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SUPPLEMENTARY SERVICE MANUAL

RG413 / RG415

SUPPLEMENTARY SERVICE MANUAL 99501-80G10-01E

USE THIS MANUAL WITH MANUALS MENTIONED IN FOREWORD OF THIS MANUAL.

Printed in Japan

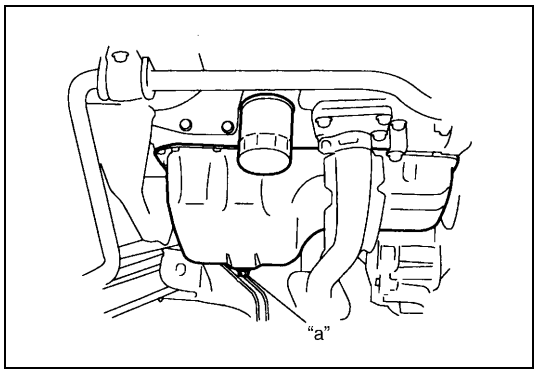
SUZUKI
Caring for Customers

99501-80G10-01E
（英）

Abbreviations and Symbols May Be Used in This Manual

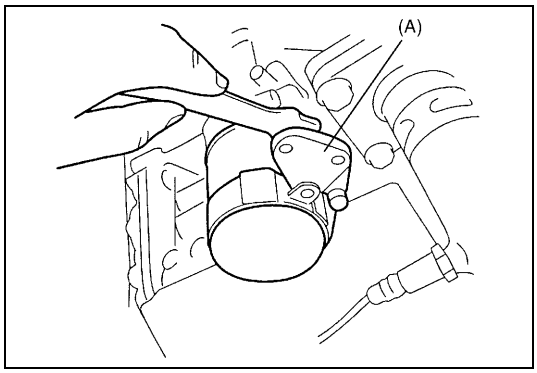
Abbreviations

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



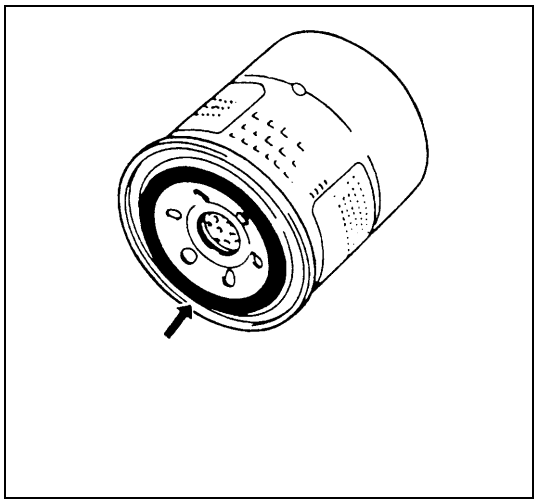
1) Drain engine oil by removing drain plug.
2) After draining oil, wipe drain plug clean. Reinstall drain plug, and tighten it securely as specified below.

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



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

Special tool
(A) : 09915-47330



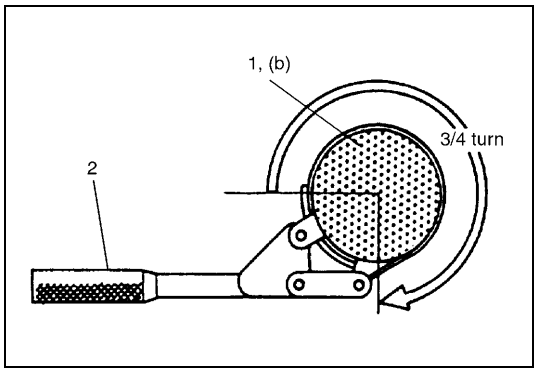
NOTE:

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

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

CAUTION:

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

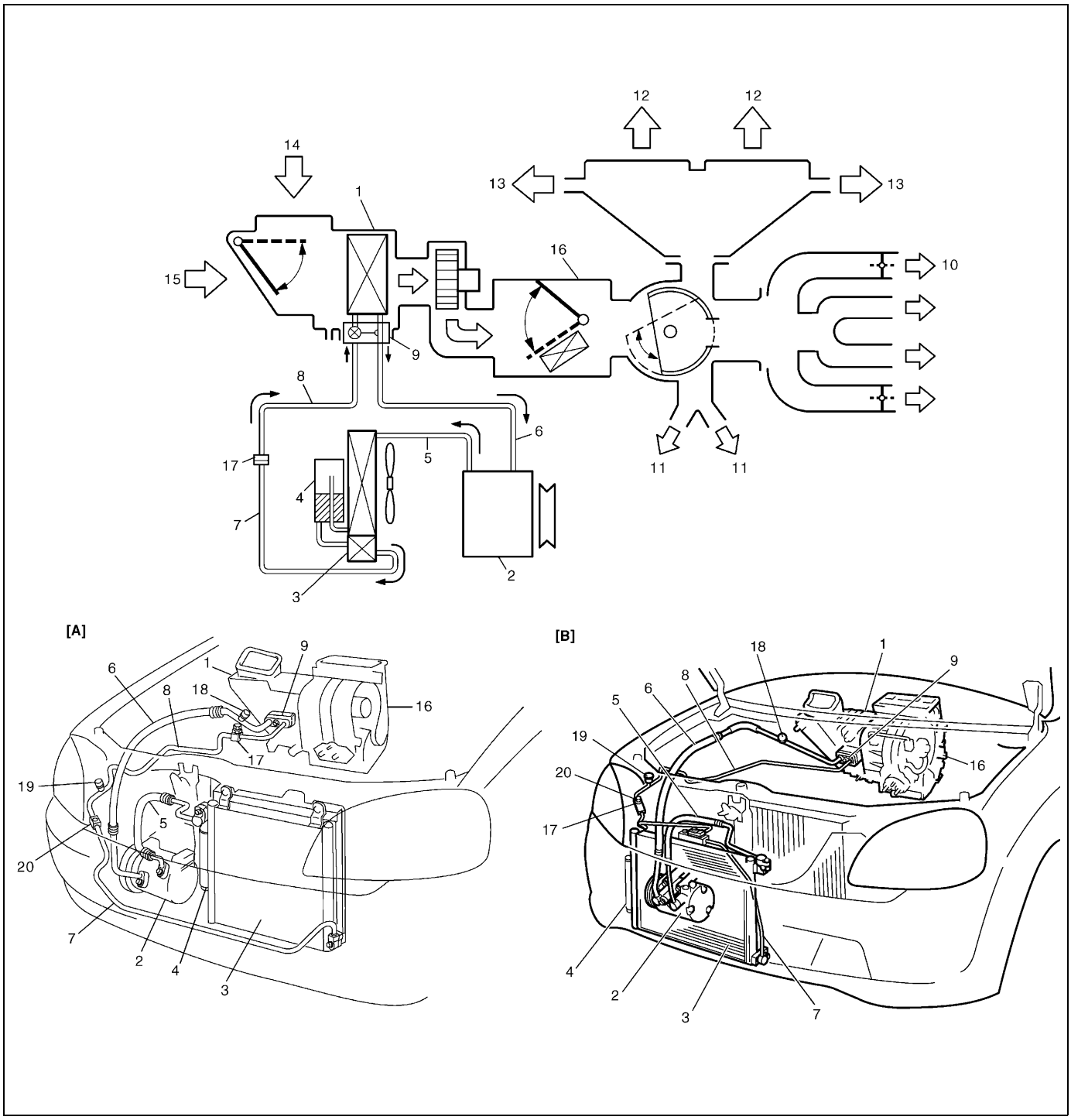


5) Tighten the filter (1) 3/4 turn from the point of contact with the mounting surface using an oil filter wrench (2).

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

General Description

Major Components and Location



[A]: Except sport model	5. Discharge hose	11. Foot air	17. A/C refrigerant pressure switch
[B]: Sport model	6. Suction pipe	12. Defroster air	18. Low pressure charge valve
1. Cooling unit	7. Condenser outlet pipe	13. Demister air	19. High pressure charge valve
2. Compressor	8. Liquid pipe	14. Fresh air	20. Sight glass
3. Condenser assembly	9. Expansion valve	15. Recirculation air	
4. Receiver/dryer	10. Ventilation air	16. Heater unit	

ECM Voltage Values Table for Relation of A/C Control (Sport Model)

Terminal	Wire	Circuit	Measurement ground	Normal value	Condition
C41-1	PNK/BLK	A/C compressor clutch and condenser fan switch	Ground to engine (Fig B)	0 – 1 V	Fulfill all the following conditions: • Blower speed selector ON • A/C switch ON • Engine running • A/C pressure sensor ON
				12 – 15 V	Except the above mentioned condition with engine running
C41-5	BLK/RED	Main power supply for ECM	Ground to engine (Fig B)	10 – 14 V	Ignition switch ON with engine not running
C41-6	BLK/RED	Main power supply for ECM	Ground to engine (Fig B)	10 – 14 V	Ignition switch ON with engine not running
C41-10	BRN/WHT	Main relay drive	Ground to engine (Fig B)	0.5 – 1.2 V	Ignition switch ON with engine not running
				10 – 14 V	Ignition switch OFF
C41-16	YEL/GRN	A/C switch input	Ground to engine (Fig B)	10 – 14 V	Except the above mentioned condition with engine running
				0 – 1 V	Fulfill all the following conditions: • Blower speed selector ON • A/C switch ON • Engine running • A/C pressure sensor ON
C42-1	BLK/ORN	Main ground for ECM	Ground to body (Fig A)	–0.5 – 1 V	Engine running
C42-2	BLK	ECM ground for power circuit	Ground to body (Fig A)	–0.5 – 1 V	Engine running
C42-3	BLK/ORN	ECM ground for power circuit	Ground to body (Fig A)	–0.5 – 1 V	Engine running
C42-10	ORN	Sensor ground for ECT sensor	Ground to body (Fig A)	–0.5 – 1 V	Engine running
C42-14	LT GRN	ECT sensor input	Ground to engine (Fig B)	0.71 – 0.75 V (298 – 320 Ω)	Engine coolant temperature at approximately 80 °C (176 °F) with engine running
				0.35 – 0.37 V (135 – 144 Ω)	Engine coolant temperature at Approximately 110 °C (230 °F) with engine running. If the temperature is more than 112.5 °C (234.5 °F), compressor and condenser cooling fan should stop (restart at less than 110 °C (230 °F)
G02-1	WHT/BLK	A/C evaporator temperature sensor input	Ground to engine (Fig B)	2.09 – 2.17 V (1940 – 2060 Ω)	Evaporator thermistor temperature at approximately 25 °C (77 °F) with engine running
				3.52 – 3.59 V (6450 – 6859 Ω)	A/C evaporator thermistor at approximately 0 °C (32 °F) with engine running. If the temperature is less than approximately 2.5 °C (36.5 °F), compressor and condenser cooling fan should stop (restart at more than approximately 4 °C (39.2 °F)
G02-14	ORN	Sensor ground for A/C evaporator temperature sensor	Ground to body (Fig A)	–0.5 – 1 V	Engine running
G02-13	PNK/BLU	Blower fan speed input	Ground to engine (Fig B)	0 – 1 V	Blower fan motor switch “ML”, “MH” or “H” with engine running
				4 – 7 V	Blower fan motor switch “L” position with engine running
				10 – 14 V	Blower fan motor switch OFF with engine running

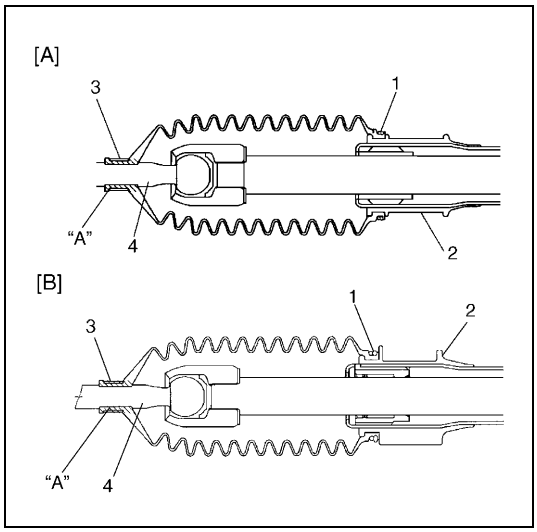
SECTION 3A

FRONT END ALIGNMENT

NOTE:

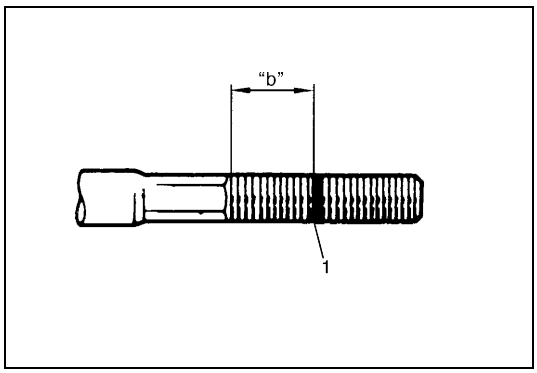
For the items with asterisk (*) in the "CONTENTS" below, refer to the same section of the Service Manual mentioned in "FOREWORD" of this manual.

CONTENTS



4) Position boot properly in grooves of gear case and tie rod (4) and clamp it with wire (1) and clip (3).
Wire should be new and should go around twice and be tightened with its both ends twisted together. The twisted ends should be bent in the circumferential direction.
After this, check to ensure that boot is free from twist and dent.

[A]:	Except sport model
[B]:	Sport model
2.	Rack side mount
"A":	Apply grease here.



5) Install tie rod end lock nut and tie rod end to tie rod.
Position lock nut to marking (1) made in removal.

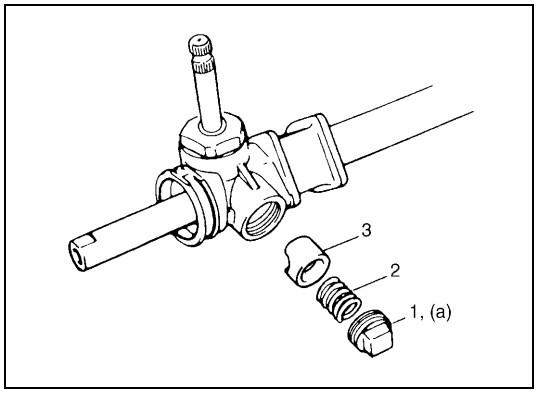
NOTE:

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

6) Install steering gear case referring to "Manual Rack and Pinion Assembly Installation" of this section.

Steering Rack Plunger

Installation



1) Apply grease lightly to sliding part of plunger against rack.

Grease: 99000-25050

2) Install rack plunger (3), rack plunger spring (2), rack damper screw (1) to steering case in direction shown. Tighten rack damper screw to specified torque.

Tightening torque
Rack damper screw (a): 12N·m (1.2 kg-m, 8.5 lb-ft)

SECTION 3D

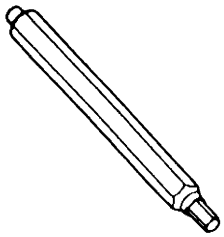
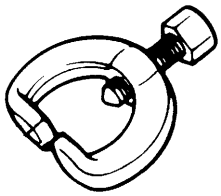
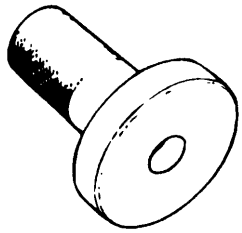
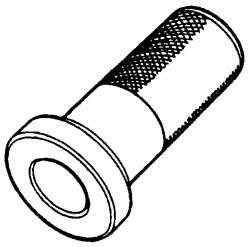
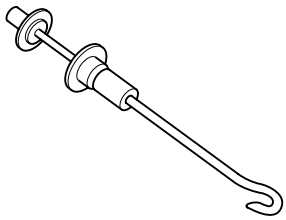
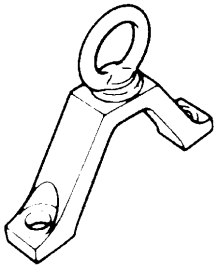
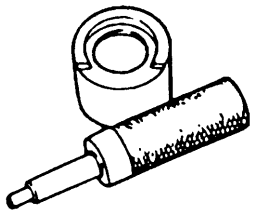
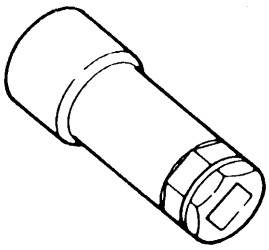
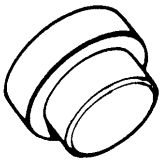
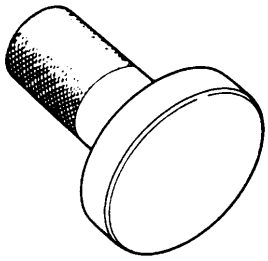
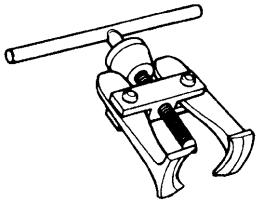
FRONT SUSPENSION

NOTE:

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

CONTENTS

Special Tool

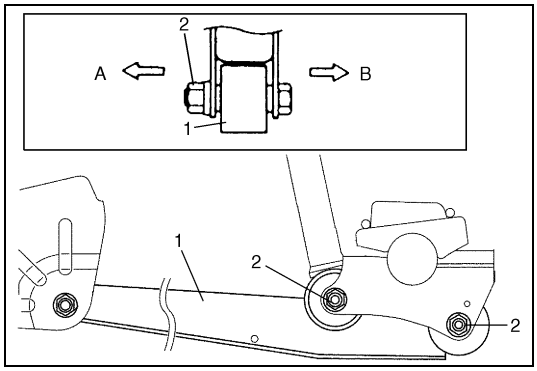
 09900-00411 Hexagon wrench socket	 09900-00414 Hexagon wrench bit 6 mm	 09913-65210 Tie rod end remover	 09913-75520 Bearing installer
 09913-75810 Bearing installer	 09942-15511 Sliding hammer	 09943-17912 Front wheel hub remover	 09943-77910 Bushing remover
 09945-26010 Socket wrench 17 mm	 09925-88210 Bearing puller attachment	 09913-75510 Bearing installer (Sport model)	 09913-61110 Bearing puller

Rear Axle (2WD Except Sport Model)

Installation

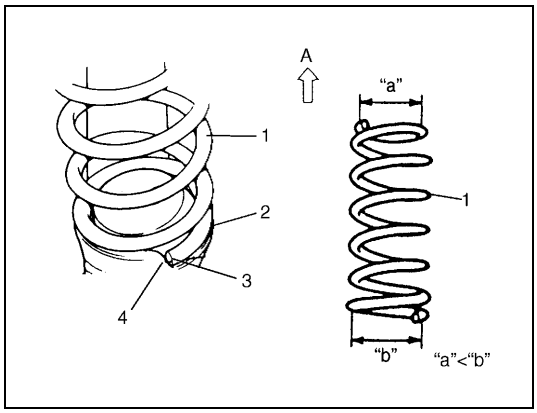
Install removed parts in reverse order of removal, noting the following points.

1) Place rear axle on floor jack.
   Then install lateral rod to rear axle and tighten nut temporarily at this step.



2) Install trailing arms (1) (right & left) to rear axle in proper direction as shown in figure.
   Tighten rear trailing arm nuts (2) temporarily at this step.

A :	Vehicle outside
B :	Vehicle center side

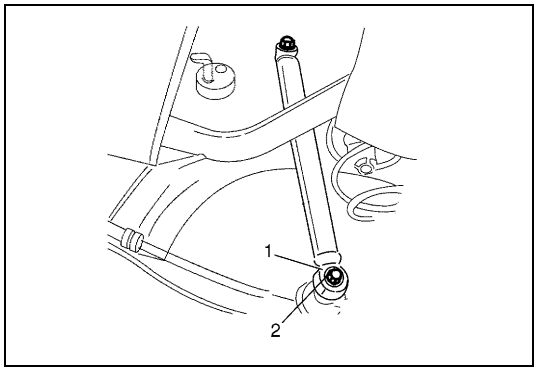


3) Install coil springs (1) (right & left) on spring seat (2) of rear axle and raise rear axle.

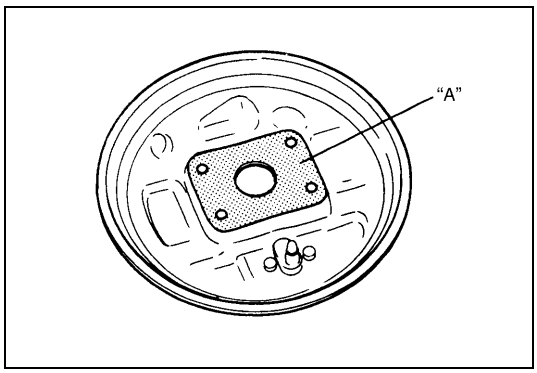
NOTE:

Upper and lower diameters of coil spring are different. Bring larger diameter end at bottom and mate its open end (3) with stepped part (4) of rear axle spring seat as shown.

A :	Upper side

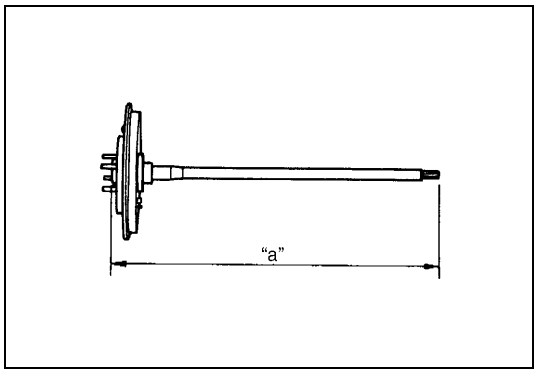


4) Install shock absorber (1) lower sides (right & left) to rear axle.
   Tighten shock absorber lower bolts (2) temporarily at this step.
5) Remove floor jack from rear axle.



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

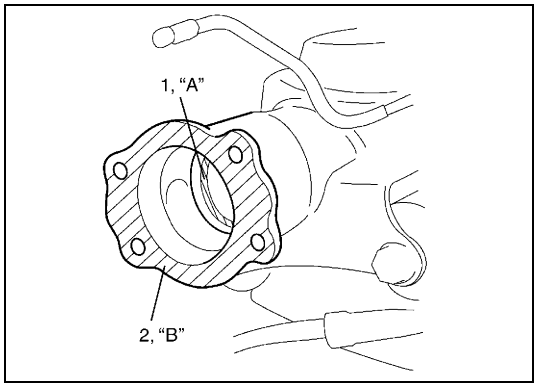
"A": Sealant 99000-31090



4) Inspect axle shaft length.

Rear axle shaft length "a"
Right side: 657.5 mm (25.9 in.)
Left side: 785.5 mm (30.9 in.)

5) Install rear axle shaft oil seal referring to "Rear Axle Shaft Oil Seal (4WD Vehicle)" in this section.



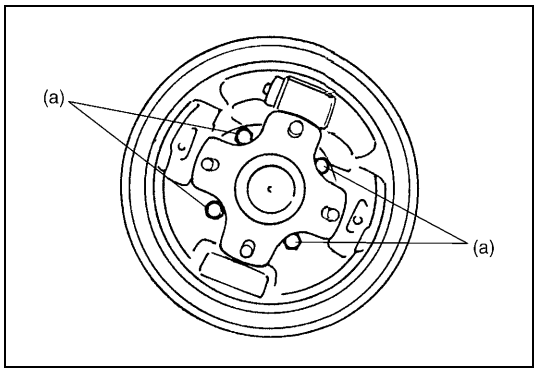
6) Apply grease to axle shaft oil seal (1) lip as shown.

