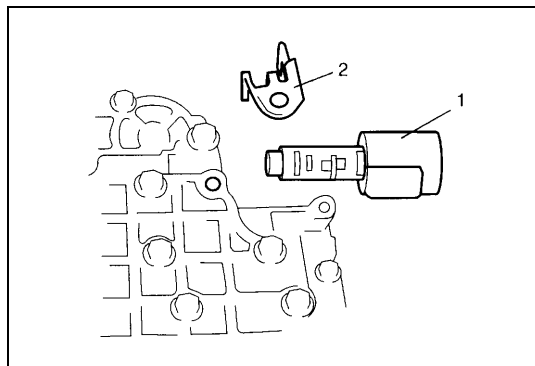
When replacing pressure control solenoid valve, it is strictly required to replace it together with valve body assembly as a set. Replacing pressure control solenoid independently may cause excessive shift shock.

### DISASSEMBLY



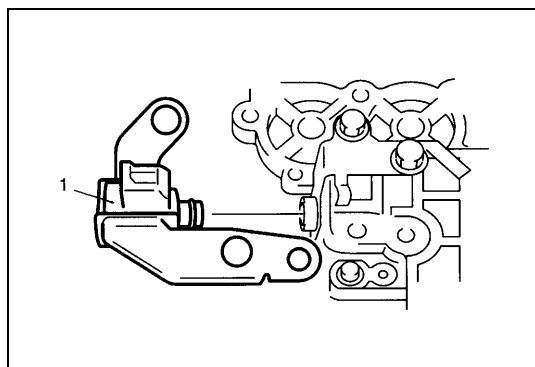
- 1) Pull out manual valve (1).



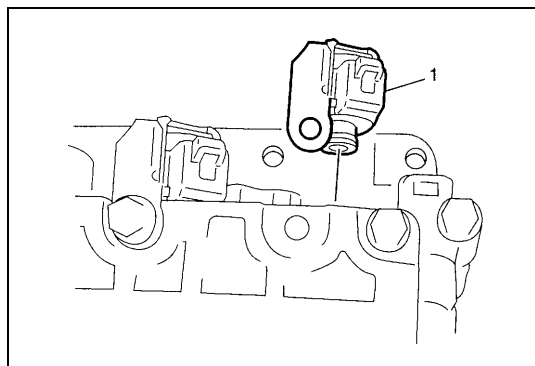


2) Remove pressure control solenoid valve (1).

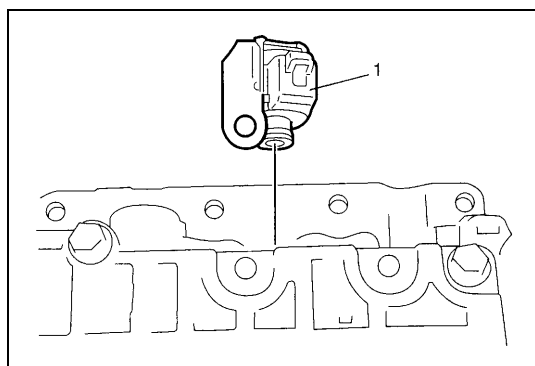
2. Solenoid lock plate



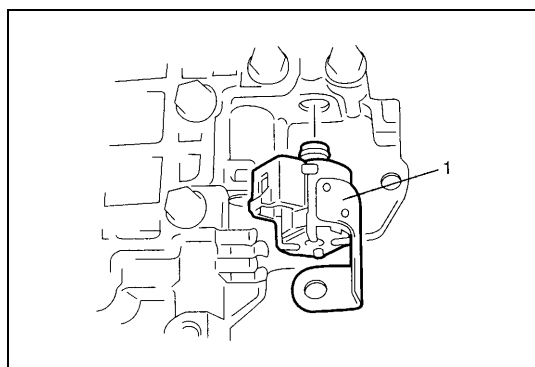
3) Remove TCC solenoid valve (1).



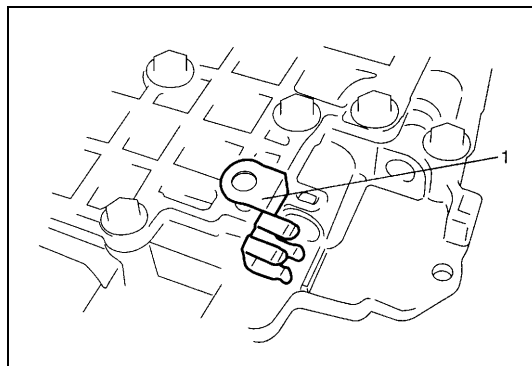
4) Remove shift solenoid valve-A (1).



5) Remove shift solenoid valve-B (1).



6) Remove timing solenoid valve (1).



7) Remove temperature sensor clamp (1).

## ASSEMBLY

Reverse disassembly procedure for assembly, noting following points.

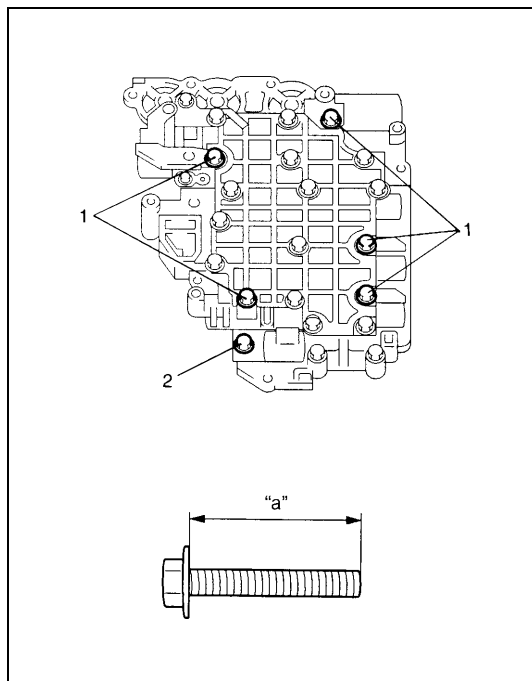
- Shift solenoid valve-A and -B are identical
- After applying A/T fluid to new O-rings, fit them to solenoid valves, then install solenoid valves to valve body.
- Tighten solenoid valve bolts to specified torque

### Tightening torque

#### Solenoid valve bolts

(a) : 11 N·m (1.1 kg-m, 8.0 lb-ft)

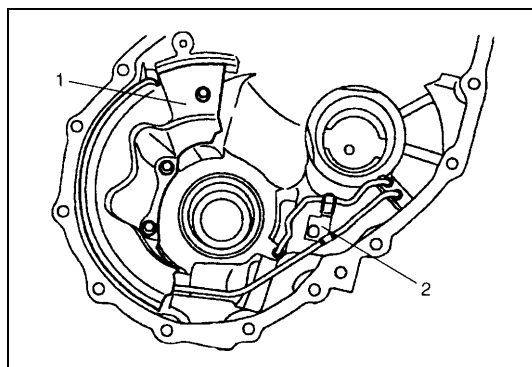
Bolt	Length "a"	Pieces
A (1)	49 mm (1.93 in.)	5
B (2)	20 mm (0.79 in.)	1

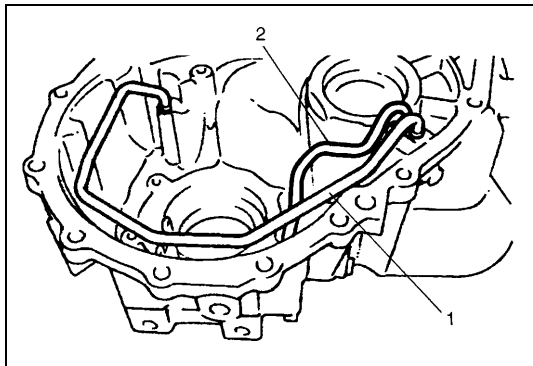


## Torque converter housing

### DISASSEMBLY

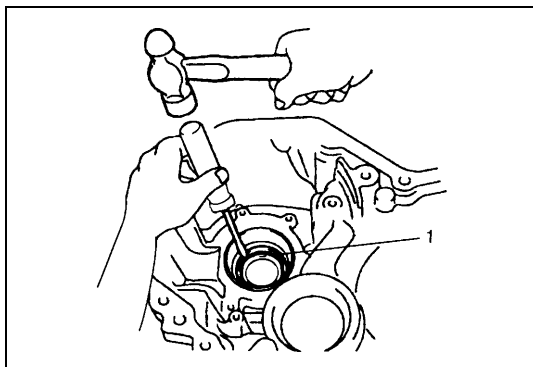
- 1) Remove fluid reservoir RH plate (1) and lubrication tube clamp (2).



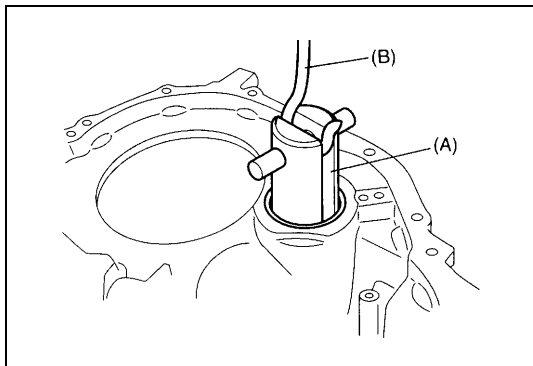
**NOTE:**

**Do not bend lubrication tube with excessive force.**

- 2) Remove lubrication LH tube (1) and RH tube (2).



- 3) Remove differential side oil seal (1).

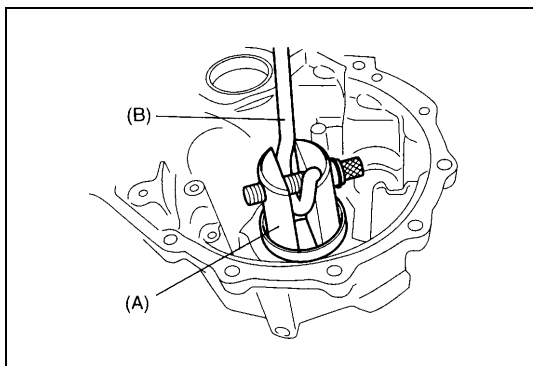


- 4) Remove countershaft RH bearing cup by using special tools.

**Special tool**

**(A) : 09944-96011**

**(B) : 09942-15511**

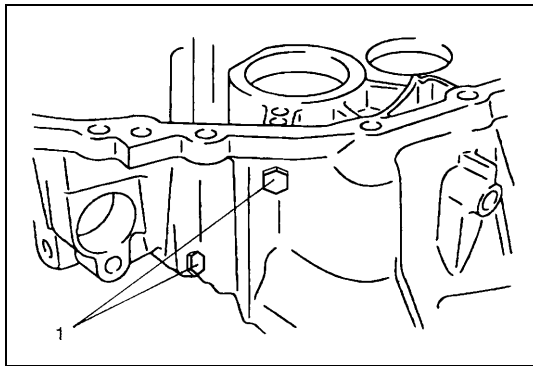


- 5) Remove differential side RH bearing cup by using special tools.

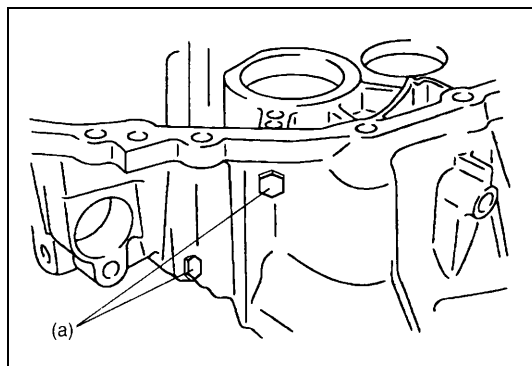
**Special tool**

**(A) : 09944-96011**

**(B) : 09942-15511**



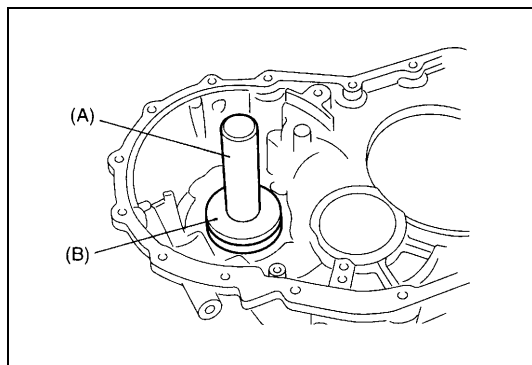
- 6) Remove torque converter case plugs (1).

**ASSEMBLY**

- 1) After applying A/T fluid to new O-rings, fit them to housing plugs. Finally install plugs to torque converter housing.

**Tightening torque****Torque converter housing plugs**

(a) : 7.5 N·m (0.75 kg-m, 5.5 lb-ft)

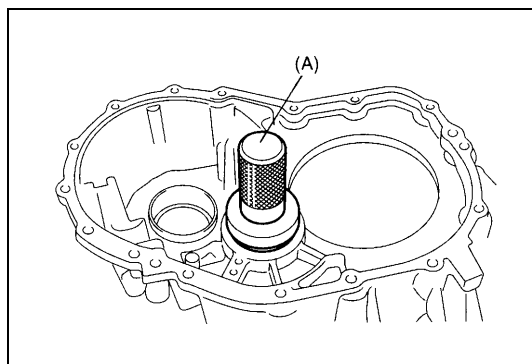


- 2) Using special tools, assemble differential side RH bearing cup.

**Special tool**

(A) : 09924-74510

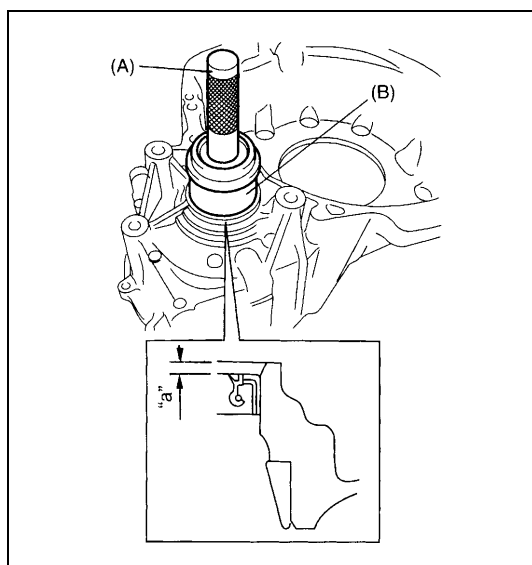
(B) : 09944-68210



- 3) Using special tool, install countershaft RH bearing cup.

**Special tool**

(A) : 09913-75520



- 4) Using special tools, install new differential side oil seal to torque converter housing.

**Special tool**

(A) : 09924-74510

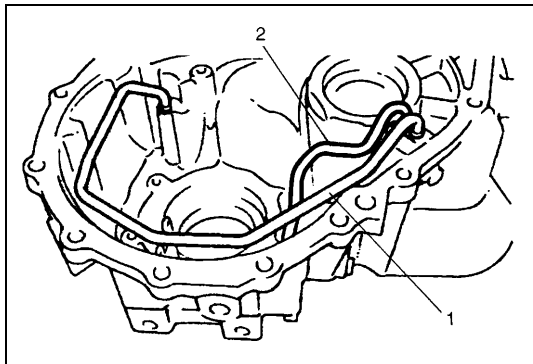
(B) : 09944-88220

**Differential side oil seal installing depth “a” : 2.6 – 3.6 mm**

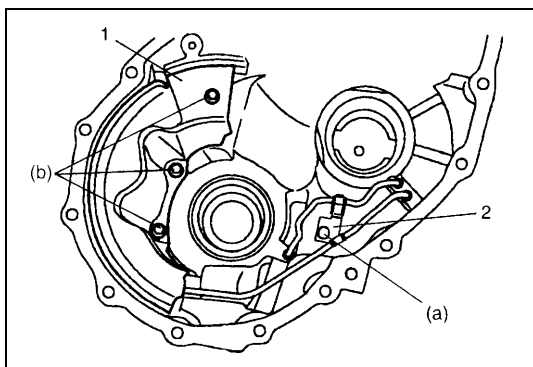
**(0.10 – 0.14 in.)**

- 5) Apply grease to oil seal lip.

**Grease 99000-25030**



6) Install lubrication LH tube (1) and RH tube (2).



7) Install fluid reservoir RH plate (1) and lubrication tube clamp (2).

**Tightening torque**

**Lubrication tube clamp bolt**

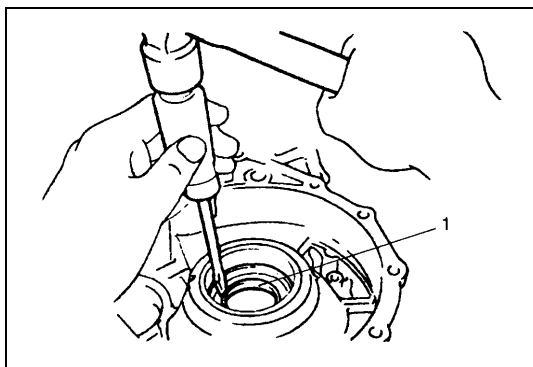
(a) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

**Fluid reservoir RH plate bolts**

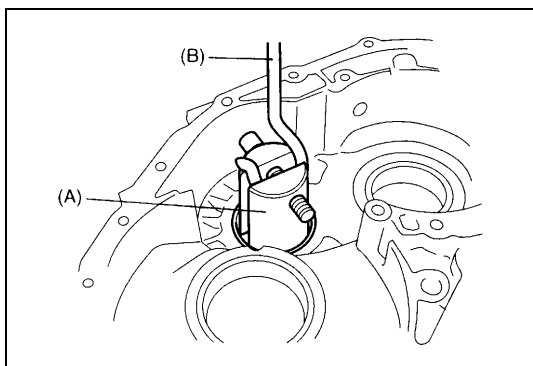
(b) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)

**Transaxle case**

**DISASSEMBLY**



1) Remove differential side oil seal (1).

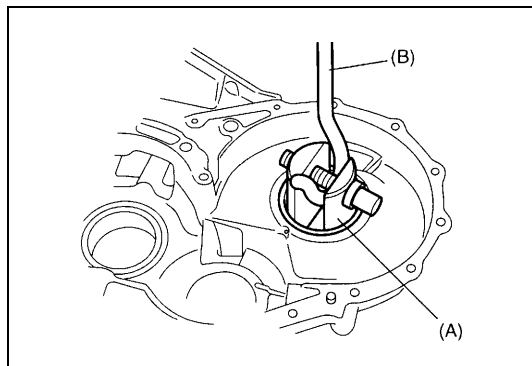


2) Remove countershaft LH bearing cup and shim with special tools.

**Special tool**

(A) : 09944-96011

(B) : 09942-15511



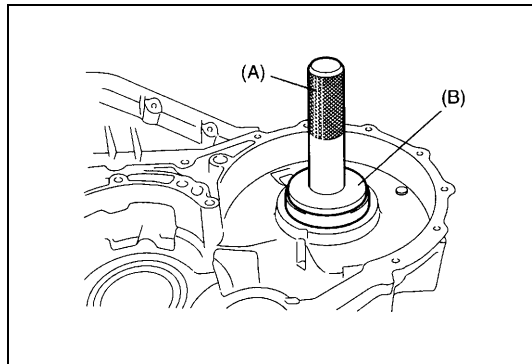
- 3) Remove differential side LH bearing cup and shim with special tools.

**Special tool**

(A) : 09944-96011

(B) : 09942-15511

**ASSEMBLY**



- 1) Using special tools, assemble shim and differential side LH bearing cup.

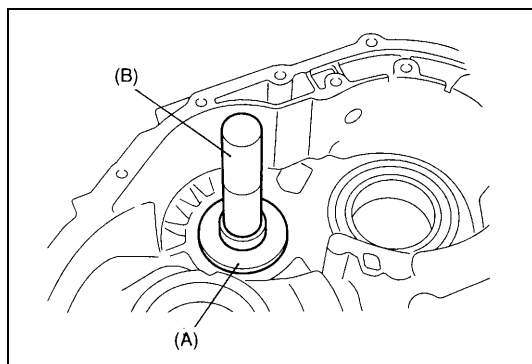
**Special tool**

(A) : 09924-74510

(B) : 09944-68210

**NOTE:**

Use shim with same thickness as the removed one.



- 2) Using special tools, assemble shim and countershaft LH bearing cup.

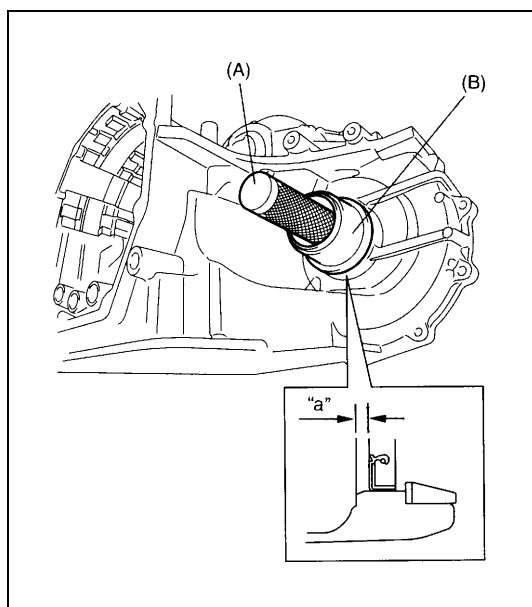
**Special tool**

(A) : 09924-84510-002

(B) : 09913-75821

**NOTE:**

Use shim with same thickness as the removed one.



- 3) Install new differential side oil seal to transaxle case by using special tools.

**Special tool**

(A) : 09924-74510

(B) : 09944-88220

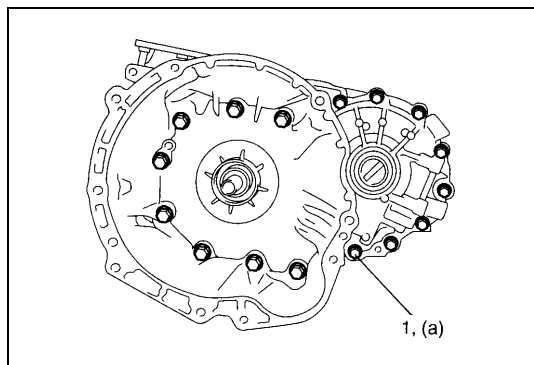
Differential side oil seal installing depth "a" : 3.8 – 4.8 mm (0.15 – 0.19 in.)

- 4) Apply grease to oil seal lip.

Grease 99000-25030

## Adjustment before unit assembly

### Differential side bearing preload

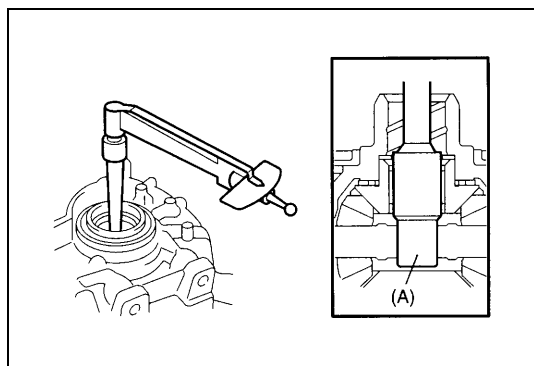


- 1) After applying A/T fluid to differential assembly, fit it to transaxle case.
- 2) Install torque converter housing to transaxle case, then tighten bolts (1) to specified torque.

#### Tightening torque

##### Torque converter housing bolts

(a) : 33 N·m (3.3 kg·m, 24.0 lb·ft)



- 3) Measure bearing preload "a" by using a special tool.

#### Special tool

(A) : 09928-06050

#### Differential side bearing preload measured as starting torque

##### In the case of new bearing

"a" : 0.8 – 1.4 N·m (8.0 – 14.0 kg·cm, 0.58 – 1.01 lb·ft)

##### In the case of reused bearing

"a" : 0.4 – 0.7 N·m (4.0 – 7.0 kg·cm, 0.29 – 0.51 lb·ft)

- 4) If bearing preload is out of specification, select shim with suitable thickness from among the list below and replace it. Then adjust differential side bearing preload within specification.

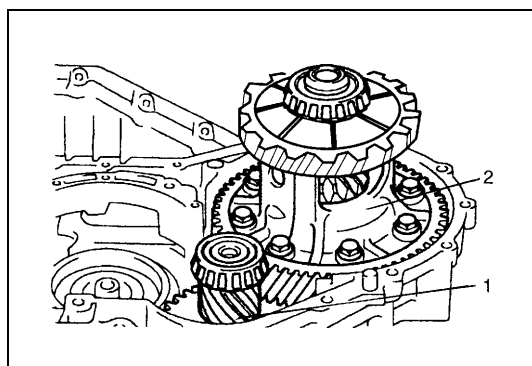
## Available shim thickness

Thickness	Identification mark
1.80 mm (0.070 in.)	A
1.85 mm (0.072 in.)	B
1.90 mm (0.074 in.)	C
1.95 mm (0.076 in.)	D
2.00 mm (0.078 in.)	E
2.05 mm (0.080 in.)	F
2.08 mm (0.081 in.)	G
2.11 mm (0.083 in.)	H
2.14 mm (0.084 in.)	J
2.17 mm (0.085 in.)	K
2.20 mm (0.087 in.)	L
2.23 mm (0.088 in.)	M
2.26 mm (0.089 in.)	N
2.29 mm (0.090 in.)	P
2.32 mm (0.091 in.)	Q
2.35 mm (0.092 in.)	R
2.40 mm (0.094 in.)	S
2.45 mm (0.096 in.)	T
2.50 mm (0.098 in.)	U
2.55 mm (0.100 in.)	V
2.60 mm (0.102 in.)	W
2.65 mm (0.104 in.)	X
2.70 mm (0.106 in.)	Y

**NOTE:**

Record measured value “a”, because it is necessary to adjust counter shaft bearing preload.

- 5) Remove differential assembly.

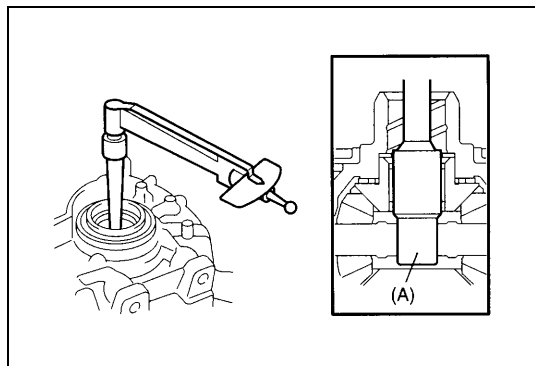
**Counter shaft bearing preload**

- 1) After applying A/T fluid to countershaft assembly (1) and differential assembly (2), fit them.
- 2) Install torque converter housing to transaxle case, then tighten bolts to specified torque.

**Tightening torque**

**Torque converter housing bolts : 30 N·m (3.0 kg-m, 21.5 lb-ft)**





- 3) Measure bearing preload “b” by using special tool.

**Special tool**

**(A) : 09928-06050**

Counter shaft bearing preload “c” = “b” – Differential side bearing preload “a”

**Counter shaft bearing preload measured as starting torque**

**In the case of new bearing**

**“c” : 0.33 – 0.76 N·m (3.3 – 7.6 kg-cm, 0.24 – 0.55 lb-ft)**

**In the case of reused bearing**

**“c” : 0.17 – 0.38 N·m (1.7 – 3.8 kg-cm, 0.12 – 0.28 lb-ft)**

- 4) If bearing preload is out of specification, select shim with suitable thickness from among the list below and replace it. Then adjust countershaft bearing preload within specification.

**Available shim thickness**

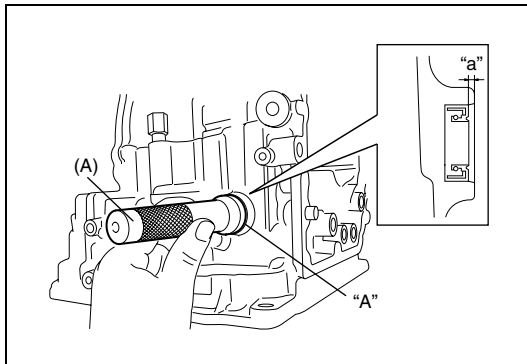
Thickness	Identification mark
1.70 (0.066 in.)	1
1.75 (0.068 in.)	2
1.80 (0.070 in.)	3
1.85 (0.072 in.)	4
1.90 (0.074 in.)	5
1.93 (0.075 in.)	6
1.96 (0.077 in.)	7
1.99 (0.078 in.)	A
2.02 (0.079 in.)	B
2.05 (0.080 in.)	C
2.08 (0.081 in.)	D
2.11 (0.083 in.)	E
2.14 (0.084 in.)	F
2.17 (0.085 in.)	G
2.20 (0.086 in.)	H
2.25 (0.088 in.)	K
2.30 (0.090 in.)	L
2.35 (0.092 in.)	M
2.40 (0.094 in.)	N
2.45 (0.096 in.)	P
2.50 (0.098 in.)	Q
2.55 (0.100 in.)	R
2.60 (0.102 in.)	S
2.65 (0.104 in.)	U
2.70 (0.106 in.)	W

- 5) Remove differential assembly and counter shaft assembly.

## Unit Assembly

### CAUTION:

- Automatic transaxle consists of highly precise parts. As even flaw in small part may cause oil leakage or decrease in function, check each part carefully before installation.
- Clean all parts with compressed air. Never use wiping cloths or rags.
- Before assembling new clutch or brake discs, soak them in automatic transaxle fluid for at least 2 hours.
- Be sure to use new gaskets and O-rings.
- Lubricate O-rings with automatic transaxle fluid.
- Apply automatic transaxle fluid on sliding or rotating surfaces of the parts before assembly.
- Use Suzuki Super Grease "C" to retain parts in place.
- Be sure to install thrust bearings and races in correct direction and position.
- Make sure that snap ring ends are not aligned with one of cutouts and are installed in groove correctly.
- Do not use adhesive cements on gaskets and similar parts.
- Be sure to torque each bolt and nut to specification.



- 1) Install new manual shift shaft oil seal to transaxle case.  
Use special tool and hammer to install it, and then apply grease to its lip.

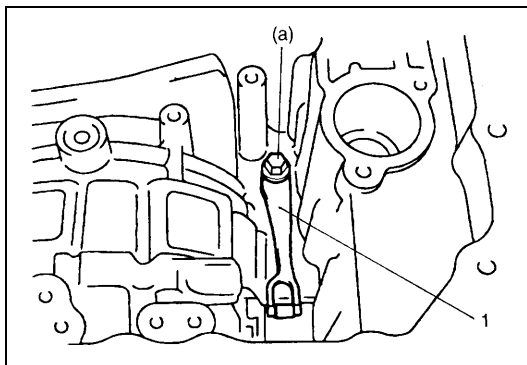
#### Special tool

(A) : 09925-98210

"A" : Grease 99000-25030

#### Manual shift shaft oil seal installing depth

"a" : 0.75 – 1.25 mm (0.03 – 0.05 in.)

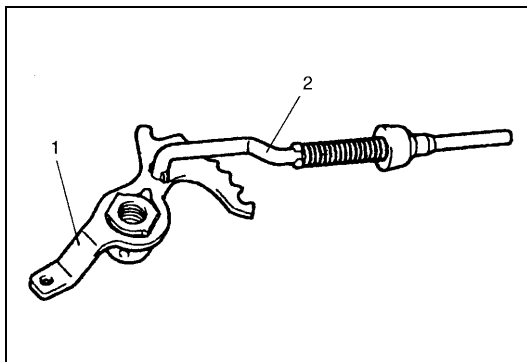


- 2) Install manual detent spring (1) to transaxle case and tighten manual detent spring bolt to specified torque.

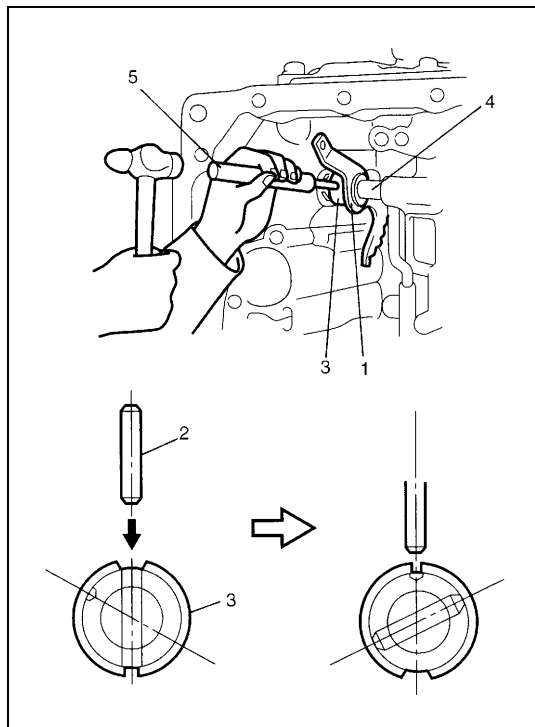
#### Tightening torque

##### Manual detent spring bolt

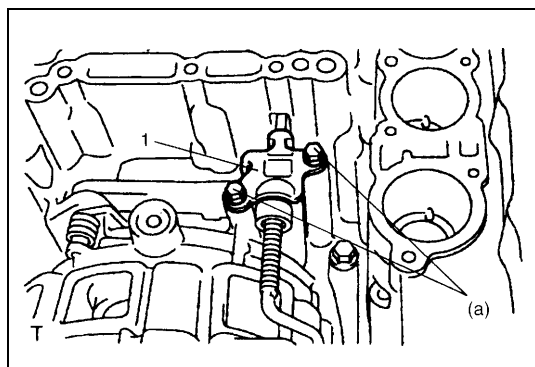
(a) : 10 N·m (1.0 kg-m, 7.5 lb-ft)



- 3) Install parking lock pawl rod (2) to manual valve lever (1).



- 4) After applying A/T fluid to new manual valve lever (1), install new manual shift shaft (4), new spacer (3) and manual valve lever to transaxle case.
- 5) After installing manual valve lever pin (2) by using spring pin remover with 3 mm (0.12 in.) in diameter (5) and hammer, turn spacer to set the position as shown in the figure. Then calk spacer with a punch.

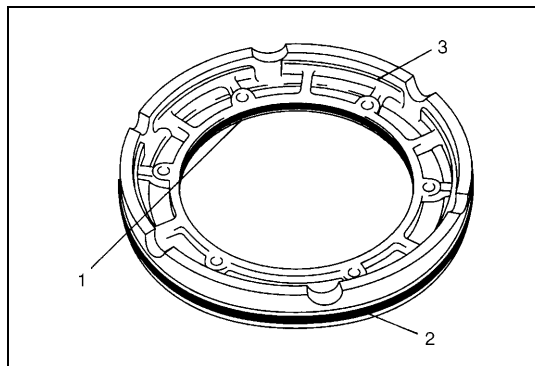


- 6) Install parking lock pawl bracket (1) to transaxle case.

#### **Tightening torque**

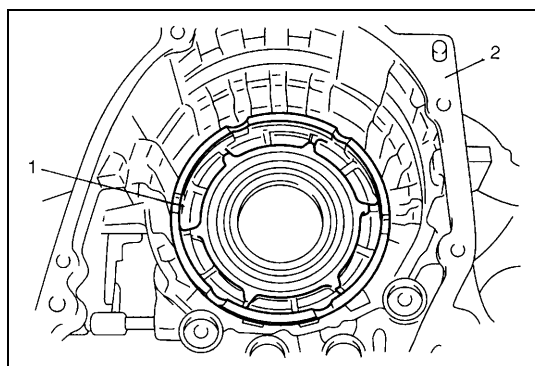
#### **Parking lock pawl bracket bolts**

(a) : 7.5 N·m (0.75 kg-m, 5.5 lb-ft)



- 7) After applying A/T fluid to new O-rings, install them to 1st and reverse brake piston (3).

