

# IMPORTANT

## WARNING/CAUTION/NOTE

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

### WARNING:

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

### CAUTION:

Indicates a potential hazard that could result in vehicle damage.

### NOTE:

Indicates special information to make maintenance easier or instructions clearer.

### WARNING:

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

### WARNING:

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

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

## FOREWORD

This SUPPLEMENTARY SERVICE MANUAL is a supplement to SQ416/SQ420/SQ625 SERVICE MANUAL. It has been prepared exclusively for the following applicable model.

**Applicable model: SQ416/SQ420/SQ625 of and after the vehicle identification number below.**

ⓧ JSAFTA03V00170001 ⓧ	2S2GTA03C00490001
ⓧ JSAFTL52V00170001 ⓧ	2S2GTA03C20490001
ⓧ JSAFTD62V00170001 ⓧ	2S2GTA03C26490001
ⓧ JSFTB52V00170001 ⓧ	2S3TA03C□26100001
	2S3TA52C□26100001
	2S2GTA52C00490001
	2S2GTA52C20490001
	2S3TD52V□26100001

It describes only different service information of the above applicable model as compared with SQ416/SQ420/SQ625 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 manuals mentioned in the next page.

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

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

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

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

### NOTE:

**Refer to the next page for RELATED MANUALS.**

**SUZUKI MOTOR CORPORATION**

*OVERSEAS SERVICE DEPARTMENT*

## RELATED MANUAL

MANUAL NAME	MANUAL NO.	APPLICABILITY
SQ416/SQ420/SQ625 Unit Repair Manual	99501-65D01-xxx	This manual is the base manual for Transmission, Transfer and Differentials (Front and Rear) of this supplementary service manual.
SQ416/SQ420/SQ625 Wiring Diagram Manual	99512-65D11-015	Applicable model mentioned in FOREWORD of this supplementary service manual.
SQ416/SQ420/SQ625 Service Manual	99500-65D10-xxx	This manual is the base manual for this supplementary service manual.

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**NOTE:**

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

SECTION 0A

GENERAL INFORMATION

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

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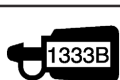

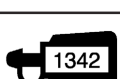





# Abbreviations and Symbols May Be Used in This Manual

## ABBREVIATIONS

<b>A</b>	ABS	Anti-lock Brake System	<b>E</b>	EFE Heater	Early Fuel Evaporation Heater (Positive Temperature Coefficient, PTC Heater)
	ATDC	After Top Dead Center		EPS	Electronic Power Steering
	API	American Petroleum Institute		EVAP	Evaporative Emission
	ATF	Automatic Transmission Fluid		EVAP Canister	Evaporative Emission Canister (Charcoal Canister)
	ALR	Automatic Locking Retractor		4WD	4 Wheel Drive
	AC	Alternating Current		GEN	Generator
	A/T	Automatic Transmission		GND	Ground
	A/C	Air Conditioning		HC	Hydrocarbons
	ABDC	After Bottom Dead Center		HO2S	Heated Oxygen Sensor
	A/F	Air Fuel Mixture Ratio		IAC Valve	Idle Air Control Valve (Idle Speed Control Solenoid Valve ISC Solenoid Valve)
<b>B</b>	A-ELR	Automatic-Emergency Locking Retractor	<b>I</b>	IAT Sensor	Intake Air Temperature Sensor (Air temperature Sensor, ATS)
	B+	Battery Positive Voltage		ICM	Immobilizer Control Module
	BTDC	Before Top Dead Center		IG	Ignition
<b>C</b>	BBDC	Before Bottom Dead Center		ISC Actuator	Idle Speed Control Actuator
	CKT	Circuit	<b>L</b>	LH	Left Hand
	CKP sensor	Crankshaft Position Sensor		LSPV	Load Sensing Proportioning Valve
	CMP sensor	Camshaft Position Sensor	<b>M</b>	MAF Sensor	Mass Air Flow Sensor (Air Flow Sensor, AFS, Air Flow Meter, AFM)
	CO	Carbon Monoxide		MAP Sensor	Manifold Absolute Pressure Sensor (Pressure Sensor, PS)
<b>D</b>	CPP switch	Clutch Pedal Position Switch (Clutch Switch, Clutch Start Switch)		Max	Maximum
	CPU	Central Processing Unit		MFI	Multiport Fuel Injection (Multipoint Fuel Injection)
	CRS	Child Restraint System		MIN	Minimum
	DC	Direct Current		MIL	Malfunction Indicator Lamp ("SERVICE ENGINE SOON" Light)
<b>E</b>	DLC	Data Link Connector (Assembly Line Diag. Link, ALDL, Serial Data Link, SDL)		M/T	Manual Transmission
	DOHC	Double Over Head Camshaft	<b>N</b>	NOx	Nitrogen Oxides
	DOJ	Double Offset Joint		OBD	On-Board Diagnostic System (Self-Diagnosis Function)
	DRL	Daytime Running Light	<b>O</b>	O/D	Overdrive
	DTC	Diagnostic Trouble Code (Diagnostic Code)		OHC	Over Head Camshaft
	EBCM	Electronic Brake Control Module, ABS Control Module		O2S	Oxygen Sensor
	EBD	Electronic Brake Force Distribution			
<b>E</b>	ECM	Engine Control Module			
	ECT sensor	Engine Coolant Temperature Sensor (Water Temp. Sensor, WTS)			
	EGR	Exhaust Gas Recirculation			
	EGRT sensor	EGR Temperature Sensor (Recirculated Exhaust Gas Temp. Sensor, REGTS)			

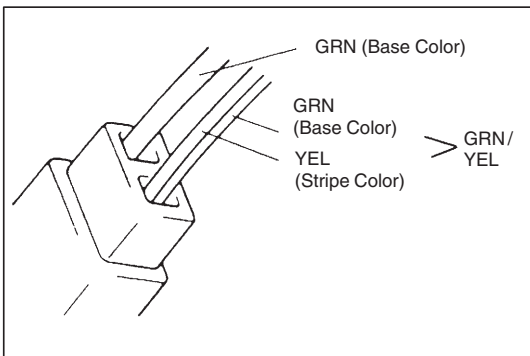
<b>P</b>	PNP	Park/Neutral Position
	P/S	Power Steering
	PSP Switch	Power Steering Pressure Switch (P/S Pressure Switch)
	PCM	Powertrain Control Module
	PCV	Positive Crankcase Ventilation
<b>R</b>	RH	Right Hand
<b>S</b>	SAE	Society of Automotive Engineers
	SDM	Sensing and Diagnostic Module (Air bag controller, Air bag control module)
	SFI	Sequential Multiport Fuel Injection
	SOHC	Single over Head Camshaft
<b>T</b>	TBI	Throttle Body Fuel Injection (Single-Point Fuel Injection, SPI)
	TCC	Torque Converter Clutch
	TCM	Transmission Control Module (A/T Controller, A/T Control Module)
	TP Sensor	Throttle Position Sensor
	TVV	Thermal Vacuum Valve (Thermal Vacuum Switching Valve, TVSV, Bimetal Vacuum Switching Valve, BVSV)
	TWC	Three Way Catalytic Converter (Three Way Catalyst)
	2WD	2 Wheel Drive
<b>V</b>	VIN	Vehicle Identification Number
	VSS	Vehicle Speed Sensor
<b>W</b>	WU-OC	Warm Up Oxidation Catalytic Converter
	WU-TWC	Warm Up Three Way Catalytic Converter

## SYMBOLS

SYMBOL	DEFINITION	SYMBOL	DEFINITION
	Tightening torque		Apply SUZUKI BOND NO. 1216 99000-31160
	Apply oil (engine, transmission, transfer, differential)		Apply SILICONE SEALANT 99000-31120
	Apply fluid (brake, power steering or automatic transmission fluid)		Apply SEALING COMPOUND 366E 99000-31090
	Apply SUZUKI SUPER GREASE A 99000-25010		
	Apply SUZUKI SUPER GREASE C 99000-25030		Apply THREAD LOCK 1322 99000-32110
	Apply SUZUKI SUPER GREASE E 99000-25050		Apply THREAD LOCK 1333B 99000-32020
	Apply SUZUKI SUPER GREASE H 99000-25120		Apply THREAD LOCK 1342 99000-32050
	Apply SUZUKI SUPER GREASE I 99000-25210		
	Apply SUZUKI BOND NO. 1215 99000-31110		Do not reuse
	Apply SUZUKI BOND NO. 1207C 99000-31150		Note on reassembly

## WIRE COLOR SYMBOLS

Symbol		Wire Color	Symbol		Wire Color
B	BLK	Black	O, Or	ORN	Orange
Bl	BLU	Blue	R	RED	Red
Br	BRN	Brown	W	WHT	White
G	GRN	Green	Y	YEL	Yellow
Gr	GRY	Gray	P	PNK	Pink
Lbl	LT BLU	Light blue	V	PPL	Violet
Lg	LT GRN	Light green			



There are two kinds of colored wire used in this vehicle. One is single-colored wire and the other is dual-colored (striped) wire. The single-colored wire uses only one color symbol (i.e. "GRN"). The dual-colored wire uses two color symbols (i.e. "GRN/YEL"). The first symbol represents the base color of the wire ("GRN" in the figure) and the second symbol represents the color of the stripe ("YEL" in the figure).



SECTION 3E

REAR SUSPENSION

NOTE:

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

3E

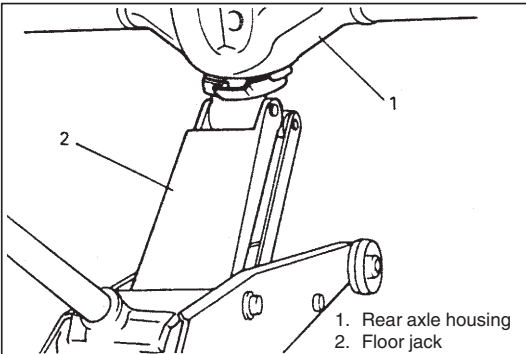
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## ON-VEHICLE SERVICE

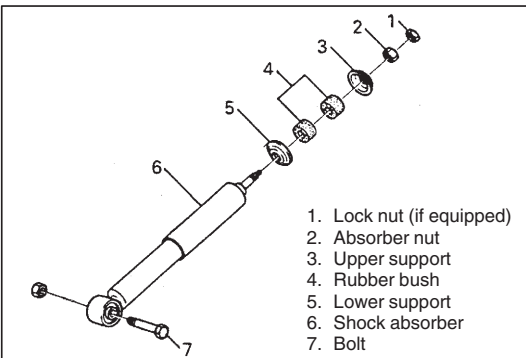
### SHOCK ABSORBER

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

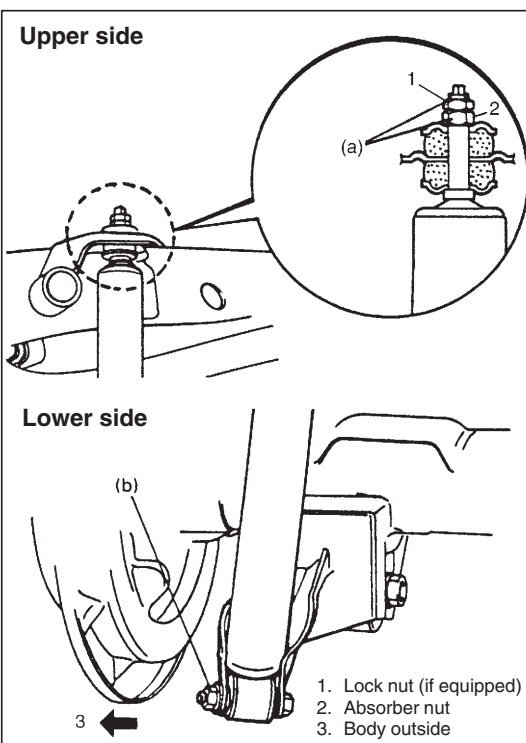


#### REMOVAL

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



- 3) Remove lock nut (if equipped) and absorber nut.
- 4) Remove lower mounting bolt.
- 5) Remove shock absorber.



#### INSTALLATION

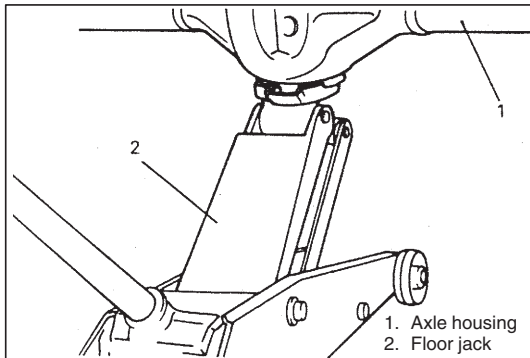
- 1) Install shock absorber. Refer to figure for proper installing direction of lower mounting bolt.
- 2) Remove floor jack.
- 3) Lower hoist.
- 4) Tighten nuts to specified torque.

#### NOTE:

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

#### Tightening Torque

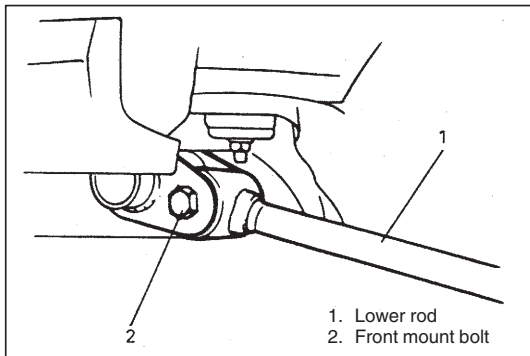
- (a): 29 N·m (2.9 kg-m, 21.0 lb-ft)  
(b): 100 N·m (10.0 kg-m, 72.5 lb-ft)



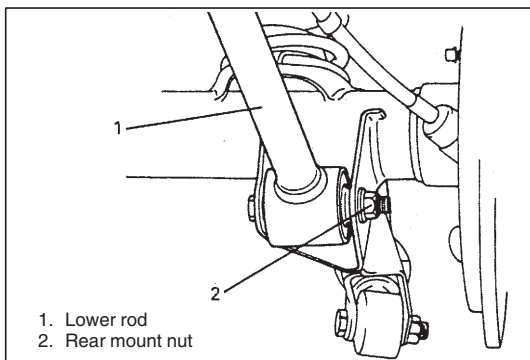
## LOWER ROD

### REMOVAL

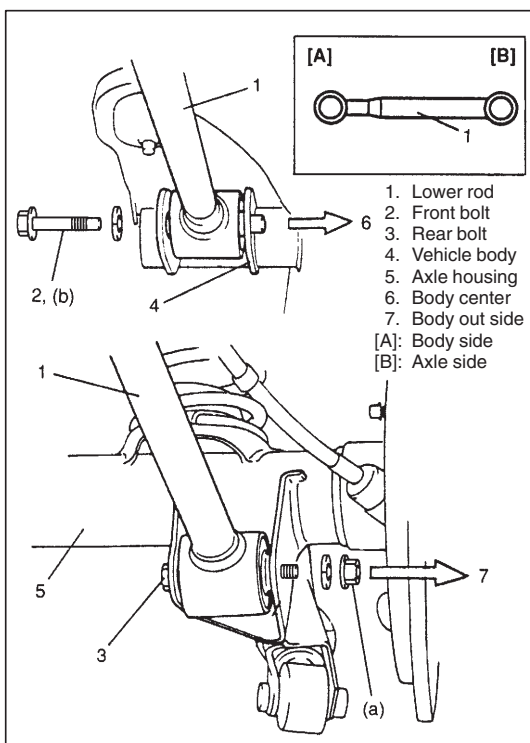
- 1) Hoist vehicle and remove rear wheel.
- 2) Support rear axle housing by using floor jack.



- 3) Remove lower rod front mount bolt.



- 4) Remove lower rod rear mount bolt.



### INSTALLATION

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

**Nuts should not be tightened.**

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

#### Tightening Torque for wheel nuts

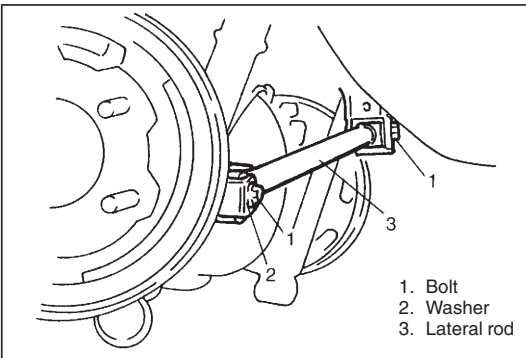
**100 N·m (10.0 kg-m, 72.5 lb-ft)**

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

#### Tightening Torque

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

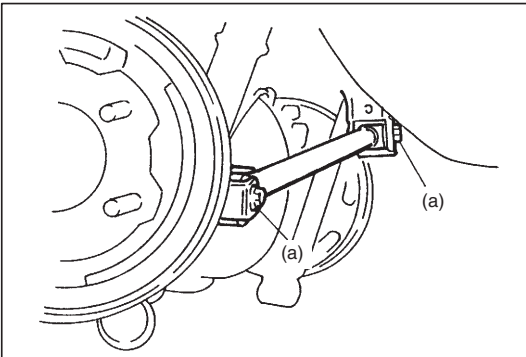
**(b): 100 N·m (10.0 kg-m, 72.5 lb-ft)**



## LATERAL ROD

### REMOVAL

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

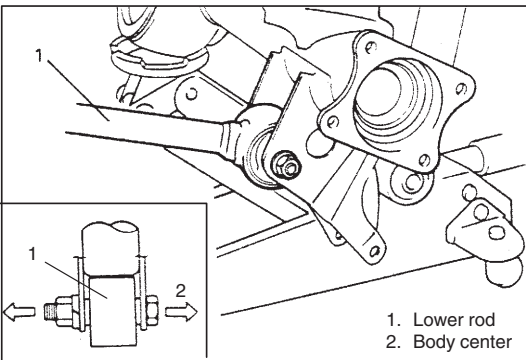


### INSTALLATION

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

#### Tightening Torque

(a): 100 N·m (10.0 kg-m, 72.5 lb-ft)

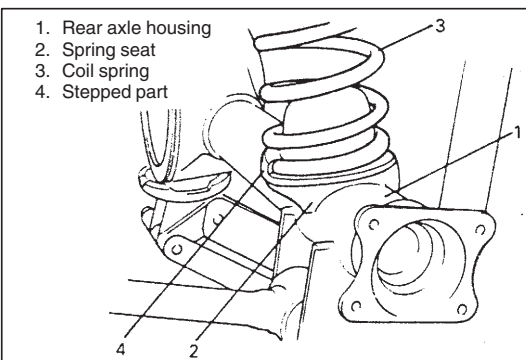


## REAR AXLE HOUSING

### INSTALLATION

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

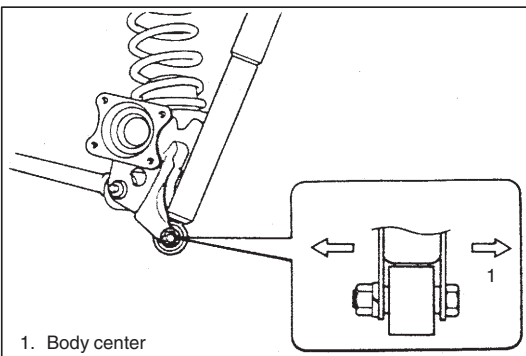
- 1) Place rear axle housing on floor jack. Then install upper/lower rod rear mounting bolts (right & left) in proper direction as shown (refer to UPPER ROD INSTALLATION for upper rod bolts). At this time, mount nuts but don't tighten them.



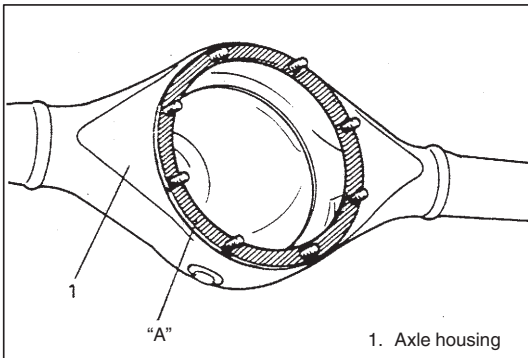
- 2) Install coil spring (right & left) on spring seat of axle housing and raise axle housing.

#### NOTE:

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

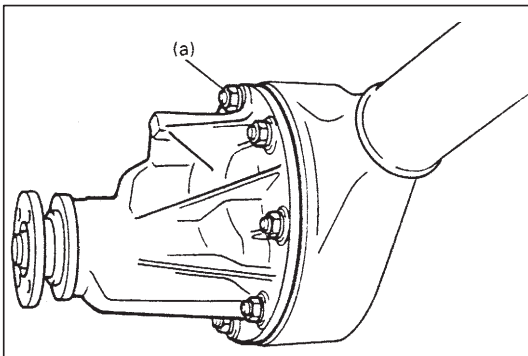


- 3) Install lateral rod to rear axle housing.
- 4) Install lower part of shock absorber to right and left sides of axle housing and install bolts in proper direction as shown in figure. At this time, mount nuts but don't tighten them.



- 5) Clean mating surfaces of axle housing and differential carrier and apply sealant to housing side.

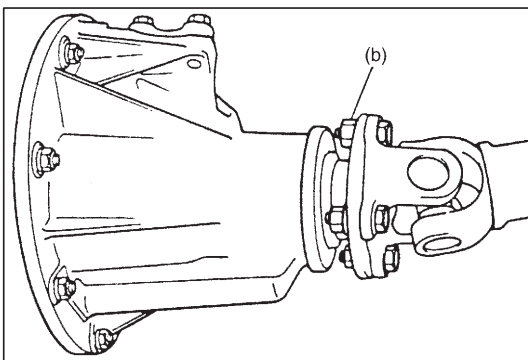
**“A”:** Sealant 99000-31110



- 6) Install differential carrier assembly to axle housing and tighten carrier nuts to specified torque.

**Tightening Torque**

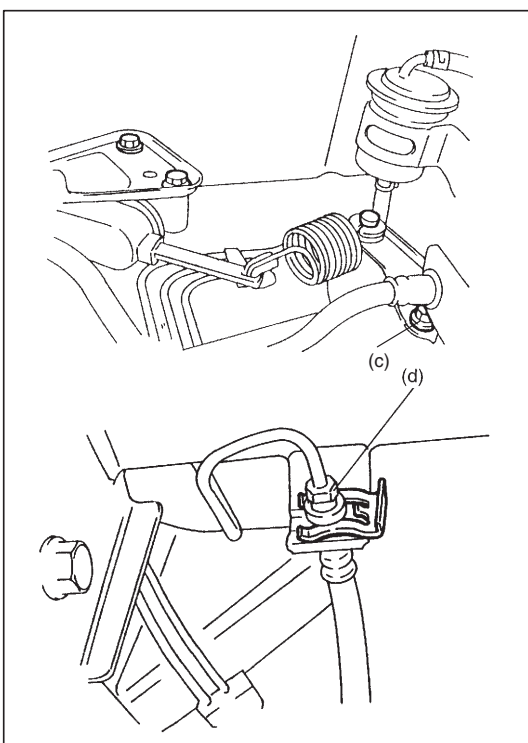
**(a): 55 N·m (5.5 kg-m, 40.0 lb-ft)**



- 7) For vehicle with ABS, connect wheel speed sensor coupler and install harness.
- 8) Install propeller shaft and torque nuts to specification.

**Tightening Torque**

**(b): 50 N·m (5.0 kg-m, 36.5 lb-ft)**



- 9) Remove floor jack from axle housing and connect breather hose onto axle housing and clamp it securely.
- 10) Connect brake pipes onto axle housing and clamp them securely.

For clamping positions, refer to SECTION 5A of this manual.

- 11) Connect brake flexible hose to bracket on axle housing and secure it with E-ring.
- 12) Install LSPV stay to axle housing, tighten LSPV stay bolt to specified torque.

And adjust LSPV referring to “LSPV ASSEMBLY INSPECTION AND ADJUSTMENT” in SECTION 5A.

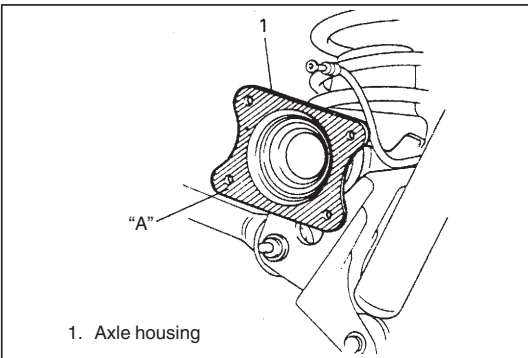
**Tightening Torque**

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

- 13) Connect brake pipe to brake flexible hose and tighten brake pipe flare nut to specified torque.

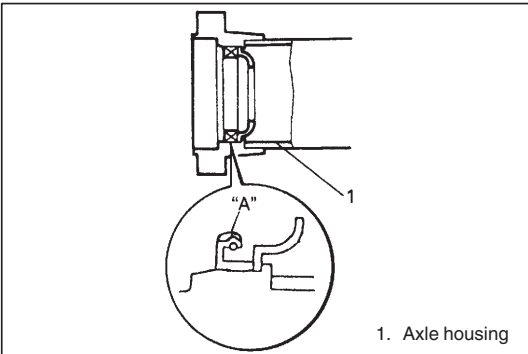
**Tightening Torque**

**(d): 16 N·m (1.6 kg-m, 11.5 lb-ft)**



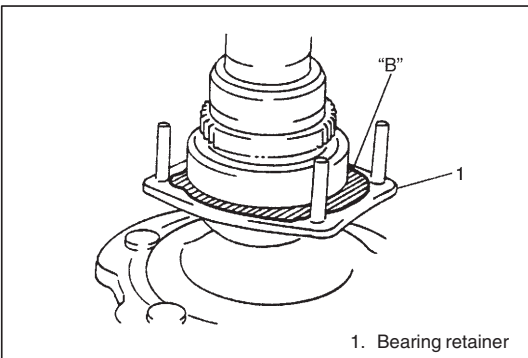
- 14) Clean mating surface of axle housing (right & left) and brake back plate, then apply sealant as shown.

**"A": Sealant 99000-31110**



- 15) Apply grease to axle shaft inner oil seal lip as shown.

**"A": Grease 99000-25010**

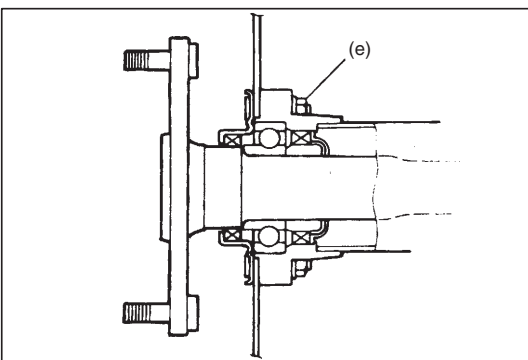


- 16) Apply sealant to mating surface of bearing retainer with brake back plate.

**NOTE:**

**Make sure to remove old sealant before applying it anew.**

**"B": Sealant 99000-31110**



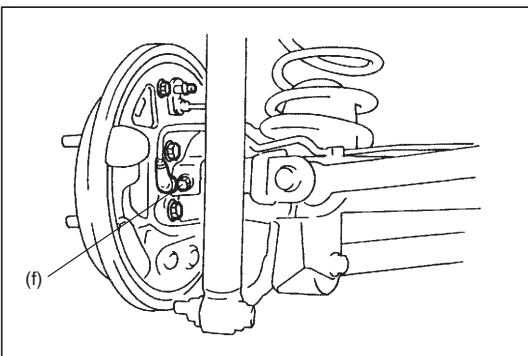
- 17) Install rear axle shaft to rear axle housing and tighten bearing retainer nuts to specified torque.

**NOTE:**

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

**Tightening Torque**

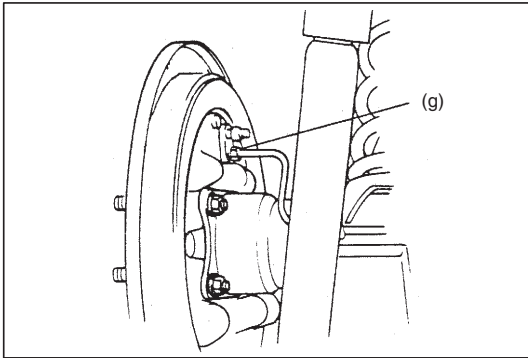
**(e): 23 N·m (2.3 kg-m, 17.0 lb-ft)**



- 18) For vehicle with ABS, tighten wheel speed sensor bolt to specified torque.

**Tightening Torque**

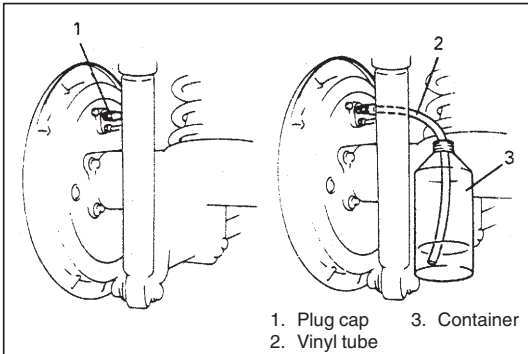
**(f): 21 N·m (2.1 kg-m, 15.5 lb-ft)**



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

**Tightening Torque**

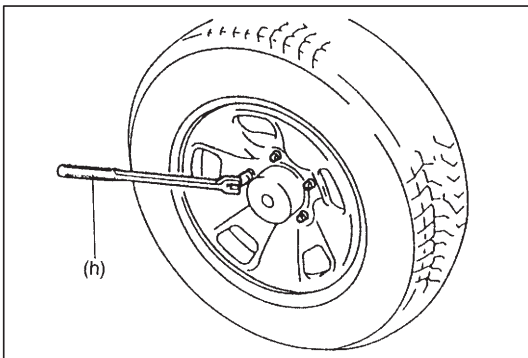
**(g): 16 N·m (1.6 kg-m, 11.5 lb-ft)**



- 20) Install brake drum (right & left). For details, refer to SECTION 5C "BRAKE DRUM INSTALLATION".

- 21) Refill differential gear housing with new specified gear oil. Refer to "ON-VEHICLE SERVICE" in SECTION 7F for refill.

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



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

**Tightening Torque**

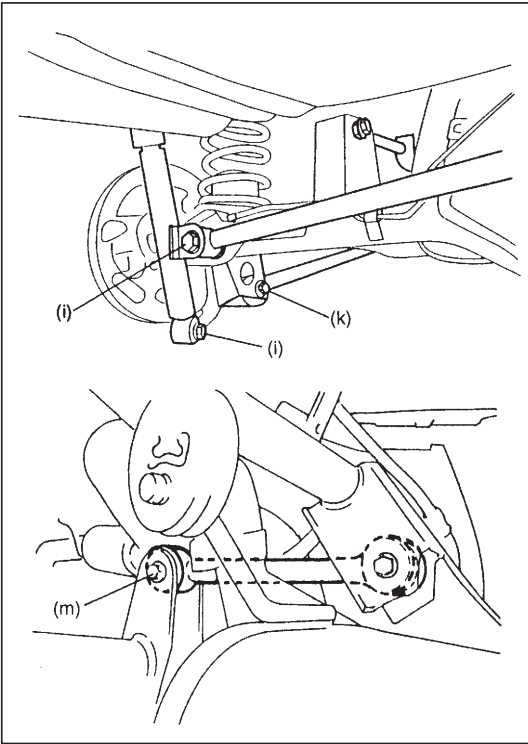
**(h): 100 N·m (10.0 kg-m, 72.5 lb-ft)**

- 24) Upon completion of all jobs, depress brake pedal with about 30 kg (66 lbs) load three to ten times so as to obtain proper drum-to-shoe clearance.

Adjust parking brake cable (for adjustment, see SECTION 5C of this manual.)

- 25) Tighten parking brake lever cover screws.

- 26) Lower hoist.



- 27) Tighten right and left lower/upper rod nuts lateral rod mount bolt and shock absorber nuts to specified torque.

**NOTE:**

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

**Tightening Torque**

**(i): 100 N·m (10.0 kg-m, 72.0 lb-ft)**

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

**(k): 90 N·m (9.50 kg-m, 65.0 lb-ft)**

- 28) Check to ensure that brake drum is free from dragging and proper braking is obtained.
- 29) Perform brake test (foot brake and parking brake).
- 30) Check each installed part for oil leakage.

## TIGHTENING TORQUE SPECIFICATIONS

Fastening parts		Tightening torque		
		N·m	Kg-m	lb-ft
Shock absorber lock nut		29	2.9	21.0
Shock absorber nut		29	2.9	21.0
Shock absorber lower nut		100	10.0	72.5
Lower rod bolt		100	10.0	72.5
Lower rod nut		90	9.0	65.0
Upper rod bolt and nut				
Lateral rod bolt		100	10.0	72.5
Differential carrier nut		55	5.5	40.0
Propeller shaft nut		50	5.0	36.5
Brake pipe flare nut		16	1.6	11.5
Bearing retainer nut		23	2.3	17.0
Differentiation gear oil filler & drain plug	Filler plug	50	5.0	36.5
	Drain plug	27	2.7	16.0
Wheel nut		100	10.0	72.5



## SECTION 6

# ENGINE GENERAL INFORMATION AND DIAGNOSIS (G16/J20 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 descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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## ENGINE DIAGNOSIS

### Engine Diagnostic Flow Table

#### INSPECTION OF PCM (ECM) AND ITS CIRCUITS

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

#### CAUTION:

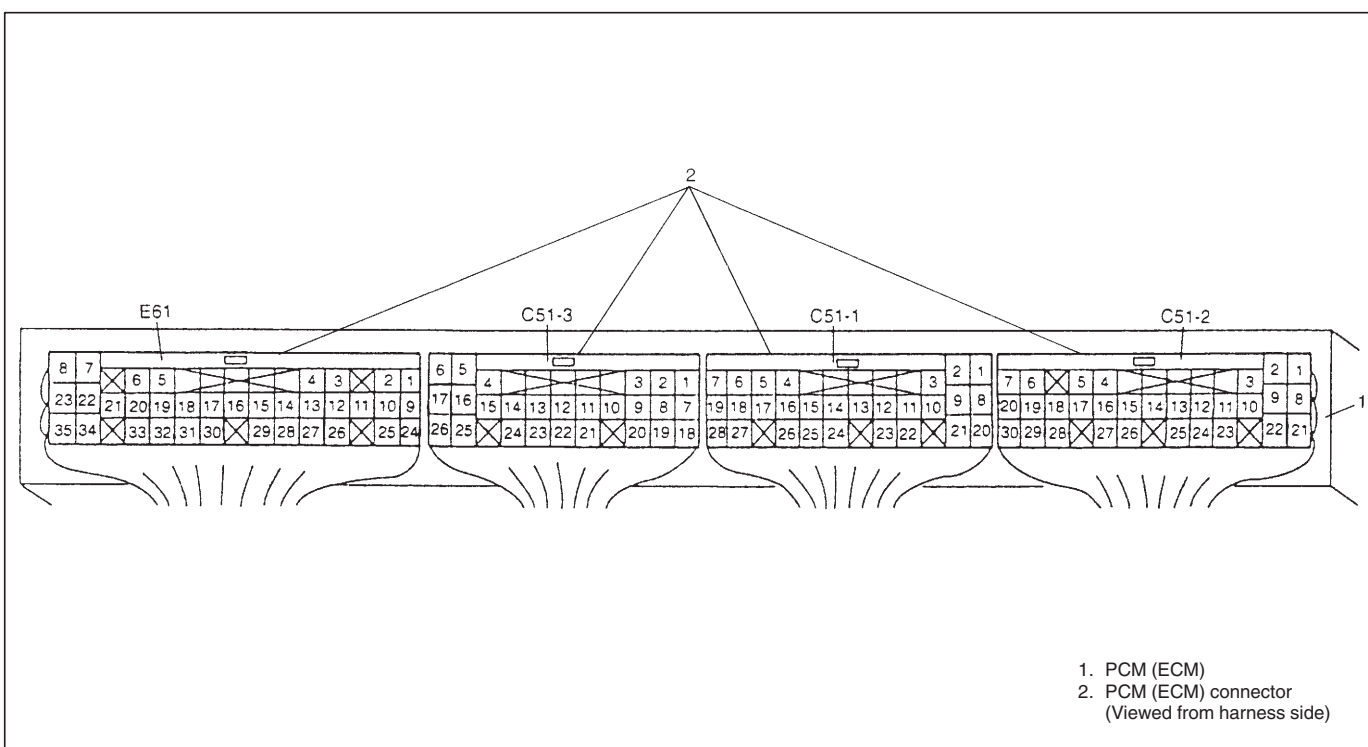
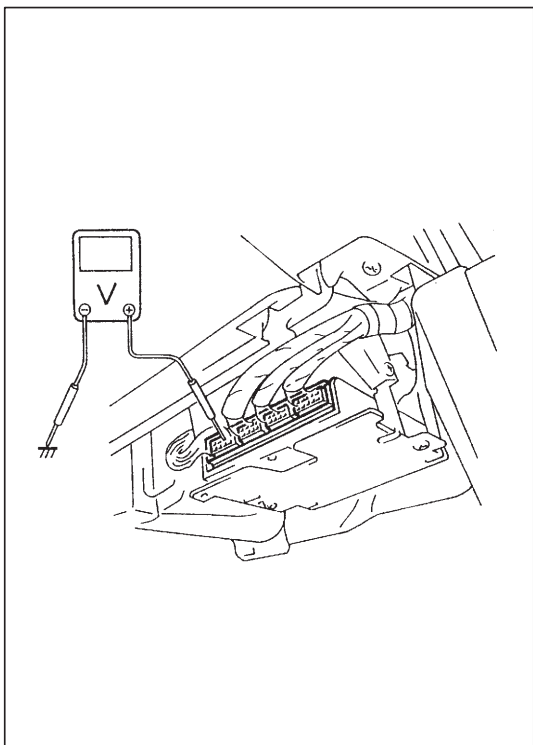
PCM/ECM cannot be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to PCM (ECM) with couplers disconnected from it.

#### Voltage Check

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

#### NOTE:

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



TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
E61	1 Power source for CO adjusting resistor (if equipped)	4.75 – 5.25 V	Ignition switch ON
	2 Power source for back up	10 – 14 V	Ignition switch ON and OFF
	3 Heater of HO2S-2 (if equipped)	10 – 14 V	Ignition switch ON
		0 – 2 V	At specified condition
	4 ———	———	———
	5 Immobilizer indicator lamp (without monitor connector)	0 – 1 V	Ignition switch ON, engine stops
		10 – 14 V	Engine running
	Duty output terminal (with monitor connector)	0 – 1 V	Ignition switch ON
	6 Tachometer	0 – 1 V	Ignition switch ON
	7 Malfunction indicator lamp	0 – 2.5 V	Ignition switch ON, engine stops
		10 – 14 V	Engine running
	8 A/C cut signal (if equipped)	0 – 1.5 V	A/C is not operating
		10 – 14 V	A/C is operating
	9 Main relay	10 – 14 V	Ignition switch OFF
		0 – 2 V	Ignition switch ON or for 4 seconds after ignition switch OFF
	10 CO adjusting resistor (if equipped)	———	———
	11 ———	———	———
	12 Data link connector (5 V) (if equipped)	4 – 6 V	Ignition switch ON
	13 Data link connector (12 V)	10 – 14 V	Ignition switch ON
	14 Test switch terminal (if equipped)	10 – 14 V	Ignition switch ON
	15 Rear defogger switch (if equipped)	0 – 1.5 V	Ignition switch ON, rear defogger switch OFF and lighting switch OFF
		10 – 14 V	Ignition switch ON, rear defogger switch or lighting switch ON
	16 Heater blower switch	10 – 14 V	Ignition switch ON, heater blower switch OFF
		0 – 1.5 V	Ignition switch ON, heater blower switch ON
	17 A/C signal (if equipped)	10 – 14 V	Ignition switch ON, A/C switch or heater blower switch OFF
		0 – 1 V	Ignition switch ON, A/C switch ON and heater blower switch ON
	18 ———	———	———
	19 “4WD” lamp (if equipped)	0 – 1 V	Ignition switch ON, Transfer lever: H4 or 4L range
		10 – 14 V	Ignition switch ON, Transfer lever: 2H range
	20 “O/D OFF” lamp (if equipped)	0 – 1 V	For 4 sec. after ignition switch ON or overdrive cut switch ON
		10 – 14 V	After 4 sec. from ignition switch ON and overdrive cut switch OFF
	21 “POWER” lamp (if equipped)	0 – 1 V	Ignition switch ON, P/N change switch: POWER mode
		10 – 14 V	Ignition switch ON, P/N change switch: NORMAL mode
	22 A/C condenser fan motor relay (if equipped)	10 – 14 V	Ignition switch ON, Engine coolant temp.: less than 113°C, 235°F
	23 Fuel pump relay (Type B only: See NOTE.)	0 – 2.5 V	For 3 sec. after ignition switch ON or while engine running
		10 – 14 V	After 3 sec. from ignition switch ON with engine stopped
	24 Ground for HO2S-2 or CO adjusting resistor	———	———

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
E61	25	—	—
	26	Heated oxygen sensor-2 (if equipped)	0.01 – 0.95 V While engine running at 2000 r/min. for 3 min. or longer after warming up.
	27	—	—
	28	Fuel level sensor	0 – 6 V Ignition switch ON Voltage depends on fuel level
	29	Diagnosis switch terminal (if equipped)	10 – 14 V Ignition switch ON
	30	ABS control module (if equipped)	10 – 14 V Ignition switch ON
	31	Power/Normal change switch (if equipped)	0 – 1 V Ignition switch ON, P/N change switch: POWER mode
			10 – 14 V Ignition switch ON, P/N change switch: NORMAL mode
	32	Lighting switch (if equipped)	0 – 1 V Ignition switch ON, Lighting switch OFF
			10 – 14 V Ignition switch ON, Lighting switch ON
	33	Overdrive cut switch	10 – 14 V Ignition switch ON, Overdrive cut switch OFF
			0 – 1 V Ignition switch ON, Overdrive cut switch ON
	34	Stop lamp switch	0 – 1 V Brake pedal released (switch OFF), Ignition switch ON
			10 – 14 V Brake pedal depressed (switch ON), Ignition switch ON
	35	—	—
C51-3	1	Intake air temp. sensor	2.2 – 3.0 V Ignition switch ON, Sensor ambient temp.: 20°C, 68°F
	2	Engine coolant temp. sensor	0.5 – 0.9 V Ignition switch ON, Engine coolant temp.: 80°C, 176°F
	3	Knock sensor (J20)	About 2.5 V Ignition switch ON
		Ignition timing adjusting resistor (G16) (if equipped)	—
	4	Power source	10 – 14 V Ignition switch ON
	5	Ground for MAF sensor	—
	6	Ground	—
	7	Power steering pressure switch	10 – 14 V Ignition switch ON
			0 – 1 V With engine running at idle speed, turning steering wheel to the right or left as far as it stops.
	8	Manifold absolute pressure sensor	3.3 – 4.3 V Ignition switch ON
	9	Throttle position sensor	0.5 – 1.2 V Ignition switch ON, Throttle valve at idle position
			3.4 – 4.7 V Ignition switch ON, Throttle valve at full open position
	10	Mass air flow sensor	1.0 – 1.6 V Ignition switch ON and engine stops
			1.7 – 2.0 V With engine running at idle speed
	11	Heated oxygen sensor-1	Deflects between over and under 0.45 V While engine running at 2,000 r/min. for 1 min. or longer after warmed up.