"A": Grease 99000-25010

7) Apply sealant to mating surface of axle housing (2) with brake back plate.

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

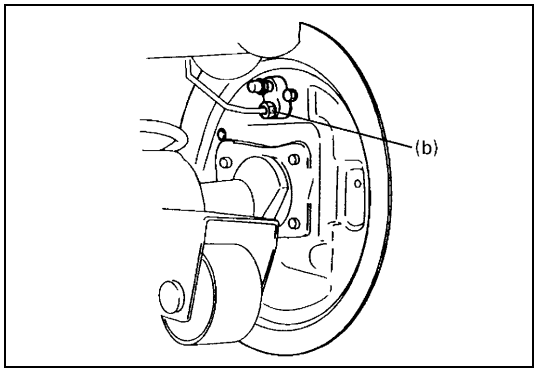
"B": Sealant 99000-31090



8) Install rear axle shaft to rear axle housing and tighten brake back plate bolts to specified torque.

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

Tightening torque
Brake back plate bolt (a): 23 N·m (2.3 kg-m, 17.0 lb-ft)



9) Connect brake pipe to wheel cylinder and tighten brake pipe flare nut to specified torque.

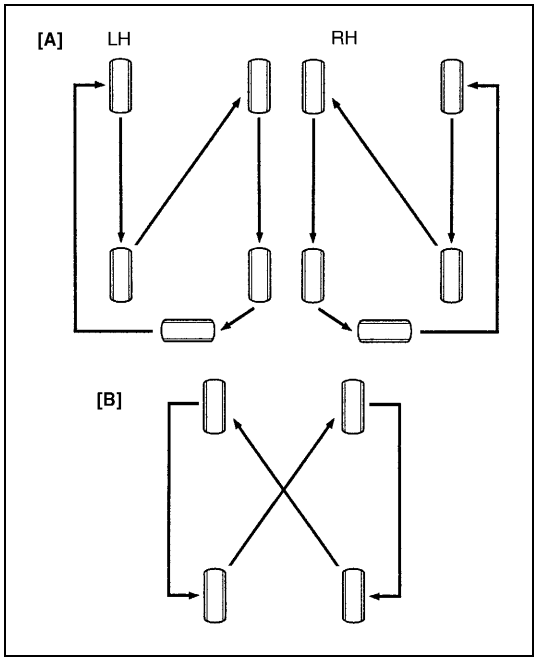
Tightening torque
Brake pipe flare nut (b): 16 N·m (1.6 kg-m, 11.5 lb-ft)

10) Refill rear axle (differential) housing with new specified gear oil. Refer to Section 7F for refill.
11) Install brake drum. For details, refer to "Brake Drum" of Section 5.

Maintenance and Minor Adjustments

Tire Maintenance

Tire rotation (except sport model)



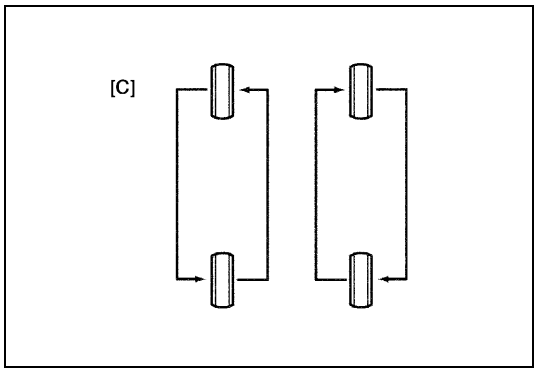
To equalize wear, rotate tires according to left figure. Radial tires should be rotated periodically. Set tire pressure.

NOTE:

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

[A] : 5-tire rotation
[B] : 4-tire rotation
LH : Left-hand drive
RH : Right-hand drive

Tire rotation (sport model)

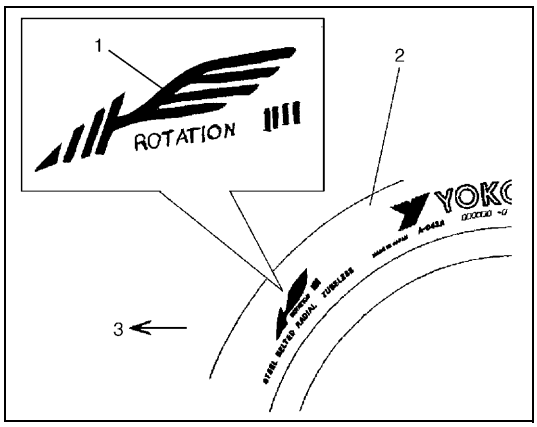


To equalize wear, rotate tires according to left figure. Radial tires should be rotated periodically. Set tire pressure.

NOTE:

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

[C]: 4-tire rotation

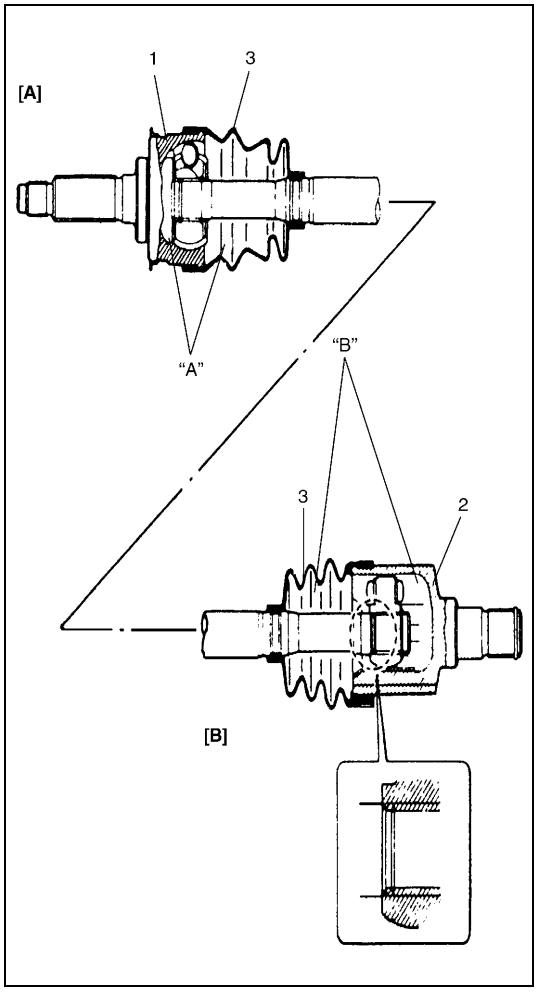


This model uses tires with specified rotation direction which is indicated by a rotation mark (1) on the side of each tire.
When installing tires, mark sure that this rotation mark (1) is directed in the vehicle forward direction.

2. Left side tire
3. Forward

Assembly

For Tripod Joint Type



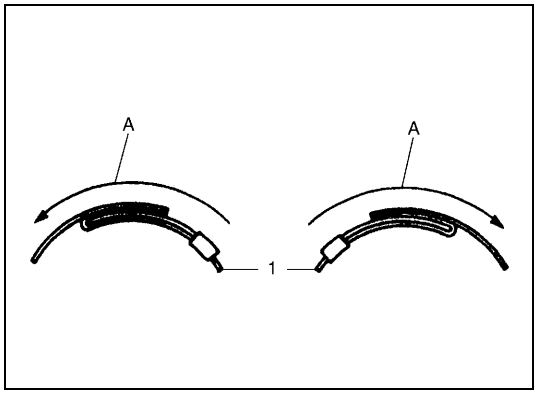
Judging from abnormality noted before disassembly and what is found through visual check of component parts after disassembly, prepare replacing parts and proceed to reassembly.
Make sure that wheel side joint assembly (1) and tripod joint housing (2) are washed thoroughly and air dried, and boots (3) are cleaned with cloth if they are to be reused.

CAUTION:
- **Do not wash boots in degreaser, such as gasoline or kerosene, etc. Washing in degreaser causes deterioration of boot.**
- **To ensure full performance of joint as designed, be sure to distinguish between two types of grease in repair set and apply specified volume to respective joint. Refer to the followings for identification of the grease.**

"A": Dark gray grease (approx. 60 – 80 g/2.1 – 2.8 oz)
"B": Orange grease (approx. 85 – 105 g/3.0 – 3.7 oz)

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

1) Wash disassembled parts (except boots). After washing, dry parts completely by blowing air.
2) Clean boots with cloth.
3) Apply grease to wheel side joint. Use specified grease in tube in wheel side boot set.
4) Install wheel side boot on shaft.



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

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

General Description

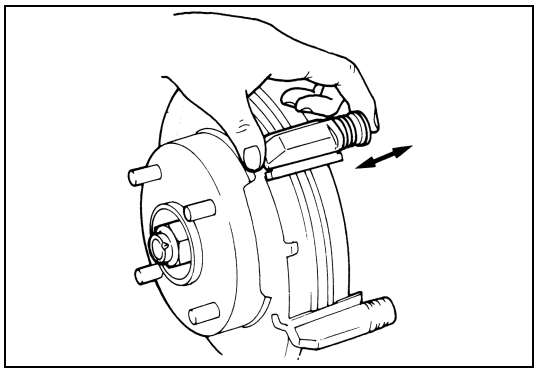
Except sport model

When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder to actuate pistons (two in front and four in rear).
The master cylinder is a tandem master cylinder. Brake pipes are connected to the master cylinder and they make two independent circuits. One connects front right & rear left brakes and the other connects front left & rear right brakes.
The load sensing proportioning valve (LSPV) or the proportioning valve (P valve) is included in these circuits between the master cylinder and the rear brake for the vehicle without ABS.
In this brake system, the disc brake type is used for the front wheel brake and a drum brake type (leading/trailing shoes) for the rear brake.
The parking brake system is mechanical. It applies brake force to only rear wheels by means of the cable and mechanical linkage system. The same brake shoes are used for both parking and foot brakes.

Sport model

When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder to actuate pistons (two in front and rear).
The master cylinder is a tandem master cylinder. Brake pipes are connected to the master cylinder and they make two independent circuits. One connects front right & rear left brakes and the other connects front left & rear right brakes.
The proportioning valve (P valve) is included in these circuits between the master cylinder and the rear brake.
In this brake system, the disc brake type is used for the front and rear wheel brake.
The parking brake system is mechanical. It applies brake force to only rear wheels by means of the cable and mechanical linkage system. The same brake pads are used for both parking and foot brakes.

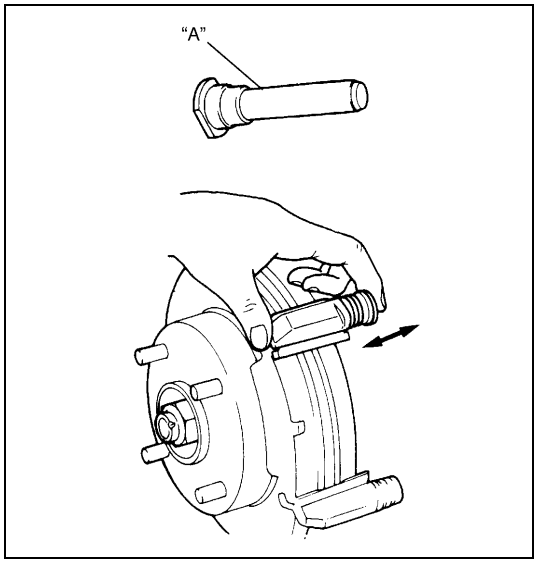
Slide Pin



Check guide pin for smooth movement as shown.
If it is found faulty, correct or replace.
Apply rubber grease to guide pin outer surface. Rubber grease should be the one whose viscosity is less affected by such low temperature as –40 °C (–40 °F).

Assembly

CAUTION:
- **Wash each part cleanly before installation in the same fluid as the one used in master cylinder reservoir.**
- **Never use other fluid or thinner.**



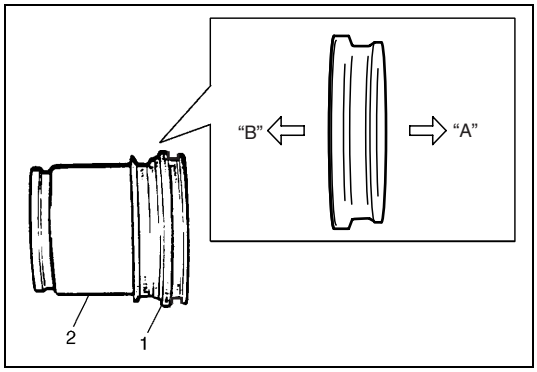
1) Install slide pin to brake caliper carrier.

CAUTION:
Before installing caliper to carrier, install slide pin with grease applied into brake caliper carrier hole and check for its smooth movement in thrust direction.

"A": Rubber grease

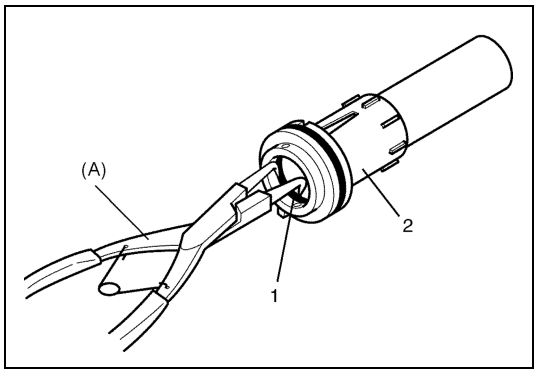
2) Install piston seal to caliper.

CAUTION:
- **Before installing piston seal to cylinder, apply fluid to them.**
- **Install a new piston seal into groove in cylinder securely making sure that it is not twisted.**



3) Before inserting piston (2) into cylinder, install boot (1) onto piston as shown.

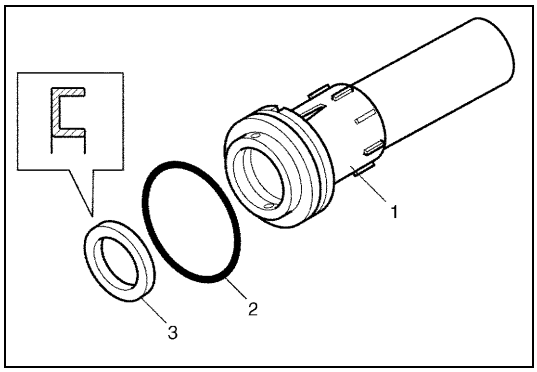
"A": 1-grooved side directed cylinder side
"B": 2-grooved side directed pad side



4) Remove sleeve cup (1) from sleeve (2).

CAUTION:
Do not cause any damage to inside of sleeve.
If caused, replace primary piston assembly.

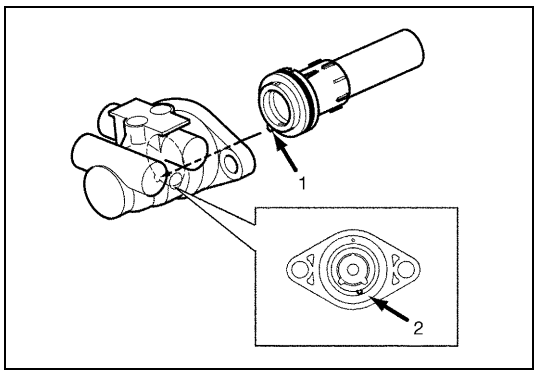
Special tool
(A): 09900-06106



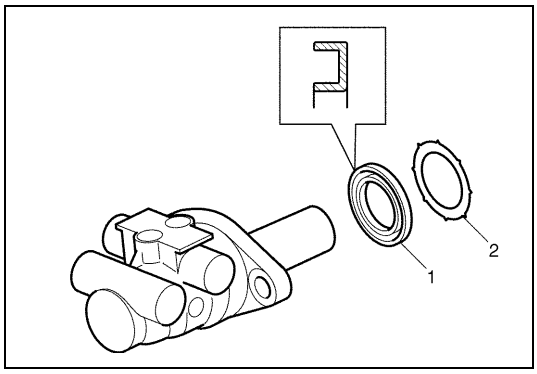
5) Install sleeve cup (3) and O-ring (2) to sleeve (1) such a direction as shown.

NOTE:

- **Diameter of sleeve cup and O-ring are smaller than those of cap.**
- **O-ring is the same as that of smaller one of cap O-ring.**



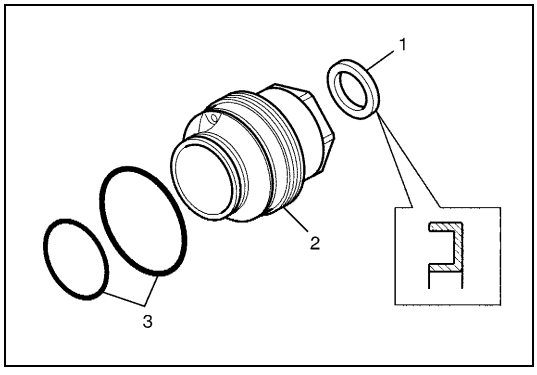
6) Install sleeve assembly with aligning protrusion (1) of sleeve and dent (2) of cylinder body.



7) Install cup (1) and washer (2) such a direction as shown.

NOTE:

- **Primary cup is the same as secondary cup.**
- **Primary cup is the largest compared with that of cap and sleeve.**

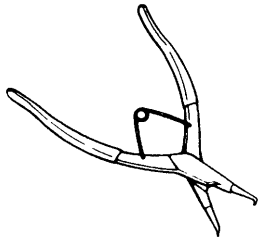
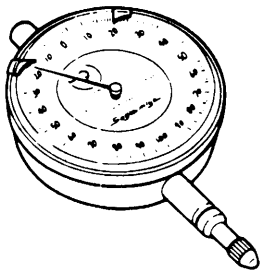
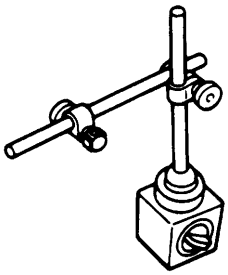
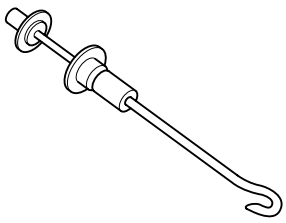
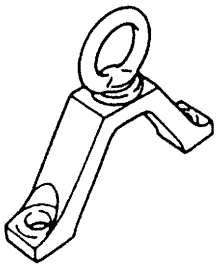
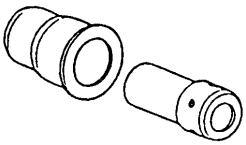
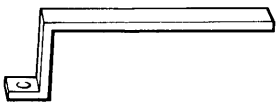


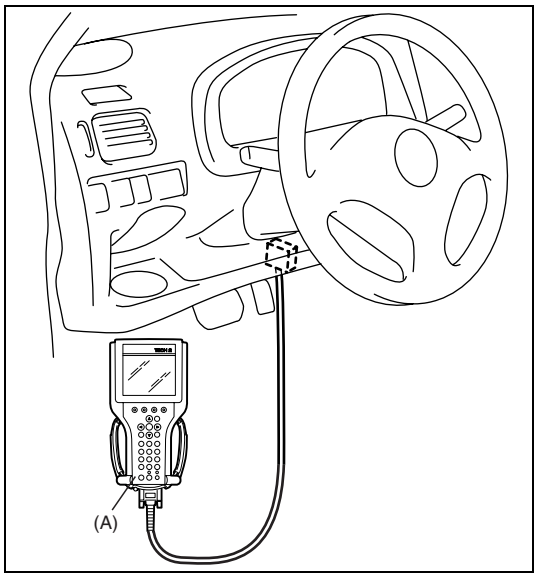
8) Remove cap cup (1) from cap with caring not to cause any damage to inside of cap (2).
9) Install cap cup and O-rings (3) to cap such a direction as shown.

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Brake fluid	DOT 3	• To fill master cylinder reservoir. • To clean and apply to inner parts of master cylinder caliper and wheel cylinder when they are disassembled.
Water tight sealant	SEALING COMPOUND 366E (99000-31090)	• To apply to mating surfaces of brake back plate and rear axle (2WD vehicle) or rear axle housing (4WD vehicle). • To apply to mating surfaces of brake back plate and parking brake cable.
Rubber grease	Rubber grease should be the one whose viscosity is less affected by such low temperature as –40 °C (–40 °F).	• To apply to slide pin of brake caliper carrier.

Special Tool

 09900-06106 Snap ring remover	 09900-20607 Dial gauge	 09900-20701 Dial gauge chuck	 09942-15511 Sliding hammer
 09943-17912 Brake drum remover (Front wheel hub remover)	 09951-18220 Secondary cup installer set (Except sport model)	 09952-16021 Booster piston rod adjuster	 09952-46010 Master cylinder attachment



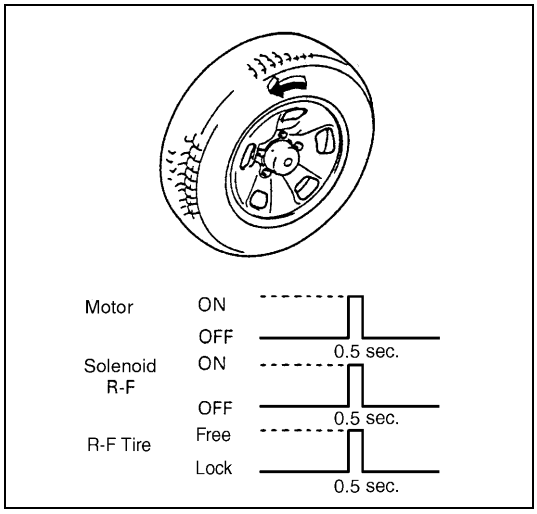
7) Connect SUZUKI scan tool to data link connector (DLC) with ignition switch turned OFF.

Special tool
(A): SUZUKI scan tool

8) Turn ignition switch to ON position and check actuator operation using “Hydraulic Control Test” under “Miscellaneous Test” (“MISC. Test”) mode of SUZUKI scan tool. Follow the instructions indicated on the SUZUKI scan tool.

NOTE:

For further details, refer to the operator’s manual for SUZUKI scan tool.

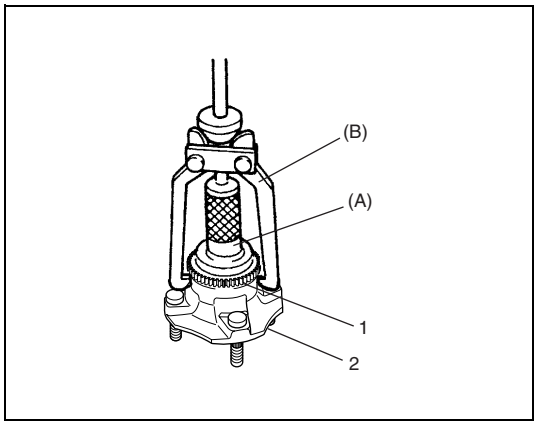


9) Check that each wheel turns when only brake force is depressurized (about 0.5 sec.)
10) If a faulty condition is found in Steps 9), replace hydraulic unit/control module assembly.
11) Turn ignition switch OFF and disconnect SUZUKI scan tool from data link connector (DLC).