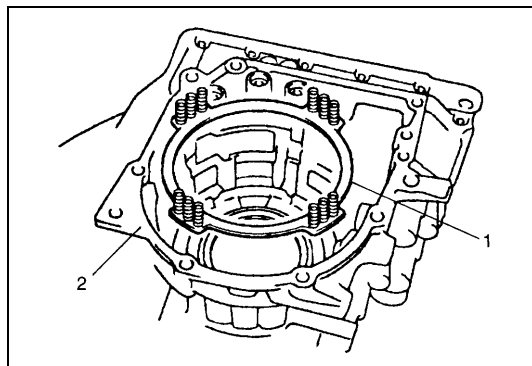
1. Inner O-ring
2. Outer O-ring



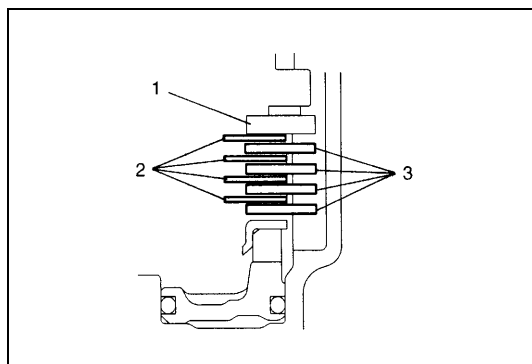
- 8) Install 1st and reverse brake piston (1) to transaxle case (2).

#### **NOTE:**

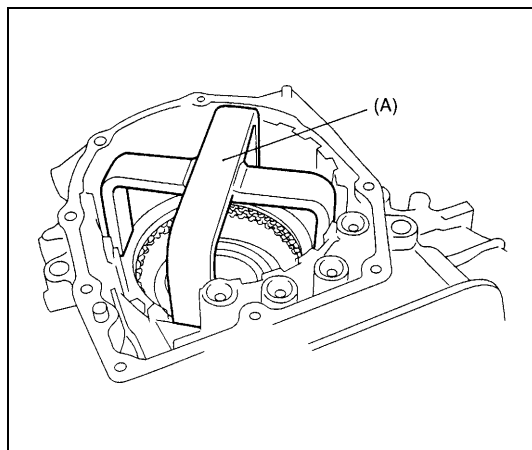
**Be careful not to damage O-ring when installing 1st and reverse brake piston.**



- 9) Install 1st and reverse brake return spring subassembly (1) to transaxle case (2).



- 10) Apply A/T fluid to 1st and reverse brake discs (2) separator plates (3) and retaining plate (1), then install them to transaxle case.



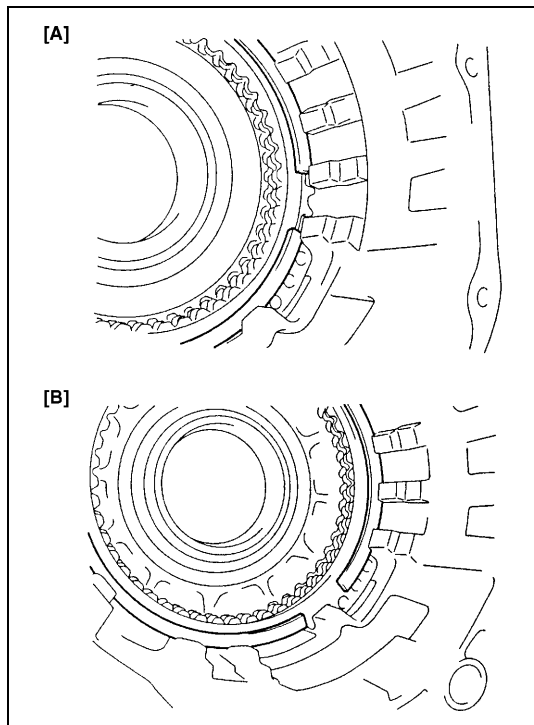
**CAUTION:**

**Do not damage 1st and reverse brake return spring subassembly discs, plates and piston by pressing in 1st and reverse brake return spring subassembly passing through its original installing position over 0.8 mm (0.031 in.)**

- 11) Compress 1st and reverse brake return spring using special tool and hydraulic press, then attach snap ring.

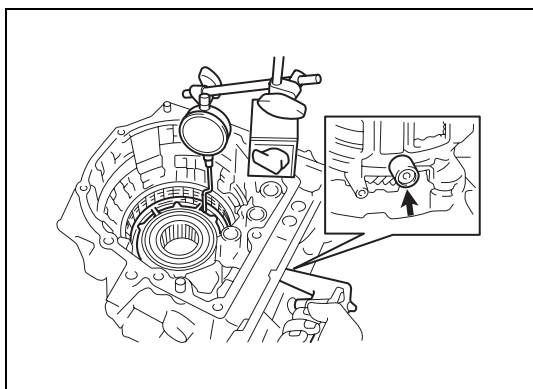
**Special tool**

**(A) : 09926-97620**



- 12) Install 1st and reverse brake plate snap ring so that its both ends would be positioned in correct locations as shown in figure.

[A]	Correct
[B]	Incorrect



- 13) Using special tools, measure 1st and reverse brake piston stroke when compressed air (400 – 800 kPa, 4 – 8 kg/cm<sup>2</sup>, 57 – 113 psi) is blown through oil hole.

#### Special tool

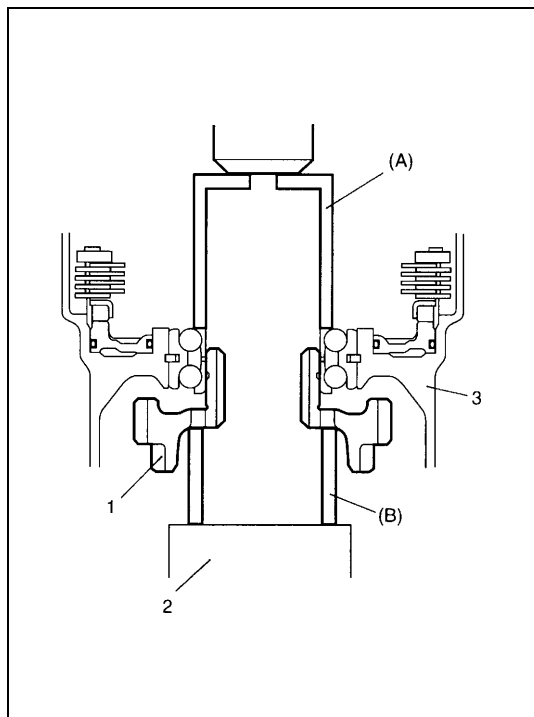
(A) 09900-20607

(B) 09900-20701

(C) 09952-06020

#### 1st and reverse brake piston stroke

Standard : 0.791 – 1.489 mm (0.0311 – 0.0586 in.)



#### CAUTION:

- Do not use transaxle case as groundwork to press fit reduction drive gear.
- Do not give load more than 20 kN (2000 kg, 4410 lb) with hydraulic press. Otherwise, it may result in damaging reduction drive gear bearing.

- 14) Install reduction drive gear (1) to transaxle case (3) by using special tools and hydraulic press.

#### Special tool

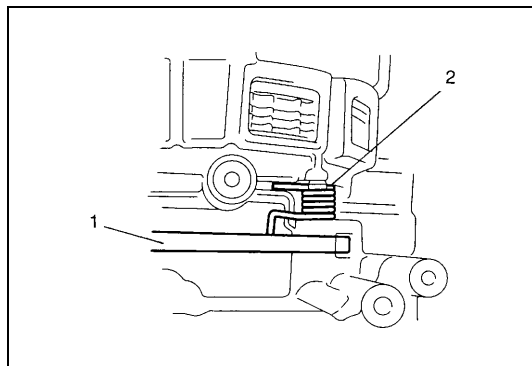
(A) : 09951-18210

(B) : 09944-78210

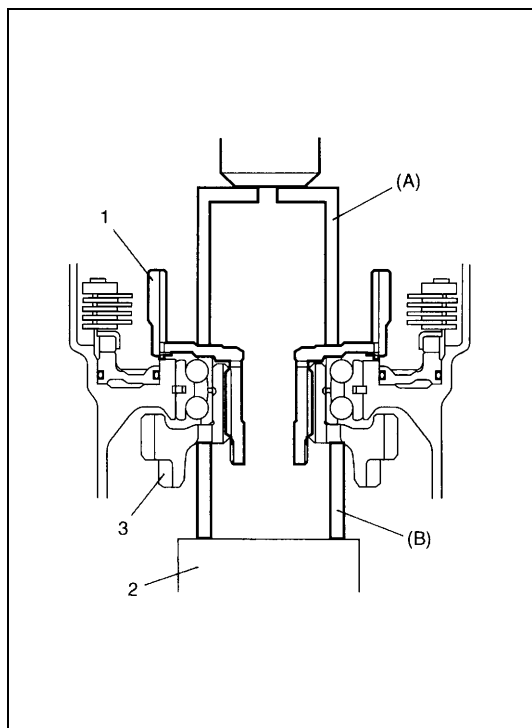
2. Stand that can slightly lift transaxle case.

#### NOTE:

When replacing reduction drive gear, replace it together with reduction driven gear as a set.



- 15) Install parking lock pawl (1) and spring (2). Apply A/T fluid to parking lock pawl shaft, then insert it into transaxle case.



**CAUTION:**

- Do not reuse planetary ring gear subassembly. Otherwise it may cause damage to planetary gear unit and/or reduction gears.
- Do not use transaxle case as groundwork to press fit planetary ring gear subassembly.
- Do not give load more than 20 kN (2000 kg, 4410 lb) with hydraulic press. Otherwise, it may result in damaging reduction drive gear bearing.

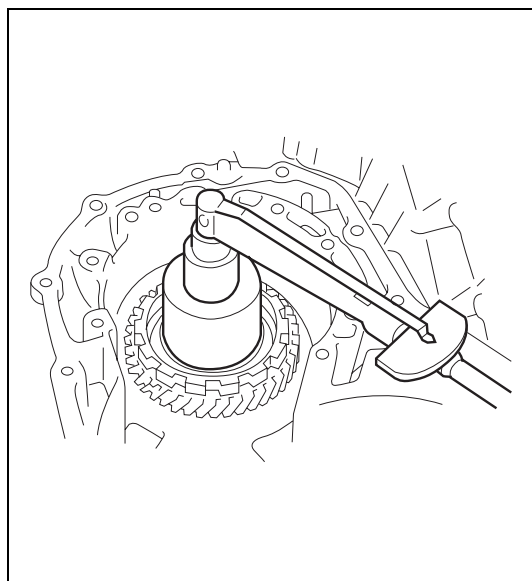
- 16) Install new planetary ring gear subassembly (1) to reduction drive gear (3) by using special tools and hydraulic press.

**Special tool**

(A) : 09951-18210

(B) : 09944-78210

2. Stand that can slightly lift transaxle case.



**CAUTION:**

- Do not tighten nut over the specifications so that reduction drive gear nut would not be broken.
- Carry out this procedure on rubber mat in order not to damage transaxle case.

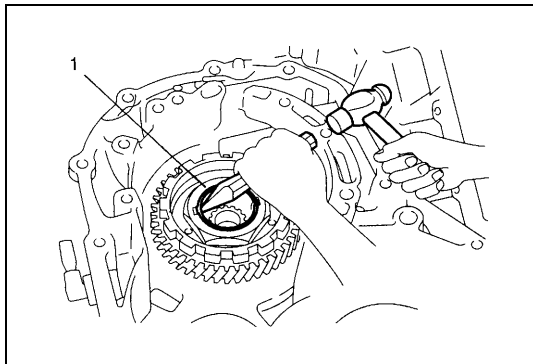
- 17) Tighten new reduction drive gear nut to planetary ring gear subassembly little by little until reduction drive gear bearing preload is within specification.

**Tightening torque**

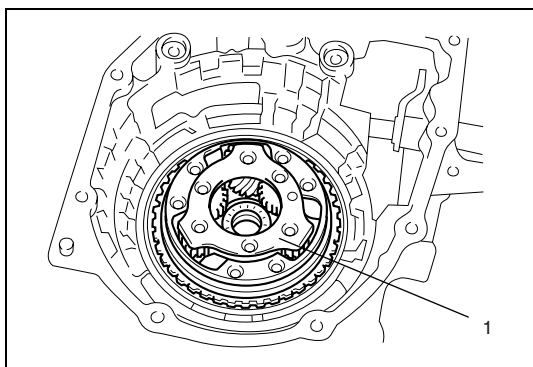
Reference : 100 N·m (10.0 kg-m, 72.5 lb-ft)

Reduction drive gear bearing preload measured as starting torque

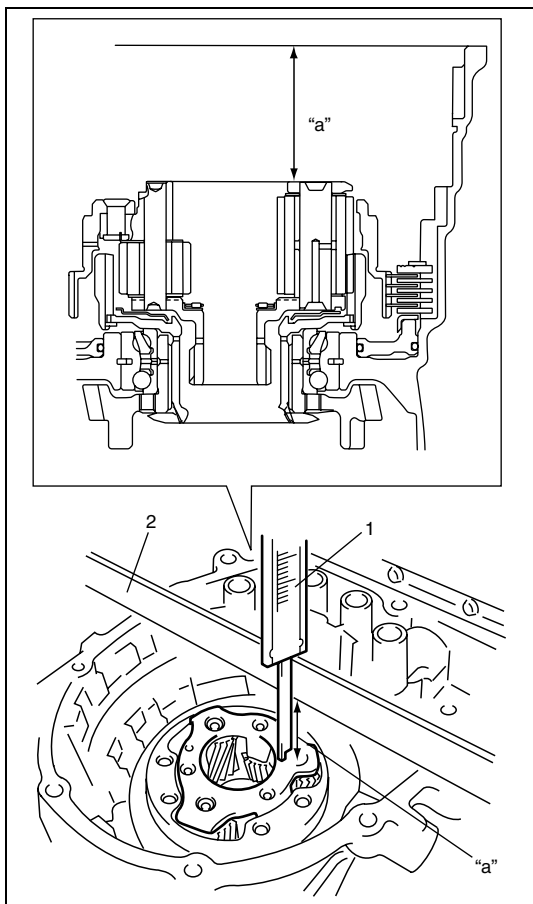
Standard : 0.05 – 0.35 N·m (0.5 – 3.5 kg-cm, 0.036 – 0.253 lb-ft)



18) Caulk reduction drive gear nut (1).



19) Apply A/T fluid to planetary gear assembly (1), then fit it to planetary ring gear assembly.

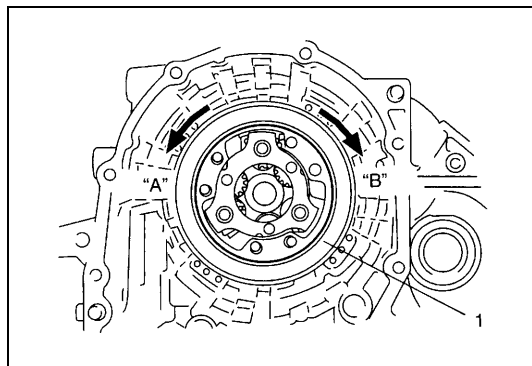


20) Check for correct installation of planetary gear assembly as follows.

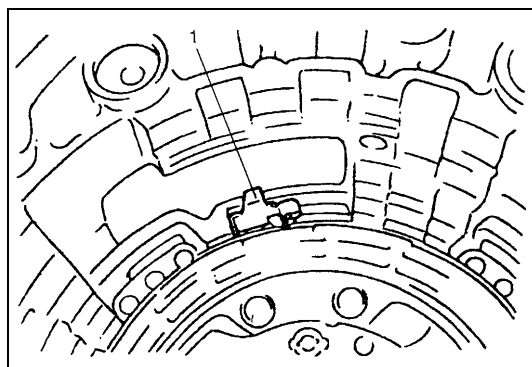
Measure the distance "a" by using micrometer caliper (1) and straightedge (2). If measured value is out of specification, remove planetary gear assembly and reinstall it properly.

**Distance between planetary gear assembly and mating surface of transaxle case**

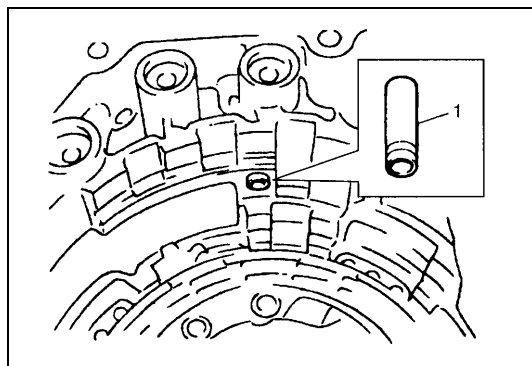
**"a" : More than 49.9 mm (1.965 in.)**



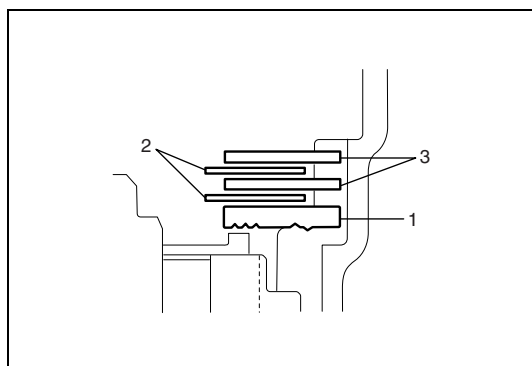
- 21) Apply A/T fluid to one-way clutch No.2 assembly (1), then install it to planetary gear assembly. After that, ensure that planetary carrier rotates only in counterclockwise direction "A", not in clockwise direction "B".



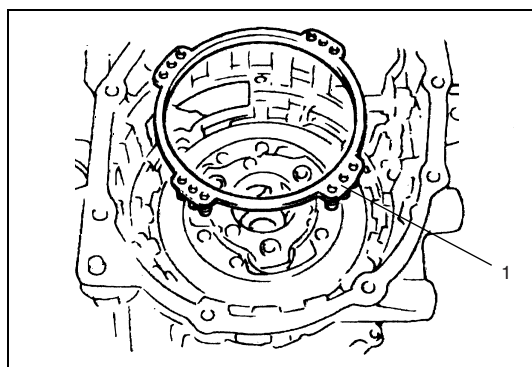
- 22) Install one-way clutch outer race retainer (1).



- 23) Apply A/T fluid to new brake drum gasket (1), then install it to transaxle case.

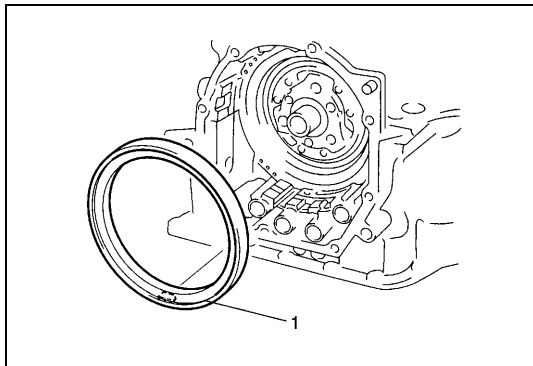


- 24) Apply A/T fluid to 2nd brake retaining plate (1), discs (2) and separator plates (3), then install them to transaxle case.

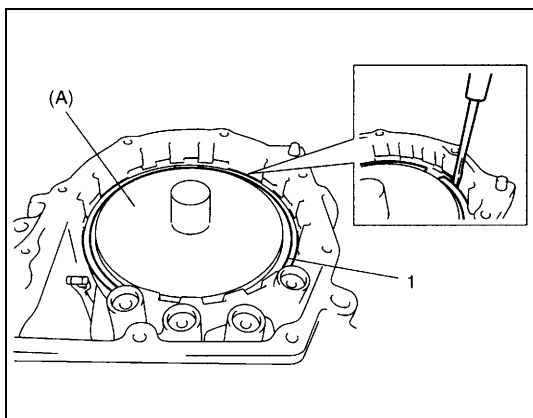


- 25) Install 2nd brake return spring subassembly (1) to transaxle case.





- 26) Apply A/T fluid to 2nd brake piston assembly (1), and align the projection of 2nd brake piston assembly with the groove of transaxle case, then put together.



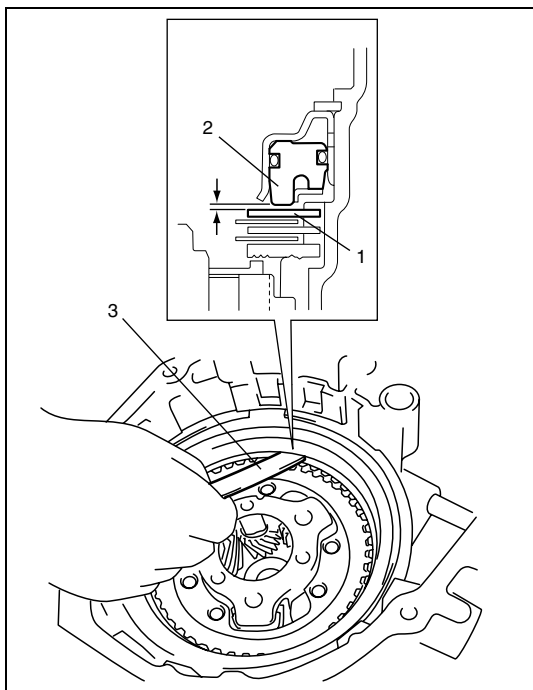
**CAUTION:**

**Do not damage 2nd brake piston assembly, return spring subassembly, plates and discs by pressing in 2nd brake assembly passing through its original installing position over 0.4 mm (0.016 in.).**

- 27) Install 2nd brake piston snap ring (1) by using special tool and hydraulic press.

**Special tool**

**(A) : 09926-96050**



- 28) Check 2nd brake piston stroke by measuring clearance between 2nd brake separator plate (1) and piston (2) with feeler gauge (3).

If clearance, that is, piston stroke is out of specification replace clutch discs and plates with new ones.

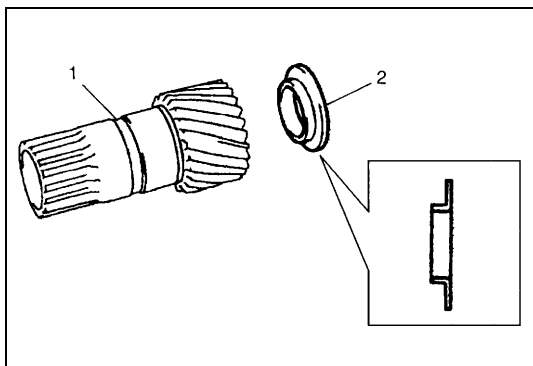
**2nd brake piston stroke**

**Standard : 0.40 – 1.25 mm (0.016 – 0.049 in.)**

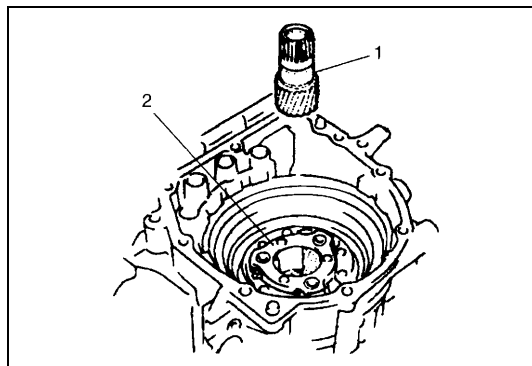
**CAUTION:**

**When brake disc, retaining plate and/or separator plate of 2nd brake have been replaced, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized referring to “Learning Control Initialization” in this section.**

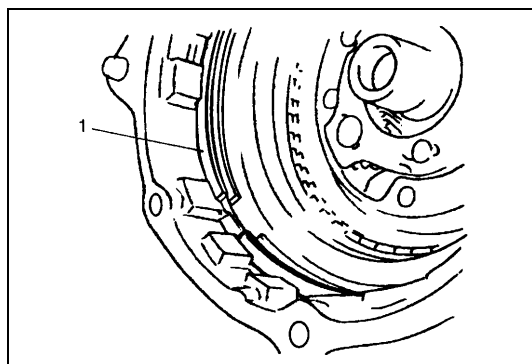
**Neglecting this initialization may cause excessive shift shock.**



- 29) After applying A/T fluid to front sun gear thrust bearing race (2), install it to front planetary sun gear (1).



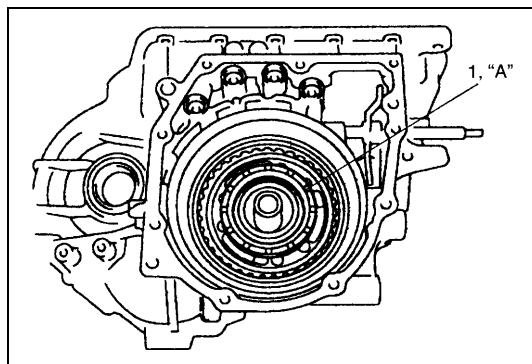
- 30) Apply A/T fluid to front planetary sun gear (1) and install it to planetary gear assembly (2).



**CAUTION:**

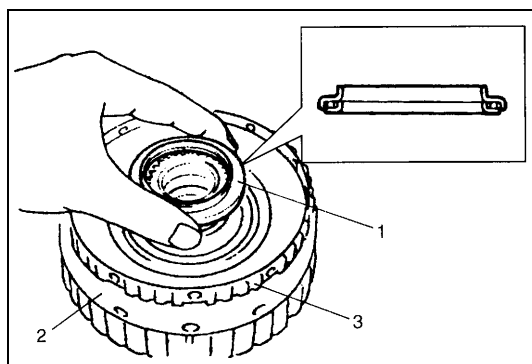
**Be sure to install O/D and 2nd coast brake retaining plate snap ring correctly in groove of transaxle case.**

- 31) Install O/D and 2nd coast brake retaining plate snap ring (1).



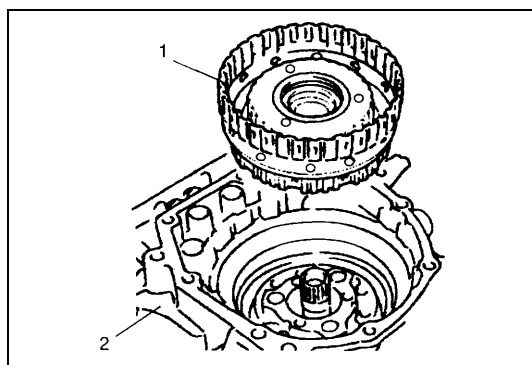
- 32) After applying grease to slide contact face of planetary carrier thrust washer (1), install it to planetary gear assembly.

**"A" : Grease 99000-25030**

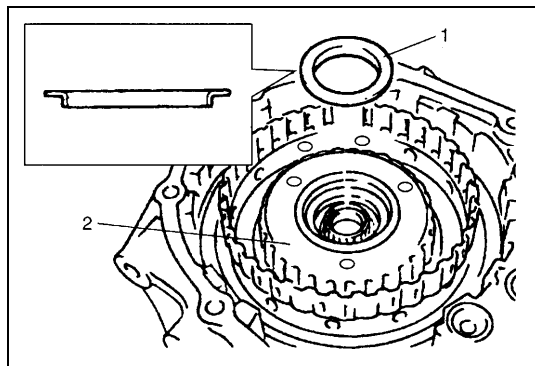


- 33) Apply A/T fluid to one-way clutch No.1 assembly (3) and install one-way clutch No.1 assembly (3) to rear planetary sun gear subassembly (2).

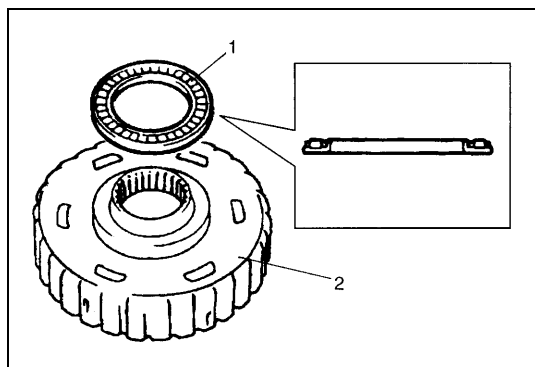
- 34) Apply A/T fluid to planetary gear thrust bearing (1), then install it to one-way clutch No.1 assembly (3).



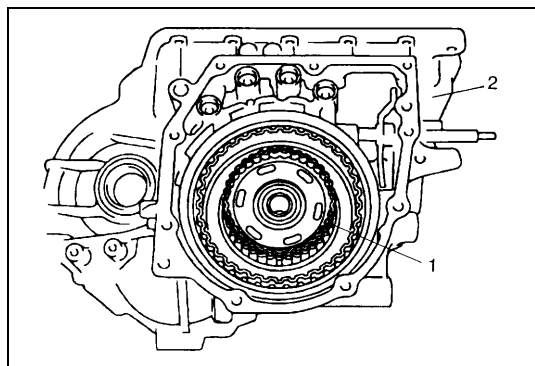
- 35) After applying A/T fluid to rear planetary sun gear subassembly and one-way clutch No.1 assembly (1), install them in transaxle case (2).



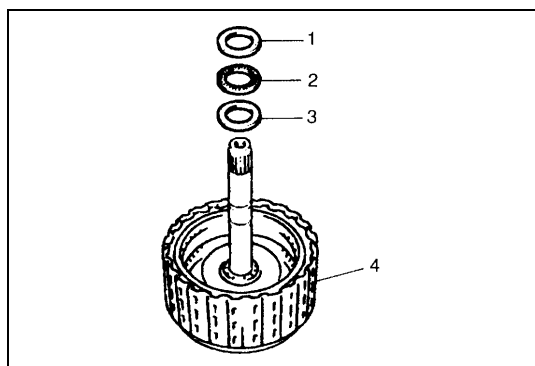
- 36) After applying A/T fluid to rear sun gear thrust bearing race (1), install it to rear planetary sun gear (2).



- 37) After applying A/T fluid to rear sun gear thrust bearing (1), install it to forward clutch hub (2).



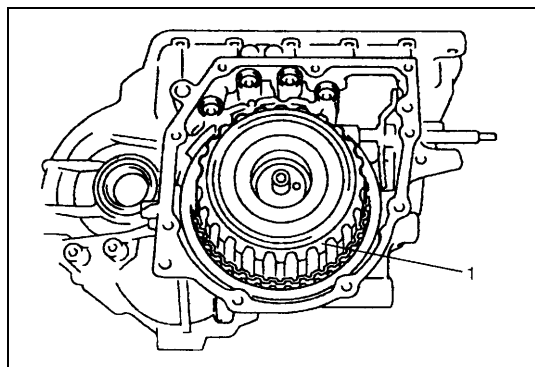
- 38) After applying A/T fluid to forward clutch hub (1), install it in transaxle case (2).



- 39) After applying A/T fluid to intermediate shaft thrust bearing rear race (3), thrust bearing (2) and front race (1), install them to forward and reverse clutch assembly (4).

#### Bearing race dimension

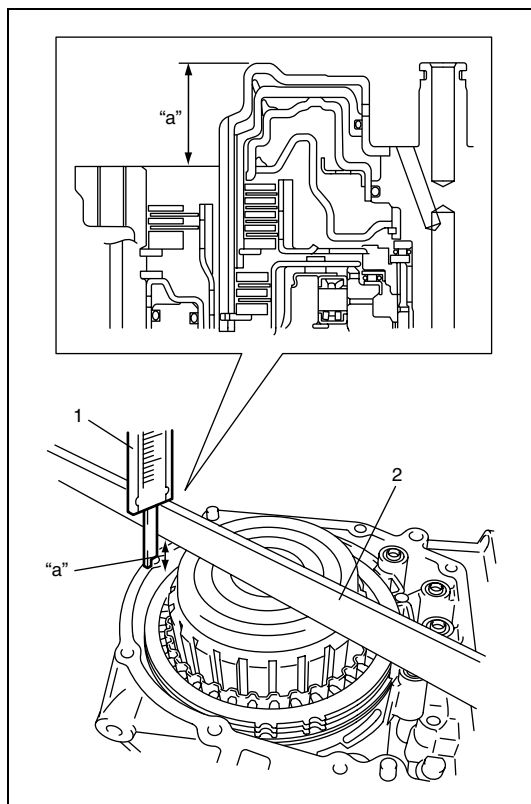
	Front race	Rear race
Outside diameter	30.6 mm (1.20 in.)	28.2 mm (1.11 in.)
Thickness	2.0 mm (0.08 in.)	2.0 mm (0.08 in.)



- 40) Apply A/T fluid to forward and reverse clutch assembly (1). Install forward and reverse clutch assembly while rotating clockwise and counter clockwise frequently to fit clutch discs to mating hubs.

#### NOTE:

Before installation, align teeth of forward and reverse clutch discs to facilitate installation.

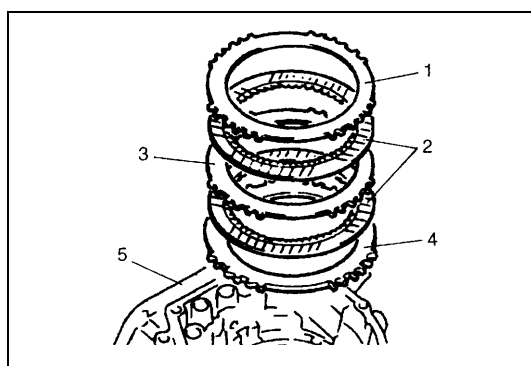


- 41) Check for correct installation of forward and reverse clutch assembly as follows.

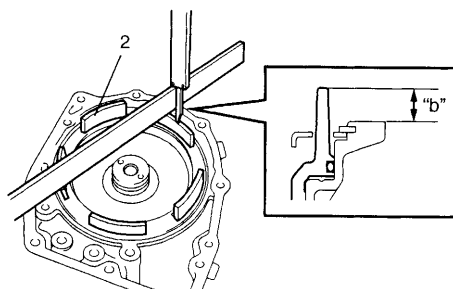
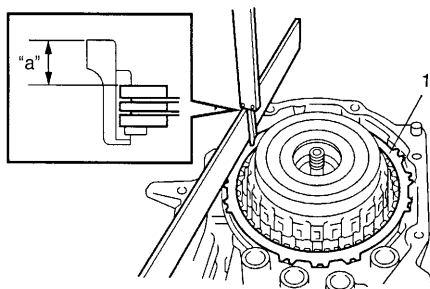
Measure distance "a" by using micrometer caliper (1) and straightedge (2). If out of specification, remove forward and reverse clutch assembly, forward clutch hub, rear planetary sun gear subassembly and one-way clutch No.1 assembly, and reinstall them properly.

**Distance between forward and reverse clutch assembly and mating surface of transaxle case**

**"a" : Less than 29.4 mm (1.157 in.)**



- 42) After applying A/T fluid to O/D and 2nd coast brake retaining plate (4), separator plate (3), discs (2) and rear plate (1), install them to transaxle case (5).



43) Measure O/D and 2nd coast brake piston stroke.

