SUZUKI

SQ416/SQ420
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VOLUME 1 OF 2

SERVICE MANUAL

99500-65D10-01E

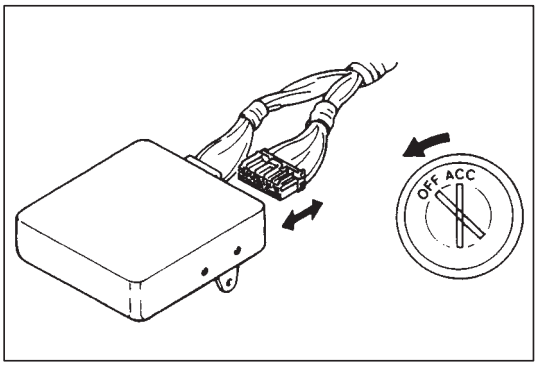
Printed in Japan Ⓘ Ⓢ

SUZUKI MOTOR CORPORATION

SERVICE MANUAL

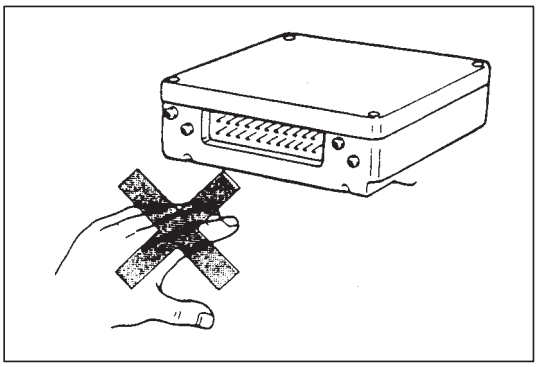
VOLUME 1 OF 2
CHASSIS / ELECTRICAL/BODY

SUZUKI
Caring for Customers
99500-65D10-01E
(英)



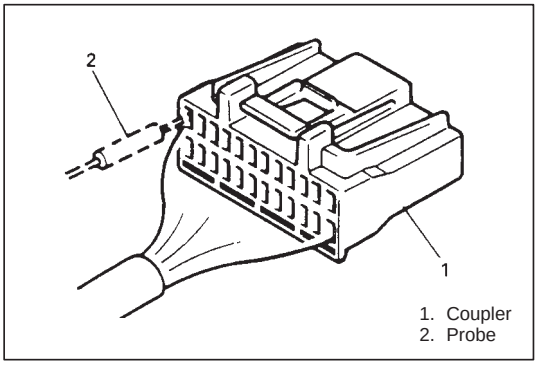
PRECAUTIONS FOR ELECTRICAL CIRCUIT SERVICE

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



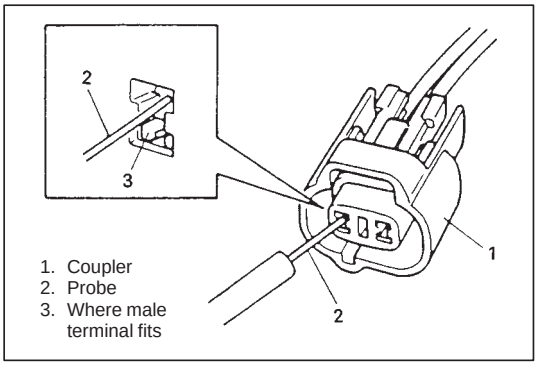
- **Be careful not to touch the electrical terminals of parts which use microcomputers (e.g. electronic control unit like as ECM, PCM, P/S controller, etc.). The static electricity from your body can damage these parts.**

- **Never connect any tester (voltmeter, ohmmeter, or whatever) to electronic control unit when its coupler is disconnected. Attempt to do it may cause damage to it.**
- **Never connect an ohmmeter to electronic control unit with its coupler connected to it. Attempt to do it may cause damage to electronic control unit and sensors.**
- **Be sure to use a specified voltmeter/ohmmeter. Otherwise, accurate measurements may not be obtained or personal injury may result.**



1. Coupler
2. Probe

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



1. Coupler
2. Probe
3. Where male terminal fits

- **When connecting meter probe from terminal side of coupler because it can't be connected from harness side, use extra care not to bend male terminal of coupler of force its female terminal open for connection.**
  In case of such coupler as shown connect probe as shown to avoid opening female terminal.
  Never connect probe where male terminal is supposed to fit.

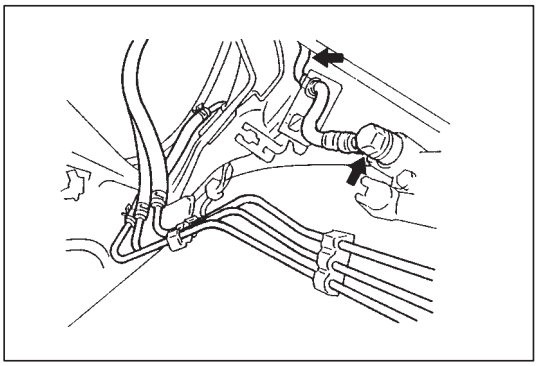
SECTION 0B

MAINTENANCE AND LUBRICATION

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

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

CONTENTS



ITEM 6-3

Brake Hoses and Pipes Inspection

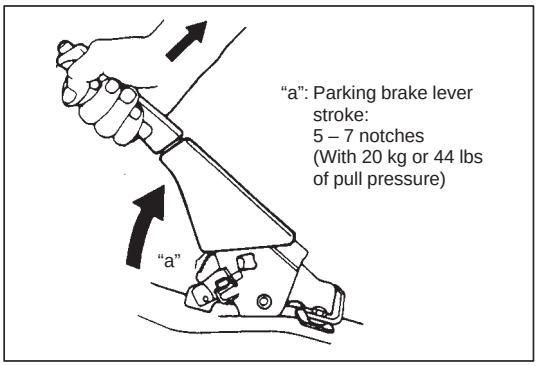
Check brake hoses and pipes for proper hookup, leaks, cracks, chafing and other damage.
Replace any of these parts as necessary.

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

ITEM 6-4

Brake Fluid Change

Change brake fluid as follows.
Drain existing fluid from brake system completely, fill system with specified fluid and carry out air purge operation.
For air purging procedure, refer to Section 5.

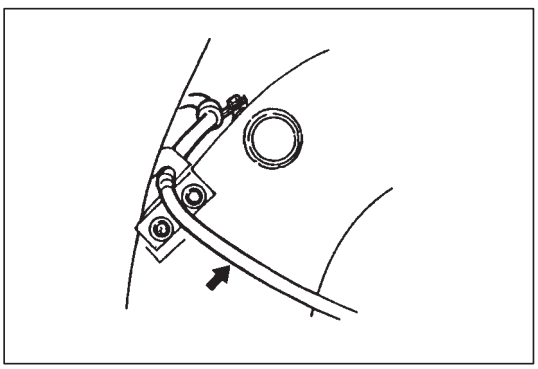


ITEM 6-5

Parking Brake Lever and Cable Inspection

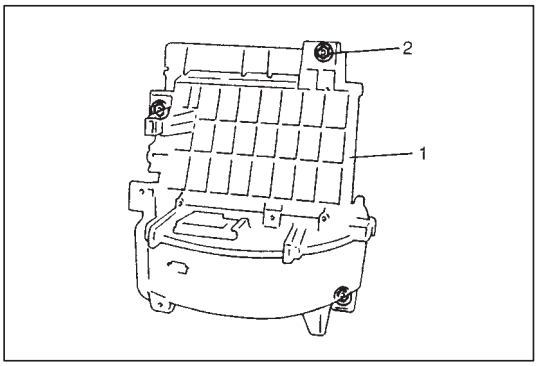
Parking brake lever

1) Check tooth tip of each notch for damage or wear. If any damage or wear is found, replace parking lever.
2) Check parking brake lever for proper operation and stroke, and adjust it if necessary.
   For checking and adjusting procedures, refer to Parking Brake Inspection and Adjustment in Section 5.

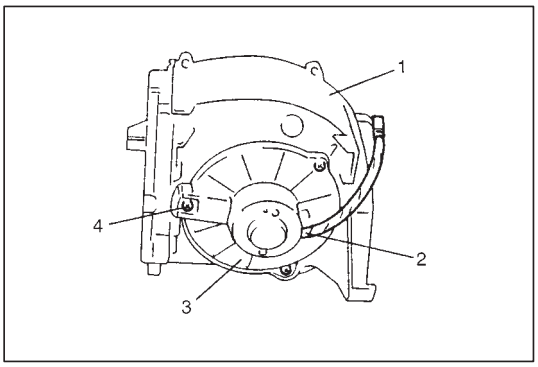


Parking brake cable

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



6) Remove cooling unit (If equipped).
   Refer to item COOLING UNIT (EVAPORATOR) REMOVAL in Section 1B.
7) Disconnect fresh air control cable from blower motor case.
8) Remove blower motor unit (1) by removing its fastening nuts (2).

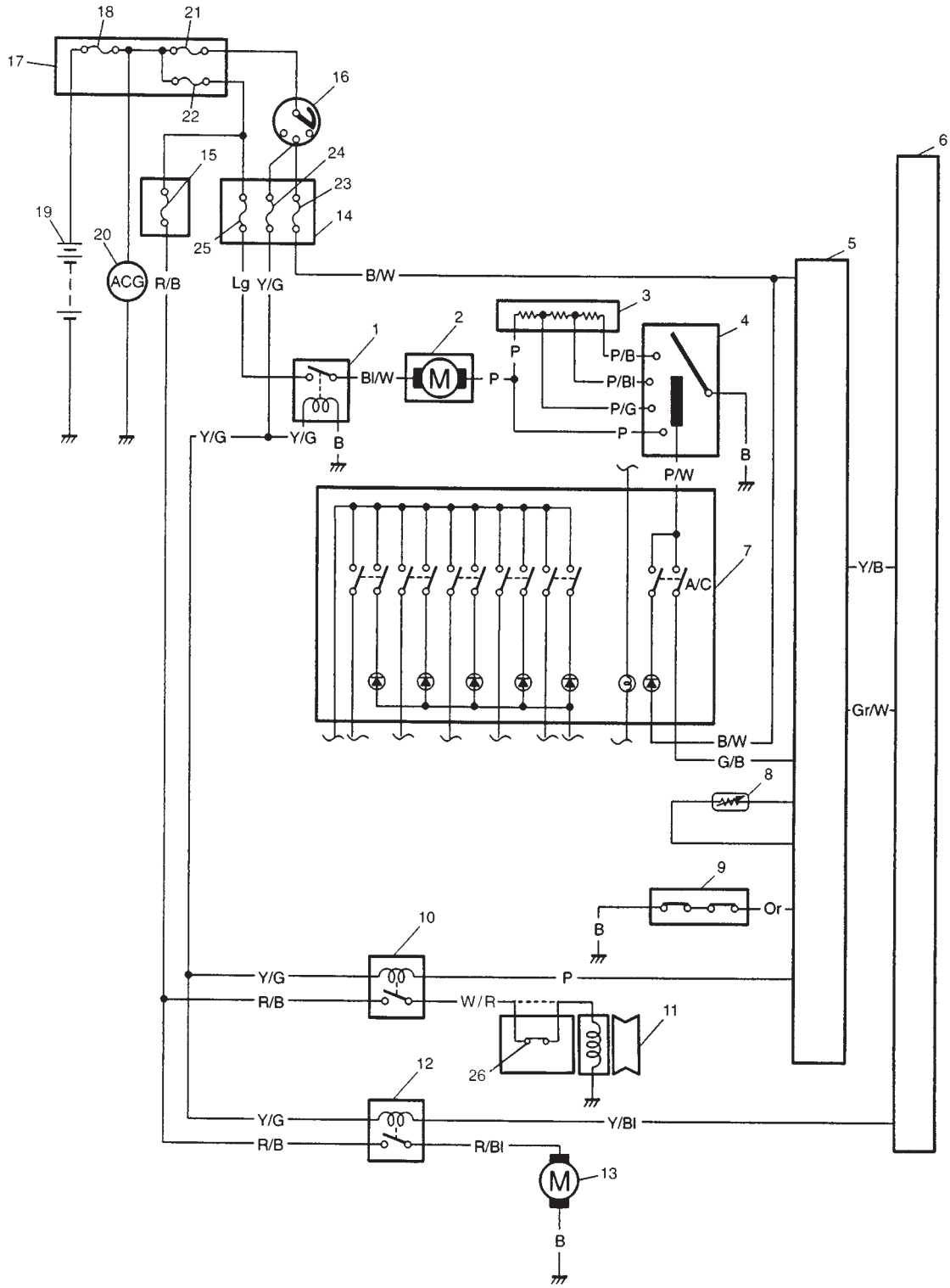


9) Disconnect blower motor lead wire (2) at coupler from blower unit (1).
10) Remove blower motor (3) by removing its mounting screws (4).