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
C51-3	12	Ground for HO2S-1 shield wire	—
	13	Power source for TP sensor	4.75 – 5.25 V Ignition switch ON
	14	Power source for MAP sensor	
	15	Power source	
	16	—	—
	17	Ground	—
	18	6 – 14 V	While engine cranking
		0 – 1 V	Other than above
	19	—	—
	20	10 – 14 V	Ignition switch ON
	21	Ground for TP sensor	—
	22	Ground for HO2S-1 sensor	—
	23	—	—
	24	—	—
	25	Ground for IAT sensor, ECT sensor, MAP sensor and ignition timing resistor	—
	26	Ground for CMP sensor	—
C51-1 (A/T)	1	Shift solenoid B	0 – 1 V Ignition switch ON
	2	Shift solenoid A	10 – 14 V Ignition switch ON
	3 ~ 7	—	—
	8	TCC solenoid	0 – 1 V Ignition switch ON
	9	—	—
	10	A/T input speed sensor (–)	About 2.5 V Ignition switch ON
	11	A/T input speed sensor (+)	About 2.5 V Ignition switch ON
	12 ~ 14	—	—
	15	10 – 14 V	Ignition switch ON, selector lever: “D” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “D” range
	16	10 – 14 V	Ignition switch ON, selector lever: “N” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “N” range
	17	10 – 14 V	Ignition switch ON, selector lever: “R” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “R” range
	18	10 – 14 V	Ignition switch ON, selector lever: “P” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “P” range
	19	—	—
	20	Shield wire ground for A/T output speed sensor	—
	21	Shield wire ground for A/T input speed sensor	—

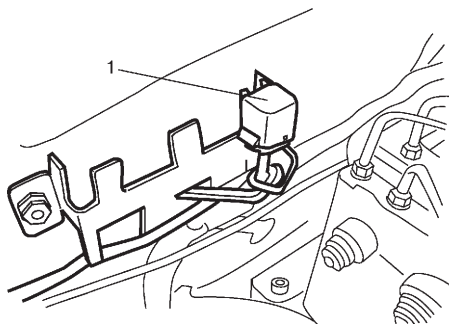
TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
C51-1 (A/T)	22 A/T output speed sensor (-)	About 2.5 V	Ignition switch ON
	23 A/T output speed sensor (+)	About 2.5 V	Ignition switch ON
	24-25	—	—
	26 4WD low switch	0 – 1 V	Ignition switch ON, Transfer lever: 4WD low range
		10 – 14 V	Ignition switch ON, Transfer lever: 4H or 2H range
	27 Transmission range switch "L"	10 – 14 V	Ignition switch ON, Selector lever: "L" range
		0 – 1 V	Ignition switch ON, Selector lever: Other than "L" range
	28 Transmission range switch "2"	10 – 14 V	Ignition switch ON, Selector lever: "2" range
		0 – 1 V	Ignition switch ON, Selector lever: Other than "2" range
C51-2	1 Fuel injector No.2	10 – 14 V	Ignition switch ON
	2 Fuel injector No.1		
	3 IAC valve (stepper motor coil 1)	—	—
	4 Heater of HO2S-1 (if equipped)	10 – 14 V	Ignition switch ON
		0 – 2 V	At specified idle speed after engine warmed up.
	5 Fuel pump relay (Type A only: See NOTE.)	0 – 2.5 V	For 3 sec. after ignition switch ON or while engine running
		10 – 14 V	After 3 sec. from ignition switch ON with engine stopped
	6	—	—
	7 4WD air pump assembly (if equipped)	10 – 14 V	Ignition switch ON, Transfer lever: 4H or 4L range
		0 – 1 V	Ignition switch ON, Transfer lever: 2H range
	8 Fuel injector No.4	10 – 14 V	Ignition switch ON
	9 Fuel injector No.3		
	10 IAC valve (stepper motor coil 4)	—	—
	11 IAC valve (stepper motor coil 3)	—	
	12 IAC valve (stepper motor coil 2)	—	
	13 EGR valve (stepper motor coil 4) (if equipped)	0 – 1 V	Ignition switch ON
	14 EGR valve (stepper motor coil 3) (if equipped)	10 – 14 V	
	15 EGR valve (stepper motor coil 2) (if equipped)	10 – 14 V	
	16 EGR valve (stepper motor coil 1) (if equipped)	0 – 1 V	
	17 EVAP canister purge valve	10 – 14 V	Ignition switch ON
	18 4WD switch	0 – 1 V	Ignition switch ON, Transfer lever: 4H or 4L range
		10 – 14 V	Ignition switch ON, Transfer lever: 2H range
	19 Crankshaft position sensor (+) (if equipped)	—	—
	20 Crankshaft position sensor (-) (if equipped)	—	—
	21 Ignition coil assembly for No.4 (J20)	—	—
	22 Ignition coil assembly for No.3 (J20)	—	—
	23 Ignition coil assembly for No.2 and No.3 (G16)	—	—
		—	—
	24 Ignition coil assembly for No.1 and No.4 (G16)	—	—
		—	—

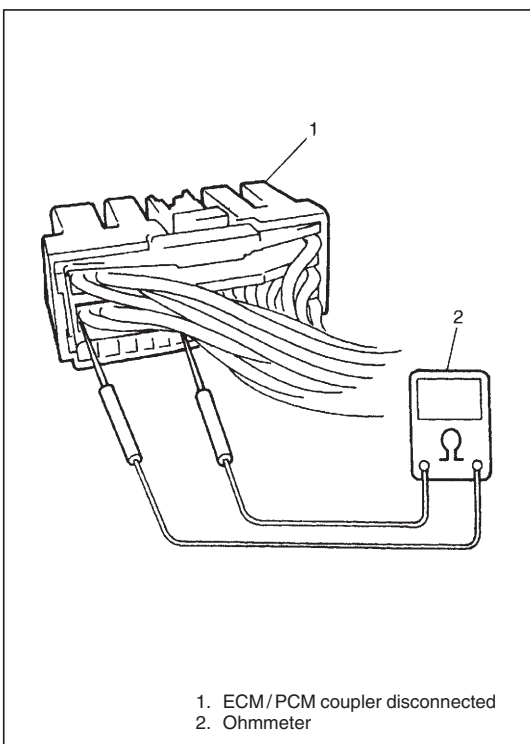
TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
C51-2	25 Vehicle speed sensor	Deflects between 0 – 1 V and over 4 V	Ignition switch ON, Rear right tire turned slowly with rear left tire locked
	26 Camshaft position sensor (+)	Deflects between 0 – 1 V and 4 – 6 V	Ignition switch ON, crankshaft turned slowly
	27 Pressure switch in 4WD air pump assembly (if equipped)	10 – 14 V	Ignition switch ON, Transfer lever: 4H or 4L range
		0 V	Ignition switch ON, Transfer lever: 2H range
	28 Ground	—	—
	29	—	—
	30 Ground for CKP sensor shield wire (if equipped)	—	—

**NOTE:**

**Type A** is RH steering vehicle equipped with immobilizer control system and engine monitor connector (1).

**Type B** is Other than above.





### Resistance Check

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

#### CAUTION:

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

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

#### CAUTION:

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

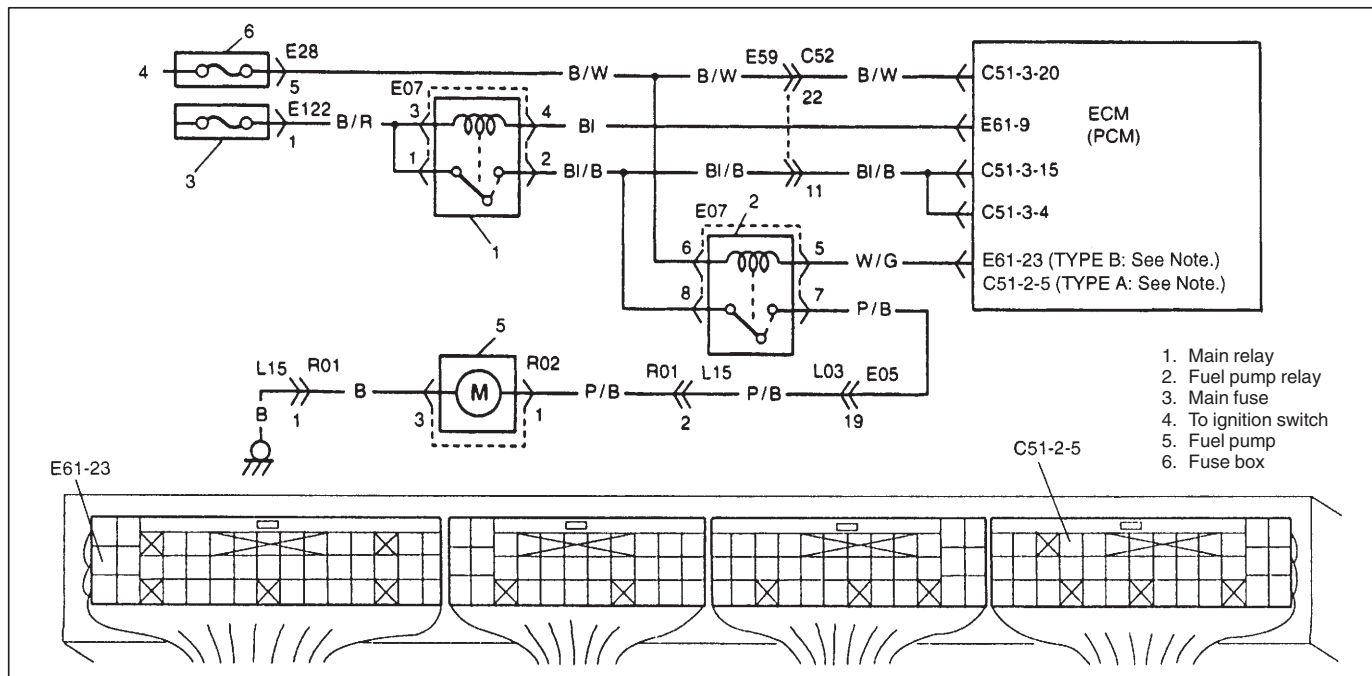
TERMINALS	CIRCUIT	STANDARD RESISTANCE	CONDITION
E61-3 and C51-3-20	Heater of HO2S-2 (if equipped)	11.7 – 14.3 $\Omega$	—
E61-9 and E61-2	Main relay	79 – 95 $\Omega$	—
E61-22 and C51-3-20	A/C fan motor relay (if equipped)	75 – 110 $\Omega$	Battery disconnected and ignition switch ON
E61-23 and C51-3-20	Fuel pump relay (Type B only: See NOTE.)	79 – 95 $\Omega$	—
C51-3-6 and Body ground	Ground	Continuity	—
C51-3-17 and Body ground	Ground	Continuity	—
C51-1-1 and Body ground	Shift solenoid B (A/T)	11 – 15 $\Omega$	—
C51-1-2 and Body ground	Shift solenoid A (A/T)		
C51-1-8 and Body ground	TCC solenoid (A/T)		
C51-2-1- and C51-3-4	Fuel injector No.2	13 – 16 $\Omega$	—
C51-2-2 and C51-3-4	Fuel injector No.1		
C51-2-3 and C51-3-4	IAC valve (stepper motor coil 1)	35 – 43 $\Omega$	—
C51-2-4 and C51-3-20	Heater of HO2S-1 (if equipped)	5 – 6.4 $\Omega$	—
C51-2-5 and C51-3-4	Fuel pump relay (Type A only: See NOTE.)	79 – 95 $\Omega$	—
C51-2-8 and C51-3-4	Fuel injector No.4	13 – 16 $\Omega$	—
C51-2-9 and C51-3-4	Fuel injector No.3		
C51-2-10 and C51-3-4	IAC valve (stepper motor coil 4)	35 – 43 $\Omega$	—
C51-2-11 and C51-3-4	IAC valve (stepper motor coil 3)		
C51-2-12 and C51-3-4	IAC valve (stepper motor coil 2)		
C51-2-13 and C51-3-4	EGR valve (stepper motor coil 4) (if equipped)	20 – 24 $\Omega$	—
C51-2-14 and C51-3-4	EGR valve (stepper motor coil 3) (if equipped)		
C51-2-15 and C51-3-4	EGR valve (stepper motor coil 2) (if equipped)		
C51-2-16 and C51-3-4	EGR valve (stepper motor coil 1) (if equipped)		
C51-2-17 and C51-3-4	EVAP canister purge valve	28 – 35 $\Omega$	—
C51-2-28 and Body ground	Ground	Continuity	—

#### NOTE:

See page 6-7 for the applicable model.



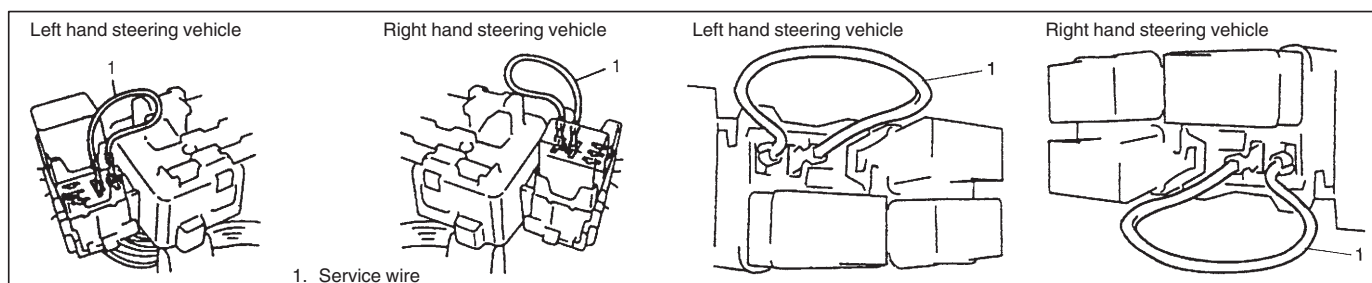
### TABLE B-1 FUEL PUMP CIRCUIT INSPECTION WIRING DIAGRAM



**NOTE:**  
See page 6-7 for the applicable model.

## INSPECTION

STEP	ACTION	YES	NO
1	<p>Fuel Pump Operation Check:</p> <p>1) Remove fuel filler cap.</p> <p>2) Turn ON ignition switch.</p> <p>Is fuel pump operation sound heard for 3 sec. after ignition switch ON?</p>	Fuel pump circuit is in good condition.	Go to Step 2.
2	<p>Fuel Pump Circuit Check:</p> <p>1) With ignition switch OFF, remove fuel pump relay from connector.</p> <p>2) Check for proper connection to relay at each terminal.</p> <p>3) If OK, using service wire, connect terminals E07-7 and E07-8 of relay connector.</p> <div style="border: 1px solid black; padding: 5px; margin: 10px 0;"> <p><b>CAUTION: Check to make sure that connection is made between correct terminals. Wrong connection can cause damage to ECM, wire harness etc.</b></p> </div> <p>Is fuel pump heard to operate at ignition switch ON?</p>	Go to Step 3.	"BI/B", "P/B" or "B" circuit open or fuel pump malfunction.
3	<p>Fuel Pump Relay Check:</p> <p>1) Check fuel pump relay referring to "Fuel Pump Relay Inspection" in Section 6E1.</p> <p>Is it in good condition?</p>	"B/W" or "W/G" circuit open.	Replace fuel pump.



## SECTION 6-1

# ENGINE GENERAL INFORMATION AND DIAGNOSIS (H25 ENGINE)

**WARNING:**

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

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

**NOTE:**

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

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# ENGINE DIAGNOSIS

## DIAGNOSTIC TROUBLE CODE (DTC) TABLE

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL (vehicle without monitor connector)	MIL (vehicle with monitor connector)
P0100 (No.34)	Mass air flow circuit malfunction	Sensor output too low	1 driving cycle	1 driving cycle
P0100 (No.33)		Sensor output too high		
P0110 (No.25)	Intake air temp. circuit malfunction	Intake air temp. circuit low input	1 driving cycle	1 driving cycle
P0110 (No.23)		Intake air temp. circuit high input		
P0115 (No.15)	Engine coolant temp. circuit malfunction	Engine coolant temp. circuit low input	1 driving cycle	1 driving cycle
P0115 (No.14)		Engine coolant temp. circuit high input		
P0120 (No.22)	Throttle position circuit malfunction	Throttle position circuit low input	1 driving cycle	1 driving cycle
P0120 (No.21)		Throttle position circuit high input		
P0121	Throttle position circuit performance problem	Poor performance of TP sensor	2 driving cycles	Not applicable
P0130	HO2S circuit malfunction (Bank 1 – Sensor 1)	Min. output voltage of HO2S-1 is higher than specification.	2 driving cycles	Not applicable
		Max. output voltage of HO2S-1 is lower than specification.		
P0133	HO2S circuit slow response (Bank 1 – Sensor 1)	Response time of HO2S-1 output voltage between rich and lean is longer than specification.	2 driving cycles	Not applicable
P0134 (No.13)	HO2S (Bank 1 – Sensor 1) no activity detected	Output voltage of HO2S-1 fails to go above specification (or HO2S-1 circuit open).	2 driving cycles	2 driving cycles
P0135	HO2S heater circuit malfunction (Bank 1 – Sensor 1)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON.	2 driving cycles	Not applicable
P0136	HO2S circuit malfunction (Bank 1 – Sensor 2)	Max. voltage of HO2S-2 is lower than specification or its min. voltage is higher than specification.	2 driving cycles	Not applicable
P0141	HO2S heater circuit malfunction (Bank 1 – Sensor 2)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON.	2 driving cycles	Not applicable
P0150	HO2S circuit malfunction (Bank 2 – Sensor 1)	Min. output voltage of HO2S-1 is higher than specification.	2 driving cycles	Not applicable
		Max. output voltage of HO2S-1 is lower than specification.		

DTC NO.	DETECTING ITEM	DETECTING CONDITION (DTC will set when detecting:)	MIL (vehicle without monitor connector)	MIL (vehicle with monitor connector)
P0153	HO2S circuit slow response (Bank 2 – Sensor 1)	Response time of HO2S-1 output voltage between rich and lean is longer than specification.	2 driving cycles	Not applicable
P0154 (No.26)	HO2S (Bank 2 – Sensor 1) no activity detected	Output voltage of HO2S-1 fails to go above specification (or HO2S-1 circuit open).	2 driving cycles	2 driving cycles
P0155	HO2S heater circuit malfunction (Bank 2 – Sensor 1)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON.	2 driving cycles	Not applicable
P0156	HO2S circuit malfunction (Bank 2 – Sensor 2)	Max. voltage of HO2S-2 is lower than specification or its min. voltage is higher than specification.	2 driving cycles	Not applicable
P0161	HO2S heater circuit malfunction (Bank 2 – Sensor 2)	Terminal voltage is lower than specification at heater OFF or it is higher at heater ON (or heater circuit or short).	2 driving cycles	Not applicable
P0171	Fuel system too lean (Bank 1)	Short term fuel trim or total fuel trim (short and long terms added) is larger than specification for specified time or longer. (Fuel trim toward rich side is large.)	2 driving cycles	Not applicable
P0172	Fuel system too rich (Bank 1)	Short term fuel trim or total fuel trim (short and long term added) is smaller than specification for specified time or longer. (Fuel trim toward lean side is large.)	2 driving cycles	Not applicable
P0174	Fuel system too lean (Bank 2)	Short term fuel trim or total fuel trim (short and long terms added) is larger than specification for specified time or longer. (Fuel trim toward rich side is large.)	2 driving cycles	Not applicable
P0175	Fuel system too rich (Bank 2)	Short term fuel trim or total fuel trim (short and long term added) is smaller than specification for specified time or longer. (Fuel trim toward lean side is large.)	2 driving cycles	Not applicable
P0300 P0301 P0302 P0303 P0304 P0305 P0306	Random misfire detected Cylinder 1 misfire detected Cylinder 2 misfire detected Cylinder 3 misfire detected Cylinder 4 misfire detected Cylinder 5 misfire detected Cylinder 6 misfire detected	Misfire of such level as to cause damage to three way catalyst	MIL flashing during misfire detection	Not applicable
		Misfire of such level as to deteriorate emission but not to cause damage to three way catalyst	2 driving cycles	Not applicable
P0325 (No.43)	Knock sensor circuit malfunction	Knock sensor circuit low input Knock sensor circuit high input	1 driving cycle	1 driving cycle
P0335	Crankshaft position sensor circuit malfunction	No signal for 2 sec. during engine cranking	1 driving cycle	Not applicable
P0340 (No.42)	Camshaft position sensor circuit malfunction	No signal during engine running.	1 driving cycle	1 driving cycle

<b>DTC NO.</b>	<b>DETECTING ITEM</b>	<b>DETECTING CONDITION (DTC will set when detecting:)</b>	<b>MIL (vehicle without monitor connector)</b>	<b>MIL (vehicle with monitor connector)</b>
P0400	Exhaust gas recirculation flow malfunction detected	Excessive or insufficient EGR flow.	2 driving cycles	Not applicable
P0420	Catalyst system efficiency below threshold (Bank 1)	Output waveforms of HO2S-1 and HO2S-2 are similar. (Time from output voltage change of HO2S-1 to that of HO2S-2 is shorter than specification.)	2 driving cycles	Not applicable
P0430	Catalyst system efficiency below threshold (Bank 2)	Output waveforms of HO2S-1 and HO2S-2 are similar. (Time from output voltage change of HO2S-1 to that of HO2S-2 is shorter than specification.)	2 driving cycles	Not applicable
P0443	Purge control valve circuit malfunction	Purge control valve circuit is open or shorted to ground.	2 driving cycles	Not applicable
P0460	Fuel level sensor high input	Fuel level sensor circuit open (high voltage).	2 driving cycles	Not applicable
P0500 (No.24)	Vehicle speed sensor malfunction	No signal while running in "D" range or during fuel cut at decelerating.	1 driving cycle	1 driving cycle
P0505	Idle control system malfunction	No closed signal to IAC valve is detected.	2 driving cycles	1 driving cycle
P0601 (No.71)	Internal control module memory check sum error	Data write error (or check sum error) when written into ECM	1 driving cycle	Not applicable
P1408	Manifold absolute pressure sensor circuit malfunction	Manifold absolute pressure sensor output voltage is higher or lower than specified value (or sensor circuit shorted to ground or open).	2 driving cycles	Not applicable
P1450	Barometric pressure sensor circuit malfunction	Barometric pressure is lower or higher than specification (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
P0705 (No.72)	Transmission range circuit malfunction	Refer to Section 7B1	
P0715 (No.76)	Input/turbine speed sensor circuit malfunction		
P0720 (No.75)	A/T VSS signal circuit malfunction		
P0741	Torque converter clutch circuit performance or stuck off		
P0743 No.65 No.66	Torque converter clutch circuit electrical		
P0751	Shift solenoid A (#1) performance or stuck off		
P0753 No.61 No.62	Shift solenoid A (#1) electrical		
P0756	Shift solenoid B (#2) performance or stuck off		
P0758 No.63 No.64	Shift solenoid B (#2) electrical		
P1875	4WD low switch 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 ( ) marked No. in DTC column, it is used for vehicle with monitor connector.
- DTC No.12 appears when none of the other codes is identified.
- With the generic scan tool, only star (☆) marked data in the above table can not be read.

## ECM (PCM) SUBSTITUTION

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

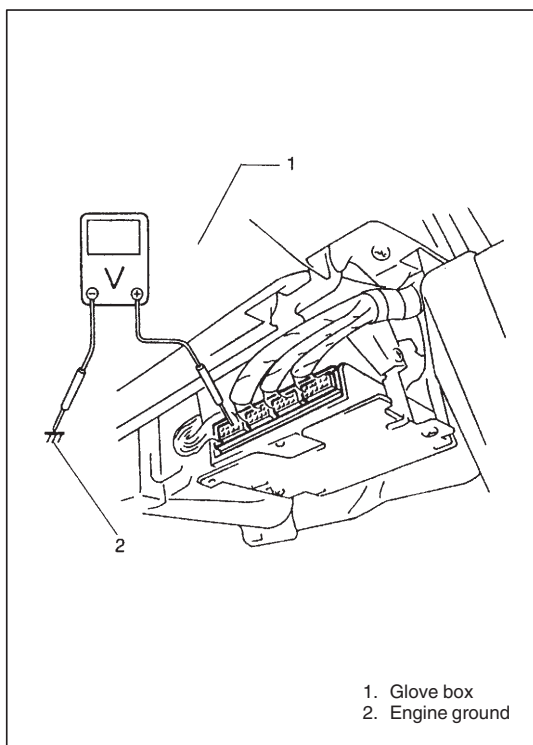
- Resistance value of all relays, actuators is as specified respectively.
- MAF sensor, MAP sensor, TP sensor and fuel tank pressure sensor are in good condition and none of power circuits of these sensors is shorted to ground.

## INSPECTION OF ECM (PCM) AND ITS CIRCUITS

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

### CAUTION:

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

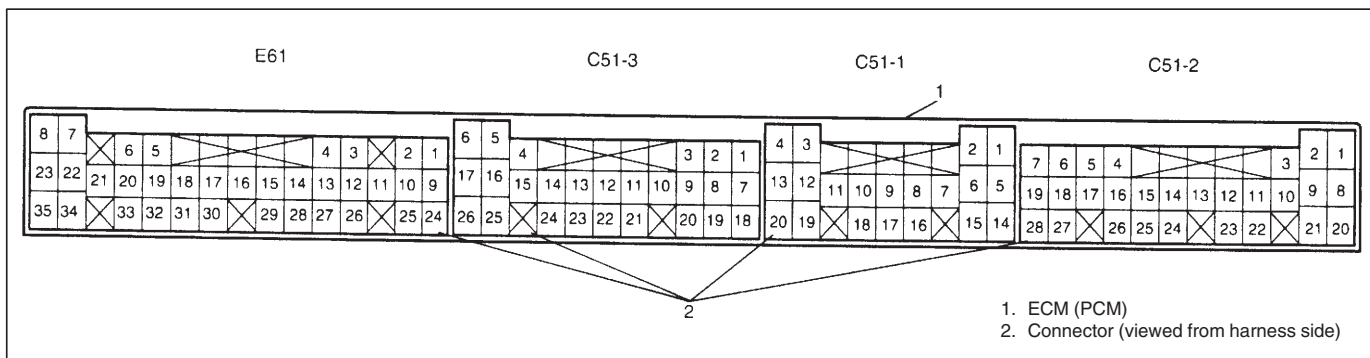


### VOLTAGE CHECK

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

### NOTE:

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





TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
E61-1	Fuel pump relay (TYPE B only: See NOTE.)	0 – 2.5 V	For 3 sec. after ignition switch ON or while engine running.
		10 – 14 V	After 3 sec. from ignition switch ON with engine stopped.
E61-2	_____	_____	_____
E61-3	Cruise control module	10 – 14 V	Ignition switch ON.
E61-4	Tachometer	0 – 0.8 V	Ignition switch ON, engine stops.
E61-5	A/C condenser fan motor relay (if equipped)	10 – 14 V	Ignition switch ON.
		0 – 2.5 V	A/C condenser fan motor ON.
E61-6	Cruise control module (Throttle opening signal) (if equipped)	Indicator deflection between 0 – 1 V and 10 – 14 V	Ignition switch ON.
E61-7	“O/D OFF” lamp (A/T VEHICLE)	0 – 2.5 V	For 4 sec. after ignition switch ON, overdrive cut switch ON.
		10 – 14 V	After 4 sec. from ignition switch ON and overdrive cut switch OFF.
E61-8	Main relay	10 – 14 V	Ignition switch OFF.
		0 – 2 V	Ignition switch ON.
E61-9	Power/Normal change switch (A/T VEHICLE)	0 – 1 V	For 4 sec. after ignition switch ON, P/N change switch in POWER mode
		10 – 14 V	Ignition switch ON, P/N change switch: NORMAL mode
E61-10	“POWER” lamp (A/T VEHICLE)	0 – 2.5 V	Ignition switch ON, P/N change switch: POWER mode
		10 – 14 V	Ignition switch ON, P/N change switch: NORMAL mode
E61-11	_____	_____	_____
E61-12	Fuel level sensor	0.7 – 5.5 V (Full) (Empty)	Ignition switch ON.
E61-13	Heater blower switch	10 – 14 V	Ignition switch ON, heater blower switch OFF.
		0 – 2.5 V	Ignition switch ON, heater blower switch ON.
E61-14	Overdrive cut switch (A/T VEHICLE)	10 – 14 V	Ignition switch ON, overdrive cut switch OFF.
		0 – 1 V	Ignition switch ON, overdrive cut switch ON.
E61-15	Rear defogger switch (if equipped)	0 – 1 V	Rear defogger switch OFF.
		10 – 14 V	Ignition switch ON. Rear defogger switch ON.
E61-16	Test switch terminal (vehicle with monitor connector)	10 – 14 V	Ignition switch ON.
E61-17	Output duty select switch terminal (vehicle with monitor connector)	10 – 14 V	Ignition switch ON.
E61-18	ABS control module (if equipped)	10 – 14 V	Ignition switch ON.
E61-19	CO adjusting resistor (if equipped)	_____	_____
E61-20	Fuel pump relay (TYPE A only: See NOTE.)	0 – 2.5 V	For 3 sec. after ignition switch ON or while engine running.
		10 – 14 V	After 3 sec. from ignition switch ON with engine stopped.



**6-1-8 ENGINE GENERAL INFORMATION AND DIAGNOSIS (H25 ENGINE)**

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
E61-21, 22	————	————	————
E61-23	Immobilizer indicator lamp (vehicle without monitor connector)	0 – 1 V	Ignition switch ON
		10 – 14 V	Engine running
	Duty output terminal (vehicle with monitor connector)	0 – 1 V	Ignition switch ON
E61-24	Data link connector (5 V)	4 – 6 V	Ignition switch ON
E61-25	Data link connector (12 V)	10 – 14 V	Ignition switch ON
E61-26	Power steering pressure switch	10 – 14 V	Ignition switch ON
		0 – 1 V	With engine running at idle speed, turning steering wheel to the right or left as far as it stops
E61-27	A/C cut signal (if equipped)	0 – 1 V	A/C is not operating
		10 – 14 V	A/C is operating
E61-28	A/C signal (if equipped)	10 – 14 V	Ignition switch ON, A/C switch or heater blower switch OFF
		0 – 1.5 V	Ignition switch ON, A/C switch ON and heater blower switch ON
E61-29	Lighting switch	0 – 1 V	Ignition switch ON, lighting switch OFF
		10 – 14 V	Ignition switch ON, lighting switch ON
E61-30	Diag. switch terminal (vehicle with monitor connector)	10 – 14 V	Ignition switch ON
E61-31	Stop lamp switch (A/T VEHICLE)	0 – 1 V	Brake pedal released (switch OFF), Ignition switch ON
		10 – 14 V	Brake pedal depressed (switch ON), Ignition switch ON
E61-32	CO adjusting resistor ground (if equipped)	————	————
E61-33	Power source for CO adjusting resistor (if equipped)	4.75 – 5.25 V	Ignition switch ON
E61-34	Malfunction indicator lamp	0 – 2.5 V	Ignition switch ON, engine stops
		10 – 14 V	Engine running
E61-35	Power source for back up	10 – 14 V	Ignition switch ON and OFF
C51-3-1	Vehicle speed sensor	Deflects between 0 and over 4 V	Ignition switch ON, Rear right tire turned slowly with rear left tire locked
C51-3-2	Crankshaft position (CKP) sensor (if equipped)	————	————
C51-3-3	Crankshaft position (CKP) sensor (if equipped)	————	————
C51-3-4	Heated oxygen sensor (Bank 1 – Sensor 1) (if equipped)	Deflects between over and under 0.5 V	While engine running at 2,000 r/min. for 1 min. or longer after warmed up
C51-3-5	Heater of HO2S (Bank 2 – Sensor 1) (if equipped)	10 – 14 V	Ignition switch ON
		Deflects between 0 – 1 V and 10 – 14 V	At specified idle speed after engine warmed up
C51-3-6	Heater of HO2S (Bank 1 – Sensor 1) (if equipped)	10 – 14 V	Ignition switch ON
		Deflects between 0 – 1 V and 10 – 14 V	At specified idle speed after engine warmed up
C51-3-7	————	————	————
C51-3-8	Intake air temp. sensor	2.2 – 3.0 V	Ignition switch ON, Sensor ambient temp.: 20°C, 68°F

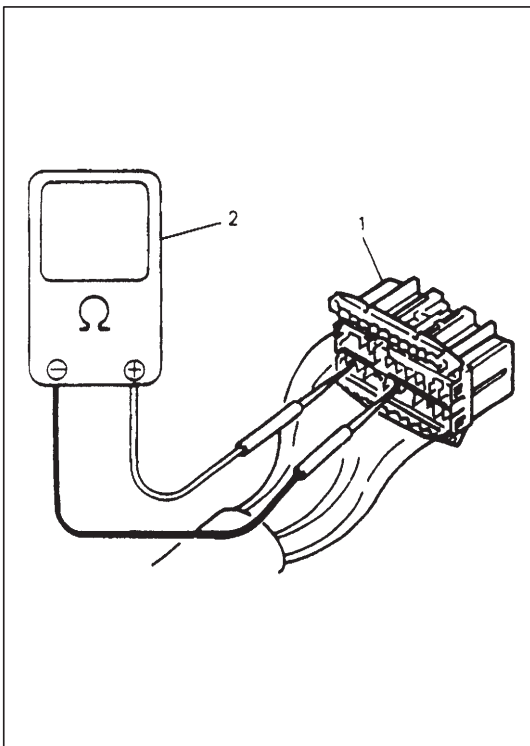
TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
C51-3-9	Camshaft position sensor (POS)	Deflects between 0 – 1 V and 4 – 6 V	Ignition switch ON, crankshaft turned slowly.
C51-3-10	Camshaft position sensor (REF)	Deflects between 0 – 1 V and 4 – 6 V	Ignition switch ON, camshaft turned slowly.
C51-3-11	Power source for TP sensor and MAP sensor	4.75 – 5.25 V	Ignition switch ON.
C51-3-12	Throttle position sensor	0.35 – 0.65 V	Ignition switch ON, throttle valve at idle position.
		3.5 – 4.5 V	Ignition switch ON, throttle valve at full open position.
C51-3-13	Manifold absolute pressure sensor	3.3 – 4.3 V	Ignition switch ON.
C51-3-14	Heated oxygen sensor (Bank 1 – Sensor 2) (if equipped)	———	———
C51-3-15	Heated oxygen sensor (Bank 2 – Sensor 1) (if equipped)	Deflect between over and under 0.5 V	While engine running at 2000 r/min. for 1 min. or longer after warmed up.
C51-3-16	Heater of HO2S (Bank 2 – Sensor 2) (if equipped)	10 – 14 V	Ignition switch ON.
		Deflect between 0 – 1 V and 10 – 14 V	At specified idle speed after engine warmed up.
C51-3-17	Heater of HO2S (Bank 1 – Sensor 2) (if equipped)	10 – 14 V	Ignition switch ON.
		Deflect between 0 – 1 V and 10 – 14 V	At specified idle speed after engine warmed up.
C51-3-18	Knock sensor (if equipped)	About 2.5 V	With engine running at idle after warmed up.
C51-3-19	———	———	———
C51-3-20, 21	Ground	———	———
C51-3-22	Engine coolant temp. sensor	0.5 – 0.9 V	Ignition switch ON, Engine coolant temp.: 80°C, 176°F
C51-3-23	Mass air flow sensor	0.5 – 1.0 V	Ignition switch ON and engine stops.
		1.5 – 1.8 V	With engine running at idle speed.
C51-3-24	Heated oxygen sensor (Bank 2 – Sensor 2) (if equipped)	———	———
C51-3-25, 26	Ground	———	———
C51-1-1	Shift solenoid B (A/T VEHICLE)	0 – 1 V	Ignition switch ON.
C51-1-2	TCC solenoid (A/T VEHICLE)	0 – 1 V	Ignition switch ON.
C51-1-3	Transmission range switch “R” (A/T VEHICLE)	10 – 14 V	Ignition switch ON, selector lever: “R” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “R” range
C51-1-4	Transmission range switch “P” (A/T VEHICLE)	10 – 14 V	Ignition switch ON, selector lever: “P” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “P” range
C51-1-5	4WD low switch (if equipped) (A/T VEHICLE)	0 – 1 V	Ignition switch ON, transfer lever: 4WD low range
		10 – 14 V	Ignition switch ON, transfer lever: 4H or 2H range

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
C51-1-6	Shift solenoid A (A/T VEHICLE)	10 – 14 V	Ignition switch ON
C51-1-7	4WD lamp (if equipped)	10 – 14 V	Ignition switch ON, Transfer lever: N or 2H range
		0 – 1 V	Ignition switch ON, Transfer lever: 4L or 4H range
C51-1-8	A/T input speed sensor (A/T VEHICLE)	—	—
C51-1-9	A/T vehicle (output) speed sensor (A/T VEHICLE)	—	—
C51-1-10	A/T vehicle (output) speed sensor (A/T VEHICLE)	—	—
C51-1-11	4WD switch (if equipped)	10 – 14 V	Ignition switch ON, Transfer lever: N or 2H range
		0 – 1 V	Ignition switch ON, Transfer lever: 4L or 4H range
C51-1-12	Transmission range switch “D” (A/T VEHICLE)	10 – 14 V	Ignition switch ON, selector lever: “D” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “D” range
C51-1-13	Transmission range switch “N”	10 – 14 V	Ignition switch ON, selector lever: “N” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “N” range
C51-1-14	Shield wire ground for A/T input speed sensor and A/T vehicle (output) speed sensor (A/T VEHICLE)	—	—
C51-1-15	4WD actuator (if equipped)	10 – 14 V	Ignition switch ON, Transfer lever: 4L or 4H range
		0 – 1 V	Ignition switch ON, Transfer lever: N or 2H range
C51-1-16	A/T input speed sensor (A/T VEHICLE)	—	—
C51-1-17	—	—	—
C51-1-18	4WD pressure switch (if equipped)	10 – 14 V	Ignition switch ON, Transfer lever: 4L or 4H range
		0 V	Ignition switch ON, Transfer lever: N or 2H range
C51-1-19	Transmission range switch “L” (A/T VEHICLE)	10 – 14 V	Ignition switch ON, selector lever: “L” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “L” range
C51-1-20	Transmission range switch “2” (A/T VEHICLE)	10 – 14 V	Ignition switch ON, selector lever: “2” range
		0 – 1 V	Ignition switch ON, selector lever: Other than “2” range
C51-2-1	EVAP canister purge valve	10 – 14 V	Ignition switch ON
C51-2-2	Ground	—	—
C51-2-3	Ignition switch	10 – 14 V	Ignition switch ON
C51-2-4	EGR valve (stepper motor coil 2) (if equipped)	10 – 14 V	Ignition switch ON
C51-2-5	EGR valve (stepper motor coil 1) (if equipped)	0 – 1 V	
C51-2-6	Fuel injector No.2	10 – 14 V	Ignition switch ON
C51-2-7	Fuel injector No.1		
C51-2-8, 9	Ground	—	—
	Ground	—	—
C51-2-10	Ignition coil assembly for No.4	—	—
C51-2-11	Ignition coil assembly for No.3	—	—
C51-2-12	Ignition coil assembly for No.2	—	—
C51-2-13	Ignition coil assembly for No.1	—	—

TERMINAL	CIRCUIT	NORMAL VOLTAGE	CONDITION
C51-2-14	IAC valve (stepper motor coil 2)	———	———
C51-2-15	IAC valve (stepper motor coil 1)	———	———
C51-2-16	EGR valve (stepper motor coil 4) (if equipped)	0 – 1 V	Ignition switch ON
C51-2-17	EGR valve (stepper motor coil 3) (if equipped)	10 – 14 V	
C51-2-18	Fuel injector No.4	10 – 14 V	Ignition switch ON
C51-2-19	Fuel injector No.3		
C51-2-20, 21	Power source	10 – 14 V	Ignition switch ON
C51-2-22	Ignition coil assembly for No.6	———	———
C51-2-23	Ignition coil assembly for No.5	———	———
C51-2-24	IAC valve (stepper motor coil 4)	———	———
C51-2-25	IAC valve (stepper motor coil 3)	———	———
C51-2-26	Engine start signal	6 – 14 V	While engine cranking
		0 – 1 V	Other than above
C51-2-27	Fuel injector No.6	10 – 14 V	Ignition switch ON
C51-2-28	Fuel injector No.5		

**NOTE:**

See page 6-7 for the applicable model.