- Measure dimension “a” from end face of transaxle case to O/D and 2nd coast brake rear plate (1) using straightedge and micrometer caliper.
- Measure dimension “b” from O/D and 2nd coast brake piston (2) to rear cover assembly mating surface using straightedge and micrometer caliper.
- Calculate piston stroke from measured value of dimensions “a” and “b”.
- Piston stroke = “a” – “b”

#### O/D and 2nd coast brake piston stroke

**standard : 0.65 – 1.05 mm (0.026 – 0.041 in.)**

When piston stroke is out of specification, select O/D and 2nd coast brake rear plate with proper thickness from among the list below and replace it.

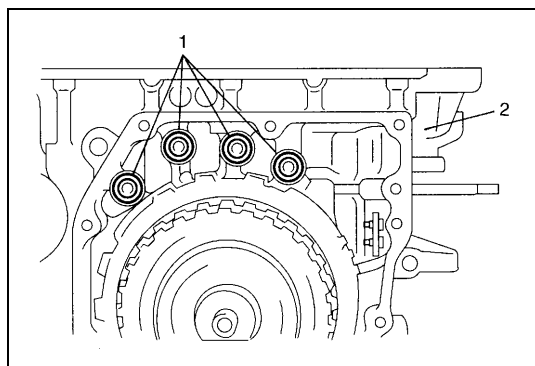
#### Available O/D and 2nd coast brake rear plate thickness

Thickness	Identification mark
1.8 mm (0.071 in.)	1
2.0 mm (0.079 in.)	2
2.2 mm (0.087 in.)	3
2.4 mm (0.094 in.)	4
2.6 mm (0.102 in.)	5

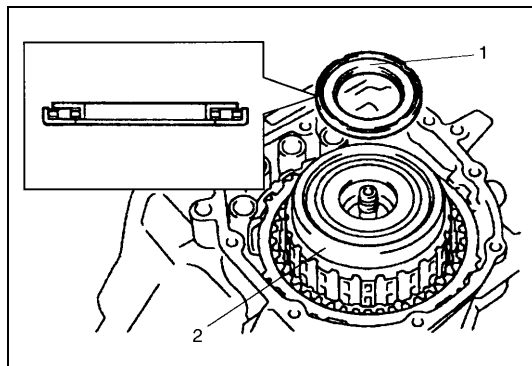
#### CAUTION:

When brake disc, retaining plate, separator plate and/or rear plate of O/D and 2nd coast brake have been replaced, all learned contents, which have been stored in TCM memory by executing learning control, should be initialized referring to “Learning Control Initialization” in this section.

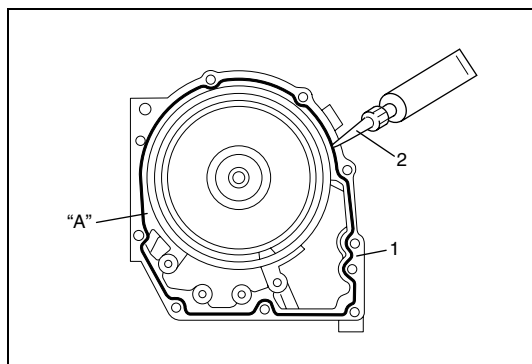
Neglecting this initialization may cause excessive shift shock.



44) After applying A/T fluid to new 2nd brake gaskets (1), install them to transaxle case (2).



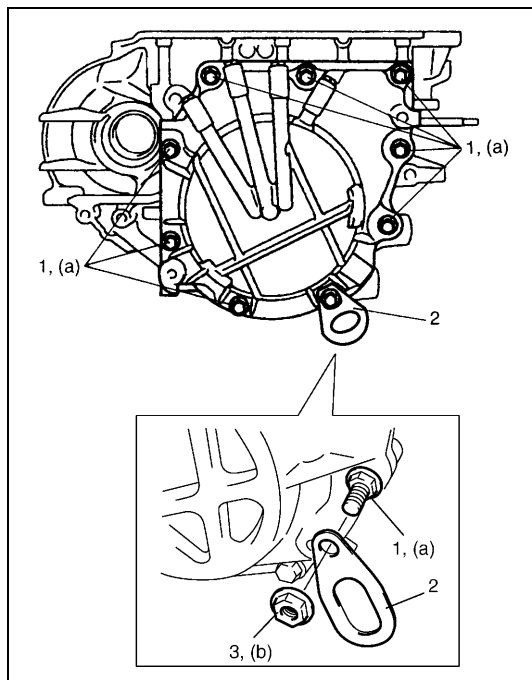
- 45) After applying A/T fluid to reverse clutch drum thrust bearing (1), install it to forward and reverse clutch assembly (2).



- 46) Remove sealant attached to mating surface of transaxle rear cover (1) completely.
- 47) Apply sealant to mating surface of transaxle rear cover (1) by using a nozzle (2) as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter.

**“A” : Sealant 99000-31230**

- 48) Install transaxle rear cover assembly on transaxle case.



- 49) Tighten rear cover bolts (1).

**Tightening torque**

**Rear cover bolts**

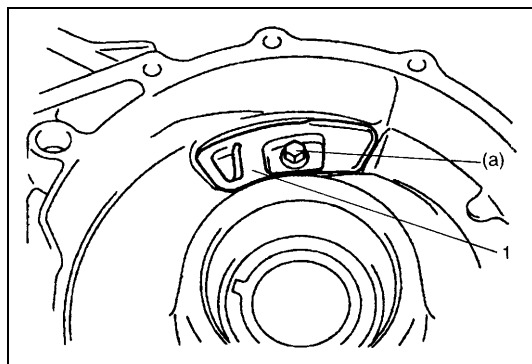
**(a) : 25 N·m (2.5 kg-m, 18.0 lb-ft)**

- 50) Install transaxle hook (2) to location shown in figure and tighten nut (3).

**Tightening torque**

**Transaxle hook nut**

**(b) : 18 N·m (1.8 kg-m, 13.0 lb-ft)**

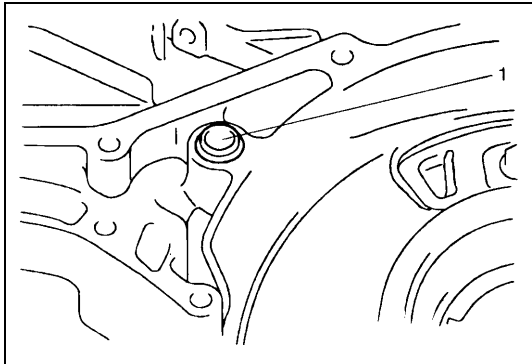


- 51) Install fluid reservoir LH plate (1).

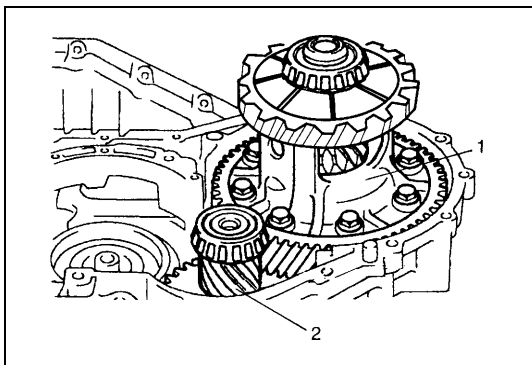
**Tightening torque**

**Fluid reservoir LH plate bolt**

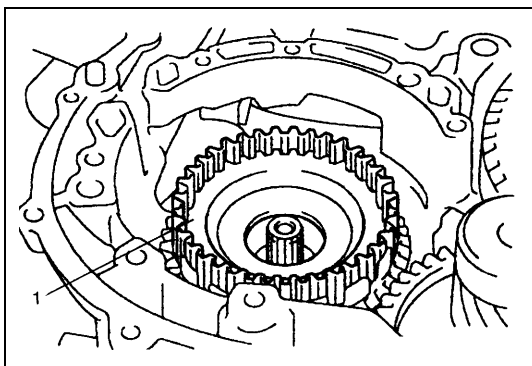
**(a) : 10 N·m (1.0 kg-m, 7.5 lb-ft)**



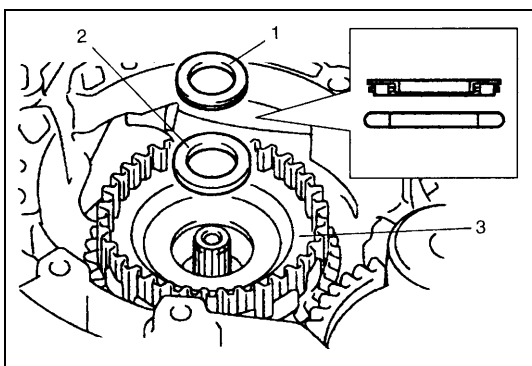
- 52) After applying A/T fluid to new governor apply No.2 gasket (1), install it to transaxle case.



- 53) After applying A/T fluid to differential assembly (1) and countershaft assembly (2), install them to transaxle case.

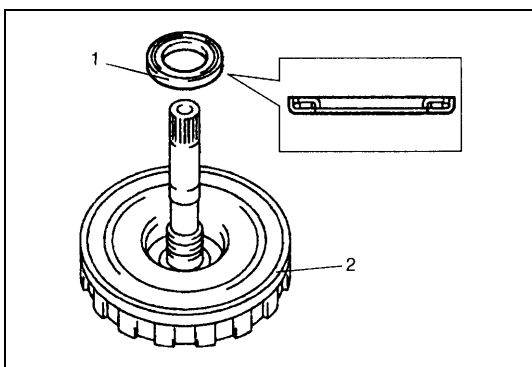


- 54) After applying A/T fluid to direct clutch hub (1), install it to planetary gear assembly.

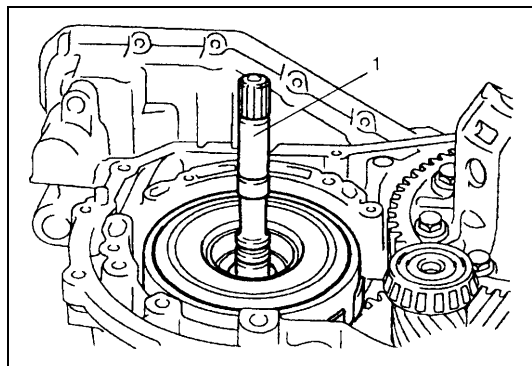


- 55) After applying A/T fluid to input shaft rear thrust bearing (1) and thrust bearing race (2), install them into direct clutch hub (3).

3. Direct clutch hub



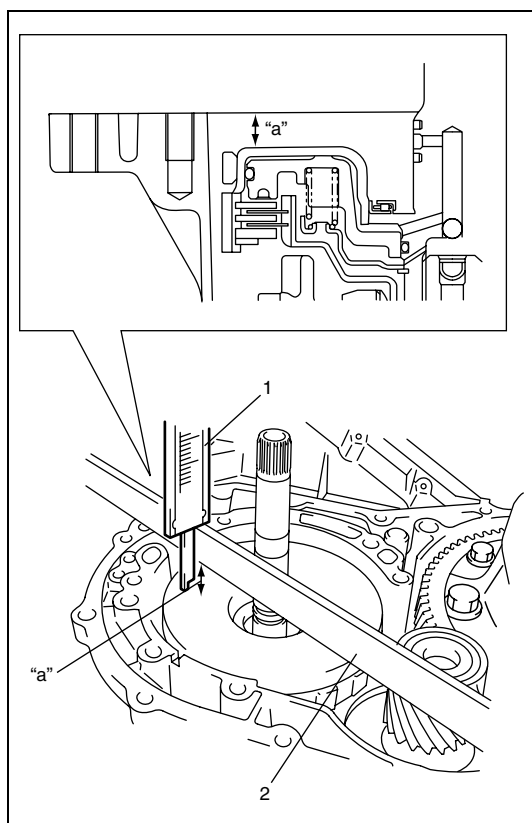
- 56) After applying A/T fluid to input shaft front thrust bearing (1), install it to direct clutch assembly (2).



- 57) Apply A/T fluid to direct clutch assembly (1).  
Install direct clutch assembly while rotating clockwise and counter clockwise frequently to fit clutch discs to mating hub.

**NOTE:**

**Before installation, align teeth of direct clutch discs to facilitate installation.**

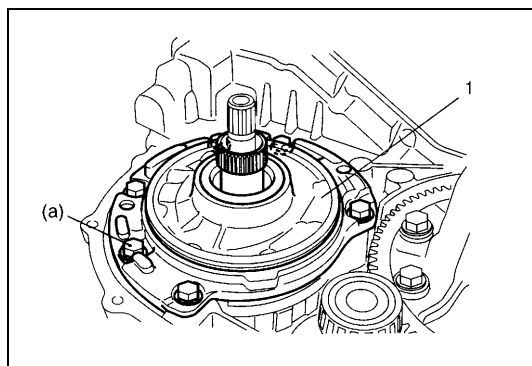


- 58) Check for correct installation of direct clutch assembly as follows.

Measure distance "a" by using micrometer caliper (1) and straightedge (2). If out of specification, remove direct clutch assembly, direct clutch hub and reinstall them properly.

**Distance between direct clutch assembly and mating surface of transaxle case**

**"a" : 10.4 – 11.4 mm (0.409 – 0.449 in.)**



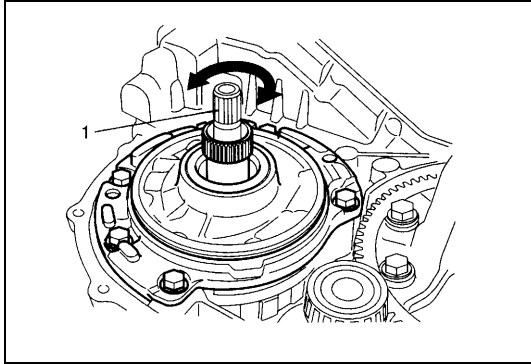
- 59) Install oil pump assembly to transaxle case.

**Tightening torque**

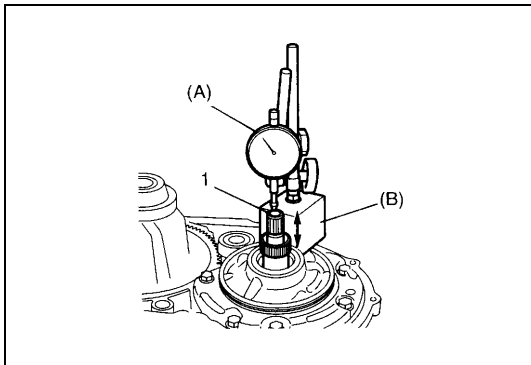
**Oil pump assembly bolts**

**(a) : 25 N·m (2.5 kg·m, 18.0 lb·ft)**





60) Make sure that input shaft (1) turns smoothly.



61) Measure input shaft thrust play.

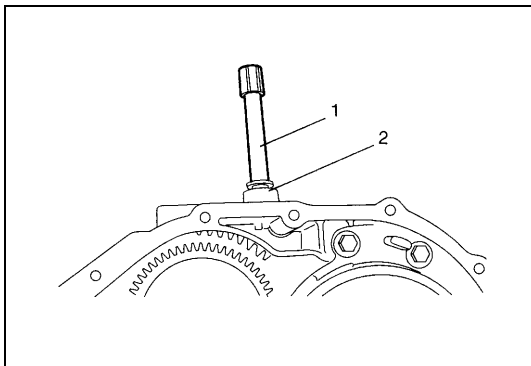
Apply dial gauge onto input shaft end (1) and measure thrust play of input shaft.

**Special tool**

(A) : 09900-20607

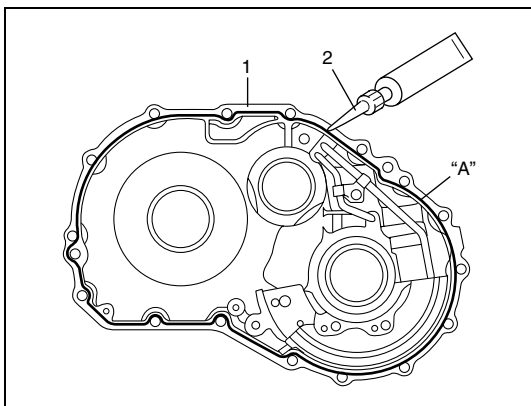
(B) : 09900-20701

**Input shaft thrust play : 0.3 – 0.9 mm (0.012 – 0.035 in.)**



62) After applying A/T fluid to new O-ring, fit it to breather union (2). Then install breather union to transaxle case.

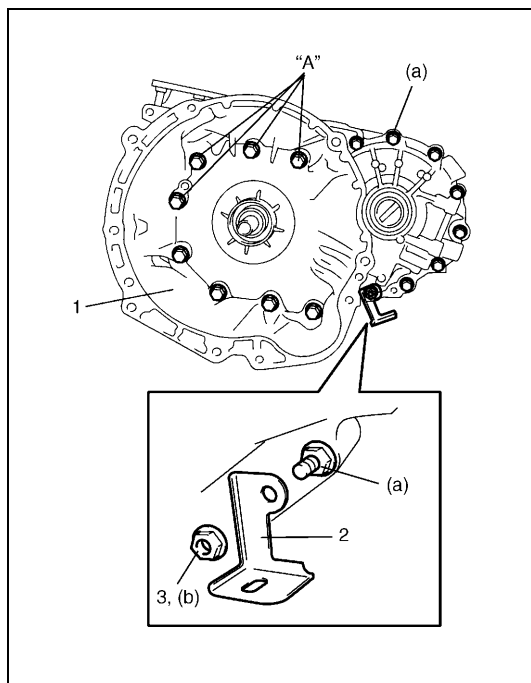
63) Install breather hose (1).



64) Wipe off and clean mating surface between transaxle case (1) and torque converter housing.

65) Apply sealant to torque converter housing (1) by using a nozzle (2) as shown in figure by such amount that its section is 1.2 mm (0.047 in.) in diameter.

**“A” : Sealant 99000-31230**

**CAUTION:**

Apply sealant to threads of four bolts shown in figure before tightening.

**“A” : Sealant 99000-31230**

- 66) Install torque converter housing (1) to transaxle case, tighten bolts to specified torque.

**Tightening torque**

**Torque converter housing bolts**

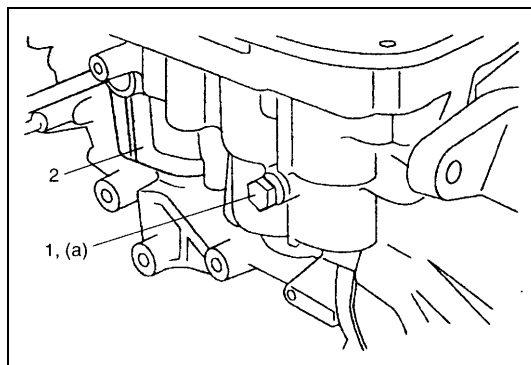
**(a) : 33 N·m (3.3 kg-m, 24.0 lb-ft)**

- 67) Install harness bracket (2) to location shown in the figure and tighten nut (3).

**Tightening torque**

**Harness bracket nut**

**(b) : 10 N·m (1.0 kg-m, 7.5 lb-ft)**

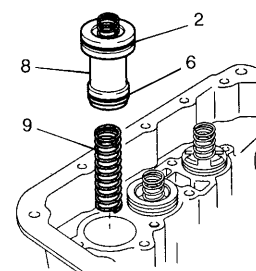
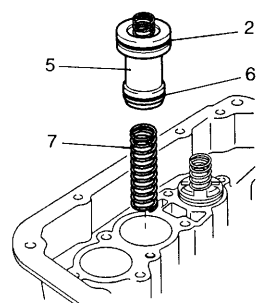
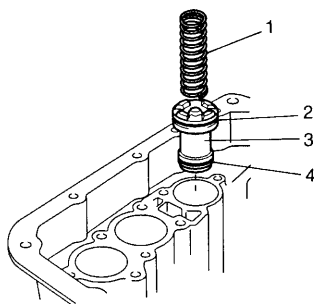


- 68) After applying A/T fluid to new O-ring, fit it to transaxle case plug (1). Then install the transaxle case plug to transaxle case (2).

**Tightening torque**

**Transaxle case plug**

**(a) : 7.5 N·m (0.75 kg-m, 5.5 lb-ft)**



- 69) Install new O-rings to each accumulator piston and apply A/T fluid to them.

#### Accumulator O-ring dimension

O-ring name	Inside diameter	Section diameter
Large B1 accumulator O-ring (2) Large C1 accumulator O-ring (2) Large C2 accumulator O-ring (2) – Above three O-rings are same.	29.4 mm (1.16 in.)	2.6 mm (0.10 in.)
Small B1 accumulator O-ring (4)	19.7 mm (0.78 in.)	2.6 mm (0.10 in.)
Small C1 accumulator O-ring (6) Small C2 accumulator O-ring (6) – Above two O-rings are same.	21.8 mm (0.86 in.)	2.6 mm (0.10 in.)

#### NOTE:

Make sure that O-rings are not twisted or caught when installing.

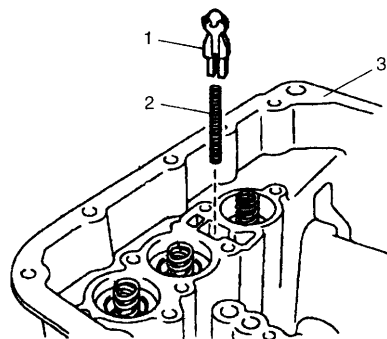
- 70) Install B1, C1, C2 accumulator pistons and springs.

#### Accumulator piston identification

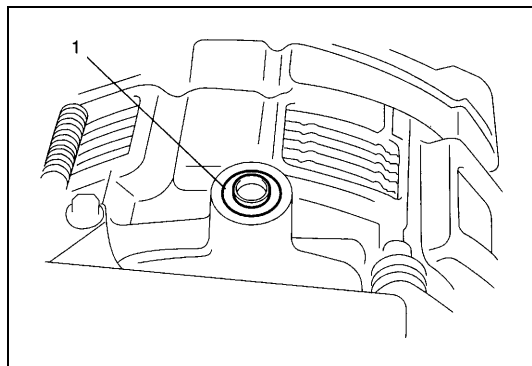
Piston name	Identification as embossed letters on piston
B1 accumulator piston (3)	SB-1
C1 accumulator piston (5)	SC-1
C2 accumulator piston (8)	SC-2

#### Accumulator spring identification

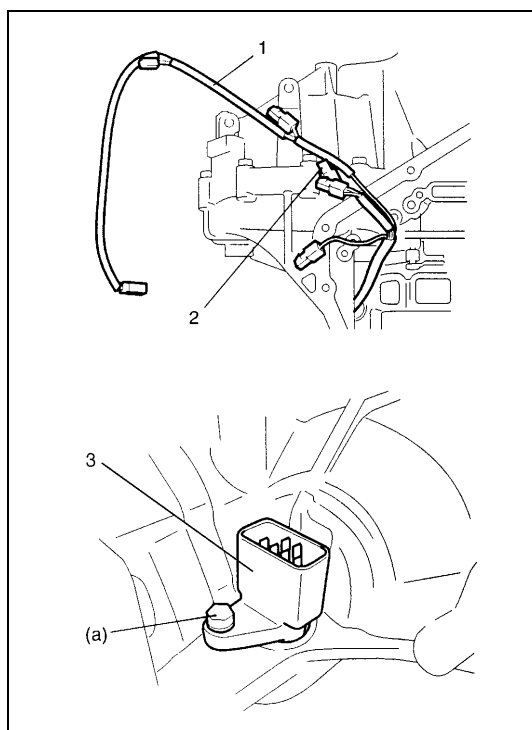
Spring name	Color of identification paint
B1 accumulator No.2 spring (1)	Pink
C1 accumulator No.2 spring (7)	Blue
C2 accumulator No.2 spring (9)	Light Green



- 71) After applying A/T fluid to cooler check valve (1) and spring (2), install them to transaxle case (3).



- 72) After applying A/T fluid to new governor apply No.1 gasket (1), install it to transaxle case.



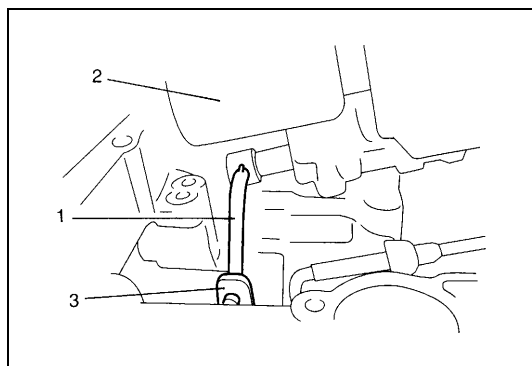
**CAUTION:**

When put valve body harness (1) into transaxle case, take care not to damage transmission fluid temperature sensor (2) at narrow entrance of case. Careless sensor treatment might cause sensor malfunction.

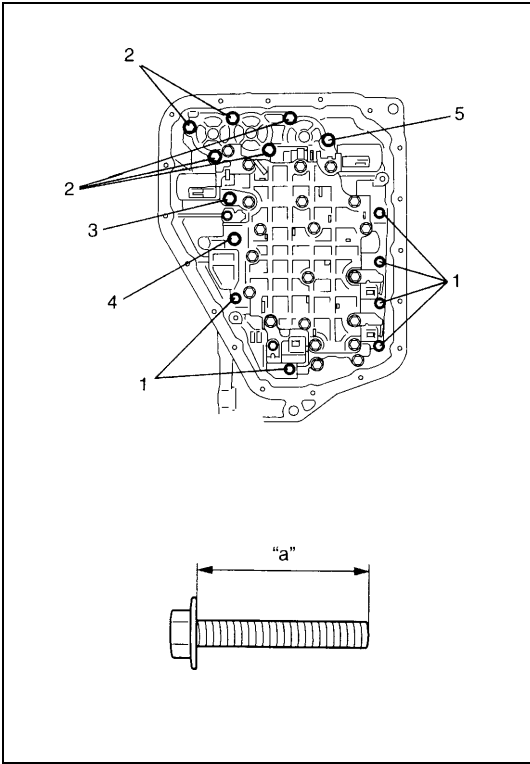
- 73) After applying A/T fluid to new O-ring, fit it to valve body harness connector (3), then install valve body harness to transaxle case.

**Tightening torque**

**Valve body harness connector bolt**  
**(a) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)**



- 74) Install manual valve rod (1) to manual valve lever (3) and then install valve body assembly (2) to transaxle case.

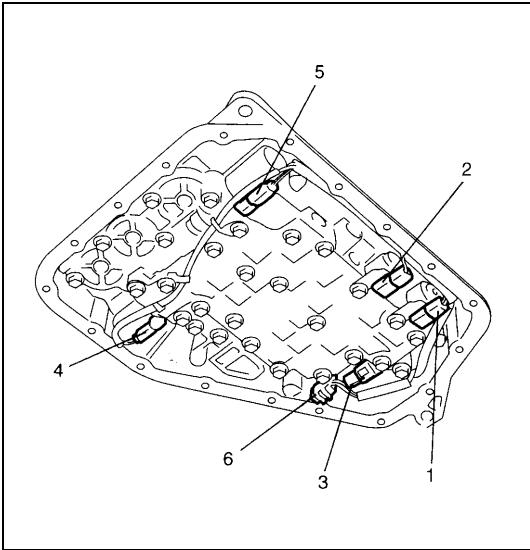


75) Tighten valve body bolts to specified torque.

**Tightening torque**  
**Valve body bolts**  
: 11 N·m (1.1 kg·m, 8.0 lb·ft)  
**Valve body bolt length**

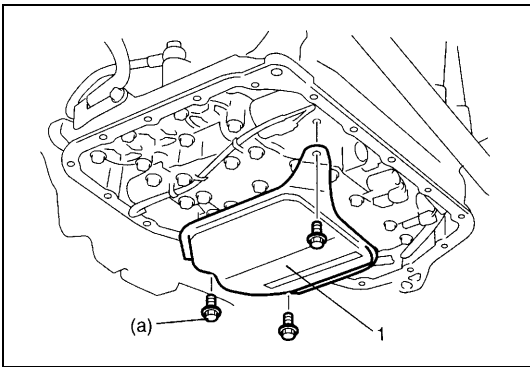
Bolt	Length “a”	Pieces
A	20 mm (0.79 in.)	6
B	28 mm (1.10 in.)	5
C	49 mm (1.93 in.)	1
D	36 mm (1.42 in.)	1
E	40 mm (1.58 in.)	1

1. Bolt A
2. Bolt B
3. Bolt C
4. Bolt D
5. Bolt E



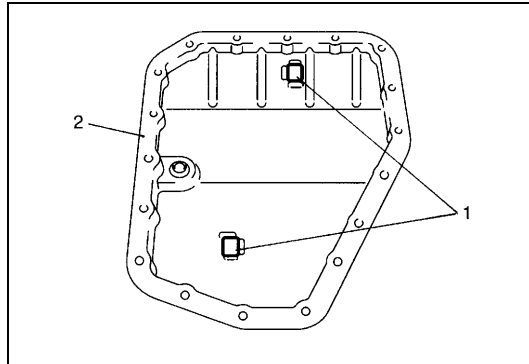
76) Connect solenoid connectors to solenoid valves identifying their installing positions by wire colors, and install transmission fluid temperature sensor to its clamp.

Solenoid valve coupler	Wire Color
Shift solenoid valve-A (1)	White
Shift solenoid valve-B (2)	Black
Timing solenoid valve (3)	Yellow
TCC/Lock-up solenoid valve (4)	Light Green
Pressure control solenoid valve (5)	Gray + Green
Transmission fluid temperature sensor (6)	Orange



77) Install oil strainer assembly (1).

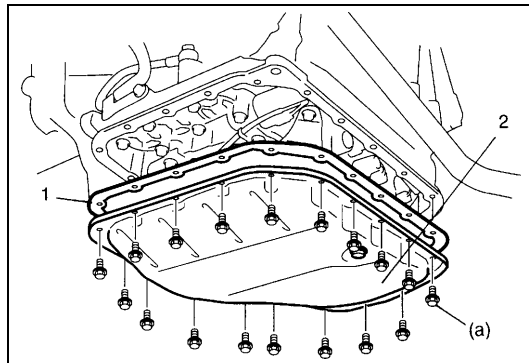
**Tightening torque**  
**Oil strainer bolts**  
(a) : 10 N·m (1.0 kg·m, 7.5 lb·ft)



78) Install oil cleaner magnets (1) in oil pan (2).

**NOTE:**

**If metal particles are attached to the magnets, clean them before installing.**

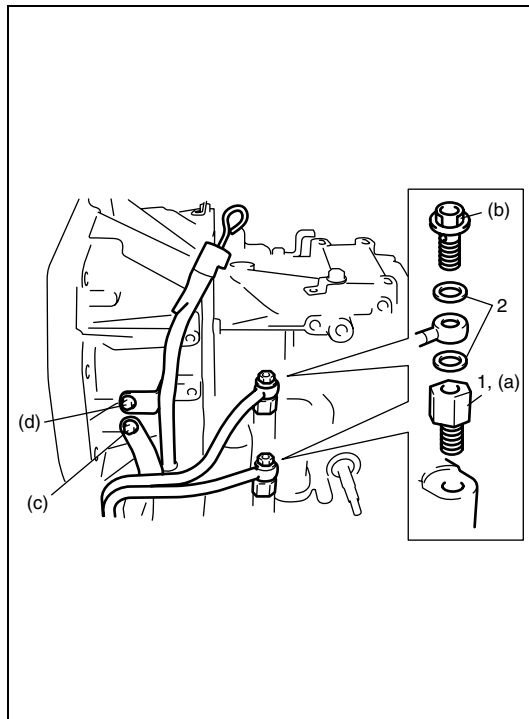


79) Install new oil pan gasket (1) between transaxle case and oil pan (2).

**Tightening torque**

**Oil pan bolts**

**(a) : 7.0 N·m (0.7 kg-m, 5.0 lb-ft)**



80) After applying A/T fluid to new O-rings, fit it to fluid cooler pipe unions (1). Then install fluid cooler pipe unions to transaxle case.

**Tightening torque**

**Fluid cooler pipe unions**

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

81) Install new gaskets and then install fluid cooler pipes.

**Tightening torque**

**Fluid cooler pipe union bolts**

**(b) : 22 N·m (2.2 kg-m, 16.0 lb-ft)**

**Fluid cooler pipe bracket bolt**

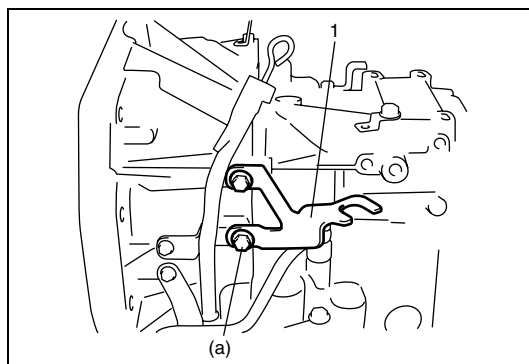
**(c) : 10 N·m (1.0 kg-m, 7.5 lb-ft)**

82) After applying A/T fluid to new O-ring, fit it to fluid filler tube. Then install fluid filler tube to transaxle case.

**Tightening torque**

**Fluid filler tube bolt**

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

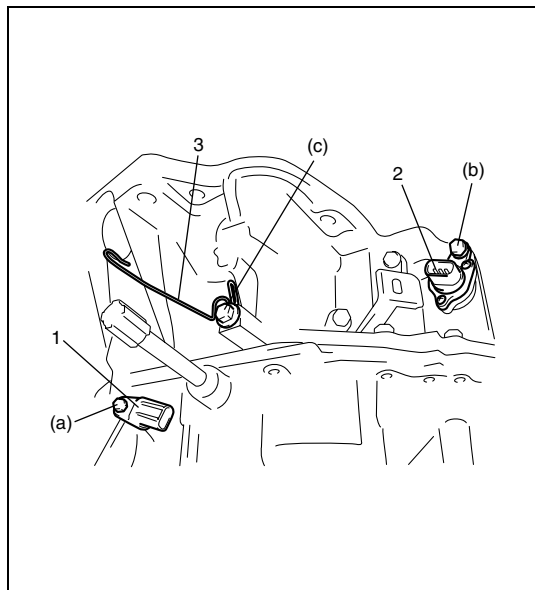


83) Install select cable bracket (1).

**Tightening torque**

**Select cable bracket bolts**

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



- 84) Apply A/T fluid to O-rings of each sensor and install input shaft speed sensor (1) and output shaft speed sensor/VSS (2).

**Tightening torque**

**Input shaft speed sensor bolt**

**(a) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)**

**Output shaft speed sensor/VSS bolt**

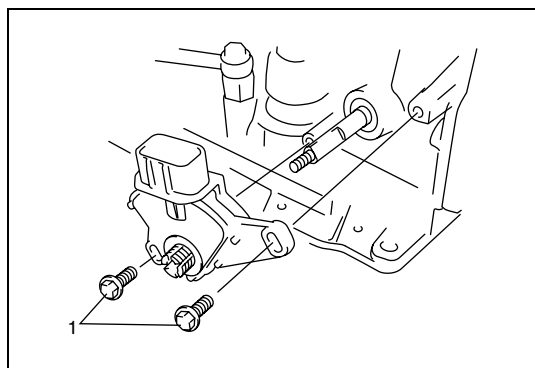
**(b) : 13 N·m (1.3 kg-m, 9.5 lb-ft)**

- 85) Install select cable clamp (3).