Rear Wheel Speed Sensor Ring (Sport Model)

Removal

1) Remove rear wheel sensor from rear axle housing.
2) Remove rear brake disc referring to “Rear Brake Disc” in Section 5.
3) Remove rear wheel hub referring to “Wheel Bearing and Wheel Stud (For Sport Model)” in Section 3F.



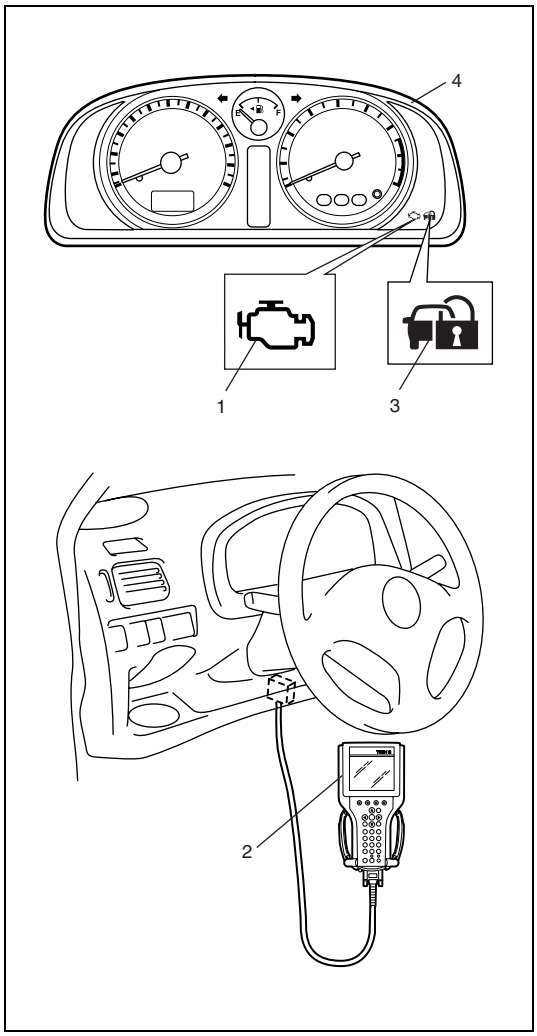
4) Remove sensor ring (1) from rear wheel hub (2) using special tools.

Special tool
(A) : 09913-75520
(B) : 09913-65135

CAUTION:

Pull out sensor ring from rear wheel hub gradually and evenly. Attempt to pull it out partially may cause it to be deformed.

On-board Diagnostic System Description (Vehicle with Immobilizer Indicator Lamp)



ECM in this vehicle has following functions.

- When the ignition switch is turned ON with the engine at a stop, malfunction indicator lamp (MIL) (1) turns ON to check the malfunction indicator lamp (1) in the combination meter (4) and its circuit.
- When ECM detects a malfunction which gives an adverse effect to vehicle emission while the engine is running, it makes the malfunction indicator lamp (1) in the combination meter turn ON or flash (flashing only when detecting a misfire which can cause damage to the catalyst) and stores the malfunction area in its memory.
  (If it detects that continuously 3 driving cycles are normal after detecting a malfunction, however, it makes MIL (1) turn OFF although DTC stored in its memory will remain.)
- As a condition for detecting a malfunction in some areas in the system being monitored by ECM and turning ON the malfunction indicator lamp (1) due to that malfunction, 2 driving cycle detection logic is adopted to prevent erroneous detection.
- When a malfunction is detected, engine and driving conditions then are stored in ECM memory as freeze frame data. (For the details, refer to description on Freeze frame data.)
- It is possible to communicate by using not only SUZUKI scan tool (2) but also OBD generic scan tool. (Diagnostic information can be accessed by using a scan tool.)

3. Immobilizer indicator lamp

Warm-up cycle

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

Driving cycle

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

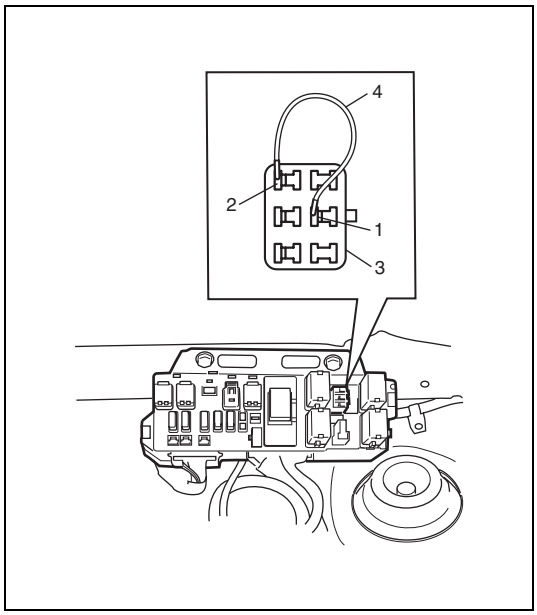
2 driving cycles detection logic

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

Pending DTC

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

[Without using SUZUKI scan tool] (vehicle without immobilizer indicator lamp)



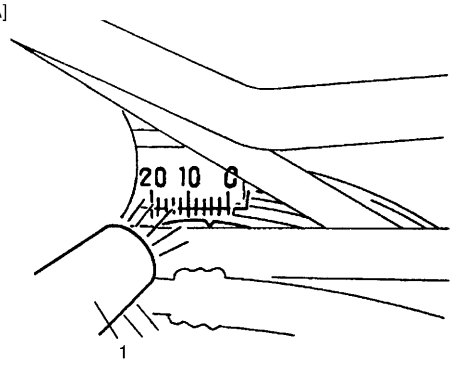
1) Check malfunction indicator lamp referring to “Malfunction Indicator Lamp Check” in this section.
2) With the ignition switch OFF position, disconnect SUZUKI scan tool if connected and using service wire (4), connect diagnosis switch terminal (1) to ground terminal (2) in diagnosis connector (3).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

NOTE:

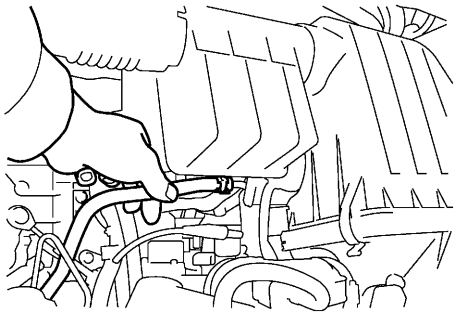
- **If abnormality or malfunction lies in two or more areas, malfunction indicator lamp indicates applicable codes three times each.**
  And flashing of these codes is repeated as long as diagnosis terminal is grounded and ignition switch is held at ON position.
- **Take a note of diagnostic trouble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

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

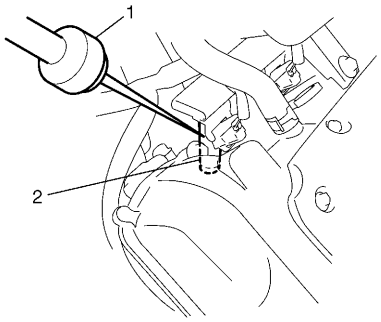
[A]



[B]



[C]



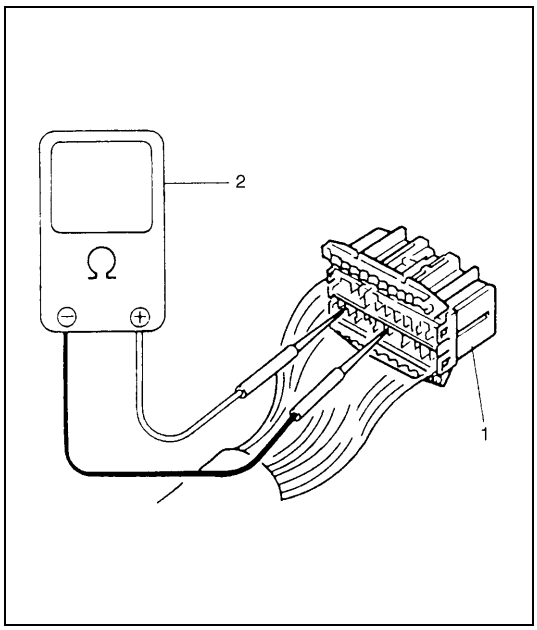
[A]: Fig. 4 for Step 6
[B]: Fig. 5 for Step 9
[C]: Fig. 6 for Step 12

SCAN TOOL DATA			VEHICLE CONDITION		NORMAL CONDITION/ REFERENCE VALUES
	✱	CALC LOAD (CALCULATED LOAD VALUE)	At specified idle speed with no load after warming up		0 – 10%
			At 2500 r/min with no load after warming up		0 – 10%
	✱	THROTTLE POSITION (ABSOLUTE THROTTLE POSITION)	Ignition switch ON/warmed up engine stopped	Accelerator pedal released	0 – 5%
				Accelerator pedal depressed fully	90 – 100%
	✱	O2S B1 S1 (HEATED OXYGEN SENSOR–1)	At specified idle speed after warming up		0.1 – 0.95 V
Δ	✱	O2S B1 S2 (HEATED OXYGEN SENSOR–2)	When engine is running at 2000 r/min. for 3 min or longer after warming up.		0.1 – 0.95 V
Δ		FUEL SYSTEM B1 (FUEL SYSTEM STATUS)	At specified idle speed after warming up		CLOSED (closed loop)
	✱	MAP (INTAKE MANIFOLD ABSOLUTE PRESSURE)	At specified idle speed with no load after warming up		24 – 38 kPa 180 – 285 mmHg
		BAROMETRIC PRES	–		Display the barometric pressure
		STEP EGR FLOW DUTY	At specified idle speed after warming up		0%
		FUEL CUT	When engine is at fuel cut condition		ON
			Other than fuel cut condition		OFF
		CLOSED THROTTLE POS (CLOSED THROTTLE POSITION)	Throttle valve at idle position		ON
			Throttle valve opens larger than idle position		OFF
		CANIST PRG DUTY (EVAP CANISTER PURGE FLOW DUTY)	At specified idle speed after warming up		0%
	✱	IGNITION ADVANCE (IGNITION TIMING ADVANCE FOR NO.1 CYLINDER)	At specified idle speed with no load after warming up		3 – 13° BTDC
		BATTERY VOLTAGE	Ignition switch ON/engine stop		10 – 14 V
		FUEL PUMP	Within 3 seconds after ignition switch ON or engine running		ON
			Engine stop at ignition switch ON		OFF
		ELECTRIC LOAD	Ignition switch ON/Headlight, small light, all turned OFF		OFF
			Ignition switch ON/Headlight, small light, turned ON		ON
		BRAKE SWITCH	Ignition switch ON	Brake pedal is released	OFF
				Brake pedal is depressed	ON
		RADIATOR FAN (RADIATOR FAN CONTROL RELAY)	Ignition switch ON	Engine coolant temp.: Lower than 92.5°C (198.5°F)	OFF
				Engine coolant temp.: 97.5°C (208°F) or higher	ON

Terminal number		Wire color	Circuit	Normal Voltage	Condition
C41	18	BLU	Radiator fan relay No.1 output	10 – 14 V	Ignition switch ON and engine coolant temperature less than 95°C, 203°F
				0 – 1V	Ignition switch ON and engine coolant temperature more than 97.5°C, 208°F
	19	PNK	Fuel pump relay output	0 – 2.5 V	For 3 sec. from the time is ignition switch turned to ON or while engine is running
				10 – 14 V	On and after 3 sec. from the time is ignition switch turned to ON or while engine is stop
	20	BLK/YEL	Starting motor signal	0 – 1 V	Ignition switch turned ON
				6 – 14 V	While engine cranking
	21	GRN/WHT	Electric load signal for stop lamp	0 – 1V	Ignition switch turned ON, Stop lamp not lighted up
				10 – 14 V	Ignition switch turned ON, Stop lamp lighted up
	22	PPL	Vehicle speed sensor signal	* 0 – 1 V ↑ ↓ 10 – 14 V (Reference waveform No.20)	Vehicle running. (Sensor signal is pulse. Pulse frequency varies depending on vehicle speed. (8190 pulses are generated par 60 km/h, 37.5 ml/h)
	23	–	–	–	–
	24	–	–	–	–

Terminal number		Wire color	Circuit	Normal Voltage	Condition
G02	1	WHT/BLK	A/C evaporator outlet air temp. sensor signal (if equipped)	3.3 – 3.8 V	Ignition switch turned ON at A/C evaporator inlet air temperature 0°C (32°F)
				2.5 – 2.9 V	Ignition switch turned ON at A/C evaporator inlet air temperature 15°C (59°F)
				1.9 – 2.3 V	Ignition switch turned ON at A/C evaporator inlet air temperature 25°C (77°F)
	2	–	–	–	–
	3	–	–	–	–
	4	–	–	–	–
	5	–	–	–	–
	6	–	–	–	–
	7	YEL	Serial communication line of data link connector 5 V	4 – 6 V	Ignition switch turned ON
	8	PNK	Immobilizer indicator lamp output (if equipped)	10 – 14 V	While engine running
				0 – 1V	Ignition switch turned ON with engine stop

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 terminal of connectors disconnected.

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

TERMINAL RESISTANCE TABLE

TERMINALS	CIRCUIT	STANDARD RESISTANCE
C42-7 to C41-11	Heater of HO2S–1	5.0 – 6.4 Ω
C41-4 to C41-11	Heater of HO2S–2	11.5 – 16.5 Ω
C42-9 to C41-5/6	No.1 injector	11.3 – 13.8 Ω
C42-21 to C41-5/6	No.2 injector	11.3 – 13.8 Ω
C42-31 to C41-5/6	No.3 injector	11.3 – 13.8 Ω
C42-8 to C41-5/6	No.4 injector	11.3 – 13.8 Ω
C42-18 to C41-5/6	EGR valve (stepper motor coil 1)	20 – 24 Ω
C42-29 to C41-5/6	EGR valve (stepper motor coil 2)	20 – 24 Ω
C42-17 to C41-5/6	EGR valve (stepper motor coil 3)	20 – 24 Ω
C42-28 to C41-5/6	EGR valve (stepper motor coil 4)	20 – 24 Ω
C42-4 to C41-5/6	EVAP canister purge valve	30 – 34 Ω
C41-2 to C41-3	Oil control valve	6.5 – 10 Ω
C41-19 to C41-11	Fuel pump relay	160 – 240 Ω
C41-18 to C41-5/6	Radiator fan control relay No.1	160 – 240 Ω
C41-10 to C41-7	Main relay	160 – 240 Ω
C42-1 to Body ground	Ground	Less than 1 Ω
C42-2 to Body ground	Ground	Less than 1 Ω
C42-3 to Body ground	Ground	Less than 1 Ω

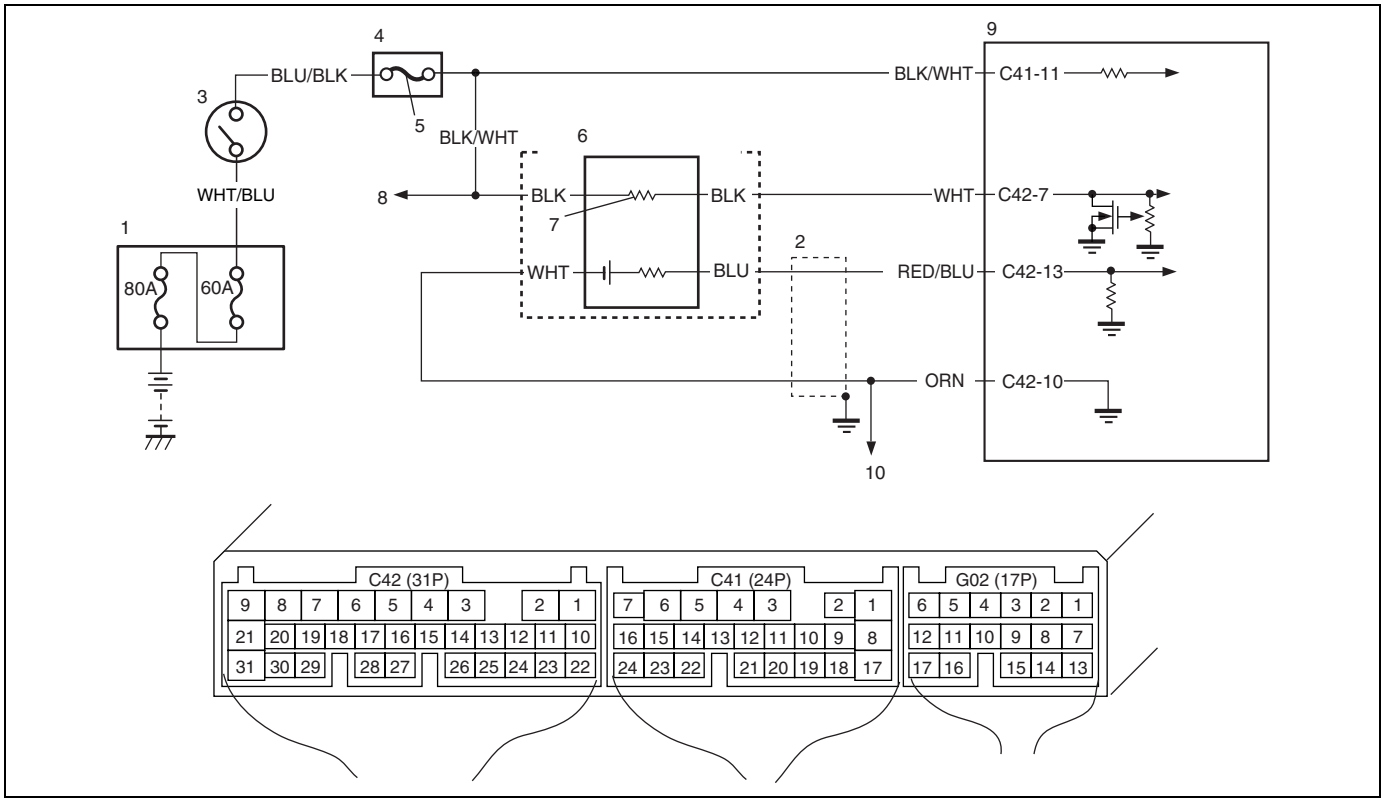
Step	Action	Yes	No
3	Main Relay Circuit Check 1) Turn ignition switch to OFF position. 2) Check for fuse blow at FI fuse (15 A). (See Fig. 1.) 3) If OK, measure voltage between “C41-10” wire terminal of ECM connector and body ground. Is voltage 10 – 14 V?	Go to Step 4.	Go to Step 8.
4	Main Relay Circuit Check 1) Remove ECM from vehicle body and connect connectors to ECM. 2) Turn ignition switch to ON position. 3) Measure voltage between “C41-10” wire terminal of ECM connector and body ground. Is voltage 0 – 1 V?	Go to Step 6.	Go to Step 5.
5	ECM Ground Circuit Check 1) Turn ignition switch to OFF position. 2) Disconnect connectors from ECM. 3) Measure resistance between each “C42-1”, “C42-2” and “C42-3” wire terminals of ECM connector and body ground. Is resistance 1 Ω or less?	Substitute a known-good ECM and recheck.	“BLK/ORN” or “BLK” wire open circuit or high resistance circuit.
6	Main Relay Circuit Check 1) Disconnect connectors from ECM with ignition switch turned OFF. 2) Using service wire, ground “C41-10” wire terminal of ECM connector and measure voltage between each “C41-5” and “C41-6” wire terminals of ECM connector and body ground. Is voltage 10 – 14 V?	Substitute a known-good ECM and recheck.	Go to Step 7.
7	Main Relay Circuit Check 1) Remove main relay from relay box. (See Fig. 2.) 2) Check for proper connection to main relay connector at “BLK/YEL” and “BLK/RED” wire terminals. 3) If OK, measure resistance between each “C41-5” and “C41-6” wire terminals of ECM connector and “BLK/RED” wire terminal of main relay connector. Is resistance 1Ω or less?	Go to Step 8.	“BLK/RED” wire open circuit or high resistance circuit.
8	Main Relay Circuit Check 1) Remove main relay from relay box. 2) Measure voltage between “BLK/YEL” wire terminals of main relay connector and body ground. Is voltage 10 – 14 V?	Go to Step 9.	“BLK/YEL” wire circuit open.