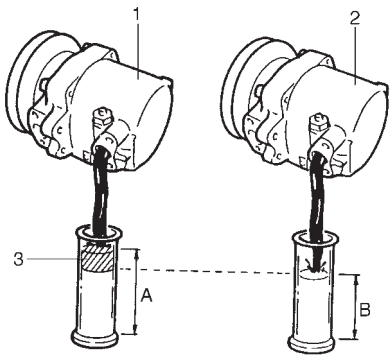
INSTALLATION

1) Reverse removal procedure for installation.
2) Connect fresh air control cable, refer to HEATER CONTROL CABLES INSTALLATION.
3) Enable air bag system, if equipped. Refer to ENABLING AIR BAG SYSTEM in Section 10B.

FOR RH VEHICLE



1. Blower motor main relay
2. Blower motor
3. Blower motor resistor
4. Blower motor switch
5. A/C controller
6. ECM
7. Heater mode control switch
8. Evaporator temperature sensor
9. Refrigerant pressure switch
10. Compressor relay
11. Compressor
12. Condenser cooling fan relay
13. Condenser cooling fan
14. Fuse box
15. A/C fuse 25 A
16. Ignition switch
17. Main fuse box
18. Battery main fuse 80 A
19. Battery
20. Generator
21. Ignition main fuse 60 A
22. Heater/A/C main fuse 60 A
23. Ignition/meter fuse 20 A
24. Rear defogger fuse 15 A
25. Heater fuse 30 A
26. Compressor thermal switch (only IWATA production vehicle)



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

REPLENISHING COMPRESSOR OIL

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

When changing gas only

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

When replacing compressor

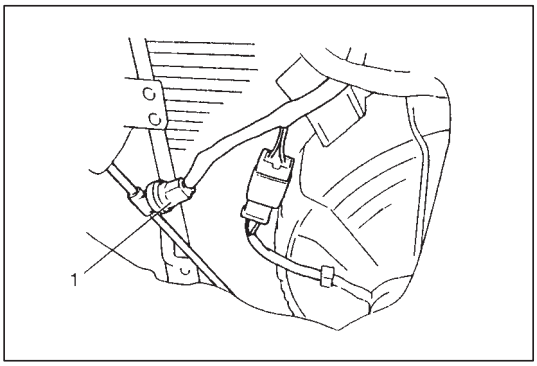
Compressor oil is sealed in each new compressor by the amount required for air conditioner cycle. Therefore, when using a new compressor for replacement, drain oil from it by the amount calculated as follows.

"C" = "A" – "B"

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

When replacing other part

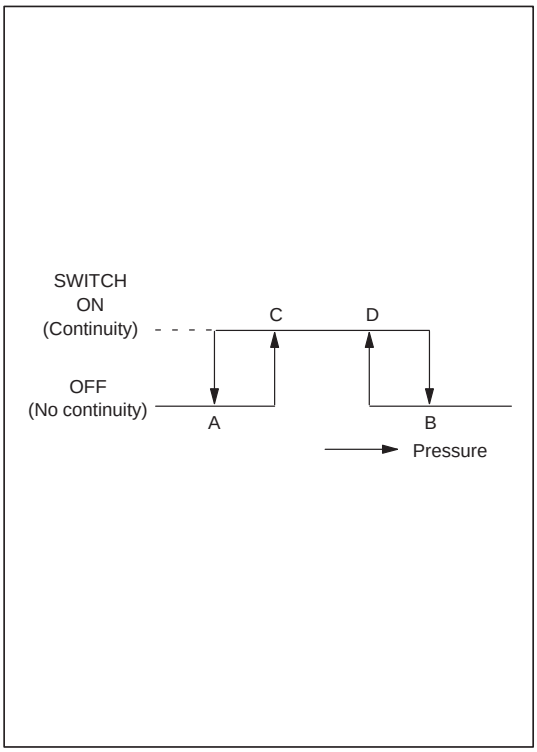
Replaced part	Amount of compressor oil to be replenished
Evaporator	25 cc
Condenser	15 cc
Receiver/dryer	20 cc
Hoses	10 cc each
Pipes	10 cc each



DUAL PRESSURE SWITCH

INSPECTION

1) Check dual pressure switch (1) on liquid pipe for continuity at normal temperature (approx. 25°C (77°F)) when A/C system has a proper charge of refrigerant and when A/C system (compressor) is under operation. In each of these cases, switch should show proper continuity.



2) Using a manifold gauge set, check switch for operation at specified pressure as shown, refer to "PERFORMANCE DIAGNOSIS" in this section.

Switch ON : above "C" and below "D"
Switch OFF : below "A" or above "B"

"A": Approx. 200 kPa (2.0 kg/cm^2)
"B": Approx. 3200 kPa (32 kg/cm^2)
"C": Approx. 230 kPa (2.3 kg/cm^2)
"D": Approx. 2800 kPa (28 kg/cm^2)

Tightening torque:
Dual pressure switch: 10 N·m (1.0 kg-m, 7.5 lb-ft)

SECTION 3

STEERING, SUSPENSION, WHEELS AND TIRES

CONTENTS

GENERAL DIAGNOSIS

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

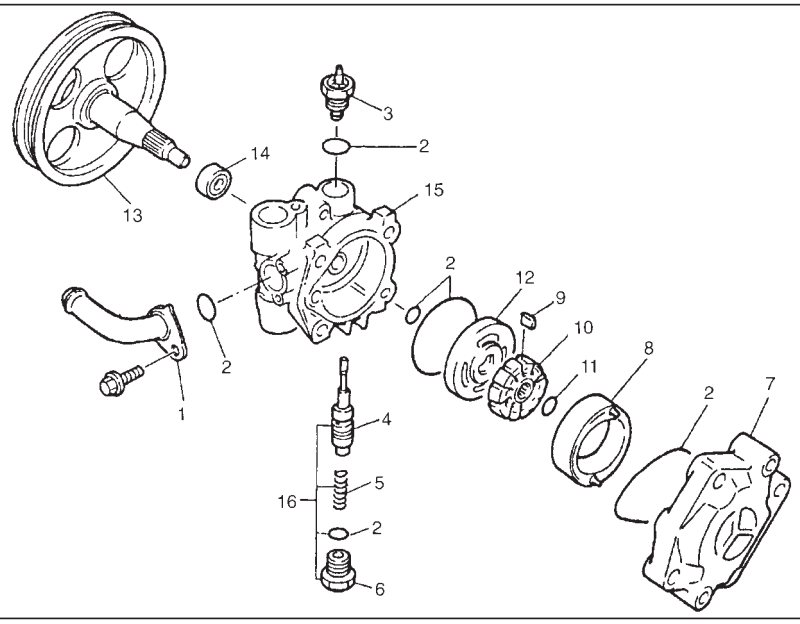
1) Inspect tires for proper pressure and uneven wear.
2) Raise vehicle on a hoist and inspect front and rear suspension and steering system for loose or damaged parts.
3) Spin front wheel. Inspect for out-of-round tires, out-of-balance tires, bent rims, loose and/or rough wheel bearings.

DIAGNOSIS TABLE

Condition	Possible Cause	Correction
Vehicle Pulls (Leads)	● Mismatched or uneven tires.	Replace tire.
	● Tires not adequately inflated.	Adjust tire pressure.
	● Broken or sagging springs.	Replace spring.
	● Radial tire lateral force.	Replace tire.
	● Disturbed front end alignment.	Check front end alignment.
	● Disturbed rear axle alignment.	Check rear axle alignment.
	● Brake dragging in one road wheel.	Repair front brake.
	● Loose, bent or broken front or rear suspension parts.	Tighten or replace suspension part.

POWER STEERING (P/S) PUMP

The power steering pump is a vane type and is driven by the V-ribbed belt from the crankshaft.



1. Suction connector
2. O-ring
3. Pressure switch
4. Flow control valve (Relief valve)
5. Spring
6. Plug
7. Pump cover
8. Cam ring
9. Vane
10. Rotor
11. Snap ring
12. Side plate
13. Pulley (pump shaft)
14. Oil seal
15. Pump body
16. Flow control valve Assembly

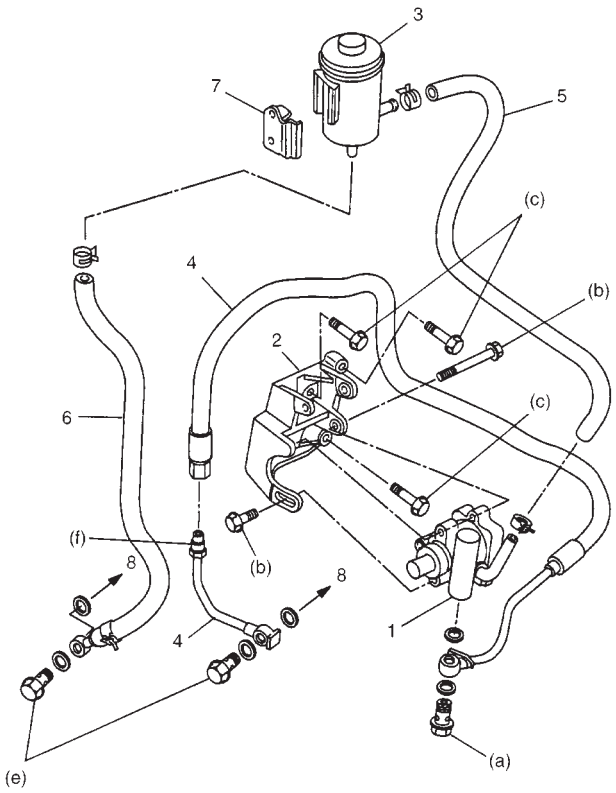
Model		Vane type
Hydraulic pressure control	Relieved pressure	6500 kPa (65 kg/cm^2, 924 psi) ..... G16 Type engine 7000 kPa (70 kg/cm^2, 995 psi) ..... J20 Type engine 7350 kPa (73.5 kg/cm^2, 1045 psi) ..... H25 Type engine
	Control device	Flow control valve
		Relief valve
Power steering pressure switch		Switch turns on (closes) when the pressure is higher than 2500 – 3500 kPa (25 – 35 kg/cm^2, 356 – 498 psi). ECM uses this signal for idle speed control.
Capacity		0.70 – 0.75 ℓ (1.48/1.23 – 1.58/1.32 US/Imp. pt)
Specified fluid		DEXRON®II, DEXRON®III A/T fluid or equivalent

FLOW CONTROL VALVE

As the discharge rate of the P/S pump increases in proportion to the pump revolution speed, a flow control valve is added to control it so that the optimum amount of fluid for steering operation is supplied according to the engine speed (driving condition).
Described below is its operation at different engine speed.