### RESISTANCE CHECK

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

#### CAUTION:

**Never touch terminals of ECM itself or connect voltmeter or ohmmeter (2).**

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

#### CAUTION:

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

TERMINAL	CIRCUIT	STANDARD RESISTANCE	CONDITION
E61-1 – C51-2-3	Fuel pump relay (TYPE B only: See NOTE.)	70 – 110 Ω	—
E61-5 – C51-2-3	A/C condenser fan relay	75 – 110 Ω	Battery disconnected and ignition switch ON.
E61-8 – E61-35	Main relay	70 – 110 Ω	—
E61-12 – Body ground	Fuel level sensor	117.5 – 122.5 Ω	Fuel level is Empty.
		1.5 – 4.5 Ω	Fuel level is Full.
E61-20 – C51-2-3	Fuel pump relay (TYPE A only: See NOTE.)	70 – 110 Ω	—
C51-3-2 – C51-3-3	CKP sensor	485 – 655 Ω	—
C51-3-8 – C51-3-20	IAT sensor	2.09 – 2.81 kΩ	—
C51-3-22 – C51-3-21	ECT sensor	303 – 326 Ω	Engine coolant temp.: 80°C (176°F)

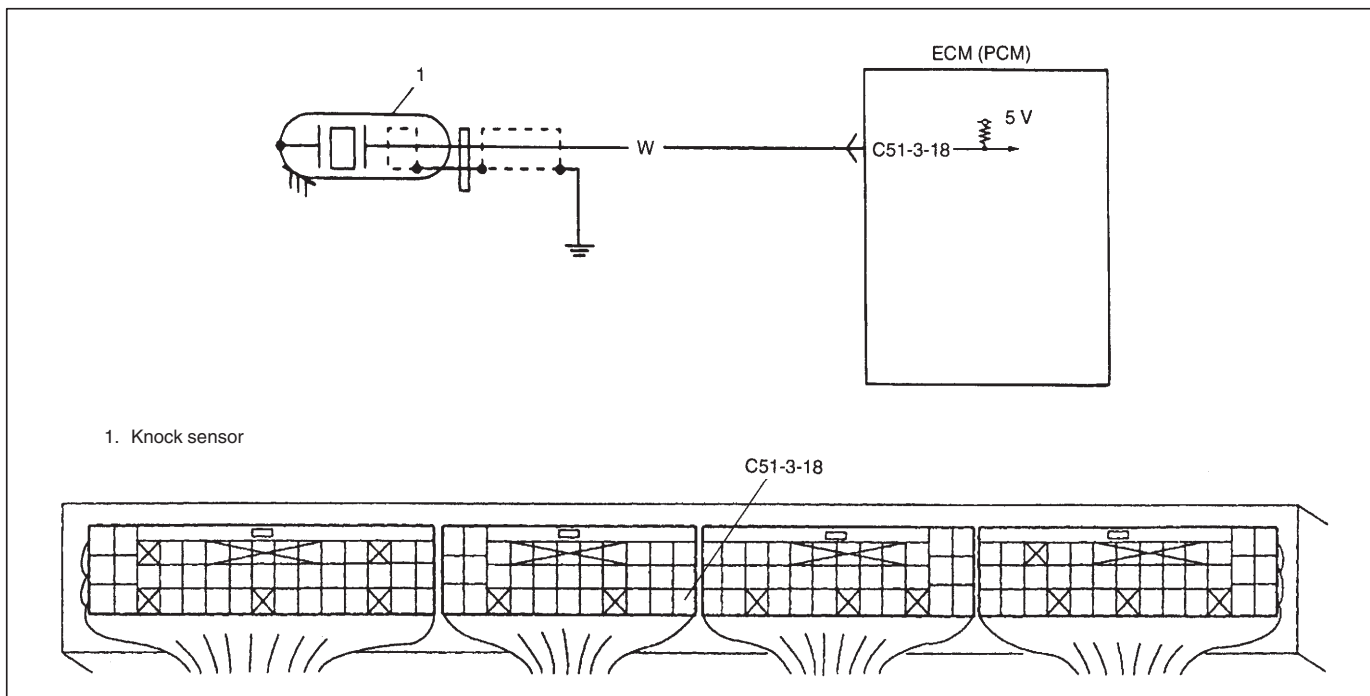
TERMINAL	CIRCUIT	STANDARD RESISTANCE	CONDITION
C51-1-1 – Body ground	Shift solenoid-B	11 – 15 $\Omega$	—
C51-1-2 – Body ground	TCC solenoid		
C51-1-6 – Body ground	Shift solenoid-A		
C51-1-8 – C51-1-16	A/T input speed sensor	560 – 680 $\Omega$	—
C51-1-9 – C51-1-10	A/T output speed sensor	369 – 451 $\Omega$	—
C51-2-1 – C51-2-20	EVAP canister purge valve	28 – 36 $\Omega$	—
C51-2-5 – C51-2-20	EGR valve (stepper motor coil 1)	20 – 24 $\Omega$	—
C51-2-4 – C51-2-20	EGR valve (stepper motor coil 2)		
C51-2-17 – C51-2-20	EGR valve (stepper motor coil 3)		
C51-2-16 – C51-2-20	EGR valve (stepper motor coil 4)		
C51-2-7 – C51-2-20	Fuel injector No.1	10 – 14 $\Omega$	—
C51-2-6 – C51-2-20	Fuel injector No.2		
C51-2-19 – C51-2-20	Fuel injector No.3		
C51-2-18 – C51-2-20	Fuel injector No.4		
C51-2-28 – C51-2-20	Fuel injector No.5		
C51-2-27 – C51-2-20	Fuel injector No.6		
C51-2-15 – C51-2-20	IAC valve (stepper motor coil 1)	21 – 23 $\Omega$	—
C51-2-14 – C51-2-20	IAC valve (stepper motor coil 2)		
C51-2-25 – C51-2-20	IAC valve (stepper motor coil 3)		
C51-2-24 – C51-2-20	IAC valve (stepper motor coil 4)		

**NOTE:**

See page 6-7 for the applicable model.

## DTC P0325 (DTC No.43) KNOCK SENSOR CIRCUIT MALFUNCTION

### CIRCUIT DESCRIPTION



DTC DETECTING CONDITION	TROUBLE AREA
<ul style="list-style-type: none"> <li>● Knock sensor output voltage: 3.98 V or more</li> <li>● Knock sensor output voltage: 0.90 V or less</li> </ul>	<ul style="list-style-type: none"> <li>● "W" circuit open or shorted to ground</li> <li>● Knock sensor malfunction</li> <li>● ECM malfunction</li> </ul>

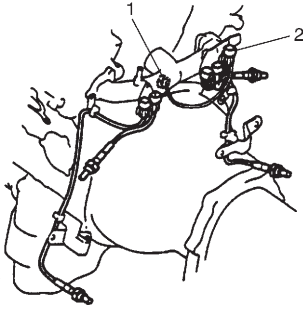
### DTC CONFIRMATION PROCEDURE

- 1) Connect scan tool to DLC with ignition OFF.
- 2) Turn ON ignition switch and clear DTC by using scan tool and run engine at idle speed for 5 sec. or more.
- 3) Check DTC by using scan tool.

### INSPECTION

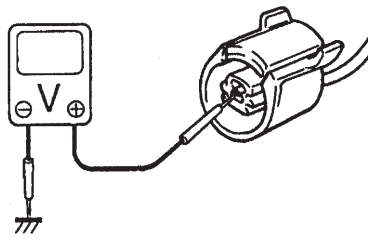
STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	1) With engine running, check voltage from C51-3-18 terminal of ECM connector to body ground. 2) Is voltage about 0.90 – 3.98 V?	Knock sensor and its circuit are in good condition. Intermittent trouble or faulty ECM. Recheck, referring to INTERMITTENT TROUBLE in Section 0A.	Go to Step 3.
3	1) Stop engine. 2) With ignition switch at OFF position, disconnect knock sensor connector. See Fig. 1. 3) With ignition switch at ON position, check voltage from "W" to body ground terminal of knock sensor connector. See Fig. 2. 4) Is it 4 – 5 V?	Substitute a known-good knock sensor and recheck.	"W" wire open, shorted to ground circuit or poor C51-3-18 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

Fig. 1 for Step 3



- 1. Knock sensor
- 2. Knock sensor connector

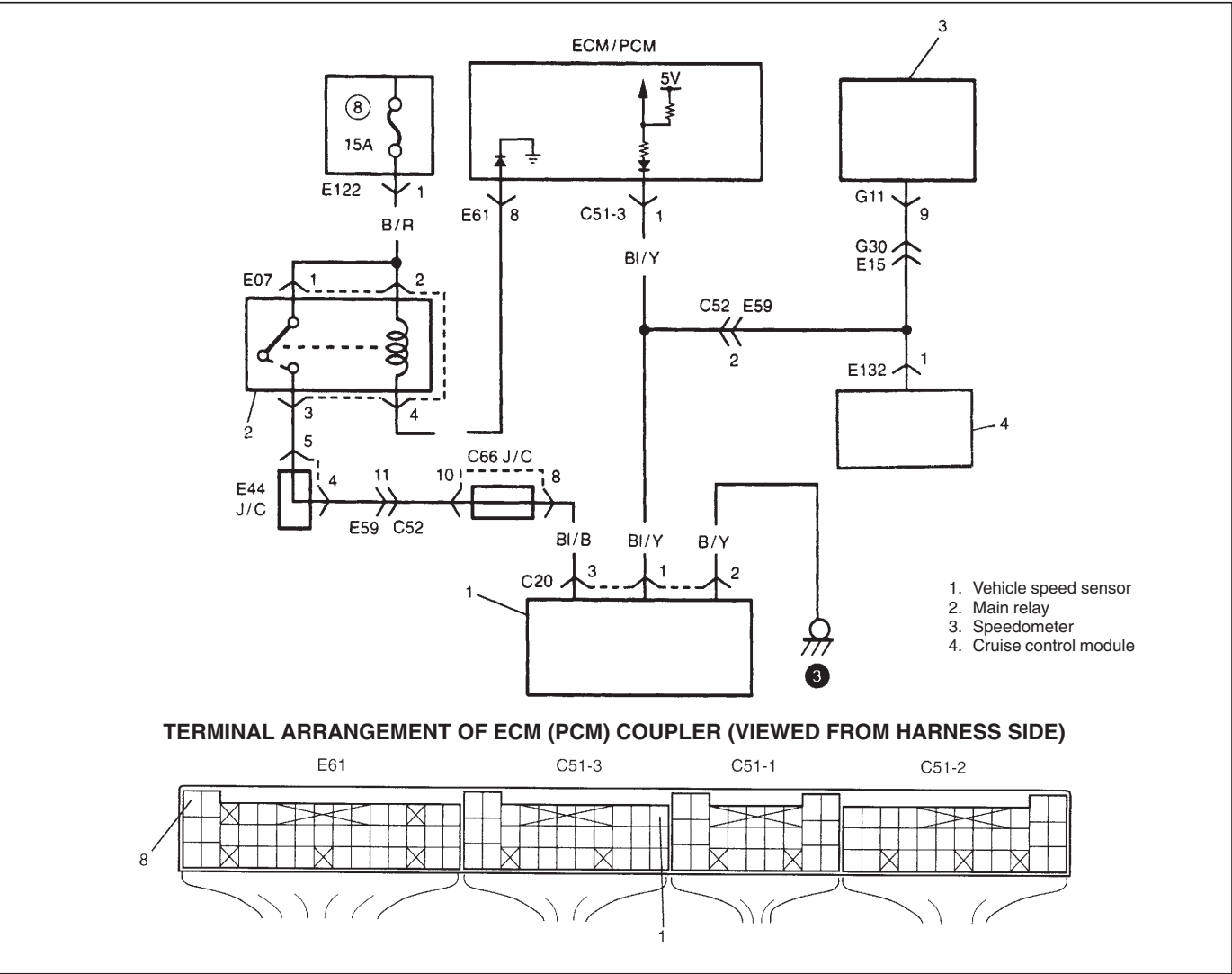
Fig. 2 for Step 3





DTC P0500 VEHICLE SPEED SENSOR MALFUNCTION  
(DTC No.24)

WIRING DIAGRAM



CIRCUIT DESCRIPTION

Refer to “ENGINE AND EMISSION CONTROL” section.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Vehicle speed sensor signal is not inputted while fuel is cut for 4 sec.	Vehicle speed sensor Vehicle speed sensor circuit Vehicle speed sensor driven gear Speedometer Cruise control module (if equipped) ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

Check to make sure that following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

**WARNING:**

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

- Intake air temperature: between  $-14^{\circ}\text{C}$  and  $70^{\circ}\text{C}$  ( $6.8^{\circ}\text{F}$  and  $158^{\circ}\text{F}$ )
- Atmospheric pressure: higher than 560 mmHg (Altitude: lower than 2790 m (9150 ft))

- (1) With ignition switch OFF, connect scan tool.
- (2) Turn ON ignition switch and clear DTC by using scan tool if any.
- (3) Start engine and warm up to normal operating temperature.
- (4) Increase vehicle speed till engine speed is reached 4000 r/min. in 3rd gear (M/T) or 2nd range (A/T).
- (5) Release accelerator pedal and with engine brake applied, keep vehicle coasting and then stop vehicle.
- (6) Check DTC by using scan tool.

**DTC TROUBLESHOOTING**

STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Does speedometer indicate vehicle speed?	Faulty "Bl/Y" wire, poor C51-3-1 connection or intermittent trouble. If OK, substitute a known-good ECM (PCM) and recheck.	Go to Step 3.
3	VSS Power Supply Voltage check: (1) Remove ECM (PCM) cover. (2) With ignition switch OFF, remove VSS coupler (1). (3) With ignition switch ON leaving engine OFF, check voltage between C20-3 and C20-2 terminal of VSS coupler. Is voltage 10 – 14 V?	Go to Step 4.	Faulty "B/Bl", "B/Y" wire.
4	VSS Signal Harness check: (1) With ignition switch ON leaving engine OFF, check voltage between C20-1 and C20-2 terminal of VSS coupler. Is voltage 4 V or more?	Go to Step 5.	Go to Step 6.
5	VSS Visual inspection: (1) Remove VSS (2) referring to "TRANSFER" section. (2) Check VSS drive gear (4) and driven gear (3) for damage and excessive wear. Are they in good condition?	Poor VSS connection. If OK, substitute a known-good VSS and recheck.	Replace VSS.

STEP	ACTION	YES	NO
6	Speedometer Circuit check: (1) With ignition switch OFF, disconnect G11 coupler from combination meter. (2) With ignition switch ON leaving engine OFF, check voltage between C20-1 and C20-2 terminal of VSS coupler. Is voltage 4 V or more?	Substitute a known-good combination meter and recheck.	Go to Step 7.
7	Cruise control module Circuit check: (1) With ignition switch OFF, disconnect E132 coupler from cruise control module. (2) With ignition switch ON leaving engine OFF, check voltage between C20-1 and C20-2 terminal of VSS coupler. (See Fig.) Is voltage 4 V or more?	Substitute a known-good cruise control module and recheck.	Faulty "Bl/Y" wire. If OK, substitute a known-good ECM (PCM) and recheck.

Fig. for STEP 3

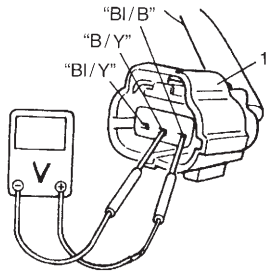


Fig. for STEP 4, 6, 7

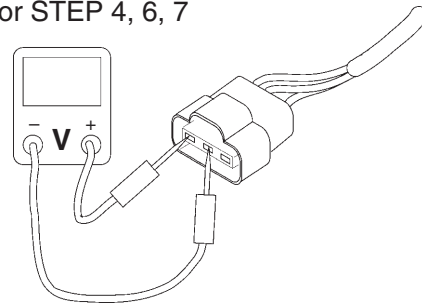
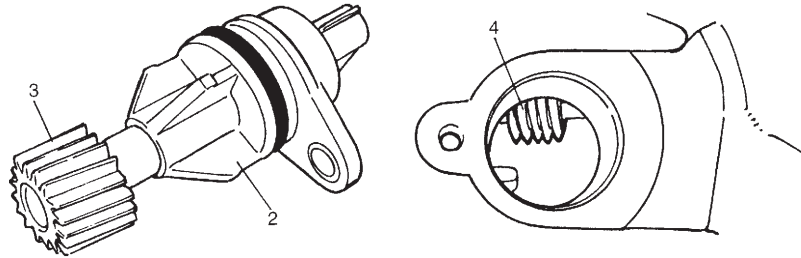
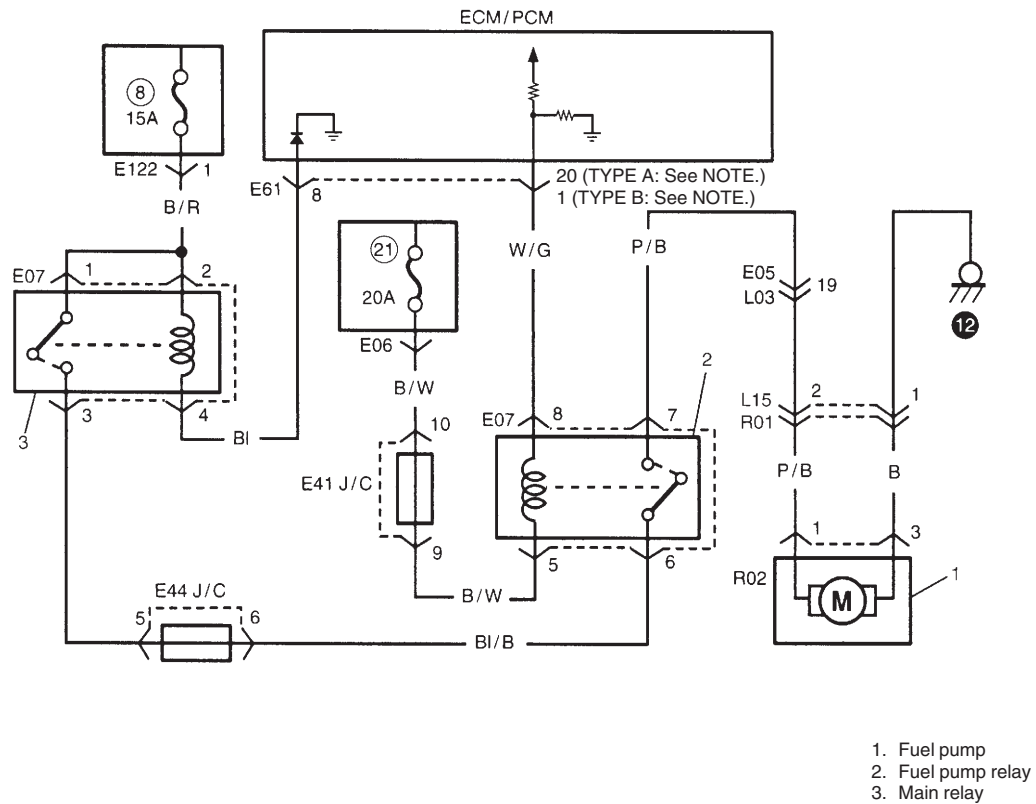


Fig. for STEP 5

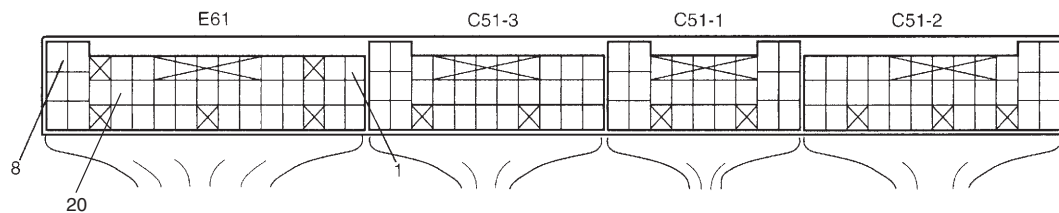


## TABLE B-1 FUEL PUMP CIRCUIT CHECK

### WIRING DIAGRAM



#### TERMINAL ARRANGEMENT OF ECM (PCM) COUPLER VIEWED FROM HARNESS SIDE



#### NOTE:

See page 6-7 for the applicable model.

#### CIRCUIT DESCRIPTION

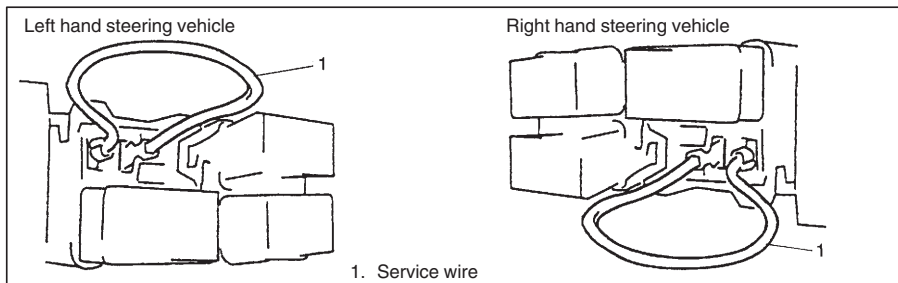
Fuel pump relay is turned ON

- for 3 sec. after ignition switch is turned ON
- while start engine signal is inputted.
- while engine is running.

**TROUBLESHOOTING**

STEP	ACTION	YES	NO
1	Fuel Pump Operation check: (1) Remove fuel filler cap. (2) Turn On ignition switch. Is fuel pump operation sound heard for 3 sec. after ignition switch ON?	Fuel pump circuit is in good condition.	Go to Step 2.
2	Fuel Pump Circuit check: (1) With ignition switch OFF, remove fuel pump relay from relay box. (2) Using service wire (1), connect E07-6 and E07-7. Is fuel pump operation sound heard with ignition switch ON?	Go to Step 3.	“BI/B”, “P/B” wire open. “B” wire open, poor 12 connection. Fuel pump malfunction.
3	Fuel Pump Relay check: (1) Check fuel pump relay referring to “ENGINE AND EMISSION CONTROL” section. Is it in good condition?	“B/W”, “W/G” wire open.	Faulty fuel pump relay.

Fig. for STEP 2



## SECTION 6A2

# ENGINE MECHANICAL (H25 ENGINE)

6A2

**WARNING:**

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

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

**NOTE:**

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

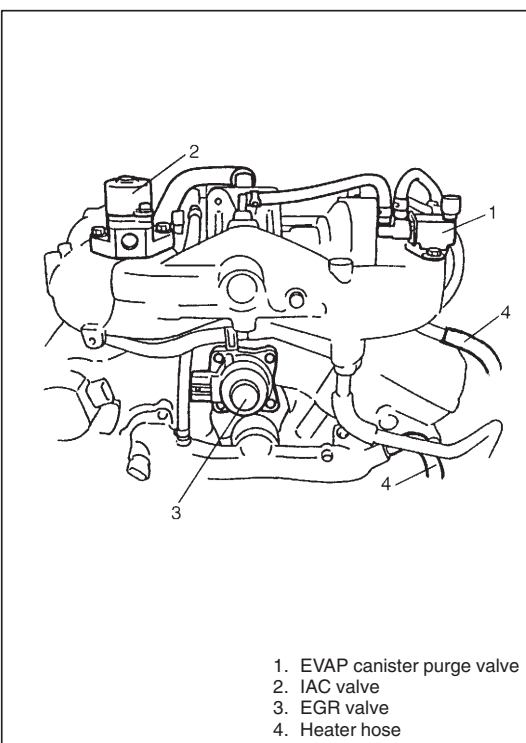
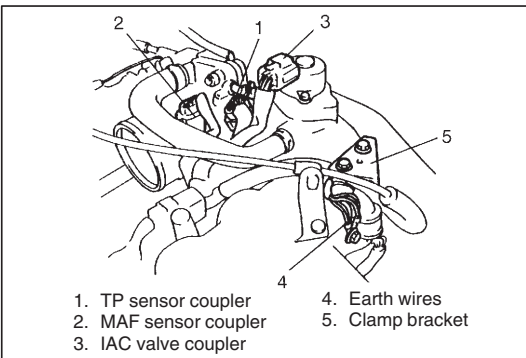
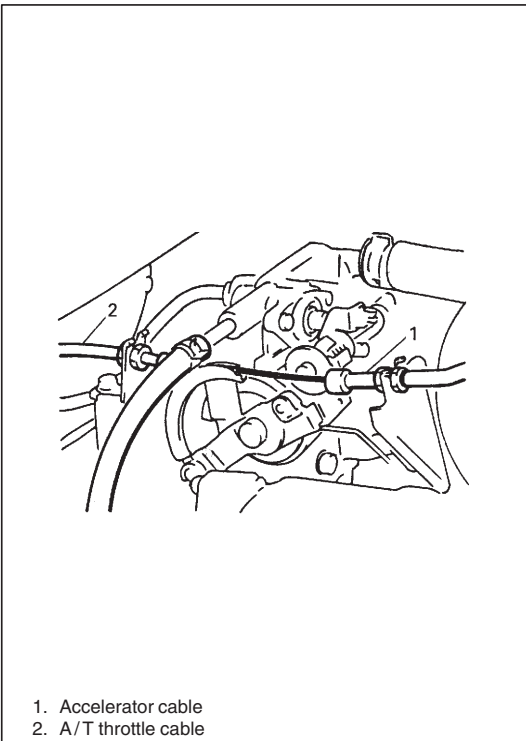
## CONTENTS

<b>UNIT REPAIR OVERHAUL</b> .....	6A2-2
Engine Assembly .....	6A2-2
Main Bearings, Crankshaft and Cylinder Block .....	6A2-5

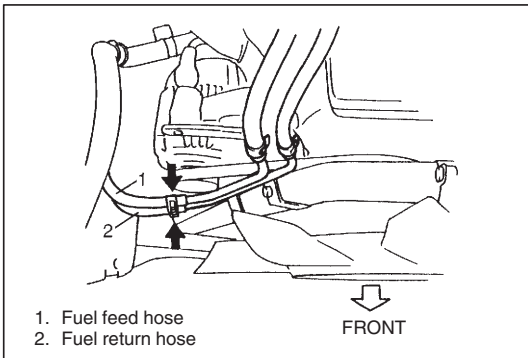
## UNIT REPAIR OVERHAUL

### ENGINE ASSEMBLY

#### REMOVAL

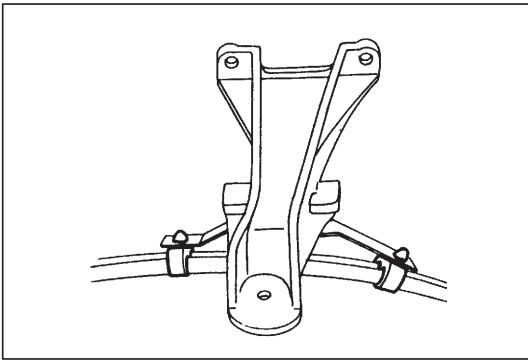


- 1) Release fuel pressure in fuel feed line.  
Refer to Section 6.
- 2) Disconnect negative cable at battery.
- 3) Remove engine hood.
- 4) Drain engine oil.
- 5) Drain coolant.
- 6) Remove radiator, radiator fan shroud, cooling fan and radiator reservoir. Refer to Section 6B for removal.
- 7) Disconnect accelerator cable and A/T throttle cable (for A/T vehicle) from throttle body.
- 8) Remove strut tower bar and surge tank cover.
- 9) Disconnect IAT sensor coupler then remove air cleaner upper case, intake air hose, intake air pipe and surge tank pipe as a component.
- 10) Remove engine oil level gauge guide and A/T fluid level gauge guide (for A/T vehicle).
- 11) Remove ignition coil covers.
- 12) Disconnect following electric lead wires:
  - Injector wire coupler
  - CMP sensor coupler
  - Ignition coil couplers
  - CKP sensor coupler
  - MAP sensor coupler
  - TP sensor coupler
  - MAF sensor coupler
  - IAC valve coupler
  - Knock sensor coupler (if equipped)
  - Earth wire from surge tank
  - EVAP canister purge valve coupler
  - EGR valve coupler
  - Oxygen sensor -1 and -2 couplers (Refer to "Exhaust Manifold" in this section for disconnection)
  - Coolant temperature sensor coupler
  - Generator wires
  - Startor wires
  - Oil pressure wire
  - P/S pump wire
  - Earth wire from generator bracket
- 13) Remove clamps and brackets.
- 14) Disconnect following hoses:
  - Heater hose from heater water pipe
  - Heater hose from water outlet cap
  - EVAP canister hose from canister pipe
  - Brake booster vacuum hose
  - Tank pressure control solenoid valve hose from intake manifold
- 15) Remove IAC valve and EVAP canister purge valve.

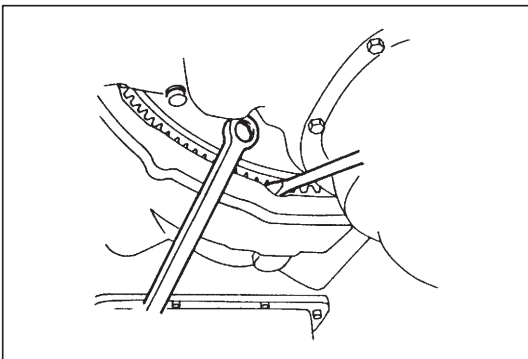


- 16) Disconnect following hoses at the location shown in figure:
  - Fuel feed hose from fuel feed pipe
  - Fuel return hose from fuel return pipe
- 17) Remove EVAP canister.

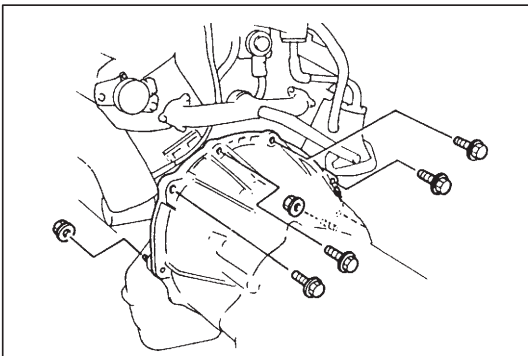
- 18) Remove P/S pump ass'y. Refer to Section 3B1 for details.
- 19) Remove A/C compressor ass'y. Refer to Section 1B for details.
- 20) Remove steering shaft lower assembly. Refer to Section 3C/3C1 for details.



- 21) Raise vehicle.
- 22) Remove front differential housing with differential from chassis if equipped. Refer to Section 7E for removal.
- 23) Remove exhaust No.1 pipe. Refer to item "EXHAUST MAN-IFOLD" in this section for removal.
- 24) Remove exhaust manifold stiffener from transmission.
- 25) Remove A/T fluid hose clamps from engine mounting bracket. (for A/T vehicle)

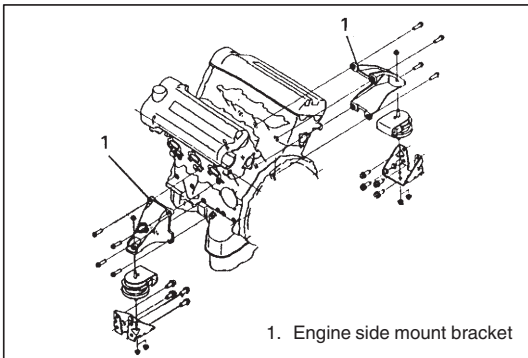


- 26) Remove clutch housing lower plate.
- 27) Remove torque converter bolts (for A/T vehicle).
- 28) Remove starter motor.
- 29) Lower vehicle.



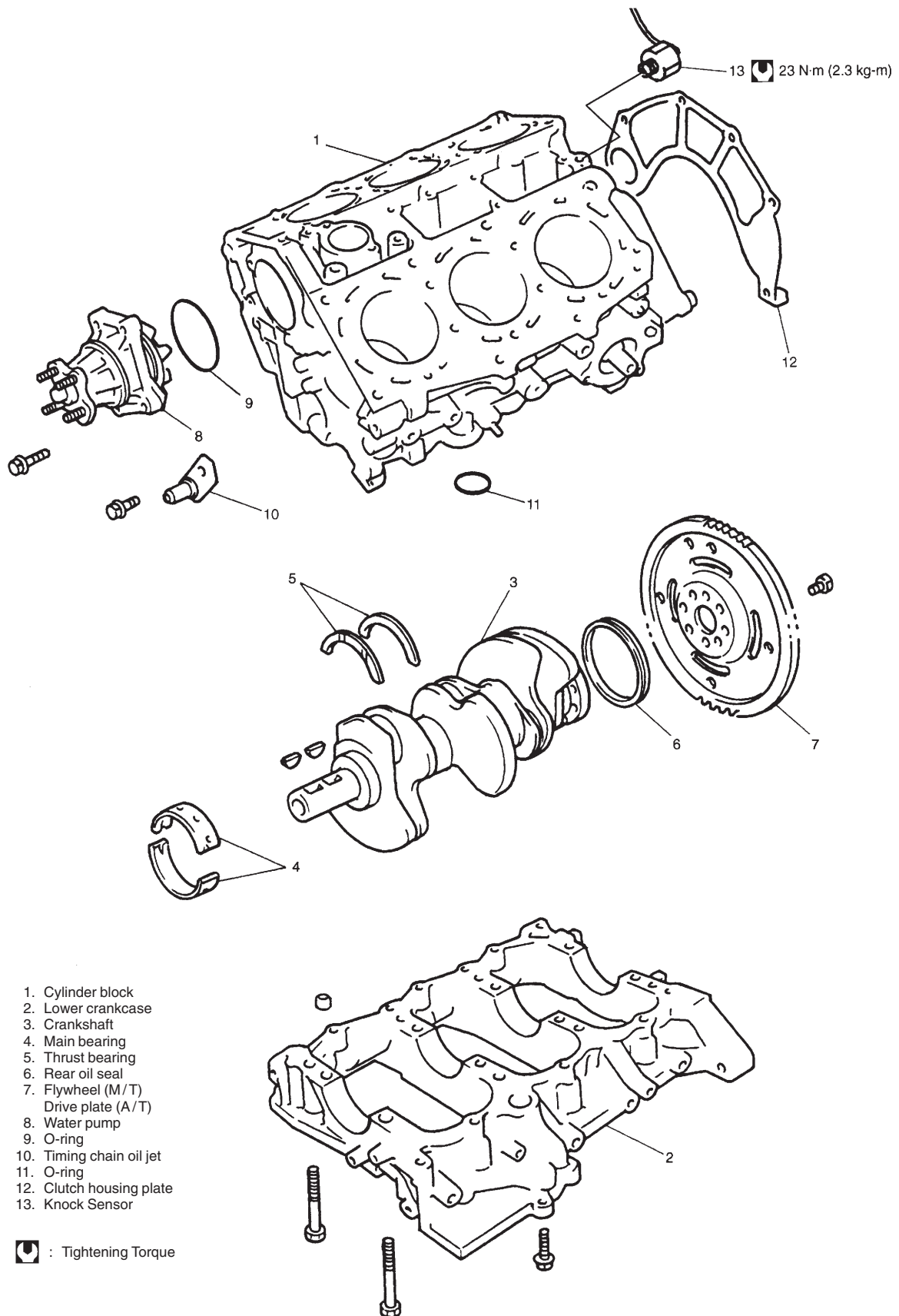
- 30) Support transmission. For A/T vehicle, don't jack under A/T oil pan to support transmission.
- 31) Remove bolts and nuts fastening cylinder block and transmission.

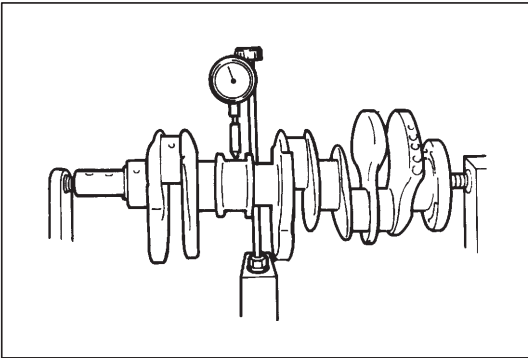




- 32) Install lifting device.
- 33) Disconnect engine side mounting brackets to engine mountings.
- 34) Before lifting engine, check to ensure all hoses, wires and cables are disconnected from engine.
- 35) Remove engine assembly from chassis and transmission by sliding toward front, and then, carefully hoist engine assembly.

# MAIN BEARINGS, CRANKSHAFT AND CYLINDER BLOCK



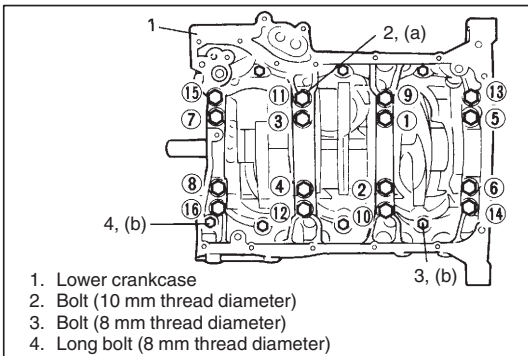


## INSPECTION

### Crankshaft runout

Using a dial gauge, measure runout at center journal. Rotate crankshaft slowly. If runout exceeds its limit, replace crankshaft.

**Limit on runout: 0.06 mm (0.0023 in.)**



### Crankshaft thrust play

Measure this play with crankshaft set in cylinder block in the normal manner, that is, with thrust bearing and journal bearing caps installed. Tighten crankcase bolts to specified torque in such order as indicated in figure.

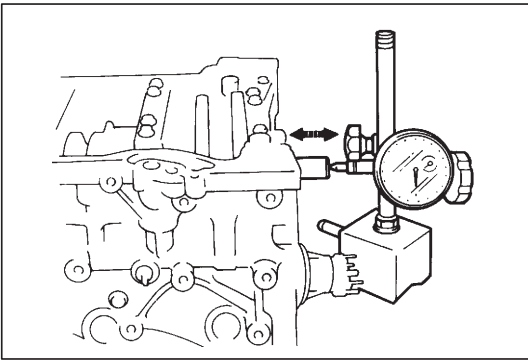
#### NOTE:

**Tighten 10 mm thread diameter bolts first (following the order shown in figure), then tighten 8 mm thread diameter bolts.**

#### Tightening Torque

**(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)**

**(b): 27 N·m (2.7 kg-m, 19.5 lb-ft)**



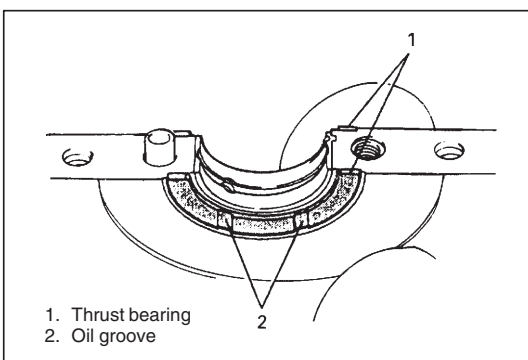
Use a dial gauge to read displacement in axial (thrust) direction of crankshaft.

If its limit is exceeded, replace thrust bearing with new standard one or oversize one to obtain standard thrust play.

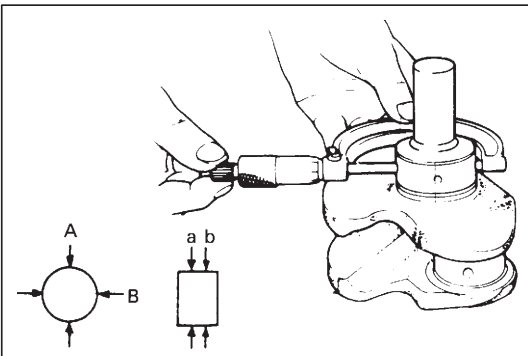
### Crankshaft Thrust Play

**Standard: 0.11 – 0.31 mm (0.0044 – 0.0122 in.)**

**Limit: 0.38 mm (0.0149 in.)**



Item	Thrust Bearing	
	Standard	Oversize 0.125 mm (0.0049 in.)
Thickness of crankshaft thrust bearing	2.500 mm (0.984 in.)	2.563 mm (0.1009 in.)



### Out-of-round and taper (uneven wear) of journals

An unevenly worn crankshaft journal shows up as a difference in diameter at a cross section or along its length (or both). This difference, if any, is determined by taking micrometer readings. If any one of journals is badly damaged or if amount of uneven wear in the sense explained above exceeds its limit, regrind or replace crankshaft.

**Limit on out-of-round and taper: 0.01 mm (0.0004 in.)**

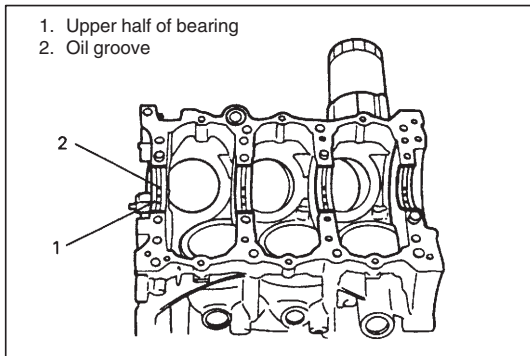
**Out-of-round: A – B**

**Taper: a – b**

## Main Bearings

### General information

- Service main bearings are available in standard size and 0.25 mm (0.0098 in.) undersize, and each of them has 5 kinds of bearings differing in tolerance.



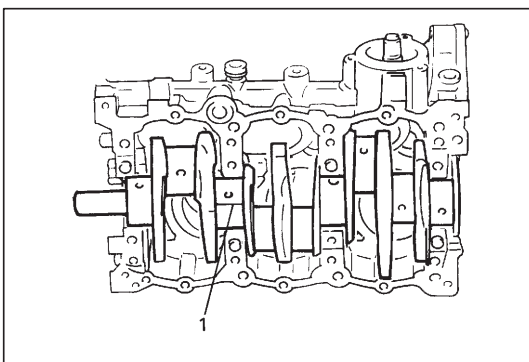
- Upper half of bearing has oil groove as shown in figure. Install this half with oil groove toward cylinder block.
- Lower half of bearing does not have oil groove.

### Inspect

Check bearings for pitting, scratches, wear or damage.

If any malfunction is found, replace both upper and lower halves.

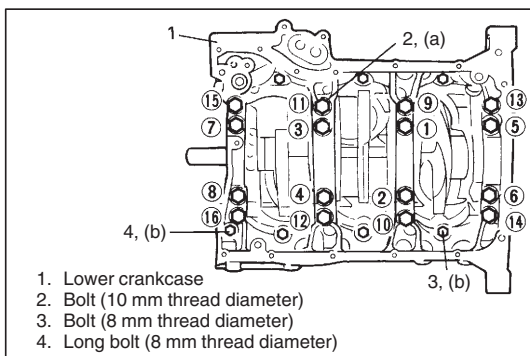
Never replace either half without replacing the other half.



### Main bearing clearance

Check clearance by using gaging plastic according to following procedure.

- 1) Remove crankcase.
- 2) Clean bearings and main journals.
- 3) Place a piece of gaging plastic to full width of bearing (parallel to crankshaft) on journal, avoiding oil hole.



- 4) Install crankcase to cylinder block.  
Tighten crankcase bolts, following sequence in figure. Tighten crankcase bolts to specified torque.

#### NOTE:

**Tighten 10 mm thread diameter bolts first (following the order shown in figure) then tighten 8 mm thread diameter bolts.**

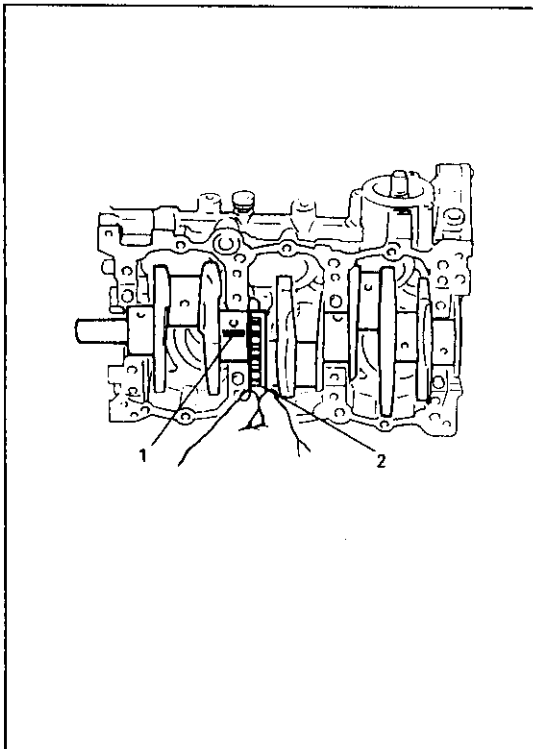
#### Tightening Torque

(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)

(b): 27 N·m (2.7 kg-m, 19.5 lb-ft)

#### NOTE:

**Do not rotate crankshaft while gaging plastic is installed.**



- 5) Remove crankcase and using scale on gaging plastic envelop, measure gaging plastic width at its widest point. If clearance exceeds its limit, replace bearing. Always replace both upper and lower inserts as a unit.

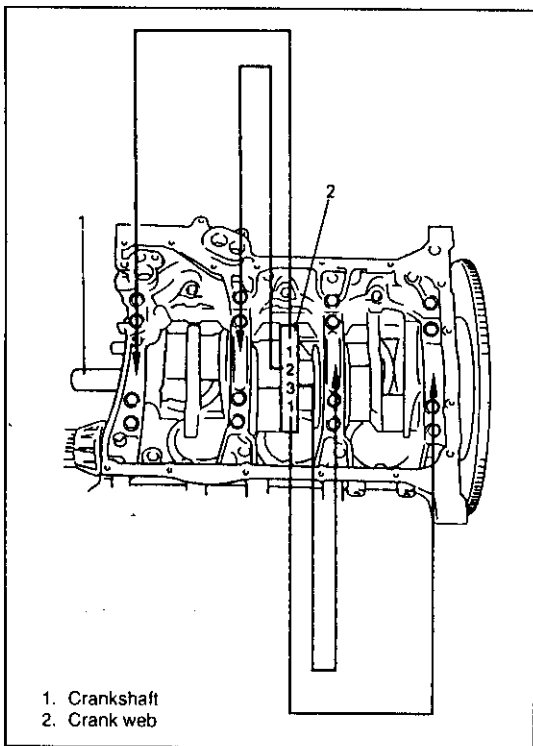
A new standard bearing may produce proper clearance. If not, it will be necessary to regrind crankshaft journal for use of 0.25 mm undersize bearing.