Troubleshooting

Step	Action	Yes	No
1	Was “Engine and Emission Control System Check” performed?	Go to Step 2.	Go to “Engine and Emission Control System Check”.
2	Check IAT Sensor and Its Circuit. 1) Connect scan tool (1) to DLC (2) with ignition switch OFF. 2) Turn ignition switch ON. 3) Check intake air temp. displayed on scan tool. See Fig. 1. Is – 40°C (– 40°F) or 119°C (246°F) indicated?	Go to Step 3.	Intermittent trouble. Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A.
3	Check Wire Harness. 1) Disconnect IAT sensor connector with ignition switch OFF. 2) Check for proper connection to IAT sensor at “LT GRN/BLK” and “ORN” wire terminals. 3) If OK, then with ignition switch ON, is voltage applied to “LT GRN/BLK” wire terminal about 4 – 6 V? See Fig. 2.	Go to Step 5.	“LT GRN/BLK” wire is open or shorted to power, or poor C42-15 connection. If wire and connection are OK, substitute a known-good ECM and recheck.
4	Does scan tool indicate – 40°C (– 40°F) at Step 2.	Go to Step 6.	Go to Step 5.
5	Check Wire Harness 1) Check intake air temp. displayed on scan tool with ignition switch ON. Is – 40°C (– 40°F) indicated?	Replace IAT sensor.	“LT GRN/BLK” wire shorted to ground. If wire is OK, substitute a known-good ECM and recheck.
6	Check Wire Harness. 1) Using service wire, connect IAT sensor connector terminals. 2) Check intake air temp. displayed on scan tool with ignition switch ON. See Fig. 3. Is 119°C (246°F) indicated?	Replace IAT sensor.	“LT GRN/BLK” wire open or poor C42-10 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

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

Wiring Diagram



1. Relay box	3. Ignition switch	5. "IG" fuse	7. Heater	9. ECM
2. Shield wire	4. Circuit fuse box	6. HO2S–1	8. To HO2S–2 heater	10. To other sensors

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
• When running at idle speed after engine warmed up and running at specified vehicle speed, HO2S–1 output voltage does not go below 0.3 V or over 0.6 V. ✱2 driving cycle detection logic, Monitoring once/1 driving.	• Heated oxygen sensor-1 malfunction • "WHT" or "ORN" circuit open (poor connection) or short

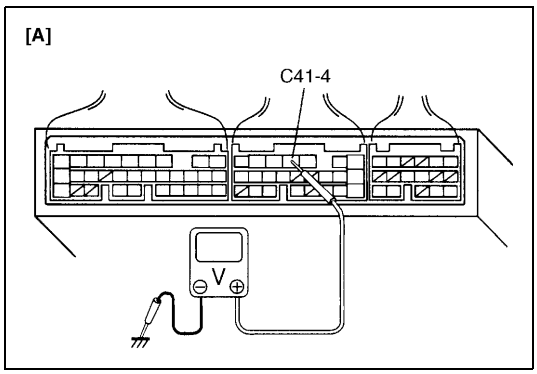
DTC Confirmation Procedure

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

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

Troubleshooting

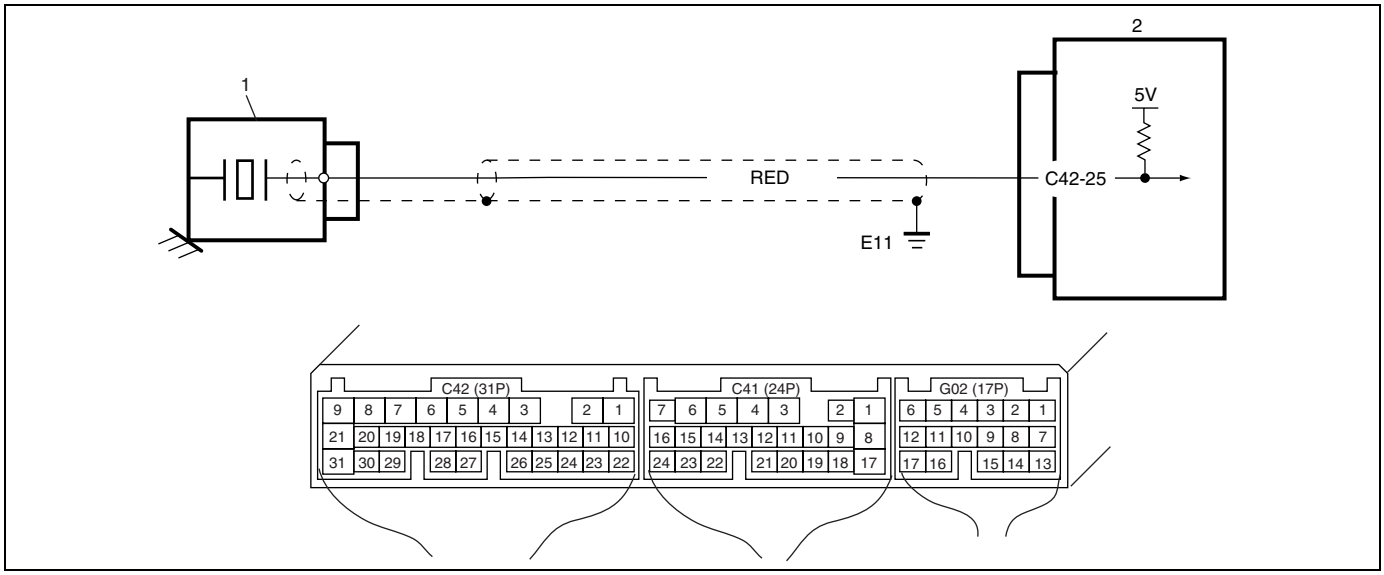
Step	Action	Yes	No
1	Was “Engine and Emission Control System Check” performed?	Go to Step 2.	Go to “Engine and Emission Control System Check”.
2	Check HO2S–2 Heater and Its Circuit. 1) Warm up engine to normal operating temperature. 2) Stop engine. 3) Turn ignition switch ON and check voltage at terminal C41-4 See Fig. 1. Voltage should be over 10 V. 4) Start engine, run it at idle and check voltage at the same terminal after 1 min. from engine start. Voltage should be below 1.9 V. Are check result as specified?	Intermittent trouble. Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A.	Go to Step 3.
3	Check Heater of Sensor–2. 1) Disconnect HO2S–2 coupler with ignition switch OFF. 2) Check for proper connection to HO2S–2 at “BLK/WHT” and “PNK/BLU” wire terminals. 3) If OK, then check heater resistance. Is it 12.0 – 14.3 Ω at 20°C, 68°F?	“PNK/BLU” wire open or shorted to ground or poor connection at C41-4. If wire and connection are OK, substitute a known-good ECM and recheck.	Replace HO2S–2.



[A]: Fig. 1 for Step 2

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

Wiring Diagram



1. KNK sensor	2. ECM

DTC Detecting Condition and Trouble Area

DTC Detecting Condition	Trouble Area
• Knock sensor voltage is 3.91 V or more or • Knock sensor voltage is 1.23 V or less	• "RED" circuit open or shorted to ground • Knock sensor malfunction • ECM malfunction

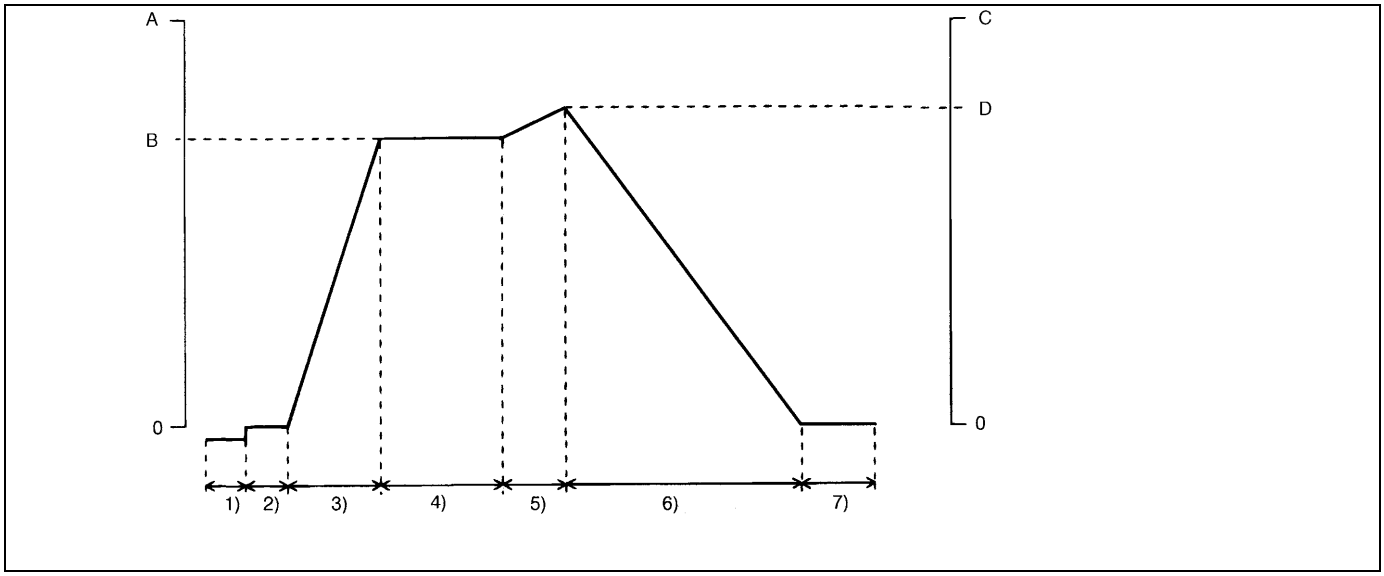
DTC Confirmation Procedure

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

Troubleshooting

Step	Action	Yes	No
1	Was "Engine and Emission Control System Check" performed?	Go to Step 2.	Go to "Engine and Emission Control System Check".
2	Check Knock Sensor Signal. 1) With engine running, check voltage from C42-25 terminal of ECM connector to body ground. See Fig. 1. Is voltage about 1.23 – 3.91 V?	Knock sensor and its circuit are in good condition. Intermittent trouble or faulty ECM. Recheck, referring to Intermittent Trouble in Section 0A.	Go to Step 3.
3	Check Knock Sensor Output. 1) Stop engine. 2) With ignition switch at OFF position, disconnect knock sensor connector. 3) With ignition switch at ON position, check voltage from "RED" terminal of knock sensor connector to body ground. See Fig. 2. Is it 4 – 5 V?	Faulty knock sensor. Substitute a known-good knock sensor and recheck.	"RED" wire open, shorted to ground circuit or poor 42-25 connection. If wire and connection are OK, substitute a known-good ECM and recheck.

1) Turn ignition switch OFF.
   Clear DTC with ignition switch ON, check vehicle and environmental condition for:
   – Altitude (barometric pressure): 2400 m, 8000 ft or less (560 mmHg, 75 kPa or more)
   – Ambient temp.: –10°C, 14°F or higher
   – Intake air temp.: 70°C, 122°F or lower
2) Start engine and warm it up to normal operating temperature (70 – 110°C, 158 – 230°F) and run it at idle for 5 min.
3) Increase vehicle speed to 50 – 55 mph, 80 – 88 km/h in 5th gear or in “D” range.
4) Hold throttle valve at that opening position for 2 min. or longer.
5) Increase engine speed to 4000 r/min. in 3rd gear or in “2” range.
6) Release accelerator pedal and with engine brake applied, keep vehicle coasting (fuel cut condition) till engine speed reaches 1500 r/min.
7) Stop vehicle (don't turn ignition switch OFF) and confirm test results according to following “Test Result Confirmation Flow Table”.



A. Vehicle speed	C. Engine speed
B. 50 – 55 mph 80 – 88 km/h (Keep throttle valve opening constantly)	D. 4000 r/min

Test Result Confirmation Flow Table

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

Troubleshooting

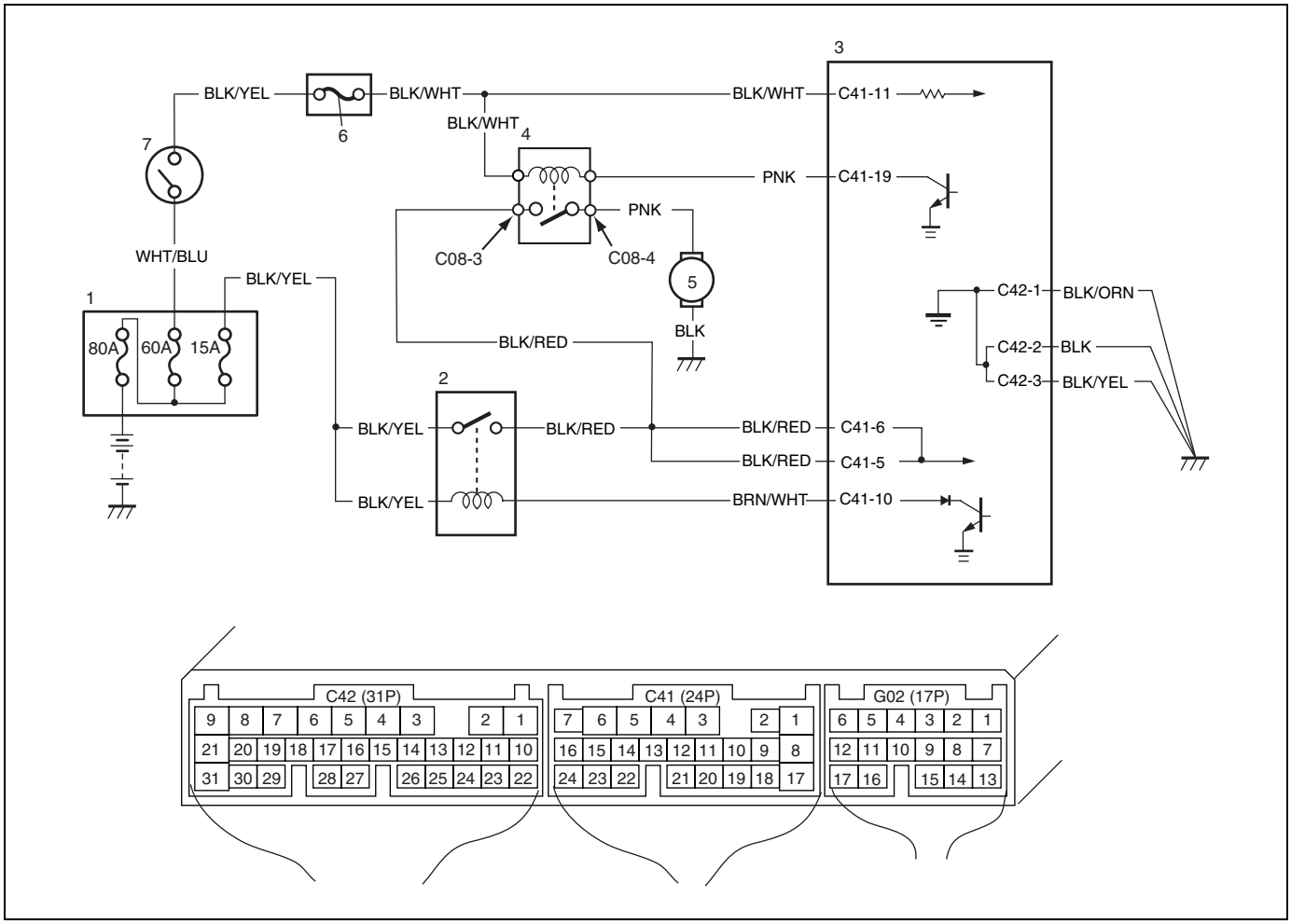
Step	Action	Yes	No
1	Was “Engine and Emission Control System Check” performed?	Go to Step 2.	Go to “Engine and Emission Control System Check”.
2	Do you have SUZUKI scan tool?	Go to Step 3.	Go to Step 5.

Troubleshooting

Step	Action	Yes	No
1	Was “Engine and Emission Control System Check” performed?	Go to Step 2.	Go to “Engine and Emission Control System Check”.
2	Does speedometer indicate vehicle speed?	Go to Step 3.	Go to Step 5.
3	Check Vehicle Speed Signal. Is vehicle speed displayed on scan tool in step 2) and 3) of DTC confirmation procedure?	Intermittent trouble or faulty ECM. Check for intermittent referring to “Intermittent and Poor Connection” in Section 0A.	Go to Step 4.
4	Check VSS Signal Circuit. 1) Turn ignition switch to OFF position. 2) Disconnect combination meter connectors and multi information display connectors. Refer to Section 8. 3) Disconnect P/S control module connector. 4) Turn ignition switch to ON position, without running engine. 5) Measure voltage from terminal “a” of VSS connector to ground. Is voltage within 4 – 5 V?	Faulty speedometer. Faulty P/S control module. Faulty multi information display.	“PPL” wire open or short. Poor connection of ECM connector terminal. If OK, substitute a known-good ECM and recheck.
5	Check VSS Power Supply. 1) With ignition switch at OFF position, disconnect VSS connector. 2) Turn ignition switch to ON position, without running engine. 3) Measure voltage from terminal “b” to “c” of VSS connector. See Fig. 1. Is voltage within 10 – 14 V?	Go to Step 6.	“BLK/RED” or “BLK/ORN” wire open or short.
6	Check VSS Signal Circuit. 1) Measure voltage from terminal “a” of VSS connector to ground. Is voltage more than 4 V?	Go to Step 7.	“PPL” wire open or short. Poor connection of ECM connector terminal. If OK, substitute a known-good ECM and recheck.
7	Check Signal Rotor. 1) Remove VSS. 2) Visually inspect VSS sensor signal rotor for damage. Was any damage found?	Faulty VSS signal rotor.	Poor connection of VSS connector terminal. If OK, substitute a known-good VSS and recheck.

Table B-2 Fuel Pump and Its Circuit Check

Wiring Diagram



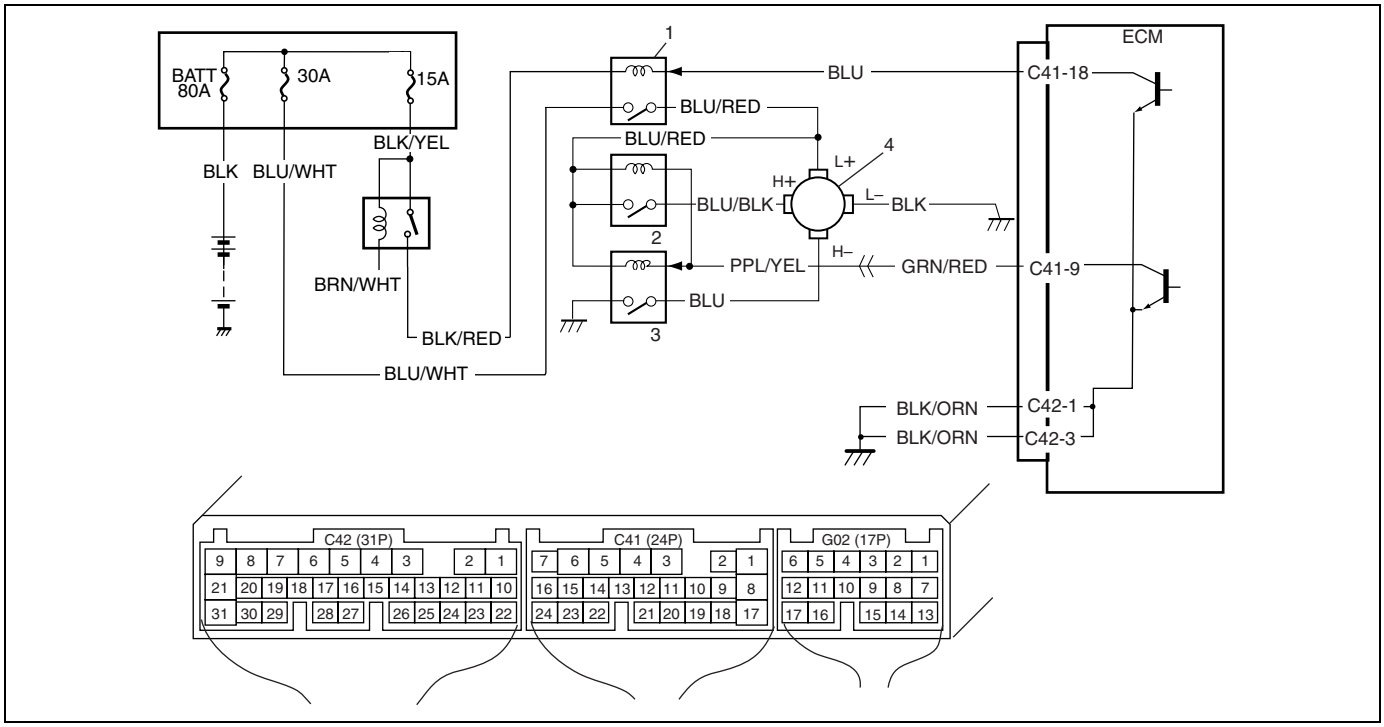
1. Fuel pump relay	2. Fuel pump

Inspection

CAUTION:
Check to make sure that connection is made between correct terminals. Wrong connection can cause damage to ECM, wire harness, etc.

Step	Action	Yes	No
1	Was “Engine and Emission Control System Check” performed?	Go to Step 2.	Go to “Engine and Emission Control System Check”.
2	Check Fuel Pump Control System for operation. See Fig. 1. Is fuel pump heard to operate for 2 sec. after ignition switch ON?	Fuel pump circuit is in good condition.	Go to Step 3.

Table B-7 Radiator Fan Control System Check



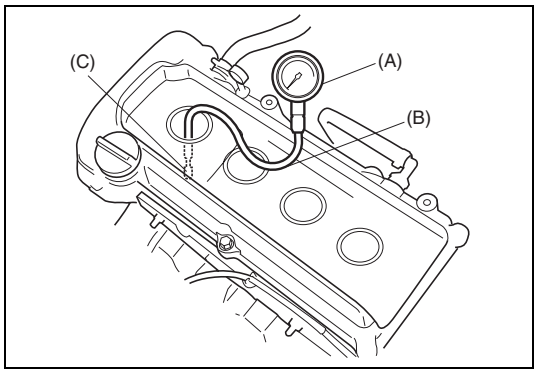
1. Radiator fan relay No.1	3. Radiator fan relay No.3
2. Radiator fan relay No.2	4. Radiator fan

Inspection

Step	Action	Yes	No
1	Check Fan Control System. 1) Connect scan tool (1) to DLC (2) with ignition switch OFF. 2) Start engine and select “DATA LIST” mode on scan tool. 3) Warm up engine until coolant temp. is 97.5°C, 208°F or higher and A/C switch turn OFF. (If engine coolant temp. does not rise, check engine cooling system or ECT sensor.) See Fig. 1. Is radiator cooling fan started when engine coolant temp. reached above temp.?	Radiator cooling fan control system is in good condition.	Go to Step 2.
2	Check Radiator Fan Relay and Its Circuit. 1) Check DTC and pending DTC with scan tool. Is DTC P0480 displayed?	Go to DTC P0480 Diag. Flow Table.	Go to Step 3.
3	Check Radiator Fan Relays. 1) Turn ignition switch OFF and remove radiator cooling fan relays. (No.1 – No.3) 2) Check for proper connection to relay at terminals “c” and “d”. 3) If OK, check that there is continuity between “c” and “d” when battery is connected to terminals “a” and “b”. See Fig. 3. Is check result satisfactory?	Go to Step 4.	Replace radiator fan relay(s).

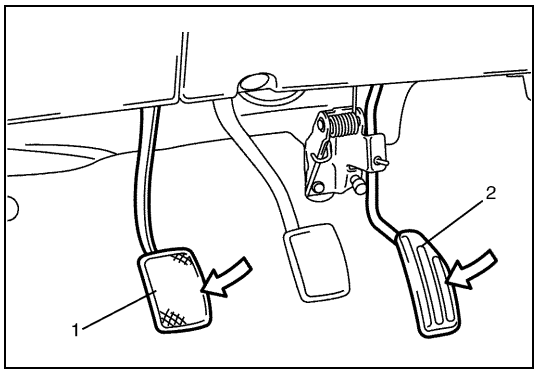
Tightening Torque Specification

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



9) Install special tools (compression gauge) into spark plug hole.

Special tool
(A): 09915-64512
(B): 09915-64530
(C): 09915-67010



10) Disengage clutch (1) (to lighten starting load on engine) for M/T vehicle, and depress accelerator pedal (2) all the way to make throttle fully open.

11) Crank engine with fully charged battery, and read the highest pressure on compression gauge.

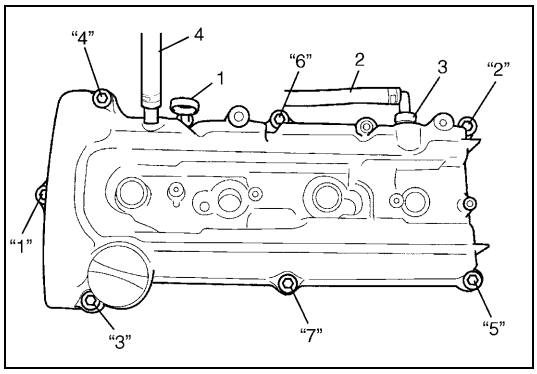
NOTE:

- **For measuring compression pressure, crank engine at least 250 rpm by using fully charged battery.**
- **If measured compression pressure is lower than limit value, check installation condition of special tool. If it is properly installed, possibility is compression pressure leakage from where piston ring or valve contact.**

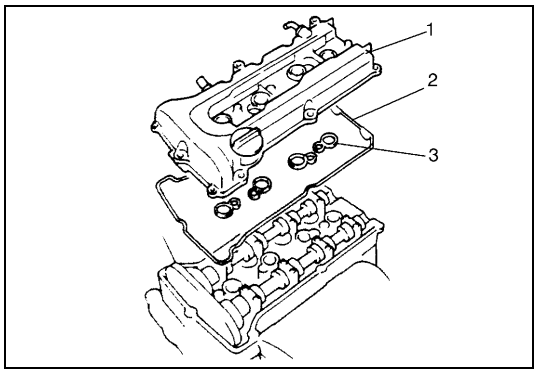
Compression pressure

Standard	**1400 kPa (14.0 kg/cm^2, 199.0 psi)**
Limit	**1100 kPa (11.0 kg/cm^2, 156.0 psi)**
Max. difference between any two cylinders	**100 kPa (1.0 kg/cm^2, 14.2 psi)**

12) Carry out Steps 9) through 11) on each cylinder to obtain 4 readings.