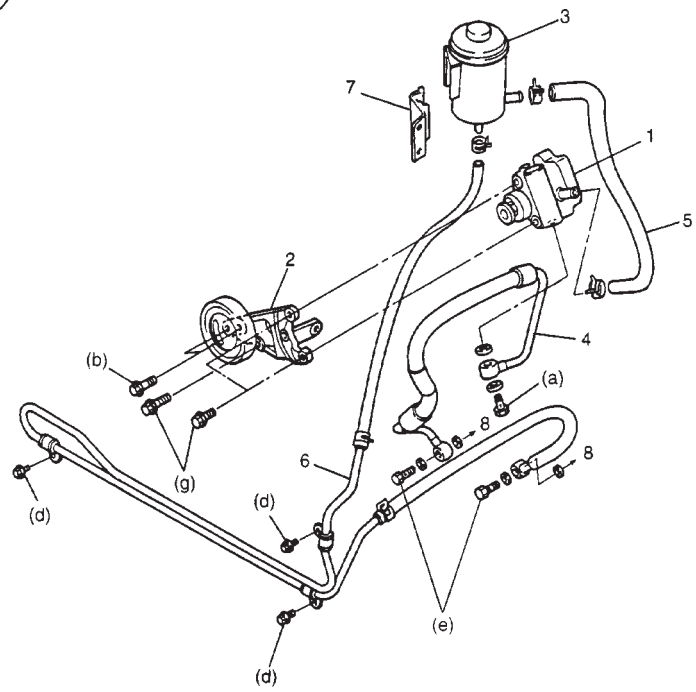
POWER STEERING PUMP

[G16 ENGINE MODEL]

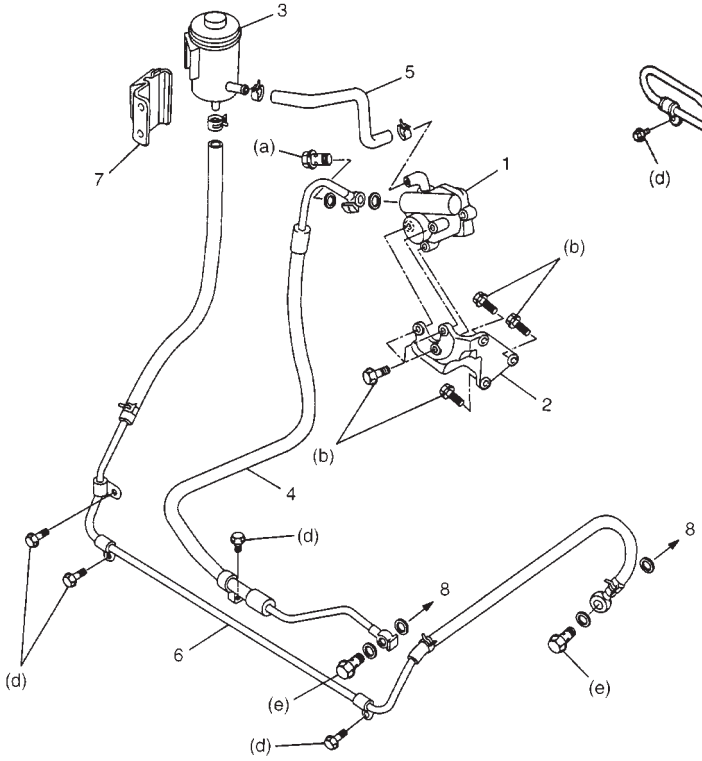


Tightening Torque
(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)
(b): 25 N·m (2.5 kg-m, 18.5 lb-ft)
(c): 55 N·m (5.5 kg-m, 40.0 lb-ft)
(d): 11 N·m (1.1 kg-m, 8.0 lb-ft)
(e): 35 N·m (3.5 kg-m, 25.5 lb-ft)
(f): 40 N·m (4.0 kg-m, 29.0 lb-ft)
(g): 45 N·m (4.5 kg-m, 33.0 lb-ft)

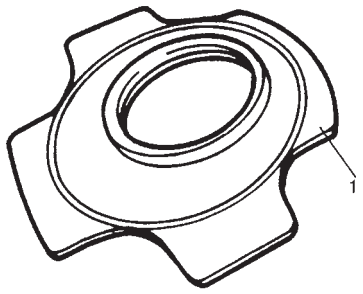
[H25 ENGINE MODEL]



[J20 ENGINE MODEL]



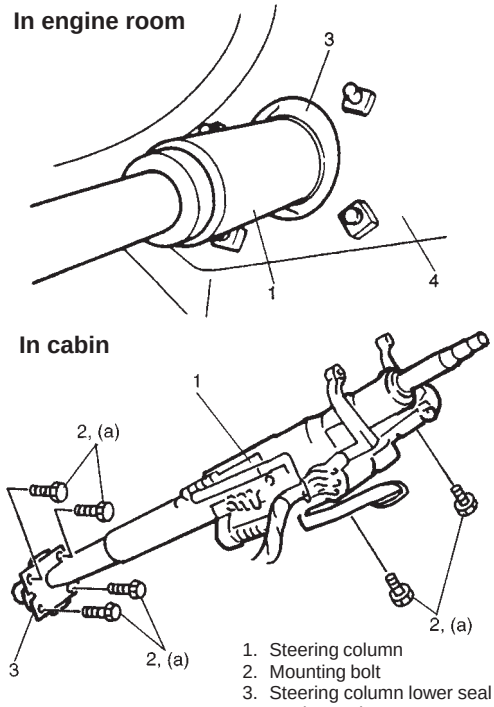
1. Power steering pump assembly
2. Bracket
3. P/S fluid reservoir
4. High pressure hose & pipe
5. Suction hose
6. Low pressure return hose
7. Oil tank bracket
8. To P/S gear box



1. Steering column lower seal

4) Check steering column lower seal for breakage or deformation.
   If found defective, replace.

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



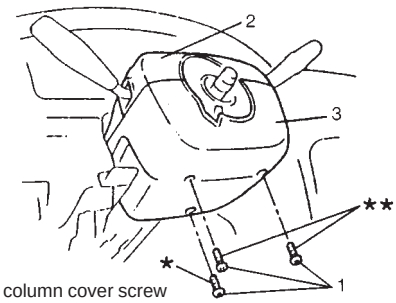
1. Steering column
2. Mounting bolt
3. Steering column lower seal
4. Dash panel

INSTALLATION

CAUTION:
- **After tightening steering column mounting bolts, steering shaft joint bolts should be tightened.**
- **After tightening steering column lower bolts, steering column upper bolts should be tightened.**

1) Be sure that front wheels and steering wheel are in straight-ahead position.
2) If equipped with shift (key) interlock cable, install shift (key) interlock cable to ignition switch.
3) Install steering column assembly to dash panel and upper bracket so that boss of steering column lower seal and all around it project out of hole in dash panel into engine room. Tighten steering column lower bolts (4 pieces) first and then upper bolts (2 pieces) to specified torque.

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

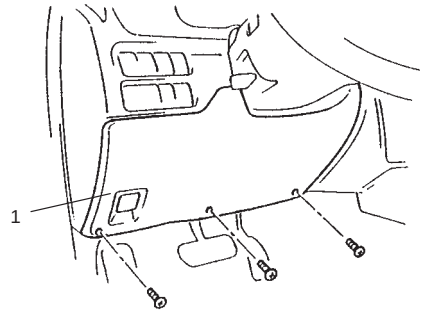


1. Steering column cover screw
2. Steering column upper cover
3. Steering column lower cover

*: Standard screw
**: Tapping screw

3) Connect all connectors that have been removed in removal.
4) Install steering column upper and lower cover, and then tighten steering column cover screws.

CAUTION:
When installing lower cover and upper cover, be careful so that contact coil and combination switch lead wire is not caught between covers.



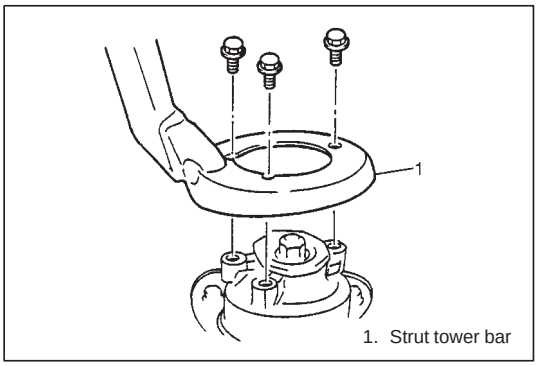
1. Steering column hole cover

5) Install steering column hole cover.
6) Install steering wheel to steering column. Refer to “STEERING WHEEL” in this section.

STEERING COLUMN

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

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

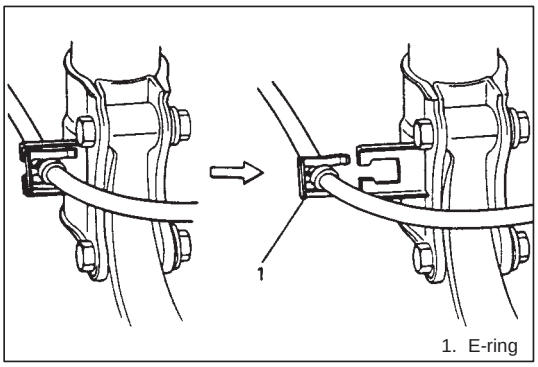


1. Strut tower bar

STRUT DAMPER

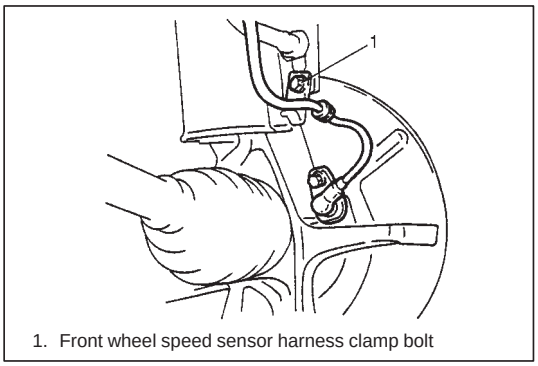
REMOVAL

1) Remove strut tower bar (if equipped).



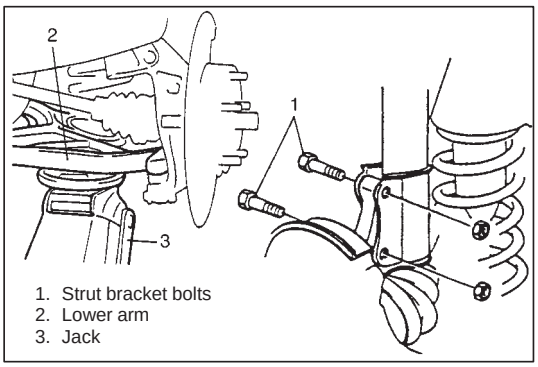
1. E-ring

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



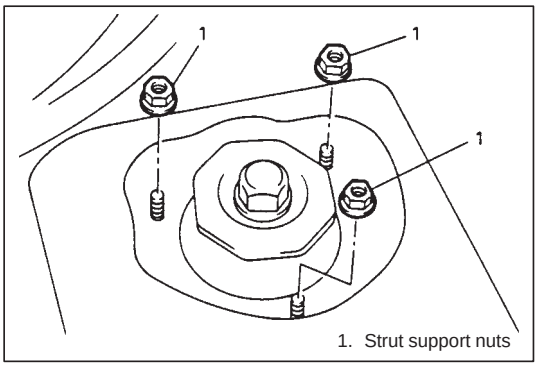
1. Front wheel speed sensor harness clamp bolt

5) If equipped with ABS, remove front wheel speed sensor harness clamp bolt.



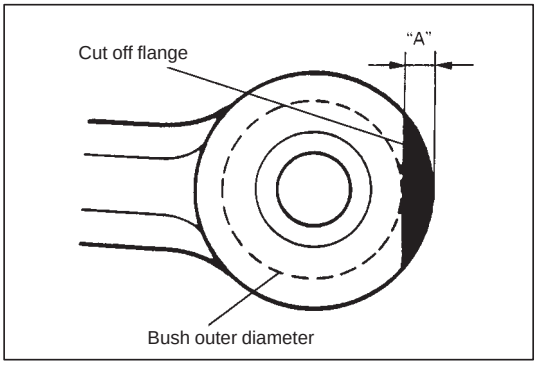
1. Strut bracket bolts
2. Lower arm
3. Jack

6) Remove strut bracket bolts, then support lower arm with jack.



1. Strut support nuts

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

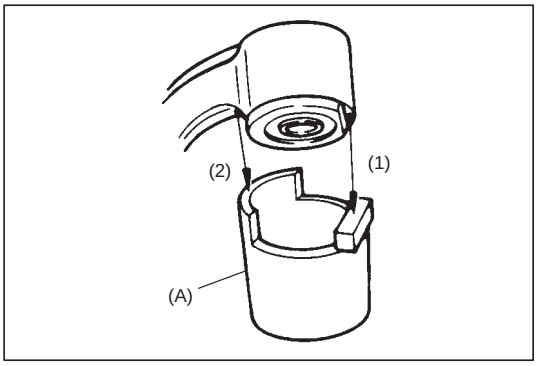


SUSPENSION CONTROL ARM/BUSHINGS

REMOVAL

1) Remove coil spring. Refer to COIL SPRING in this section.
2) Remove control arm bolts and nuts. Then remove control arm.
3) Cut flange part of control arm bush (rubber and steel) with using care not to damage control arm end surface.

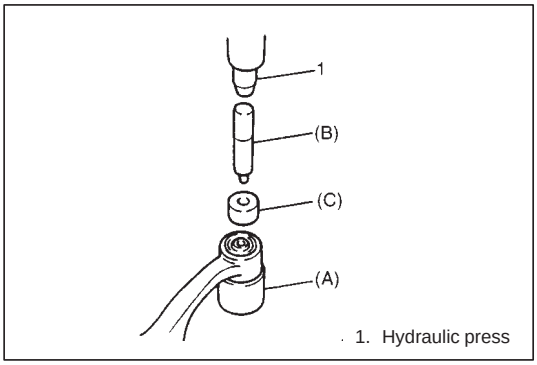
Dimension "A": Approx. 6 mm (0.236 in.)