After selecting new bearing, recheck clearance.

#### Bearing Clearance

**Standard:** 0.024 – 0.044 mm (0.0009 – 0.0017 in.)

**Limit:** 0.060 mm (0.0023 in.)



1. Crankshaft  
2. Crank web

#### Selection of main bearings

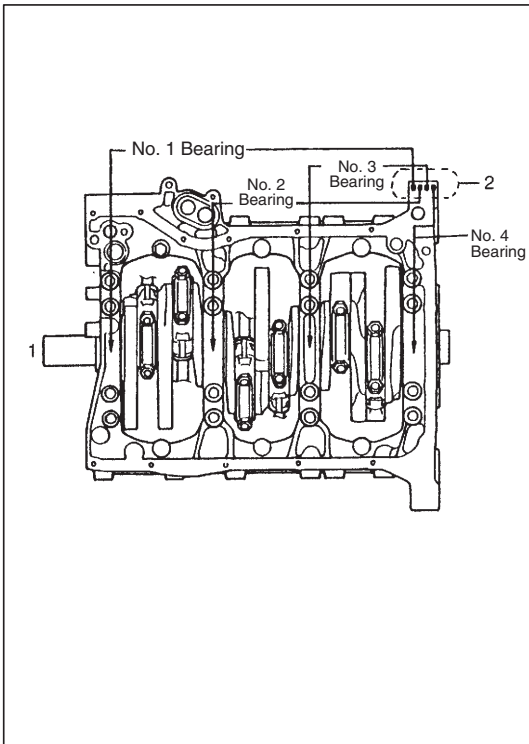
##### STANDARD BEARING:

If bearing is in malcondition, or bearing clearance is out of specification, select a new standard bearing according to following procedure and install it.

- 1) First check journal diameter. As shown in figure, crank web has stamped numbers and alphabet at the center.

Three kinds of numbers ("1", "2" and "3") represent following journal diameters.

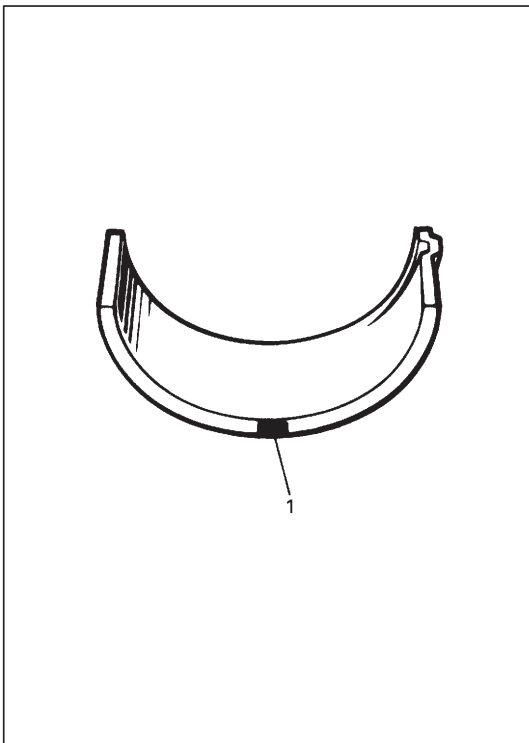
Stamped numbers	Journal diameter
1	65.000 – 65.006 mm (2.5590 – 2.5593 in.)
2	64.994 – 65.000 mm (2.5588 – 2.5590 in.)
3	64.988 – 64.994 mm (2.5586 – 2.5588 in.)



2) Next, check crankcase (bearing cap) bore diameter without bearing. On lower surface of lower crankcase 4 alphabets are stamped as shown in figure.

Three kinds of alphabets (A, B and C) represent following cap bore diameters.

Stamped alphabet	Bearing cap bore diameter (without bearing)
A	70.000 – 70.006 mm (2.7559 – 2.7561 in.)
B	70.006 – 70.012 mm (2.7561 – 2.7563 in.)
C	70.012 – 70.018 mm (2.7563 – 2.7566 in.)



3) There are five kinds of standard bearings differing in thickness. To distinguish them, they are painted in following colors at the position as indicated in figure.

Each color indicates following thickness at the center of bearing.

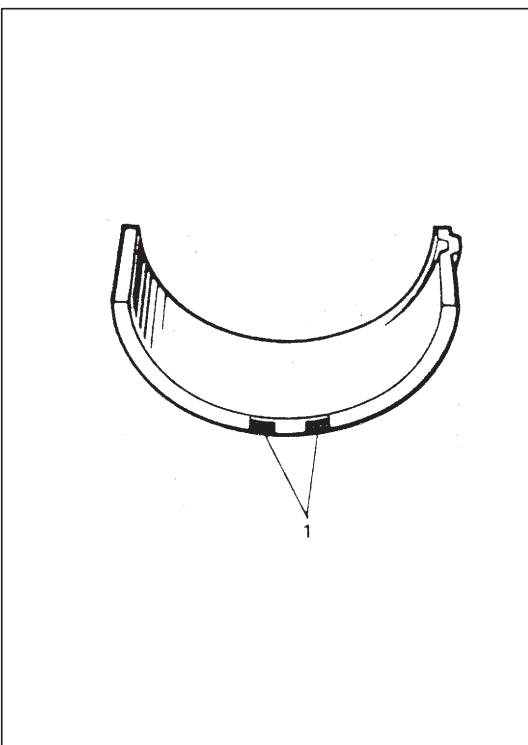
Color painted	Bearing thickness
Black	2.496 – 2.500 mm (0.0983 – 0.0984 in.)
Colorless (no paint)	2.499 – 2.503 mm (0.0984 – 0.0985 in.)
Yellow	2.502 – 2.506 mm (0.0985 – 0.0986 in.)
Blue	2.505 – 2.509 mm (0.0986 – 0.0987 in.)
Pink	2.508 – 2.512 mm (0.0987 – 0.0988 in.)

- 4) From number stamped on crank webs at its center and alphabets stamped on crankcase lower side, determine new standard bearing to be installed to journal, by referring to table shown below.

For example, if number stamped on crank webs is “1” and alphabet stamped on crankcase is “B”, install a new standard bearing painted in “Black” to its journal.

		Number stamped on crank web (Journal diameter)		
		1	2	3
Alphabet stamped on lower crankcase (Cap bore dia.)	A	Black	Colorless	Yellow
	B	Colorless	Yellow	Blue
	C	Yellow	Blue	Pink
		New standard bearing to be installed.		

- 5) Using gaging plastic, check bearing clearance with newly selected standard bearing.  
If clearance still exceeds its limit, use next thicker bearing and recheck clearance.
- 6) When replacing crankshaft or cylinder block and crank case due to any reason, select new standard bearings to be installed by referring to number stamped on new crankshaft or alphabets stamped on new crankcase lower side.



#### UNDERSIZE BEARING (0.25 mm):

- 0.25 mm undersize bearing is available, in five kinds varying in thickness.

To distinguish them, each bearing is painted in following colors at such position as indicated in figure.

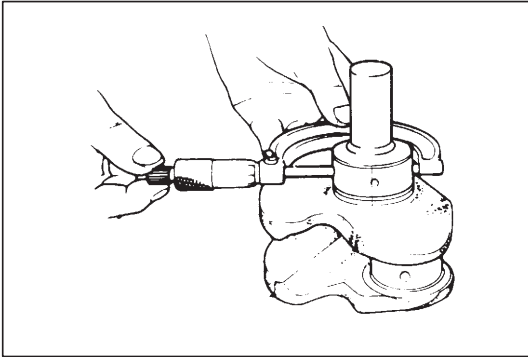
Each color represents following thickness at the center of bearing.

Color painted	Bearing thickness
Black & Red	2.621 – 2.625 mm (0.1032 – 0.1033 in.)
Red	2.624 – 2.628 mm (0.1033 – 0.1034 in.)
Red & Yellow	2.627 – 2.631 mm (0.1034 – 0.1035 in.)
Red & Blue	2.630 – 2.634 mm (0.1035 – 0.1036 in.)
Red & Pink	2.633 – 2.637 mm (0.1036 – 0.1037 in.)

- If necessary, regrind crankshaft journal and select undersize bearing to use with it as follows.

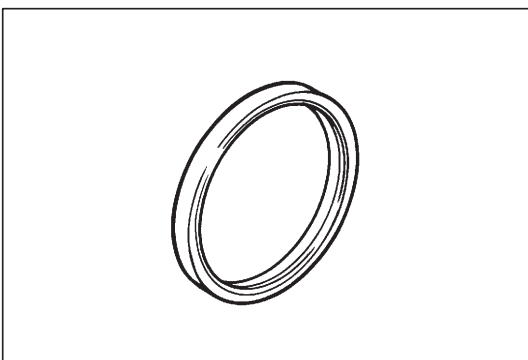
1) Regrind journal to following finished diameter.

**Finished diameter: 64.738 – 64.756 mm  
(2.5487 – 2.5494 in.)**



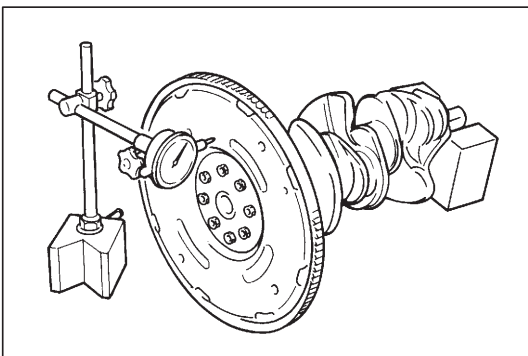
- 2) Using micrometer, measure reground journal diameter. Measurement should be taken in two directions perpendicular to each other in order to check for out-of-round.
- 3) Using journal diameter measured above and alphabets stamped on lower crankcase, select an undersize bearing by referring to table given below. Check bearing clearance with newly selected undersize bearing.

		Measured journal diameter		
		64.750 – 64.756 mm (2.5492 – 2.5494 in.)	64.744 – 64.750 mm (2.5489 – 2.5492 in.)	64.738 – 64.744 mm (2.5487 – 2.5489 in.)
Alphabets stamped on lower crankcase	A	Black & Red	Red	Red & Yellow
	B	Red	Red & Yellow	Red & Blue
	C	Red & Yellow	Red & Blue	Red & Pink
		Undersize bearing to be installed		



### Rear Oil Seal

Carefully inspect oil seal for wear or damage. If lip portion is worn or damaged, replace oil seal.

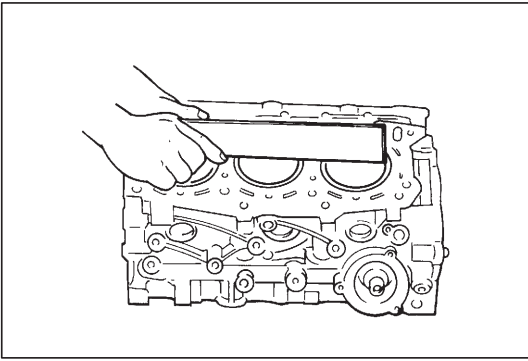


### Flywheel

- If ring gear is damaged, cracked or worn, replace flywheel.
- If the surface contacting clutch disc is damaged, or excessively worn, replace flywheel.
- Check flywheel for face runout with a dial gauge. If runout exceeds its limit, replace flywheel.

**Limit on runout: 0.2 mm (0.0078 in.)**



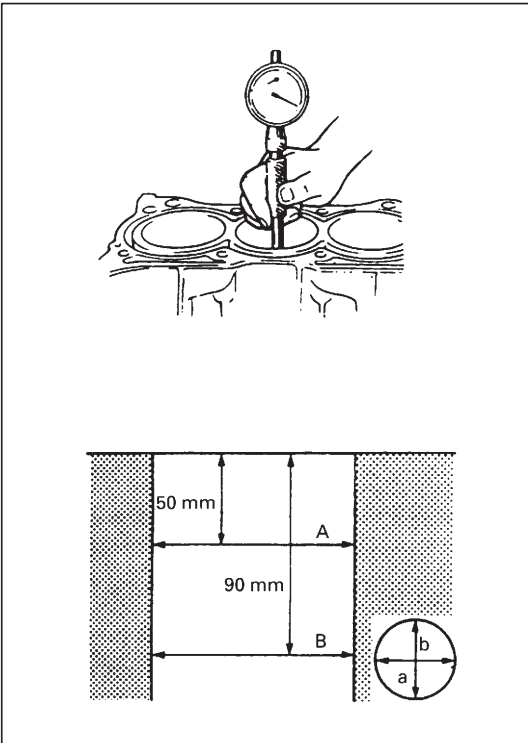


### Cylinder Block

#### Distortion of gasketed surface

- Using straightedge and thickness gauge, check gasketed surface for distortion and, if flatness exceeds its limit, correct it.

**Flatness Limit: 0.06 mm (0.0024 in.)**



#### Honing or reboring cylinders

- When any cylinder needs reboring, all other cylinders must also be rebored at the same time.
- Select oversized piston according to amount of cylinder wear.

Size	Piston diameter
STD	83.970 – 83.990 mm (3.3059 – 3.3067 in.)
O/S 0.50	84.470 – 84.490 mm (3.3256 – 3.3264 in.)

- Using micrometer, measure piston diameter.
- Calculate cylinder bore diameter to be rebored as follows.

$$D = A + B - C$$

D: Cylinder bore diameter to be rebored

A: Piston diameter as measured

B: Piston clearance = 0.02 – 0.04 mm  
(0.0008 – 0.0015 in.)

C: Allowance for honing = 0.02 mm  
(0.0008 in.)

- Rebore and hone cylinder to calculated dimension.

#### NOTE:

**Before reboring, install all main bearing caps in place and tighten to specification to avoid distortion of bearing bores.**

- Measure piston clearance after honing.

## SECTION 6E1

# ENGINE AND EMISSION CONTROL SYSTEM (SEQUENTIAL MULTIPOINT FUEL INJECTION FOR G16/J20 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).

6E1

**NOTE:**

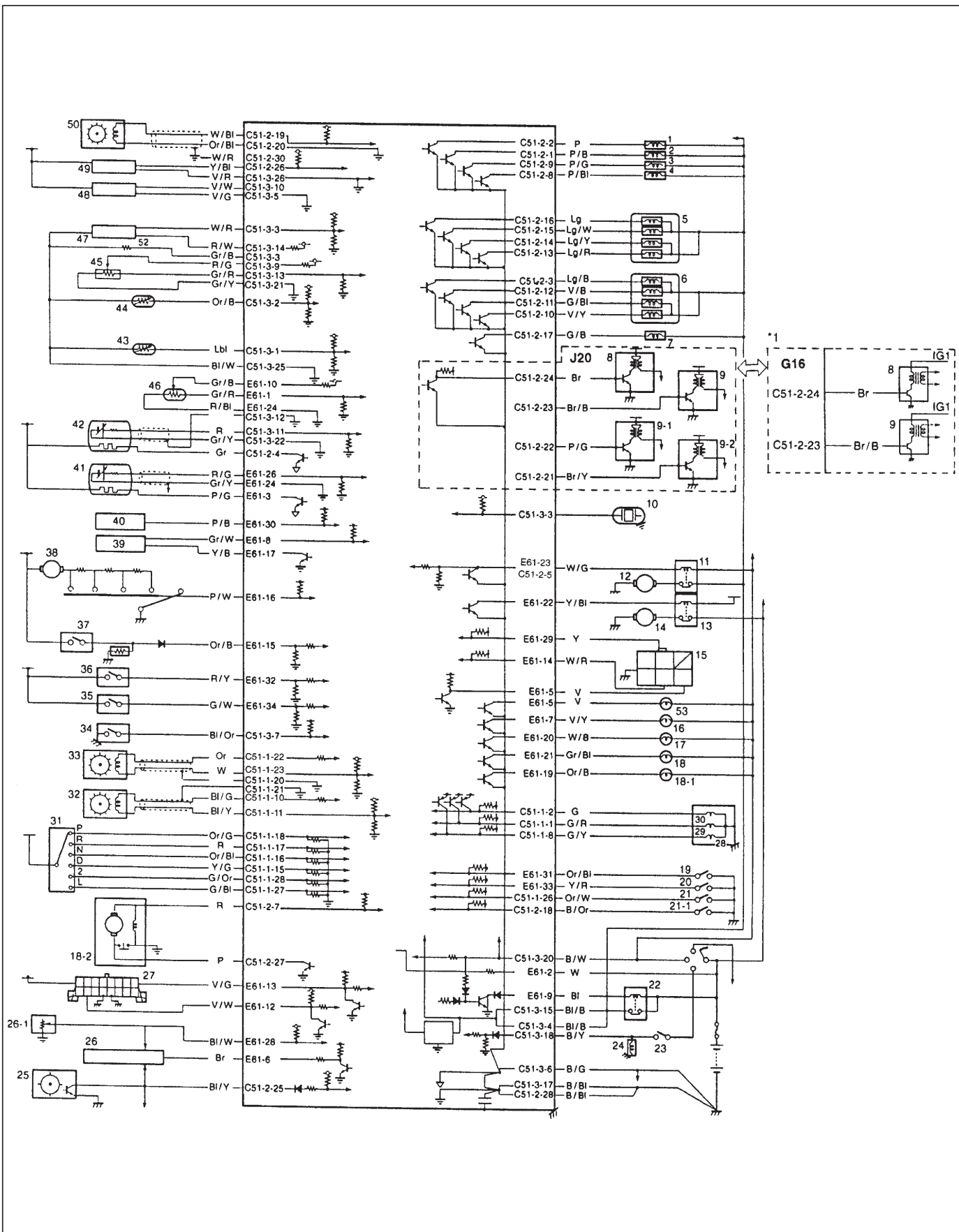
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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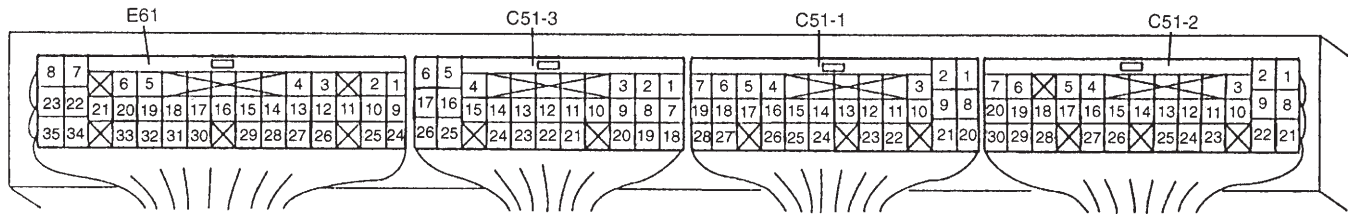
# GENERAL DESCRIPTION

## ELECTRONIC CONTROL SYSTEM



1. Fuel injector No.1
2. Fuel injector No.2
3. Fuel injector No.3
4. Fuel injector No.4
5. EGR valve (if equipped)
6. Idle air control (IAC) valve
7. EVAP canister purge valve
8. Ignition coil assembly for No.1 and No.4 spark plugs (G16)  
Ignition coil assembly for No.1 (J20)
9. Ignition coil assembly for No.2 and No.3 spark plugs (G16)  
Ignition coil for No.2 (J20)
- 9-1. Ignition coil for No.3 (J20)
- 9-2. Ignition coil for No.4 (J20)
10. Knock sensor (J20)
11. Fuel pump relay
12. Fuel pump
13. A/C condenser fan relay (if equipped)
14. A/C condenser fan motor (if equipped)
15. Monitor connector (if equipped)
16. Malfunction indicator lamp
17. "O/D OFF" lamp (A/T)
18. "POWER" lamp (A/T)
- 18-1. "4WD" lamp
- 18-2. 4WD air pump assembly
19. Power/Normal change switch (A/T)
20. O/D cut switch (A/T)
21. 4WD low switch
- 21-1. 4WD switch
22. Main relay
23. Transmission range switch (Park/Neutral position switch)
24. Starter magnetic switch
25. Vehicle speed sensor
26. Combination meter
- 26-1. Fuel level sensor
27. Data link connector
28. TCC solenoid (A/T)
29. Shift solenoid-B (A/T)
30. Shift solenoid-A (A/T)
31. Transmission range switch (sensor) (A/T)
32. A/T input speed sensor (A/T)
33. A/T vehicle (output) speed sensor (A/T)
34. Power steering pressure switch
35. Stop lamp switch (Brake pedal switch)
36. Lighting switch
37. Rear defogger switch (if equipped)
38. Heater blower motor (if equipped)
39. A/C control module (Amplifier) (if equipped)
40. ABS control module (if equipped)
41. Heated oxygen sensor-1 (if equipped)
42. Heated oxygen sensor-2 (if equipped)
43. Intake air temp. sensor
44. Engine coolant temp. sensor
45. Throttle position sensor
46. CO adjusting resistor (if equipped)
47. Manifold absolute pressure sensor (if equipped)
48. Mass air flow sensor
49. Camshaft position sensor
50. Crankshaft position sensor (if equipped)
51. Engine control module (Powertrain control module)
52. Ignition timing adjusting resistor (if equipped)
53. Immobilizer indicator lamp

### TERMINAL ARRANGEMENT OF ECM (PCM) CONNECTOR (VIEWED FROM HARNESS SIDE)



TERMINAL	CIRCUIT	TERMINAL	CIRCUIT	TERMINAL	CIRCUIT
E61	1 Power source for CO adjusting resistor	C51-3	5 Ground for MAF sensor	C51-1	22 A/T output speed sensor (-)
	2 Power source for back up		6 Ground		23 A/T output speed sensor (+)
	3 Heater of HO2S-2 (if equipped)		7 Power steering pressure switch		24-25 —
	4 —		8 Manifold absolute pressure (MAP) sensor		26 4WD low switch
	5 Duty output terminal (if equipped)		9 Throttle position (TP) sensor		27 Transmission range switch "L" (A/T)
	6 Tachometer		10 Mass air flow (MAF) sensor		28 Transmission range switch "2" (A/T)
	7 MIL		11 Heated oxygen sensor-1 (if equipped)	C51-2	1 Fuel injector No.2
	8 A/C cut signal (if equipped)		12 Ground for HO2S-1 shield wire		2 Fuel injector No.1
	9 Main relay		13 Power source for TP sensor		3 IAC valve (stepper motor coil 1)
	10 CO adjusting resistor (if equipped)		14 Power source for MAP sensor		4 Heater of HO2S-1
	11-12 —		15 Power source		5 Fuel pump relay (TYPE A only: See NOTE.)
	13 Data link connector		16 —		6 —
	14 Test switch terminal (if equipped)		17 Ground		7 4WD air pump assembly (if equipped)
	15 Rear defogger switch (if equipped)		18 Engine start signal		8 Fuel injector No.4
	16 Heater blower switch		19 —		9 Fuel injector No.3
	17 A/C signal (if equipped)		20 Ignition switch		10 IAC valve (stepper motor coil 4)
	18 —		21 Ground for TP sensor		11 IAC valve (stepper motor coil 3)
	19 "4WD" lamp (4WD)		22 Ground for HO2S-1		12 IAC valve (stepper motor coil 2)
	20 "O/D OFF" lamp (A/T)		23 —		13 EGR valve (stepper motor coil 4)
	21 "POWER" lamp (A/T)		24 —		14 EGR valve (stepper motor coil 3)
	22 A/C fan motor relay (if equipped)		25 Ground for IAT sensor, ECT sensor MAP sensor and/or Ignition timing adjusting resistor		15 EGR valve (stepper motor coil 2)
	23 Fuel pump relay (TYPE B only: See NOTE.)		26 Ground for CMP sensor		16 EGR valve (stepper motor coil 1)
	24 Ground for HO2S-2	C51-1			17 EVAP canister purge valve
	Ground for CO adjusting resistor		1 Shift solenoid-B (A/T)		18 4WD switch (if equipped)
	25 —		2 Shift solenoid-A (A/T)		19 CKP sensor (+)
	26 Heated oxygen sensor-2 (if equipped)		3-7 —		20 CKP sensor (-)
	27 —		8 TCC solenoid (A/T)		21 Ignition coil assembly for No.4 (J20)
	28 Fuel level sensor		9 —		22 Ignition coil assembly for No. 3 (J20)
	29 Diagnosis switch terminal (if equipped)		10 A/T input speed sensor (-)		23 Ignition coil assembly for No.2 and No.3 spark plugs (G16)
	30 ABS control module (if equipped)		11 A/T input speed sensor (+)		
	31 Power/Normal change switch (A/T)		12-14 —	24 Ignition coil assembly for No.1 and No.4 spark plugs (G16)	Ignition coil assembly for No.1 (J20)
	32 Lighting switch		15 Transmission range switch "D" (A/T)		
	33 O/D cut switch (A/T)		16 Transmission range switch "N" (A/T)	25 Vehicle speed sensor	26 CMP sensor (+)
	34 Stop lamp switch (Brake pedal switch)		17 Transmission range switch "R" (A/T)		
	35 —		18 Transmission range switch "P" (A/T)		
C51-3			19 —		
	1 Intake air temp. sensor		20 Shield wire ground for A/T output speed sensor		
	2 Engine coolant temp. sensor		21 Shield wire ground for A/T input speed sensor		
	3 Knock sensor (J20)			27 Pressure switch in 4WD air pump assembly (if equipped)	
	Ignition timing adjusting resistor (G16, if equipped)			28 Ground	
	4 Power source			29 Ground for DLC	
				30 Ground for CKP sensor shield wire	

#### NOTE:

See page 6-7 for the applicable model.

SECTION 6E2

ENGINE AND EMISSION CONTROL SYSTEM  
(SEQUENTIAL MULTIPOINT FUEL INJECTION FOR  
H25 ENGINE)

**WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System

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

6E2

**NOTE:**

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

CONTENTS

GENERAL DESCRIPTION .....	6E2-2
ELECTRONIC CONTROL SYSTEM .....	6E2-4
ENGINE & EMISSION CONTROL INPUT/OUTPUT TABLE .....	6E2-8
ON VEHICLE SERVICE	
ELECTRONIC CONTROL SYSTEM .....	6E2-9
Knock sensor .....	6E2-9

## GENERAL DESCRIPTION

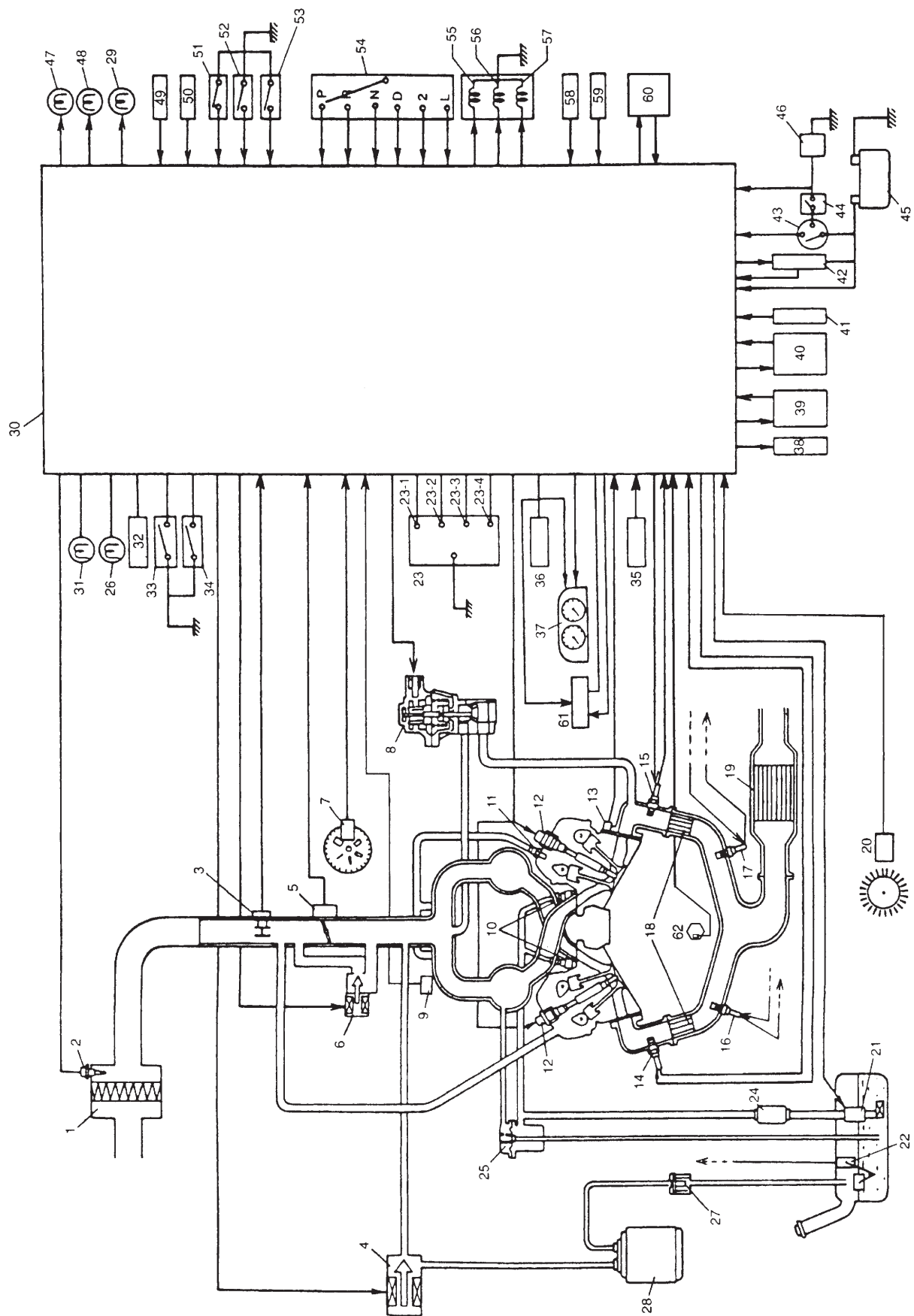
The engine and emission control system has 4 major sub-systems: air intake system, fuel delivery system, electronic control system and emission control system.

Air intake system includes air cleaner, mass air flow sensor, throttle body, idle air control valve and intake manifold.

Fuel delivery system includes fuel pump, delivery pipe, fuel pressure regulator, fuel injectors, etc.

Electronic control system includes ECM (PCM), various sensors and controlled devices.

Emission control system includes EGR, EVAP and PCV systems.





1. Air cleaner		
2. Intake air temp. sensor		
3. Mass air flow sensor		
4. EVAP canister purge valve		
5. Throttle position sensor		
6. Idle air control valve		
7. Camshaft position sensor		
8. EGR valve (if equipped)		
9. Manifold absolute pressure sensor (if equipped)		
10. Fuel injector		
11. PCV valve		
12. Ignition coil assembly		
13. Engine coolant temp. sensor		
14. Heated oxygen sensor (bank 1 sensor 1) (if equipped)		
15. Heated oxygen sensor (bank 2 sensor 1) (if equipped)		
16. Heated oxygen sensor (bank 1 sensor 2) (if equipped)		
17. Heated oxygen sensor (bank 2 sensor 2) (if equipped)		
18. Warm-up three way catalytic converter (if equipped)		
19. Three way catalytic converter (if equipped)		
20. Crank shaft position sensor (if equipped)		
21. Fuel pump		
22. Fuel level sensor		
23. Monitor connector (if equipped)		
23-1. Diag. switch terminal (if equipped)		
23-2. Test switch terminal (if equipped)		
23-3. Output duty select switch terminal (if equipped)		
23-4. Duty output terminal (if equipped)		
24. Fuel filter		
25. Fuel pressure regulator		
26. Immobilizer indicator lamp (if equipped)		
27. Tank pressure control valve		
28. EVAP canister		
29. 4WD lamp		
30. ECM/PCM (Engine control module/Powertrain control module)		
31. Malfunction indicator lamp		
32. Electric load		
– Rear defogger (if equipped)		
33. Power steering pressure switch (if equipped)		
34. Heater blower fan switch		
35. 4WD switch		
36. Vehicle speed sensor		
37. Combination meter		
38. A/C condenser fan relay (if equipped)		
39. A/C controller (if equipped)		
40. Data link connector/Immobilizer control module (if equipped)		
41. ABS control module (if equipped)		
42. Main relay		
43. Ignition switch		
44. Park/Neutral position switch in TR switch		(A/T)
45. Battery		
46. Starter magnetic switch		
47. "O/D OFF" lamp		(A/T)
48. "POWER" lamp		(A/T)
49. Lighting switch		
50. Stop lamp switch		(A/T)
51. O/D cut switch		(A/T)
52. POWER/NORMAL change switch		(A/T)
53. 4WD low switch		(A/T)
54. Transmission range switch		(A/T)
55. Solenoid valve A		(A/T)
56. Solenoid valve B		(A/T)
57. TCC solenoid valve		(A/T)
58. A/T input speed sensor		(A/T)
59. A/T vehicle (output) speed sensor		(A/T)
60. 4WD actuator		
61. Cruise control module (if equipped)		
62. Knock sensor (if equipped)		

## ELECTRONIC CONTROL SYSTEM

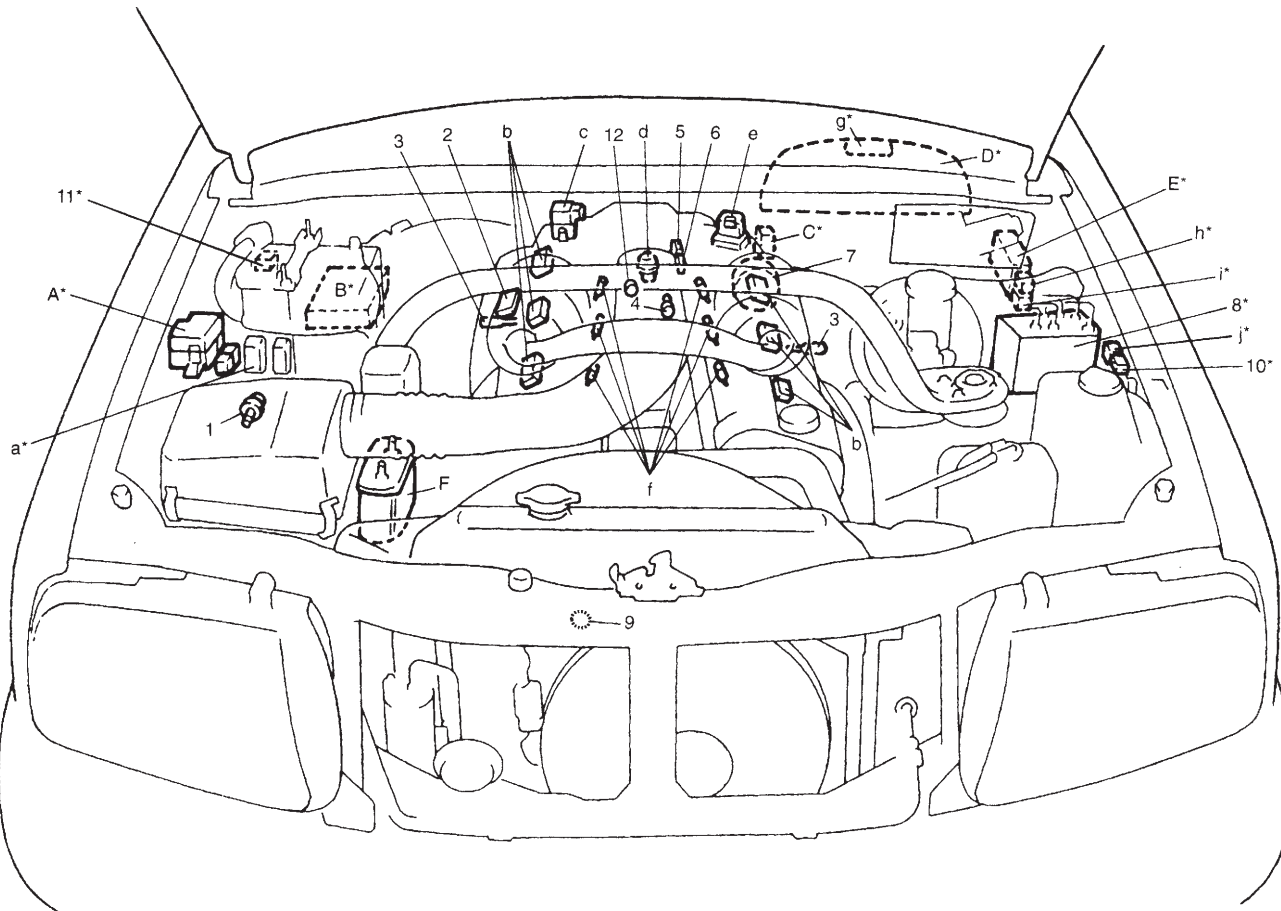
The electronic control system consists of 1) various sensors which detect the state of engine and driving conditions, 2) ECM (PCM) which controls various devices according to the signals from the sensors and 3) various controlled devices.

Functionally, it is divided into the following sub systems:

- Fuel injection control system
- Heated oxygen sensor heater control system (if equipped)

- Idle air control system
- Fuel pump control system
- Evaporative emission control system
- Ignition control system
- EGR system

Also, with A/T model, PCM controls A/T.