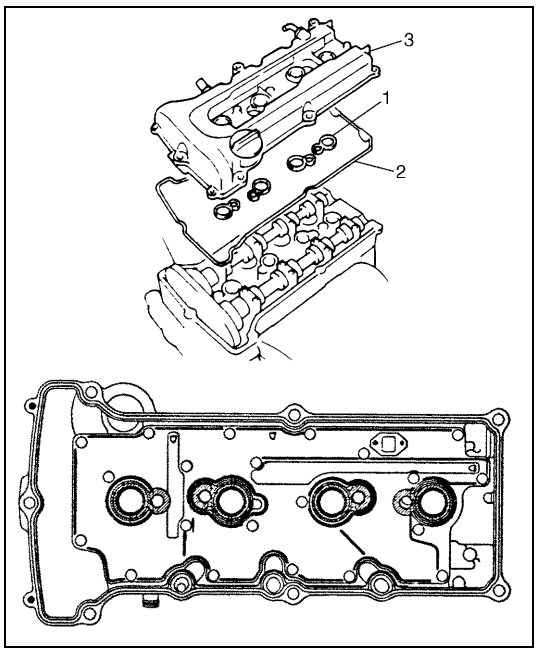


8) Remove oil level gauge (1).
9) Disconnect PCV hose (2) from PCV valve (3) and disconnect breather hose (4) from cylinder head cover.
10) Remove cylinder head cover mounting bolts in such order as indicated in figure.

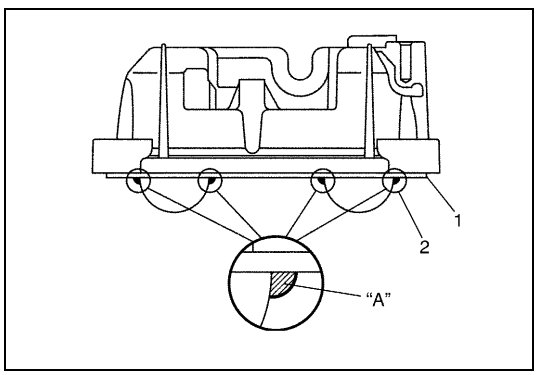


11) Remove cylinder head cover (1) with cylinder head cover gasket (2) and spark plug hole gasket (3).

Installation

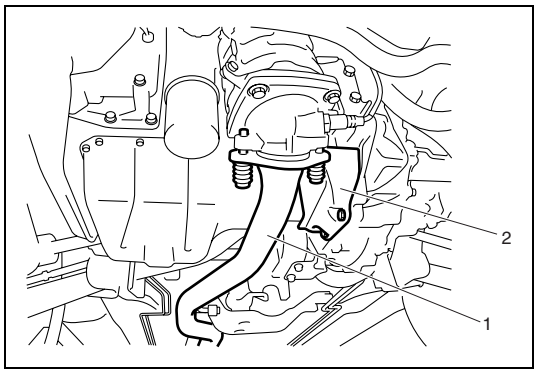


1) Install new spark plug hole gaskets (1) and new cylinder head cover gasket (2) to cylinder head cover (3) as shown in figure.

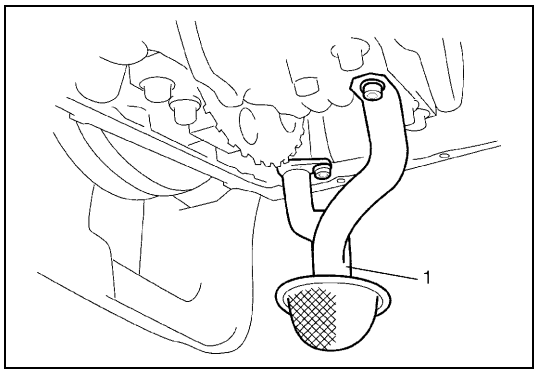


2) Remove oil, old sealant and dust from sealing surface on cylinder head and cover. After cleaning, apply sealant "A" to the following point.
   - Cylinder head cover gasket (1) sealing surface area (2) as shown.

"A": Sealant 99000-31250

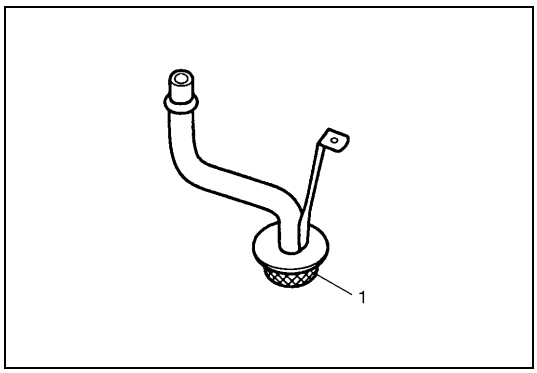


4) Remove exhaust No.2 pipe (1) and transaxle stiffener (2).
5) Remove engine rear mounting bracket.

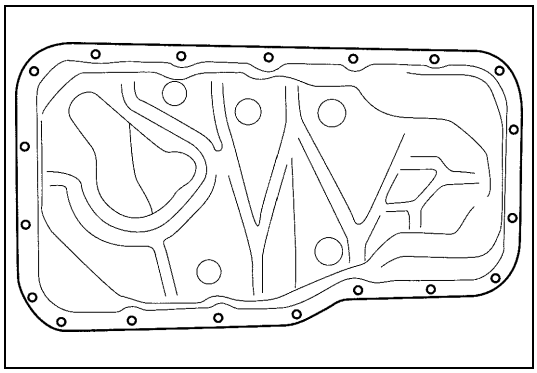


6) Remove oil pan and then oil pump strainer (1) from cylinder block.

Installation



1) Clean oil pump strainer screen (1).



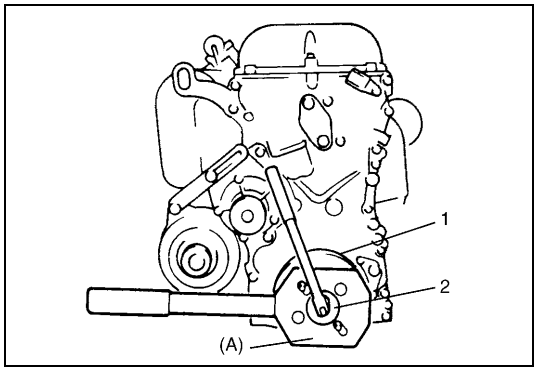
2) Clean sealing surface on oil pan and cylinder block. Remove oil, old sealant and dust from sealing surface.

Timing Chain Cover Removal and Installation

Removal

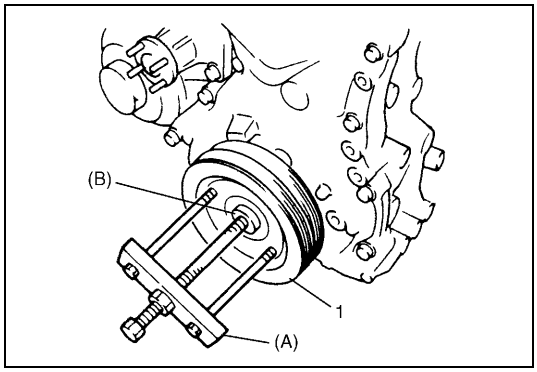
CAUTION:
- **Keep working table, tools and hands clean while overhauling.**
- **Use special care to handle aluminum parts so as not to damage them.**
- **Do not expose removed parts to dust. Keep them always clean.**

1) Remove engine assembly from vehicle referring to “Engine Assembly Removal and Installation” in this section.



2) Remove crankshaft pulley bolt (2).
   To lock crankshaft pulley (1), use special tool with it as shown in figure.

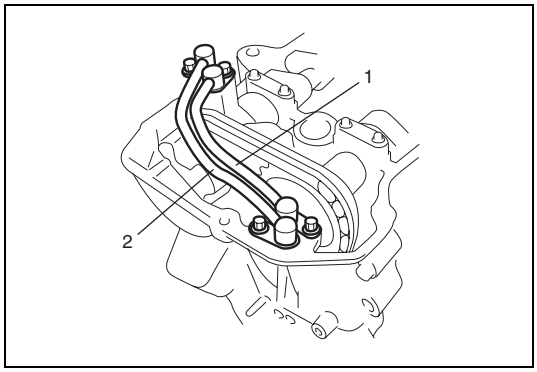
   Special tool
   (A) : 09917-68221



3) Remove crankshaft pulley (1).
   If it is hard to remove, use special tools as shown in figure.

   Special tool
   (A) : 09944-36011
   (B) : 09926-58010

4) Remove cylinder head cover referring to “Cylinder Head Cover Removal and Installation” in this section.
5) Remove oil pan referring to “Oil Pan and Oil Pump Strainer Removal and Installation” in this section.
6) Remove water pump pulley.



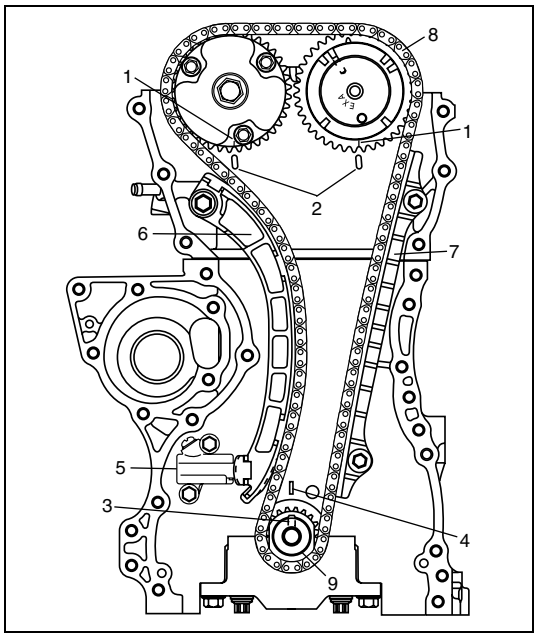
7) Remove oil gallery pipes No.2 (1) and No.3 (2).

Timing Chain and Chain Tensioner Removal and Installation

Removal

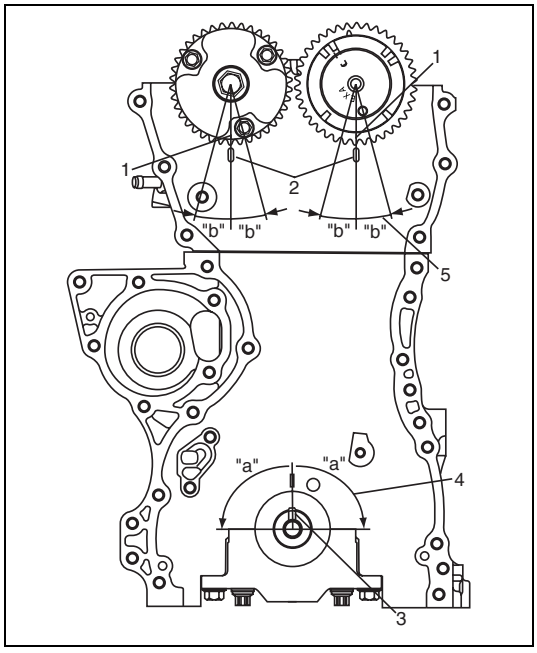
CAUTION:
After removing timing chain, never turn crankshaft and camshafts independently more than its allowable turning range described in "Installation" section.
If turned, interference may occur between piston and valves and valves themselves, and parts related to piston and valves may be damaged.

1) Remove timing chain cover referring to "Timing Chain Cover Removal and Installation" in this section.



2) By turing crankshaft, align both intake and exhaust camshaft timing sprocket marks (1) with notches (2) of cylinder head respectively and align crank shaft sprocket key (3) with notch of cylinder block (4).
3) Remove timing chain tensioner adjuster assembly (5).
4) Remove timing chain tensioner (6).
5) Remove timing chain No.1 guide (7).
6) Remove timing chain (8) with crankshaft timing sprocket (9)

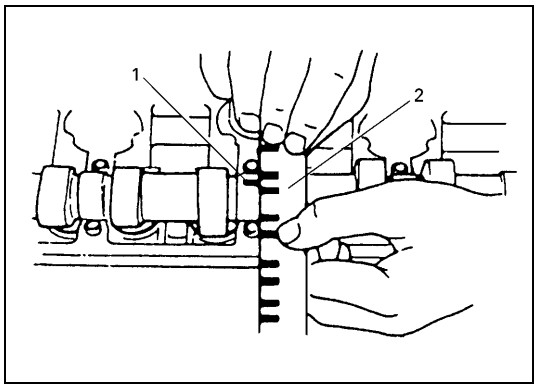
Installation



CAUTION:
After timing chain is removed, never turn crankshaft and camshafts independently more than such an extent ("a", "b") as shown in figure.
If turned, interference may occur between piston and valves and valves themselves, and parts related to piston and valves may be damaged.

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

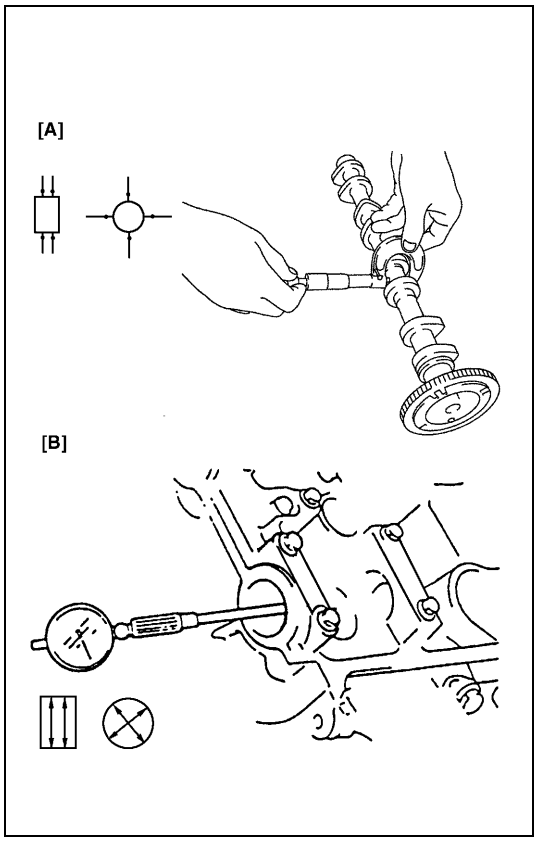
"a" : 90°	4. Crankshaft allowable turning range. By key on crankshaft, within 90° from top on both right and left.
"b" : 15°	5. Camshaft (IN and EX) allowable turning range. By marks on camshaft timing sprocket within 15° from notches on cylinder head on both right and left.



7) Remove housing, and using scale (2) on gaging plastic (1) envelop, measure gaging plastic width at its widest point.

Camshaft journal clearance

	Standard	Limit
Intake side No.1 housing	0.020 – 0.072 mm (0.0008 – 0.0028 in.)	0.10 mm (0.0039 in.)
Others	0.045 – 0.087 mm (0.0018 – 0.0034 in.)	0.12 mm (0.0047 in.)



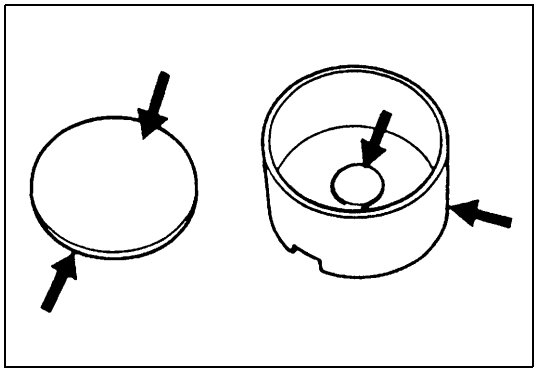
If measured camshaft journal clearance exceeds limit, measure journal (housing) bore and outside diameter of camshaft journal. Replace camshaft or cylinder head assembly whichever the difference from specification is greater.

Camshaft journal diameter [A]

Item	Standard
Intake side No.1 housing	26.940 – 26.955 mm (1.0606 – 1.0612 in.)
Exhaust side No.1 housing	26.934 – 26.955 mm (1.0604 – 1.0612 in.)
Others	22.934 – 22.955 mm (0.9029 – 0.9037 in.)

Camshaft journal bearing bore [B]

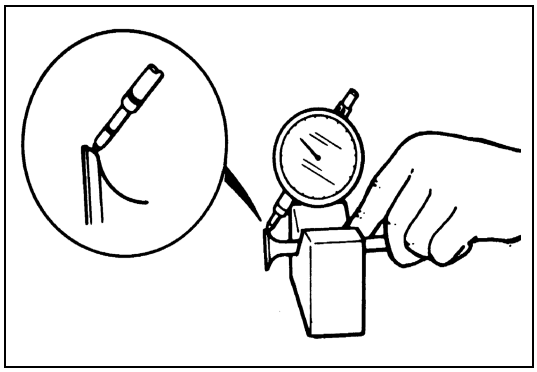
Item	Standard
Intake side No.1 housing	–
Exhaust side No.1 housing	27.000 – 27.021 mm (1.0630 – 1.0638 in.)
Others	23.000 – 23.021 mm (0.9055 – 0.9063 in.)



Wear of tappet and shim

Check tappet and shim for pitting, scratches or damage.
If any malcondition is found, replace.

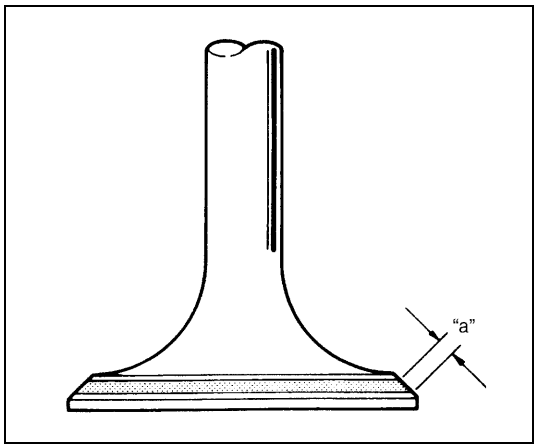
Valve head radial runout



Check each valve for radial runout with a dial gauge and "V" block. To check runout, rotate valve slowly. If runout exceeds its limit, replace valve.

Limit on valve head radial runout
0.08 mm (0.003 in.)

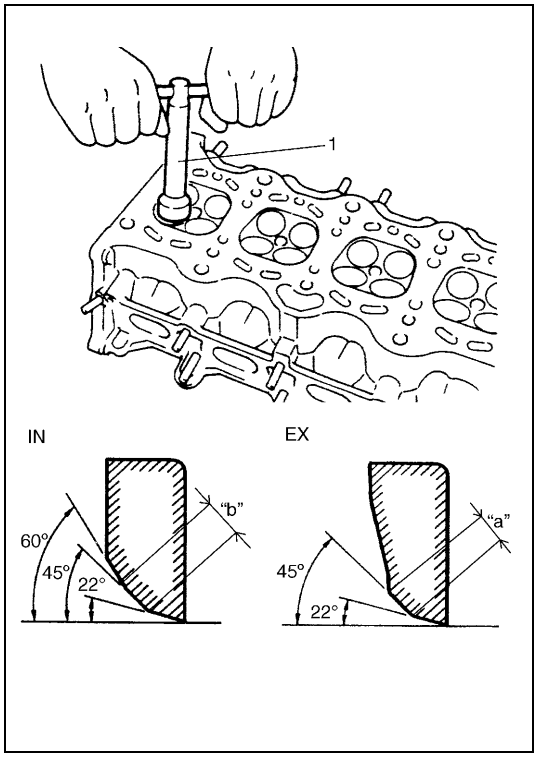
Seating contact width



Create contact pattern on each valve in the usual manner, i.e. by giving uniform coat of marking compound to valve seat and by rotatingly tapping seat with valve head. Valve lapper (tool used in valve lapping) must be used.
Pattern produced on seating face of valve must be a continuous ring without any break, and the width of pattern must be within specified range.

Standard seating width "a" revealed by contact pattern on valve face
In and Ex: 1.0 - 1.4 mm (0.0389 - 0.0551 in.)

Valve seat repair



A valve seat not producing a uniform contact with its valve or showing width of seating contact that is out of specified range must be repaired by regrinding or by cutting and regrinding and finished by lapping.

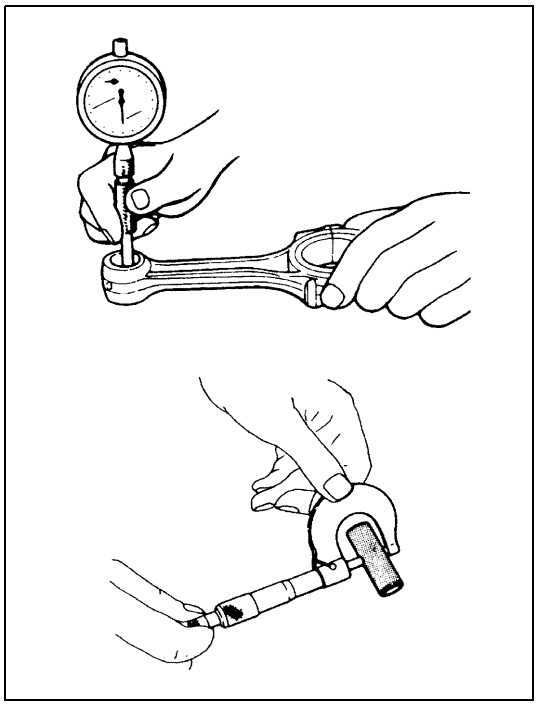
1) EXHAUST VALVE SEAT: Use valve seat cutters (1) to make two cuts as illustrated in figure. Two cutters must be used: the first for making 22° angle, and the second for making 45° angle. The second cut must be made to produce desired seat width.

   Seat width for exhaust valve seat
   "a": 1.0 – 1.4 mm (0.0389 – 0.0551 in.)

2) INTAKE VALVE SEAT: Use valve seat cutters (1) to make three cuts as illustrated in figure. Three cutters must be used: the 1st for making 15° angle, the 2nd for making 60° angle, and 3rd for making 45° angle. The 3rd cut (45°) must be made to produce desired seat width.

   Seat width for intake valve seat
   "b": 1.0 – 1.4 mm (0.0389 – 0.0551 in.)

3) VALVE LAPPING: Lap valve on seat in two steps, first with coarse size lapping compound applied to face and the second with fine-size compound, each time using valve lapper according to usual lapping method.



Piston pin clearance

Check piston pin clearance in small end and piston. Replace connecting rod and/or piston if its small end is badly worn or damaged or if measured clearance exceeds limit.