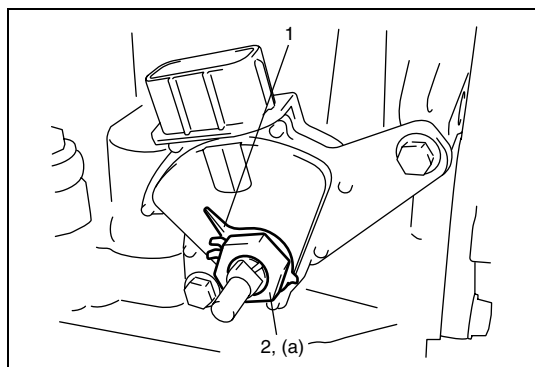
**Tightening torque**

**Select cable clamp bolt**

**(c) : 10 N·m (1.0 kg-m, 7.5 lb-ft)**



- 86) Install transmission range sensor to transaxle case, tighten bolts (1) temporarily at this step.

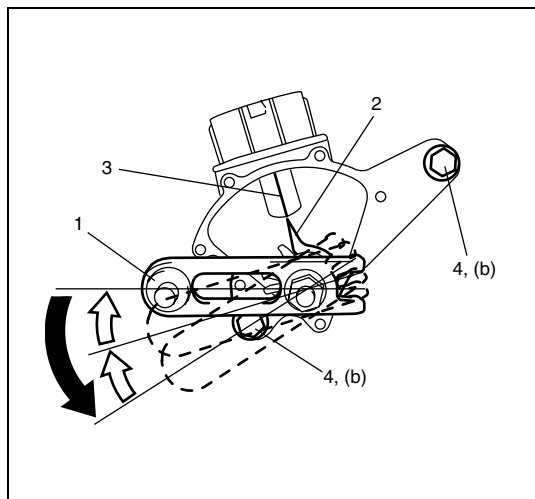


- 87) Install lock washer (1) and tighten lock nut (2) to specified torque.

**Tightening torque**

**Transmission range sensor lock nut**

**(a) : 7 N·m (0.7 kg-m, 5.0 lb-ft)**

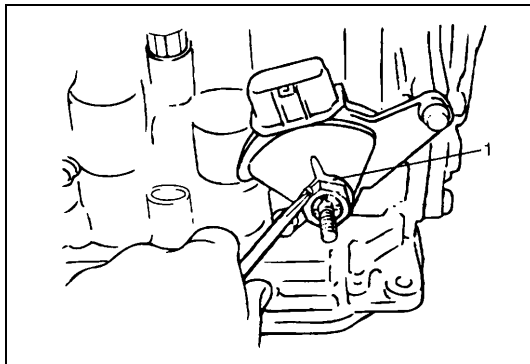


- 88) Install manual select lever (1) temporarily at this step.  
 89) After shifting manual select lever counterclockwise fully, select "N" range position by bringing it back 2 notches clockwise.  
 90) Remove manual select lever (1) at this step.  
 91) Loosen sensor bolts and align needle direction shaped on lock washer (2) with "N" reference line (3) on transmission range sensor by moving sensor in rotative direction.  
 92) Tighten sensor bolts to specified torque.

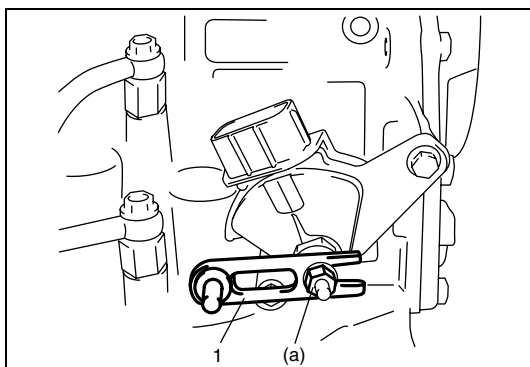
**Tightening torque**

**Transmission range sensor bolts**

**(b) : 5.5 N·m (0.55 kg-m, 4.0 lb-ft)**



- 93) Bend dents of lock washer (1) in order to prevent displacement of lock washer.

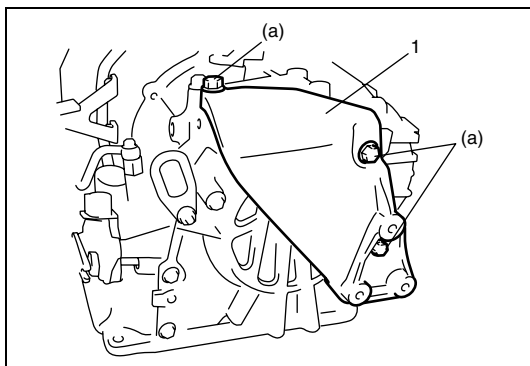


- 94) Install manual select lever (1).

**Tightening torque**

**Manual select lever nut**

**(a) : 13 N·m (1.3 kg-m, 9.5 lb-ft)**



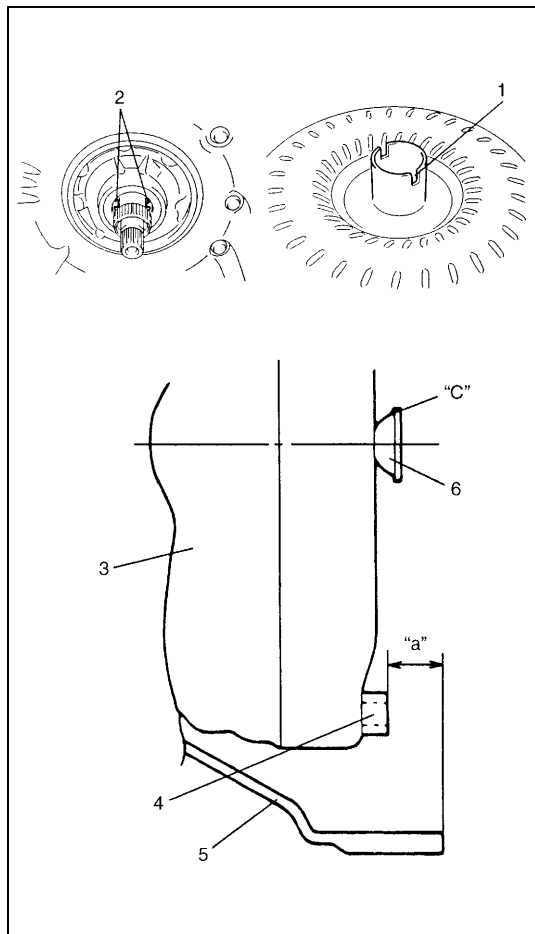
- 95) Install engine mounting LH bracket (1).

**Tightening torque**

**Engine mounting LH bracket bolts**

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





96) Install torque converter noting the following points.

**CAUTION:**

- Before installing converter, make sure that its pump hub portion is free from nicks, burrs or damage which may cause oil seal to leak.
- Be very careful not to drop converter on oil pump gear. Damage in gear, should it occur, may cause a critical trouble.

- Install torque converter aligning grooves (1) of torque converter and projection (2) of oil pump drive gear.
- Install torque converter, using care not to damage oil seal of oil pump.
- After installing torque converter, check that distance "a" is within specification.

**Torque converter installing position**

**"a" : More than 19.9 mm (0.783 in.)**

- Check torque converter for smooth rotation.
- Apply grease around cup at the center of torque converter.

**"C" : Grease 99000-25010**

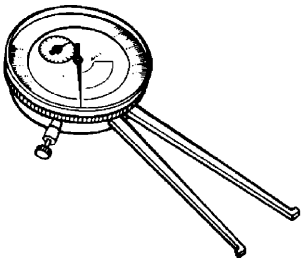
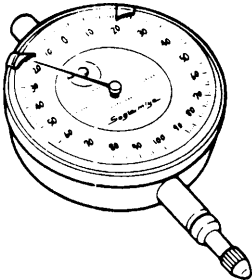
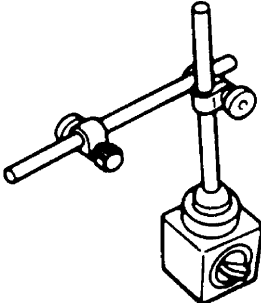
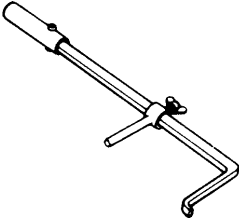
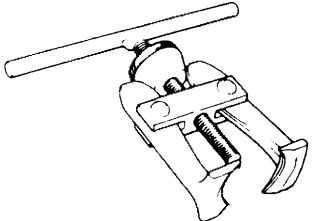
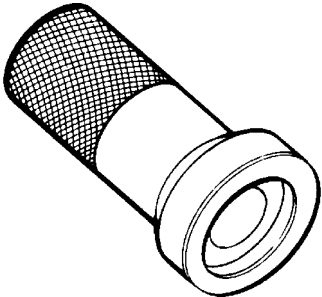
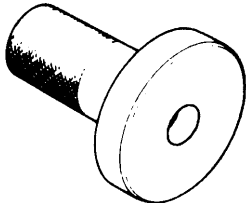
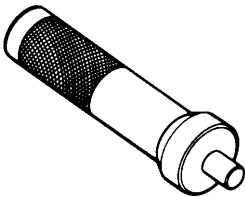
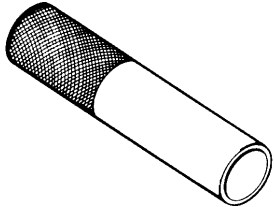
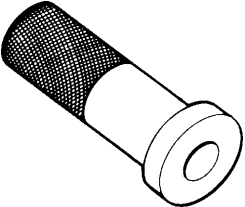
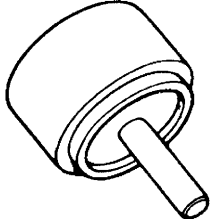
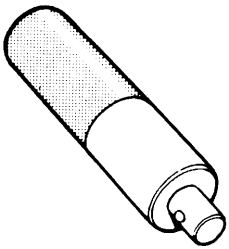
3.	Torque converter
4.	Flange nut
5.	Torque converter housing
6.	Cup

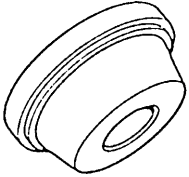
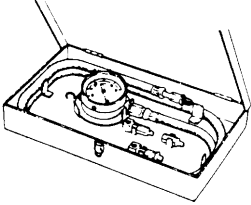
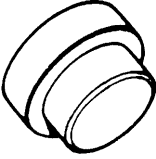
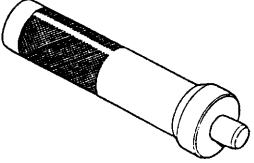
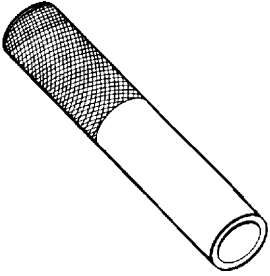
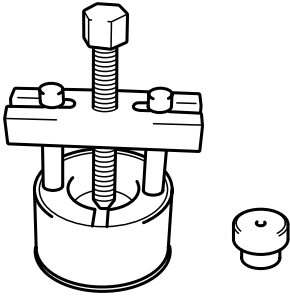
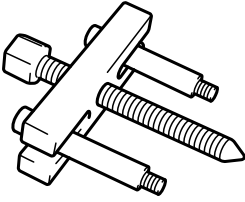
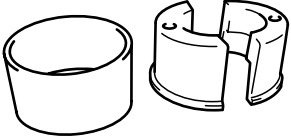
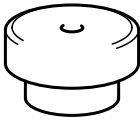

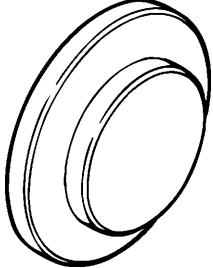
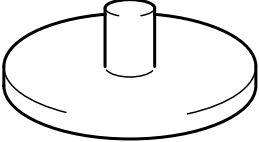
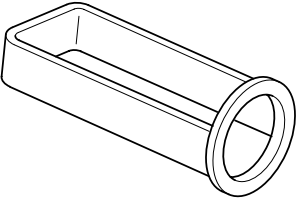
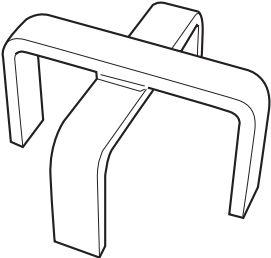
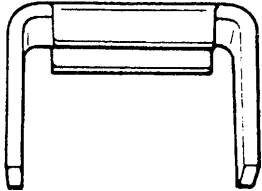
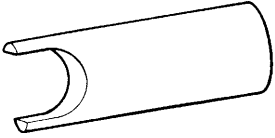
## Tightening Torque Specification

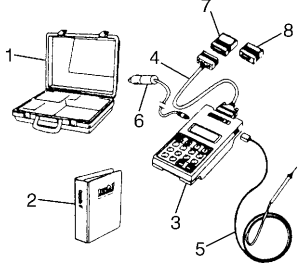
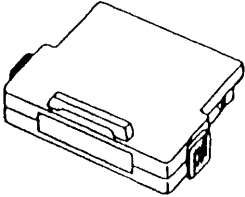
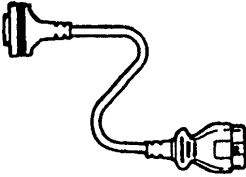
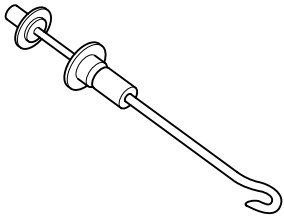
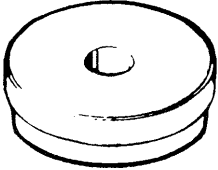
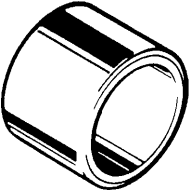
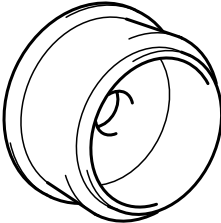
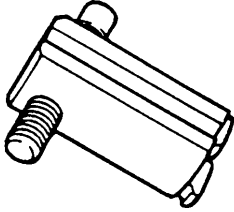
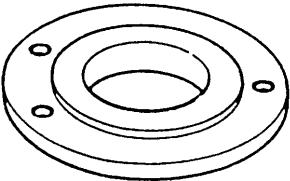
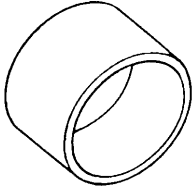
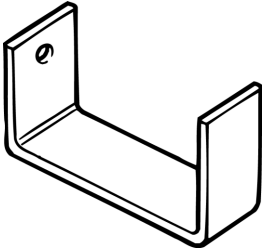
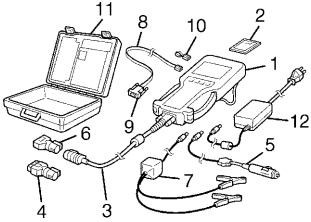
Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
A/T fluid drain plug	17	1.7	12.5
Output shaft speed sensor bolt	13	1.3	9.5
Input shaft speed sensor/VSS bolt	5.5	0.55	4.0
Transaxle case plug	7.5	0.75	5.5
Solenoid valve bolts	11	1.1	8.0
Rear cover plugs	7.5	0.75	5.5
Transaxle and engine fastening bolts and nut	85	8.5	61.5
Drive plate to torque converter bolts	19	1.9	14.0
Transaxle housing lower plate bolts	10	1.0	7.5
Starter motor bolt and nut	50	5.0	36.5
Steering knuckle ball stud lock nuts	60	6.0	43.5
Exhaust No.1 pipe to manifold bolts	50	5.0	36.5
Exhaust No.2 pipe to No.1 pipe bolts	43	4.3	31.5
Engine front mounting nuts	45	4.5	32.5
Engine rear mounting nuts	45	4.5	32.5
Mounting member bolts	55	5.5	40.0
Suspension frame bolts	90	9.0	65.0
Engine rear mounting No.2 bracket M10 bolt	55	5.5	40.0
Engine rear mounting No.2 bracket M8 bolt	25	2.5	18.0
Engine LH mounting No.1 bolt	55	5.5	40.0
Engine LH mounting No.2 bolts	55	5.5	40.0
Lower stiffener bolts	50	5.0	36.5
Ground cable bolt	23	2.3	17.0
Oil pump subassembly bolts	10	1.0	7.5
Valve body bolts	11	1.1	8.0
Final gear bolts	78	7.8	56.5
Reduction drive gear nut – Reference	100	10.0	72.5
Rear cover bolts	25	2.5	18.0
Transaxle hook nut	18	1.8	13.0
Fluid reservoir LH plate bolt	10	1.0	7.5
Manual detent spring bolt	10	1.0	7.5
Parking lock pawl bracket bolts	7.5	0.75	5.5
Oil pump assembly bolts	25	2.5	18.0
Torque converter housing bolts	33	3.3	24.0
Harness bracket nut	10	1.0	7.5
Torque converter housing plugs	7.5	0.75	5.5
Lubrication tube clamp bolt	5.5	0.55	4.0
Fluid reservoir RH plate bolts	5.5	0.55	4.0
Valve body harness connector bolt	5.5	0.55	4.0
Oil pan bolts	7.0	0.7	5.0
Oil strainer bolts	10	1.0	7.5
Fluid cooler pipe unions	25	2.5	18.0
Fluid cooler pipe union bolts	22	2.2	16.0
Fluid cooler pipe bracket bolt	10	1.0	7.5
Fluid filler tube bolt	10	1.0	7.5

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Select cable bracket bolts	23	2.3	17.0
Transmission range sensor lock nut	7	0.7	5.0
Transmission range sensor bolts	5.5	0.55	4.0
Manual select lever nut	13	1.3	9.5
Engine mounting LH bracket bolts	55	5.5	40.0
Harness bracket bolts	23	2.3	17.0
Select cable clamp bolt	10	1.0	7.5

## Special Tool

			
09900-20605 Dial caliper gauge	09900-20607 Dial gauge	09900-20701 Magnetic stand	09913-50121 Oil seal remover
			
09913-61510 Bearing puller	09913-70123 Bearing installer	09913-75520 Bearing installer	09913-75821 Bearing installer handle
			
09913-84510 Bearing installer	09913-85210 Bearing installer	09923-78210 Bearing installer	09924-74510 Bearing installer handle

 <p>09924-84510-002 Bearing installer</p>	 <p>09925-37811-001 Oil pressure gauge</p>	 <p>09925-88210 Bearing puller attachment</p>	 <p>09925-98210 Bearing installer</p>
 <p>09925-98221 Bearing installer</p>	 <p>09926-37610 Bearing remover See NOTE "A".</p>	 <p>09926-37610-001 Bearing puller See NOTE "B".</p>	 <p>09926-37610-002 Bearing puller attachment See NOTE "B".</p>
 <p>09926-37610-003 Bearing remover attachment See NOTE "B".</p>	 <p>09926-58010 Bearing remover attachment</p>	 <p>09926-96030 Clutch spring compressor</p>	 <p>09926-96050 Brake piston compressor</p>
 <p>09926-97610 Spring compressor</p>	 <p>09926-97620 Spring compressor</p>	 <p>09926-98310 Clutch spring compressor</p>	 <p>09928-06050 Differential preload adapter</p>

 <p>09931-76011 Tech 1A kit (SUZUKI scan tool) (See NOTE "C".)</p>	 <p>Mass storage cartridge for Tech 1A</p>	 <p>09931-76030 16/14 pin DLC cable for Tech 1A</p>	 <p>09942-15511 Sliding hammer</p>
 <p>09944-68210 Bearing installer</p>	 <p>09944-78210 Bearing installer support</p>	 <p>09944-88220 Oil seal installer</p>	 <p>09944-96011 Bearing outer race remover</p>
 <p>09946-06710 Bearing retainer dummy</p>	 <p>09951-18210 Oil seal installer</p>	 <p>09952-06020 Dial gauge plate No.2</p>	 <p>Tech 2 kit (SUZUKI scan tool) (See NOTE "D".)</p>

**NOTE:**

- "A" : This tool consists of Bearing Puller with 09926-37610-001, Bearing Puller Attachment with 09926-37610-002 and Bearing Remover Attachment with 09926-37610-003.
- "B" : This tool is constituent of Bearing Remover with 09926-37610.
- "C" : 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 (14/26 pin, 09931-76040), 5. Test lead/probe, 6. Power source cable, 7. DLC cable adaptor, 8. Self-test adaptor
- "D" : 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 adaptor, 5. Cigarette cable, 6. DLC loopback adaptor, 7. Battery power cable, 8. RS232 cable, 9. RS232 adaptor, 10. RS232 loopback connector, 11. Storage case, 12. Power supply

## Required Service Material

Material	Recommended SUZUKI Material	Use
Automatic transmission fluid	An equivalent of DEXRON®-III or DEXRONR®-IIE	<ul style="list-style-type: none"> <li>• Automatic transaxle</li> <li>• Parts lubrication when installing</li> <li>• O-rings</li> </ul>
Sealant	SUZUKI BOND No. 1216B (99000-31230)	<ul style="list-style-type: none"> <li>• Mating surface of torque converter housing</li> <li>• Mating surface of rear cove assembly</li> <li>• Torque converter housing bolts</li> <li>• Drive plate bolts</li> </ul>
Lithium grease	SUZUKI SUPER GREASE C (99000-25030)	<ul style="list-style-type: none"> <li>• Oil seal lips</li> <li>• Planetary carrier thrust washer</li> </ul>
	SUZUKI SUPER GREASE A (99000-25010)	<ul style="list-style-type: none"> <li>• Cable ends</li> <li>• Converter center cup</li> </ul>



## 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 items with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in “FOREWORD”

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## Diagnosis

### Interior Light (Dome, Front Spot or Luggage Compartment Light)

Condition	Possible Cause	Correction
<b>Dome light does not light up</b>	Bulb blown	Replace bulb.
	"RADIO/DOME" fuse blown	Replace fuse to check for short.
	Dome light switch faulty	Check switch.
	Door switch faulty	Check switch.
	Wiring or grounding	Repair circuit.
<b>Front spot lights do not light up (if equipped)</b>	Bulb(s) blown	Replace bulb(s).
	Spot light switch faulty	Check switch.
	Wiring or grounding	Repair circuit.
<b>Luggage compartment light does not light up (if equipped)</b>	Bulb blown	Replace bulb.
	Back door switch faulty	Check switch.
	Trunk lid switch faulty	Check switch
	Wiring or grounding faulty	Repair circuit.

### Power Door Lock System with Keyless Entry System (If Equipped)

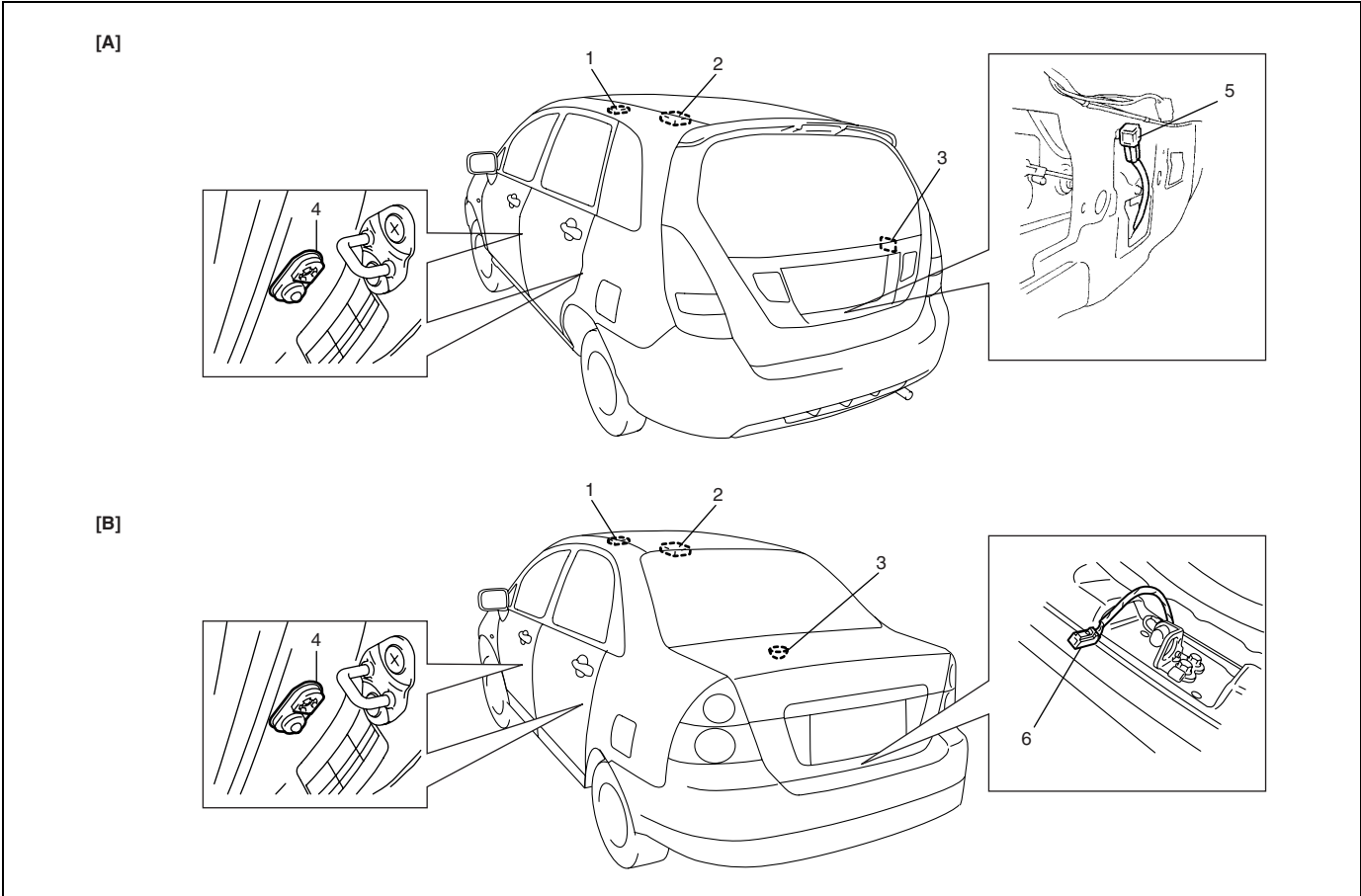
Condition	Possible Cause	Correction
<b>All doors are not locked/unlocked by all of switches</b>	"DOOR LOCK" fuse blown	Replace fuse to check for short.
	Power door lock controller faulty	Check system referring to POWER DOOR LOCK SYSTEM WITH KEYLESS ENTRY SYSTEM in this section.
	Wiring or grounding faulty	
<b>All doors are not locked/unlocked by only power door lock switch</b>	Power door lock switch faulty	Check switch.
	Wiring harness connected to power door lock switch faulty	Repair.
	Power door lock controller faulty	Check system referring to POWER DOOR LOCK SYSTEM WITH KEYLESS ENTRY SYSTEM in this section.
	Wiring or grounding faulty	
<b>All are not locked/unlocked by only driver side key cylinder switch</b>	Driver side key cylinder switch faulty	Replace key cylinder switch.
	Wiring harness connected to driver side door key cylinder switch faulty	Repair.
	Power door lock controller faulty	Check system referring to POWER DOOR LOCK SYSTEM WITH KEYLESS ENTRY SYSTEM in this section.
	Wiring or grounding faulty	
<b>Only one door is not locked/unlocked</b>	Wiring harness connected to applicable door lock actuator faulty	Repair.
	Power door lock actuator faulty	Check actuator.
<b>All doors are not locked/unlocked by only keyless entry transmitter</b>	Transmitter battery dead	Replace battery.
	Door switch faulty	Replace door switch.
	Transmitter faulty	Replace transmitter.
	Code registration error	Perform code registration.
	Key remainder switch (in ignition switch) faulty	Replace ignition switch.
	Power door lock controller faulty	Replace controller.
	Wiring or grounding faulty	Repair.

Condition	Possible Cause	Correction
<b>Turn signal lights are not flashed when doors are locked/unlocked by keyless entry transmitter</b>	Power door lock controller faulty	Check system referring to POWER DOOR LOCK SYSTEM WITH KEYLESS ENTRY SYSTEM in this section.
	Wiring or grounding faulty	
<b>Dome light does not turn ON when doors are unlocked by keyless entry transmitter</b>	Power door lock controller faulty	Check system referring to POWER DOOR LOCK SYSTEM WITH KEYLESS ENTRY SYSTEM in this section.
	Wiring or grounding faulty	

# On-Vehicle Service

## Interior Light (Dome, Front Spot or Luggage Compartment Light)

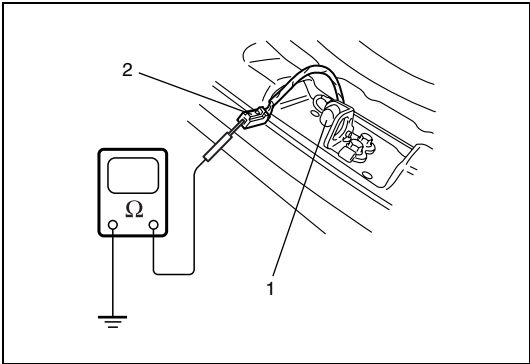
### Interior light system location



[A]: For wagon model	[B]: For sedan model	1. Front spot lights	2. Dome light
3. Luggage compartment light	4. Door switches (both sides)	5. Back door switch	6. Trunk lid switch

## Trunk lid switch

### INSPECTION



Check for trunk lid switch (1) for continuity between trunk lid switch connector terminal (2) and body ground. If found defective, replace trunk lid switch (1).

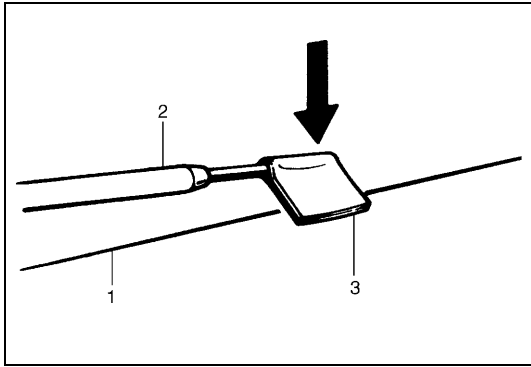
### Trunk lid switch (1) operation

Trunk lid switch position	Condition
Pushing	No continuity
Free	Continuity

## Rear Window Defogger

### Defogger wire

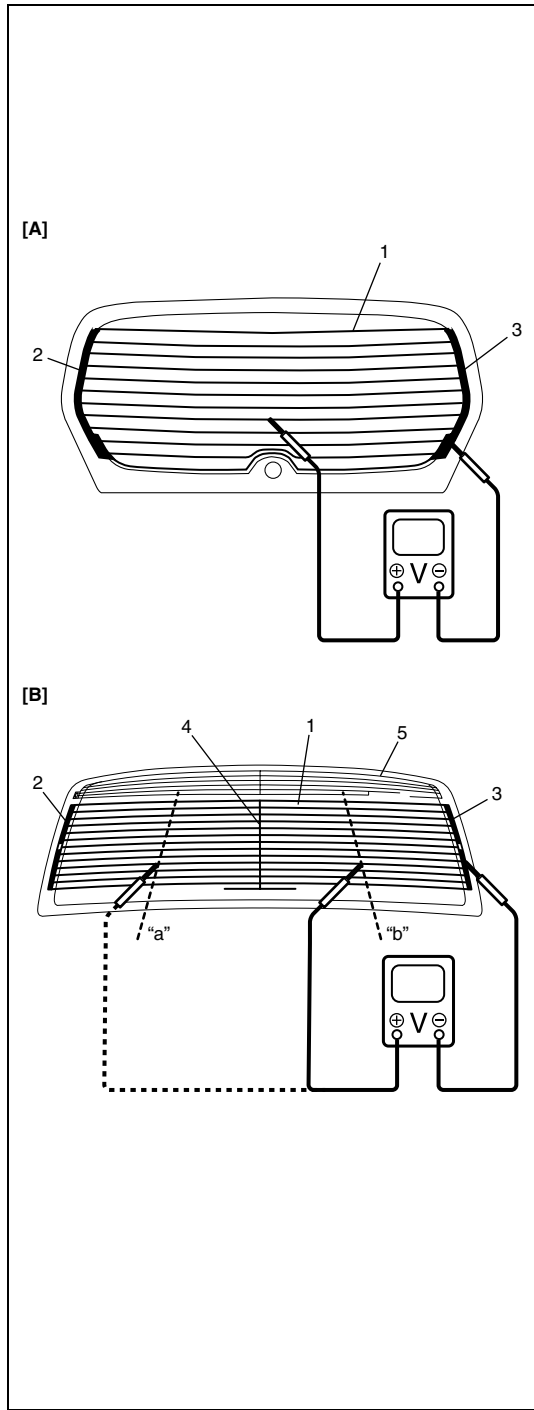
#### INSPECTION



#### NOTE:

- When cleaning rear window glass, use a dry cloth to wipe it along heat wire (1) direction.
- When cleaning glass, do not use detergent or abrasive-containing glass cleaner.
- When measuring wire voltage, use a tester with negative probe (2) wrapped with a tin foil (3) which should be held down on wire by finger pressure.

- 1) Turn ignition switch to ON position.
- 2) Turn on defogger switch.



3) Measure voltage at each position(s) as follows.

For wagon model:

Measure voltage at the center of each defogger wire (1), and check defogger wire condition according to table below.

For sedan model:

Measure voltage at position “a” and position “b” of each defogger wire (1), and check defogger wire condition according to table below.

If defogger wire open is found, go to next step.

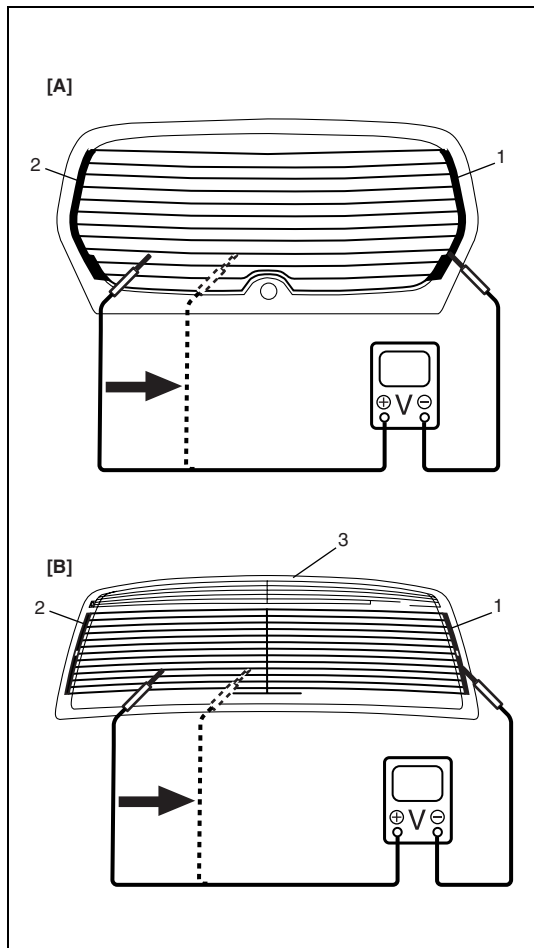
#### Defogger wire voltage for wagon model

Voltage	Circuit
10 – 12 V	Defogger wire open between its center and defogger wire power source terminal end (2)
4 – 6 V	Normal condition
0 – 1 V	Defogger wire open between its center and defogger wire ground terminal end (3)

#### Defogger wire voltage for sedan model

Measuring position	Voltage	Circuit
Midpoint “a” between (2) and (4)	10 – 12 V	Defogger wire open between defogger wire power source terminal end (2) and position “a”
	7 – 9 V	Normal condition
	4 – 6 V	Defogger wire open between position “a” and center line (4)
Midpoint “b” between (3) and (4)	4 – 6 V	Defogger wire open between center line (4) and position “b”
	2 – 4 V	Normal condition
	0 – 1 V	Defogger wire open between position “b” and defogger wire ground terminal end (3)

[A]: For wagon model
[B]: For sedan model
5 : Glass antenna



- 4) Touch voltmeter negative (–) lead to defogger wire ground terminal end (1).
- 5) Touch voltmeter positive (+) lead with a foil strip to defogger wire power source terminal end (2), then move it along wire to defogger wire ground end (1).