4) Place control arm and special tool on hydraulic press. Set control arm cutting flange to welded part (1) of the special tool and control arm joint side to the stepped part (2) of special tool.

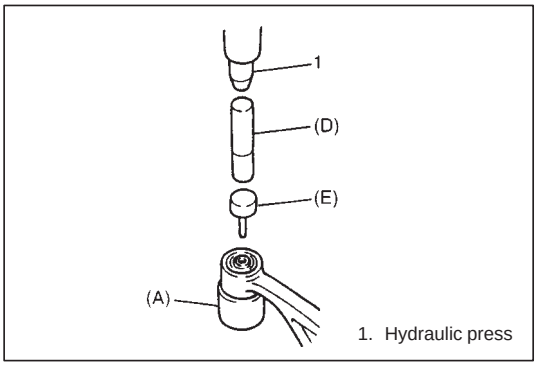
CAUTION:
Use special care in driving out control arm bush to press it vertically.
Or it may cause personally injury.

Special tool
(A): 09951-46020



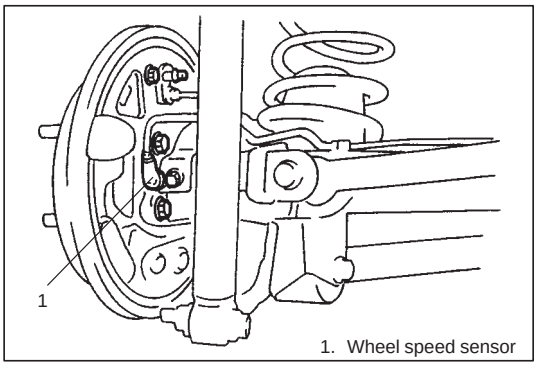
5) Remove front bushing by using hydraulic press and special tools, pull out bushing.

Special Tool
(A): 09951-46020
(B): 09924-74510
(C): 09951-16060



6) Remove rear bushing by using hydraulic press and special tools, pull out bushing.

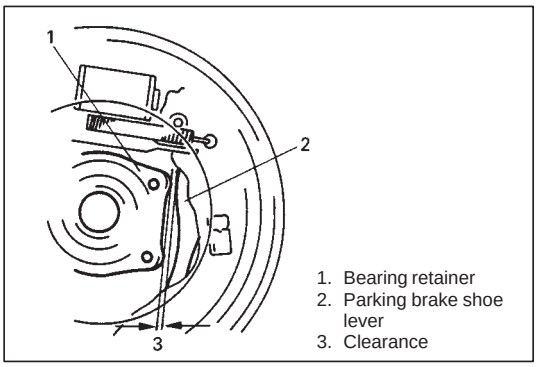
Special Tool
(A): 09951-46020
(D): 09913-80112
(E): 09925-58210



1. Wheel speed sensor

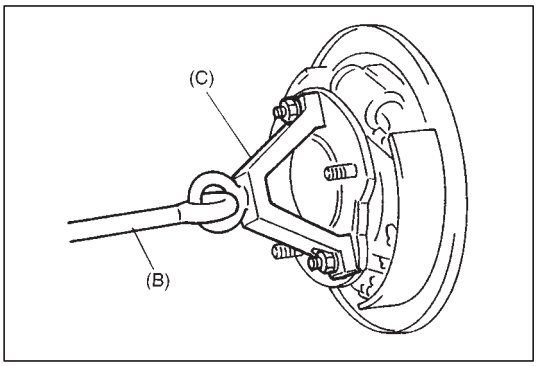
4) Remove wheel speed sensor from rear axle housing (if equipped with ABS).

CAUTION:
- **Do not pull wire harness or twist more than necessary when removing rear wheel speed sensor.**
- **Do not cause damage to surface of rear wheel speed sensor or pole piece and do not allow dust, etc. to enter its installation hole.**



1. Bearing retainer
2. Parking brake shoe lever
3. Clearance

5) Check to ensure that there is clearance between rear wheel bearing retainer and parking brake shoe lever. If no clearance is found, loosen cable locking nut further to obtain clearance.

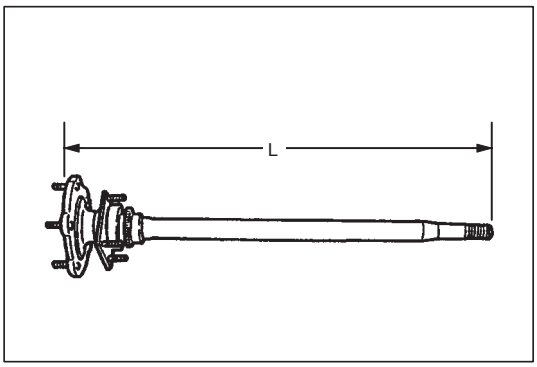


6) Using special tools (B) & (C) indicated below, draw out axle shaft.

NOTE:
Use care not to pull brake back plate along with shaft.

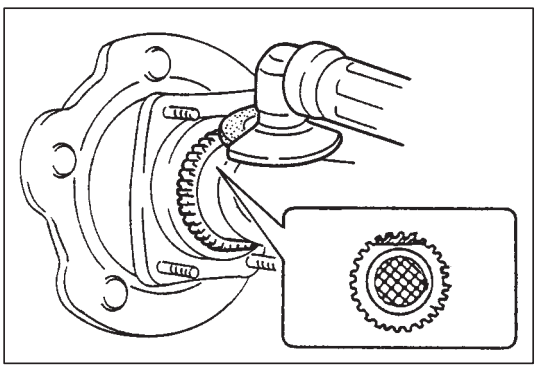
CAUTION:
Pull out axle shaft using care so that upper and lower brake struts and parking cable are not caught.

Special Tool
(C): 09943-35512
(B): 09942-15510



7) Rear axle shaft that was drawn out.

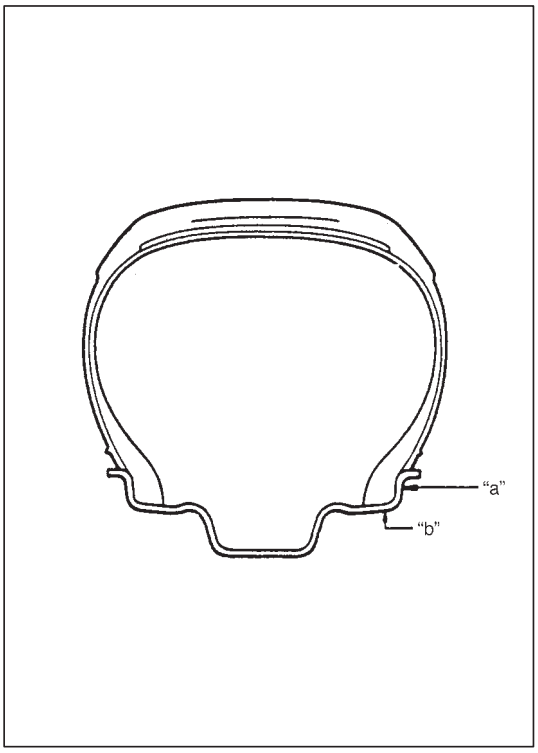
Shaft length "L":
Left side: 711.5 mm (28.0 in.)
Right side: 757.5 mm (29.8 in.)



8) If equipped with ABS, in order to remove sensor rotor from retainer ring, grind with a grinder one part of the sensor rotor as illustrated till it becomes thin.

kPa	kgf/cm^2	psi
160	1.6	23
180	1.8	26
200	2.0	29
220	2.2	32
240	2.4	35
260	2.6	38
280	2.8	41
300	3.0	44
320	3.2	47
340	3.4	50
Conversion:	1 psi = 6.895 kPa 1 kgf/cm^2 = 98.066 kPa	

The metric term for tire inflation pressure is the kilopascal (kPa). Tire pressures will usually be printed in both kPa and psi on the Tire Placard. Metric tire gauges are available from tool suppliers. The chart, left table, converts commonly used inflation pressures from kPa to psi.



WHEELS REPLACEMENT

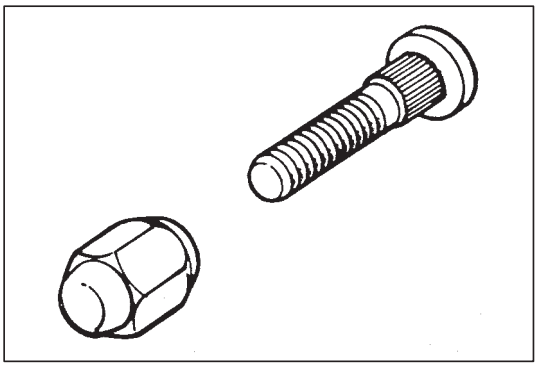
Wheels must be replaced if they are bent, dented, have excessive lateral or radial runout, leak air through welds, have elongated bolt holes, if lug nuts won't stay tight, or if they are heavily rusted. Wheels with greater runout than shown in left figure may cause objectional vibrations.

Wheels for replacement must be equivalent to the originally equipped wheels in load capacity, diameter, rim width, off-set and mounting configuration. A wheel of improper size or type may affect wheel and bearing life, brake cooling, speedometer/odometer calibration, ground clearance to the body and chassis.

To measure the wheel runout, it is necessary to use accurate dial indicator. The tire may be on or off the wheel. The wheel should be installed to the wheel balancer of the like for proper measurement. Take measurements of both lateral runout and radial runout at both inside and outside of the rim flange. With dial indicator set in place securely, turn the wheel one full revolution slowly and record every reading of the indicator.

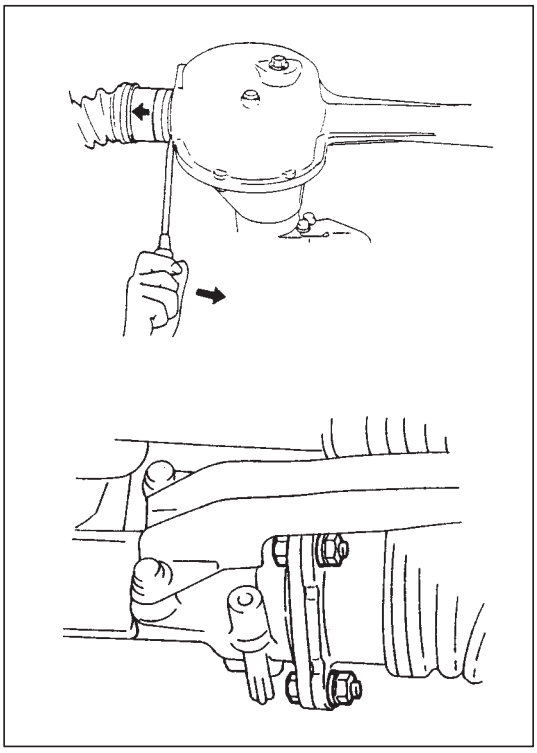
When the measured runout exceeds the specification and correction by the balancer adjustment is impossible, replace the wheel. If the reading is affected by welding, paint or scratch, it should be ignored.

Lateral runout limit "a": 1.20 mm (0.047 in.)
Radial runout limit "b": 1.20 mm (0.047 in.)



METRIC LUG NUTS AND WHEEL STUDS

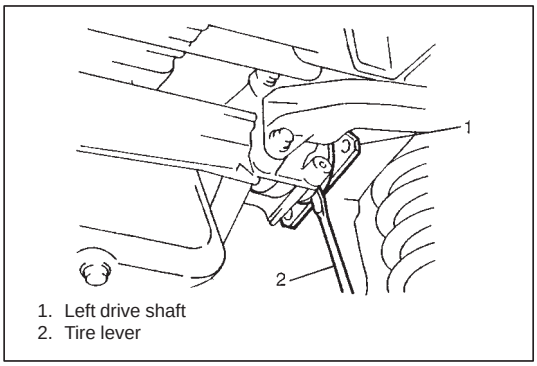
All models use metric lug nuts and wheel studs (size M12 x 1.25).



SHAFT BEARING/OIL SEAL

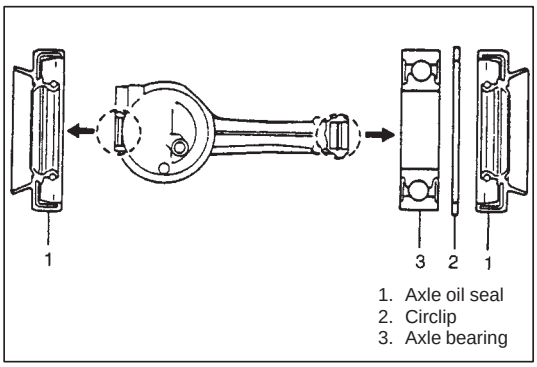
REMOVAL

1) Remove drive shaft assembly.
   Refer to item DRIVE SHAFT REMOVAL (LEFT and RIGHT) in this section.
   For right side shaft bearing/oil seal removal, drain differential gear oil.