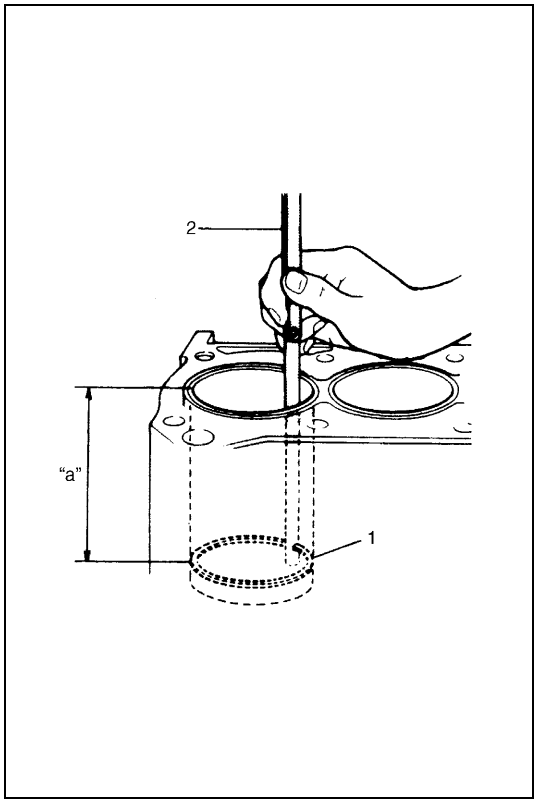
Piston pin clearance in connecting rod small end
Standard: 0.003 – 0.014 mm (0.0002 – 0.0005 in.)
Limit: 0.05 mm (0.0020 in.)

Piston pin clearance in piston
Standard: 0.006 – 0.017 mm (0.00024 – 0.00066 in.)
Limit: 0.05 mm (0.0020 in.)

Small-end bore
20.003 – 20.011 mm (0.7876 – 0.7878 in.)

Piston pin dia.
19.997 – 20.000 mm (0.7873 – 0.7874 in.)

Piston bore
20.006 – 20.014 mm (0.7877 – 0.7879 in.)



Piston rings

Piston ring end gap

To measure end gap, insert piston ring (1) into cylinder bore and then measure the gap by using thickness gauge (2).
If measured gap exceeds limit, replace ring.

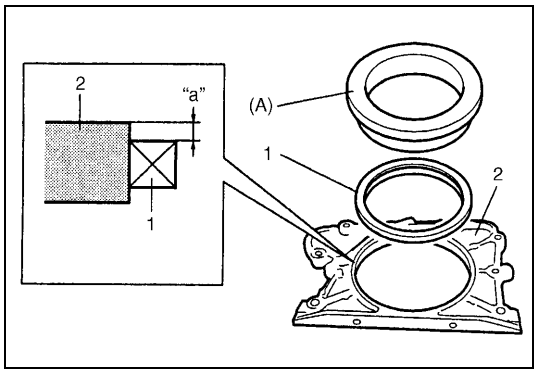
NOTE:

Decarbonize and clean top of cylinder bore before inserting piston ring.

Piston ring end gap

Item	Standard	Limit
Top ring	0.20 – 0.35 mm (0.0079 – 0.0137 in.)	0.7 mm (0.0276 in.)
2nd ring	0.30 – 0.45 mm (0.0119 – 0.0177 in.)	1.0 mm (0.0394 in.)
Oil ring	0.20 – 0.70 mm (0.0079 – 0.0275 in.)	1.2 mm (0.0472 in.)

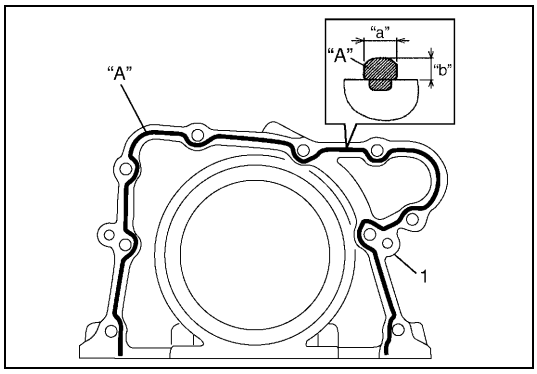
"a": 120 mm (4.72 in.)



8) If necessary, press-fit rear oil seal (1) to oil seal housing (2) by using special tool as shown in the figure.

Special tool
(A): 09911-97820

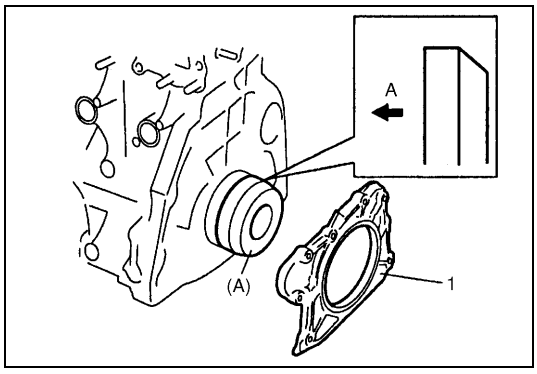
Crank rear oil seal installing position (dimension)
"a": 3 mm (0.12 in.)



9) Apply sealant to mating surface of rear oil seal housing (1).

"A": Sealant 99000-31250

Sealant amount for rear oil seal housing
Width "a": 3 mm, 0.12 in.
Height "b": 2 mm, 0.08 in.

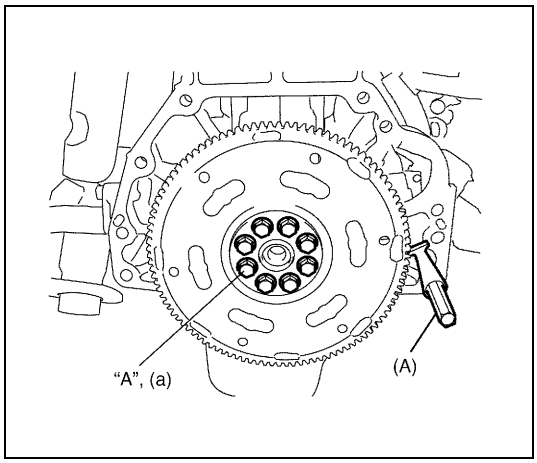


10) Install rear oil seal housing (1) and tighten bolts to specified torque by using special tool.

Special tool
(A): 09911-97720

Tightening torque
Rear oil seal housing bolt: 11 N·m (1.1 kg-m, 8.0 lb-ft)

A : Crankshaft side



11) Install flywheel.
Using special tool, lock flywheel or drive plate, and tighten flywheel or drive plate bolts to specified torque.

NOTE:
Use new flywheel or drive plate bolts.

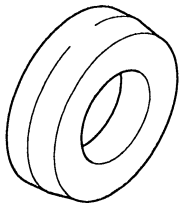
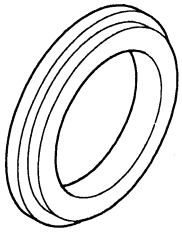
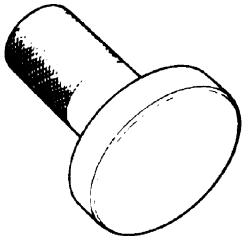
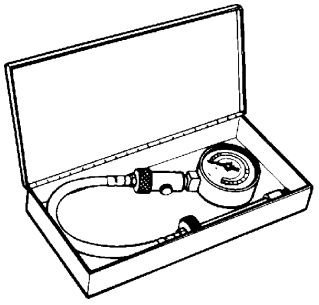
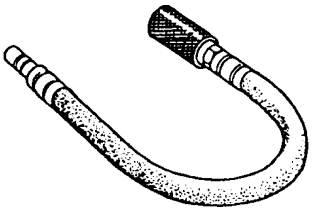
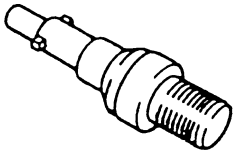
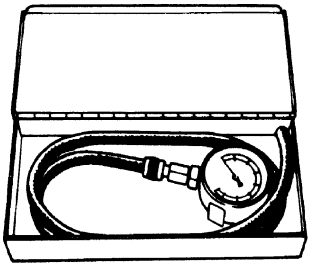
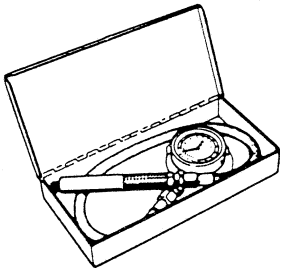
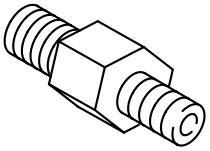
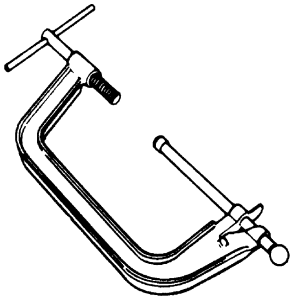
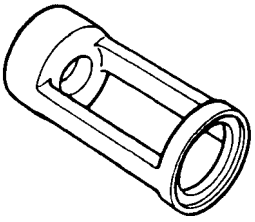
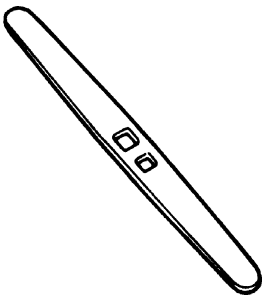
Special tool
(A): 09924-17810

Tightening torque
Flywheel or drive plate bolt
(a): 70 N·m (7.0 kg-m, 51.0 lb-ft)

12) Install piston and connecting rod referring to "Pistons, Piston Rings, Connecting Rods and Cylinders Removal and Installation" in this section.
13) Install engine assembly to vehicle referring to "Engine Assembly Removal and Installation" in this section.

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Main bearing cap No.1 bolt	Tighten 30 N·m (3.0 kg-m, 22.0 lb-ft), 50 N·m (5.0 kg-m, 36.5 lb-ft), and 60 ° by the specified procedure		
Main bearing cap No.2 bolt	Tighten 25 N·m (2.5 kg-m, 18.0 lb-ft) by the specified procedure		
Sensor plate bolt	11	1.1	8.0
Rear oil seal housing bolt	11	1.1	8.0
Flywheel or drive plate bolt	70	7.0	51.0
Transaxle stiffener bolt	Tighten 50 N·m (5.0 kg-m, 36.5 lb-ft) by the specified procedure		
Timing chain tensioner bolt	25	2.5	18.0
Oil gallery pipe No.1 bolt	30	3.0	21.5
Oil gallery pipe No.2 bolt	11	1.1	8.0
Oil gallery pipe No.3 bolt	11	1.1	8.0
Oil control valve mounting nut	11	1.1	8.0
Intake camshaft sprocket bolt	60	6.0	43.0

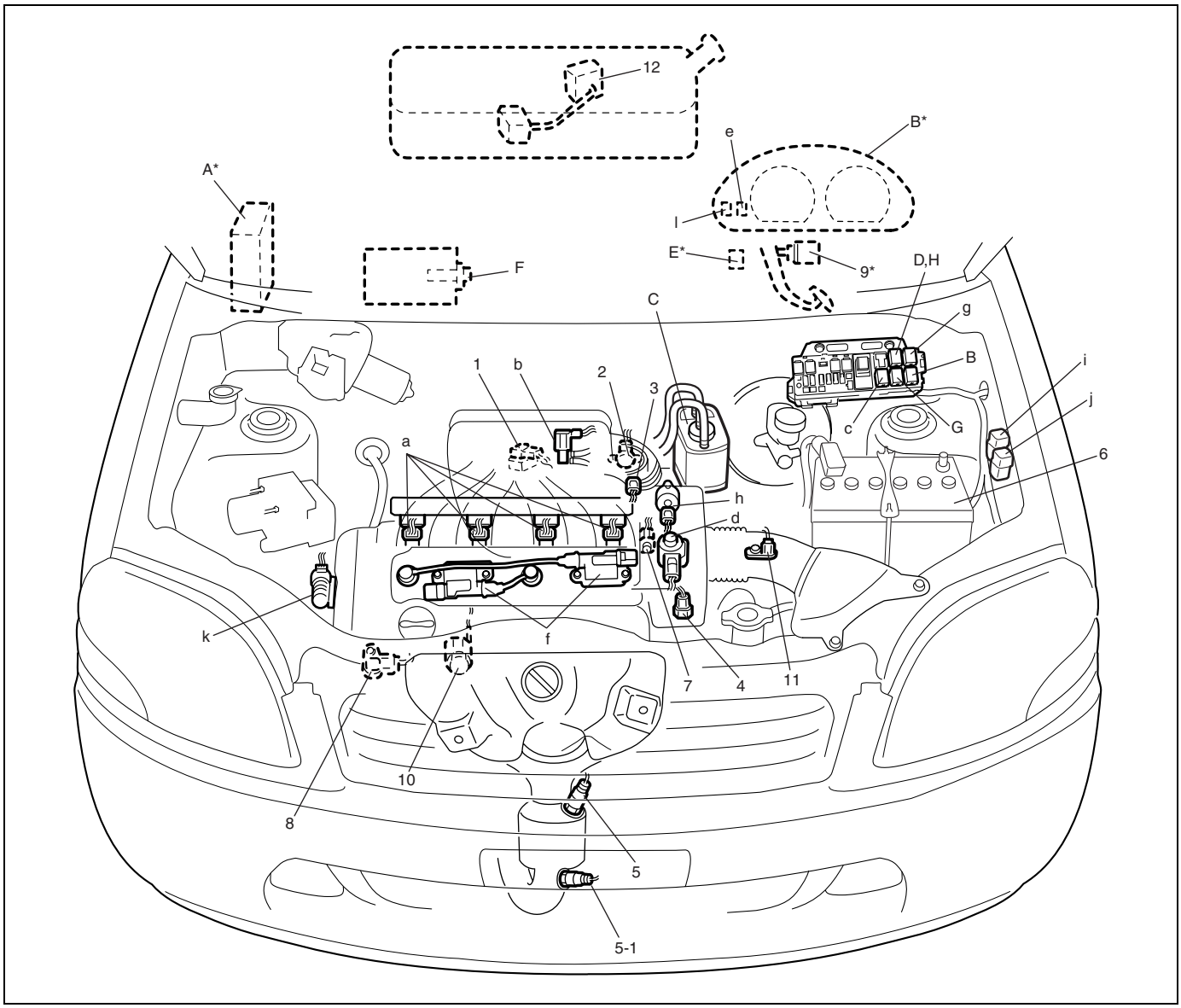
Special Tool

 09911-97720 Oil seal guide	 09911-97820 Oil seal installer	 09913-75810 Bearing installer	 09915-64512 Compression gauge
 09915-64530 Hose	 09915-67010 Attachment	 09915-67311 Vacuum gauge	 09915-77311 Oil pressure gauge
 09915-78211 Oil pressure gauge attachment	 09916-14510 Valve lifer	 09916-14521 Valve lifer attachment	 09916-34542 Reamer handle

Tightening Torque Specification

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Air ventilation bolt	4.5	0.45	3.5
Generator adjusting bolt	23	2.3	17
Generator pivot bolt	50	5	36
Water pump bolt and Nuts	22	2.2	16

Electronic Control System Component Location



INFORMATION SENSORS	CONTROL DEVICES	OTHERS
1. MAP sensor	a: Fuel injector	A: ECM
2. TP sensor	b: EVAP canister purge valve	B: Main relay
3. IAT sensor	c: Fuel pump relay	C: EVAP canister
4. ECT sensor	d: EGR valve (step motor)	D: Monitor connector (if equipped)
5. Heated oxygen sensor–1	e: Malfunction indicator lamp	E: Data link connector
5-1. Heated oxygen sensor–2 (if equipped)	f: Ignition coil assembly	F: A/C EVAP outlet air temp. sensor (if equipped)
6. Battery	g: Radiator fan control relay No.1	G: A/C condenser fan relay (if equipped)
7. CMP sensor	h: IAC valve	H: A/C compressor relay (if equipped)
8. CKP sensor	i: Radiator fan control relay No.2	
9. Stop lamp switch	j: Radiator fan control relay No.3	
10. Knock sensor	k. Oil control valve	
11. VSS	l. Immobilizer indicator lamp (if equipped)	
12. Fuel level sensor		

NOTE:

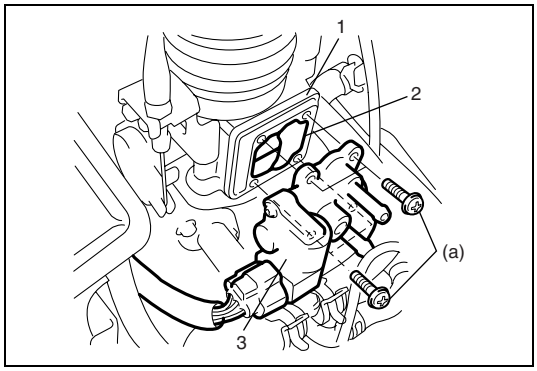
Above figure shows left-hand steering vehicle. For right-hand steering vehicle, parts with (*) are installed at the opposite side.

Idle air control valve (IAC valve) removal and installation

Removal

1) Detach EVAP canister.
2) Drain coolant referring to “Cooling System Draining” in Section 6B.
3) Disconnect coolant hoses from IAC valve.
4) Remove IAC valve from throttle body.

Installation

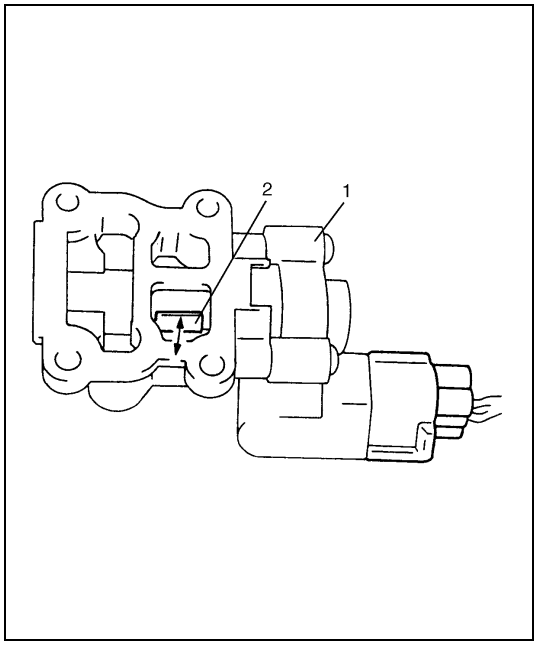


1) Install new gasket (2) to throttle body (1).
2) Install IAC valve (3) to throttle body (1).
   Tighten IAC valve screws to specified torque.

Tightening torque
IAC valve screw (a): 3.5 N·m (0.35 kg-m, 2.5 lb-ft)

3) Connect coolant hoses to IAC valve.
4) Refill coolant referring to “Cooling System Refill” in Section 6B.
5) Install EVAP canister.

Idle air control valve (IAC valve) inspection

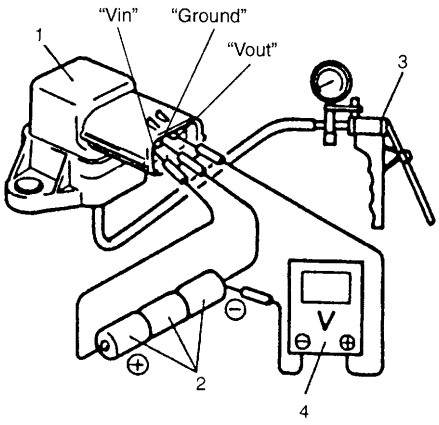


1) Connect each connector to IAC valve (1), TP sensor and IAT sensor.
2) Check that rotary valve (2) of IAC valve opens and closes once and then stops in about 60 ms as soon as ignition switch is turned ON.

NOTE:

- **This check should be performed by two people, one person turns on ignition switch while the other checks valve operation.**
- **As valve operation is momentary, it may be overlooked. To prevent this, perform this operation check 3 times or more continuously.**
  If rotary valve of IAC valve does not operate at all, check wire harness for open and short. If wire harness is in good condition, replace IAC valve and recheck.

Manifold absolute pressure sensor (MAP sensor) inspection



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

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

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

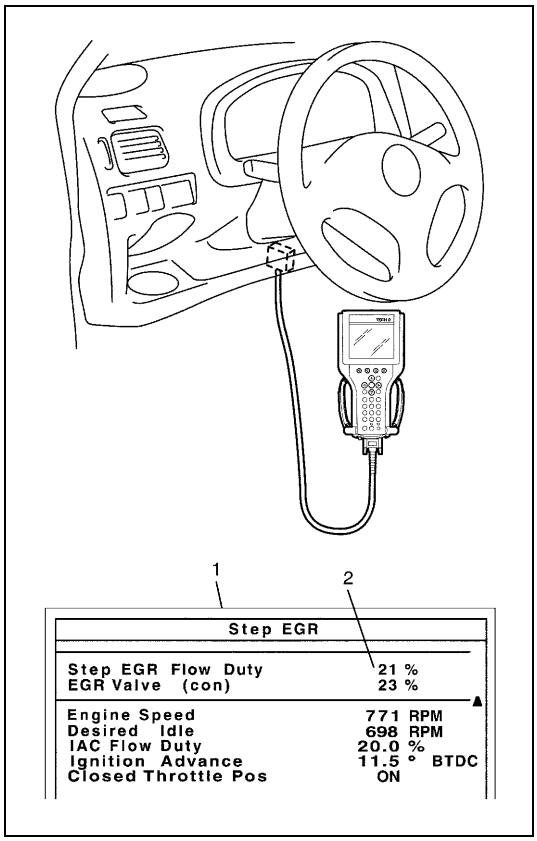
If check result is not satisfactory, replace MAP sensor (1).

4) Install MAP sensor (1) securely.
5) Connect MAP sensor (1) connector securely.

4. Digital type voltmeter

Emission Control System

EGR system inspection



1) Connect SUZUKI scan tool to data link connector (DLC) with ignition switch turn OFF.
2) Turn ON ignition switch and erase DTC using “CLEAR DTC” in “TROUBLU CODES” menu.
3) Start engine and warm up it to normal operating temperature then select “DTATA LIST” mode on scan tool.
4) Make sure that vehicle condition is as following.
   - Vehicle speed = 0 km/h (0 KPH)
   - Engine speed ≤900 rpm
   - Engine coolant temp. ≥ 90°C, 164°F
5) With engine idling (without depressing accelerator pedal), open EGR valve using “STEP EGR” mode in “MISC. TEST” menu.
   In this state, according as EGR valve opening increases engine idle speed drops. If not, possible cause is clogged EGR gas passage, stuck or faulty EGR valve.

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

EGR valve removal and installation

Removal

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

Installation

Reverse removal procedure noting following.

- Clean mating surface of valve and cylinder head.
- Use new gaskets.