### INFORMATION SENSORS

1. IAT sensor
2. MAP sensor (if equipped)
3. Heated oxygen sensor (sensor 1) (if equipped)
4. ECT sensor
5. TP sensor
6. MAF sensor
7. Camshaft position sensor (CMP sensor)
8. ABS control module (if equipped)
9. Crank shaft position sensor (CKP sensor) (if equipped)
10. Monitor connector (if equipped)
11. CO adjusting resistor (if equipped)
12. Knock sensor (if equipped)

### CONTROLLED DEVICES

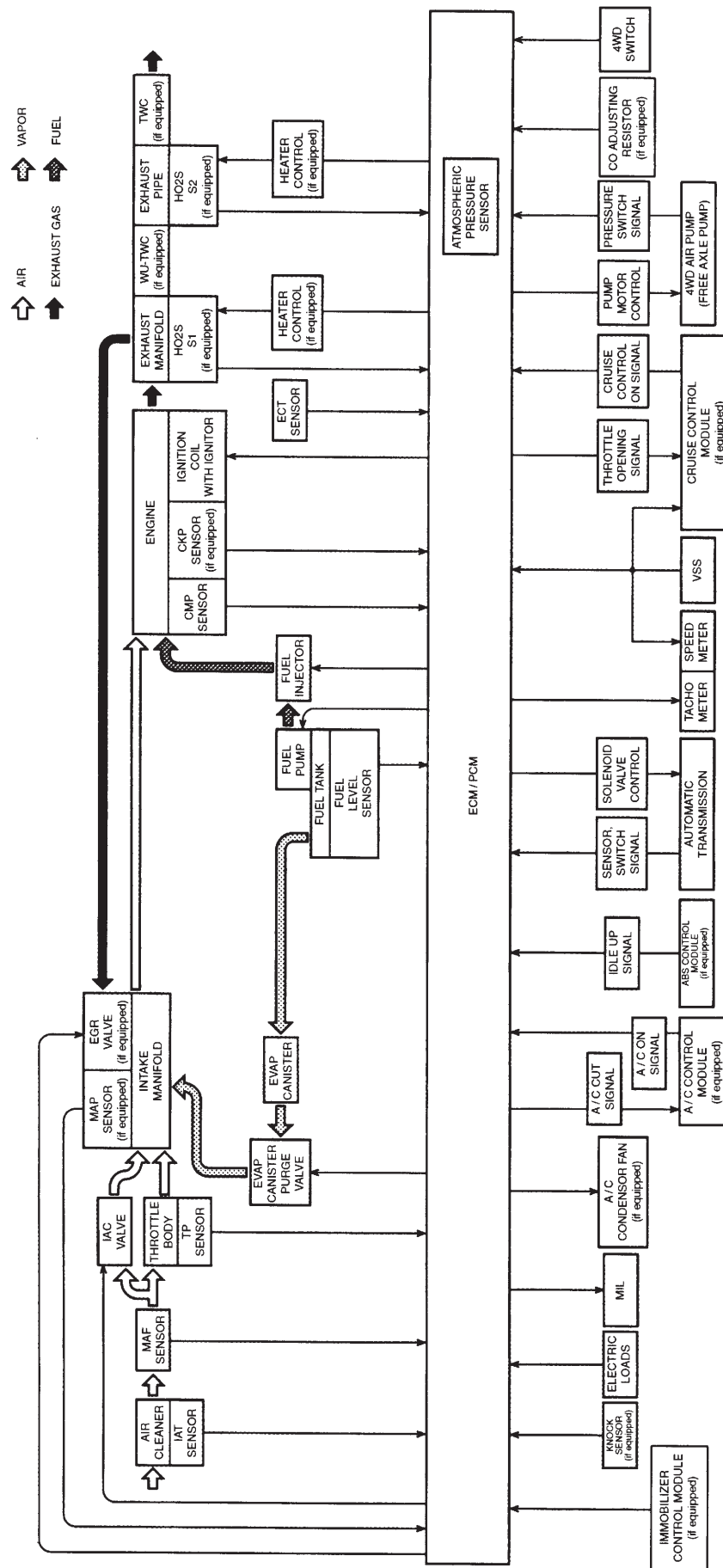
- a : A/C condenser fan motor relay (if equipped)
- b : Ignition coil assemblies
- c : EVAP canister purge valve
- d : EGR valve (if equipped)
- e : Idle air control valve
- f : Injectors
- g : Malfunction indicator lamp
- h : Fuel pump relay
- i : Main relay
- j : Oxygen sensor heater relay (if equipped)

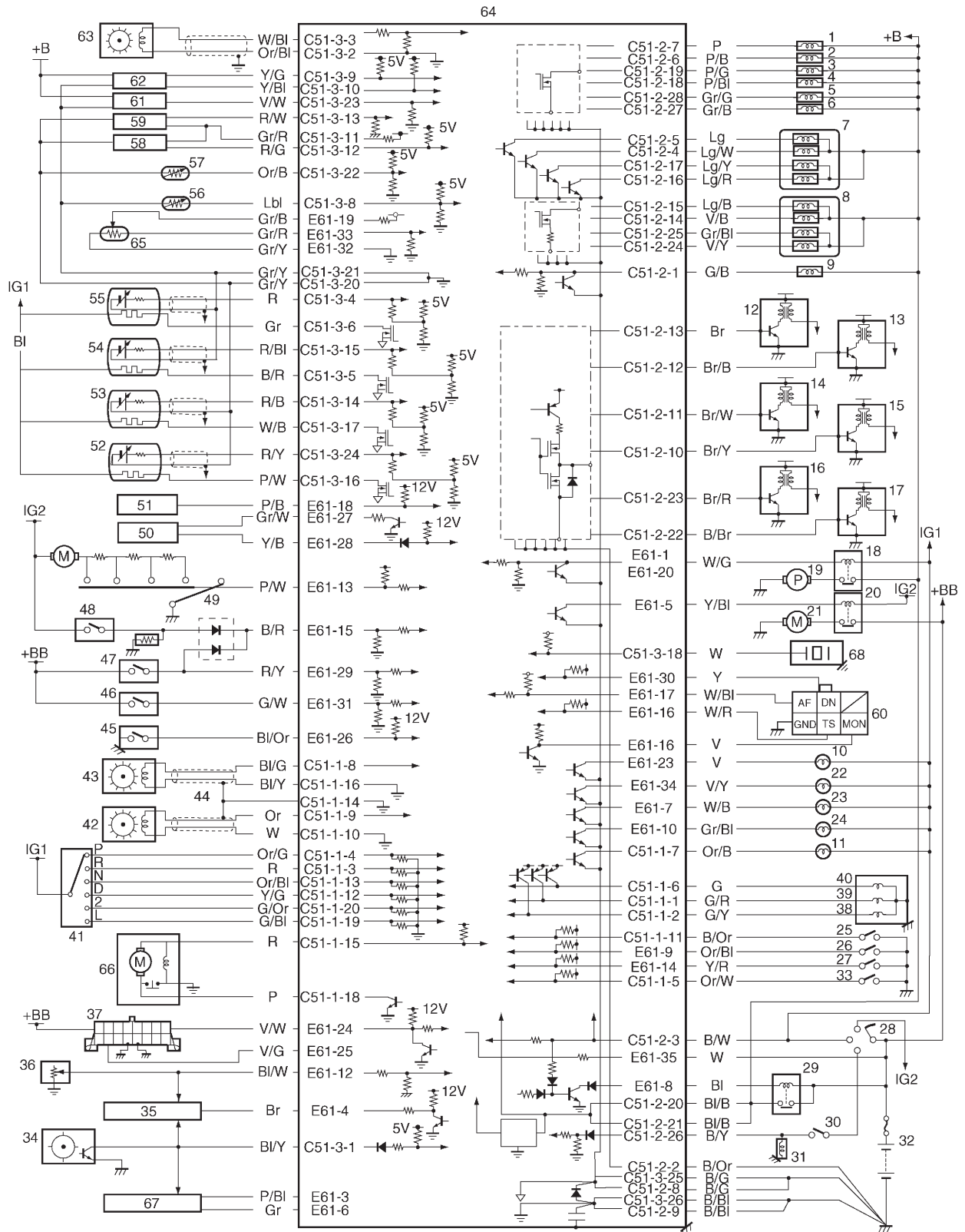
### OTHERS

- A : Main fuse box
- B : ECM (PCM)
- C : Data link connector
- D : Combination meter
- E : Fuse box
- F : EVAP canister

### NOTE:

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





TERMINAL ARRANGEMENT OF ECM (PCM) CONNECTOR (VIEWED FROM HARNESS SIDE)

E61

C51-3

C51-1

C51-2

8	7	6	5	4	3	2	1	6	5	4	3	2	1	4	3	2	1	7	6	5	4	3	2	1
23	22	21	20	19	18	17	16	15	14	13	12	11	10	9	13	12	11	10	9	8	7	6	5	4
35	34	33	32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17	16	15	14	13	12	11

1. Fuel injector No.1
2. Fuel injector No.2
3. Fuel injector No.3
4. Fuel injector No.4
5. Fuel injector No.5
6. Fuel injector No.6
7. EGR valve (if equipped)
8. Idle air control (IAC) valve
9. EVAP canister purge valve
10. Immobilizer indicator lamp
11. 4WD lamp
12. Ignition coil assembly for No.1 spark plug
13. Ignition coil assembly for No.2 spark plug
14. Ignition coil assembly for No.3 spark plug
15. Ignition coil assembly for No.4 spark plug
16. Ignition coil assembly for No.5 spark plug
17. Ignition coil assembly for No.6 spark plug
18. Fuel pump relay
19. Fuel pump
20. A/C condenser fan relay (if equipped)
21. A/C condenser fan motor (if equipped)
22. Malfunction indicator lamp
23. "O/D OFF" lamp
24. "POWER" lamp
25. 4WD switch
26. Power/Normal change switch
27. O/D cut switch
28. Ignition switch
29. Main relay
30. Transmission range switch (Park/neutral position switch)
31. Starter magnetic switch
32. Battery
33. 4WD low switch
34. Vehicle speed sensor
35. Combination meter
36. Fuel level sensor
37. Data link connector
38. TCC solenoid valve
39. Solenoid valve No.1(-B)
40. Solenoid valve No.1(-A)
41. Transmission range switch (Sensor)
42. A/T vehicle (output) speed sensor
43. A/T input speed sensor
44. Shield wire
45. Power steering pressure switch
46. Stop lamp switch (Brake pedal switch)
47. Lighting switch
48. Rear defogger switch (if equipped)
49. Heater blower switch
50. A/C amplifier (if equipped)
51. ABS control module (if equipped)
52. HO2S Bank 2 Sensor 2 (if equipped)
53. HO2S Bank 1 Sensor 2 (if equipped)
54. HO2S Bank 2 Sensor 1 (if equipped)
55. HO2S Bank 1 Sensor 1 (if equipped)
56. Intake air temp. sensor
57. Engine coolant temp. sensor
58. Throttle position sensor
59. MAP sensor (if equipped)
60. Monitor connector (if equipped)
61. Mass air flow sensor
62. Camshaft position sensor
63. CKP sensor (if equipped)
64. ECM (PCM)
65. CO adjusting resistor (if equipped)
66. 4WD actuator
67. Cruise control module (if equipped)
68. Knock sensor (if equipped)

TERMINAL	CIRCUIT	TERMINAL	CIRCUIT
E61-1	Fuel pump relay (TYPE B only: See NOTE)	C51-3-18	Knock sensor (if equipped)
E61-2	—	C51-3-19	—
E61-3	Cruise control module (if equipped)	C51-3-20	Ground
E61-4	Tachometer	C51-3-21	Ground
E61-5	A/C condenser fan motor (if equipped)	C51-3-22	Engine coolant temp. sensor
E61-6	Cruise control module (if equipped)	C51-3-23	Mass air flow sensor
E61-7	"O/D OFF" lamp (A/T vehicle)	C51-3-24	Heated oxygen sensor (bank 2 sensor 2) (if equipped)
E61-8	Main relay	C51-3-25	Ground
E61-9	Power/normal change switch (A/T vehicle)	C51-3-26	Ground
E61-10	"POWER" lamp (A/T vehicle)	C51-1-1	Shift solenoid No.1-B (A/T vehicle)
E61-11	—	C51-1-2	Shift solenoid No.2 (TCC) (A/T vehicle)
E61-12	Fuel level sensor	C51-1-3	Transmission range switch "R" (A/T vehicle)
E61-13	Heater blower fan switch	C51-1-4	Transmission range switch "P" (A/T vehicle)
E61-14	O/D OFF switch (A/T vehicle)	C51-1-5	4WD low switch (if equipped) (A/T vehicle)
E61-15	Rear defogger switch (if equipped)	C51-1-6	Shift solenoid No.1-A (A/T vehicle)
E61-16	Test switch terminal (Vehicle with monitor connector)	C51-1-7	4WD lamp
E61-17	Output duty select switch terminal (Vehicle with monitor connector)	C51-1-8	A/T input speed sensor (A/T vehicle)
E61-18	ABS control module (if equipped)	C51-1-9	A/T output speed sensor (A/T vehicle)
E61-19	CO adjusting resistor (if equipped)	C51-1-10	A/T output speed sensor (A/T vehicle)
E61-20	Fuel pump relay (TYPE A only: See NOTE)	C51-1-11	4WD switch
E61-21	—	C51-1-12	Transmission range switch "D" (A/T vehicle)
E61-22	—	C51-1-13	Transmission range switch "N" (A/T vehicle)
E61-23	Immobilizer indicator lamp (Vehicle without monitor connector)	C51-1-14	Shield wire ground for A/T input speed sensor and A/T output speed sensor (A/T vehicle)
E61-24	Duty output terminal (Vehicle with monitor connector)	C51-1-15	4WD actuator
E61-25	Data link connector 5 V (if equipped)	C51-1-16	A/T input speed sensor (A/T vehicle)
E61-26	Data link connector 12 V	C51-1-17	—
E61-27	Power steering pressure switch	C51-1-18	4WD pressure switch
E61-28	A/C cut switch (if equipped)	C51-1-19	Transmission range switch "L" (A/T vehicle)
E61-29	A/C signal (if equipped)	C51-1-20	Transmission range switch "2" (A/T vehicle)
E61-30	Lighting switch	C51-2-1	EVAP canister purge valve
E61-31	Diag. switch terminal (vehicle with monitor connector)	C51-2-2	Ground
E61-32	Stop lamp switch (A/T vehicle)	C51-2-3	Ignition switch
E61-33	CO adjusting resistor (if equipped)	C51-2-4	EGR valve (stepper motor coil 2)
E61-34	Power source for CO adjusting resistor (if equipped)	C51-2-5	EGR valve (stepper motor coil 1)
E61-35	Malfunction indicator lamp	C51-2-6	Fuel injector No.2
C51-3-1	Power source for back up	C51-2-7	Fuel injector No.1
C51-3-2	Vehicle speed sensor	C51-2-8	Ground
C51-3-3	Crankshaft position sensor (-) (if equipped)	C51-2-9	Ground
C51-3-4	Crankshaft position sensor (+) (if equipped)	C51-2-10	Ignition coil assembly for No.4
C51-3-5	Heated oxygen sensor (bank 1 sensor 1) (if equipped)	C51-2-11	Ignition coil assembly for No.3
C51-3-6	Heater of HO2S (bank 2 sensor 1) (if equipped)	C51-2-12	Ignition coil assembly for No.2
C51-3-7	Heater of HO2S (bank 1 sensor 1) (if equipped)	C51-2-13	Ignition coil assembly for No.1
C51-3-8	—	C51-2-14	IAC valve (stepper motor coil 2)
C51-3-9	Intake air temp. sensor	C51-2-15	IAC valve (stepper motor coil 1)
C51-3-10	Camshaft position sensor (POS)	C51-2-16	EGR valve (stepper motor coil 4)
C51-3-11	Camshaft position sensor (REF)	C51-2-17	EGR valve (stepper motor coil 3)
C51-3-12	Power source for TP sensor and MAP sensor	C51-2-18	Fuel injector No.4
C51-3-13	Throttle position sensor	C51-2-19	Fuel injector No.3
C51-3-14	Manifold absolute pressure sensor	C51-2-20	Power source
C51-3-15	Heated oxygen sensor (bank 1 sensor 2) (if equipped)	C51-2-21	Power source
C51-3-16	Heated oxygen sensor (bank 2 sensor 1) (if equipped)	C51-2-22	Ignition coil assembly for No.6
C51-3-17	Heater of HO2S (bank 2 sensor 2) (if equipped)	C51-2-23	Ignition coil assembly for No.5
C51-3-18	Heater of HO2S (bank 1 sensor 2) (if equipped)	C51-2-24	IAC valve (stepper motor coil 4)
C51-3-19	—	C51-2-25	IAC valve (stepper motor coil 3)
C51-3-20	—	C51-2-26	Engine start signal
C51-3-21	—	C51-2-27	Fuel injector No.6
C51-3-22	—	C51-2-28	Fuel injector No.5

**NOTE:**

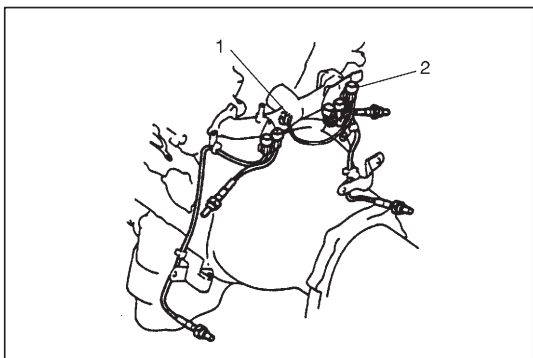
See page 6-7 for the applicable model.

## ENGINE & EMISSION CONTROL INPUT/OUTPUT TABLE

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## ON-VEHICLE SERVICE

### ELECTRONIC CONTROL SYSTEM



#### KNOCK SENSOR

##### Inspection

Check knock sensor (1) referring to DTC P0325 (No.43) Flow Table.

If malfunction is found, replace.

##### Removal and Installation

Refer to Section 6A2.



SECTION 7B1

AUTOMATIC TRANSMISSION (4 A/T)

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

CONTENTS

ON-VEHICLE SERVICE ..... 7B1- 2

Manual Selector Assembly ..... 7B1- 2

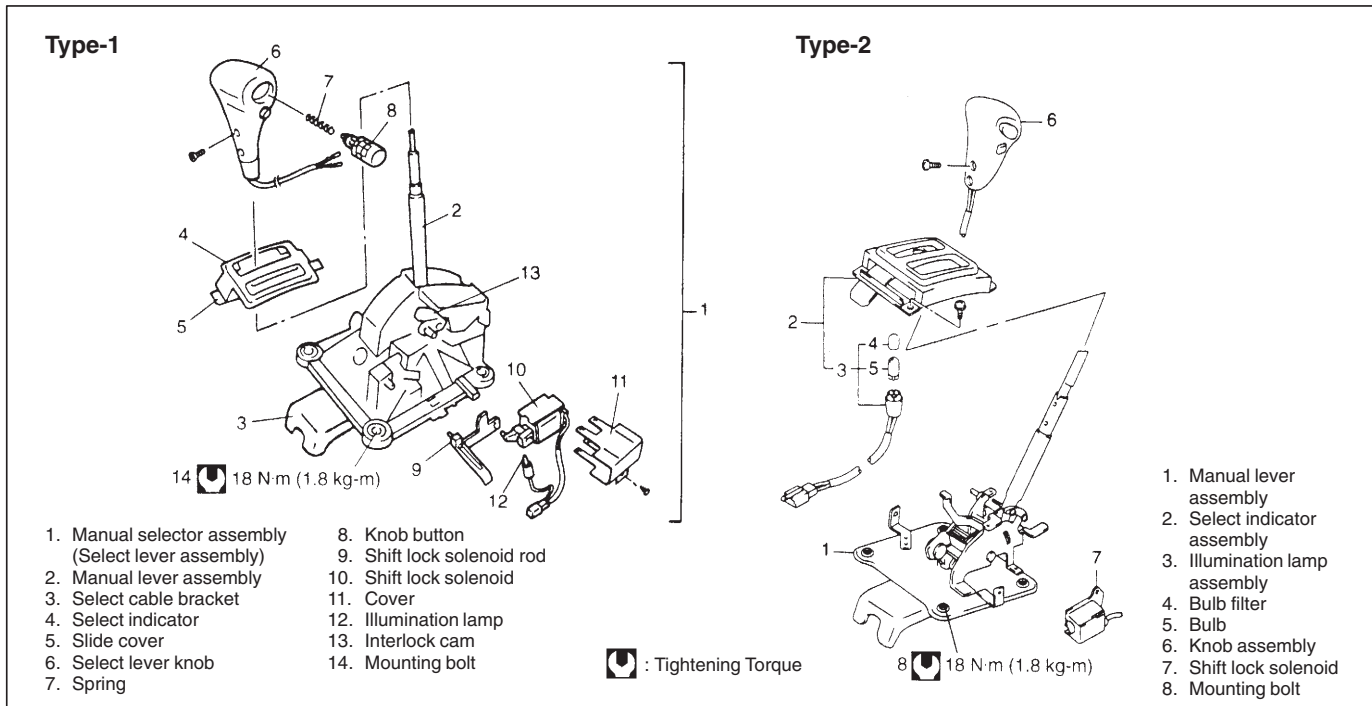
Select Cable ..... 7B1- 5

Unit Assembly ..... 7B1-14



## ON-VEHICLE SERVICE

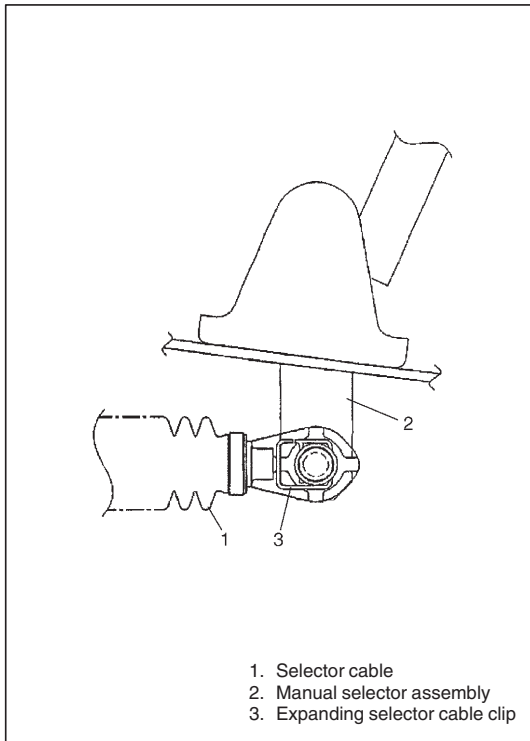
### MANUAL SELECTOR ASSEMBLY



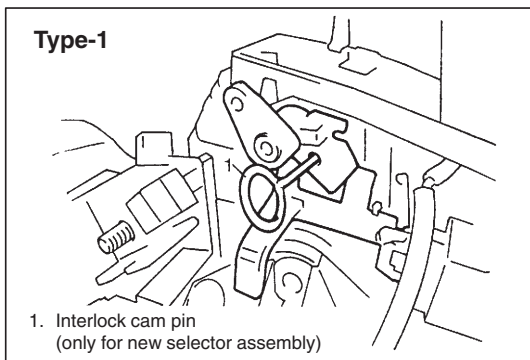
### REMOVAL

#### (For Type-1)

- 1) Disconnect negative cable at battery.
- 2) Remove console box.
- 3) Disconnect connector for illumination lamp, shift lock solenoid and overdrive OFF switch.
- 4) Disconnect interlock cable from interlock cam of selector assembly.
- 5) Remove selector assembly mounting bolts.
- 6) Disconnect selector cable from lever of selector assembly.

**(For Type-2)**

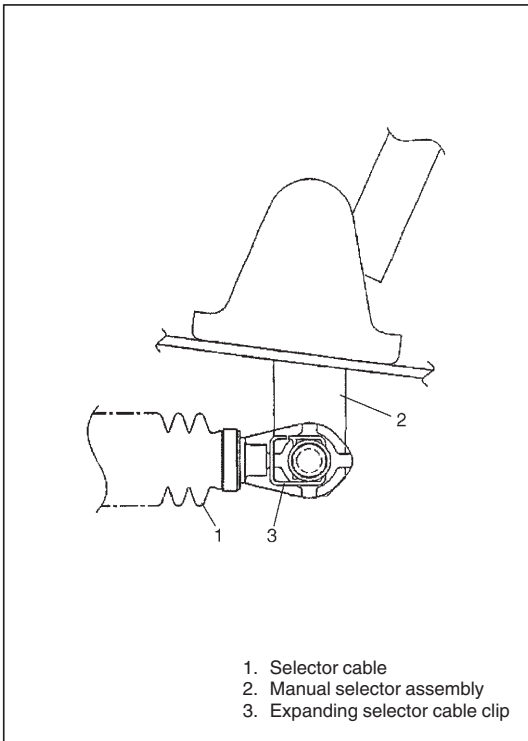
- 1) Disconnect negative (–) cable at battery.
- 2) Remove console box.
- 3) Disconnect connector for illumination lamp, shift lock solenoid (if equipped) and overdrive OFF switch.
- 4) Remove selector assembly mounting bolts.
- 5) Disconnect selector cable from manual selector assembly expanding selector cable clip.

**INSTALLATION****(For Type-1)****NOTE:**

**New selector assembly of Type-1 is supplied with held interlock cam at interlock cable connecting position with pin. Remove this pin after connecting interlock cable to interlock cam and tightening cable nut.**

Reverse removal procedure to install noting the followings.

- Connect interlock cable end to cam referring to steps 2) to 8) of “Interlock Cable Installation” section.
- Upon completion of installation, confirm that brake (key) interlock system operates properly.

**(For Type-2)**

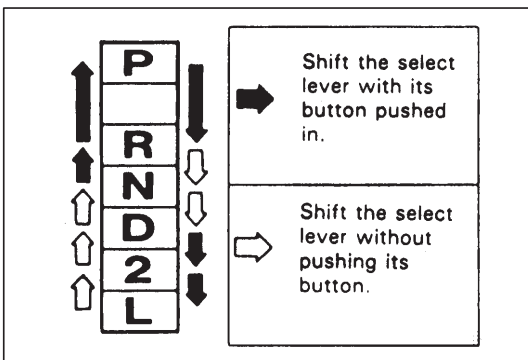
Reverse removal procedure to install manual selector assembly noting the following instructions.

- Make sure that selector cable clip hold selector cable on manual selector assembly securely.
- Tighten manual selector assembly mounting bolts as specified torque.

**Tightening torque**

**Manual selector assembly mounting bolts:**

**18 N·m (1.8 kg-m, 13.5 lb-ft)**

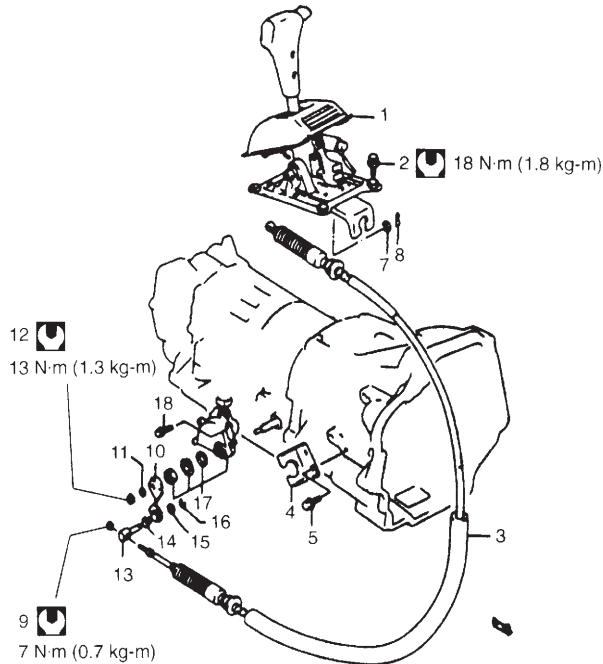
**INSPECTION**

Check select lever for smooth and clear-cut movement and position indicator for correct indication.

For operation of select lever, refer to the figure.

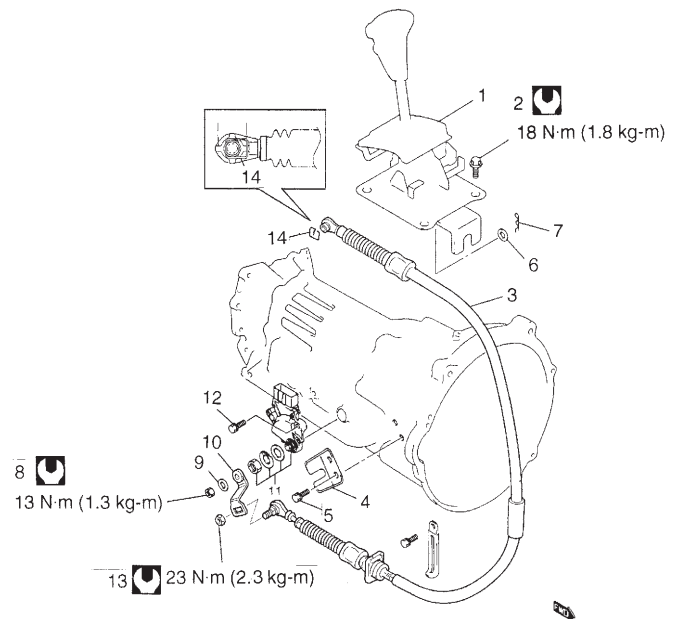
## SELECT CABLE

[Type-1]



- |                          |  |
|--------------------------|--|
| 1. Select lever assembly | 10. Manual select lever                |
| 2. Bolt                  | 11. Lock washer                        |
| 3. Select cable          | 12. Nut                                |
| 4. Cable bracket         | 13. Select cable joint                 |
| 5. Bolt                  | 14. Bush                               |
| 6. Blank                 | 15. Washer                             |
| 7. Washer                | 16. E-ring                             |
| 8. Clip                  | 17. Transmission range switch assembly |
| 9. Nut                   | 18. Bolt                               |

[Type-2]



- |   |   |
|---|---|
| 1. Selector lever assembly                                  | 9. Lock washer                                    |
| 2. Selector lever assembly mounting bolt                    | 10. Manual select lever                           |
| 3. Selector cable   | 11. Transmission range switch assembly            |
| 4. Cable bracket  | 12. Transmission range switch mounting bolt       |
| 5. Cable bracket mounting bolt                              | 13. Manual select lever nut (selector cable side) |
| 6. Washer   | 14. Selector cable clip                           |
| 7. Clip   |   |
| 8. Manual select lever nut (transmission range switch side) |   |

: Tightening Torque

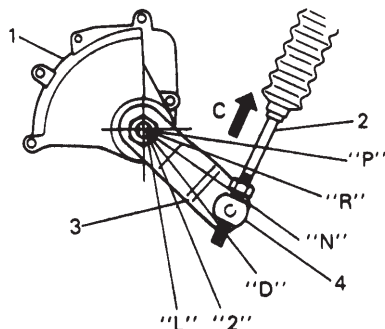
## ADJUSTMENT

### (For Type-1)

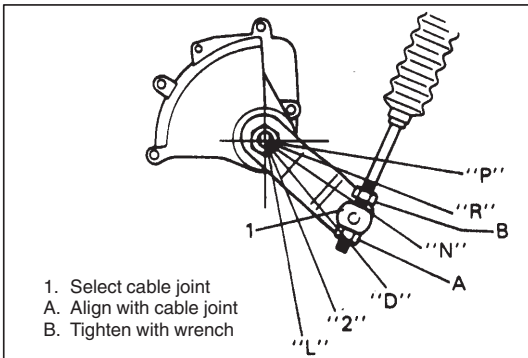
- 1) Before tightening cable end nut, shift select lever to "N".
- 2) Also shift manual shift lever to "N".

#### NOTE:

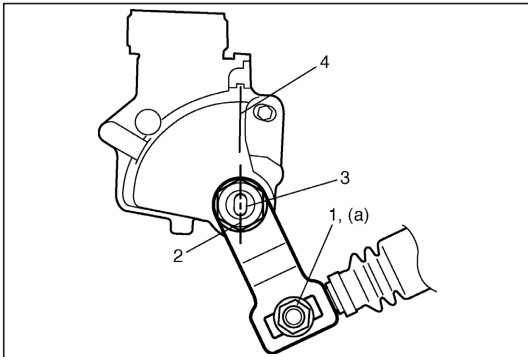
- Make sure that nut and cable joint have clearance under above conditions.
- If select cable has been moved, push it in arrow C direction as shown in figure at the left till it stops and then confirm that select lever is in "N" position.



1. Transmission range sensor (switch)
2. Select cable
3. Manual shift lever
4. Select cable joint



- 3) Turn nut A by hand till it contacts manual select cable joint. Then tighten nut B with wrench.
- 4) After select cable was installed, check for the following.
  - Push vehicle with select lever shifted to "P".  
Vehicle should not move.
  - Vehicle can not be driven in "N".
  - Vehicle can be driven in "D", "2", and "L".
  - Vehicle can be backed in "R".



### (For Type-2)

- 1) Loosen manual shift lever (select cable side) nut (1).
- 2) Shift select lever to "N" range.
- 3) Align center line (2) on manual valve shaft (3) to "N" reference line (4) as shown.
- 4) Tighten manual shift lever nut (selector cable side) (1) as specified torque.

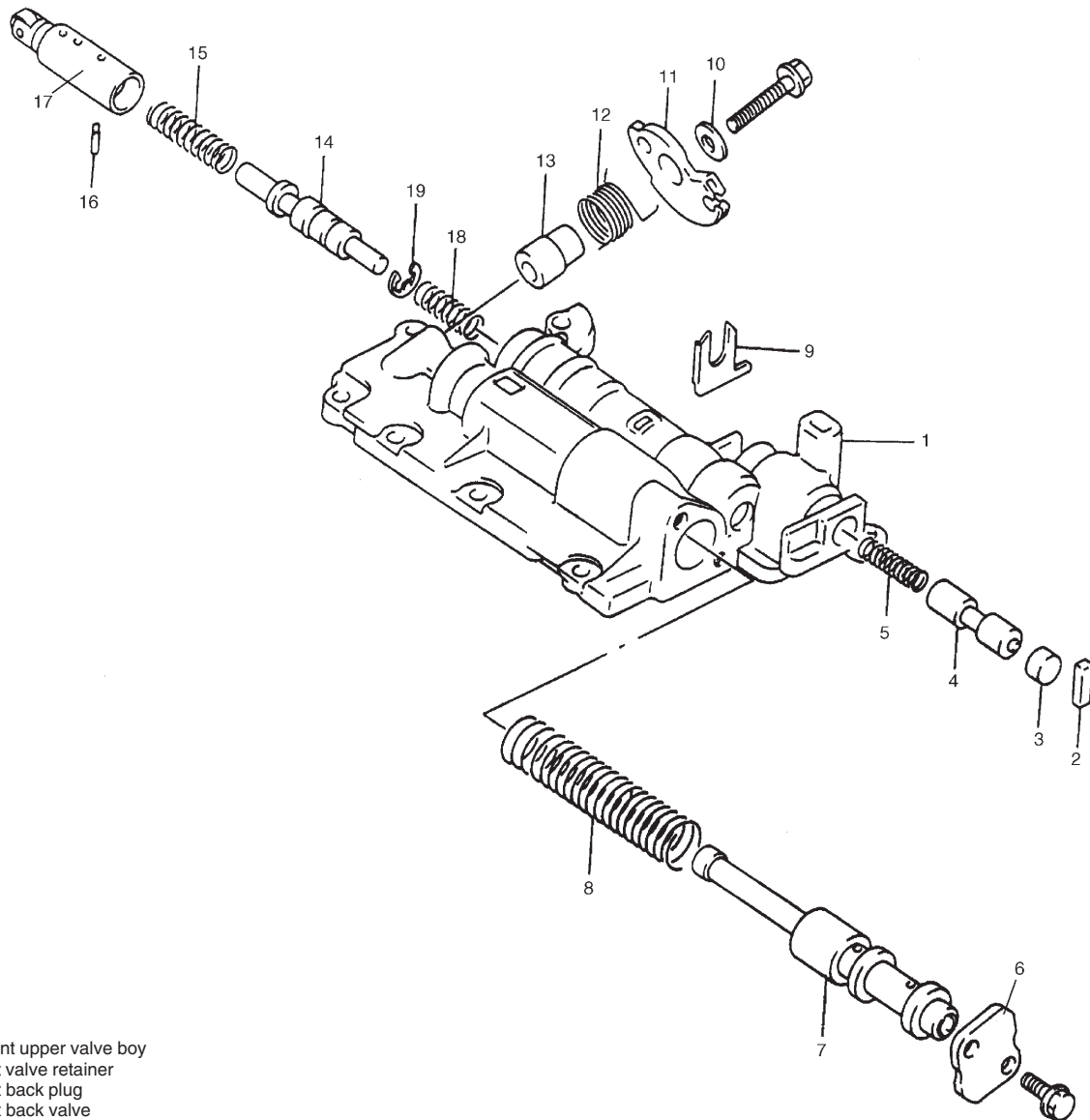
### Tightening torque

**Manual shift lever nut (a):**

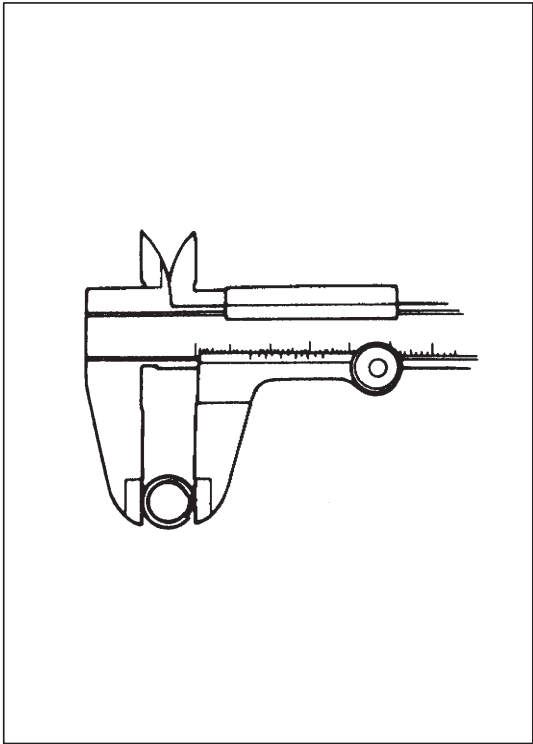
**23 N·m (2.3 kg-m, 17.0 lb-ft)**

- 5) After select cable was installed, check for the following.
  - Push vehicle with selector lever shifted to "P" range.  
Vehicle should not move.
  - Vehicle can not be driven in "N" range.
  - Vehicle can be driven in "D", "2" and "L" ranges.
  - Vehicle can be backed in "R" range.

## FRONT UPPER VALVE BODY



1. Front upper valve boy
2. Cut valve retainer
3. Cut back plug
4. Cut back valve
5. Spring
6. Front valve end cover
7. Secondary regulator valve
8. Secondary regulator spring
9. Throttle valve keep plate
10. Washer
11. Throttle valve cam
12. Cam return spring
13. Cam spacer
14. Throttle valve
15. Throttle valve primary spring
16. Locating pin
17. Down shift plug
18. Throttle valve secondary spring
19. Throttle valve compensating ring



**ASSEMBLY**

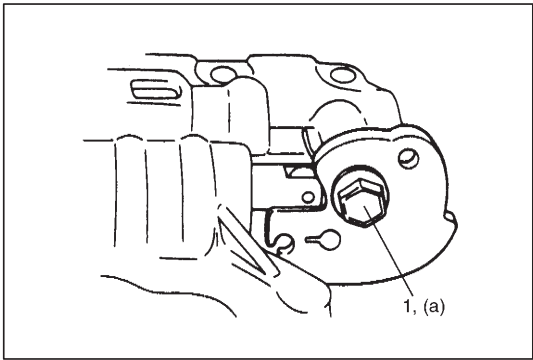
Assemble each component by reversing disassembly procedure and noting the following points.

- Coil outer diameter and free length of each valve spring should be as listed below. Be sure to use each one of correct size.

**Coil outer diameter and free length of each valve spring**

Name of spring	Outer diameter	Free length
Secondary regulator valve spring	17.43 mm (0.681 in.)	71.27 mm (2.806 in.)
Cut back valve spring	6.85 mm (0.269 in.)	23.00 mm (0.905 in.)
Throttle valve secondary spring	8.56 mm (0.337 in.)	18.86 mm (0.743 in.)
Throttle valve primary spring	10.90 mm (0.429 in.)	39.55 mm (1.557 in.)

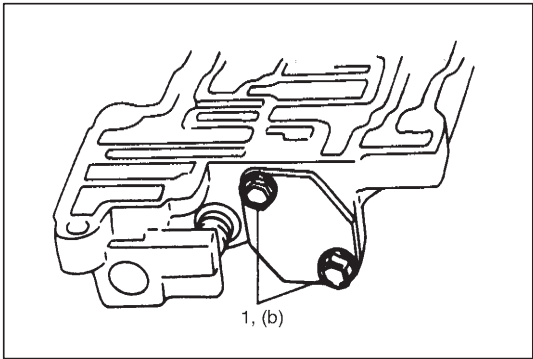
- Install as many throttle valve compensating rings as written down when disassembled.



- Tighten throttle cam bolt (1) to specified torque.

**Tightening torque**

**Throttle cam bolt (a): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)**

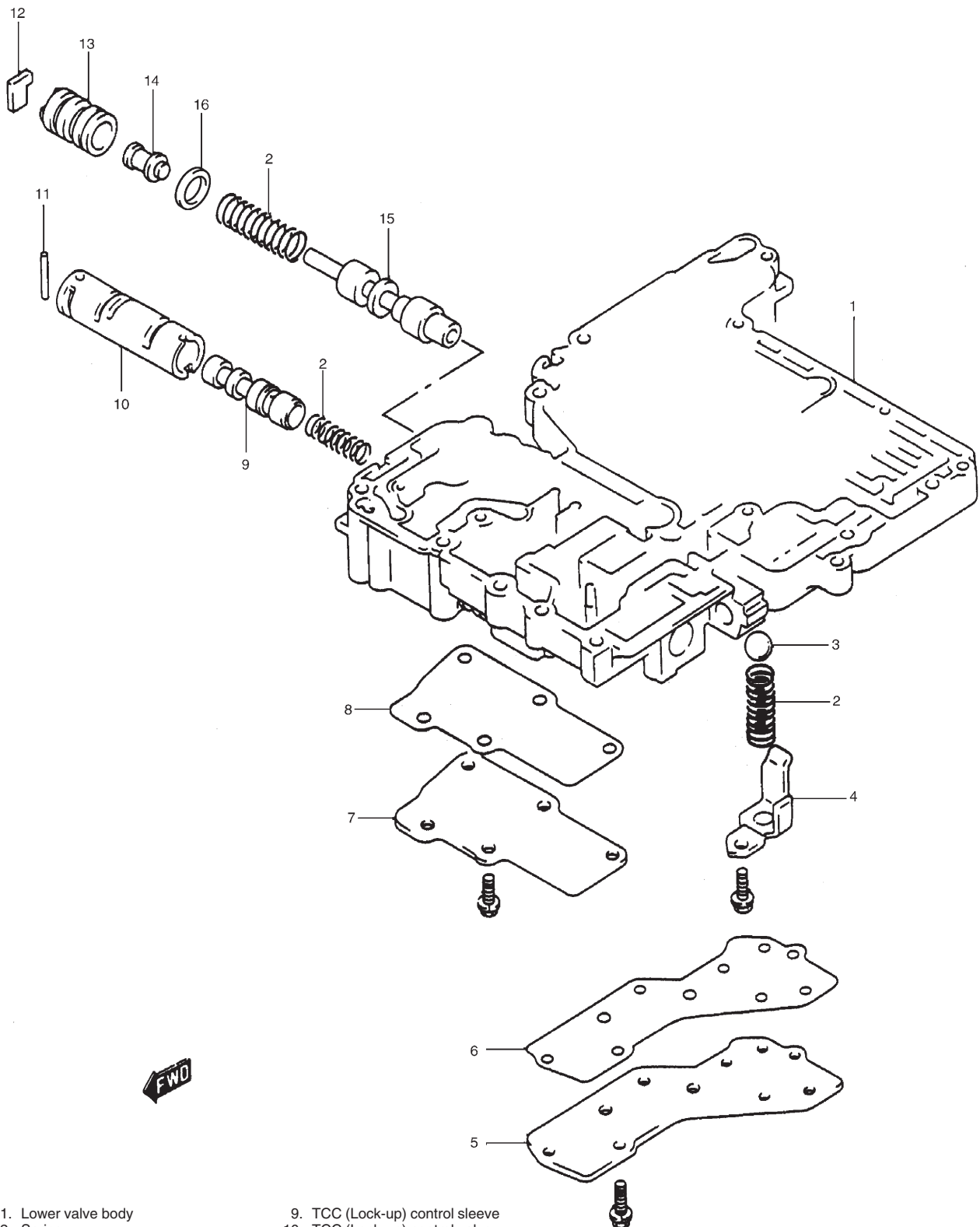


- Tighten pressure relief valve bolts (1) to specified torque.

**Tightening torque**

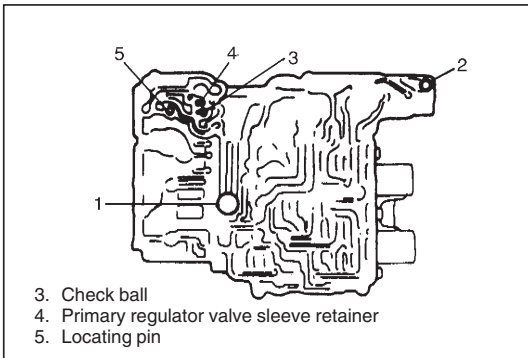
**Pressure relief valve bolt (b): 5.5 N·m (0.55 kg-m, 4.0 lb-ft)**

# **LOWER VALVE BODY**

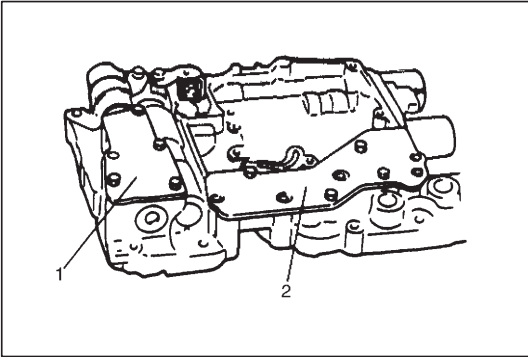


- |                                       |                                     |
|---------------------------------------|-------------------------------------|
| 1. Lower valve body                   | 9. TCC (Lock-up) control sleeve     |
| 2. Spring                             | 10. TCC (Lock-up) control valve     |
| 3. Pressure relief valve ball         | 11. Pin                             |
| 4. Pressure relief valve retainer     | 12. Retainer                        |
| 5. Lower valve body plate             | 13. Primary regulator valve sleeve  |
| 6. Lower valve body gasket            | 14. Primary regulator valve plunger |
| 7. TCC (Lock-up) control valve plate  | 15. Primary regulator valve         |
| 8. TCC (Lock-up) control valve gasket | 16. Spacer                          |

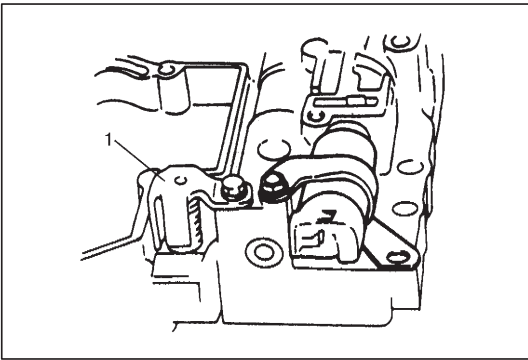


**DISASSEMBLY**

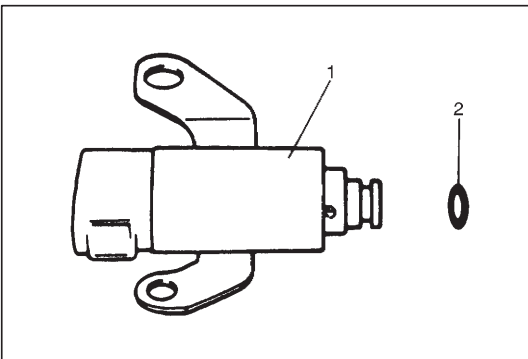
- 1) Remove bypass valve (1), bypass valve spring, check ball valve damping spring, valve body ball (2) and ball valve spring.



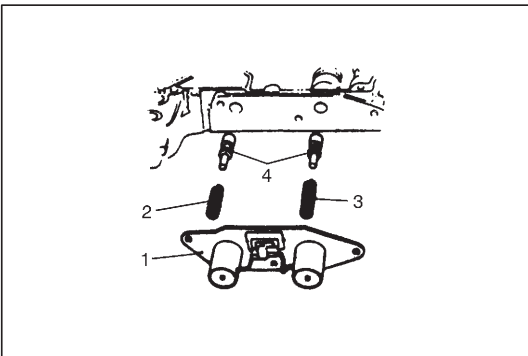
- 2) Remove lower valve body plate (1) and lower valve body plate gasket.
- 3) Remove TCC (lock-up) control valve plate (2) and TCC (lock-up) control valve gasket.