For wagon model:

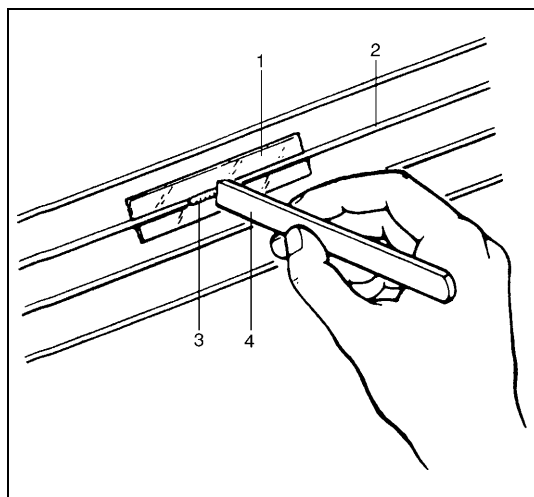
The place where voltmeter fluctuates from 10 – 12 V to 0 - 1 V is where there is open.

For sedan model:

The place where voltmeter fluctuates from 10 – 12 V to 4 - 6 V or 4 – 6 V to 0 - 1 V is where there is open.

[A]: For wagon model
[B]: For sedan model
3: Glass antenna

## REPAIR

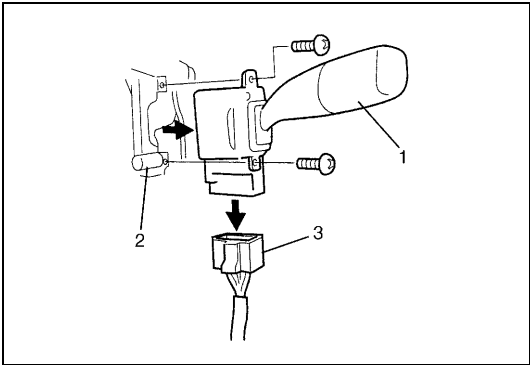


- 1) Use white gasoline for cleaning.
- 2) Apply masking tape (1) at both upper and lower sides of heat wire (2) to be repaired.
- 3) Apply commercially-available repair agent (3) with a fine-tip brush (4).
- 4) 2 to 3 minutes later, remove masking tapes (1).
- 5) Leave repaired heat wire as it is for at least 24 hours before operating rear defogger again.

# Wipers and Washers

## Front wiper and washer switch

### REMOVAL

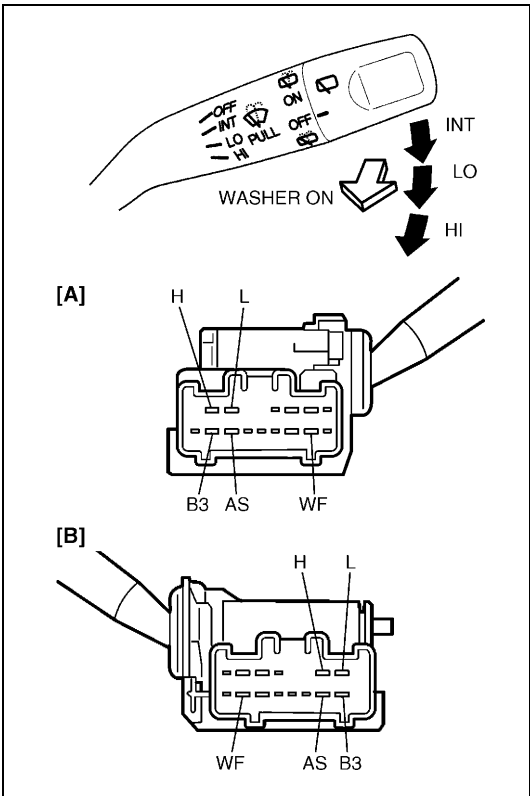


- 1) Disconnect negative cable at battery.
- 2) Remove steering column hole cover.
- 3) Remove steering column covers.
- 4) Remove wiper and washer switch (1) from combination switch assembly (2) and disconnect its coupler (3).

### INSPECTION

#### Front wiper and washer switch

Check for continuity between terminals at each switch position as shown below. If check result is not as specified, replace.



Wiper SW	Terminal	B3	H	L	AS
OFF					
INT					
LO					
HI					

Washer SW	Terminal	B3	WF
OFF			
ON			

[A] : LH steering vehicle [B] : RH steering vehicle



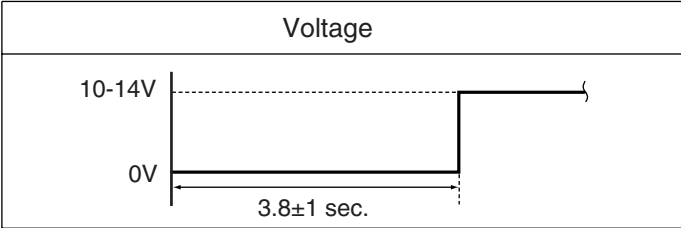
Intermittent wiper relay circuit

- 1) Turn the front wiper switch to “INT” position.
  - 2) Connect battery positive terminal to terminal “B3” and its negative terminal to terminal “EW”.
  - 3) Connect voltmeter positive lead to terminal “L” and its negative lead to terminal “EW”.
  - 4) Check that the voltmeter indicates the battery voltage (10-14V).
  - 5) Connect terminal “AS” and terminal “B3” for 5 sec. or more by a jumper wire.
  - 6) Disconnect end of the jumper wire from terminal “B3”.
  - 7) Connect disconnected jumper wire end to terminal “EW”, then check that voltage between terminal “L” and terminal “EW” changes as shown in figure.
- If check result is not satisfied, replace.

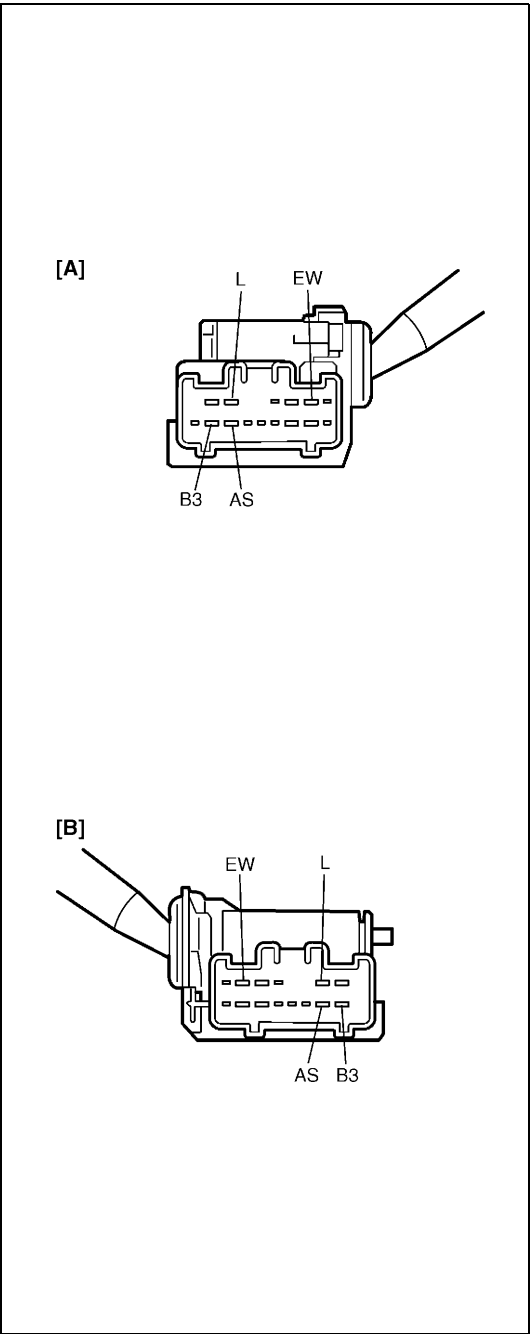
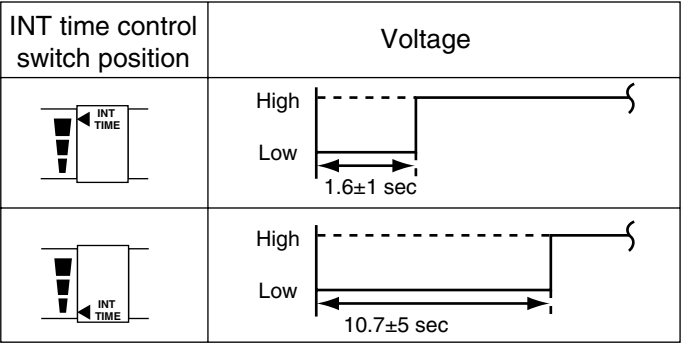
[A] : LH steering vehicle

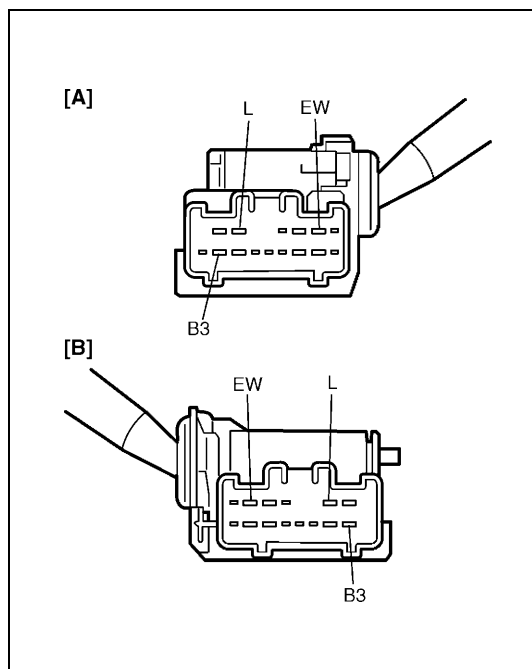
[B] : RH steering vehicle

Without INT time control switch



With INT time control switch

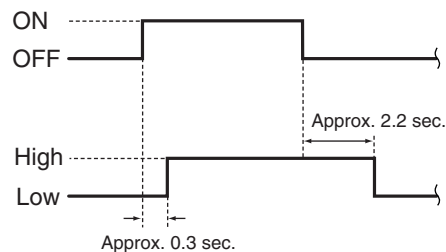


**Washer linked circuit**

- 1) Make sure that front wiper switch is at “OFF” position.
- 2) Connect battery positive terminal to terminal “B3” and its negative terminal to terminal “EW”.
- 3) Connect voltmeter positive lead to terminal “L” and its negative lead to terminal “EW”.
- 4) When front washer switch is ON, check that voltage changes as shown in figure.

[A] : LH steering vehicle

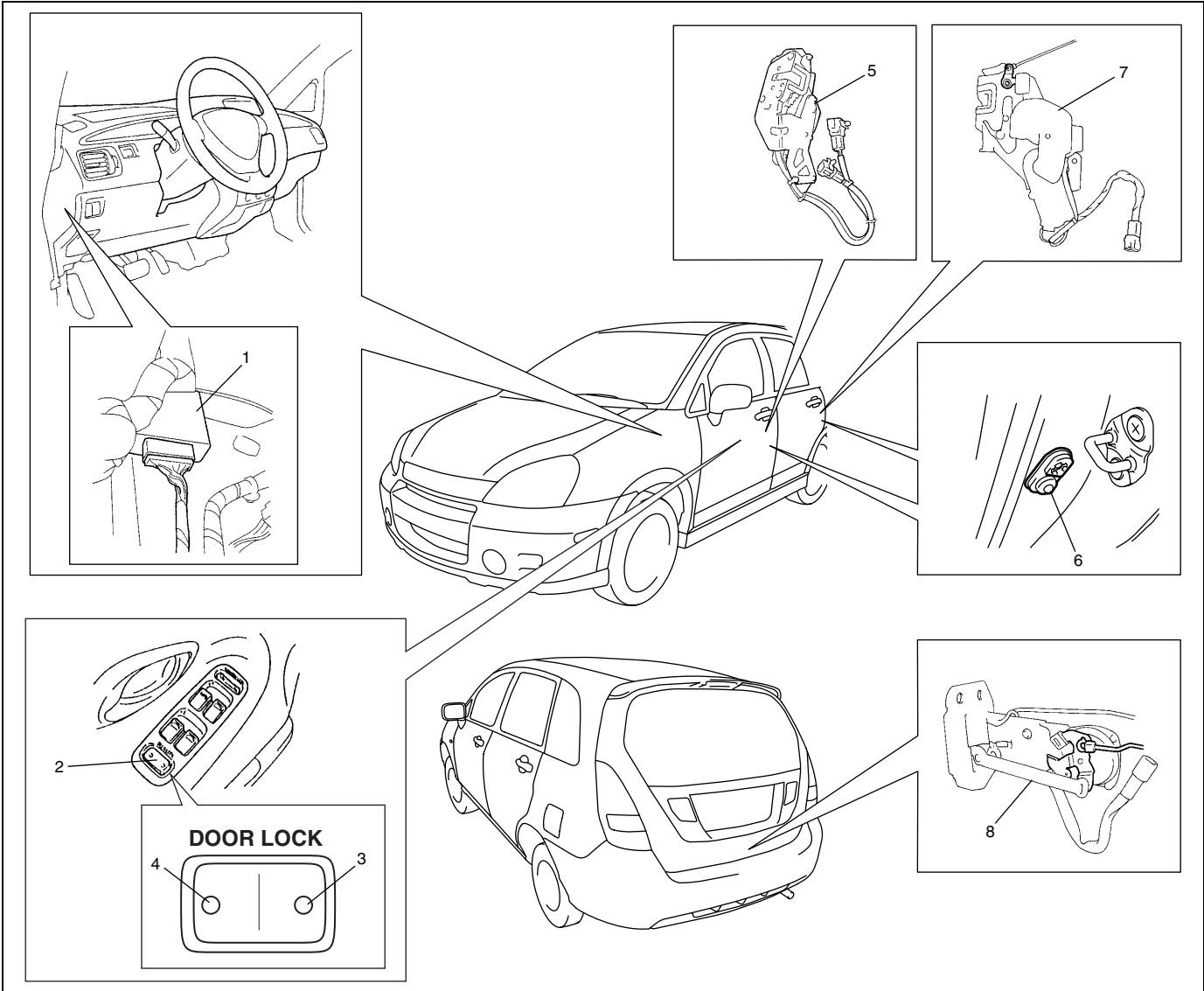
[B] : RH steering vehicle

**INSTALLATION**

Reverse removal procedure for installation.

Power Door Lock System with Keyless Entry System (If Equipped)

Power door lock system with keyless entry system component location



1. Power door lock controller	4. UNLOCK side	7. Rear door actuator
2. Power door lock switch	5. Front door actuator	8. Back door actuator for wagon model
3. LOCK side	6. Door switch	

Power door lock system operation inspection

- 1) Check the following operation:
  - a) When the driver side key cylinder is turned LOCK once, check all doors lock.
  - b) When the driver side door key cylinder is turned UNLOCK twice, check all doors unlock.
  - c) For vehicle equipped dead lock system:  
When the driver side door key cylinder is turned LOCK twice within 2 seconds, check all doors lock and not pulled up all door lock knobs by hand.

If check result is not satisfied, go to “Power Door Lock System Circuit Inspection” in this section.

## Power door lock system circuit inspection

- 1) Disconnect negative cable from battery.
- 2) Disconnect door lock controller coupler (1).
- 3) Confirm that all doors are unlocked. Connect battery positive (+) and negative (-) terminals to door lock controller coupler terminals and check power door lock operation as follows.  
If it does not operate as specified, repair applicable circuit or check actuator. If it operates as specified, go to next step.

### Power door lock operation for vehicle with dead lock system:

Step	TERMINAL				OPERATION
	L82-1	L82-2	L82-3	L82-10	
1	—	⊖	⊕	⊖	UNLOCK → LOCK
2	⊕	⊖	—	⊖	LOCK → DEAD LOCK
3	⊖	⊕	⊖	⊕	DEAD LOCK → UNLOCK

[A] : Step 1: Lock operation check

[B] : Step 2: Dead lock operation check

[C] : Step 3: Unlock operation check

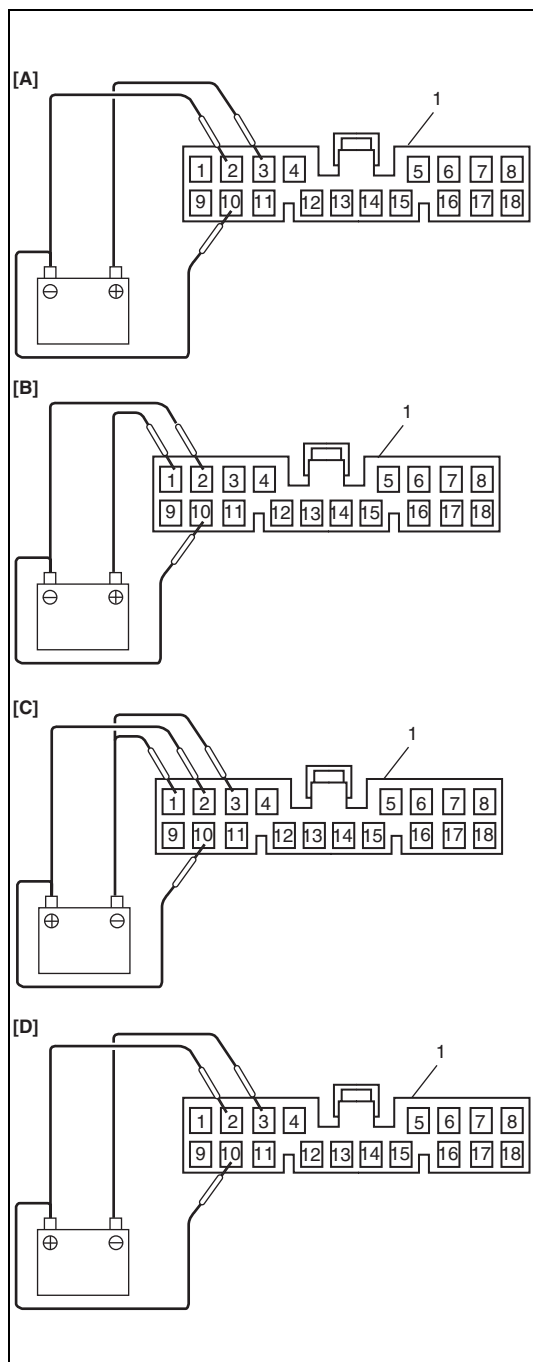
### Power door lock operation for vehicle without dead lock system:

Step	TERMINAL			OPERATION
	L82-2	L82-3	L82-10	
1	⊖	⊕	⊖	UNLOCK → LOCK
2	⊕	⊖	⊕	LOCK → UNLOCK

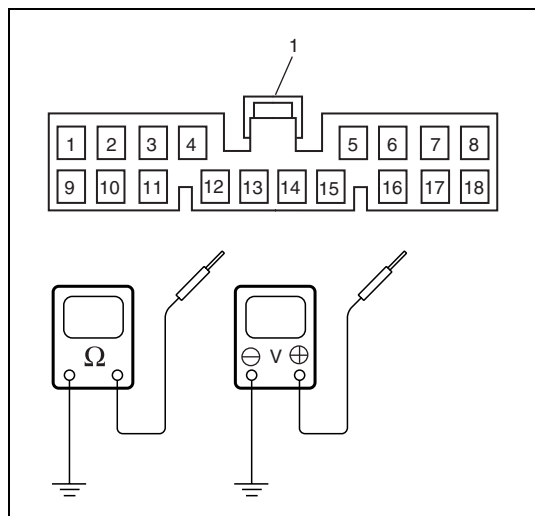
[A] : Step 1: Lock operation check

[D] : Step 2: Unlock operation check

1. Power door lock controller coupler "L82" viewed from terminal side



- 4) Connect negative (-) cable to battery.



- 5) Check that the voltage and continuity between the following terminals and body ground are specifications under each conditions.

If check result is not as specified, repair circuit.

If check result is OK, recheck power door lock system as follows.

- Substitute a known-good door lock controller.
- Recheck power door lock system circuit.

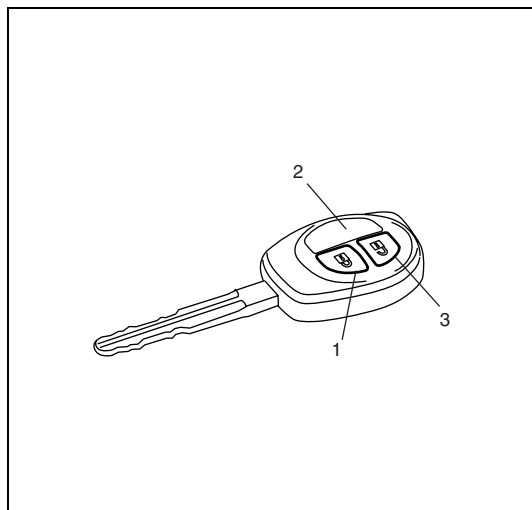
1 : Power door lock controller coupler "L82"  
viewed from terminal side

### Power door lock system circuit check

Terminal	Wire	Circuit	Specification	Condition
L82-5	WHT/BLK	Power door lock switch circuit	Continuity	Power door lock switch is LOCK position.
			No continuity	Power door lock switch is free.
L82-9	WHT/GRN	Main power supply	10 – 14 V	–
L82-12	RED/BLK	Ignition switch circuit	10 – 14 V	Ignition switch is ON position.
			0 – 1 V	Ignition switch is OFF position.
L82-13	BRN	Driver side key cylinder circuit (UNLOCK signal)	Continuity	Driver side key cylinder is UNLOCK side.
			No continuity	Except the above-mentioned condition.
L82-14	BRN/WHT	Driver side key cylinder circuit (LOCK signal)	Continuity	Driver side key cylinder is LOCK side.
			No continuity	Except the above-mentioned condition.
L82-16	BLU/ORN	Power door lock switch circuit (UNLOCK signal)	Continuity	Power door lock switch is UNLOCK position.
			No continuity	Power door lock switch is free.
L82-17	BLK	Ground	0 – 1 V	–

## Keyless entry system operation inspection

- 1) Confirm that power door lock system is good condition.
- 2) Check transmitter battery for dead. If battery is dead, replace battery referring to “Replacement of Transmitter Battery” under “Transmitter” in this section.
- 3) Confirm that all doors are closed and unlocked.
- 4) Check the following operation:
  - a) When pushing “LOCK” button (1) on transmitter (2) once, check all doors lock and hazard warning lights flash once.
  - b) When pushing “UNLOCK” button (3) on transmitter (2) twice, check all doors unlock and hazard warning lights flash several times and interior light turn on about 20 seconds with the interior light switch in the middle position.
  - c) For vehicle equipped dead lock system:  
When pushing “LOCK” button (1) on transmitter (2) twice within 2 seconds, check all doors lock and not pulled up all door lock knobs by hand.



If check result is not satisfied, go to “Keyless Entry System Circuit Inspection” in this section.

## Keyless entry system circuit inspection

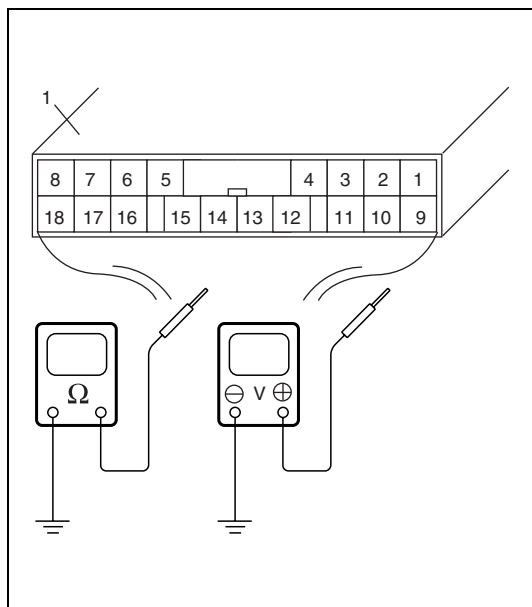
Check that the voltage and continuity between the following terminals and body ground are specifications under each conditions.

If check result is not as specified, check applicable circuit.

If circuit is normal, recheck keyless entry system circuit as follows.

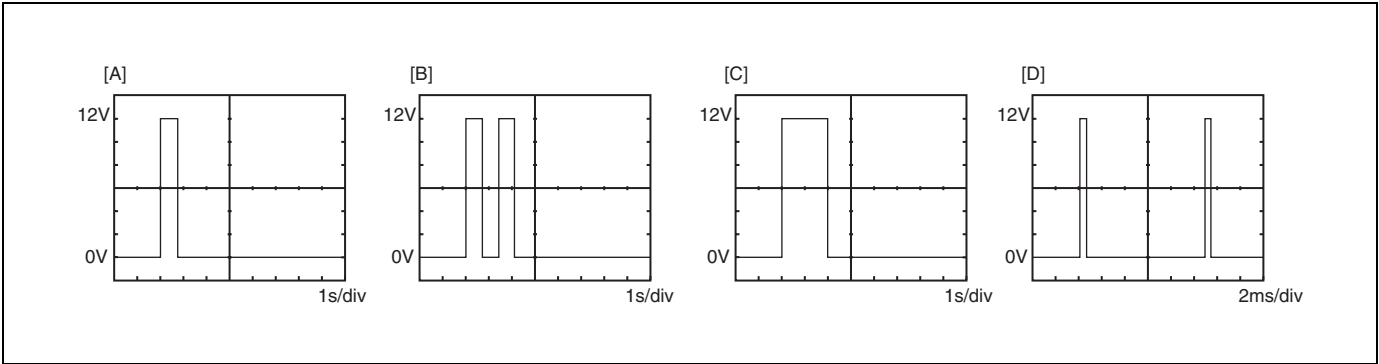
- 1) Substitute a known-good door lock controller.
- 2) Register key code referring to “Code Registration Procedure” under “Transmitter” in this section.
- 3) Recheck keyless entry system circuit.

1. Door lock controller



Keyless entry system circuit check

Terminal	Wire	Circuit	Specification	Condition
L82-7	BLU/YEL	Hazard waning signal circuit (right side)	Figure “A”	Push “LOCK” button on transmitter once.
			Figure “B”	Push “UNLOCK” button on transmitter once.
			Figure “C”	Push “LOCK” button on transmitter twice within 3 seconds.
L82-8	GRN/RED	Hazard waning signal circuit (left side)	Figure “A”	Push “LOCK” button on transmitter once.
			Figure “B”	Push “UNLOCK” button on transmitter once.
			Figure “C”	Push “LOCK” button on transmitter twice within 3 seconds.
L82-11	BLU/ORN	Key remainder circuit	10 – 14 V	Ignition key is in ignition switch.
			0 – 1 V	Ignition key is not in ignition.
L82-15	BLK/RED	Door switch & interior light circuit	0 – 1 V	Driver side, passenger side, rear driver side, rear passenger side or back door is open.
			10 – 14 V	All doors are close.
			Figure “D”	Fulfill the following conditions. <ul style="list-style-type: none"> <li>• All door is close.</li> <li>• Interior light switch is middle position.</li> <li>• 20 seconds after pushing “UNLOCK” button on transmitter once</li> </ul>

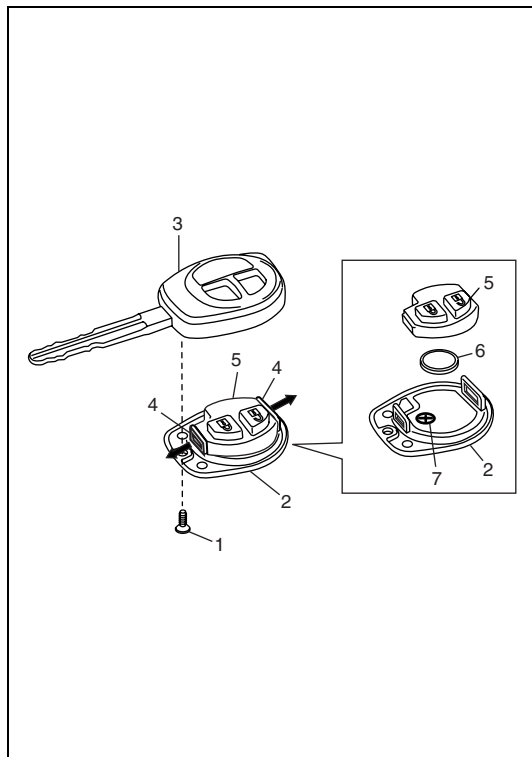


[A] : Figure “A”
[B] : Figure “B”
[C] : Figure “C”
[D] : Figure “D”

## Transmitter

### REPLACEMENT OF TRANSMITTER BATTERY

If transmitter becomes unreliable, replace transmitter battery as follows.



- 1) Remove screw (1), and remove cover (2) from ignition key (3).
- 2) Unhook tabs (4) and remove transmitter (5).
- 3) Replace battery (lithium disc-type CR1616 or equivalent battery) (6).
- 4) Set transmitter to cover (2).
- 5) Install cover (2) to ignition key (3) and tighten screw (1).
- 6) Make sure that keyless entry system can be operated with transmitter.

#### CAUTION:

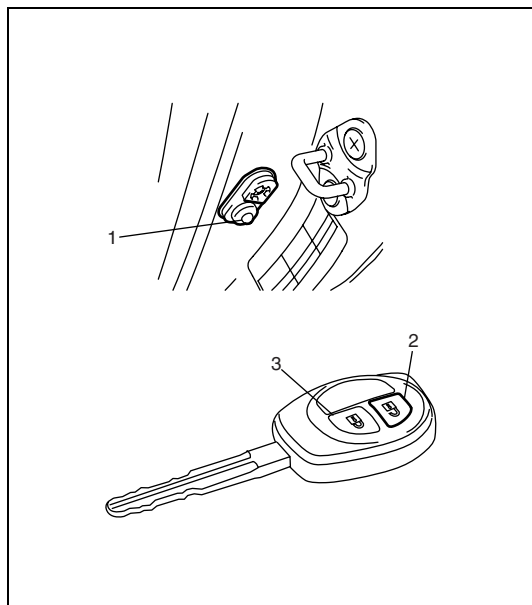
**Use care not to allow grease or dirt to be attached on the printed circuit board and the battery.**

#### NOTE:

- To prevent theft, be sure to break the transmitter before discarding it.
- Dispose of the used battery properly according to applicable rules or regulations. Do not dispose of lithium batteries with ordinary household trash.

### CODE REGISTRATION PROCEDURE

If transmitter or door lock controller replace new one, register key code as follows.



- 1) Confirm that all doors are closed and ignition key is out of ignition key cylinder
- 2) Open driver side door.
- 3) Turn ignition switch to ON position, and then drawn ignition key from ignition key cylinder within 10 seconds after that.
- 4) Push and release driver side door switch (1) at 3 times by hand within 20 seconds after removing ignition key from ignition key cylinder.
- 5) Turn ignition switch to ON position, and then drawn ignition key from ignition key cylinder within 10 seconds after that.
- 6) Push "UNLOCK" button (2) on transmitter (3) and confirm that all doors are operated from lock to unlock.  
With this, code registration is completed.

#### NOTE:

- Three transmitter codes can be registered.
- When a new transmitter code is registered, the oldest one will be cleared.



### **Power door lock switch**

Refer to “Power door lock switch” under “Power Door Lock System (If Equipped)” in the same section of the Service Manual mentioned in “FOREWORD” of this manual.

### **Door key cylinder switch (driver and passenger side)**

Refer to “Door key cylinder switch (driver and passenger side)” under “Power Door Lock System (If Equipped)” in the same section of the Service Manual mentioned in “FOREWORD” of this manual.

### **Power door lock actuator**

Refer to “Power door lock actuator” under “Power Door Lock System (If Equipped)” in the same section of the Service Manual mentioned in “FOREWORD” of this manual.

### **Door switch**

Refer to “Door switch (front/rear door)” in the same section of the Service Manual mentioned in “FOREWORD” of this manual.

## 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 servicing vehicle body, if shock may be applied to air bag system component parts, remove those parts beforehand. (Refer to Section 10B.)

**NOTE:**

- For the items with asterisk (\*) in the “CONTENTS” below, 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 or with an equivalent part if replacement becomes necessary.
- Do not use a replacement part of lesser quality or substitute a design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

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## **Glass, Windows and Mirrors**

### **Quarter Window (For Wagon Model)**

#### **REMOVAL AND INSTALLATION**

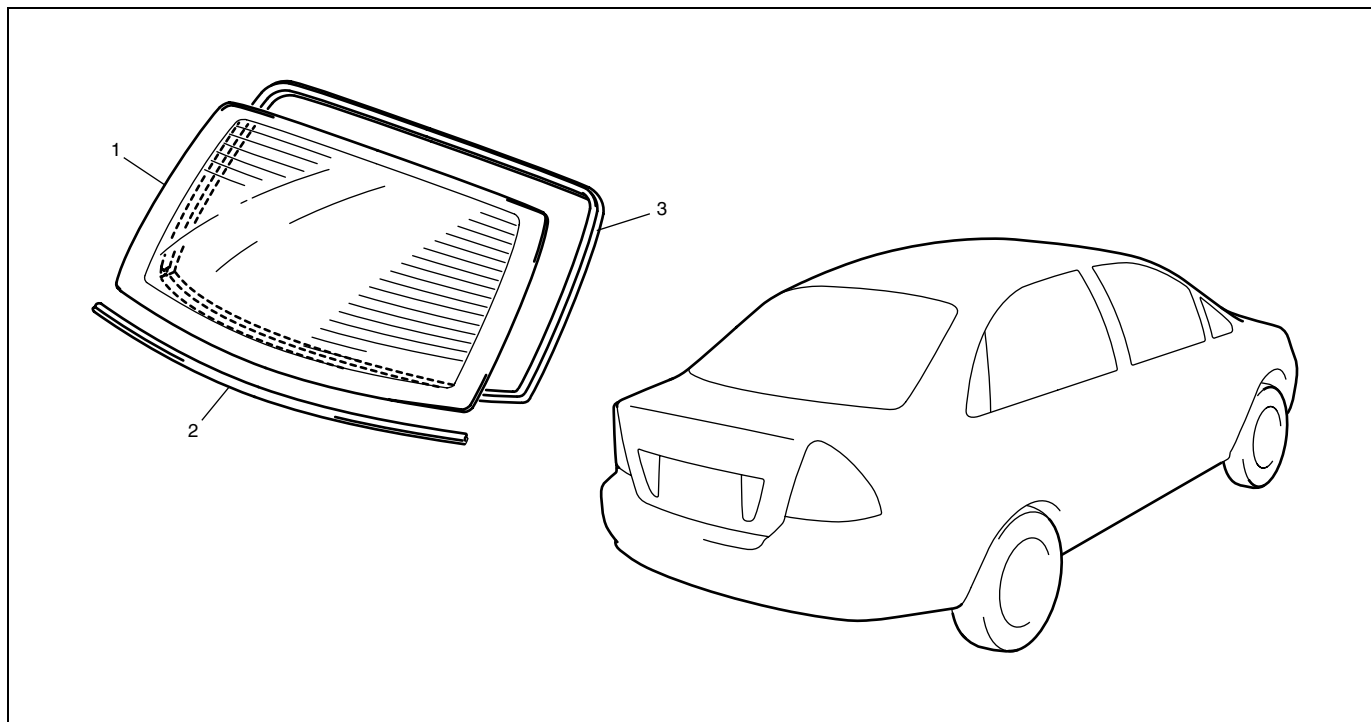
Refer to "Quarter Window" in the same section of the Service Manual mentioned in "Foreword" of this manual.