SECTION 6F1

IGNITION SYSTEM (ELECTRONIC IGNITION SYSTEM)

WARNING:

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

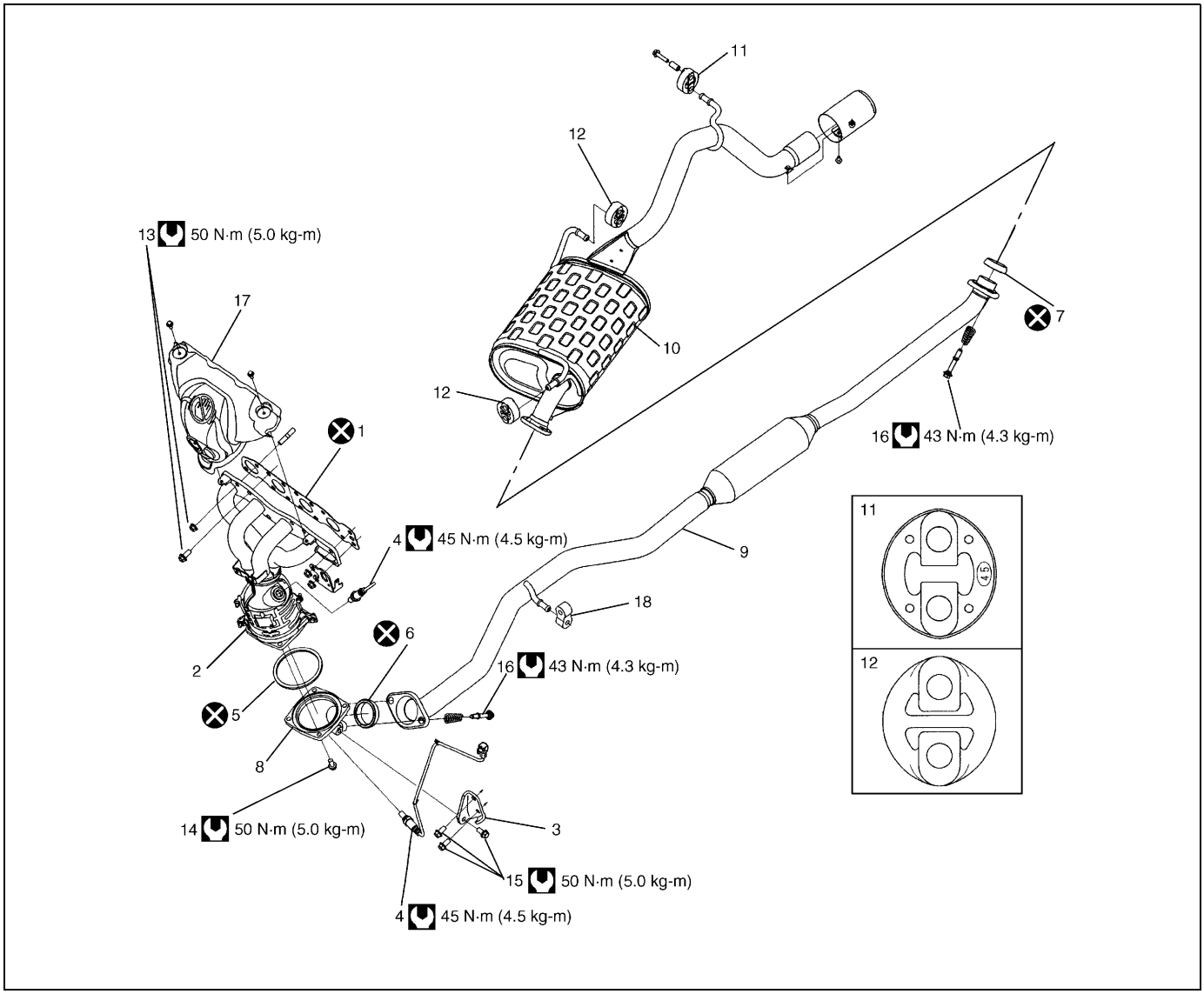
- **Service on and around the air bag system components or wiring must be performed only by an authorized SUZUKI dealer. Refer to "Air Bag System Components and Wiring Location View" under "General Description" in Section 10B in order to confirm whether you are performing service on or near the air bag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

NOTE:

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

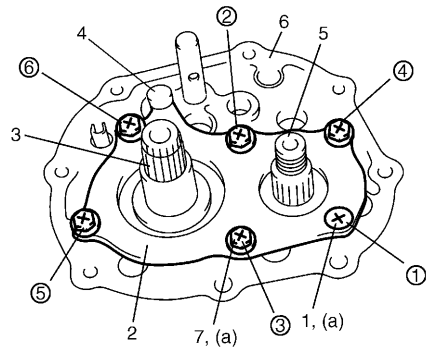
CONTENTS

M15 engine model



1. Gasket	8. Exhaust No.1 pipe	15. Exhaust manifold stiffener bolt
2. Exhaust manifold	9. Exhaust No.2 pipe	16. Exhaust No.2 pipe bolt
3. Exhaust No.1 pipe stiffener	10. Muffler	17. Exhaust manifold cover
4. Oxygen sensor (if equipped)	11. Muffler mounting No.1	18. Muffler mounting type 3
5. Exhaust pipe gasket	12. Muffler mounting No.2	Tightening torque
6. Seal ring No.1	13. Exhaust manifold bolt and nut	Do not reuse.
7. Seal ring No.2	14. Exhaust No.1 pipe bolt	

Available shim thickness
0.40, 0.45, 0.50, 0.55, 0.6, 0.65,0.7, 0.75, 0.8, 0.85, 0.9, 0.95, 1.0,1.05, 1.1 and 1.15 mm (0.015, 0.017, 0.019, 0.021, 0.023,0.025, 0.027, 0.029, 0.031, 0.033,0.035, 0.037, 0.039, 0.041, 0.043 and 0.045 in.)



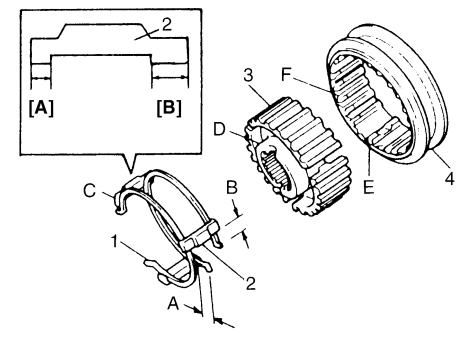
CAUTION:
Do not reuse left case plate screw (1) and bolts (7). Be sure to use new adhesive pre-coated screw and new adhesive pre-coated bolts. Otherwise, screw and/or bolts may loosen.

4) Place left case plate (2) inserting its end in groove of shift guide shaft (4) and tighten new adhesive pre-coated screw (1) and new adhesive per-coated bolts (7) temporarily with less than specified toque.
5) Tighten new screw(s) and new bolts to specified torque finally in the order of circled numbers (①→②→③→④→⑤→⑥) shown in figure.

NOTE:
After tightening screw and bolts, make sure that counter-shaft (5) can be rotated by hand feeling certain load.

Tightening torque
Left case plate screw and bolt
(a): 11 N·m (1.1 kg-m, 8.0 lb-ft)

3. Input shaft	6. Transaxle left case

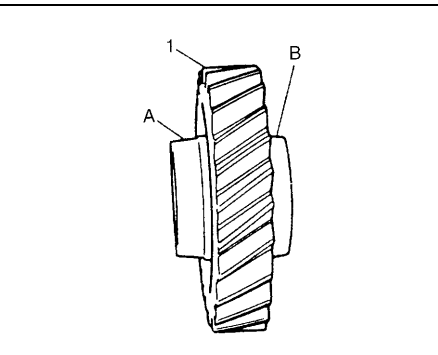


6) Assemble 5th speed synchronizer sleeve (4) and hub (3) with keys (2) and springs (1).

NOTE:
Short side C in keys, long flange D in hub and chamfered spline F in sleeve should face inward (5th gear side).

Synchronizer key installation position
: A = B

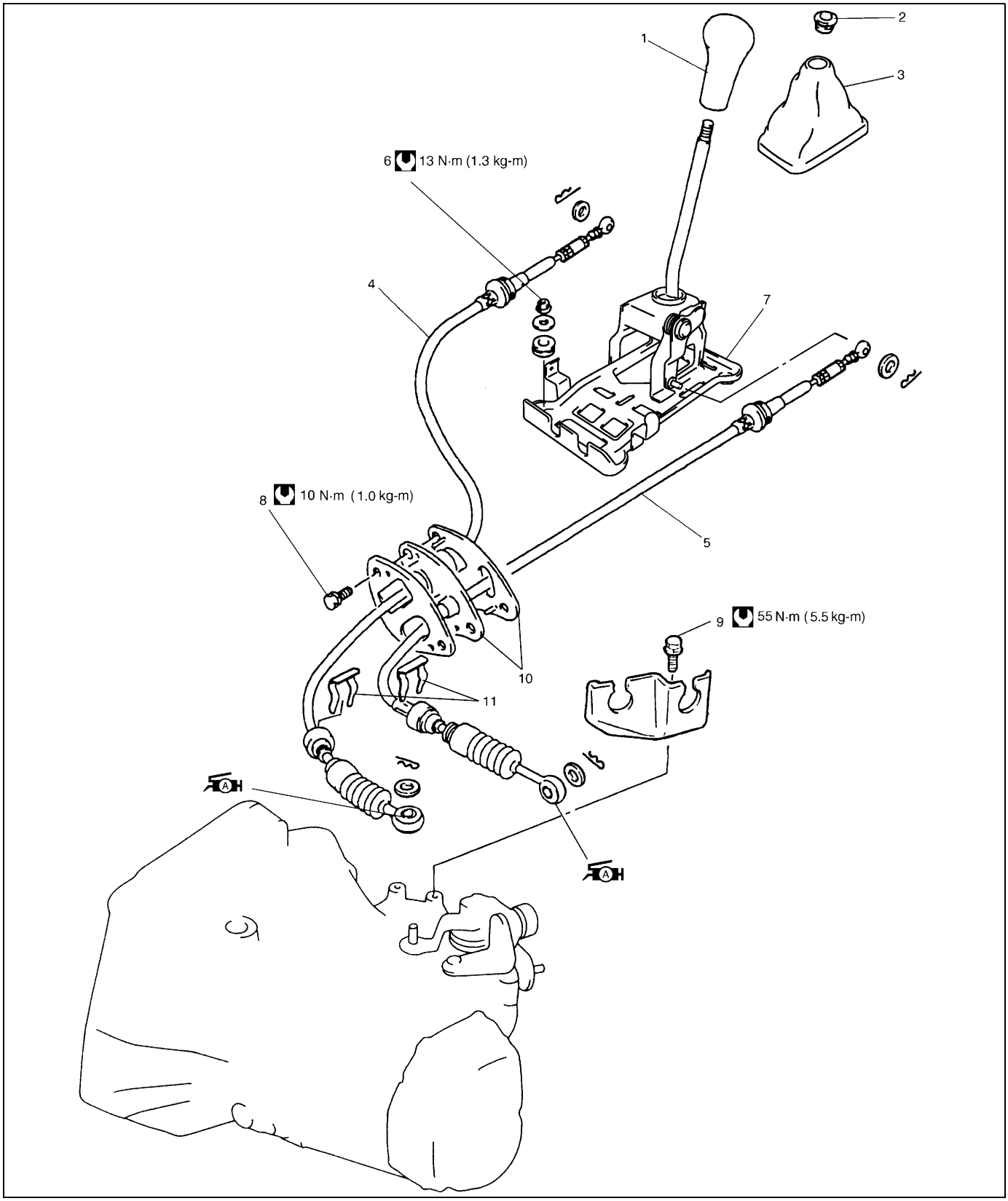
[A]: Short side C	D: Long flange (Inward)
[B]: Long side	E: Key way
C: Short side (Inward)	F: Chamfered spline (Inward)



7) Install 5th gear (1) to counter shaft facing machined boss A inward.

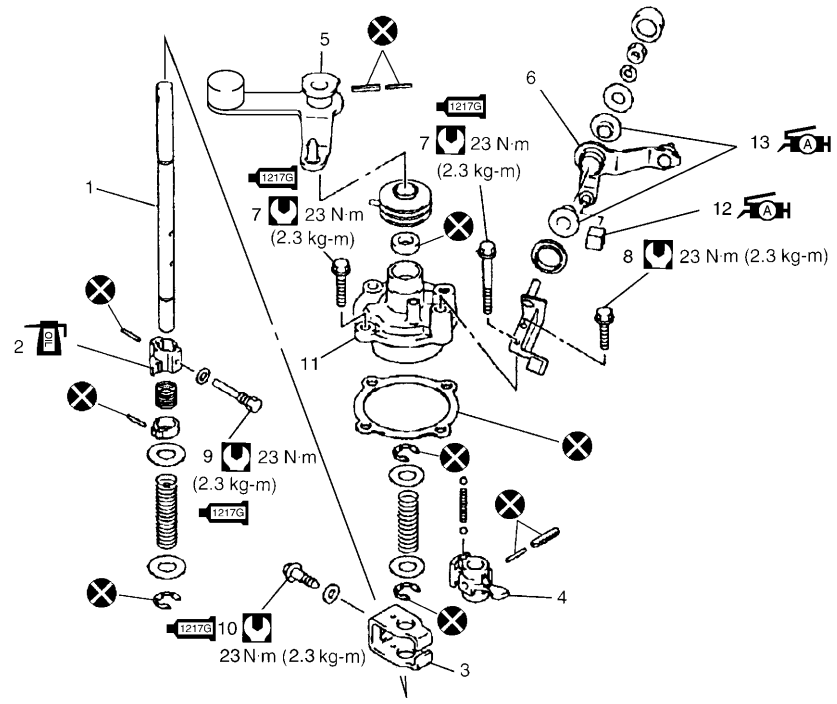
A: Machined boss (Inside)
B: No machining (Outside)

Gear Shift Control Lever and Cable Components



1. Gear shift control lever knob	5. Gear select control cable : Apply grease 99000-25010 to connecting portion of gear select control cable.	9. Cable bracket bolt
2. Lever boot holder	6. Gear shift control lever assembly mounting nut	10. Cable grommet
3. Gear shift lever boot	7. Gear shift control lever assembly	11. E-ring
A H 4. Gear shift control cable : Apply grease 99000-25010 to connecting portion of gear shift control cable.	8. Cable mounting bolt	Tightening torque

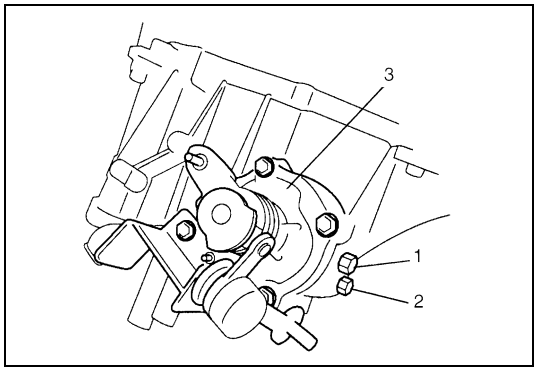
Gear Shift and Select Shaft Assembly Components



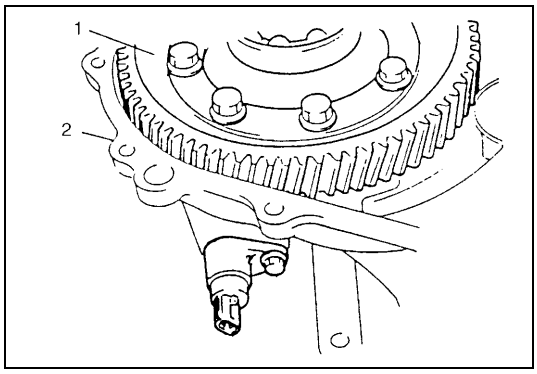
1.	Gear shift & select shaft	1217G	7.	Gear shift guide case bolt : Apply sealant 99000-31260 to bolt thread.	A H	13.	Select lever boss : Apply grease 99000-25010 to internal and external diameter
2.	5th & reverse gear shift cam		8.	Select lever bracket bolt			Tightening torque
3.	Gear shift interlock plate	1217G	9.	5th to reverse interlock guide bolt : Apply sealant 99000-31260 to bolt thread.			Do not reuse.
4.	Gear shift & select lever	1217G	10.	Gear shift interlock bolt : Apply sealant 99000-31260 to bolt thread.			Apply transaxle oil.
5.	Shift cable lever		11.	Guide case			
6.	Select cable lever	A H	12.	Select lever shaft bush : Apply grease 99000-25010 to whole area of bush.			

Gear Shift and Select Shaft Assembly Removal and Installation

Removal

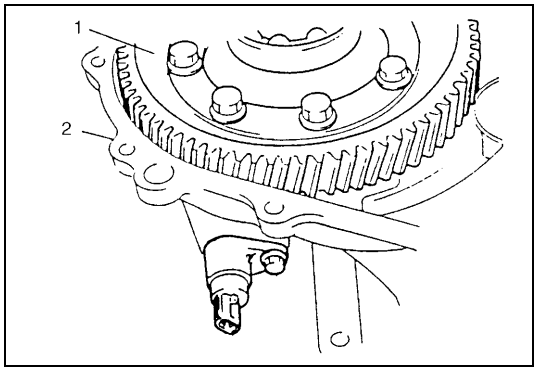


1) Remove gear shift interlock bolt (1) and 5th to reverse interlock guide bolt (2) from transaxle case.
2) Remove gear shift and select shaft assembly (3).

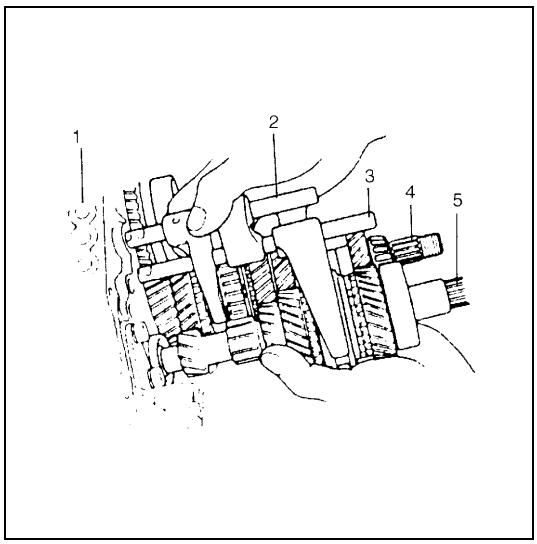


19) Remove differential gear assembly (1) from right case (2).

Installation



1) Install differential assembly (1) into right case (2).

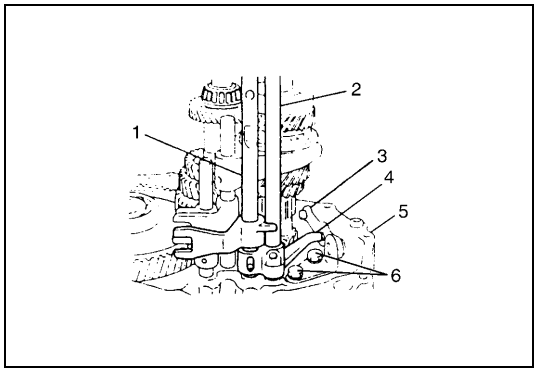


2) Join input shaft (5), counter shaft (4), low speed gear shift shaft (2) and high speed gear shift shaft (3) assemblies all together, then install them into right case (1).

CAUTION:
Take care not to damage oil seal lip by input shaft, or oil leakage may take place.

NOTE:

- **Input shaft right bearing on shaft can be installed into right case tapping shaft with plastic hammer.**
- **Check to make sure that counter shaft is engaged with final gear while installing.**

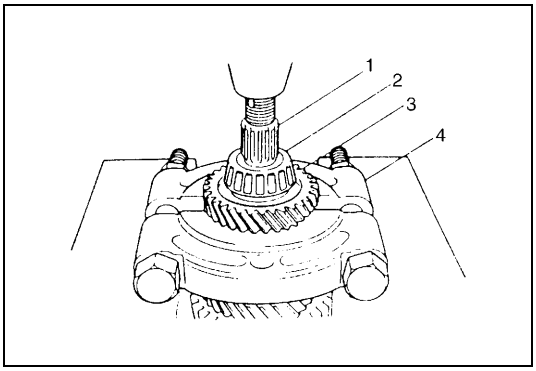


3) Install 5th & reverse gear shift shaft (1) with 5th & reverse gear shift guide shaft (2) into right case (5). Reverse gear shift arm (4) has to be joined with reverse gear shift lever (3) at the same time.

6. Reverse gear shift lever bolts

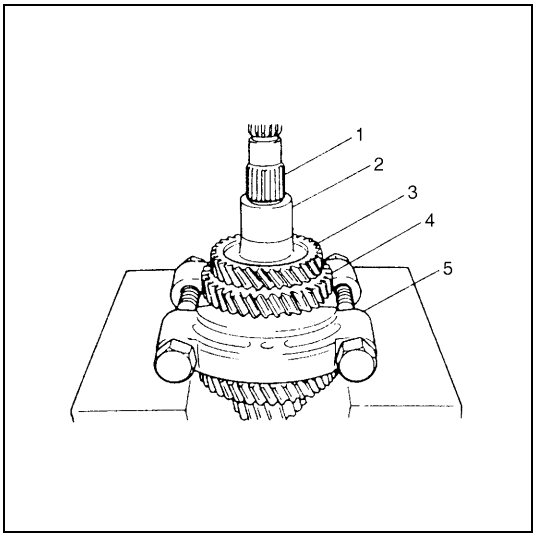
Counter Shaft Disassembly and Assembly

Disassembly



1) Drive out left bearing cone (2) with 4th gear (3) from counter shaft (1) using puller (4) and press.

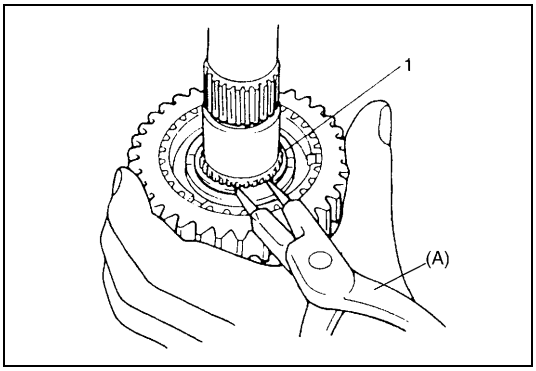
CAUTION:
- **Use puller and press that will bear at least 5 ton (11,000 lb) safely.**
- **To avoid tooth damage, support 4th gear at flat side of puller.**



2) Apply puller (5) to 2nd gear (4) and drive out 3rd & 4th gear spacer (2) and 3rd gear (3) together with 2nd gear (4) from counter shaft (1) using press. Take out needle bearing of resin cage type from counter shaft.

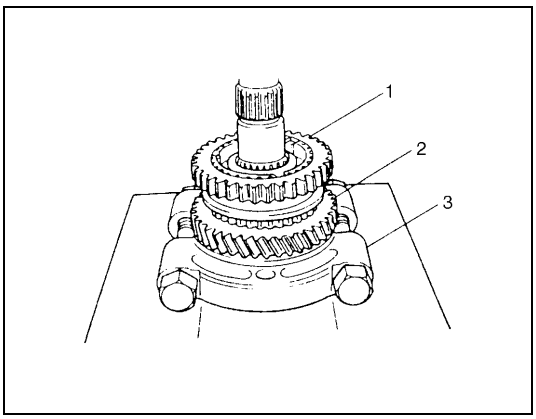
CAUTION:
- **If compression exceeds 5 ton (11,000 lb), release compression once, reset puller support and then continue press work again.**
- **To avoid gear tooth from being damaged, support it at flat side of bearing puller.**

3) Take out 2nd synchronizer outer ring, center cone and inner ring.



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

Special tool
(A): 09900-06107



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

CAUTION:
To avoid gear tooth from being damaged, support it at flat side of bearing puller.