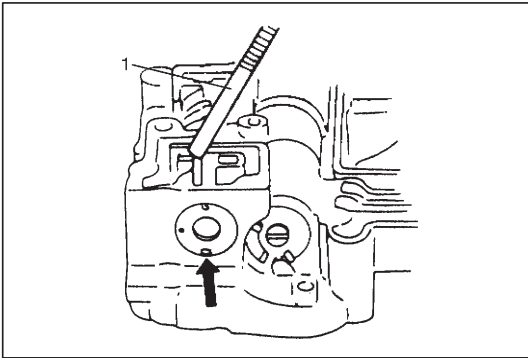
- 4) With pressure relief valve retainer (1) pressed with finger, remove pressure relief valve bolt and then remove pressure relief valve retainer (1), pressure relief valve spring and pressure relief valve ball.



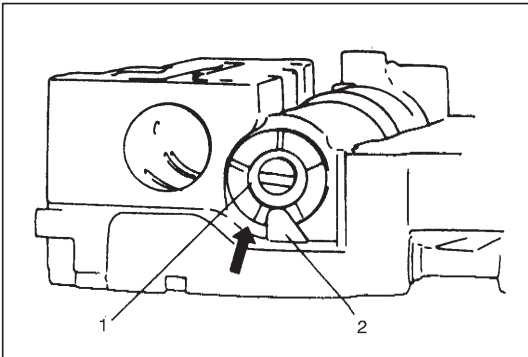
- 5) Remove TCC (lock-up) solenoid valve (1) and Then remove O-ring (2) from TCC solenoid valve (1).



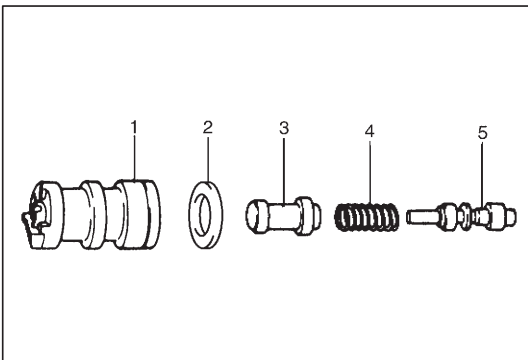
- 6) After removing shift solenoid valve (A & B) (1), remove solenoid valve gasket, low coast modulator valve spring (2), inter coast modulator valve spring (3) and 2 intermediate coast modulator valves (4).



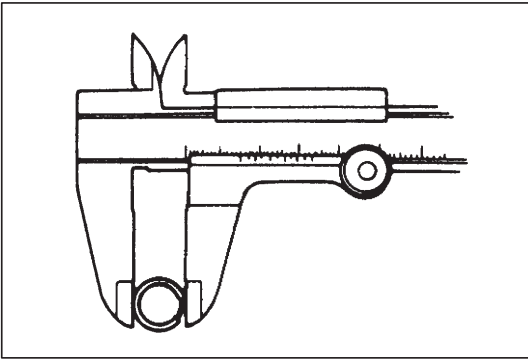
- 7) Pressing TCC (lock-up) control sleeve with finger and using magnet (1), remove locating pin and then remove TCC (lock-up) control sleeve, TCC (lock-up) control valve and TCC (lock-up) control valve spring.



- 8) Check which step of primary regulator valve sleeve (1) (how many steps down from its tip) contacts primary regulator valve sleeve retainer (2).



- 9) Pressing primary regulator valve sleeve (1) with finger and using magnet, remove primary regulator valve sleeve retainer and then remove primary regulator valve sleeve (1), spacer (2), primary regulator valve plunger (3), primary regulator valve spring (4) and primary regulator valve (5).



### ASSEMBLY

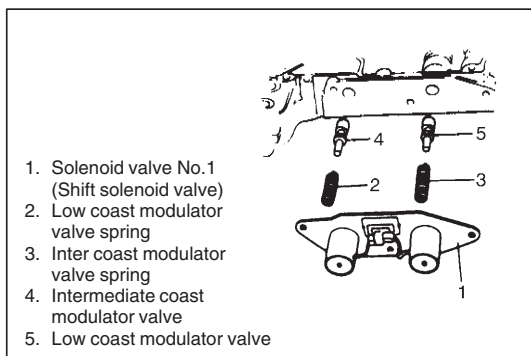
Assemble each component by reversing disassembly procedure and noting the following points.

- Coil outer diameter and free length of each valve spring should be as listed below. Be sure to use each one of correct size.

#### Coil outer diameter and free length of each valve spring :

Name of spring	Outer diameter	Free length
Pressure relief valve spring	13.14 mm (0.517 in.)	32.14 mm (1.265 in.)
TCC (Lock-up) control valve spring	11.40 mm (0.449 in.)	32.60 mm (1.283 in.)
Valve damping spring	4.95 mm (0.195 in.)	20.00 mm (0.787 in.)
Low coast modulator valve spring	10.00 mm (0.394 in.)	42.35 mm (1.667 in.)
Inter coast modulator valve spring	9.04 mm (0.356 in.) (G16 and J20 engines)	27.26 mm (1.073 in.) (G16 and J20 engines)
	10.00 mm (0.394 in.) (H25 engine)	25.60 mm (1.008 in.) (H25 engine)
Ball valve spring	10.50 mm (0.413 in.)	13.70 mm (0.539 in.)
Bypass valve spring	13.82 mm (0.544 in.)	28.90 mm (1.138 in.)
Primary regulator valve spring	17.02 mm (0.670 in.)	50.28 mm (1.980 in.)

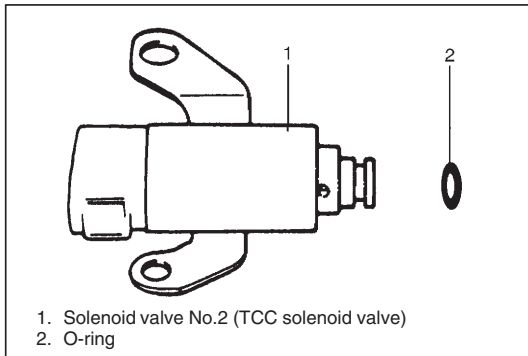
- Install primary regulator valve sleeve so that its tip is positioned as it was before disassembly.
- Use new TCC (lock-up) control valve gasket, solenoid gasket and lower valve body plate gasket.



- Tighten shift solenoid valve bolt to specified torque.

#### Tightening torque

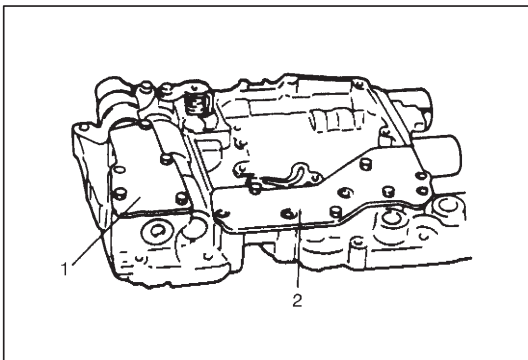
**Shift solenoid valve bolt: 10 N·m (1.0 kg-m, 7.5 lb-ft)**



- Tighten TCC (lock-up) solenoid valve bolt to specified torque.

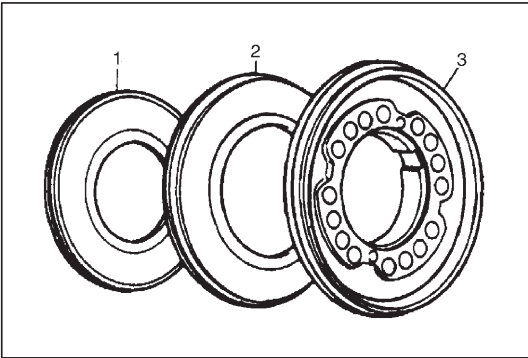
**Tightening torque****TCC solenoid valve bolt:****5.5 N·m (0.55 kg-m, 4.0 lb-ft)**

- Tighten pressure relief valve bolt to specified torque.

**Tightening torque****Pressure relief valve bolt:****5.5 N·m (0.55 kg-m, 4.0 lb-ft)**

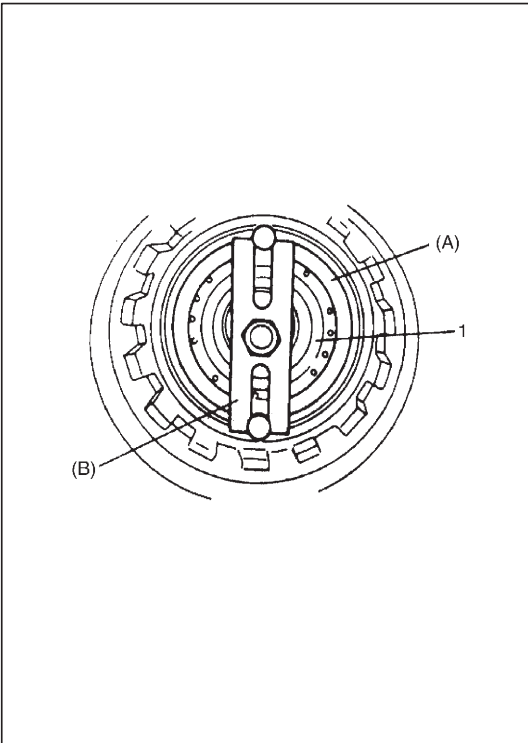
- Tighten lower valve body plate (1), TCC (lock-up) control valve plate (2) flange bolt to specified torque.

**Tightening torque****Lower valve body and TCC control valve Plate bolts:****5.5 N·m (0.55 kg-m, 4.0 lb-ft)**



## UNIT ASSEMBLY

- 1) After applying A/T fluid to new O-rings, install them to reverse brake piston (3), reaction sleeve (2) and secondary reverse piston (1).



- 2) Install reverse brake piston assembly and brake piston return spring to transmission case, using care not to damage O-ring. Then install snap ring (1) with special tool.

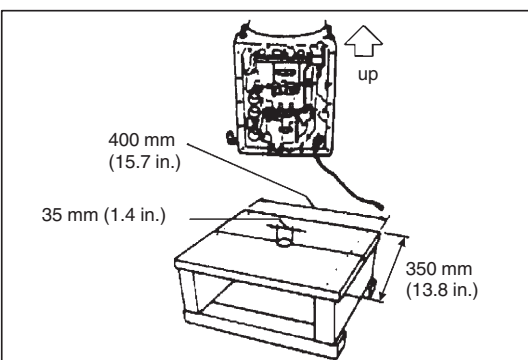
### Special tool

(A): 09926-98320

(B): 09941-84510

### NOTE:

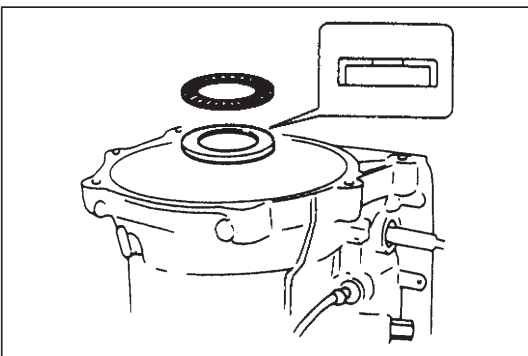
- Install so that opening in snap ring (1) will not align with any of 3 lugs of spring seat.
- Do not compress spring more than necessary and do not allow it fall or tilt.



- 3) Prepare a stand as shown in the figure. It is necessary because work will be done with transmission case set upright from this step on.

### NOTE:

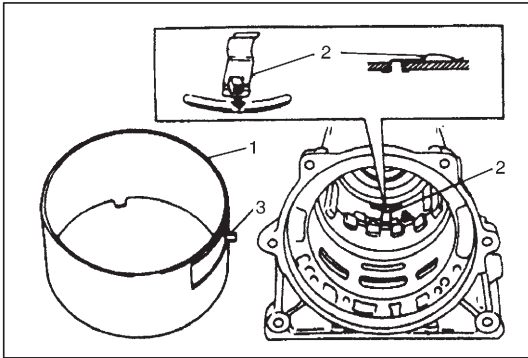
- To protect transmission case against damage, spread cloth on stand where case contacts.
- A stand of such size as shown in figure will facilitate work.



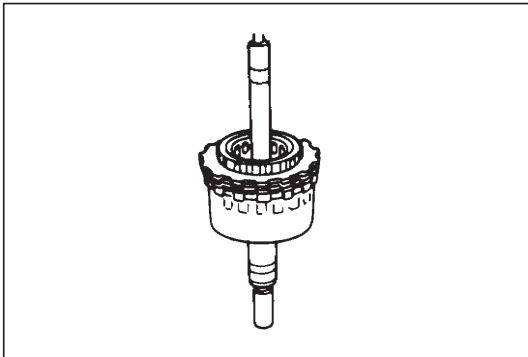
- 4) Install thrust output shaft bearing and thrust bearing output shaft race after lubricating them with grease.

### NOTE:

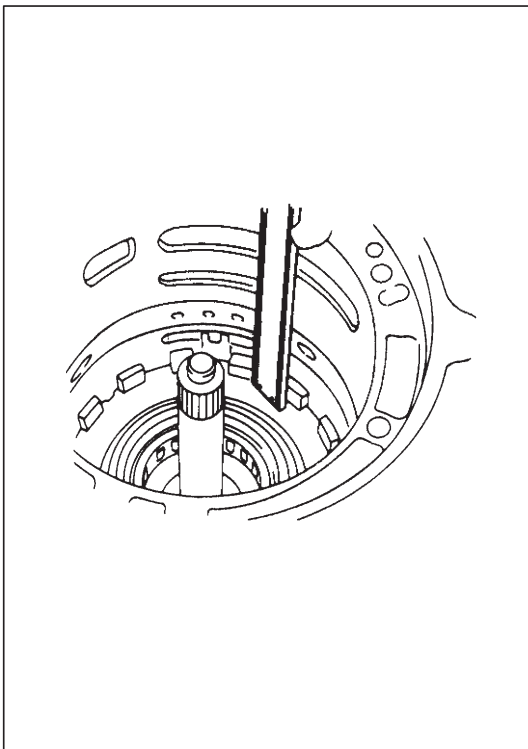
- Make sure that thrust bearing output shaft race is installed in proper direction.



- 5) Install brake applying tube (1) so that its lug fits in a in transmission case. After installation, check that 4 lugs (3) along the underside of brake applying tube fit inside of reverse brake piston and leaf spring (2) is installed properly.



- 6) Remove reverse brake reaction plate of planetary gear assembly and align lugs of reverse brake plate, reverse brake disc and reverse brake packing plate. Install planetary gear assembly to transmission case so that aligned lugs fit in groove in transmission case.



- 7) Measure clearance between reverse brake plate and lugs of transmission case.

If measured value is less than standard range, it is possible that something is installed improperly or dust or fluid is on reverse brake disc, etc. If it exceeds standard range for G16 and J20 engine models, replace reverse brake disc, reverse brake plate or reverse brake backing plate.

If it exceeds standard range for H25 engine model, adjust it to standard clearance with selective reverse brake backing plates as shown after making sure reverse brake disc, reverse brake plate and reverse brake backing plate are in good condition.

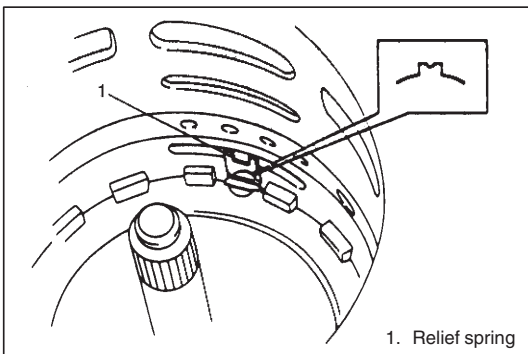
If they are not in good condition, replace.

**Standard clearance between reverse brake plate and lugs of transmission case:**

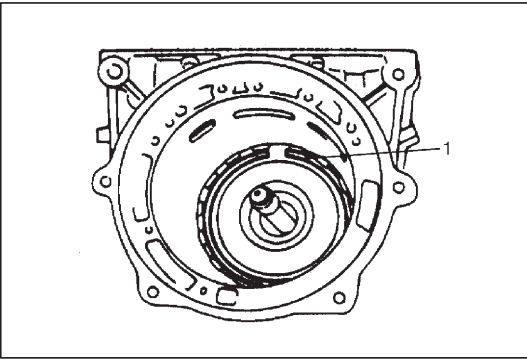
**0.56 – 2.29 mm (0.022 – 0.090 in.) (G16 engine)**

**0.61 – 2.64 mm (0.024 – 0.103 in.) (J20 and H25 engines)**

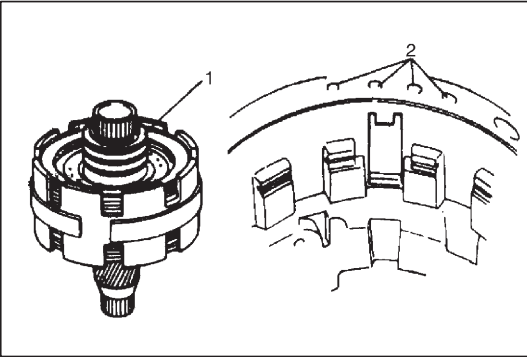
Available Plate thickness for H25 engine model only	3.25, 3.50, 3.75, 4.00, 4.25 mm (0.128, 0.138, 0.148, 0.157, 0.167 in.)
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- 8) Install reverse brake reaction plate so that its lug with dent comes to the same position as leaf spring.



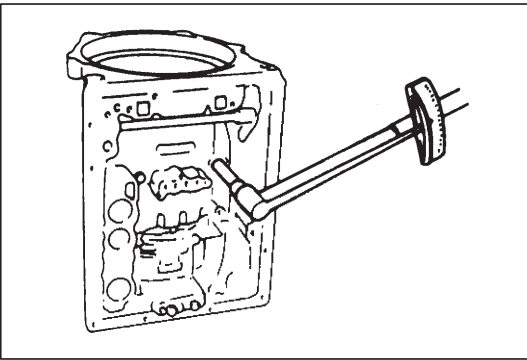
- 9) Using screwdriver with vinyl tape or the like wound at its tip, install retaining reaction plate ring (1). After installation, check that ring is in groove securely.



- 10) After confirming that lugs of all brake plates and brake discs are in grooves securely, hold retaining direct clutch ring (1) of planetary sun gear, install center support assembly by aligning fluid holes (2) in center support and transmission case.

**NOTE:**

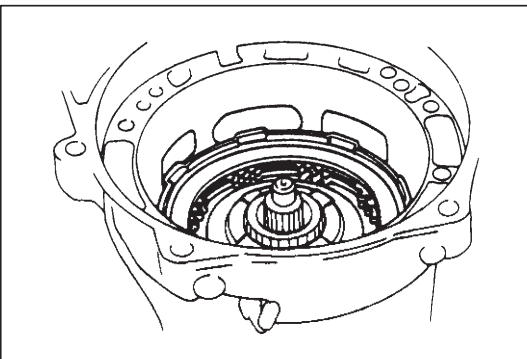
**Unless retaining direct clutch ring of planetary sun gear is held, brake valve gets off center support and that will make it impossible to align fluid holes with bolt holes.**



- 11) Tighten center support bolts by certain amount at a time till specified tightening torque is obtained.

**Tightening torque**

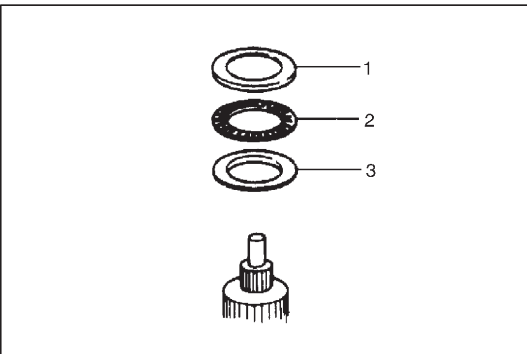
**Center support bolt: 26 N·m (2.6 kg-m, 19.0 lb-ft)**



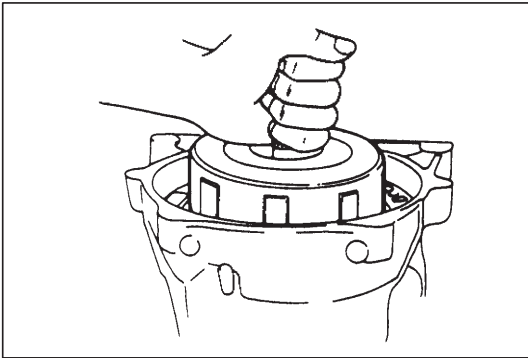
- 12) Install direct clutch assembly by aligning splines in direct clutch cylinder with planetary sun gear.

**NOTE:**

**Ends of splines in direct clutch cylinder and planetary sun gear should come almost in match.**



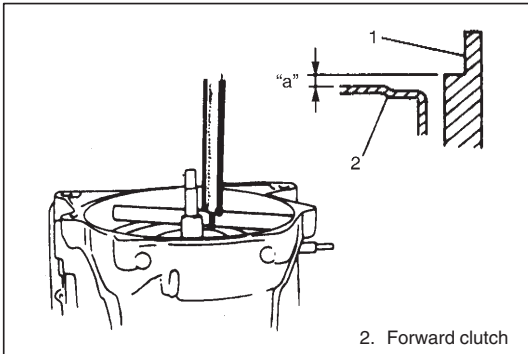
- 13) Apply grease to forward clutch rear No.1 race (1), thrust rear bearing (2), thrust bearing rear planetary ring race (3) and install thrust bearing planetary ring race (3) to direct clutch cylinder and forward clutch rear No.1 race and thrust bearing to forward clutch hub.



- 14) Install forward clutch assembly by putting all lugs of direct clutch disc hub together and matching them with groove cut in direct clutch input hub, and at the same time aligning splines in forward clutch hub with inner shaft.

**NOTE:**

**Use care not to let forward clutch rear No.1 race and thrust bearing installed to forward clutch hub fall off.**



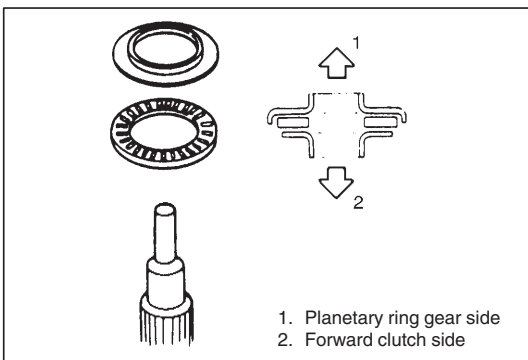
- 15) When clutch disc and plate have been replaced, check height difference between forward clutch input shaft and transmission case (1) by measuring as shown in the figure.

**Standard height difference "a":**

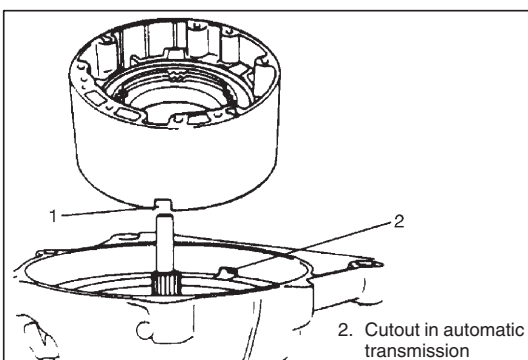
**About 2.0 mm (0.079 in.)**

**NOTE:**

**If measured value is less than standard value, remove forward clutch assembly and install it again.**



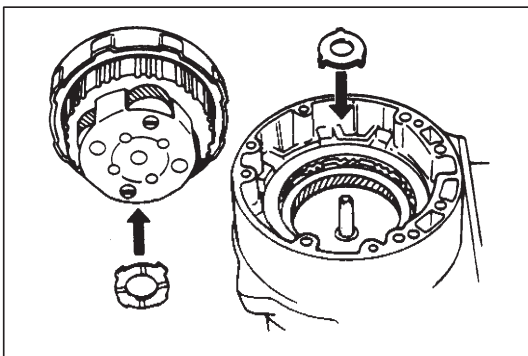
- 16) Apply grease to thrust forward clutch bearing and install it to forward clutch input shaft. Also apply grease to thrust rear race and install it to O/D case.



- 17) Install O/D case by aligning cutout in O/D case (1) and that in transmission case.

**NOTE:**

**Use care not to drop thrust rear race installed to O/D case.**

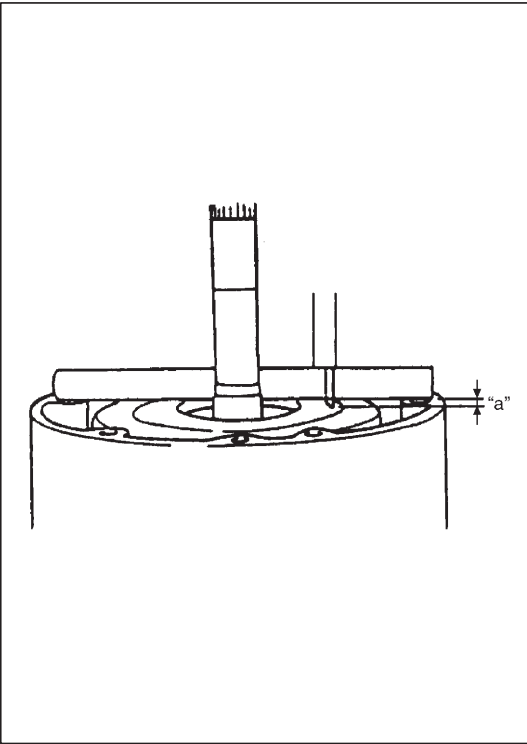


- 18) Apply grease to thrust planetary rear washer and install it to O/D planetary gear. Also apply grease to thrust planetary ring front race and install it to planetary ring gear and then install O/D input shaft assembly to O/D case.

**NOTE:**

- Fit claws of thrust planetary rear washer and thrust planetary ring front race into holes securely.
- Use care not to drop thrust planetary rear washer installed to O/D planetary gear.





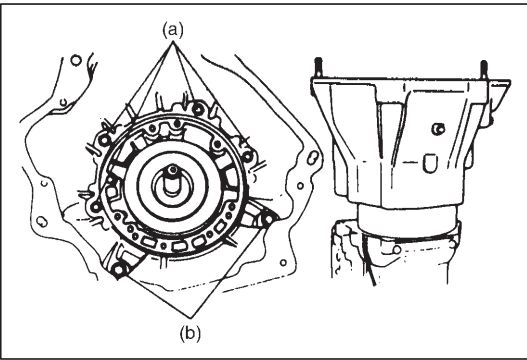
- 19) When clutch disc or plate has been replaced, check height difference between O/D case and O/D clutch cylinder by measuring it as shown in the figure.

**Standard height difference "a" between O/D case and O/D clutch cylinder:**

**About 3.5 mm (0.138 in.)**

**NOTE:**

**Measure at the highest point along inner circumference of O/D clutch cylinder.**



- 20) Apply A/T fluid to new housing O-ring and install it to O/D case. Then install converter housing and tighten housing bolt to specified torque.

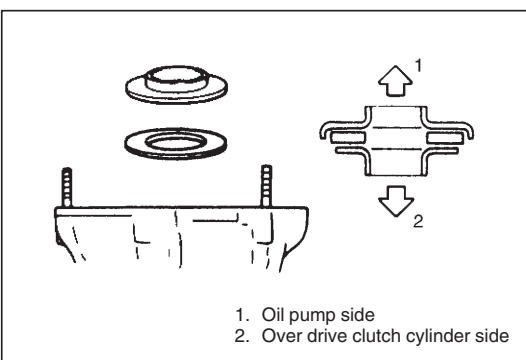
**Tightening torque**

**Torque converter housing bolt (a):**

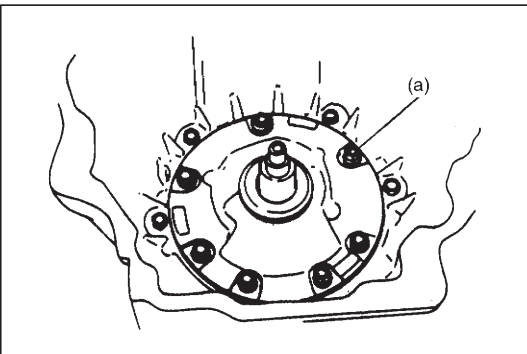
**35 N·m (3.5 kg-m, 25.5 lb-ft)**

**Torque converter housing bolt (b):**

**58 N·m (5.8 kg-m, 42.0 lb-ft)**



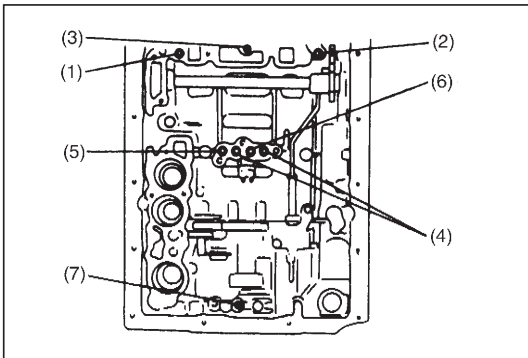
- 21) Apply grease to thrust front race and install it to O/D clutch cylinder.



- 22) Apply grease to front bearing assembly and install it to oil pump assembly. Also, apply A/T fluid to new oil pump cover O-ring and install it to oil pump assembly. Then install oil pump assembly aligning bolt holes in O/D case with those in transmission case oil pump assembly. Apply seal packing to oil pump assembly bolts and tighten them by certain amount of torque at each time one after another till specified torque is attained.

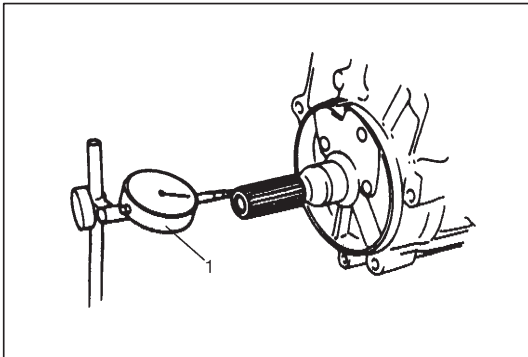
**Tightening torque**

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



23) Apply 2 – 4 kg/cm<sup>2</sup> air pressure into fluid holes in the figure as numbered and check operation sound of each part.

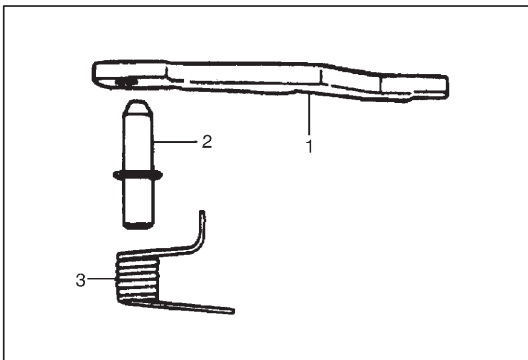
- (1) O/D clutch
- (2) O/D brake
- (3) Forward clutch
- (4) Direct clutch
- (5) B1 brake (Second coast brake)
- (6) B2 brake (Second brake)
- (7) Reverse brake



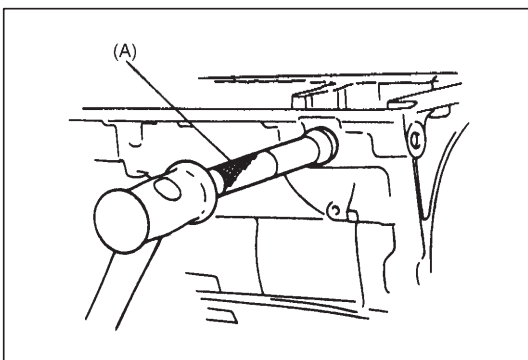
24) Take down transmission from stand and measure clearance in shaft direction by applying dial gauge (1) to output shaft as shown in the figure.

**Standard clearance in shaft direction:**  
**0.3 – 0.9 mm (0.012 – 0.035 in.)**

25) Check that inner shaft runs smoothly.

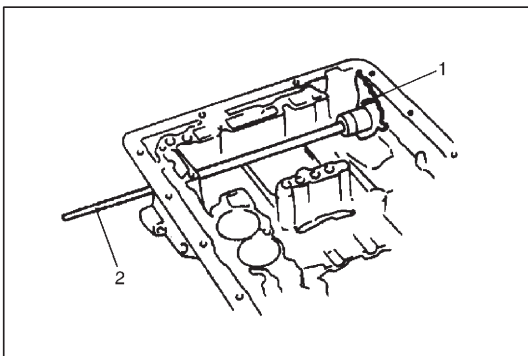


26) Install parking lock pawl (1), pawl pin (2) and pawl spring (3) to transmission case.

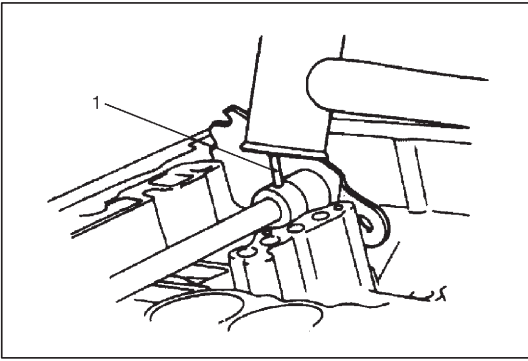


27) Apply grease to lip of new oil lip seal and drive in oil lip seal with special tool till it contacts transmission case.

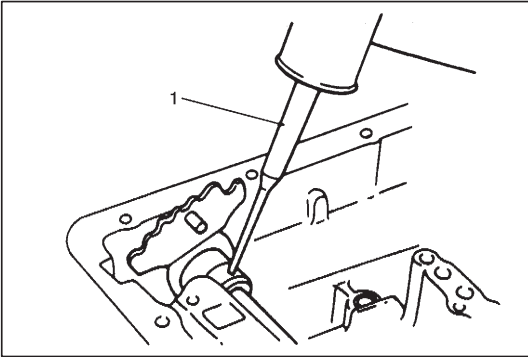
**Special tool**  
**(A): 09943-88211**



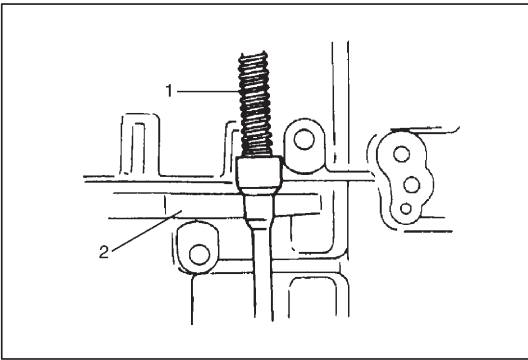
28) After installing new sleeve cover to manual shift lever (1), install manual shift shaft (2) and manual shift lever (1) to transmission case.



- 29) Align hole in manual shift shaft with that in manual shift lever and drive in new manual shift lever pin (1).



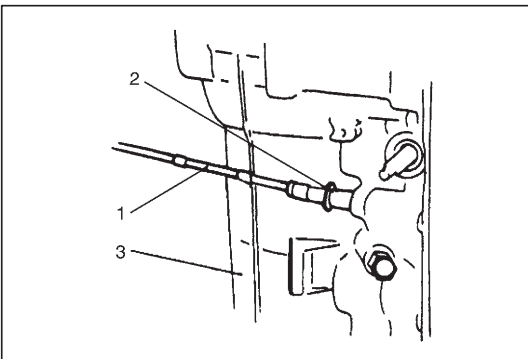
- 30) Align hole in sleeve cover with dent in manual shift lever and caulk securely with pin punch (1). Then check that manual shift shaft turns smoothly.



- 31) With parking lock rod (1) installed to manual shift lever, place parking lock rod (1) on parking lock pawl (2) as shown in the figure. Then install pawl bracket and tighten bracket screw to specified torque.

#### **Tightening torque**

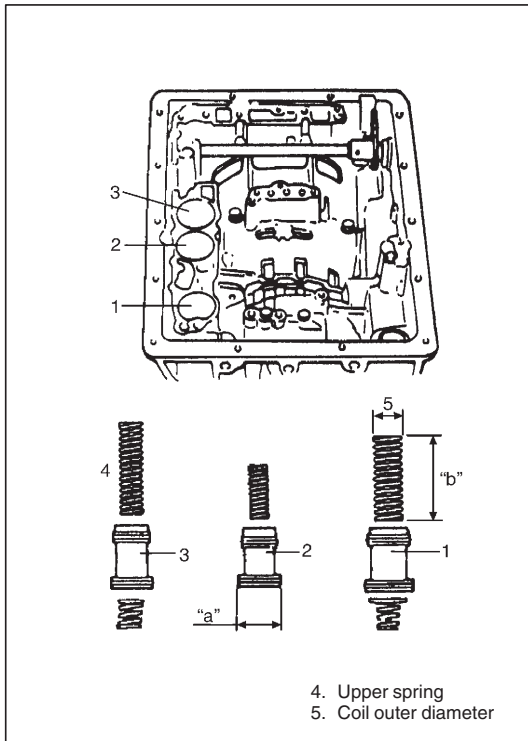
**Pawl bracket screw: 7.5 N·m (0.75 kg-m, 5.5 lb-ft)**



- 32) Apply A/T fluid to new throttle cable O-ring (2) and install it to throttle cable then connect throttle cable (1) to transmission case (3).

#### **NOTE:**

**Do not turn transmission case toward position where throttle cable is connected so as to protect retainer of throttle cable.**



- 33) Apply A/T fluid to new O-ring and spring and install them to accumulator piston and install accumulator piston to transmission case.

#### Accumulator piston and spring specification (G16 engine):

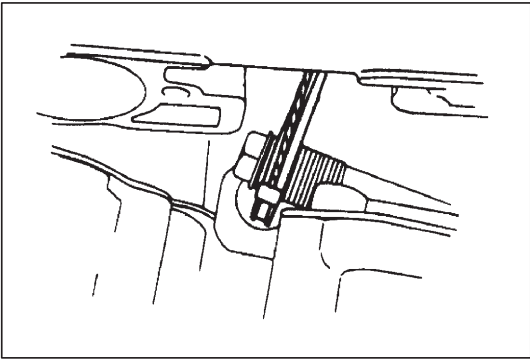
Used for	Piston outer diameter "a"	Spring free length "b"	
		Upper spring	Lower spring
Direct clutch accumulator (2)	31.80 – 31.85 mm (1.252 – 1.254 in.)	Upper spring	61.21 mm (2.410 in.)
		Lower spring	–
Forward clutch accumulator (1)	31.80 – 31.85 mm (1.252 – 1.254 in.)	Upper spring	64.68 mm (2.546 in.)
		Lower spring	–
Second brake accumulator (3)	34.80 – 34.85 mm (1.370 – 1.372 in.)	Upper spring	55.18 mm (2.172 in.)
		Lower spring	35.13 mm (1.383 in.)

#### Accumulator piston and spring specification (J20 engine):

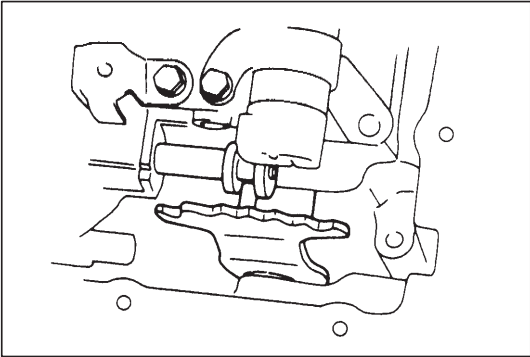
Used for	Piston outer diameter "a"	Spring free length "b"	
		Upper spring	Lower spring
Direct clutch accumulator (2)	31.80 – 31.85 mm (1.252 – 1.254 in.)	Upper spring	59.82 mm (2.355 in.)
		Lower spring	–
Forward clutch accumulator (1)	31.80 – 31.85 mm (1.252 – 1.254 in.)	Upper spring	64.68 mm (2.546 in.)
		Lower spring	–
Second brake accumulator (3)	34.80 – 34.85 mm (1.370 – 1.372 in.)	Upper spring	55.18 mm (2.172 in.)
		Lower spring	35.13 mm (1.383 in.)

#### Accumulator piston and spring specification (H25 engine) :

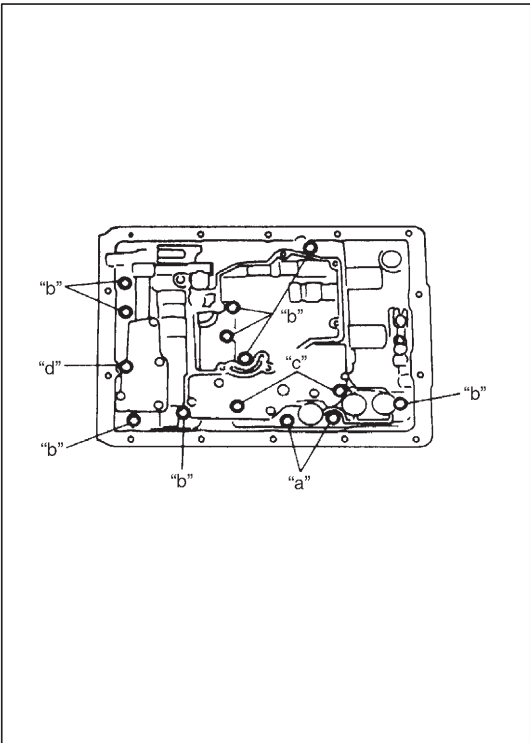
Used for	Piston outer diameter "a"	Spring free length "b"	
		Upper spring	Lower spring
Direct clutch accumulator (2)	31.80 – 31.85 mm (1.252 – 1.254 in.)	Upper spring	38.00 mm (1.496 in.)
		Lower spring	30.00 mm (1.181 in.)
Forward clutch accumulator (1)	31.80 – 31.85 mm (1.252 – 1.254 in.)	Upper spring	57.18 mm (2.251 in.)
		Lower spring	30.50 mm (1.201 in.)
Second brake accumulator (3)	34.80 – 34.85 mm (1.370 – 1.372 in.)	Upper spring	56.16 mm (2.211 in.)
		Lower spring	18.50 mm (0.728 in.)



- 34) Lift valve body a little and install nipple of throttle cable to throttle valve cam.



- 35) After confirming that accumulator piston is pushed all the way down, match pin of manual shift lever with groove in manual valve.



- 36) Fix valve body by using bolts with each nominal length as shown in the figure and tightening to specified torque.

#### **Tightening torque**

**Valve body bolt: 10 N·m (1.0 kg-m, 7.5 lb-ft)**

#### **Valve body bolt nominal length:**

**"a": 25 mm (0.98 in.)**

**"b": 30 mm (1.18 in.)**

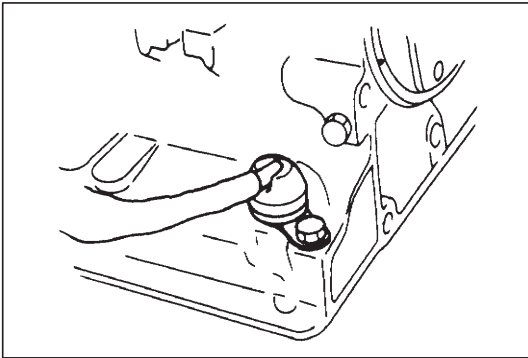
**"c": 47 mm (1.85 in.)**

**"d": 60 mm (2.36 in.)**

- 37) Install new gaskets, oil screen spacer and oil screen.