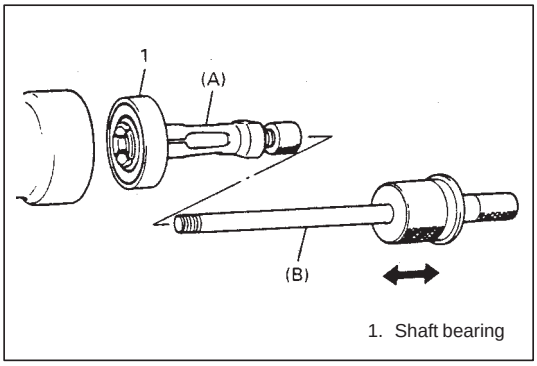
1. Left drive shaft
2. Tire lever

2) Remove left drive shaft by using tire lever.
3) Remove left side strut. Refer to steps 1) and 4) to 8) of item STRUT DAMPER REMOVAL in Section 3D.



1. Axle oil seal
2. Circlip
3. Axle bearing

4) Remove oil seal, using plain screw driver.
5) Remove circlip.



1. Shaft bearing

6) Remove bearing, using special tools (A) and (B).

Special Tool
(A): 09941-64510
(B): 09930-30102

CHECK AND ADJUSTMENT

BLEEDING BRAKES

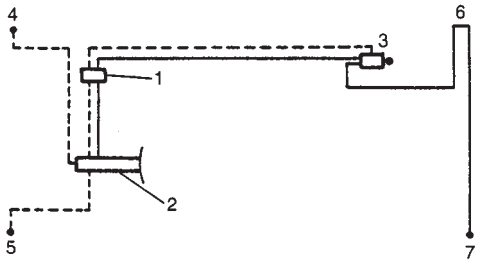
CAUTION:
Brake fluid is extremely damaging to paint. If fluid should accidentally touch painted surface, immediately wipe fluid from paint and clean painted surface.

NOTE:
For vehicle equipped with ABS, make sure that ignition switch turns off.

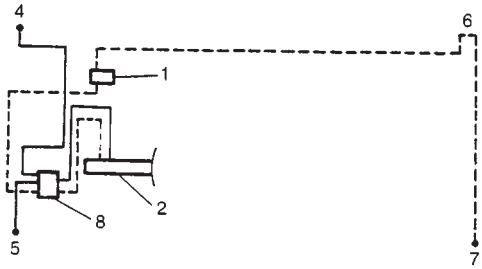
Be sure to bleed air of brake system according to following procedure when its oil hydraulic circuit has been disconnected.

Hydraulic lines of brake system consists of two separate lines, one for front wheel brakes and the other for rear wheel brakes.
Air bleeding is necessary at right and left front wheel brakes, left rear wheel brake and LSPV (if equipped without ABS), i.e. 4 places (3 places for vehicle with ABS) in all.

[A]

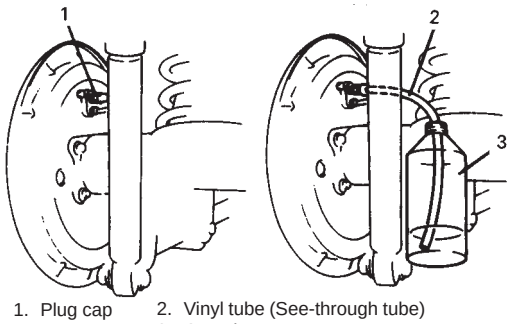


[B]



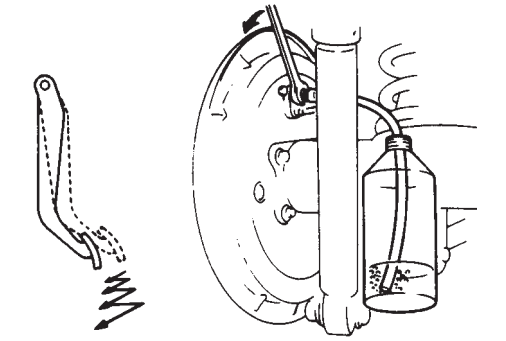
[A]: Without ABS
[B]: With ABS

1. 4-way joint / 2-way joint
2. Master cylinder
3. LSPV
4. Right brake caliper
5. Left brake caliper
6. Right wheel cylinder
7. Left wheel cylinder
8. ABS actuator
: Air bleeding point



1. Plug cap
2. Vinyl tube (See-through tube)
3. Container

1) Fill master cylinder reservoir with brake fluid and keep at least one-half full of fluid during bleeding operation.
2) Remove bleeder plug cap.
Attach a vinyl tube to bleeder plug of wheel cylinder, and insert the other end into container.



3) Depress brake pedal several times, and then while holding it depressed, loosen bleeder plug about one-third to one half turn.

DIAGNOSIS

Refer to Section 5 (BRAKES)

CHECK AND ADJUSTMENT

Refer to Section 5 (BRAKES)

ON-VEHICLE SERVICE

FRONT BRAKE HOSE/PIPE

REMOVAL

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

INSTALLATION

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

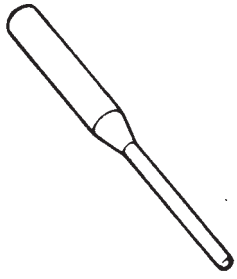
TIGHTENING TORQUE SPECIFICATIONS

Fastening parts			Tightening torque		
			N·m	kg-m	lb-ft
Brake flexible hose bolt (Brake caliper / 2 (4) way joint)			23	2.3	17.0
Master cylinder attaching nut			13	1.3	9.5
Booster nut			13	1.3	9.5
Clevis nut			25	2.5	18
2-way (or 4-way) joint mounting bolt			10	1.0	7.5
Brake pipe flare nut			16	1.6	11.5
Brake bleeder plug	Front caliper	M8	8.0	0.8	6.0
		M10	8.5	0.85	6.5
	Wheel cylinder		7.5	0.75	5.5
	LSPV		8.0	0.8	6.0
LSPV mounting bolt			23	2.3	17.0
LSPV stay bolt					
LSPV spring nut					
Wheel nut			100	10.0	72.5

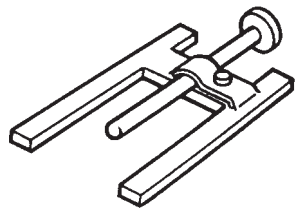
REQUIRED SERVICE MATERIAL

MATERIALS	RECOMMENDED SUZUKI PRODUCT	USE
Brake fluid	Indicated on reservoir cap or described in owner's manual of vehicle	● To fill master cylinder reservoir. ● To clean and apply to inner parts of master cylinder caliper and wheel cylinder when they are disassembled.

SPECIAL TOOLS

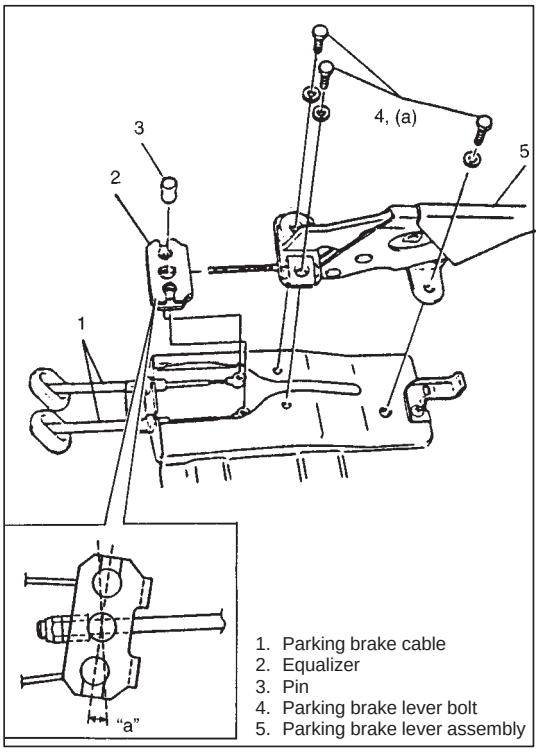


09922-85811
Connector pin remover



09950-96010
Booster piston rod gauge

09952-16010
Booster piston rod adjuster



1. Parking brake cable
2. Equalizer
3. Pin
4. Parking brake lever bolt
5. Parking brake lever assembly

INSTALLATION

1) Install in reverse order of REMOVAL procedure.
   Check equalizer inclined angle.

   Angle "a": within 15 degrees

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

2) After all parts are installed, parking brake lever needs to be adjusted. Refer to PARKING BRAKE INSPECTION AND ADJUSTMENT in Section 5.
3) Check brake drum for dragging and brake system for proper performance.

GENERAL DESCRIPTION

The ABS (Antilock Brake System) controls the fluid pressure applied to the wheel cylinder of each brake from the master cylinder so that each wheel is not locked even when hard braking is applied. This ABS is a 4-wheel type which controls the fluid pressure applied to the wheel cylinder of each of the four brakes to prevent each wheel from getting locked.

The component parts of this ABS includes following parts in addition to those of the conventional brake system.

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

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

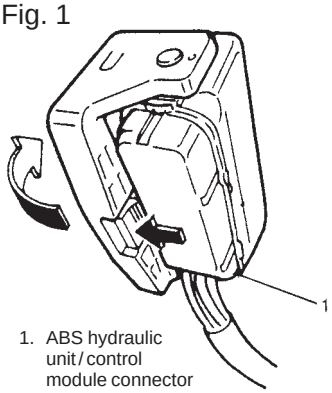
TABLE – B "ABS" WARNING LAMP CIRCUIT CHECK – LAMP COMES "ON" STEADY

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

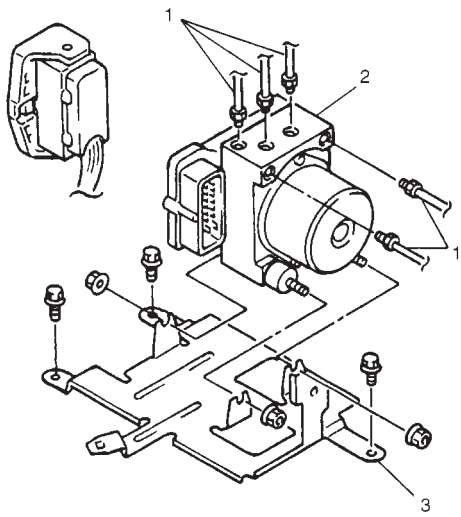
INSPECTION

STEP	ACTION	YES	NO
1	Perform diagnostic trouble code check. Is there any DTC (including code No.12, NO CODES on SUZUKI scan tool) exists?	Go to step 2.	Go to step 3.
2	Is malfunction DTC (other than code No.12) exists at step 1?	Go to step 7 of ABS diagnostic flow table in this section.	Go to step 3.
3	1) Disconnect ABS hydraulic unit/control module connector. (See Fig. 1) 2) Check for proper connection to ABS hydraulic unit/control module connector at terminals "A17", "A25" and "A10". 3) If OK, turn ignition switch "ON" and measure voltage at terminal "A25" of connector. Is it 10 – 14 V?	Go to step 4.	"B/W" circuit open.
4	1) With ABS control module connector disconnected, turn ignition switch ON and light ABS warning lamp. 2) Connect terminal "A17" of disconnected connector to ground using service wire. Does "ABS warning lamp" turn off?	Go to step 5.	"Bl/O" circuit open. If wire and connection are OK, replace ABS lamp driver module.
5	1) Measure resistance from connector terminal "A10" to body ground. Is continuity indicated?	Substitute a known-good ABS hydraulic unit/ control module assembly and recheck.	"B" circuit open.

Fig. 1



1. ABS hydraulic unit/control module connector



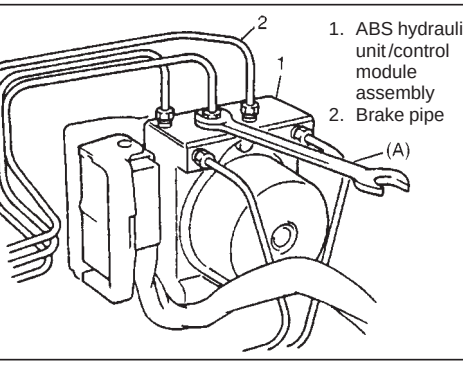
1. Brake pipe
2. ABS hydraulic unit/ control module assembly
3. Bracket

ABS HYDRAULIC UNIT/CONTROL MODULE ASSEMBLY

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

HYDRAULIC UNIT INSPECTION

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



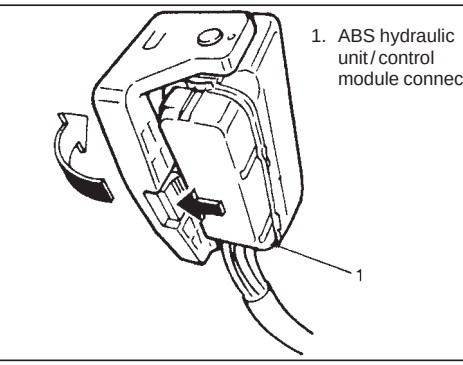
1. ABS hydraulic unit/control module assembly
2. Brake pipe

REMOVAL

1) Disconnect negative cable at battery.
2) Using special tool, disconnect brake pipes from ABS hydraulic unit/control module assembly and loosen flare nuts as shown figure.