### **Back Door Glass (For Wagon Model)**

#### **REMOVAL AND INSTALLATION**

Refer to "Back Door Glass" in the same section of the Service Manual mentioned in "Foreword" of this manual.

## Back Window (For Sedan Model)



1. Back window

2. Back window lower molding

3. Back window molding

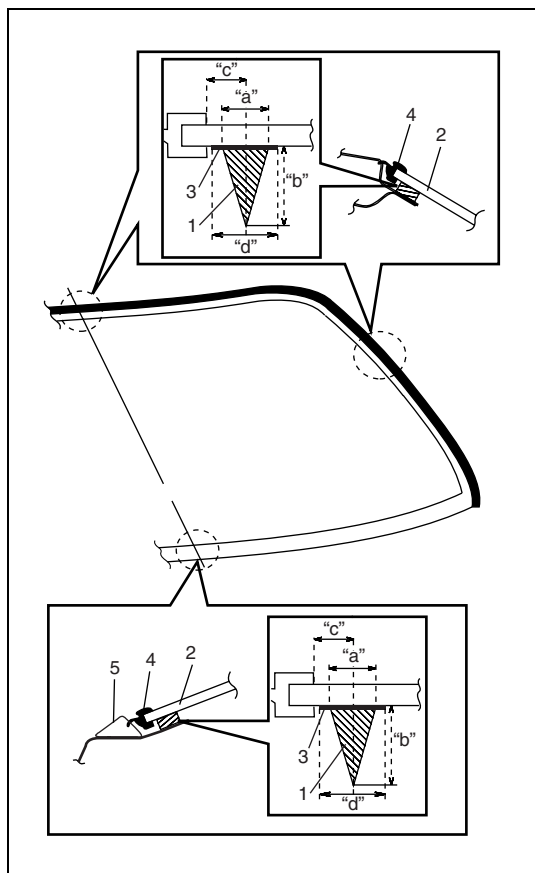
### REMOVAL AND INSTALLATION

Refer to "Windshield" in this section as removal and installation procedures are basically the same. However, note the following.

- Observe the following precautions when applying adhesive (1) along glass (2) edge.
- Adhesive (1) should be applied evenly especially in height.
- Be careful not to damage primer (3).
- Press glass against body quickly after adhesive (1) is applied.

4. Back window molding

5. Back window lower molding



### Adhesive amount specifications and position for back window

Width "a" : 7 mm (0.28 in.)

Height "b" : 14 mm (0.55 in.)

Position "c" : 6 mm (0.23 in.)

Width "d" : 14 mm (0.55 in.)

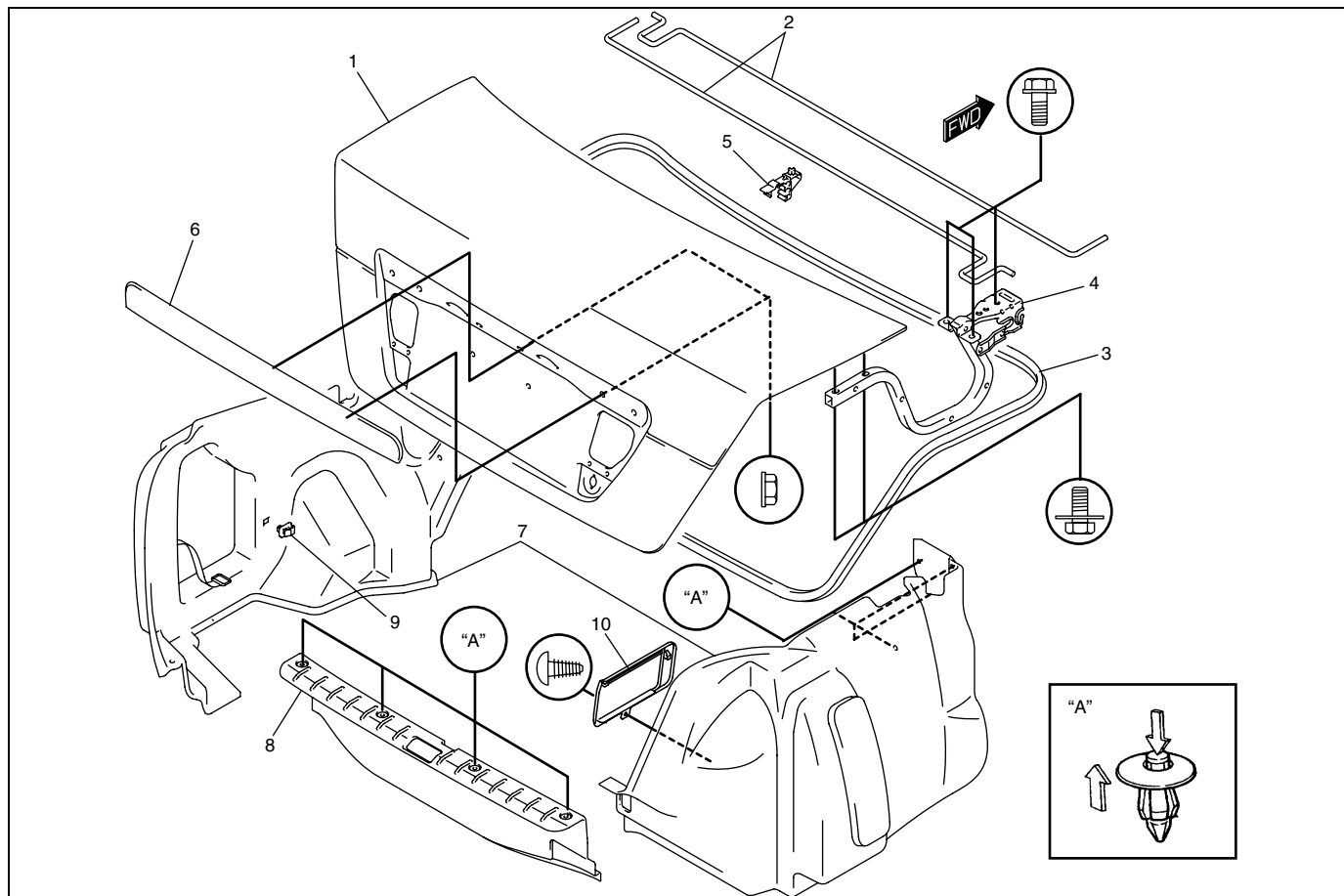
## Body Structure

### Back Door Assembly (For Wagon Model)

#### REMOVAL AND INSTALLATION

Refer to "Back Door Assembly" in the same section of the Service Manual mentioned in "Foreword" of this manual.

### Trunk Lid (For Sedan Model)

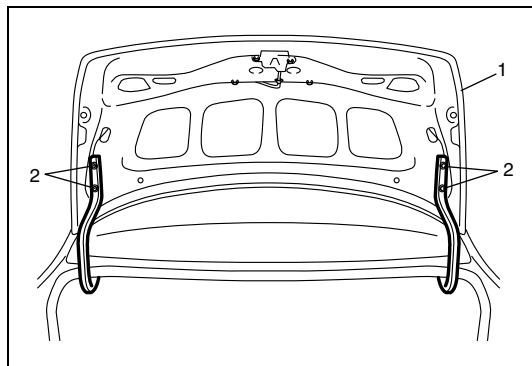


1. Trunk lid panel	3. Weather-strip	5. Torsion bar holder	7. Trunk room side trim	9. Trunk room side trim holder
2. Torsion bar	4. Hinge	6. Trunk lid garnish	8. Trunk room rear trim	10. Trunk room side trim cover

#### REMOVAL

##### **WARNING:**

**When removing torsion bar, be careful for its repulsion.**

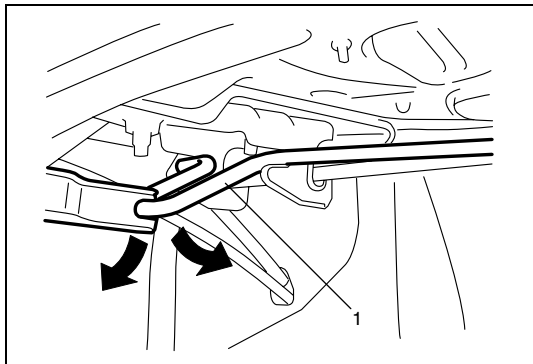


- 1) Remove trunk lid opener wire and trunk room harness from trunk lid panel (1).
- 2) Remove trunk lid attaching bolts (2), and trunk lid.

##### **NOTE:**

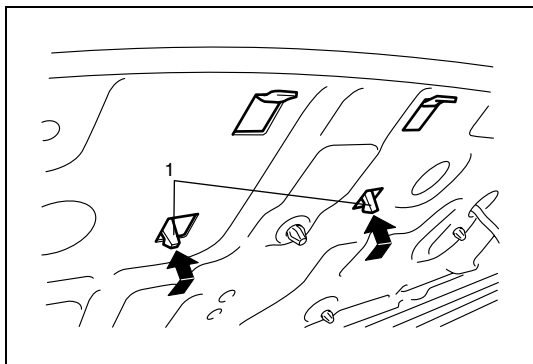
**Handle removed trunk lid carefully. Dropping it can cause damage to itself and vehicle body.**

- 3) Remove trunk room side trim.



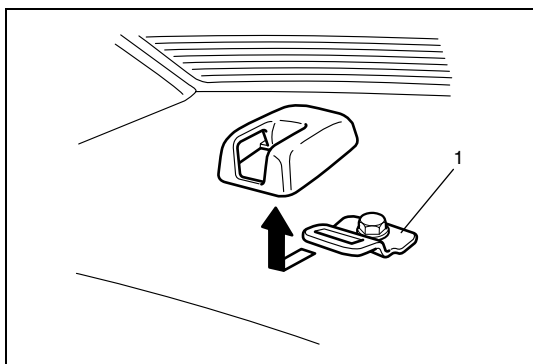
4) Remove torsion bars.

5) Fold rear seat back forward.

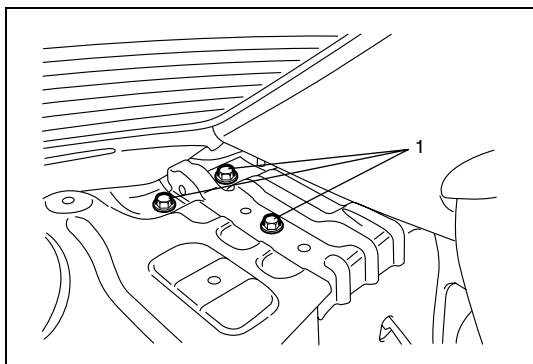


6) Remove high mounted stop light.

1. High mounted stop light stay



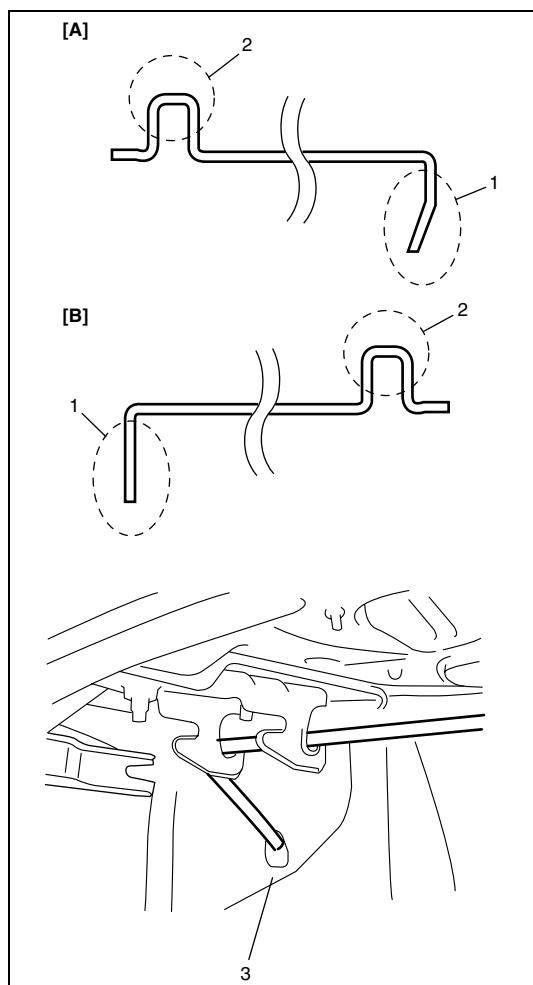
7) Remove tether anchorage (if equipped) (1) then remove partition trim.



8) Remove hinge attaching bolts (1) and take out trunk lid hinges.

## INSTALLATION

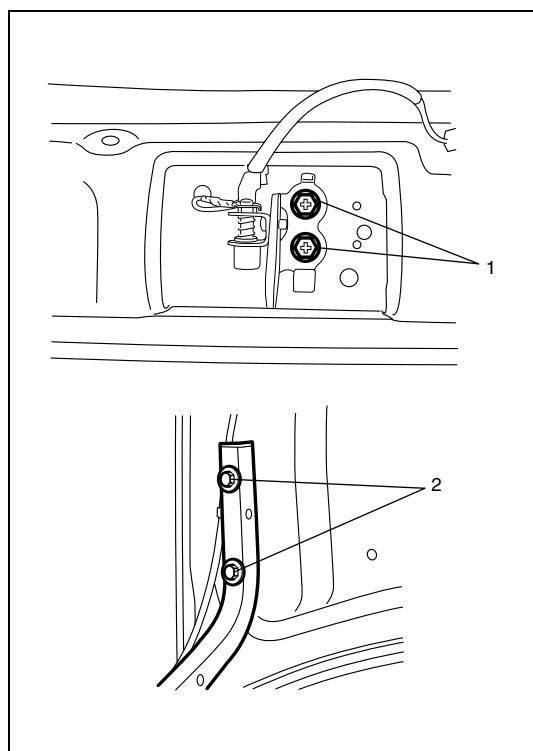
Reverse removal procedure for installation, and then noting the following instruction.



- Install torsion bars as following:

- a) Open trunk lid and hold it.
- b) Distinguish torsion bar (A) from (B) by end shape (1).
- c) Insert end (1) into hole of partition side panel (3) and fit end (2) to groove partition side panel of left side hinge.
- d) Insert end (1) into hole of partition side panel (3) and fit end (2) to groove partition side panel of right side hinge.

[A]:	Left side torsion bar
[B]:	Right side torsion bar



- Fore-and-aft and right-and-left adjustment.  
Adjust trunk lid clearance by loosening trunk lid mounting bolts (2).
- Adjust trunk lid latch striker so that striker shaft approximately aligns with the center of groove of trunk lid latch (1).

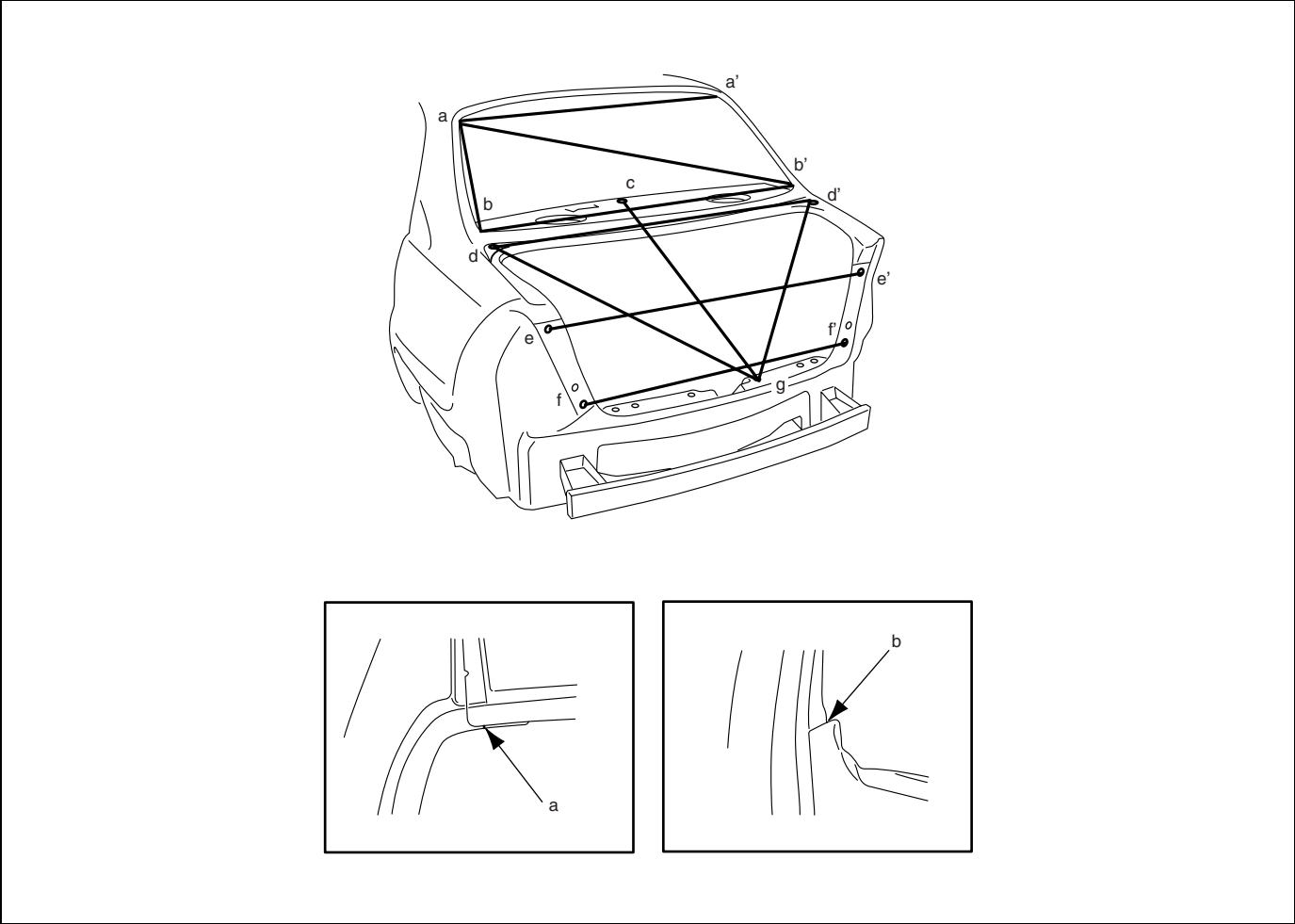


Body Dimensions

Back door (For Wagon Model)

Refer to “Body Dimensions” in the same section of the Service Manual mentioned in “Foreword” of this manual.

Trunk room (For Sedan Model)



a (a'). Joint of panel (Roof panel and side body outer panel)	e. Rear combination lamp installation hole
b (b'). Joint of panel (Side body outer panel and partition panel)	f (f'). Rear bumper installation hole
c (c'). High mount stop lamp installation hole	g. Rear luggage end garnish installation hole
d (d'). Weather-strip mounting clip installation hole	

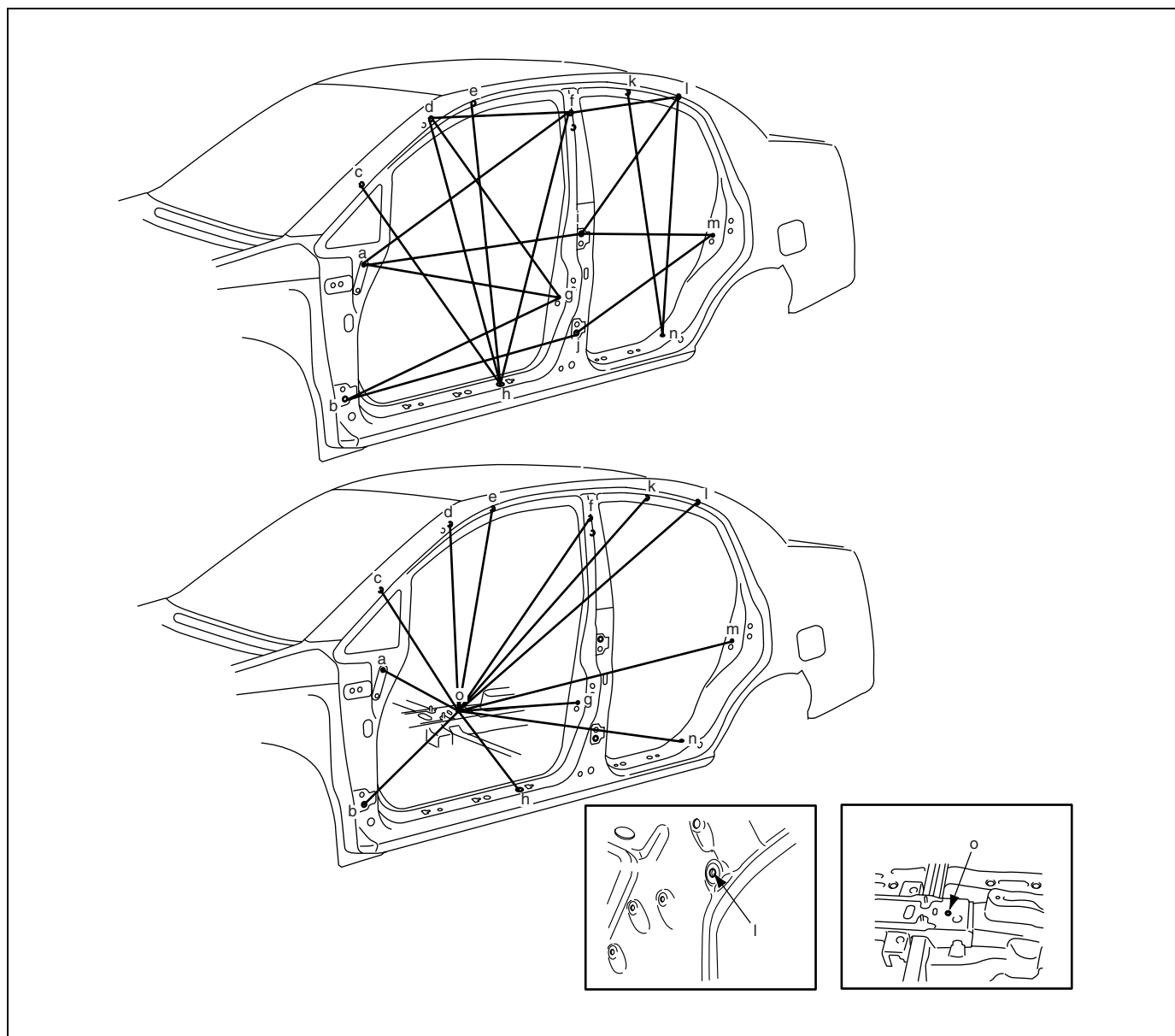
Hole to hole distance

a-a' : 951 mm (37.44 in.)	c-g : 663 mm (26.11 in.)	e-e' : 1094 mm (43.07 in.)
a-b : 528 mm (20.79 in.)	d-d' : 1221 mm (48.06 in.)	f-f' : 936 mm (36.85 in.)
a-b' : 1198 mm (47.17 in.)	d-g : 956 mm (37.62 in.)	
b-b' : 1216 mm (47.87 in.)	d'-g : 788 mm (31.01 in.)	

Side body (For Wagon Model)

Refer to “Body Dimensions” in the same section of the Service Manual mentioned in “Foreword” of this manual.

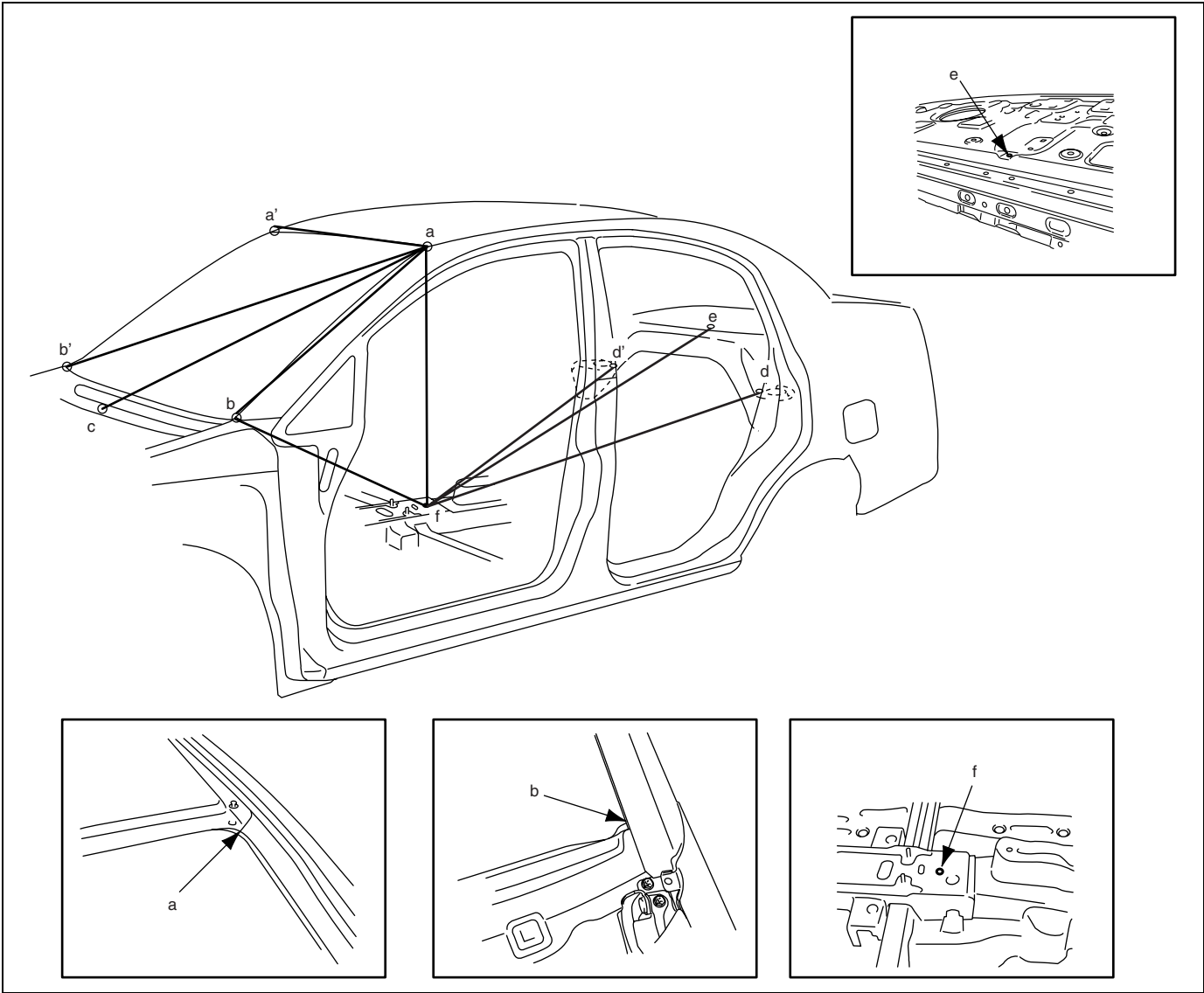
## Side body (For Sedan Model)



a. Instrumental panel upper mounting bolt hole	f. Front shoulder adjuster bracket installation upper hole	k. Jig hole ( $\phi 10$ mm (0.39 in.))
b. Front door lower hinge installation hole	g. Front door switch mounting bolt hole	l. Rear side trim installation hole
c. Front pillar inner trim installation lower hole	h. Bleeding hole ( $\phi 15$ mm (0.59 in.))	m. Rear door switch mounting bolt hole
d. Front pillar inner trim installation upper hole	i. Rear door upper hinge installation upper hole	n. Side sill scuff installation rear hole
e. Jig hole ( $\phi 10$ mm (0.39 in.))	j. Rear door lower hinge installation lower hole	o. Jig hole ( $\phi 10$ mm (0.39 in.))

## Hole to hole distance

a-f : 1112 mm (43.78 in.)	f-h : 1088 mm (42.83 in.)	d-o : 1121 mm (44.13 in.)
a-g : 918 mm (36.14 in.)	f-l : 677 mm (26.65 in.)	e-o : 1163 mm (45.79 in.)
a-i : 935 mm (36.81 in.)	i-l : 924 mm (36.38 in.)	f-o : 1199 mm (47.20 in.)
b-g : 1004 mm (39.53 in.)	i-m : 873 mm (34.37 in.)	g-o : 807 mm (31.77 in.)
b-j : 1027 mm (40.43 in.)	j-m : 912 mm (35.90 in.)	h-o : 727 mm (28.62 in.)
c-h : 988 mm (38.90 in.)	k-n : 1098 mm (43.23 in.)	k-o : 1479 mm (58.23 in.)
d-f : 645 mm (25.39 in.)	l-n : 1037 mm (40.83 in.)	l-o : 1608 mm (63.31 in.)
d-g : 877 mm (34.53 in.)	a-o : 1053 mm (41.46 in.)	m-o : 1464 mm (57.64 in.)
d-h : 1026 mm (40.39 in.)	b-o : 1012 mm (39.84 in.)	n-o : 1156 mm (45.51 in.)
e-h : 1087 mm (42.80 in.)	c-o : 1137 mm (44.76 in.)	



a (a'). Front end of windshield upper installation section	e. Quarter window trim mounting clip installation hole
b (b'). Front end of windshield lower installation section	f. Quarter window trim mounting clip installation hole
c. Datum point	g. Jig hole (ϕ10 mm (0.39 in.))
d. Quarter window trim mounting clip installation hole	

Hole to hole distance

a-a' : 1078 mm (42.44 in.)	a-f : 1165 mm (45.87 in.)	d'-f : 1577 mm (62.09 in.)
a-b : 740 mm (29.13 in.)	b-b' : 1332 mm (52.44 in.)	e-f : 1657 mm (65.24 in.)
a-b' : 1408 mm (55.43 in.)	b-f : 1211 mm (47.68 in.)	
a-c : 1149 mm (45.24 in.)	d-f : 1577 mm (62.09 in.)	

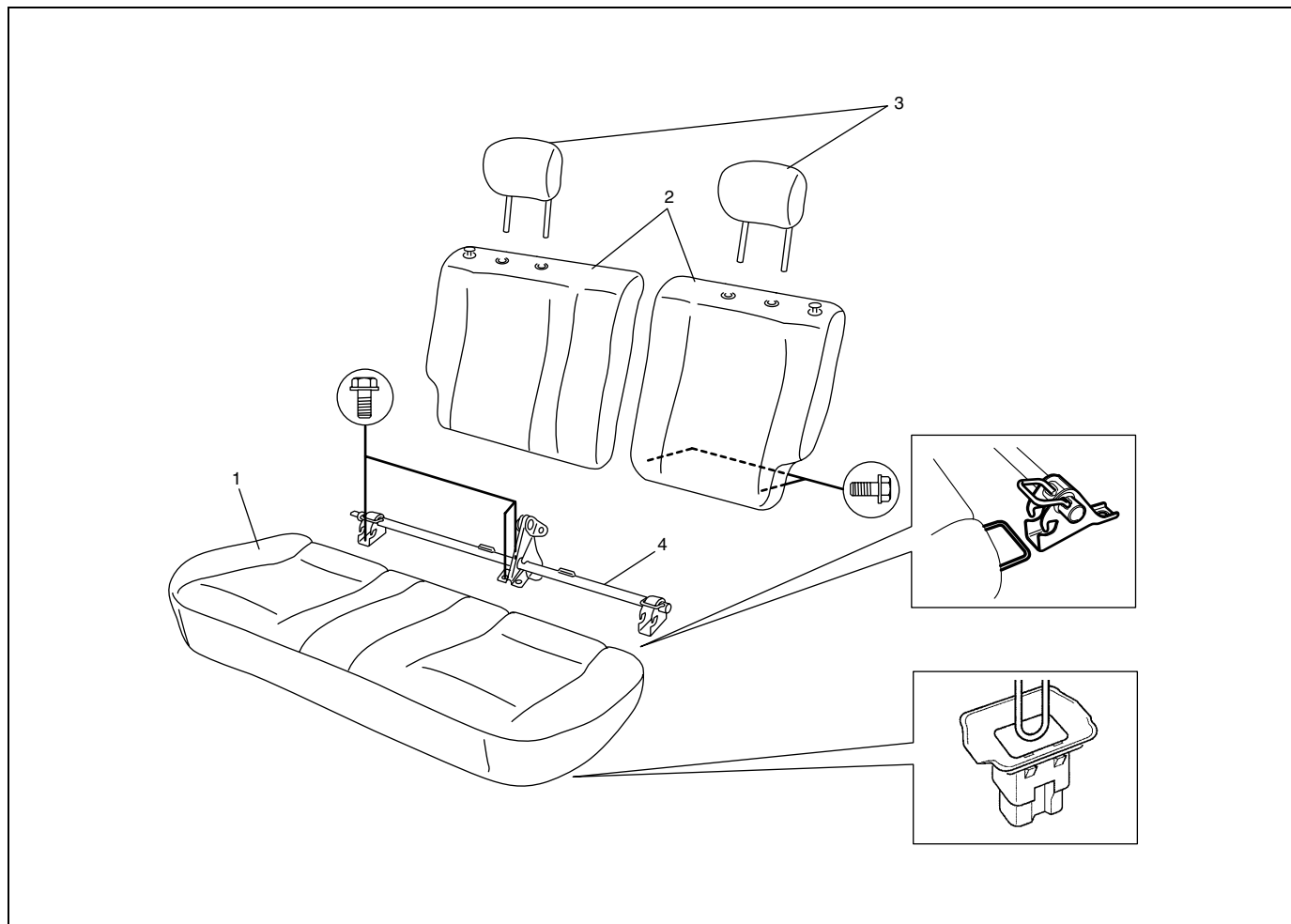
## Seats


### Rear Seat (For Wagon Model)

#### REMOVAL AND INSTALLATION

Refer to "Rear Seat" in the same section of the Service Manual mentioned in "Foreword" of this manual.

### Rear Seat (For Sedan Model)



1. Seat cushion	4. Seat back bracket
2. Seat back	 Tightening torque
3. Head rest	

#### REMOVAL

- 1) Fold rear seat back forward.
- 2) Remove 2 seat back bolts to remove seat back.
- 3) Remove seat cushion.
- 4) Disassemble and repair seat as necessary.

#### INSTALLATION

Reverse removal procedure to install rear seat noting the following instruction.

- When installing seat cushion, align seat cushion hook with seat back bracket.