#### **Tightening torque**

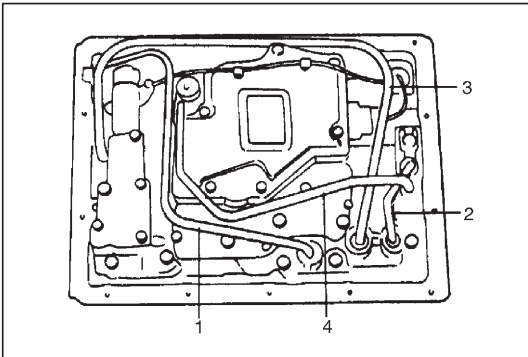
**Oil screen bolt: 5.5 N·m (0.55 kg-m, 4.0 lb-ft)**



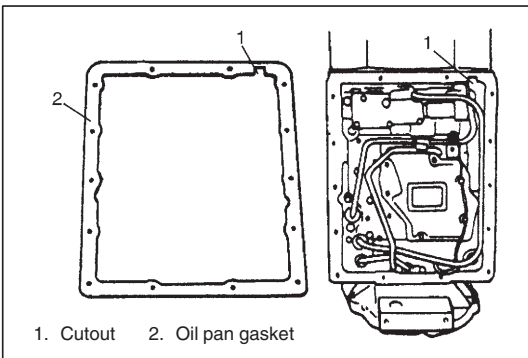
- 38) Lubricate new O-ring with A/T fluid and attach it to grommet of solenoid wire harness. Then connect solenoid wire harness to transmission case and fix it with solenoid wire harness clamp. Connect each connector to solenoid. And install new gasket and brake applying cover.

**Tightening torque**

**Brake applying cover bolt: 10 N·m (1.0 kg-m, 7.5 lb-ft)**



- 39) Using a plastic hammer, connect forward clutch applying tube (1), lube applying tube (2), reverse brake applying tube (3) and brake applying tube (4) in such order as shown in figure.



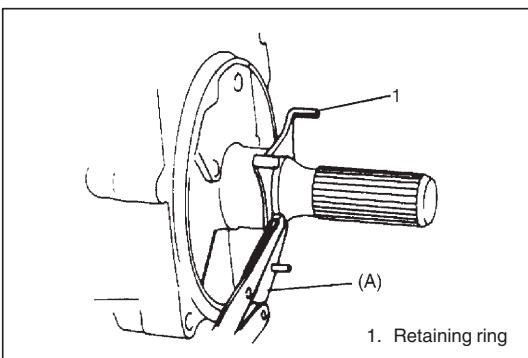
- 40) Install 2 oil pan magnets to transmission oil pan in such way that they do not interfere with oil tubes and install transmission oil pan with new oil pan gasket.

**NOTE:**

**Align cutout in oil pan gasket with that in transmission case.**

**Tightening torque**

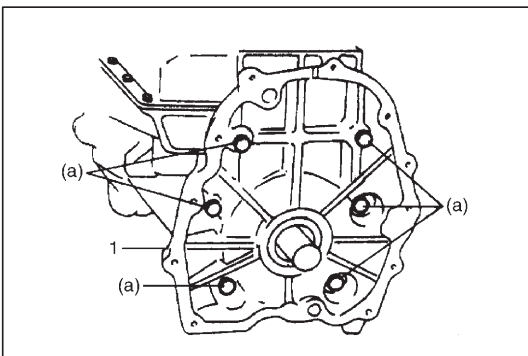
**Transmission oil pan bolt: 4.5 N·m (0.45 kg-m, 3.3 lb-ft)**



- 41) With wood rough key attached to output shaft, install sensor rotor by aligning its key groove with wood rough key and install C-ring by using special tool.

**Special tool**

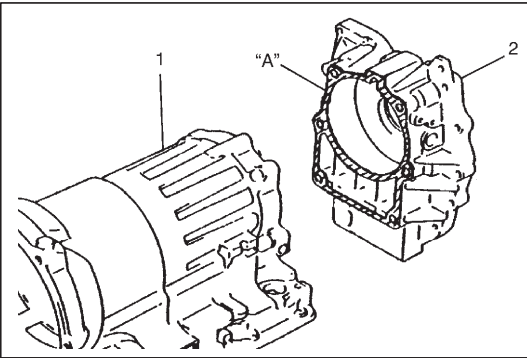
**(A): 09920-76010**



- 42) For G16 engine model, install adapter case (1) with new adapter gasket to transmission case and tighten adapter case bolts to specified torque.

**Tightening torque**

**Adapter case bolt (a): 35 N·m (3.5 kg-m, 25.5 lb-ft)**

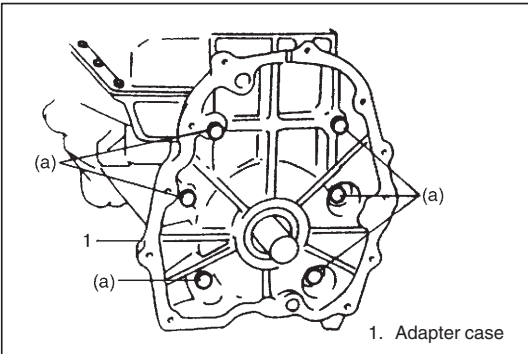


43) For J20 and H25 engines, perform the following procedures.

**[J20 and H25 engines]**

- a) Clean mating surface of transmission case (1) and adapter case (2) and apply sealant "A" to adapter case (2).

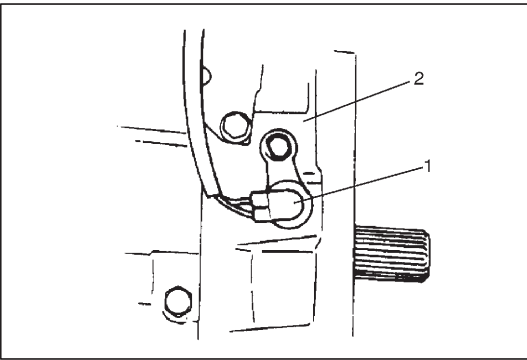
**"A" sealant: 99000-31110**



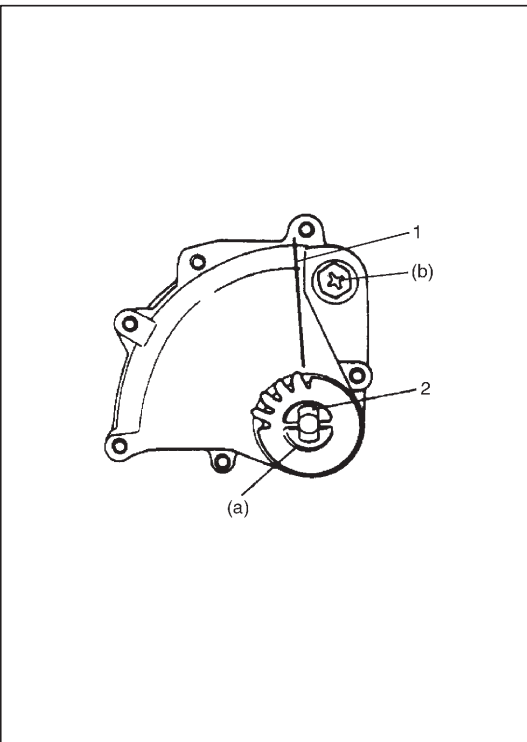
- b) Tighten adapter case bolts to specified torque.

**Tightening torque**

**Adapter case bolt (a): 42 N·m (4.2 kg-m, 30 lb-ft)**



- 44) Apply A/T fluid to new O-ring and install it to vehicle speed sensor (1) and then install vehicle speed sensor (1) to adapter case (2).



- 45) After turning manual shift shaft fully rearward, turn it back by 2 notches and set it to "N" range. Then install shift switch, lock washer and set nut and tighten set nut. After tightening it, bend claws of lock washer.

**Tightening torque**

**Manual shift shaft set nut (a):**

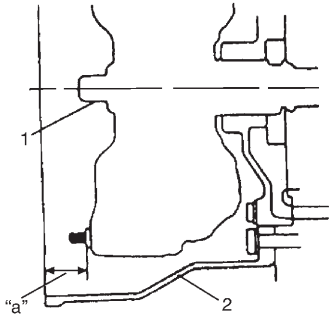
**4 N·m (0.4 kg-m, 3.0 lb-ft)**

- 46) With neutral reference line (1) and cut groove (2) in switch aligned, tighten lock bolt.

**Tightening torque**

**Shift switch lock bolt (b):**

**5.5 N·m (0.55 kg-m, 4.0 lb-ft)**



- 47) Confirm that torque converter is fully fitted in transmission. Confirmation can be done by measuring dimension between end surface of housing case (2) and drive plate installation seat.

**Standard dimension between end surface of case housing and drive plate installation seat “a”:**

**For G16 engine: 21.5 mm (0.85 in.)**

**For J20 engine: 17.3 mm (0.68 in.)**

**For H25 engine: 17.4 mm (0.69 in.)**

- 48) Check that torque converter turns smoothly and apply grease to center piece (1) of torque converter.



SECTION 7E

DIFFERENTIAL (FRONT)

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

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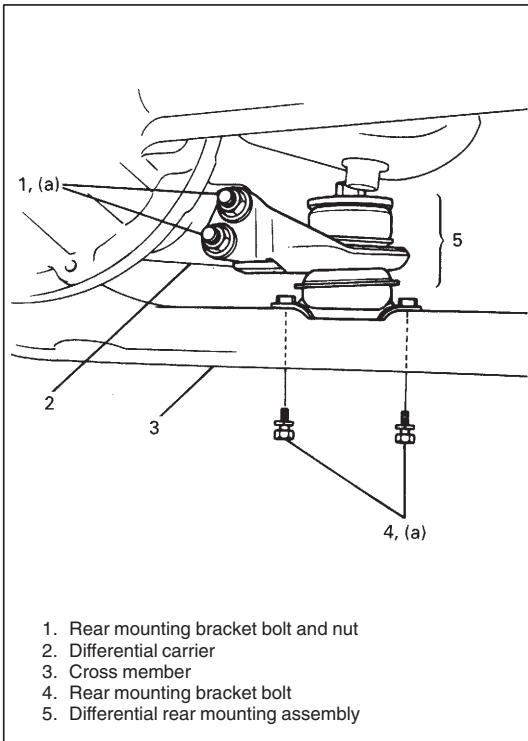
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**DISMOUNTING** ..... 7E-3

**REMOUNTING** ..... 7E-5

**UNIT REPAIR** ..... 7E-6

**TIGHTENING TORQUE SPECIFICATIONS** ..... 7E-6



## ON-VEHICLE SERVICE

### REMOVAL AND INSTALLATION

#### Differential Mountings

##### REAR MOUNTING

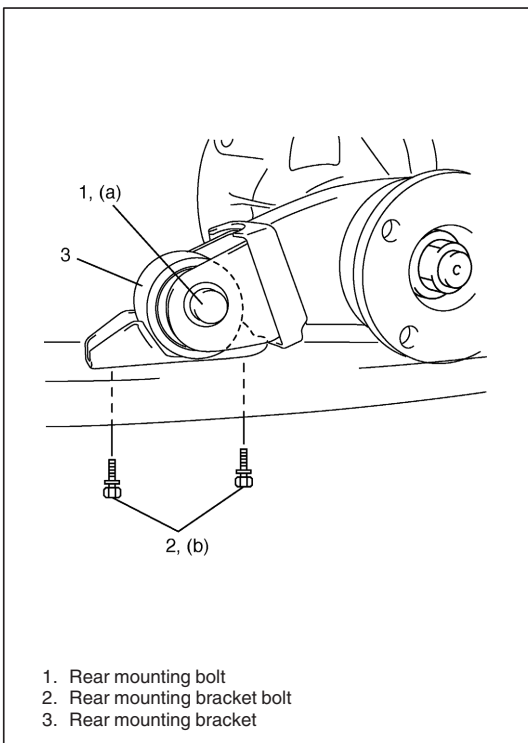
(For front differential carrier)

##### Solid Type

- 1) Lift up vehicle and remove mounting assembly by removing 2 bolts and nuts from differential carrier side and 2 bolts from cross member side.
- 2) Check mounting rubber for damage or deterioration and replace as necessary.
- 3) Use following torque for reinstallation.

##### Tightening Torque

(a): 50 N·m (5.0 kg-m, 36.5 lb-ft)



##### Bush Type

- 1) Lift up vehicle and remove rear mounting bracket by removing rear mounting bolt and rear mounting bracket bolts.
- 2) Check mounting rubber for damage or deterioration and replace as necessary.
- 3) Tighten rear mounting bolts and rear mounting bracket bolts to specified torque for reinstallation.

##### Tightening torque

Rear mounting bolt (a):

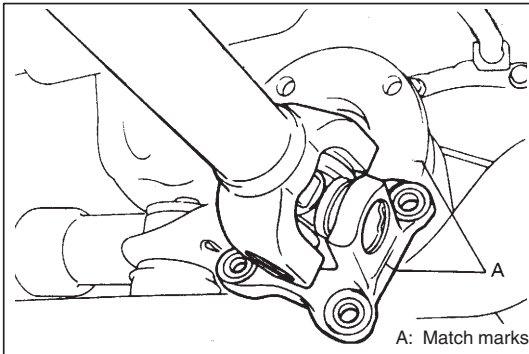
85 N·m (8.5 kg-m, 61.5 lb-ft)

Rear mounting bracket bolts (b):

50 N·m (5.0 kg-m, 36.5 lb-ft)

## DISMOUNTING

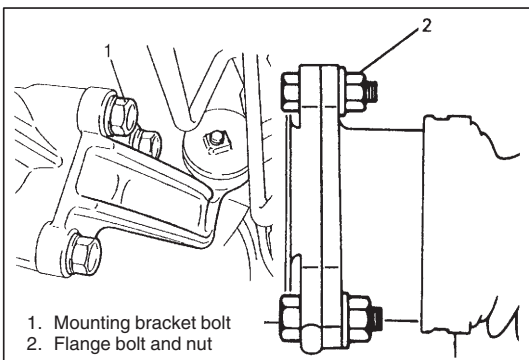
- 1) Lift up vehicle and drain oil.
- 2) Disconnect air hose and breather hose from differential housing.



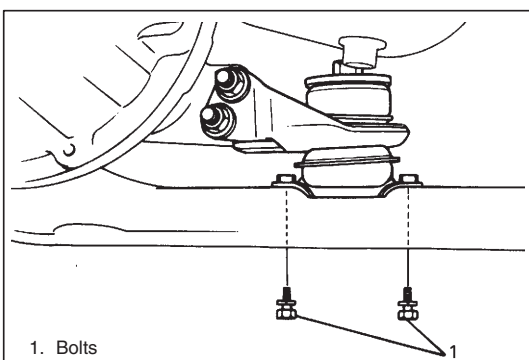
- 3) Before removing propeller shaft, give match marks on joint flange and propeller shaft as shown.
- 4) Remove propeller shaft flange by removing its 4 bolts and suspend it with cord or the like.

### NOTE:

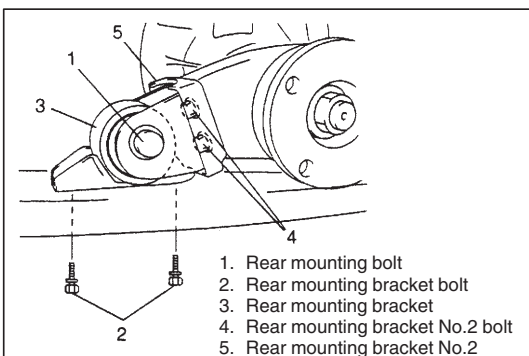
**If pull out propeller shaft, transfer oil must be drained before pulling out.**



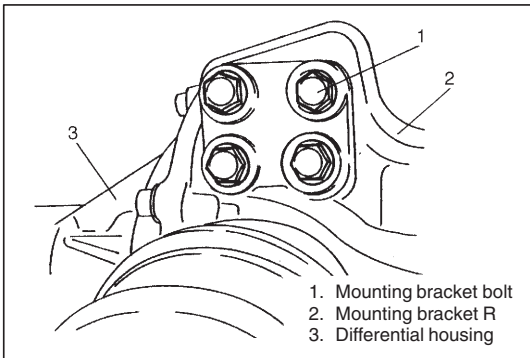
- 5) Remove 3 bolts for left mounting bracket and 3 bolts for drive shaft flange to set left side of differential free.



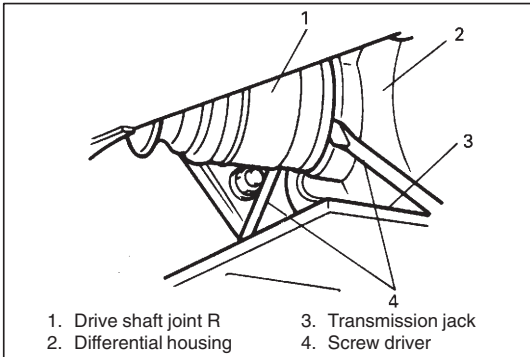
- 6) For solid type rear mounting, remove 2 bolts from cross member to set differential rear mounting free.



- 7) For bush type rear mounting, remove bolts and rear mounting bracket.
- 8) For bush type rear mounting, remove bolts and rear mounting bracket No.2.



- 9) With differential housing assembly held with transmission jack, remove mounting bolts on right end of housing.



- 10) Using 2 large screwdrivers as levers, pull out right side drive shaft joint from differential and dismount housing assembly from vehicle.

**CAUTION:**

**During above work, use care not to cause damage to drive shaft boot.**

## REMountING

For remounting, reverse dismounting procedure and use following tightening torque.

### Tightening torque

**Front drive shaft flange bolts (a):**

50 N·m (5.0 kg-m, 36.5 lb-ft)

**Propeller shaft flange bolts (a):**

50 N·m (5.0 kg-m, 36.5 lb-ft)

**Front mounting bracket bolts (a):**

50 N·m (5.0 kg-m, 36.5 lb-ft)

**Rear mounting bracket bolts (a):**

50 N·m (5.0 kg-m, 36.5 lb-ft)

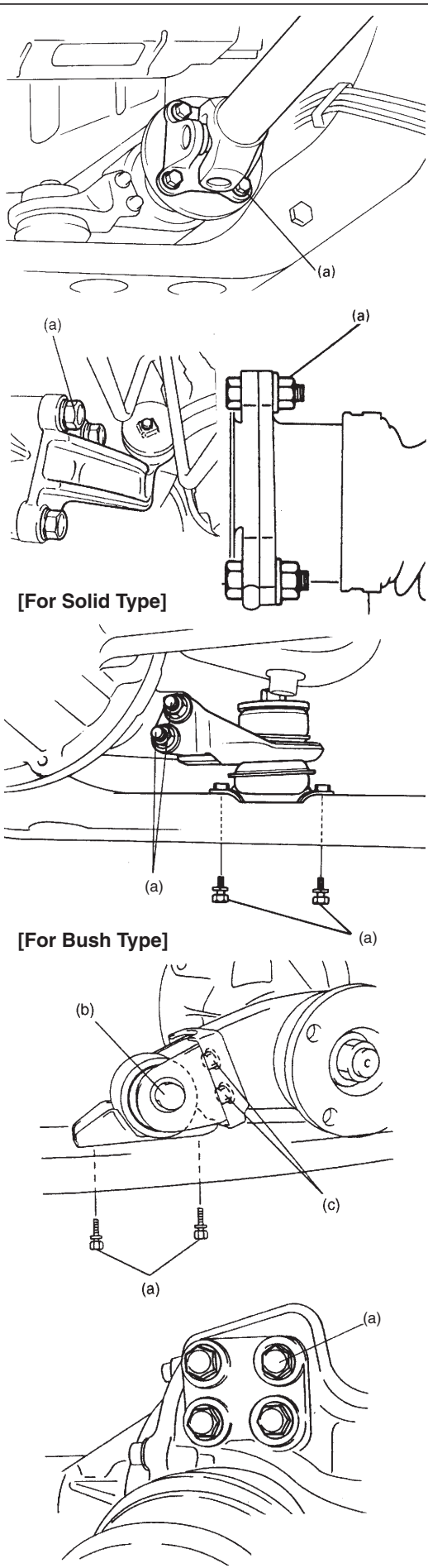
**Rear mounting bolt (b):**

85 N·m (8.5 kg-m, 61.5 lb-ft)

**Rear mounting bracket No.2 bolts (c):**

85 N·m (8.5 kg-m, 61.5 lb-ft)

After tightening all fasteners properly, fill hypoid gear oil as specified and check tightening of plugs with specification.



## UNIT REPAIR

Refer to the same section of “UNIT REPAIR MANUAL” mentioned in “FOREWORD” of this manual.

### TIGHTENING TORQUE SPECIFICATIONS

Fastening part	Tightening torque		
	N·m	kg-m	lb-ft
Differential oil level/filler plug	23	2.3	17.0
Differential oil drain plug	23	2.3	17.0
Front mounting bolts	85	8.5	61.5
Front mounting bracket bolts	50	5.0	36.5
Front drive shaft flange bolts	50	5.0	36.5
Propeller shaft flange bolts	50	5.0	36.5
Pump assembly bolts	13	1.3	9.5
Rear mounting bolt	85	8.5	61.5
Rear mounting bracket bolts	50	5.0	36.5
Rear mounting bracket No.2 bolts	85	8.5	61.5

SECTION 8C

INSTRUMENTATION/DRIVER INFORMATION

**WARNING:**

For vehicles equipped with Supplemental Restraint (Air Bag) System

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

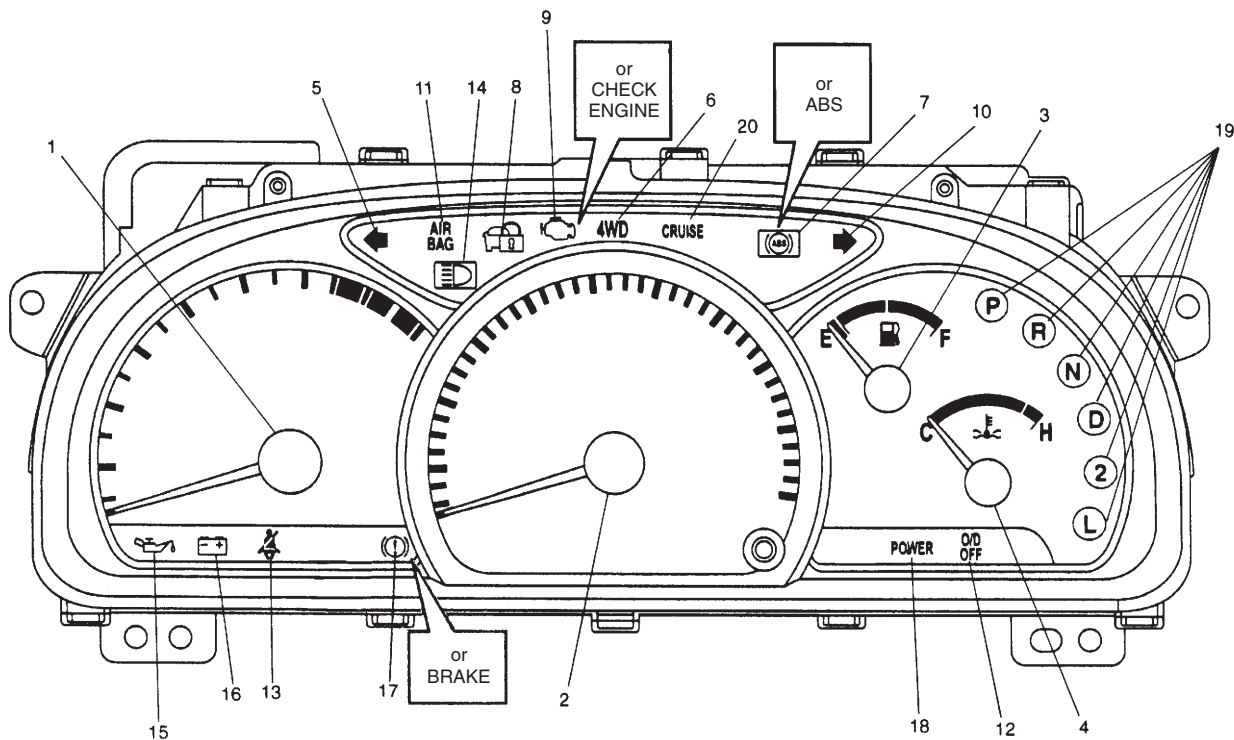
**NOTE:**  
For the descriptions (items) not found in this section, refer to the same section of the Service Manual mentioned in FOREWORD of this manual.

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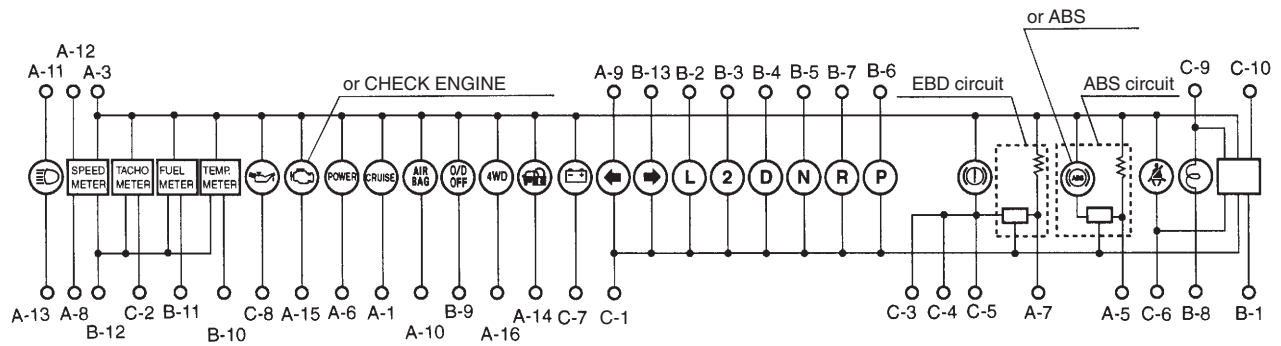
## GENERAL DESCRIPTION

### COMBINATION METER



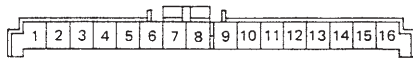
- |  |  |
|--|--|
| 1. Tachometer                              | 11. AIR BAG warning light (if equipped)                    |
| 2. Speedometer                             | 12. O/D OFF light (A/T vehicle only)                       |
| 3. Fuel level meter                        | 13. Fasten seat belt light (if equipped)                   |
| 4. Engine coolant temperature meter        | 14. High beam light  |
| 5. Turn signal pilot light (LH)            | 15. Engine oil pressure warning light                      |
| 6. 4WD indicator (if equipped)             | 16. Charge warning light                                   |
| 7. ABS warning light (if equipped)         | 17. Brake fluid level, parking brake and EBD warning light |
| 8. Immobilizer warning light (if equipped) | 18. POWER indicator light (A/T vehicle only)               |
| 9. Malfunction indicator light             | 19. Shift position indicator (A/T vehicle, if equipped)    |
| 10. Turn signal pilot light (RH)           | 20. CRUISE indicator light (if equipped)                   |



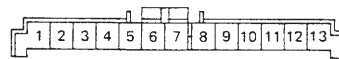


**NOTE:**  
Terminal arrangement of coupler viewed from harness side.

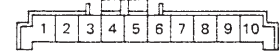
### Coupler A



### Coupler B



### Coupler C



### Coupler A

- |  |           |
|--|-----------|
| 1. To cruise control module (if equipped)      | Gr/Bl     |
| 2. Blank                                       | —         |
| 3. To ignition switch                          | B/W       |
| 4. Blank                                       | —         |
| 5. To ABS control module (if equipped)         | Bl/O      |
| 6. To PCM (A/T vehicle only)                   | Gr/Bl     |
| 7. To ABS control module (if equipped)         | Br        |
| 8. To VSS                                      | Bl/Y      |
| 9. To combination switch                       | G/R       |
| 10. To air bag SDM (if equipped)               | Y/G or Bl |
| 11. To main fuse                               | W/Bl      |
| 12. To fuse box                                | W         |
| 13. To combination switch                      | R         |
| 14. To ECM (PCM for A/T vehicle) (if equipped) | V         |
| 15. To ECM (PCM for A/T vehicle)               | V/Y       |
| 16. To ECM (PCM for A/T vehicle) (if equipped) | O/B       |

### Coupler B

- |   |      |
|---|------|
| 1. To door switch (driver side)                                   | B/Bl |
| 2. To transmission range switch (A/T vehicle only, if equipped) L | G/Bl |
| 3. To transmission range switch (A/T vehicle only, if equipped) 2 | G/O  |
| 4. To transmission range switch (A/T vehicle only, if equipped) D | Y/G  |
| 5. To transmission range switch (A/T vehicle only, if equipped) N | O/Bl |
| 6. To transmission range switch (A/T vehicle only, if equipped) P | O/G  |
| 7. To transmission range switch (A/T vehicle only, if equipped) R | R    |
| 8. To ground  | B    |
| 9. To PCM (A/T vehicle only)                                      | W/B  |
| 10. To ECT sensor   | Y/W  |
| 11. To fuel level gauge   | Bl/W |
| 12. To ground   | B/Y  |
| 13. To combination switch   | G/Y  |

### Coupler C

- |                                      |      |
|--------------------------------------|------|
| 1. To ground                         | B    |
| 2. To ECM (PCM for A/T vehicle)      | Br   |
| 3. To ignition switch (if equipped)  | V/R  |
| 4. To brake fluid level switch       | R/B  |
| 5. To parking brake switch           | V    |
| 6. To seat belt switch (if equipped) | Gr/R |
| 7. To generator                      | W/R  |
| 8. To engine oil pressure switch     | Y/B  |
| 9. To combination switch             | R/Y  |
| 10. To ignition switch (if equipped) | Bl/R |

SECTION 8D

WINDOWS, MIRRORS, SECURITY AND LOCKS

**WARNING:**

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

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

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

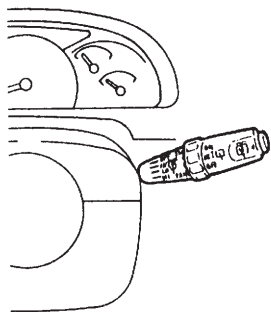
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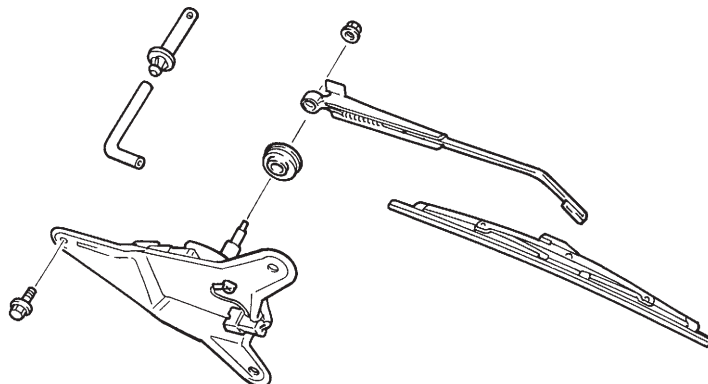
## GENERAL DESCRIPTION

### REAR WIPER AND WASHER (IF EQUIPPED)

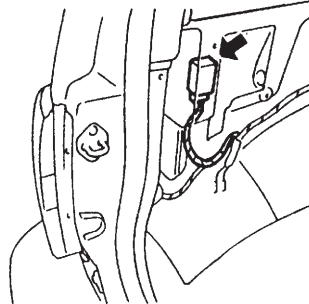
**Rear Wiper and Washer Switch  
(For vehicle without cruise control system)**



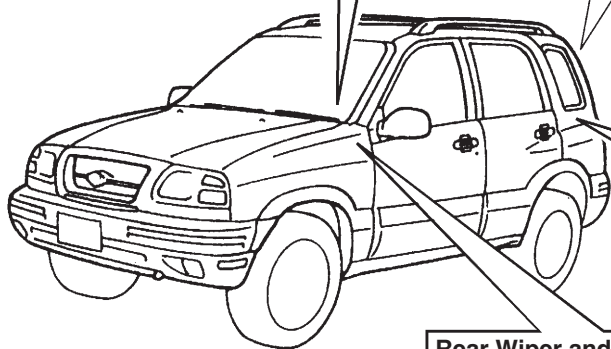
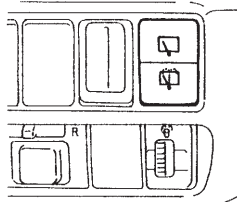
**Rear Wiper Assembly**

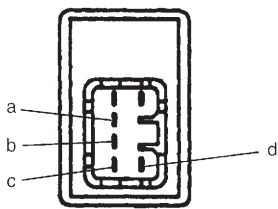
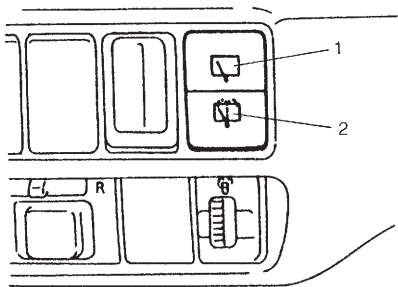


**Rear Wiper Intermittent Relay  
(For vehicle without cruise control system)**



**Rear Wiper and Washer Switch  
(For vehicle with cruise control system)**





1. Rear wiper switch  
2. Rear washer switch

## ON-VEHICLE SERVICE

### REAR WINDOW WIPER AND WASHER (FOR VEHICLE WITH CRUISE CONTROL SYSTEM)

#### INSPECTION

##### Rear Wiper and Washer Switch

- 1) Disconnect negative (–) cable at battery.
- 2) Disconnect combination switch lead wire coupler.
- 3) Use a circuit tester to check the continuity at each switch position. If any continuity is not obtained, replace switch.

##### Rear Wiper Switch

Terminal Switch	a	b	c	d
OFF				
Rear wiper ON				
Rear washer ON				

### REAR WINDOW WIPER AND WASHER (FOR VEHICLE WITHOUT CRUISE CONTROL SYSTEM)

#### INSPECTION

Refer to “REAR WIPER AND WASHER SWITCH (IN COMBINATION SWITCH)” under “REAR WIPER AND WASHER (IF EQUIPPED)” in the same section of the Service Manual mentioned in FOREWORD of this manual.

### REAR WIPER INTERMITTENT RELAY

#### INSPECTION

Refer to “REAR WIPER INTERMITTENT RELAY” under “REAR WIPER AND WASHER (IF EQUIPPED)” in the same section of the Service Manual mentioned in FOREWORD of this manual when service vehicle without cruise control system.

## SECTION 8E

# CRUISE CONTROL SYSTEM

### WARNING:

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

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

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## **GENERAL DESCRIPTION**

### **CAUTIONS IN SERVICING**

Refer to Section 8.

### **SYMBOLS AND MARKS**

Refer to Section 8A.

### **ABBREVIATIONS**

Refer to Section 8A.

### **WIRING COLOR SYMBOLS**

Refer to Section 8.

### **JOINT CONNECTOR**

Refer to Section 8.

### **FUSE BOX AND RELAY**

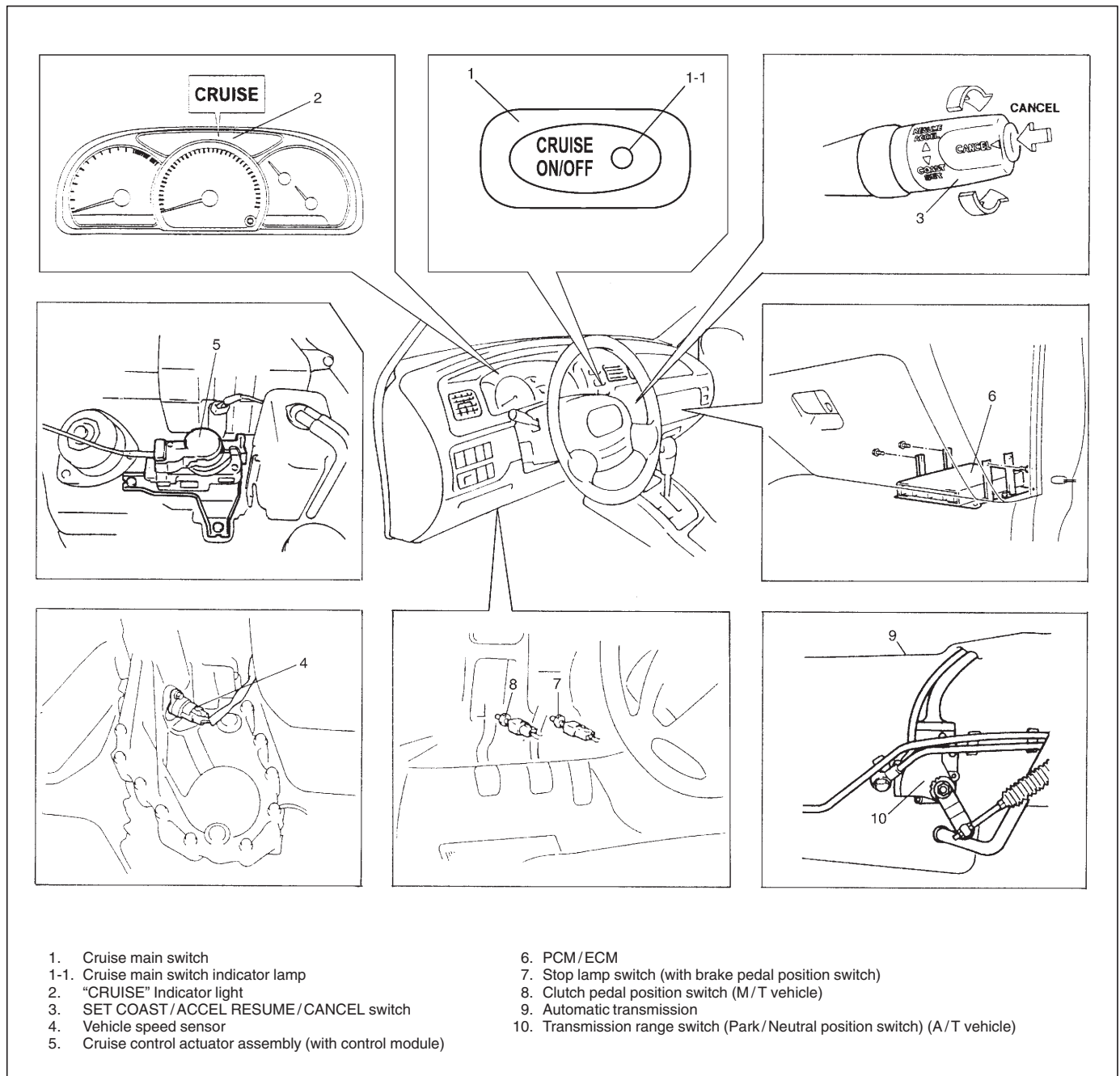
Refer to Section 8A.

### **POWER SUPPLY DIAGRAM**

Refer to Section 8A.

## CRUISE CONTROL SYSTEM

The cruise control system is a device which maintains a preset vehicle speed while driving at a high speed, e.g., on a highway. It allows the driver to drive his vehicle at a constant speed of 40 km/h (25 mile/h) or higher without depressing the accelerator pedal (constant cruising). The system also has such functions as to change the vehicle speed without operating the accelerator pedal (but using SET COAST and ACCEL RESUME switches), cancel cruise control (CANCEL switch) and resume the speed in memory automatically after cruise control is cancelled (ACCEL RESUME switch). The system mainly consists of a vehicle speed sensor, an actuator assembly incorporated with control module, cruise main switch, SET COAST switch, ACCEL RESUME switch and CANCEL switch, etc.



## CRUISE CONTROL SYSTEM CIRCUIT

Refer to Section 8A.

## COMPONENTS AND FUNCTIONS

Component	Function
Cruise control actuator assembly with control module	<p>Cruise control module: Executes centralized control by means of a microcomputer over all functions including setting a constant speed, resuming it, setting coast, limiting minimum speed and cancelling cruise control.</p> <p>Cruise control actuator (stepping motor &amp; clutch): Actuates accelerator pedal through cruise cable and arm according to a signal from cruise control module to control vehicle speed.</p>
Cruise main switch	This switch has a momentary contact type button to turn the cruise control system ON and OFF.
SET COAST switch	<p>When this switch is rotated (ON) and then released (OFF) while vehicle is running at a speed 40 km/h (25 mile/h) or higher, vehicle speed at that OFF moment is stored in memory and it is maintained (constant cruising).</p> <p>Rotating this switch (ON) continuously during constant cruising keeps slowing down vehicle speed as long as it is ON. When it is released (OFF), vehicle speed at that moment is stored in memory and vehicle starts constant cruising.</p>
ACCEL RESUME switch	<p>When this switch is rotated (ON) during constant cruising, vehicle speed keeps increasing as long as it is ON. When it is released (OFF), vehicle speed at that moment is stored in memory and vehicle starts constant cruising. If vehicle speed is higher than 40 km/h (25 mile/h) after cruise control is cancelled, turning this switch ON momentarily will resume the speed at which vehicle was running before cancellation.</p>
CANCEL switch	When this switch is pressed (ON), cruise control (accelerator pedal control) is cancelled.
Vehicle speed sensor (VSS)	<p>The vehicle speed sensor (VSS) is mounted on the transfer or transmission.</p> <p>The VSS converts vehicle speed into pulse signal and send it to the cruise control module.</p>
Stop lamp switch	<p>The stop lamp switch has 2 contact points. One contact point closes when the brake pedal is depressed to light the stop lamp and provides a voltage signal to the cruise control module. This signal, when inputted cancels cruise control (sets the accelerator pedal free).</p> <p>The other contact point (brake pedal position switch) opens when the brake pedal is depressed, to shut off the power to the magnetic clutch in the actuator, thereby cancelling cruise control (setting the accelerator pedal free).</p> <p>This switch is installed to cancel cruise control (constant cruising) without fail.</p>
Clutch pedal position switch (M/T vehicle only)	<p>When the clutch pedal is depressed, the clutch pedal position switch closes and provides a ground signal to cruise control module.</p> <p>The cruise control module cancels cruise control (accelerator pedal control) when this signal is inputted.</p>
Transmission range switch (Park/Neutral position switch) (A/T vehicle only)	<p>When the selector lever is places in either "P" or "N" position, the transmission range switch closes and provides a ground signal to cruise control module. The cruise control module cancels cruise control (accelerator pedal control) when this signal is inputted.</p>
PCM – Throttle opening signal (4 A/T vehicle only)	<p>Throttle opening signal is inputted from PCM.</p> <p>From this signal, the cruise control module detects the throttle opening and uses it as one of the factors to output the overdrive and TCC OFF command signal to PCM.</p>



Component	Function
PCM – Overdrive and TCC off command signal output	When the throttle opening for the vehicle speed exceeds the specified value during cruise control, the cruise control module sends this signal to PCM. PCM uses this signal as one of signals to control 4-A/T.
Cruise main switch indicator lamp	In the state with the ignition switch ON and the cruise control system OFF, pressing this switch once and releasing it will activate the cruise control system and the cruise control module will cause the indicator lamp to light up.
“CRUISE” indicator lamp	It lights up when cruise control (accelerator pedal control) is functioning.

## CANCEL CONDITIONS

Constant cruising is cancelled under the following conditions.

- Ignition switch is turned OFF.
- Cruise main switch is turned OFF.
- Vehicle speed has slowed down to lower than minimum operating speed (40 km/h (25 mile/h)).
- \*Vehicle speed varies beyond cancel speed range (–15 km/h, –9 mile/h) from preset speed.
- \*Brake pedal is depressed. (Stop lamp switch is turned ON).
- \*Clutch pedal is depressed (Clutch pedal position switch is turned ON) (For M/T vehicle).
- \*Selector lever is shifted to N range (Park/Neutral position switch in transmission range switch is turned ON).
- \*CANCEL switch is turned ON.