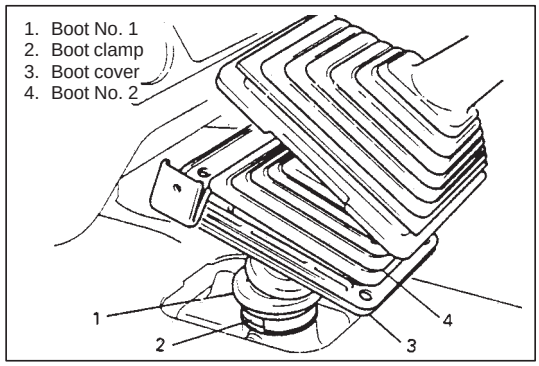
   Special Tool
   (A): 09950-78220

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

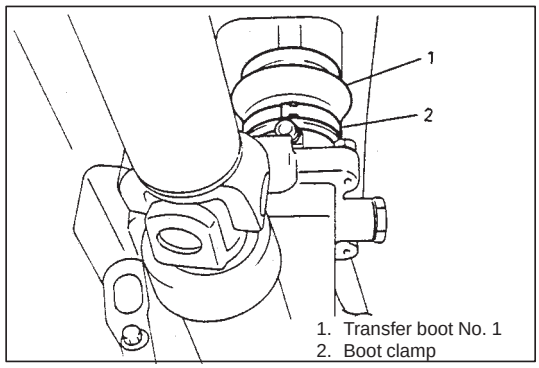


1. ABS hydraulic unit/ control module connector

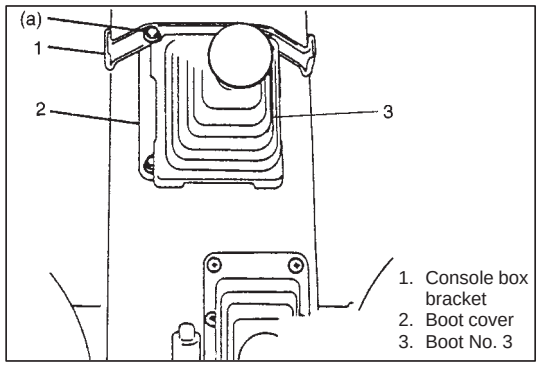
3) Disconnect ABS hydraulic unit/control module assembly connector.



5) Install transmission boot No. 1 from inside of cabin and clamp it with a new clamp securely.



6) Install transfer boot No. 1 securely on lift and clamp it by using a new clamp.



7) Tighten transmission boot No. 2 with boot cover and console box bracket.

Tightening Torque
(a): 6 N·m (0.6 kg-m, 4.0 lb-ft)

8) Install console box.

NOTE:
Be sure that flare end of transmission boot No. 3 is engaged with console box.

SECTION 7B1

AUTOMATIC TRANSMISSION (4 A/T)

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

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

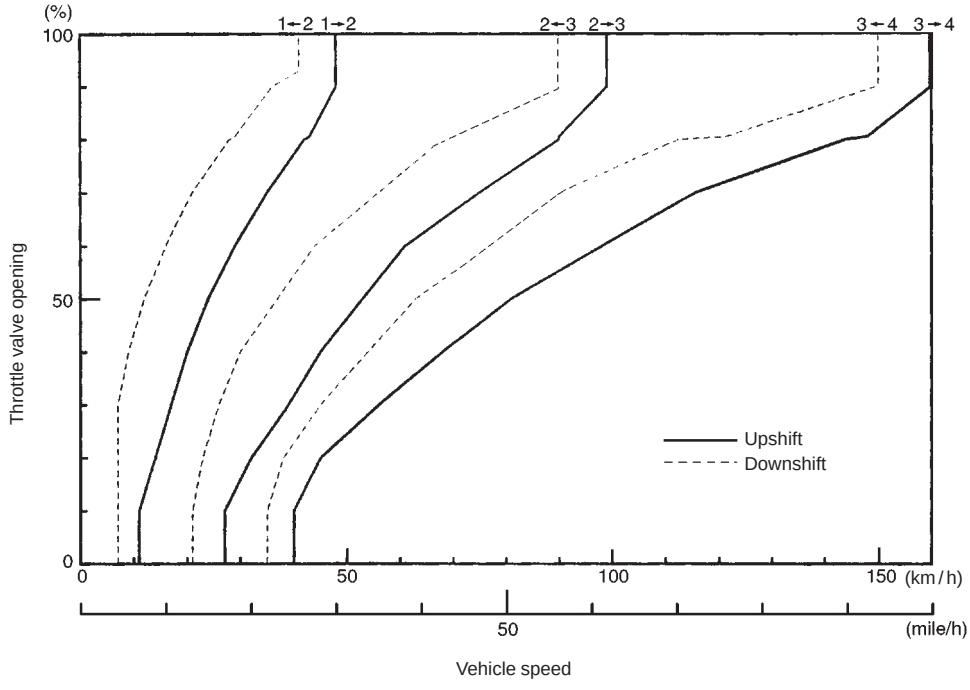
CONTENTS

Normal Mode For H25 Engine

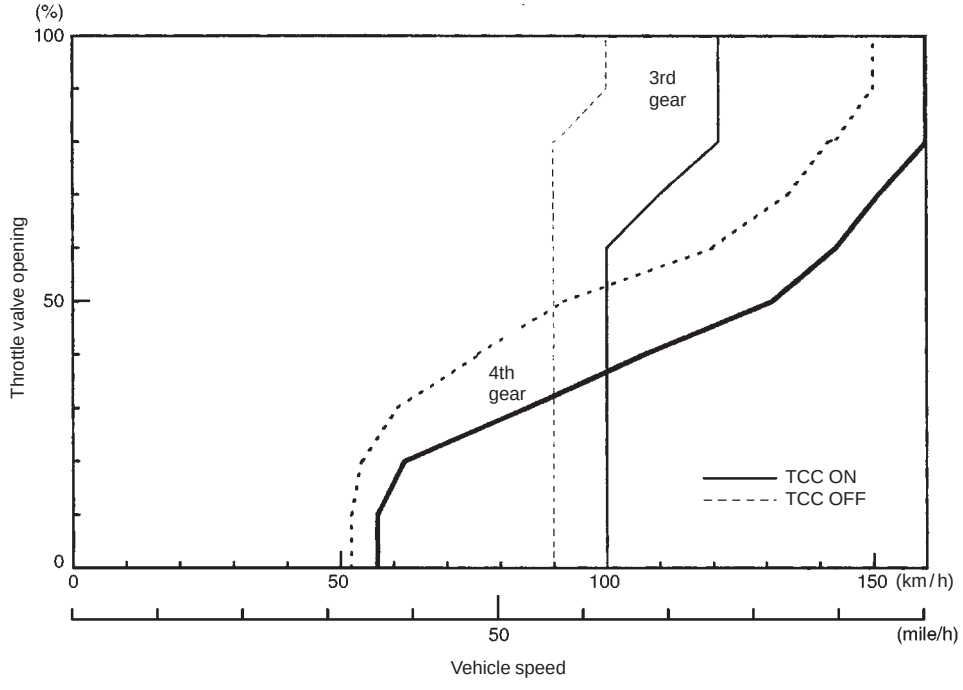
Unit: km/h
(mile/h)

Shift / Throttle opening	1→2	2→3	3→4	4→3	3→2	2→1
Full throttle	48 (30)	99 (62)	160 (99)	150 (93)	90 (56)	41 (25)
Closed throttle	11 (7)	27 (17)	40 (25)	35 (22)	21 (13)	7 (4)

Gear Shift Diagram



TCC Lock-up Diagram



DIAGNOSTIC FLOW TABLE A-1 (NO TCC LOCK-UP OCCURS)

SYSTEM DESCRIPTION

PCM turns TCC solenoid OFF under any of the following conditions.

- Brake pedal switch: ON
- 4WD LOW switch: ON
- Cruise control module: TCC OFF command signal is output (if equipped).
- ECT: ECT < 30°C (86°F)

TROUBLESHOOTING

WARNING:

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

STEP	ACTION	YES	NO
1	Was "AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE" performed?	Go to Step 2.	Go to "AUTOMATIC TRANSMISSION DIAGNOSTIC FLOW TABLE".
2	ECT check: (1) Warm up engine to normal operating temperature. (2) Check ECT using scan tool. Is ECT more than 30°C (86°F)?	Go to Step 3.	Faulty ECT sensor, its circuit or engine cooling system. If OK, substitute a known-good PCM and recheck.
3	Perform running test under the following conditions and check voltage between C51-1-8 (G16/J20 engines) or C51-1-2 (H25 engine) terminal of PCM coupler and ground. ● Normal mode in "D" range. ● Transfer "2H" position. ● Cruise control is not operated (if equipped). ● Brake pedal released. ● Drive vehicle with TCC ON condition referring to "TCC lock-up diagram" in this section. Is it battery voltage?	Faulty TCC solenoid valve, its circuit or transmission.	Go to Step 4.
4	Is vehicle equipped with H25 engine?	Go to Step 5.	Go to Step 6.
5	Brake switch signal inspection: (1) With ignition switch ON, check voltage between E61-31 terminal of PCM coupler terminal and ground. Is the result as specified?	Go to Step 6.	Faulty brake pedal switch or its circuit. If OK, substitute a known-good PCM and recheck.

Brake pedal	Released	Depressed
Voltage	0 V	Battery voltage

DTC P0741 TCC (LOCK-UP) SOLENOID VALVE PERFORMANCE OR STUCK OFF

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
While running in 2nd or 4th gear, D range, TCC control of PCM does not agree with actual operation of transmission TCC even though solenoid valve is electrically in good condition. (2 driving cycles detection logic)	● TCC (lock-up) solenoid valve stuck ● TCC control valve stuck ● Valve body fluid passage clogged ● TCC faulty

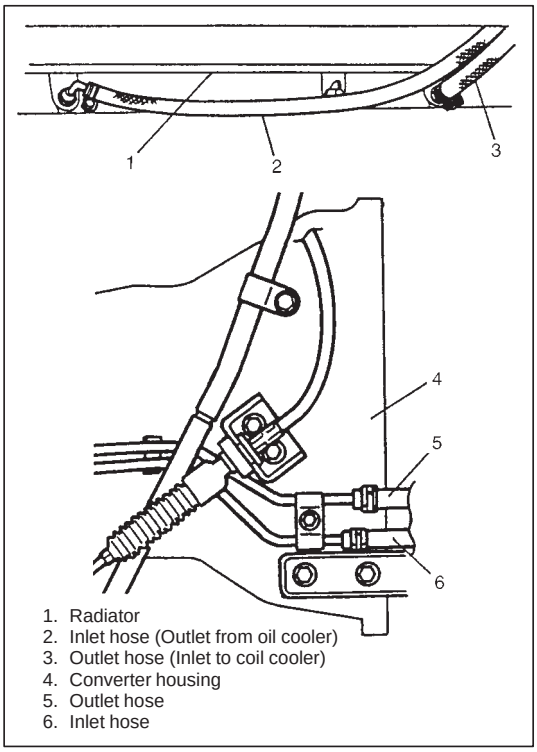
DTC CONFIRMATION PROCEDURE

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

1) Connect scan tool to DLC with ignition switch OFF.
2) Clear DTC, pending DTC and freeze frame data in PCM memory by using scan tool and check fuel level meter indication is 1/4 or more.
3) Start engine, warm it up to normal operating temperature and shift transfer lever to “2H” or “4H” range.
4) Increase vehicle speed with D range, and check that gear position changes from 1st to 2nd and keep driving about 20 mph, 30 km/h in 2nd of “D” range for 10 seconds. (Throttle valve should be not at idle position and the opening should be kept constant in this step.)
5) Keep driving about 50 mph, 80 km/h in 4th of “D” range for 10 seconds.
6) Release accelerator pedal, decrease vehicle speed and stop vehicle.
7) Check pending DTC and DTC by using scan tool.

TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “A/T DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “A/T DIAG. FLOW TABLE”.
2	TCC solenoid valve operation check: 1) Check TCC solenoid valve operation referring to “Solenoid Valves Operation Check” in this section. Is it in good condition?	Go to Step 3.	Faulty TCC solenoid valve.
3	Valve body check: 1) Check valve body referring to “Unit Repair” in this section. Is it in good condition?	Faulty torque converter.	Faulty valve body.

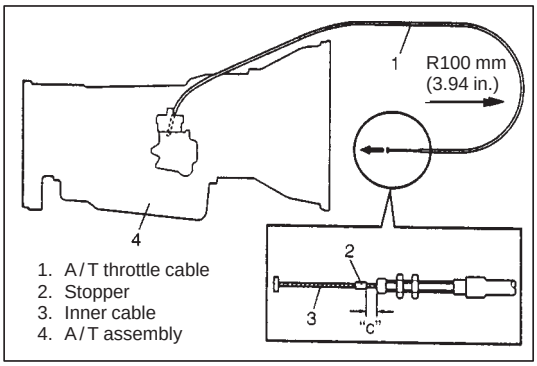


1. Radiator
2. Inlet hose (Outlet from oil cooler)
3. Outlet hose (Inlet to coil cooler)
4. Converter housing
5. Outlet hose
6. Inlet hose

OIL COOLER HOSES

When replacing them, be sure to note the followings.

- to replace clamps at the same time.
- to insert hose as far as its limit mark.
- to clamp hose securely.



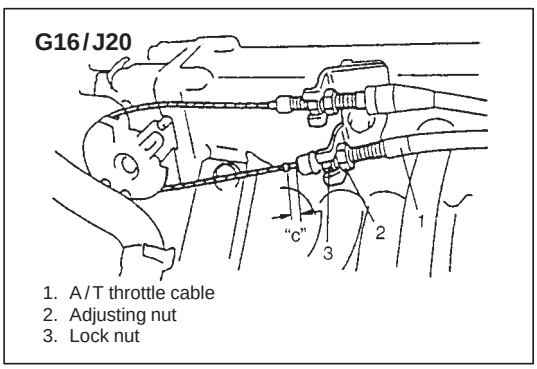
1. A/T throttle cable
2. Stopper
3. Inner cable
4. A/T assembly

A/T THROTTLE CABLE

ADJUSTMENT

1) Pull inner cable by force of 2 N (0.2 kg, 0.45 lb) or less to be no slack of inner cable with A/T throttle cable curved as shown in the figure.
2) Fix stopper to inner cable with clearance "c".

Clearance "c" : 0.8 – 1.5 mm (0.03 – 0.06 in.)

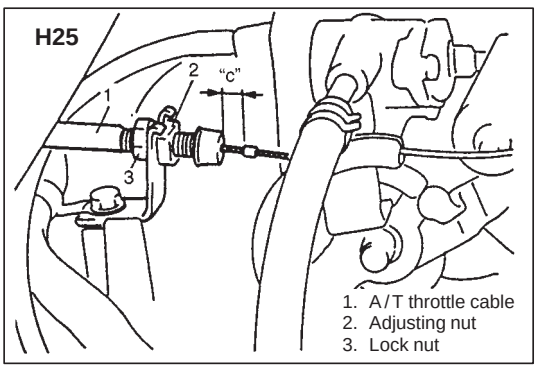


1. A/T throttle cable
2. Adjusting nut
3. Lock nut

3) **For G16/J20 engines**
   a) Check clearance "c". If it is out of specifications, adjust it by turning cable adjusting nut.

      Clearance "c" : 0.8 – 1.5 mm (0.03 – 0.06 in.)

   b) Tighten lock nut securely.



1. A/T throttle cable
2. Adjusting nut
3. Lock nut

For H25 engine

a) Warm up engine and transmission to normal operating temperature.
b) Make sure that accelerator cable is adjusted as specified.
c) With throttle valve closed, check clearance "c" which should be within the following specification.

Clearance "c" : 0.8 – 1.5 mm (0.03 – 0.06 in.)

If it is out of specification, adjust it by turning cable adjusting nut.

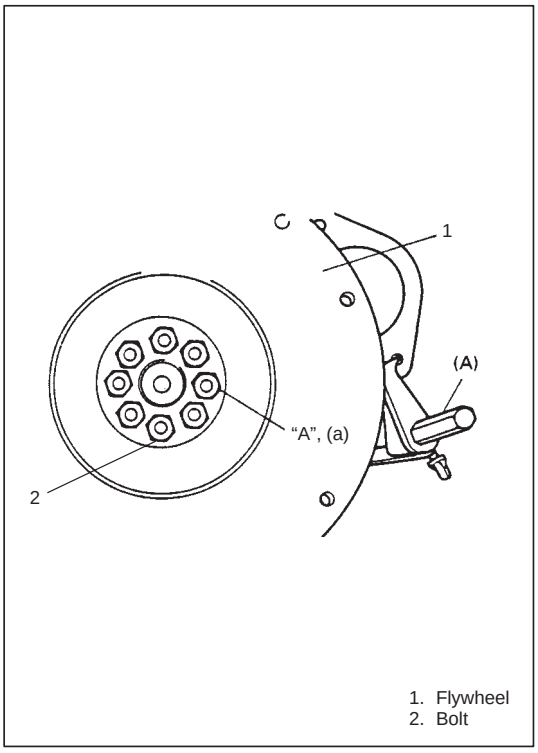
12) Remove engine to transmission nuts.
13) Disconnect connectors from VSS, output speed sensor, input speed sensor, TR switch, shift & TCC solenoid valves and other electrical parts, and release their wire harness from clamps.
14) Apply transmission jack and take off rear mounting member by removing its bolts.
15) With transmission (and transfer if equipped) assembly held up on jack, move them to the rear and lower them including torque converter.

WARNING:
Transmission (and transfer if equipped) assembly may tilt rearward on jack. It is recommended to use an auxiliary arm of jack for the purpose of safety.

AFTER DISMOUNTING

WARNING:
Be sure to keep transmission (and transfer if equipped) assembly horizontal throughout the work. Should they be tilted, torque converter may fall off and cause personal injury and A/T fluid may flow out.

1) Remove breather hoses.
2) Remove transfer by removing its bolts, if equipped.



1. Flywheel
2. Bolt

INSTALLATION

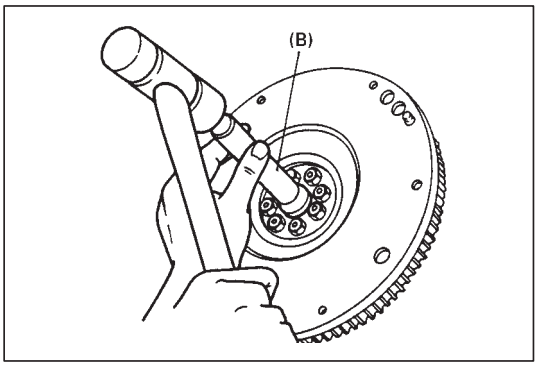
NOTE:
Before assembling, make sure that flywheel surface and pressure plate surface have been cleaned and dried thoroughly.

1) Install flywheel to crankshaft and tighten bolts to which sealant is applied to specification.

Special Tool
(A): 09924-17810

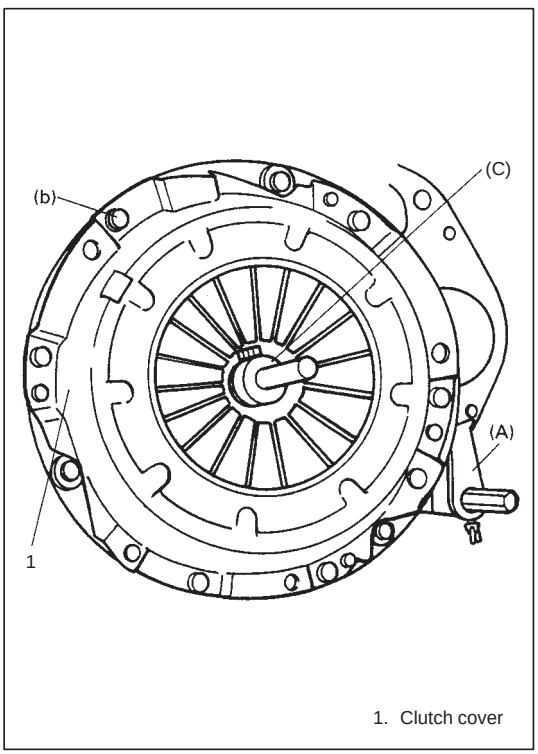
"A": Sealant 99000-31110

Tightening Torque
(a): 78 N·m (7.8 kg-m, 56.5 lb-ft) (G16 engine)
(a): 70 N·m (7.0 kg-m, 50.5 lb-ft) (J20 and H25 engines)



2) Using special tool (B), install input shaft bearing to flywheel.

Special Tool
(B): 09925-98210



1. Clutch cover

3) Aligning clutch disc to flywheel center by using special tool (C), install clutch cover and bolts. Then tighten bolts to specification.

NOTE:
- **While tightening clutch cover bolts, compress clutch disc with special tool (C) by hand so that disc centered.**
- **Tighten cover bolts little by little evenly in diagonal order.**

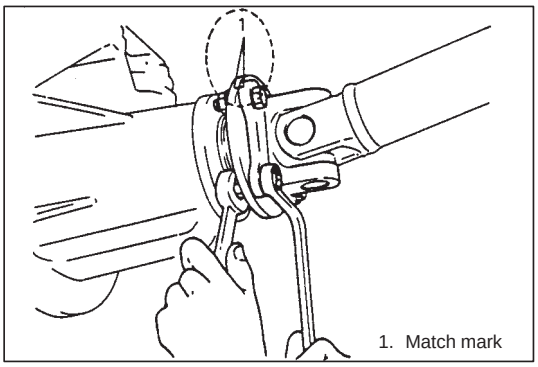
Special Tools
(A): 09924-17810
(C): 09923-36330 (G16 engine)
(C): 09923-36320 (J20 and H25 engines)

Tightening Torque
(b): 23 N·m (2.3 kg-m, 16.5 lb-ft)

STEP	ACTION	YES	NO
1	Turn ON ignition switch (but engine at stop) and check malfunction indicator lamp. Does lamp light up?	Go to step 2.	A trouble has occurred at some place. Repair it referring to MALFUNCTION INDICATOR LAMP ("CHECK ENGINE" LAMP) CHECK in DIAGNOSIS of SECTION 6.
2	Check 4WD switch circuit. Turn ignition switch ON and check that voltage between terminal C51-2-18 and terminal C51-3-17 (ground) for G16/J20 (terminal C51-1-11 and terminal C51-3-26 (ground) for H25) is as follows. ● When transfer shift lever is in N or 2H: 10 – 14 V ● When transfer shift lever is in 4L or 4H: 0 – 1 V Is the check result satisfactory?	Go to step 3.	Check 4WD switch (refer to SECTION 7A), "B/Or" and "B" circuits of 4WD switch. If OK, substitute a known-good ECM (PCM) and recheck.
3	Check power supply. 1) Turn ignition switch ON. 2) Check voltage between C51-2-7 and C51-3-17 (ground) for G16/J20 (C51-1-15 and C51-3-26 (ground) for H25). The check results should be as follows. ● When transfer shift lever is in N or 2H: 0 – 1 V ● When transfer shift lever is in 4L or 4H: 10 – 14 V Is the check result satisfactory?	Go to step 4.	Check "R" circuit. If it is OK, substitute a known-good ECM (PCM) and recheck.
4	Check air pump assembly circuit. 1) Check for proper connection to air pump assembly at all terminals. 2) Turn ignition switch ON. 3) Check voltage between C51-2-27 and C51-3-17 (ground) for G16/J20 (C51-1-18 and C51-3-26 (ground) for H25). The check result should be as follows. ● When transfer shift lever is in 2H or N: 0 – 1 V ● When transfer shift lever is in 4L or 4H (more than 4 seconds after shifted to 4L or 4H): 10 – 14 V Is the check result satisfactory?	Go to step 5.	Check air pump assembly referring to "ON-VEHICLE SERVICE", and then "P" circuit. If OK, substitute a known-good ECM (PCM) and recheck.
5	Check 4WD indicator lamp circuit. 1) Turn ignition switch ON. 2) Check voltage between E61-19 and C51-3-17 (ground) for G16/J20 (C51-1-7 and C51-3-26 (ground) for H25). The check result should be as follows. ● When transfer shift lever is in 2H or N: 10 – 14 V ● When transfer shift lever is in 4L or 4H: 0 – 1 V Is the check result satisfactory?	4WD control system is in good condition.	Check "Or/B" circuit (including indicator lamp and combination meter). If OK, substitute a known-good ECM (PCM) and recheck.