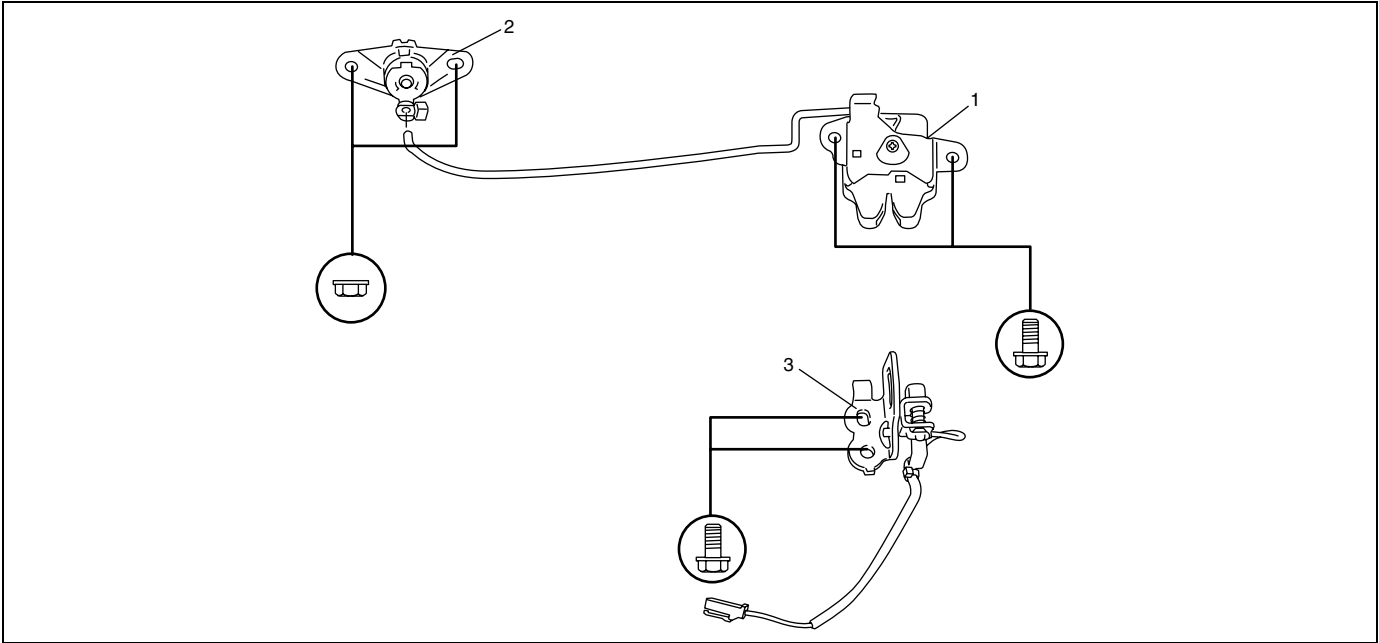
# Security and Locks

## Back Door Lock Assembly (For Wagon Model)

### REMOVAL AND INSTALLATION

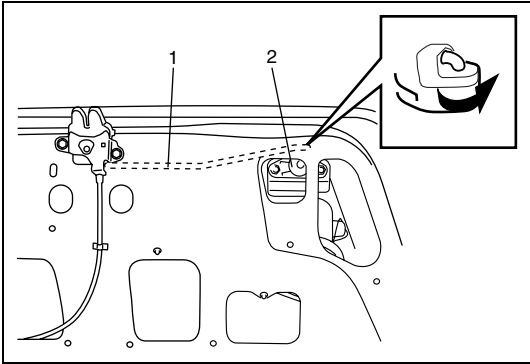
Refer to “Back Door Lock Assembly” in the same section of the Service Manual mentioned in “Foreword” of this manual.

## Trunk Lid Lock Assembly (For Sedan Model)

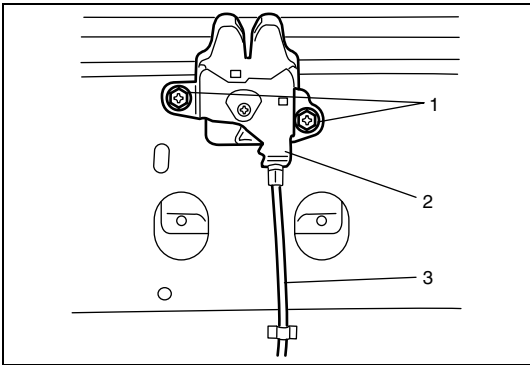


1. Trunk lid latch assembly	3. Latch striker
2. Trunk lid lock cylinder	

### REMOVAL



- 1) Disconnect trunk lid lock control rod (1).
- 2) Remove trunk lid lock cylinder (2).

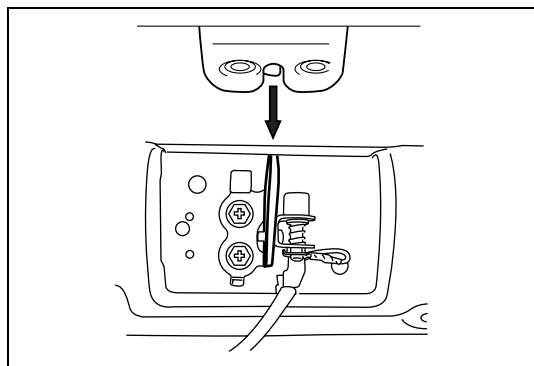


- 3) Loosen trunk lid latch bolts (1) and remove trunk lid latch assembly (2).
- 4) Disconnect trunk lid opener wire (3).

## INSTALLATION

Reverse removal procedure to install trunk lid lock assembly noting the following instruction.

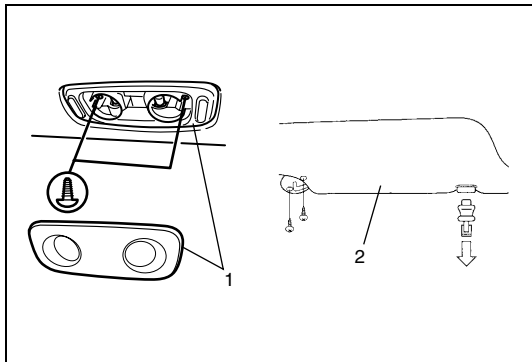
- Adjust latch striker so that its center aligns with the center of groove in trunk lid latch base.



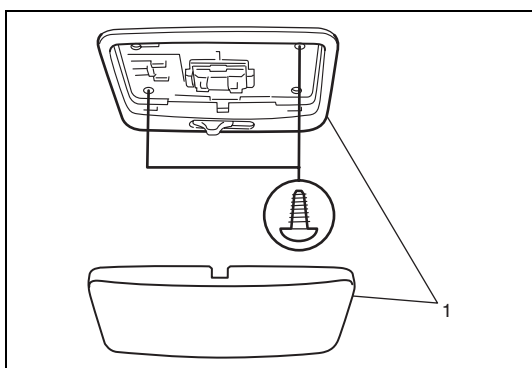
## Exterior and Interior Trim

### Head Lining

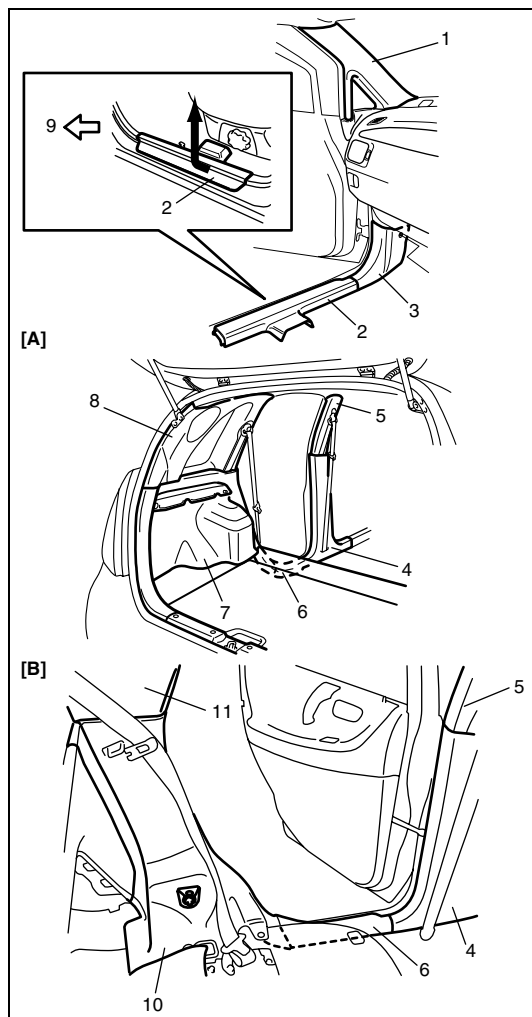
#### REMOVAL



- 1) Remove spot light assembly (1), if equipped.
- 2) Remove sun visor (2).



- 3) Remove door light assembly (1).

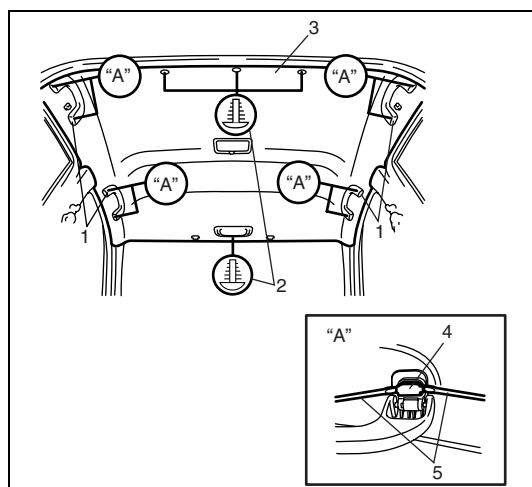


- 4) Remove front pillar trim (1), front side sill scuff (2), dash side trim (3), center pillar inner trim (4), center pillar inner upper trim (5), rear side sill scuff (6), quarter inner trim (7) and quarter window trim (8), rear side lower trim (10) and rear side upper trim (11).

9. Forward

[A]: For Wagon model

[B]: For Sedan model



- 5) Remove assistant grip (1).

- 6) Remove head lining clips (2) and remove head lining (3).

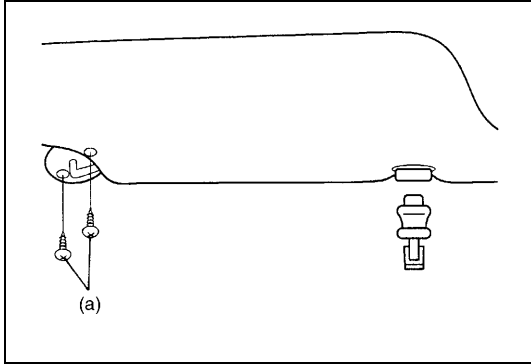
4. Clip

5. Flat head driver

## INSTALLATION

Reverse removal procedure to install head lining noting the following instructions.





- Tighten sun visor screw to specified torque.

**Tightening torque**

**Sun visor screw (a) : 4 N·m (0.4 kg-m, 2.8 lb-ft)**

## Roof Molding

Refer to “Roof Molding” in the same section of the Service Manual mentioned in “Foreword” of this manual.

**NOTE:**

**For sedan model, there are 6 place roof molding clips and not equipped with roof molding caps.**

## Paint and Coatings

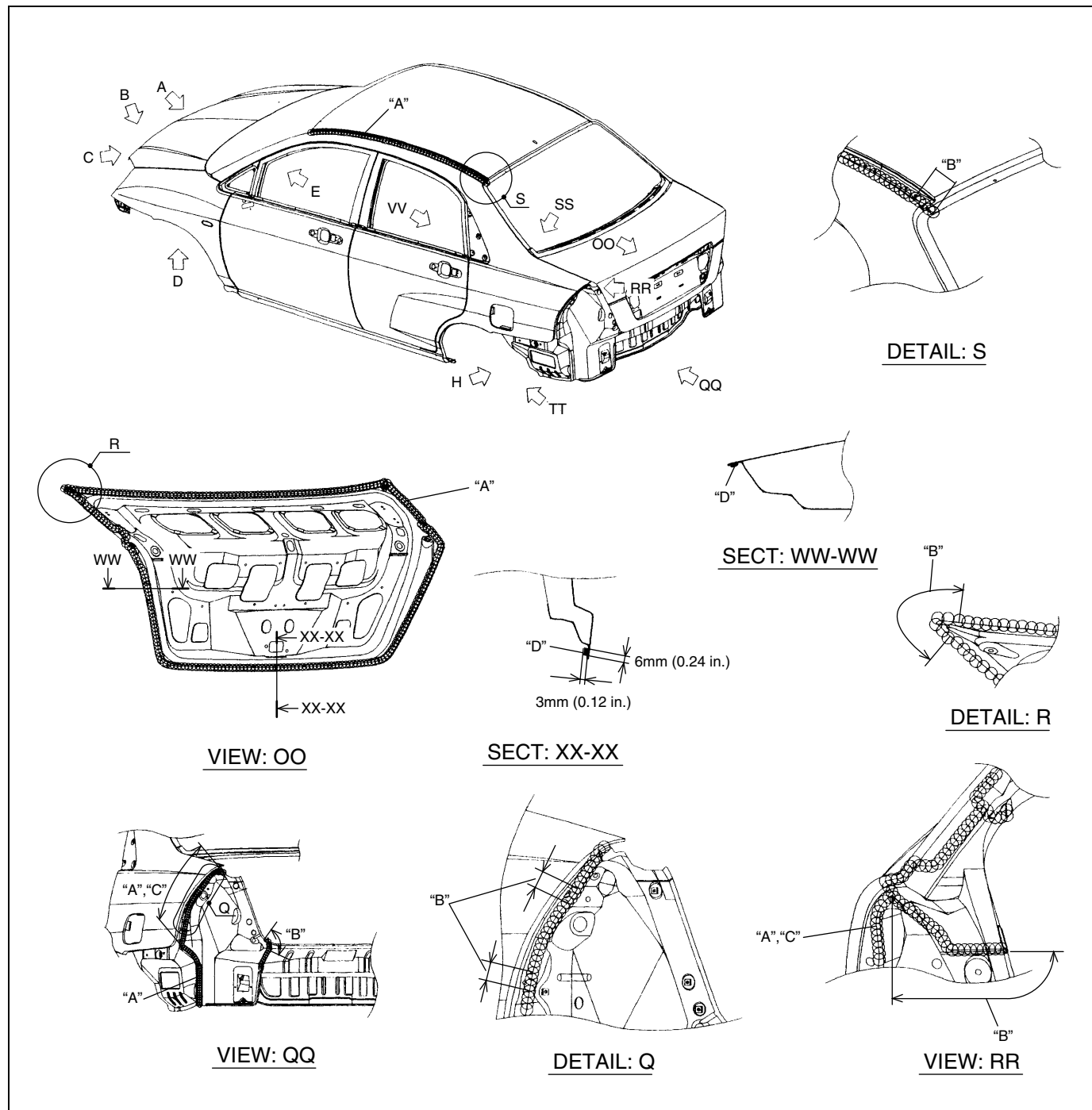
### Sealant Application Areas (For Wagon Model)

Refer to "Sealant Application Areas" in the same section of the Service Manual mentioned in "Foreword" of this manual.

### Sealant Application Areas (For Sedan Model)

#### NOTE:

For the items not found in Sedan model, refer to "Sealant Application Areas" in the same section of the Service Manual mentioned in "Foreword" of this manual.

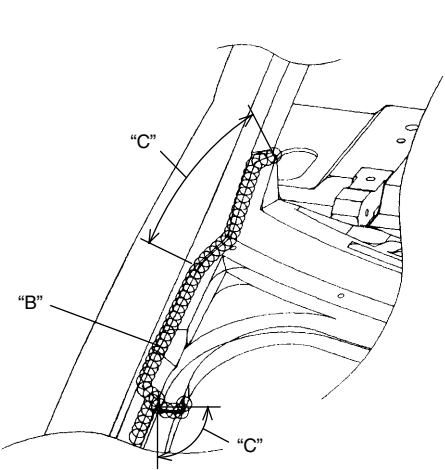


"A": Apply sealant.

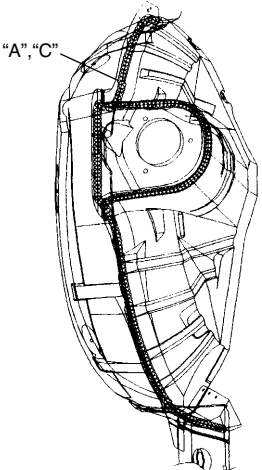
"C": Smooth out sealant with a brush.

"B": Wipe off excess sealant after application.

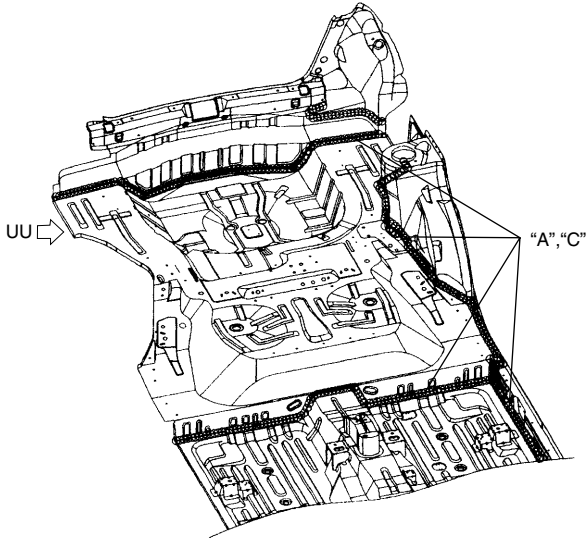
"D": Apply sealant covering flange end.



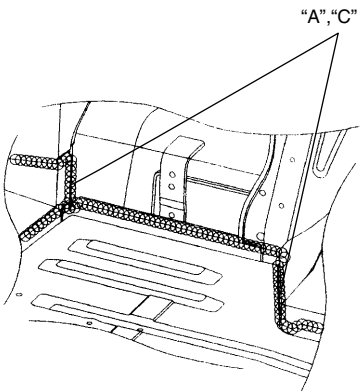
VIEW: SS



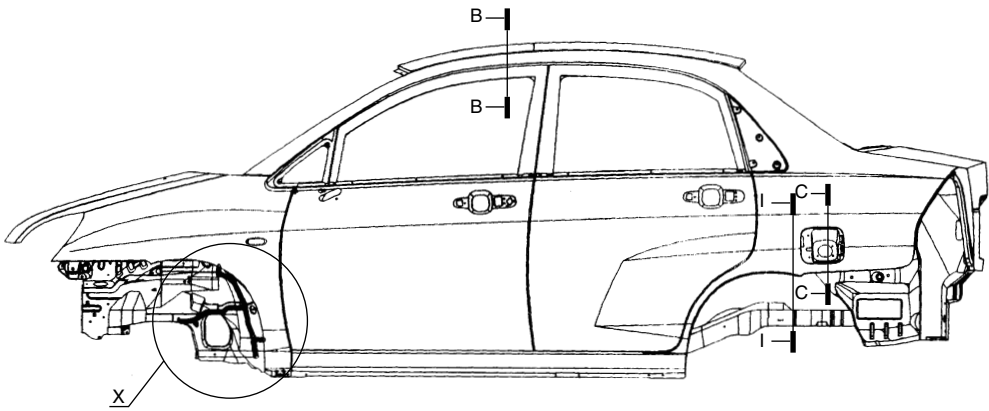
VIEW: TT



VIEW: VV



VIEW: UU

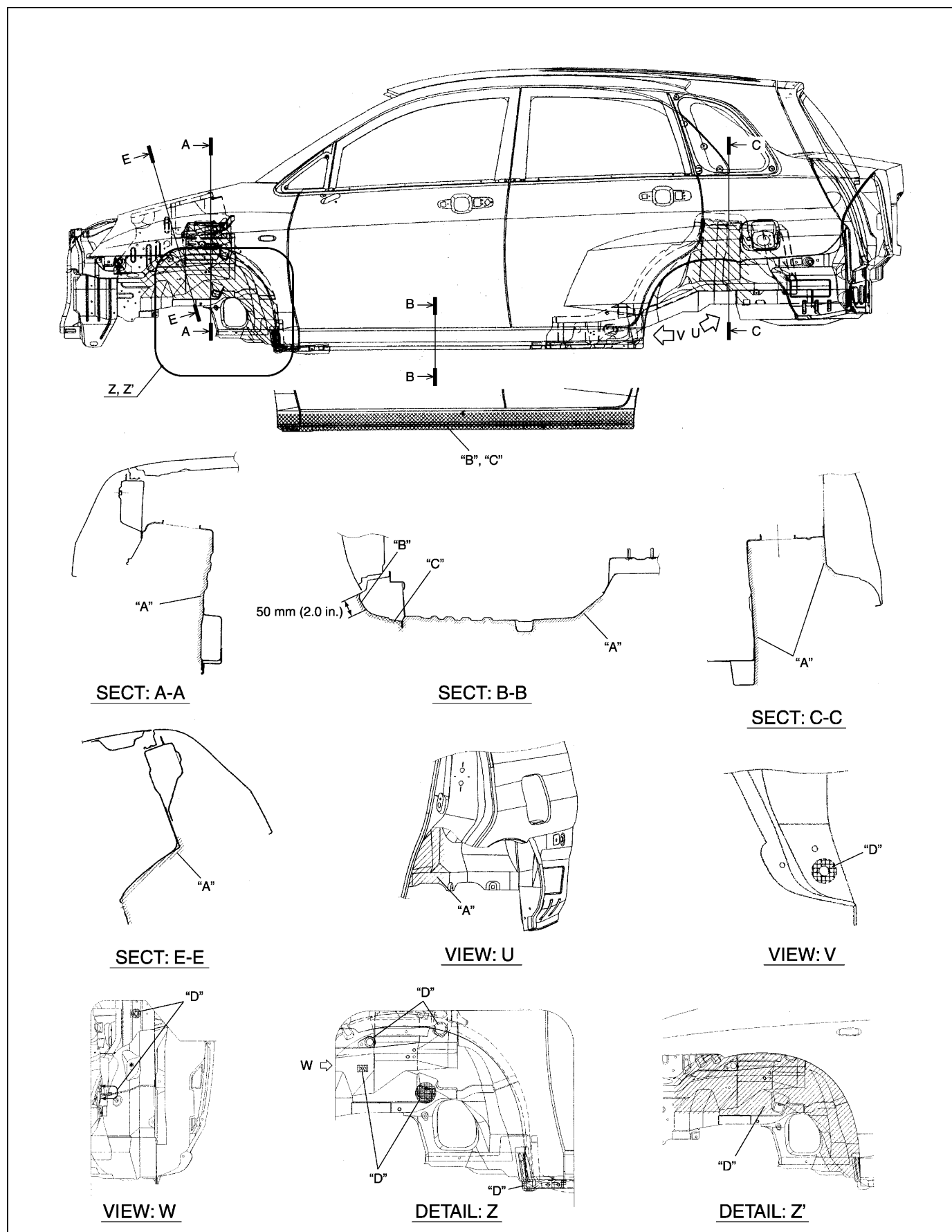


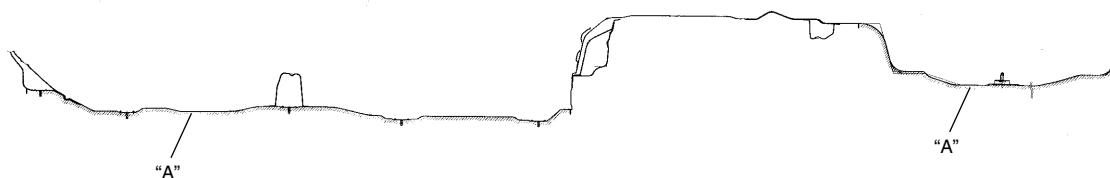
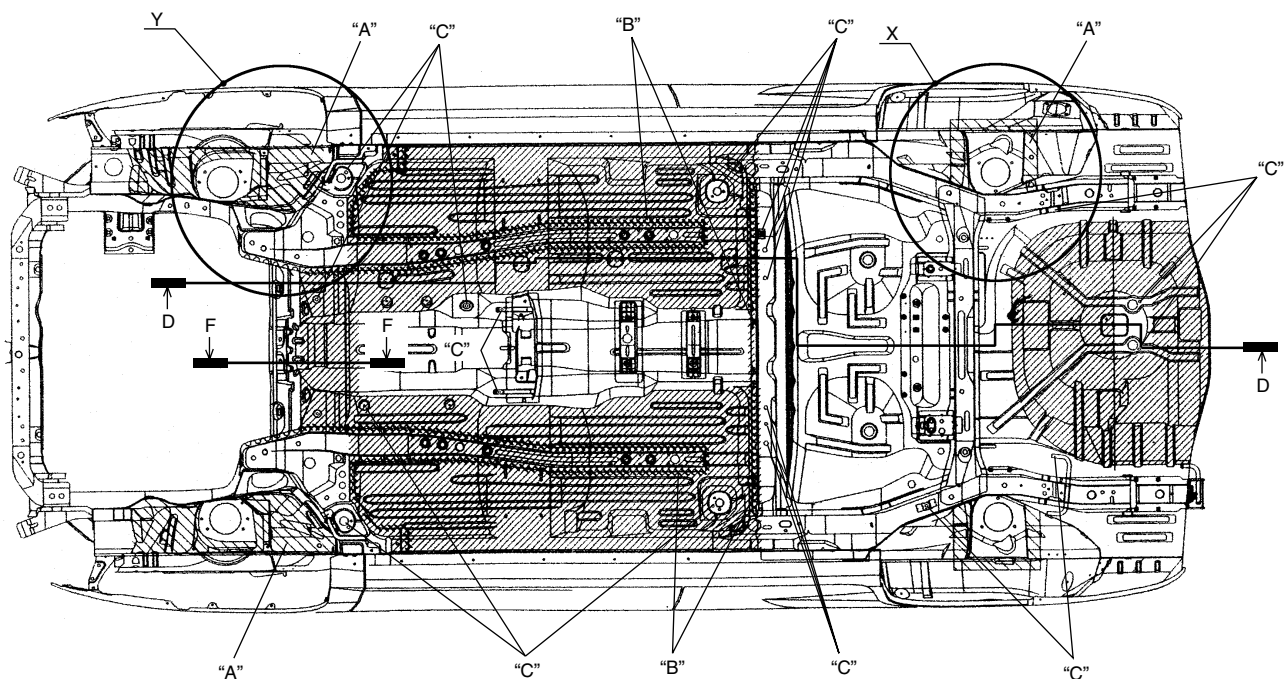
"A" : Apply sealant.

"B" : Wipe off excess sealant after application.

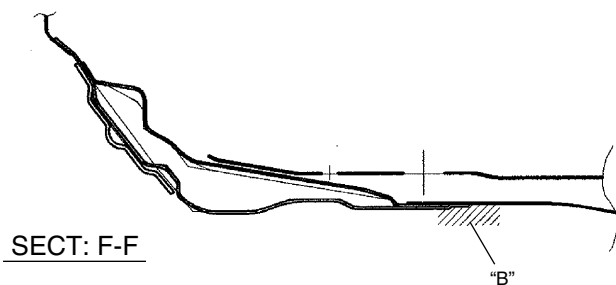
"C" : Smooth out sealant with a brush.

# Under Coating Application Areas

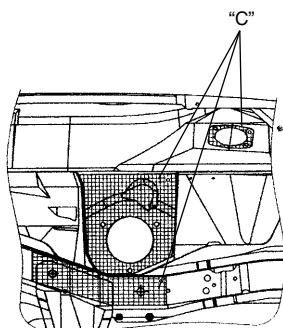




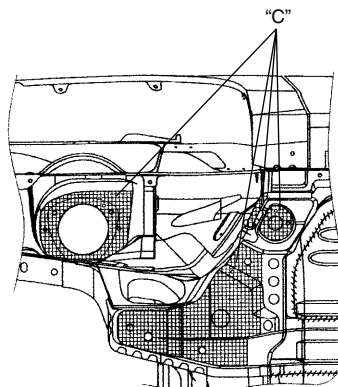
SECT: D-D



SECT: F-F



DETAIL: X



DETAIL: Y

"A" : Apply undercoating (PCV, 400 µm or more).

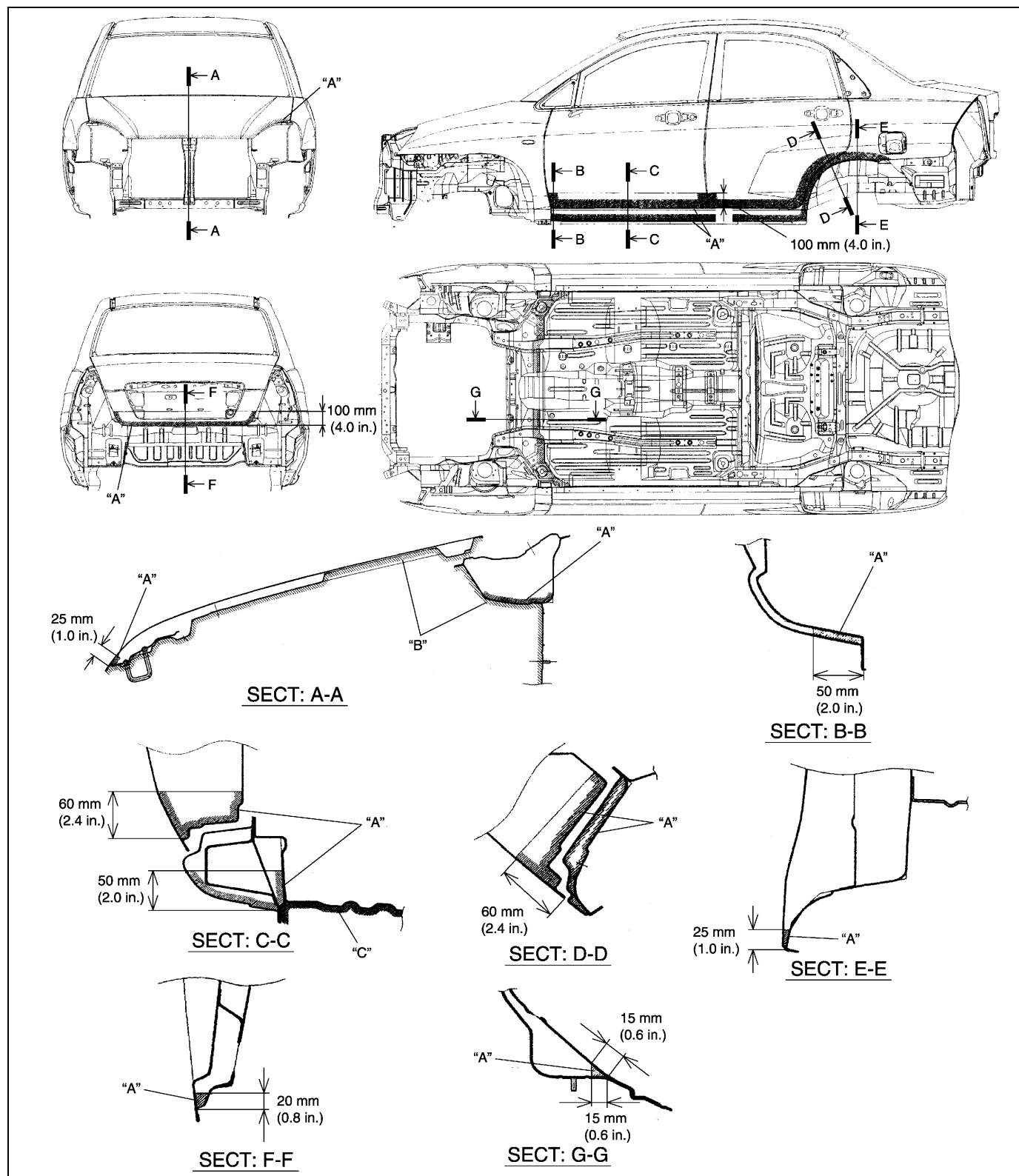
"C" : Do not apply undercoating.

"B" : Apply undercoating (PCV, 600 µm or more).

## Anti-Corrosion Compound Application Area (For Wagon Model)

Refer to "Anti-Corrosion Compound Application Area" in the same section of the Service Manual mentioned in "Foreword" of this manual.

## Anti-Corrosion Compound Application Area (For Sedan Model)



"A" : Apply rust proof wax (hot wax 50  $\mu$ m or more).

"B" : Apply rust proof wax (low viscosity wax 10  $\mu$ m or more).

"C" : Apply rust proof wax (high viscosity wax 50  $\mu$ m or more).



## 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 items with asterisk (\*) in the “CONTENTS” below, refer to the same section of the Service Manual mentioned in the “FOREWORD” of this manual.