## NOTE:

When constant cruising is cancelled under above any condition with \* (asterisk), vehicle speed before cancellation can be resumed by operating ACCEL RESUME switch, provided that vehicle speed is higher than 40 km/h (25 miles/h).

# DIAGNOSIS

## DIAGNOSIS TABLE

Condition	Possible Cause	Correction
Main switch indicator lamp fails to light up or remains ON.	Main switch indicator lamp circuit faulty	Refer to “CRUISE MAIN SWITCH INDICATOR LAMP CIRCUIT CHECK” in this section.
	Cruise control module power and ground circuits faulty	Refer to “CRUISE CONTROL MODULE POWER AND GROUND CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
“CRUISE” indicator lamp fails to light up or remains ON.	“CRUISE” indicator lamp circuit	Refer to ““CRUISE” INDICATOR LAMP CIRCUIT CHECK” in this section.
	Cruise control module power and ground circuits	Refer to “CRUISE CONTROL MODULE POWER AND GROUND CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.

Condition	Possible Cause	Correction
Vehicle speed can not be set.	Actuator cable play maladjusted or actuator cable faulty	Refer to "CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT" in this section.
	Main switch, "COAST/SET", "RESUME/ACCEL" and "CANCEL" switch circuits faulty	Refer to "CRUISE MAIN SWITCH, COAT/SET, RESUME/ACCEL AND CANCEL SWITCHES CIRCUITS CHECK" in this section.
	VSS circuit faulty	Refer to "VSS CIRCUIT CHECK" in this section.
	Stop lamp switch circuit faulty	Refer to "STOP LAMP SWITCH (WITH PEDAL POSITION SWITCH) CIRCUITS CHECK" in this section.
	Transmission range switch circuit (4 A/T model only) faulty	Refer to "TRANSMISSION RANGE SWITCH CIRCUIT CHECK" in this section.
	Clutch pedal position switch circuit faulty	Refer to "CLUTCH PEDAL POSITION SWITCH CIRCUIT CHECK" in this section.
	Cruise control module power and ground circuits faulty	Refer to "CRUISE CONTROL MODULE POWER AND GROUND CIRCUIT CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.
Vehicle set speed is unstable.	Actuator cable play maladjusted or actuator cable faulty	Refer to "CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT" in this section.
	VSS circuit faulty	Refer to "VSS CIRCUIT CHECK" in this section.
	Throttle valve opening signal circuit faulty	Refer to "THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.
Actual vehicle speed deviates above or below set speed.	Actuator cable play maladjusted or actuator cable faulty	Refer to "CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT" in this section.
	Throttle valve opening signal circuit faulty	Refer to "THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.
Acceleration or deceleration by using "RESUME/ACCEL" or "COAST/SET" switch is not attained.	Main switch, "COAST/SET", "RESUME/ACCEL" and "CANCEL" switch circuits faulty	Refer to "CRUISE MAIN SWITCH, COAT/SET, RESUME/ACCEL AND CANCEL SWITCHES CIRCUITS CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.
Cruise control is not cancelled even when "CANCEL" switch is operated.	Main switch, "COAST/SET", "RESUME/ACCEL" and "CANCEL" switch circuits faulty	Refer to "CRUISE MAIN SWITCH, COAT/SET, RESUME/ACCEL AND CANCEL SWITCHES CIRCUITS CHECK" in this section.
	Actuator assembly faulty	Replace actuator assembly.

Condition	Possible Cause	Correction
“RESUME/ACCEL” switch fails to resume preset vehicle speed after cruise control is cancelled.	Main switch, “COAST/SET”, “RESUME/ACCEL” and “CANCEL” switch circuits faulty	Refer to “CRUISE MAIN SWITCH, COAST/SET, RESUME/ACCEL AND CANCEL SWITCHES CIRCUITS CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
Cruise control is not cancelled even when brake pedal is depressed.	Stop lamp switch circuit faulty	Refer to “STOP LAMP SWITCH (WITH PEDAL POSITION SWITCH) CIRCUITS CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
Cruise control is not cancelled even when clutch pedal is depressed.	Clutch pedal position switch circuit faulty	Refer to “CLUTCH PEDAL POSITION SWITCH CIRCUIT CHECK” in this Section.
	Actuator assembly faulty	Replace actuator assembly.
Cruise control is not cancelled even when selector lever is shifted to “N” position.	Transmission range switch circuit (4 A/T model only) faulty	Refer to “TRANSMISSION RANGE SWITCH CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
4 speed A/T gear shifting is frequent between 3rd and overdrive when driving on uphill road (Hunting).	Throttle valve opening signal circuit faulty	Refer to “THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK” in this Section.
	Overdrive and TCC off command signal circuit faulty	Refer to “OVERDRIVE AND TCC OFF COMMAND SIGNAL CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.
4 speed A/T is not shifted to overdrive gear even though not on uphill road.	Throttle valve opening signal circuit faulty	Refer to “THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK” in this section.
	Overdrive and TCC off command signal circuit faulty	Refer to “OVERDRIVE AND TCC OFF COMMAND SIGNAL CIRCUIT CHECK” in this section.
	Actuator assembly faulty	Replace actuator assembly.

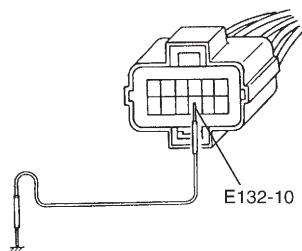
## NOTE ON SYSTEM CIRCUIT INSPECTION

Refer to “PRECAUTION FOR ELECTRICAL CIRCUIT SERVICE” in Section 0A.

## CRUISE MAIN SWITCH INDICATOR LAMP CIRCUIT CHECK

Step	Action	Yes	No
1	Check Circuit for Short. 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Turn ignition switch ON. Does cruise main switch indicator lamp turn ON?	"Lg/W" circuit is shorted to ground.	Go to Step 2.
2	Check Circuit for Open 1) Check for proper connection to cruise control module at terminal E132-10. 2) If OK, connect terminal E132-10 to ground. Does indicator lamp turn ON at ignition switch ON?	Lamp circuit is OK.	Go to Step 3.
3	Lamp Bulb Check 1) Remove cruise main switch from instrument panel. 2) Remove lamp bulb and check it. Is bulb in good condition?	"B/W" or "Lg/W" circuit is open.	Replace bulb.

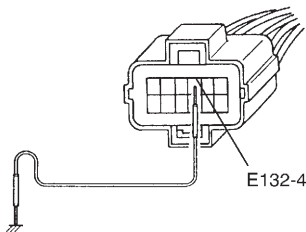
Fig. for Step 2



**“CRUISE” INDICATOR LAMP CIRCUIT CHECK**

Step	Action	Yes	No
1	Check Circuit for Short. 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Turn ignition switch ON. Does “CRUISE” indicator lamp turn ON?	“G/Y” circuit is shorted to ground.	Go to Step 2.
2	Check Circuit for Open 1) Check for proper connection to cruise control module at terminal E132-4. 2) If OK, connect terminal E132-4 to ground. Does indicator lamp turn ON at ignition switch ON?	Lamp circuit is OK.	Go to Step 3.
3	Lamp Bulb Check 1) Remove combination meter from instrument panel. 2) Remove lamp bulb and check it. Is bulb in good condition?	“B/W” or “G/Y” circuit is open.	Replace bulb.

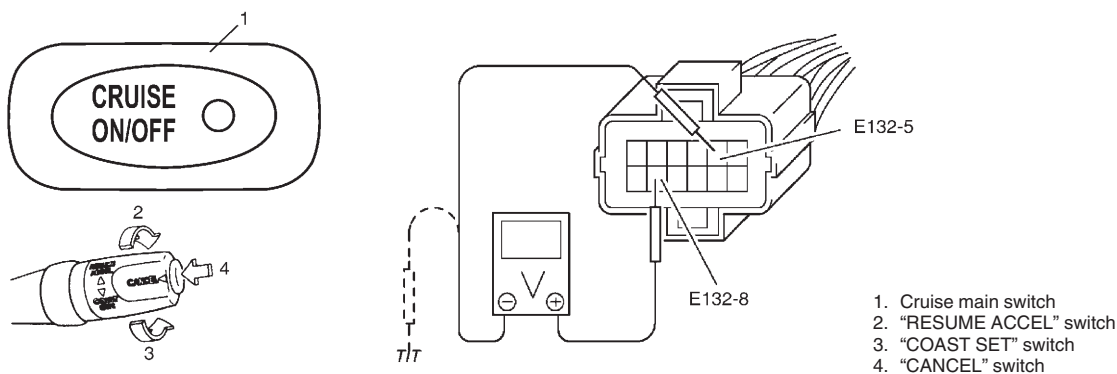
Fig. for Step 2



## CRUISE MAIN SWITCH, COAST/SET, RESUME/ACCEL AND CANCEL SWITCHES CIRCUITS CHECK

Step	Action	Yes	No
1	<p>Switch Circuit Check</p> <p>1) Disconnect connector from cruise control module with ignition switch OFF.</p> <p>2) Check for proper connection to cruise control module at terminal E132-8.</p> <p>3) If OK, check resistance between terminal E132-8 and E132-5 under each condition below.</p> <p>Switch circuit specification (resistance)</p> <p>All switches OFF : Infinity</p> <p>COAST/SET switch rotated (ON): 200 – 240 <math>\Omega</math></p> <p>RESUME/ACCEL switch rotated (ON): 820 – 1000 <math>\Omega</math></p> <p>CANCEL switch pressed (ON): About 0 <math>\Omega</math></p> <p>4) Turn ignition switch ON and check voltage between terminal E132-8 and ground under each condition below.</p> <p>Switch circuit specification (voltage)</p> <p>Cruise main switch released (OFF): 0 V</p> <p>Cruise main switch pressed (ON): 10 – 14 V</p> <p>Are check results in above steps 3) and 4) satisfactory?</p>	Switch circuit is OK.	Go to Step 2.
2	<p>Cruise Main Switch Check</p> <p>1) Check cruise main switch for operation referring to “Cruise Main Switch Inspection” in this section.</p> <p>Is switch in good condition?</p>	Go to step 3.	Replace.
3	<p>COAST/SET, RESUME/ACCEL and CANCEL Switches Check</p> <p>1) Check COAST/SET, RESUME/ACCEL and CANCEL switches for operation referring to “COAST/SET, RESUME/ACCEL and CANCEL SWITCHES” in this section.</p> <p>Are all switches in good condition?</p>	“B/Y” or “Lg” circuit is open or short.	Replace.

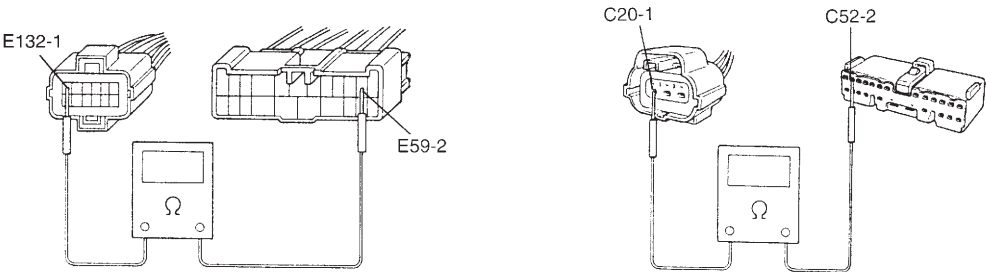
Fig. for Step 1



VSS CIRCUIT CHECK

Step	Action	Yes	No
1	<p>Vehicle Speed Sensor Circuit Check</p> <p>1) Disconnect connector from cruise control module with ignition switch OFF.</p> <p>2) Check for proper connection to cruise control module at terminal E132-1.</p> <p>3) If OK, check for continuity between terminals E132-1 and E59-2, terminals C52-2 and C20-1 referring to "CRUISE CONTROL SYSTEM" in Section 8A.</p> <p>Is check result satisfactory?</p>	VSS circuit is OK.	"BI/Y" circuit is open.

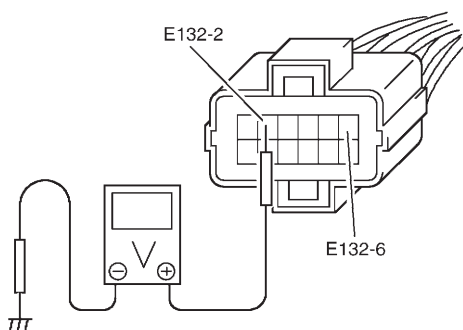
Fig. for Step 1



**STOP LAMP SWITCH (WITH PEDAL POSITION SWITCH) CIRCUITS CHECK**

Step	Action	Yes	No
1	<p>Stop Lamp Switch (With Pedal Position Switch) Circuits Check</p> <p>1) Disconnect connector from cruise control module with ignition switch OFF.</p> <p>2) Check for proper connection to cruise control module at terminals E132-2 and E132-6.</p> <p>3) If OK, turn ignition switch ON.</p> <p>4) Check Voltage between each terminal and ground under each condition below.</p> <p>Stop lamp switch circuit specification</p> <p>Brake pedal released terminal E132-2: 0 V</p> <p>Brake pedal released terminal E132-6: 10 – 14 V</p> <p>Brake pedal depressed terminal E132-2: 10 – 14 V</p> <p>Brake pedal depressed terminal E132-6: 0 V</p> <p>Is check result satisfactory?</p>	Stop lamp switch (with pedal position switch) circuits are OK.	Go to Step 2.
2	<p>Stop Lamp Switch Position Check</p> <p>1) Check stop lamp switch for installation position referring to “STOP LAMP SWITCH” in Section 5.</p> <p>Is check result satisfactory?</p>	Go to Step 3.	Adjust.
3	<p>Stop Lamp Switch (With Pedal Position Switch) Check</p> <p>1) Disconnect connector from stop lamp switch.</p> <p>2) Check for proper connection to stop lamp switch at all terminals.</p> <p>3) If OK, check stop lamp and pedal position switches for operation referring to “STOP LAMP SWITCH” in this section.</p> <p>Is this switch in good condition?</p>	“Y/G” or “G/W” circuit is open or short.	Replace.

Fig. for Step 1

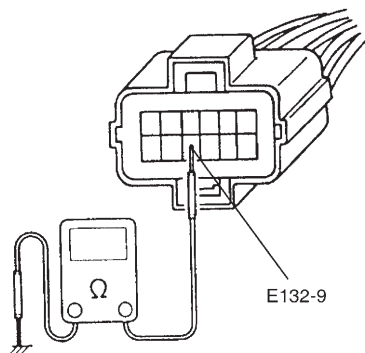




## TRANSMISSION RANGE SWITCH CIRCUIT CHECK

Step	Action	Yes	No
1	<p>Transmission Range Switch Circuit Check</p> <p>1) Disconnect connector from cruise control module with ignition switch OFF.</p> <p>2) Check for proper connection to cruise control module at terminal E132-9.</p> <p>3) If OK, connect ohmmeter between terminal E132-9 and ground.</p> <p>4) Check for continuity under each condition below.</p> <p>Transmission range switch circuit specification</p> <p>Selector lever at "P" or "N" range: Continuity</p> <p>"R", "D", "2" or "L" range: Infinity</p> <p>Is check result satisfactory?</p>	Transmission range switch circuit is OK.	Go to Step 2.
2	<p>Transmission Range Switch Check</p> <p>1) Disconnect transmission range switch connector.</p> <p>2) Check for proper connection to transmission range switch at disconnected connector terminals.</p> <p>3) If OK, check transmission range switch for operation referring to "TRANSMISSION RANGE SWITCH" in Section 7B1.</p> <p>Is check result satisfactory?</p>	"B/R" or "B/Y" circuit is open or short.	Adjust or replace.

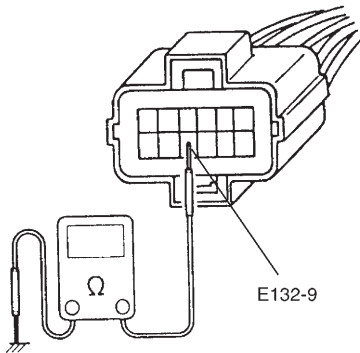
Fig. for Step 1



## CLUTCH PEDAL POSITION SWITCH CIRCUIT CHECK

Step	Action	Yes	No
1	<p>Clutch Pedal Position Switch Circuit Check</p> <p>1) Disconnect connector from cruise control module with ignition switch OFF.</p> <p>2) Check for proper connection to cruise control module at terminal E132-9.</p> <p>3) If OK, check for resistance between terminal E132-9 and ground under each condition below.</p> <p>Clutch pedal position switch circuit specification</p> <p>Clutch pedal released: Infinity</p> <p>Clutch pedal depressed: Continuity</p> <p>Is check result satisfactory?</p>	Clutch pedal position switch circuit is OK.	Go to Step 2.
2	<p>Clutch Pedal Position Switch Position Check</p> <p>1) Check clutch pedal position switch for installation position referring to "CLUTCH PEDAL POSITION SWITCH" in this section.</p> <p>Is check result satisfactory?</p>	Go to Step 3.	Adjust.
3	<p>Clutch Pedal Position Switch Check</p> <p>1) Disconnect connector from clutch pedal position switch.</p> <p>2) Check for proper connection to clutch pedal position switch at all terminals.</p> <p>3) If OK, check clutch pedal position switch for operation referring to "CLUTCH PEDAL POSITION SWITCH" in this section.</p> <p>Is this switch in good condition?</p>	"BI" or "B" circuit is open or short.	Replace.

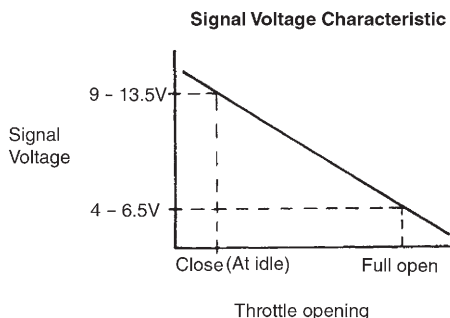
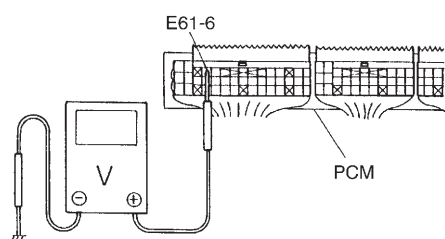
Fig. for Step 1



## THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK

Step	Action	Yes	No
1	Powertrain Control Module (PCM) Diagnostic Trouble Code Check 1) Check PCM for DTC. Is there a DTC related to throttle position sensor?	Check and repair TP sensor referring to Section 6-1.	Go to Step 2.
2	Throttle Valve Opening Signal Circuit Check 1) Turn ignition switch ON. 2) Check voltage between terminal E61-6 of PCM connector connected and ground. Does voltage vary linearly according to throttle opening?	Throttle valve opening signal circuit is OK.	Go to Step 3.
3	Supply Voltage Check 1) Disconnect connector from PCM with ignition switch OFF. 2) Check for proper connection to PCM at terminal E61-6. 3) If OK, connect "BLU" wire terminal of main relay to ground with service wire. 4) Turn ignition switch ON. 5) Check voltage between E61-6 of PCM connector and ground. Is it 10 – 14 V?	Check TP sensor and circuits referring to Section 6-1. If OK, substitute a known-good PCM and recheck.	Check "Gr" wire for open and short. If OK, proceed to cruise control module power and ground circuits check.

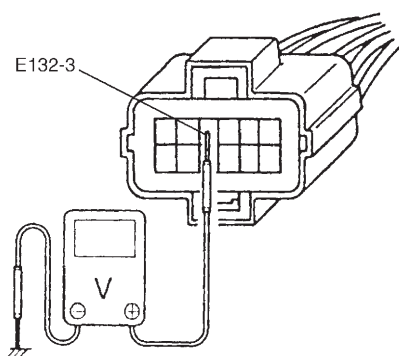
Fig. for Step 2



## OVERDRIVE AND TCC OFF COMMAND SIGNAL CIRCUIT CHECK

Step	Action	Yes	No
1	<b>Overdrive off Command Signal Circuit Check</b> 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Check for proper connection to cruise control module at terminal E132-3. 3) If OK, turn ignition switch ON. 4) Check voltage between terminal E132-3 and ground. Is it 10 –14 V?	This signal circuit is OK.	Check “P/BI” wire for open and short. If OK, substitute a known-good PCM and recheck.

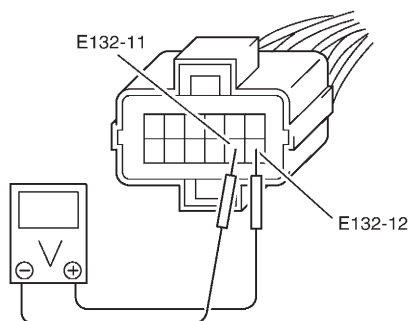
Fig. for Step 1



## CRUISE CONTROL MODULE POWER AND GROUND CIRCUITS CHECK

Step	Action	Yes	No
1	<b>Power and Ground Circuits Check</b> 1) Disconnect connector from cruise control module with ignition switch OFF. 2) Check for proper connection to cruise control module at terminals E132-12 and E132-11. 3) If OK, turn ignition switch ON. 4) Check voltage between terminals E132-12 and E132-11. Does voltmeter indicate 10 – 14 V?	Power and ground circuits are OK.	“BI/B” or “B” circuit is open.

Fig. for Step 1



## CRUISE CONTROL MODULE AND ITS CIRCUIT INSPECTION

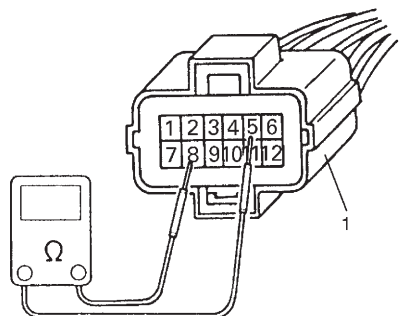
### CAUTION:

Cruise control module can not be checked by itself. It is strictly prohibited to connect voltmeter or ohmmeter to cruise control module with coupler disconnected from it.

### VOLTAGE CHECK

Check for input or output voltage of control module (voltage between each circuit and body ground) with cruise control module connector connected.

CIRCUIT	NORMAL VOLTAGE	CONDITION
Vehicle speed sensor	Indicator deflection repeated between 0 – 1 V and 3 – 5 V	Ignition switch ON and cruise main switch ON. Vehicle hoisted and rear left tire turned slowly with rear right tire locked.
Stop lamp switch	0 – 2 V	Brake pedal released.
	10 – 14 V	Brake pedal depressed.
Overdrive and TCC off signal (4 A/T only)	10 – 14 V	Ignition switch ON.
CRUISE indicator light	10 – 14 V	Ignition switch ON.
Ground	–	–
Brake pedal position switch (in stop lamp switch)	10 – 14 V	Ignition switch ON and brake pedal released.
	0 V	Ignition switch ON and brake pedal depressed.
Throttle valve opening signal from PCM (4A/T only)	Ignition switch ON. Voltage varies as specified by graph in “THROTTLE VALVE OPENING SIGNAL CIRCUIT CHECK” in this section.	
Cruise main switch	7 – 9 V	Ignition switch ON and cruise main switch released.
	3 – 5 V	Ignition switch ON and cruise main switch pressed.
CANCEL switch	0 – 1 V	Ignition switch ON and CANCEL switch pressed.
COAST SET switch	1 – 2 V	Ignition switch ON and COAST SET switch rotated.
RESUME ACCEL switch	2.5 – 4 V	Ignition switch ON and RESUME ACCEL switch rotated.
Clutch pedal position switch (M/T only)	10 – 14 V	Ignition switch ON and clutch pedal released.
	0 – 1 V	Ignition switch ON and clutch pedal depressed fully.
Transmission range switch (Park/Neutral position switch) (A/T only)	0 V	Ignition switch ON and selector lever in “P” or “N” range.
	10 – 14 V	Ignition switch ON and selector lever in “R”, “D”, “2” or “L” range.
Cruise main switch indicator lamp	0 – 1 V	Ignition switch ON.
	10 – 14 V	Ignition switch ON and after input main switch ON signal.



1. Cruise control module connector (E132)

**RESISTANCE CHECK**

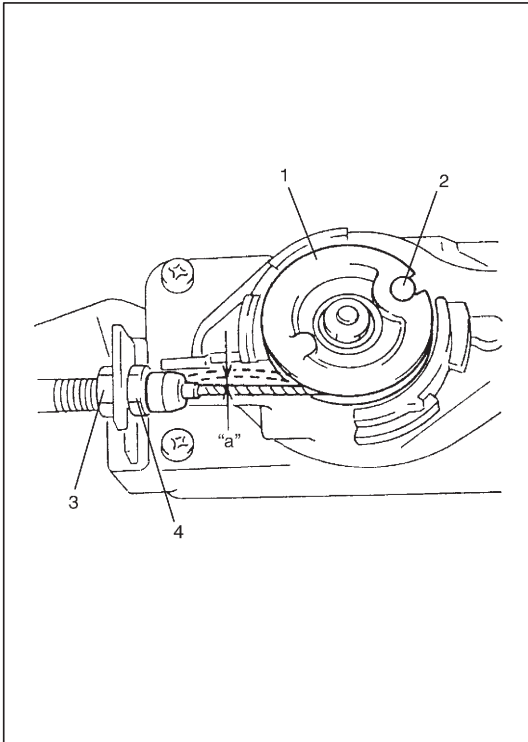
- 1) Disconnect cruise control module connector from cruise control module with ignition switch OFF.

**CAUTION:**

**Never touch terminals of cruise control module itself or connect voltmeter or ohmmeter.**

- 2) Check resistance between each pair of terminals of disconnected connectors as shown in the following table.

TERMINALS	CIRCUIT	STANDARD RESISTANCE	CONDITION
E132-11 – body ground	Ground	Continuity	—
E132-6 – E132-12	Brake pedal position switch (in stop lamp switch)	Continuity	Brake pedal released.
		No continuity	Brake pedal depressed.
E132-8 – E132-5	CANCEL switch	No continuity	CANCEL switch OFF (released).
		Continuity	CANCEL switch ON (pressed).
	COAST SET switch	No continuity	COAST SET switch OFF (released).
		200 – 240 $\Omega$	COAST SET switch ON (rotated).
	RESUME ACCEL switch	No continuity	RESUME ACCEL switch OFF (released).
		820 – 1000 $\Omega$	RESUME ACCEL switch ON (rotated).
E132-9 – E132-11 (M/T)	Clutch pedal position switch (M/T only)	No continuity	Clutch pedal released.
		Continuity	Clutch pedal depressed fully.
E132-9 – E132-11 (A/T)	Transmission range switch (Park/neutral position switch) (A/T only)	Continuity	Selector lever in “P” or “N” range.
		No continuity	Selector lever in “R”, “D”, “2” or “L” range.



## CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT

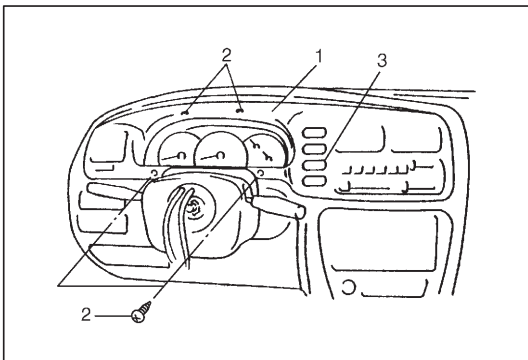
### INSPECTION AND ADJUSTMENT

- 1) Remove actuator cap.
- 2) With actuator lever (1) returned at original position (2) (Where lever does not move clockwise any further), check cruise cable for play.

If it is out of specification, adjust it as follows

**Cruise Cable play "a": 1 – 2 mm (0.04 – 0.08 in.)**

- 3) Loosen cable lock nut (3).
- 4) Adjust cable play to specified value by turning adjusting nut (4).
- 5) Tighten lock nut (3) securely after adjustment.

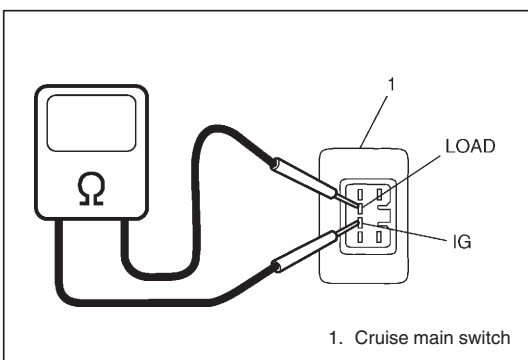


## ON-VEHICLE SERVICE

### CRUISE MAIN SWITCH

#### REMOVAL

- 1) Disconnect negative (–) cable at battery.
- 2) Remove meter cluster hood (1) by removing its mounting screws (2).
- 3) Remove cruise main switch (3) from instrument panel.
- 4) Disconnect connector from cruise main switch (3).



#### INSPECTION

- 1) Check for resistance between "IG" and "LOAD" terminals.  
If check result is not satisfactory, replace.

#### Cruise main switch specification

Switch button released: Infinity

Switch button pressed: About 3.9 kΩ

#### INSTALLATION

Reverse removal procedure for installation.

## COAST/SET, RESUME/ACCEL AND CANCEL SWITCHES

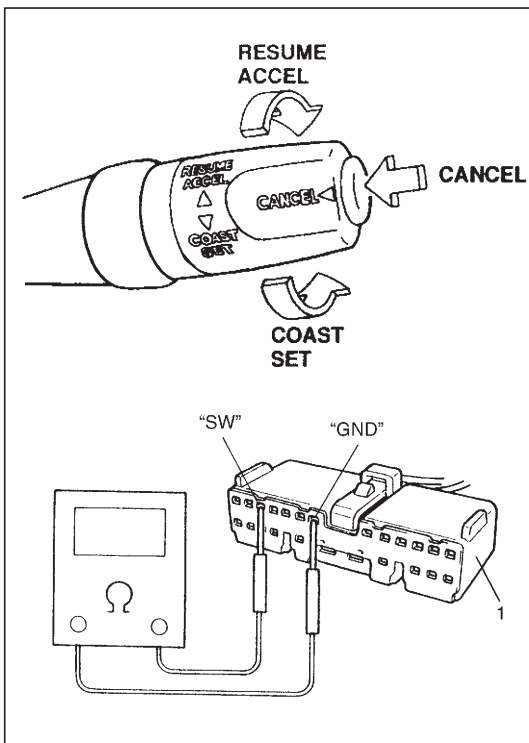
### CAUTION:

Never disassemble combination switch assembly. Disassembly will spoil its original functions.

These switches are built in the combination switch assembly.

### REMOVAL AND INSTALLATION

Refer to "COMBINATION SWITCH" in Section 3C1.



### INSPECTION

- 1) Disable air bag system referring to "DISABLING AIR BAG SYSTEM" in Section 10B.
- 2) Disconnect connector (1) of COAST/SET, RESUME/ACCEL and CANCEL switches.
- 3) Check for resistance between "SW" and "GND" terminals of disconnected switch connector (1) under each condition below. If check result is not satisfactory, replace combination switch assembly.

### COAST/SET, RESUME/ACCEL and CANCEL switch specification

All switches released (OFF): Infinity

CANCEL switch pressed (ON): About 0  $\Omega$

COAST/SET switch rotated (ON): 200 – 240  $\Omega$

RESUME/ACCEL switch rotated (ON): 820 – 1000  $\Omega$

## VEHICLE SPEED SENSOR (VSS)

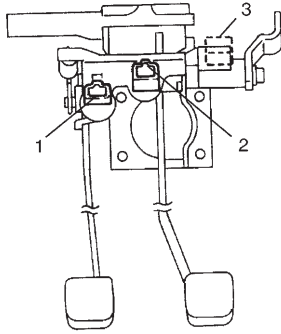
### INSPECTION

Refer to Section 6E2.

## TRANSMISSION RANGE SWITCH

Refer to Section 7B1 for inspection, removal, installation and adjustment.

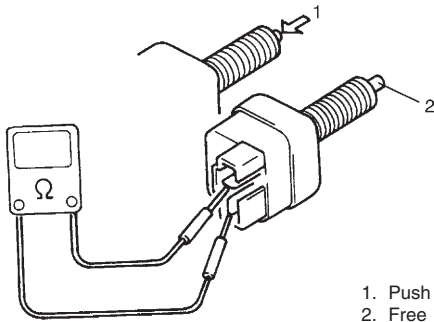




- 1. CPP switch for cruise control
- 2. Stop lamp switch
- 3. CPP switch for starter (if equipped)

## CLUTCH PEDAL POSITION (CPP) SWITCH REMOVAL

- 1) Disconnect CPP switch connector with ignition switch OFF.
- 2) Remove CPP switch from pedal bracket.



- 1. Push
- 2. Free

## INSPECTION

Check for resistance between terminals under each condition below.

If check result is not satisfactory, replace.

### CPP switch resistance

**When switch shaft is free: Continuity**

**When switch shaft is pushed: No continuity**

## INSTALLATION

- 1) Install CPP switch to pedal bracket.
- 2) With clutch pedal released, adjust switch position so that clearance between end of thread and clutch pedal bracket is within specification.

**Clearance "a" between end of thread and clutch pedal bracket:**

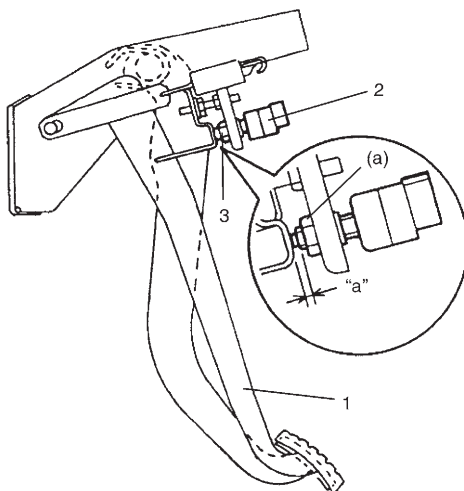
**1.5 – 2.0 mm (0.06 – 0.08 in)**

- 3) Tighten lock nut to specified torque.

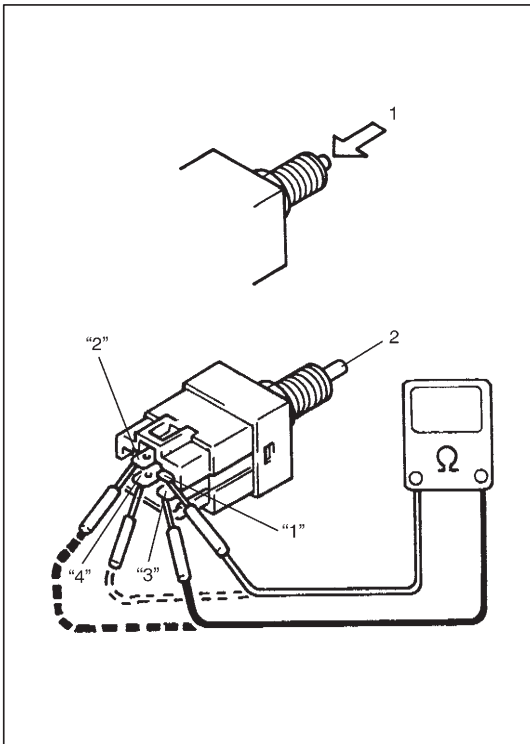
### Tightening torque

**CPP switch lock nut (a): 7.5 N·m (0.75 kg-m, 5.5 lb-ft)**

- 4) Connect connector to CPP switch securely.



- 1. Clutch pedal
- 2. CPP switch for cruise control
- 3. Lock nut



## STOP LAMP SWITCH (WITH PEDAL POSITION SWITCH)

### INSPECTION

- 1) Disconnect negative (–) cable at battery.
- 2) Disconnect stop lamp switch connector and remove stop lamp switch from pedal bracket.
- 3) Check switch (2 contacts) for resistance under each of the following each conditions.  
If check result is not satisfactory, replace stop lamp switch.

#### Stop lamp switch specification

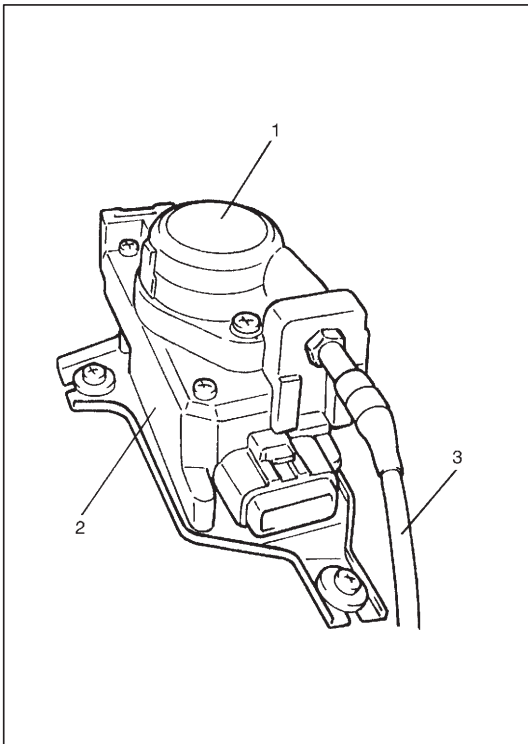
**Between terminals “1” and “3” (Contact for stop lamp)**

**FREE (2): Continuity, PUSH (1): No continuity**

**Between terminals “2” and “4” (Contact for brake pedal position)**

**FREE (2): No continuity, PUSH (1): Continuity**

- 4) Install stop lamp switch and adjust its position referring to Section 5.



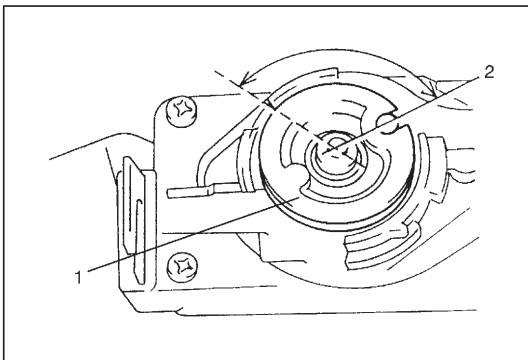
## CRUISE CONTROL ACTUATOR ASSEMBLY (WITH CONTROL MODULE)

### CAUTION:

**Never disassemble cruise control actuator assembly. Disassembly will spoil its original function.**

### REMOVAL

- 1) Disconnect negative (–) cable at battery.
- 2) Disconnect connector from actuator assembly (2) (with control module).
- 3) Remove actuator cap (1) from actuator assembly (2).
- 4) Disconnect cruise cable (3) from actuator assembly (2).
- 5) Remove actuator assembly (2) from vehicle.



### INSPECTION

Move actuator lever (1) by hand and check its operation as described below.

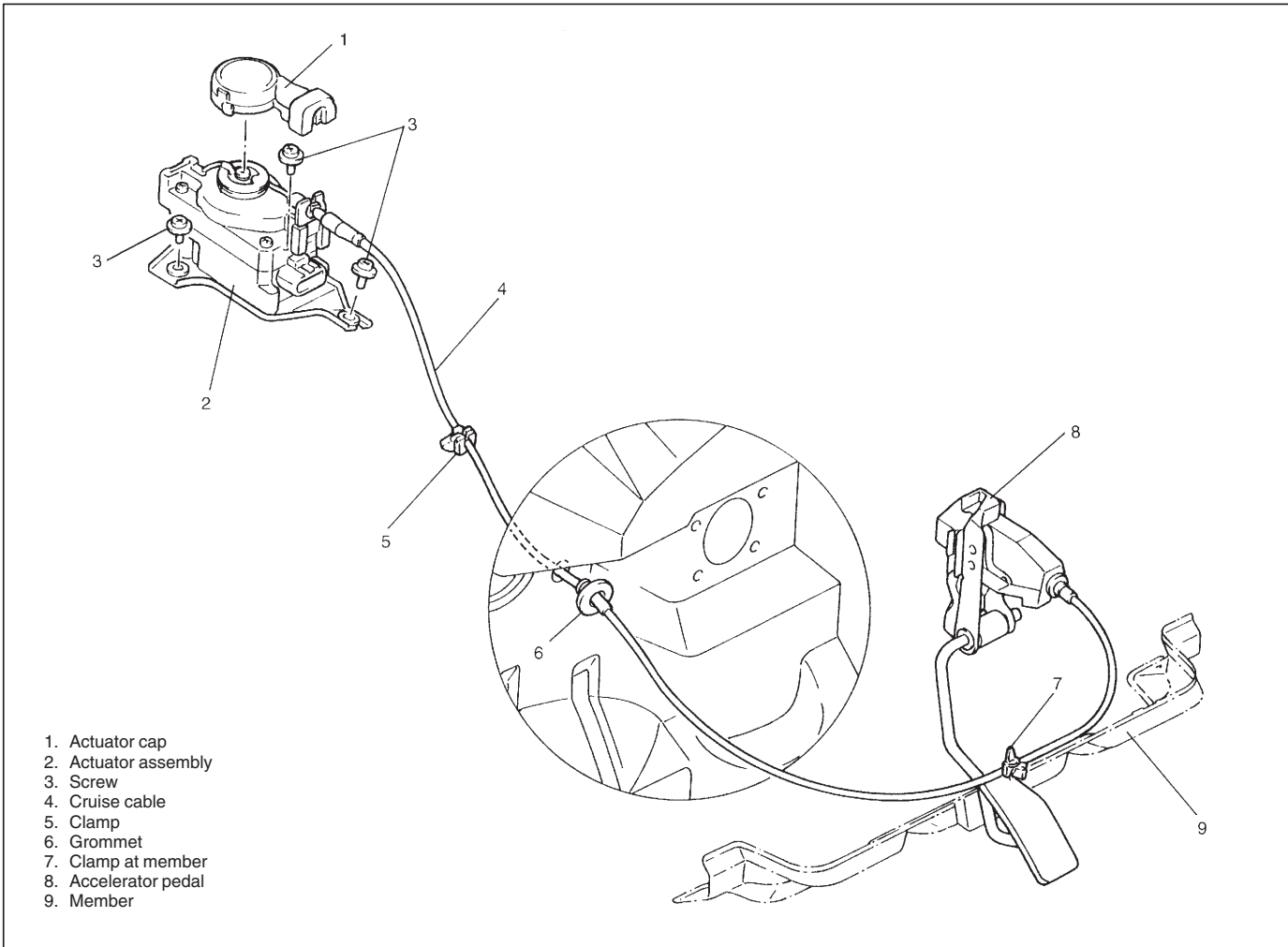
- 1) Actuator lever (1) should not turn clockwise.
- 2) Actuator lever (1) should turn smoothly by about 1/3 rotation counterclockwise and contact internal stopper.
- 3) When hand is taken off from actuator lever (1) at the position in 2) above, it should return to its original position (2) by return spring force. If actuator lever (1) does not operate as described above, replace it.

### INSTALLATION

Install actuator assembly by reversing removal procedure, noting the following point.

- Adjust cruise cable play to specification referring to “CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT” in this section.

## CRUISE CABLE



### REMOVAL

- 1) Disconnect cruise cable from cruise control arm and accelerator bracket.
- 2) Remove actuator cap and disconnect cruise cable from actuator.
- 3) Release cable from all clamps.
- 4) Remove cable from vehicle.

### INSTALLATION

Install cruise cable by reversing removal procedure, noting the following points.

- Refer to the figure for proper clamp location and cable routing.
- Adjust cable play to specification referring to "CRUISE CABLE PLAY INSPECTION AND ADJUSTMENT" in this section.

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