6) Disassemble synchronizer sleeve & hub assembly.
7) Take out 1st gear needle bearing of resin cage type from shaft.

Fastening part	Tightening torque		
	N•m	kg-m	lb-ft
Gear shift interlock bolt	23	2.3	17.0
5th to reverse interlock guide bolt	23	2.3	17.0
Back up lamp switch	23	2.3	17.0
Gear shift control lever assembly mounting nut	13	1.3	9.5
Cable lock nut	5.5	0.55	4.0
Cable mounting bolt	10	1.0	7.5
Cable bracket bolt	55	5.5	42.0
Transaxle to engine bolt	85	8.5	64.0
Engine left mounting bracket bolt	55	5.5	42.0
Stiffener bolt	10	1.0	7.5
Engine rear mounting No.1 bolt	55	5.5	42.0
Engine rear mounting No.2 bracket bolt	55	5.5	42.0
Transaxle to engine rear mounting No.2 bracket bolt	55	5.5	42.0
Transaxle to engine nut	85	8.5	64.0
Clutch housing lower plate bolt	55	5.5	42.0
VSS bolt	5.5	0.55	4.0
Select lever bracket bolt	23	2.3	17.5
Side bearing retainer bolt	23	2.3	17.0
Engine rear mounting No.2 bolt	55	5.5	42.0
Rear mounting member bolt	55	5.5	42.0

Required Service Material

Material	Recommended SUZUKI product (Part Number)	Use
Lithium grease	SUZUKI SUPER GREASE A (99000-25010)	• Oil seal lips • O-rings • Select lever boss • Select lever shaft bush
Sealant	SUZUKI BOND NO. 1217G (99000-31260)	• Oil drain plug and filler/level plug • Gear shift locating bolt • Mating surface of transaxle case • Mating surface of side cover • Gear shift interlock bolt • 5th to reverse interlock guide bolt • Guide case bolt
Thread lock cement	THREAD LOCK 1322 (99000-32110)	• Reverse gear shift lever bolt • Oil gutter bolt • Reverse shaft bolt • Final gear bolt • Left case plate bolt • Shift fork bolt

Power Door Lock System with Keyless Entry System (If Equipped)

Condition	Possible Cause	Correction
All are not locked/ unlocked by only driver side key cylinder switch	"DOOR LOCK" fuse blown	After checking short circuit, replace "DOOR LOCK" fuse.
	Driver side door knob switch faulty	Check system referring to "Power Door Lock System without Keyless Entry System" in this section.
	Power door lock controller faulty	
	Wiring or grounding faulty	
Only one door is not locked/unlocked	Power door lock actuator faulty	Check system referring to "Power Door Lock System without Keyless Entry System" in this section.
	Wiring or grounding faulty	
All doors are not locked/unlocked by only keyless entry transmitter	Transmitter battery dead	Replace battery.
	Transmitter faulty	Replace transmitter.
	Code registration error	Perform code registration referring to "Transmitter Code Registration Procedure" in this section.
	Door switch faulty	Check system referring to "Power Door Lock System without Keyless Entry System" in this section.
	Key remainder switch (in ignition switch) faulty	
	Power door lock controller faulty	
	Wiring or grounding faulty	
Turn signal lights are not flashed when doors are locked/ unlocked by transmitter	Keyless entry system is in interior light signal mode	Change signal mode referring to "Change of Signal Mode" in this section.
	Turn signal and hazard warning system faulty	Check system referring to "Turn Signal and Hazard Warning Lights System" in this section.
	Power door lock controller faulty	Check system referring to "Power Door Lock System with Keyless Entry System" in this section.
	Wiring or grounding faulty	
Interior light does not turn ON when interior light switch is at DOOR position and doors are unlocked by transmitter	Power door lock controller faulty	Check system referring to "Power Door Lock System with Keyless Entry System" in this section.
	Wiring or grounding faulty	

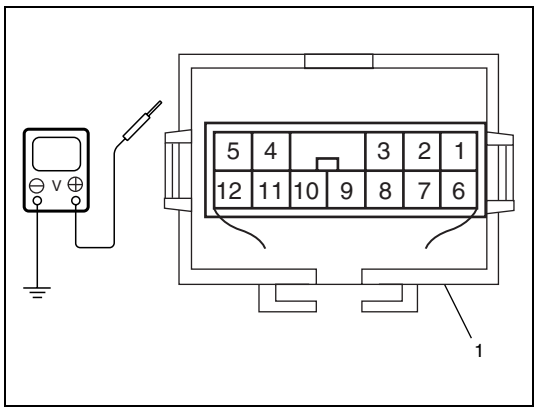
Door Mirror Heater (If Equipped)

Condition	Possible Cause	Correction
All door mirrors mist when rear defogger switch is ON	"CIGAR" fuse blown	After checking short circuit, replace fuse.
	Rear defogger switch faulty	Check switch.
	Wiring or grounding faulty	Repair circuit.
	Door mirror heater relay faulty	Check relay
One mirror mists when rear defogger switch is ON	Mirror heater faulty	Check mirror heater.
	Wiring or grounding faulty	Repair circuit.

Keyless entry system circuit inspection

NOTE:

If keyless entry system is in interior light signal mode, change to hazard warning light signal mode referring to "Change of Signal Mode" in this section.



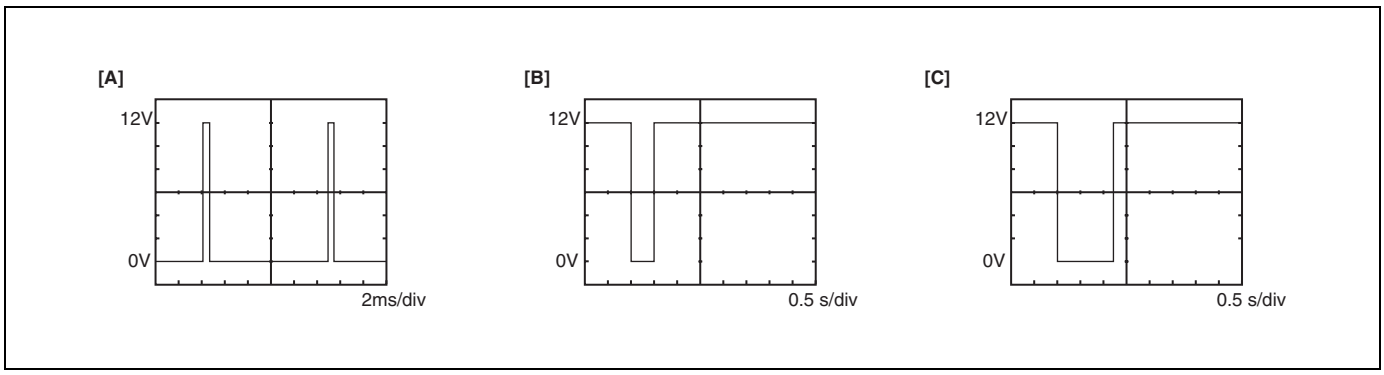
Check that the voltage and continuity between the following terminals and body ground are specifications under each conditions.
If check result is not as specified, check applicable circuit.
If circuit is normal, recheck keyless entry system circuit as follows.

1) Substitute a known-good door lock controller.
2) Register key code referring to "Transmitter Code Registration Procedure" in this section.
3) Recheck keyless entry system circuit.

1. Door lock controller

Keyless Entry System Circuit Check

Terminal	Wire	Circuit	Specification	Condition
G40-2	BLU/YEL	Key remainder circuit	10 – 14 V	Ignition key is in ignition switch.
			0 – 1 V	Ignition key is not in ignition.
G40-4	BLK/RED	Door switch & interior light circuit	0 – 1 V	Driver side, passenger side, rear driver side, rear passenger side or back door is open.
			10 – 14 V	All doors are close.
			Figure "A"	Fulfill the following conditions. • All door is close. • Interior light switch is middle position. • 15 seconds after pushing "UNLOCK" button on transmitter.
G40-5	YEL/RED	Hazard warning signal circuit	Figure "B"	Push "LOCK" button on transmitter.
			Figure "C"	Push "UNLOCK" button on transmitter.



[A]: Figure "A"
[B]: Figure "B"
[C]: Figure "C"

Diagnosis

Precautions in Diagnosing Troubles

Precautions in identifying diagnostic trouble code

ECM

<Vehicle not equipped with immobilizer indicator lamp>

- Before identifying diagnostic trouble code indicated by malfunction indicator lamp or SUZUKI scan tool, don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine.
  Such disconnection will clear trouble codes for engine and emission control system and immobilizer control system stored in memory of ECM.
- If abnormality or malfunction lies in two or more areas, malfunction indicator lamp indicates applicable codes three times each.
  And flashing of these codes is repeated as long as diagnosis terminal is grounded and ignition switch is held at ON position.
- When ECM detects a trouble in both engine and emission control system and immobilizer control system, malfunction indicator lamp indicates trouble codes of both systems alternately while the ignition switch is turned ON and the diagnosis terminal is grounded.
- Take a note of diagnostic trouble code indicated first.

<Vehicle equipped with immobilizer indicator lamp>

- Before identifying diagnostic trouble code indicated through SUZUKI scan tool, don't disconnect couplers from ECM, battery cable from battery, ECM ground wire harness from engine.
  Such disconnection will clear trouble codes for engine and emission control system and immobilizer control system stored in memory of ECM.
- Take a note of diagnostic trouble code indicated first.

Immobilizer Control Module

- Take a note of diagnostic trouble code indicated first.

Intermittent Troubles

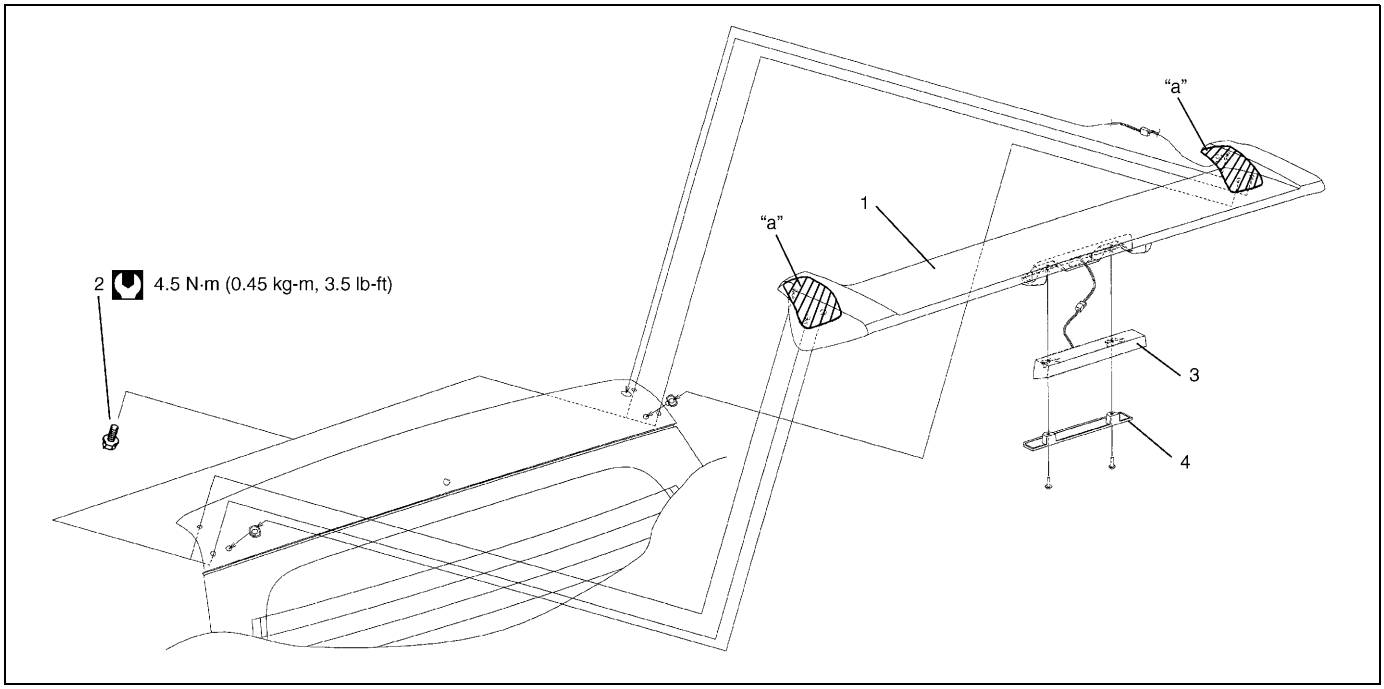
- There is case where SUZUKI scan tool indicate a diagnostic trouble code representing a trouble which occurred only temporarily and has gone. In such case, it may occur that good parts are replaced unnecessarily. To prevent such accident, be sure to follow instructions given below when checking by using "Diagnostic Flow Table".
  - When trouble can be identified, it is not an intermittent one:
    Check coil antenna, ignition key, wires and each connection and if they are all in good condition, substitute a known-good ECM and recheck.
  - When trouble can not be identified but SUZUKI scan tool indicate a trouble code:
    Diagnose trouble by using that code No. and if ignition key, coil antenna, wires and each connection are all in good condition, turn OFF ignition switch and then ON.

Then check what SUZUKI scan tool indicate. Only when they indicate trouble code again, substitute a known-good ECM or Immobilizer Control Module and check again.
If they indicate not trouble code but normal code, it means that an intermittent trouble did occur and has gone. In this case, check wires and connections carefully again.

Body Structure

Rearend Door Spoiler Removal and Installation (Sport Model)

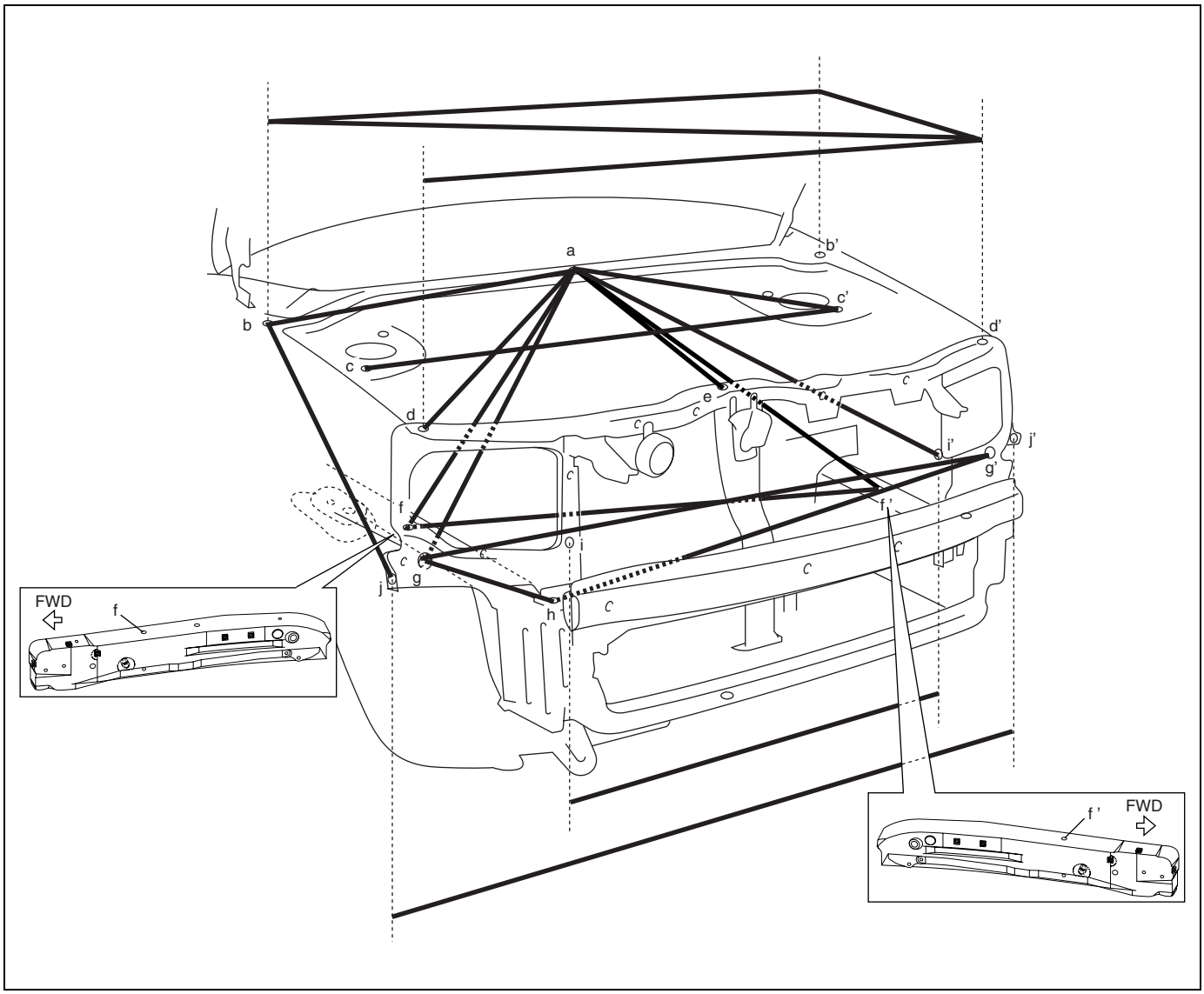
When removing or installing rearend door spoiler, refer to the figure.



"a": Adhesive tape (3M #4213)	2. Rearend door spoiler mounting bolt	4. High mount stop lamp cover
1. Rearend door spoiler	3. High mount stop lamp assembly	Tightening torque

Body Dimensions

Engine room



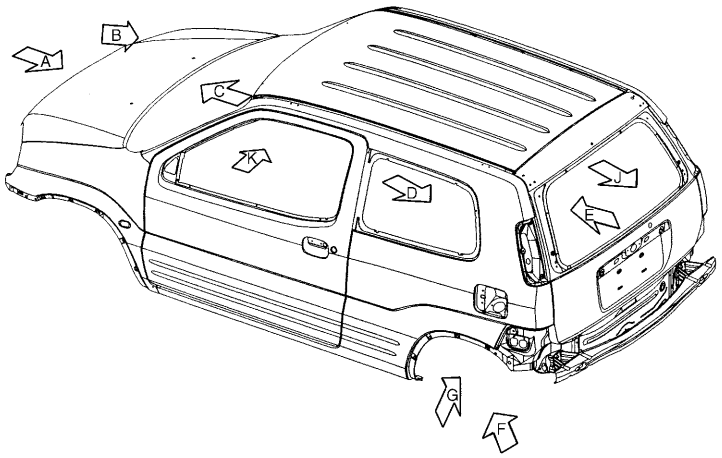
a. Garnish installation center hole (ϕ5)	e. Hood cushion installation hole	i (i'). Head light installation hole
b (b'). Front fender installation hole	f (f'). Engine mounting installation front hole	j (j'). Front fender installation hole
c (c'). Strut installation front hole	g (g'). Jig hole (ϕ15 mm)	
d (d'). Front fender installation hole	h. Bumper member upper side installation hole	

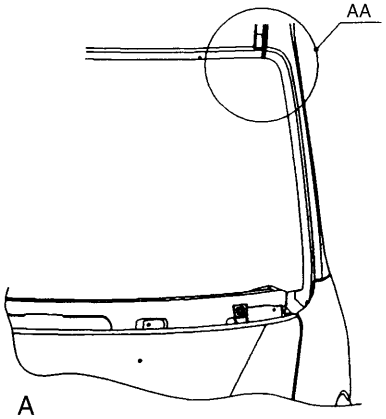
Hole to hole distance

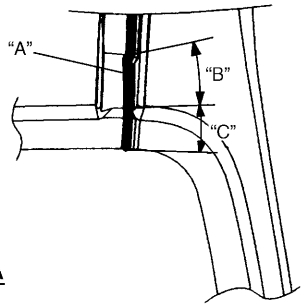
a-b: 673 mm (26.50 in.)	**a-g: 889 mm (35.00 in.)**	**d-d': 1320 mm (51.97 in.)**
a-c': 584 mm (22.99 in.)	**a-i': 758 mm (29.84 in.)**	**f-f': 950 mm (37.40 in.)**
a-d: 793 mm (31.22 in.)	**b-b': 1340 mm (52.76 in.)**	**g-g': 1315 mm (51.77 in.)**
a-e: 584 mm (22.99 in.) (except sport model)	**b-d': 1411 mm (55.55 in.)**	**g-h: 231 mm (9.09 in.)**
a-e: 599 mm (23.58 in.) (sport model)	**b-j: 639 mm (25.16 in.)**	**g'-h: 1139 mm (44.84 in.)**
a-f: 774 mm (30.47 in.)	**b'-d': 470 mm (18.50 in.)**	**i-i': 866 mm (34.09 in.)**
a-f': 777 mm (30.59 in.)	**c-c': 1098 mm (43.23 in.)**	**j-j': 1496 mm (58.90 in.)**

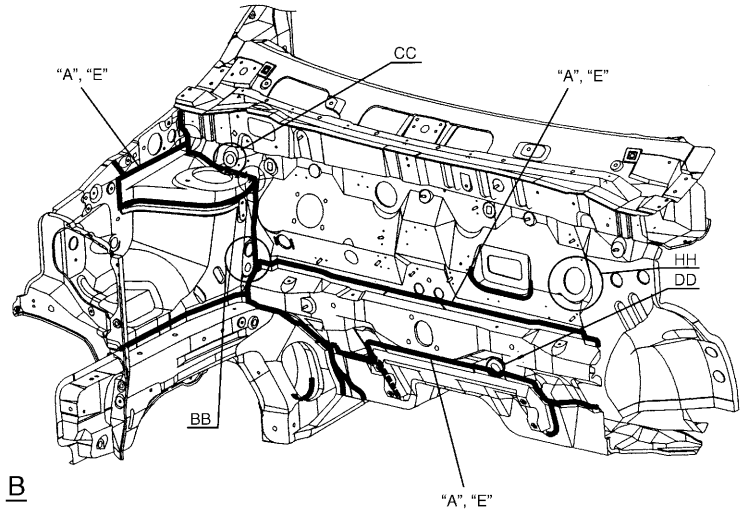
Paint and Coatings

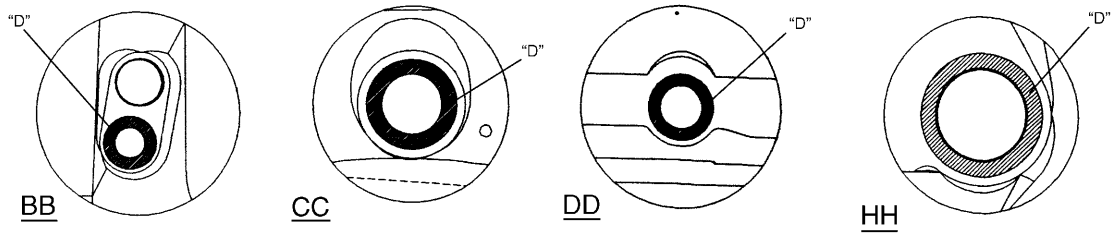
Sealant Application Areas











"A" : Apply sealant	"C" : Wipe off excess sealant after application	"E" : Smooth out sealant with a brush
"B" : Apply sealant without heeling	"D" : Do not apply sealant	