## CONTENTS

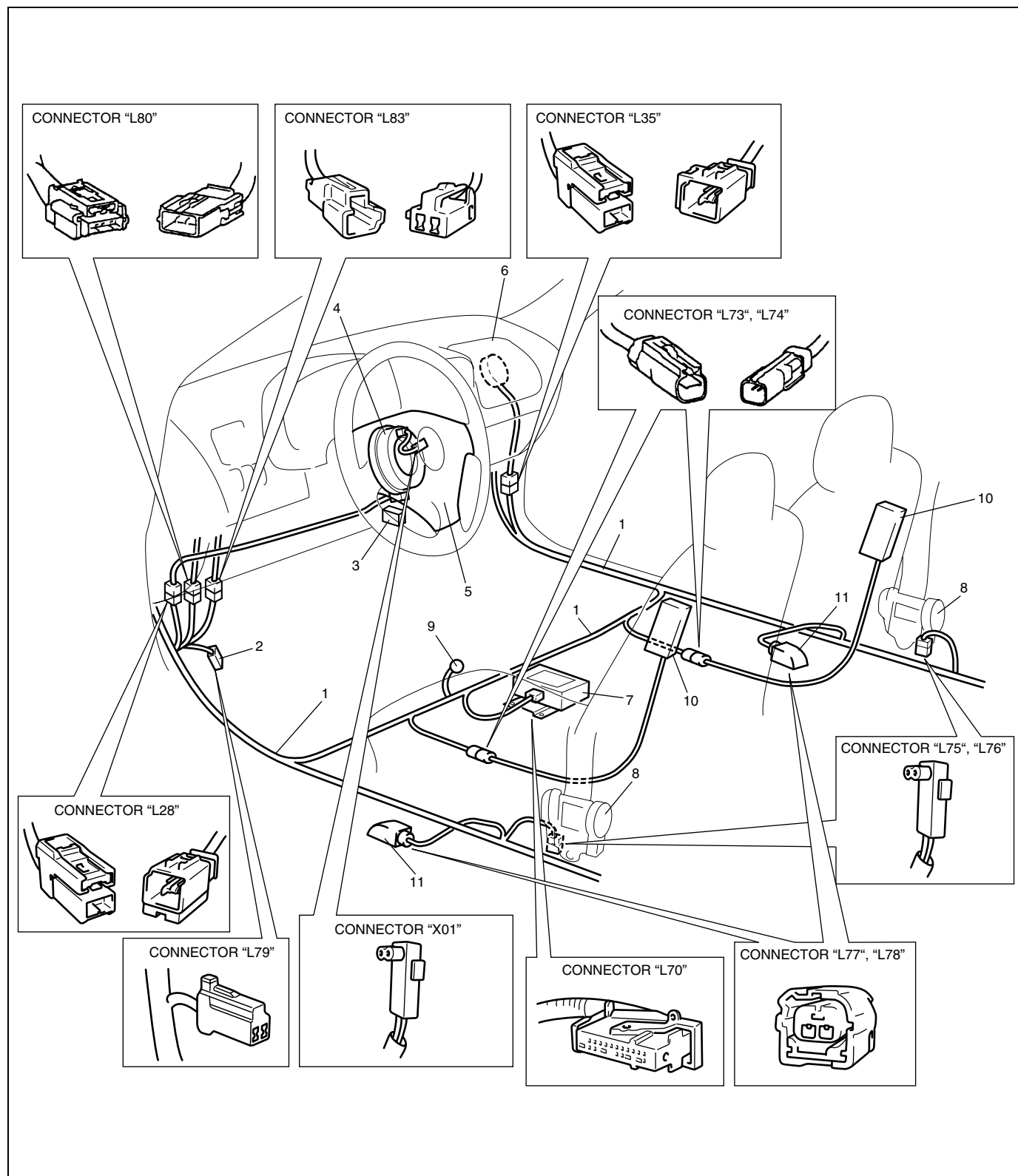
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DTC B1043 – Driver Pretensioner Initiator Circuit Short to Ground .....	*	DTC B1084 – Side Air Bag (Driver Side) Initiator Circuit Short to Power Circuit.....	*
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DTC B1073 – Side Sensor (Driver Side) Correspondence Abnormality .....	*	Side Air Bag (Inflator) Module (If Equipped) .....	*
DTC B1075 – Side Sensor (Passenger Side) Correspondence Abnormality .....	*	Driver Air Bag (Inflator) Module .....	*
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		Seat Belt Pretensioner.....	*
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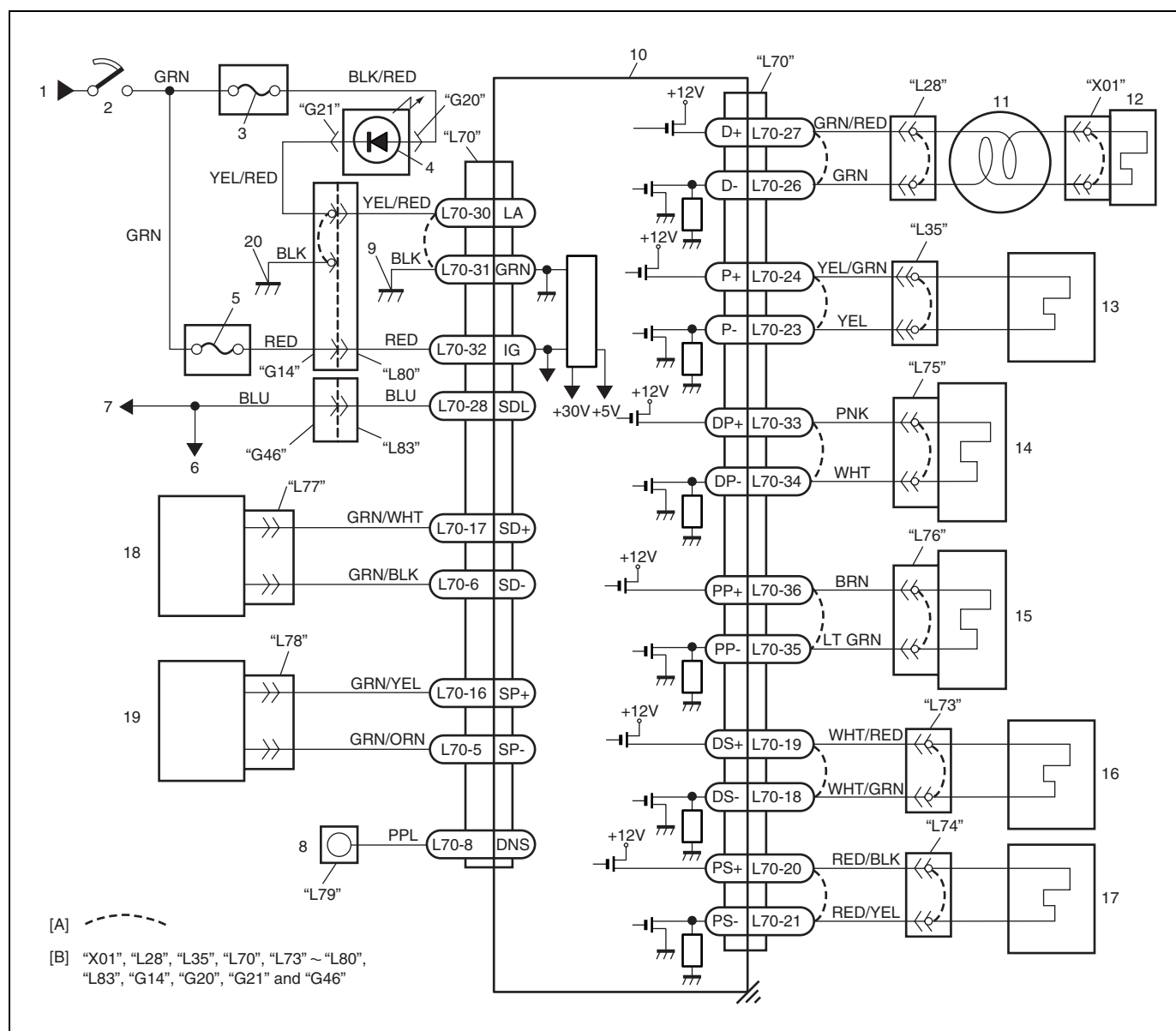
## General Description

### System Components and Wiring Location View and Connectors



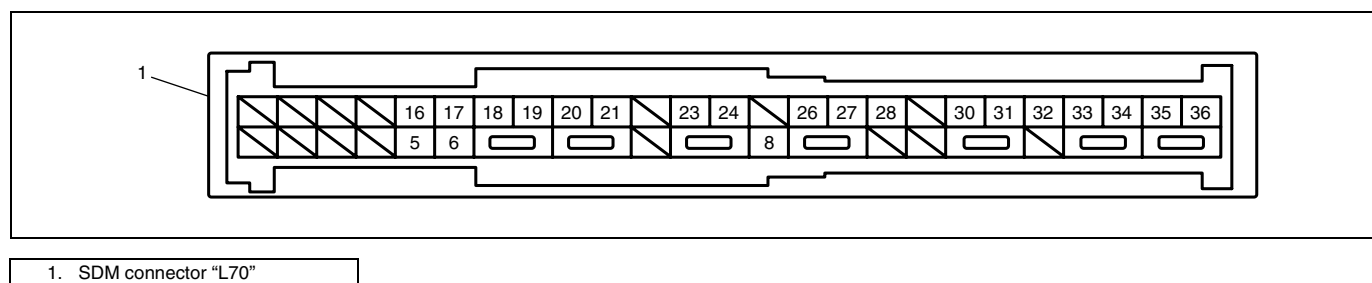
1. Air bag harness (in floor harness)	5. Driver air bag (inflator) module	9. Ground for air bag system
2. "Air bag" monitor coupler	6. Passenger air bag (inflator) module	10. Side air bag (inflator) module (if equipped)
3. DLC	7. SDM	11. Side Sensor (if equipped)
4. Contact coil assembly	8. Seat belt pretensioner (retractor assembly)	

## System Wiring Diagram



[A]: Shorting bar	7. To data link connector (DLC)	15. Passenger seat belt pretensioner
[B]: Connector	8. "AIR BAG" monitor coupler	16. Side air bag (inflator) module at driver side (if equipped)
1. From main fuse	9. Ground for air bag system	17. Side air bag (inflator) module at passenger side (if equipped)
2. Ignition switch	10. SDM	18. Side sensor at driver side (if equipped)
3. "METER" fuse	11. Contact coil assembly	19. Side sensor at passenger side (if equipped)
4. "AIR BAG" warning lamp in combination meter	12. Driver air bag (inflator) module	20. Ground on body
5. "AIR BAG" fuse	13. Passenger air bag (inflator) module	
6. To ECM and ABS control module (if equipped)	14. Driver seat belt pretensioner	

### TERMINAL ARRANGEMENT OF SDM CONNECTOR (VIEWED FROM HARNESS SIDE)



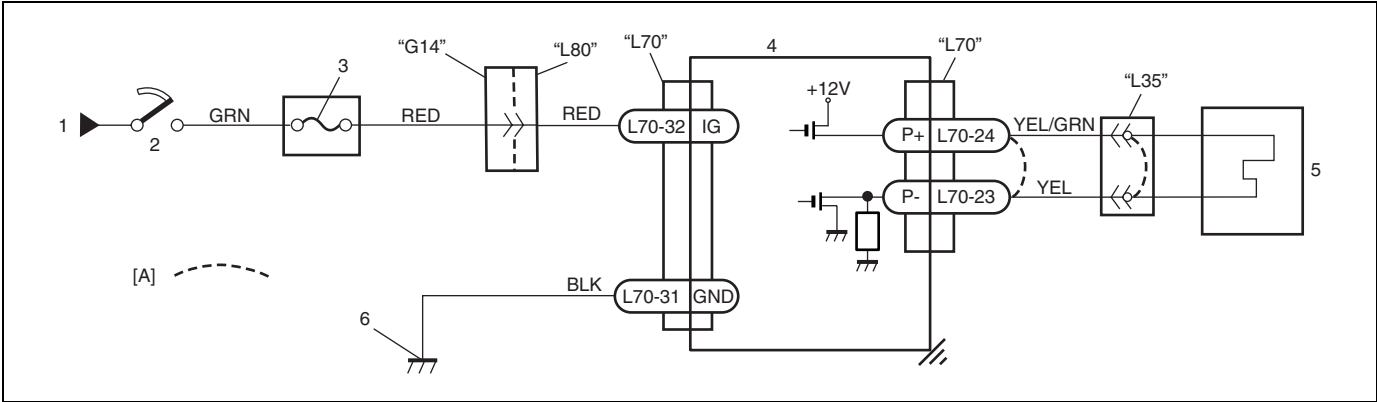
## SDM connector "L70"

TERMINAL	CIRCUIT	TERMINAL	CIRCUIT
L70-1	—	L70-20	Side air bag (inflator) High
L70-2	—	L70-21	module (passenger side) Low (if equipped)
L70-3	—	L70-22	—
L70-4	—	L70-23	Passenger air bag Low
L70-5	Side sensor (passenger side) Low	L70-24	(inflator) module High
L70-6	Side sensor (driver side) Low	L70-25	—
L70-7	—	L70-26	Driver air bag (inflator) Low
L70-8	Diagnosis switch	L70-27	module High
L70-9	—	L70-28	Data link connector (DLC)
L70-10	—	L70-29	—
L70-11	—	L70-30	"AIR BAG" warning lamp
L70-12	—	L70-31	Ground
L70-13	—	L70-32	Ignition switch (power source)
L70-14	—	L70-33	Driver pretensioner High
L70-15	—	L70-34	Low
L70-16	Side sensor (passenger side) High (if equipped)	L70-35	Low
L70-17	Side sensor (driver side) High (if equipped)	L70-36	Passenger pretensioner High
L70-18	Side air bag (inflator) Low		
L70-19	module (driver side) High (if equipped)		

# Diagnosis

- 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	2. Ignition switch	4. SDM	6. Ground for air bag system
1. From main fuse	3. "AIR BAG" fuse	5. Passenger air bag (inflator) module	

**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 adaptor kit).
- When a check for proper connection is required, refer to "Intermittents 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**

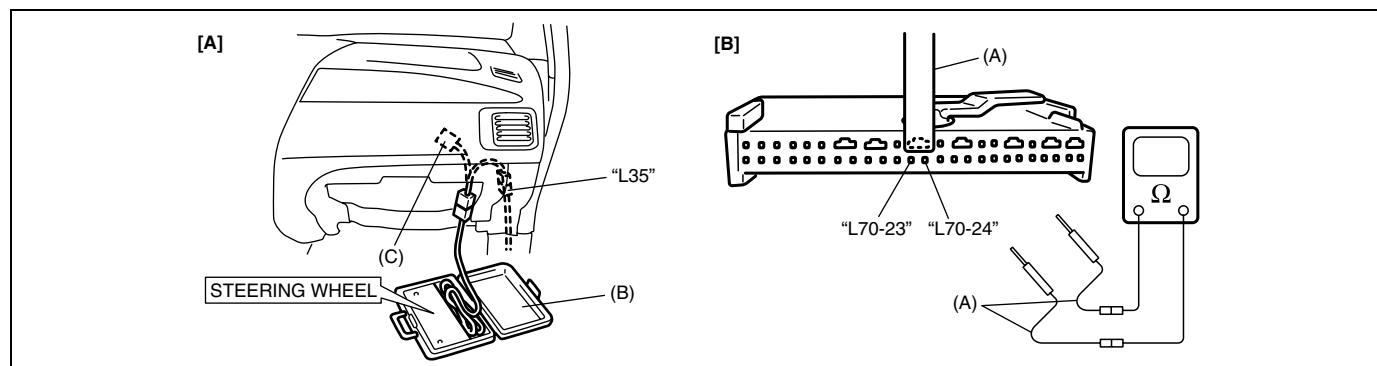
**DTC B1015, B1016, B1018 or B1019 :**

- 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 "L35" behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "L35" connector. 3) If OK, then connect Special Tool (B) and (C) to passenger air bag (inflator) module connector "L35" disconnected at the step 1). With ignition switch ON, does DTC B1015 still exist?	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 "L70". 2) Check proper connection to SDM at terminals "L70-24" and "L70-23". 3) If OK, then measure resistance between "L70-24" and "L70-23" terminals with connected Special Tool (B). Is resistance 2.8 $\Omega$ or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "YEL/GRN" or "YEL" wire circuit.

[A] Fig. for STEP 1 and 2 / [B] Fig. for STEP 2

**Special tool**

(A) : 09932-76010

(B) : 09932-75010

(C) : 09932-78340

**NOTE:**

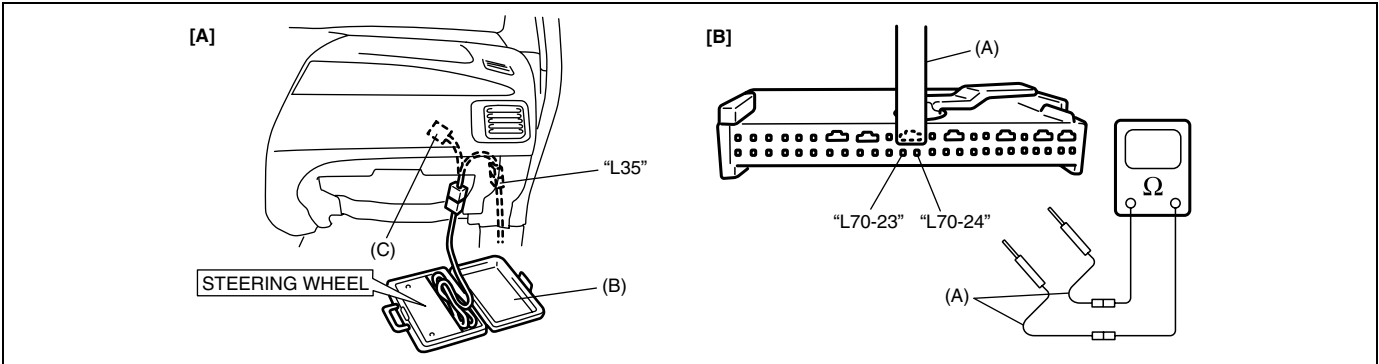
Upon completion of inspection and repair work, perform following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes, if any referring to "DTC Clearance" in this section.
- 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 “L35” behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in “L35” connector. 3) If OK, then connect Special Tool (B) and (C) to passenger air bag (inflator) module connector “L35” disconnected at the step 1). With ignition switch ON, does DTC B1016 still exist?	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 “L70”. 2) Check proper connection to SDM at terminals “L70-24” and “L70-23”. 3) If OK, then measure resistance between “L70-24” and “L70-23” terminals with connected Special Tool (B). Is resistance 2.2 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from “YEL/GRN” wire circuit to “YEL” wire circuit or from “YEL/GRN” or “YEL” wire circuit to other wire circuit.

[A] Fig. for STEP 1 and 2 / [B] Fig. for STEP 2



Special tool

- (A) : 09932-76010
- (B) : 09932-75010
- (C) : 09932-78340

NOTE:

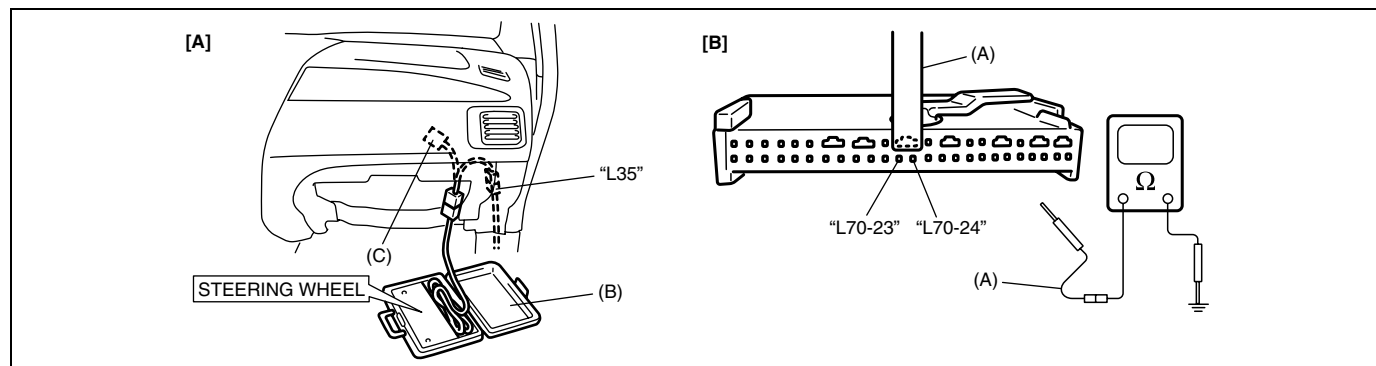
Upon completion of inspection and repair work, perform following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes, if any referring to “DTC Clearance” in this section.
- 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 "L35" behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "L35" connector. 3) If OK, then connect Special Tool (B) and (C) to passenger air bag (inflator) module connector "L35" disconnected at the step 1). With ignition switch ON, does DTC B1018 still exist?	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), (C) and SDM connector "L70". 2) Measure resistance between "L70-24" terminal and body ground. Is resistance infinity?	Go to step 3.	Repair short from "YEL/GRN" wire circuit to ground.
3	1) Measure resistance between "L70-23" terminal and body ground. Is resistance infinity?	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 and 3

**Special tool**

(A) : 09932-76010

(B) : 09932-75010

(C) : 09932-78340

**NOTE:**

Upon completion of inspection and repair work, perform following items.

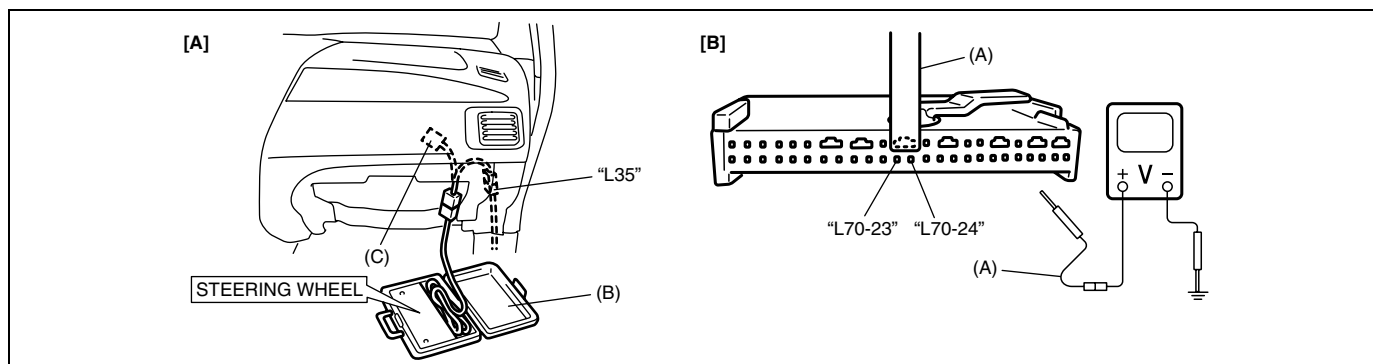
- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes, if any referring to "DTC Clearance" in this section.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.



**DTC B1019:**

Step	Action	Yes	No
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector "L35" behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "L35" connector. 3) If OK, then connect Special Tool (B) and (C) to passenger air bag (inflator) module connector "L35" disconnected at the step 1). With ignition switch ON, does DTC B1019 still exist?	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), (C) and SDM connector "L70". 2) Measure voltage from "L70-24" terminal to body ground. With ignition switch ON, is voltage 0-1 V?	Go to step 3.	Repair short from "YEL/GRN" wire circuit to power circuit.
3	1) Measure voltage from "L70-23" terminal to body ground. With ignition switch ON, is voltage 0-1 V?	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 and 3

**Special tool**

(A) : 09932-76010

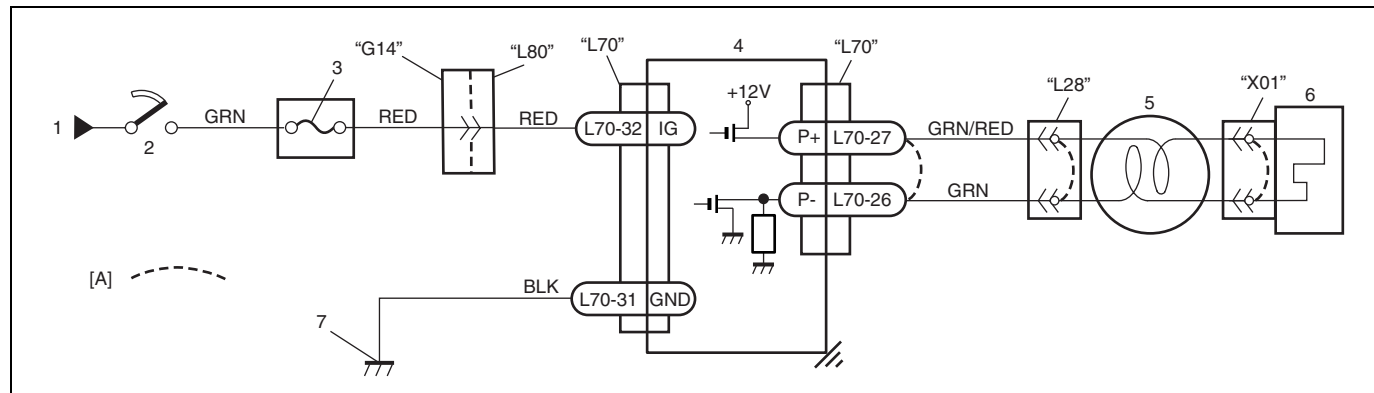
(B) : 09932-75010

(C) : 09932-78340

**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, if any referring to "DTC Clearance" in this section.
- 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	3. "AIR BAG" fuse	6. Driver air bag (inflator) module
1. From main fuse	4. SDM	7. Ground for air bag system
2. Ignition switch	5. Contact coil assembly	

**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 "Intermittents 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 or B1025 :**

STEP 1 : Check whether malfunction is in contact coil and driver air bag (inflator) module or the others.

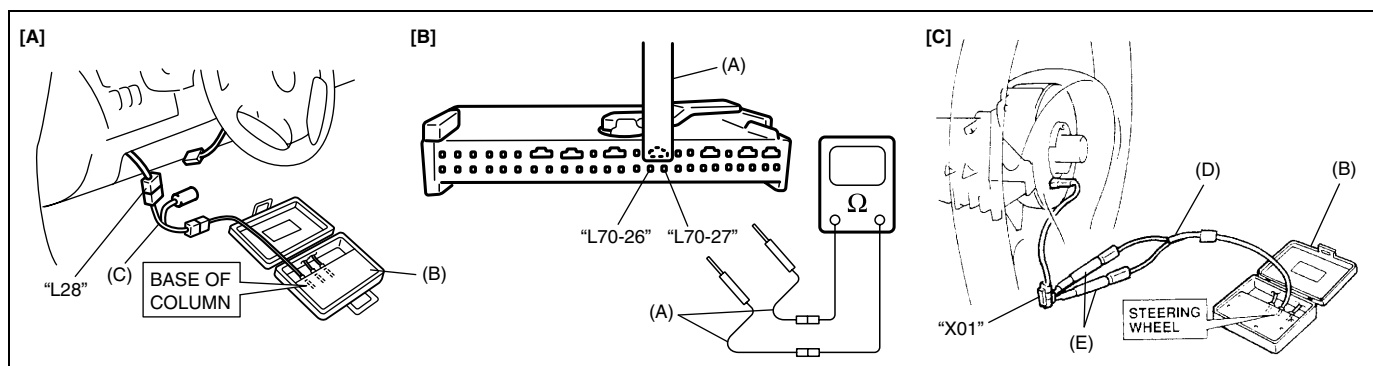
STEP 2 : Check driver air bag (inflator) module initiator circuit in air bag harness.

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 "L28" located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "L28" connector. 3) If OK, then connect Special Tool (B) and (C) to contact coil connector "L28" disconnected at step 1). With ignition switch ON, does DTC B1021 still exist?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect SDM connector "L70". 2) Check proper connection to SDM at terminals "L70-27" and "L70-26". 3) If OK, then measure resistance between "L70-27" and "L70-26" terminals with connected Special Tool (B). Is resistance 3.1 $\Omega$ or less?	Substitute a known-good SDM and recheck.	Repair high resistance or open in "GRN/RED" or "GRN" wire circuit.
3	1) With ignition switch OFF, disconnect Special Tool (B) and (C) then reconnect contact coil connector "L28" 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 3). 3) Check proper connection to driver air bag (inflator) module at terminals in "X01" connector. 4) If OK, then connect Special Tool (B), (D) and (E) to "X01" connector. With ignition switch ON, does DTC B1021 still exist?	Ignition switch OFF. Replace contact coil assembly (Refer to "Combination Switch/Contact Coil and Combination Switch Assembly" in Section 3).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to "Driver Air Bag (Inflator) Module" in Section 3).

[A] Fig. for STEP 1 and 2 / [B] Fig. for STEP 2 / [C] Fig. for STEP 3

**Special tool****(A) : 09932-76010****(B) : 09932-75010****(C) : 09932-78340****(D) : 09932-78310****(E) : 09932-76010**

**NOTE:**

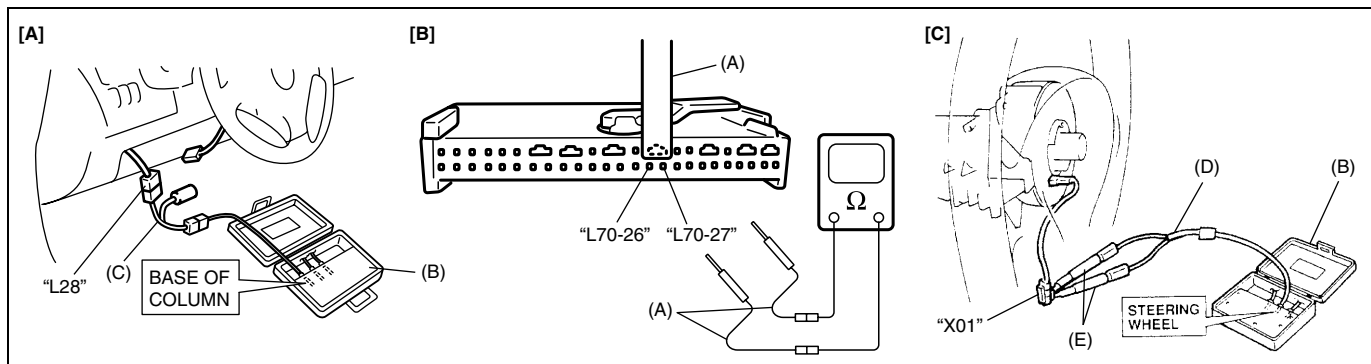
Upon completion of inspection and repair work, perform following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes, if any referring to “DTC Clearance” in this section.
- 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 “L28” located near the base of the steering column. 2) Check proper connection to contact coil at terminals in “L28” connector. 3) If OK, then connect Special Tool (B) and (C) to contact coil connector “L28” disconnected at step 1). With ignition switch ON, does DTC B1022 still exist?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect SDM connector “L70”. 2) Check proper connection to SDM at terminals “L70-27” and “L70-26”. 3) If OK, then measure resistance between “L70-27” and “L70-26” terminals with connected Special Tool (B) and (C). Is resistance 2.7 $\Omega$ or more?	Substitute a known-good SDM and recheck.	Repair short from “GRN/RED” wire circuit to “GRN” wire circuit or from “GRN/RED” or “GRN” wire circuit to other wire circuit.
3	1) With ignition switch OFF, disconnect Special Tool (B) and (C), then reconnect contact coil connector “L28” 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 3). 3) Check proper connection to driver air bag (inflator) module at terminals in “X01” connector. 4) If OK, then connect Special Tool (B), (D) and (E) to “X01” 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 3).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to “Driver Air Bag (Inflator) Module” in Section 3).

[A] Fig. for STEP 1 and 2 / [B] Fig. for STEP 2 / [C] Fig. for STEP 3



**Special tool**

(A) : 09932-76010

(B) : 09932-75010

(C) : 09932-78340

(D) : 09932-78310

(E) : 09932-76010

**NOTE:**

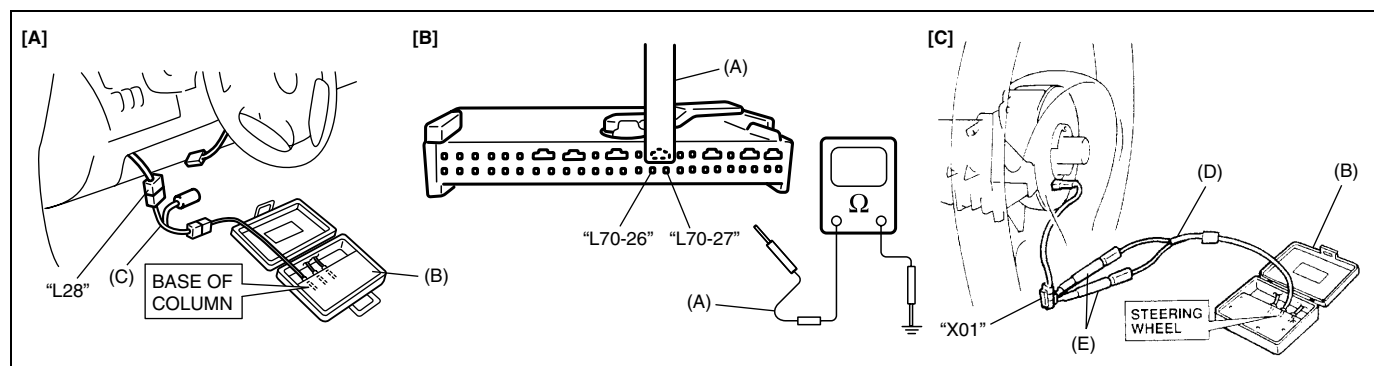
Upon completion of inspection and repair work, perform following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes, if any referring to "DTC Clearance" in this section.
- 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 "L28" located near the base of the steering column. 2) Check proper connection to contact coil at terminals in "L28" connector. 3) If OK, then connect Special Tool (B) and (C) to contact coil connector "L28" disconnected at step 1). With ignition switch ON, does DTC B1024 still exist?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect Special Tool (B), (C) and SDM connector "L70". 2) Measure resistance between "L70-27" terminal and body ground and between "L70-26" terminal and body ground. Are they infinity?	Substitute a known-good SDM and recheck.	Repair short from "GRN/RED" or "GRN" wire circuit to ground.
3	1) With ignition switch OFF, disconnect Special Tool (B) and (C), then reconnect contact coil connector "L28" 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 3). 3) Check proper connection to driver air bag (inflator) module at terminals in "X01" connector. 4) If OK, then connect Special Tool (B), (D) and (E) to "X01" connector. With ignition switch ON, does DTC B1024 still exist?	Ignition switch OFF. Replace contact coil assembly (Refer to "Combination Switch/Contact Coil and Combination Switch Assembly" in Section 3).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to "Driver Air Bag (Inflator) Module" in Section 3).

[A] Fig. for STEP 1 and 2 / [B] Fig. for STEP 2 / [C] Fig. for STEP 3

**Special tool**

(A) : 09932-76010

(B) : 09932-75010

(C) : 09932-78340

(D) : 09932-78310

(E) : 09932-76010

**NOTE:**

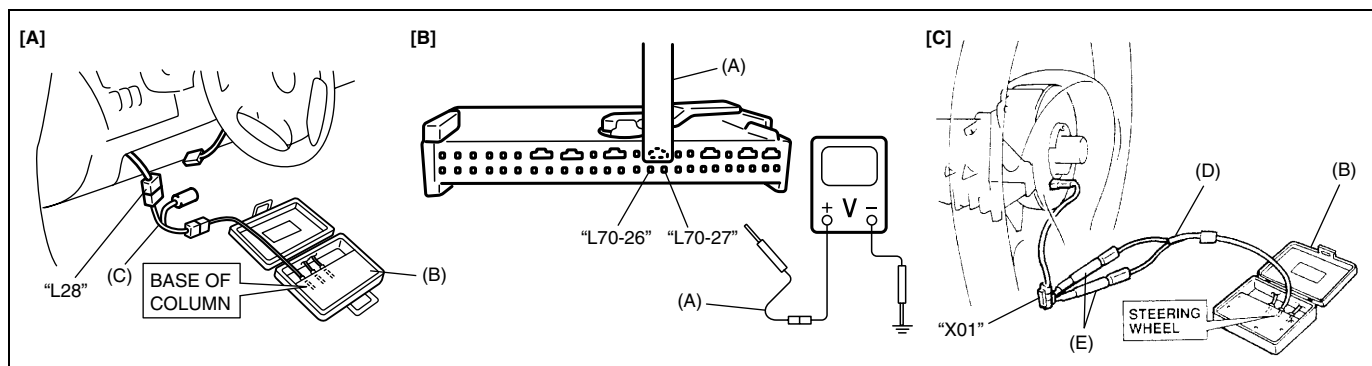
Upon completion of inspection and repair work, perform following items.

- Reconnect all air bag system components, ensure all components are properly mounted.
- Clear diagnostic trouble codes, if any referring to “DTC Clearance” in this section.
- 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 “L28” located near the base of the steering column. 2) Check proper connection to contact coil at terminals in “L28” connector. 3) If OK, then connect Special Tool (B) and (C) to contact coil connector “L28” disconnected at step 1). With ignition switch ON, does DTC B1025 still exist?	Go to step 2.	Go to step 3.
2	1) With ignition switch OFF, disconnect Special Tool (B), (C) and SDM connector “L70”. 2) Measure voltage from “L70-27” terminal to body ground and from “L70-26” terminal to body ground. With ignition switch ON, are they 0-1V?	Substitute a known-good SDM and recheck.	Repair short from “GRN/RED” or “GRN” wire circuit to power circuit.
3	1) With ignition switch OFF, disconnect Special Tool (B) and (C), then reconnect contact coil connector “L28” 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 3). 3) Check proper connection to driver air bag (inflator) module at terminals in “X01” connector. 4) If OK, then connect Special Tool (B), (D) and (E) to “X01” connector. With ignition switch ON, does DTC B1025 still exist?	Ignition switch OFF. Replace contact coil assembly (Refer to “Combination Switch/Contact Coil and Combination Switch Assembly” in Section 3).	Ignition switch OFF. Replace driver air bag (inflator) module (Refer to “Driver Air Bag (Inflator) Module” in Section 3).

[A] Fig. for STEP 1 and 2 / [B] Fig. for STEP 2 / [C] Fig. for STEP 3



### Special tool

(A) : 09932-76010

(B) : 09932-75010

(C) : 09932-78340

(D) : 09932-78310

(E) : 09932-76010

### 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, if any referring to "DTC Clearance" in this section.
- Repeat AIR BAG DIAGNOSTIC SYSTEM CHECK to confirm that the trouble has been corrected.





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