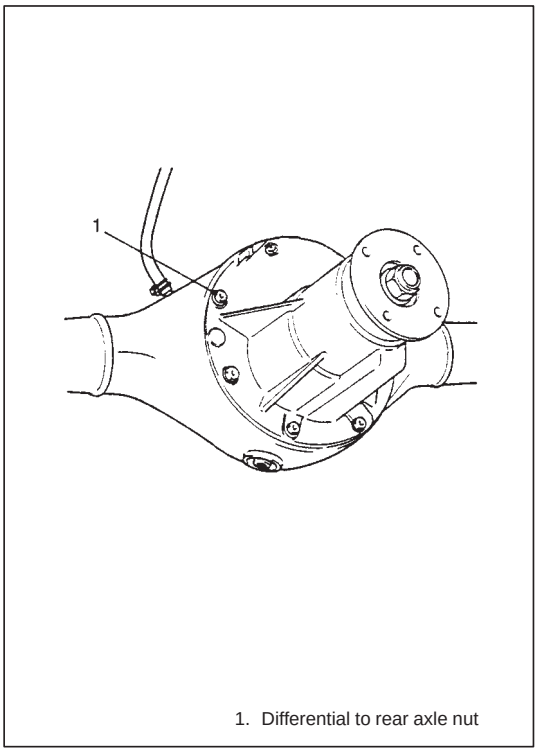
DISMOUNTING

1) Lift up vehicle and drain oil from rear differential housing.
2) Remove rear brake drums and pull out right and left rear axle shafts. (Refer to rear axle shaft removal of SECTION 3E.)



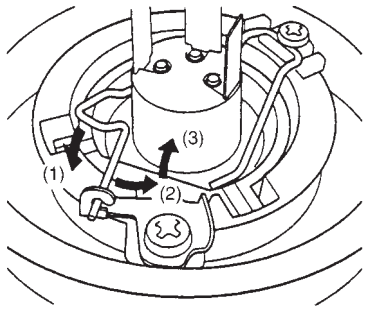
1. Match mark

3) Before removing propeller shaft, give match marks on joint flange and propeller shaft as shown.
4) Remove propeller shaft by removing its 4 flange bolts and nuts.



1. Differential to rear axle nut

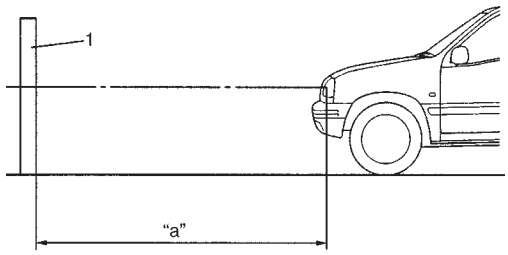
5) Remove differential assembly by removing its 8 fastening nuts.



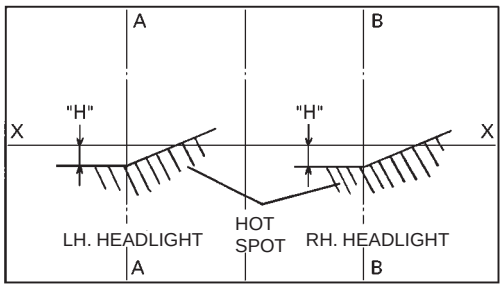
BULB REPLACEMENT

WARNING:
Don't touch when the bulb is hot.

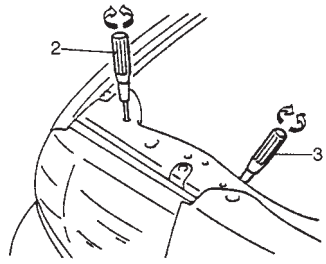
1) Disconnect negative cable at battery.
2) Disconnect harness from bulb.
3) Remove socket cover and bulb.
4) Replace bulb and install in reverse removal procedure.

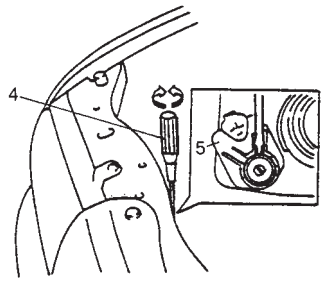


1. Screen



LH steering vehicle shown
X-X: Horizontal center line of headlight bulbs
A-A: Vertical center line of left headlight bulb
B-B: Vertical center line of right headlight bulb





2. For right / left adjustment
3. For up / down adjustment (for vehicle without leveling system)
4. For up / down adjustment (for vehicle with leveling system)
5. Headlight leveling actuator

HEADLIGHT AIMING WITH SCREEN

NOTE:
- **Unless otherwise obligated by local regulations, adjust headlight aiming according to following procedure.**
- **After replacing headlight, be sure to perform its aiming.**
- **When inspecting and adjusting headlight with leveling system, make sure to set the leveling switch to "0" position with IG switch ON.**

Before adjustment, make sure the following.
a) Place vehicle on a flat surface in front of blank wall as below ahead of headlight surface.

Clearance "a": 10 m (32.8 ft)

b) Adjust air pressure of all tires to a specified value respectively.
c) Bounce vehicle body up and down by hand to stabilize suspension.
d) Carry out one driver aboard.

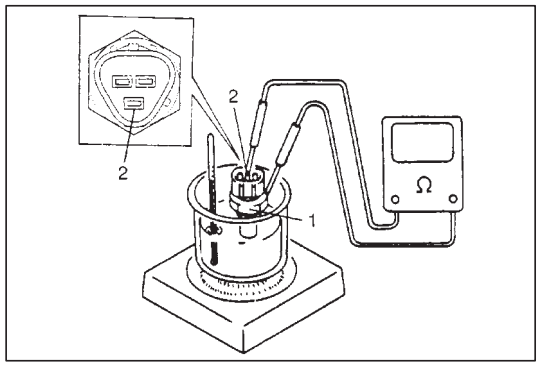
Driver's weight: 75 kg (165 lb)

Adjustment

1) Check to see if hot spot (high intensity zone) of each main (low) beam axis falls as illustrated.

Clearance "H": Approx. 130 mm (5.15 in.)

2) If headlight aiming is not set properly, align it to specification by adjusting aiming screw and aiming gear.



INSPECTION

1) Warm up ECT sensor (1) observing resistance between sensor terminal (2) and sensor unit (1). Resistance should be decreased with increase of its temperature.
2) Check resistance between sensor terminal (2) and sensor unit (1) shown below. If check result is not as specified, replace sensor.

Temperature	Resistance
50°C (122°F)	136 – 216 Ω

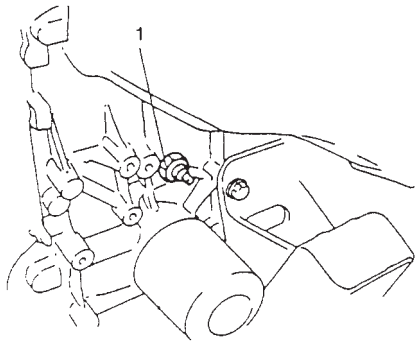
OIL PRESSURE LIGHT

OIL PRESSURE SWITCH

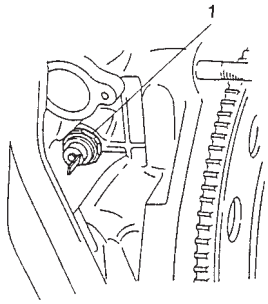
REMOVAL AND INSTALLATION

Refer to OIL PRESSURE CHECK in Section 6A1 (for G16), Section 6A2 (for H25), and Section 6A4 (for J20) of this manual for details.

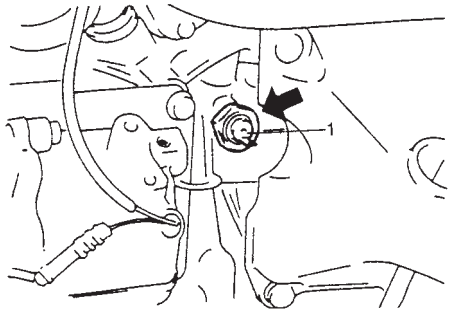
G16



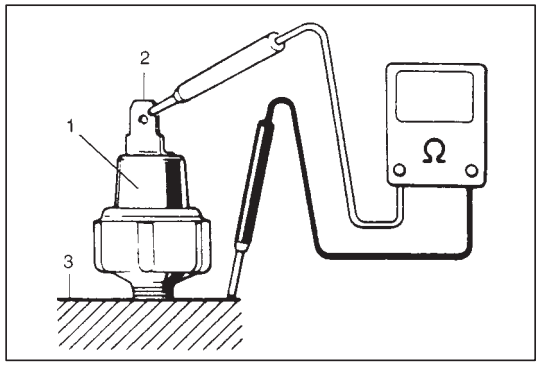
J20



H25



1. Oil pressure switch

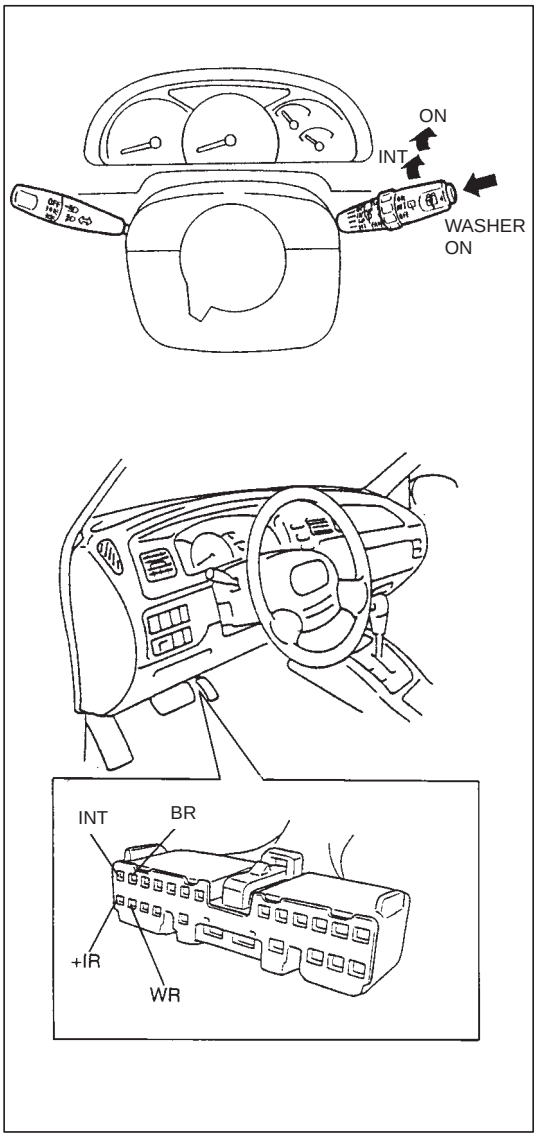


INSPECTION

1) Disconnect oil pressure switch (1) lead wire.
2) Check for continuity between oil pressure switch terminal (2) and cylinder block (3) as shown.

During Engine Running	No continuity
At Engine Stop	Continuity

If check result is not as specified, replace oil pressure switch (1).



REAR WIPER AND WASHER (IF EQUIPPED)

INSPECTION

Rear Wiper and Washer Switch (in Combination Switch)

1) Disconnect negative cable at battery.
2) Disconnect combination switch lead wire coupler.
3) Check for continuity between terminals at each switch position as shown below. If check result is not as specified, replace switch.

Rear Wiper Switch

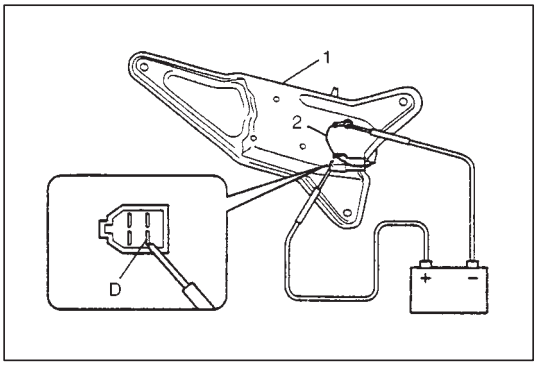
Switch \ Terminal	BR	INT	+IR
OFF			
INT	○	○	
ON	○		○

Rear Washer Switch

Switch \ Terminal	BR	WR
OFF		
ON	○	○

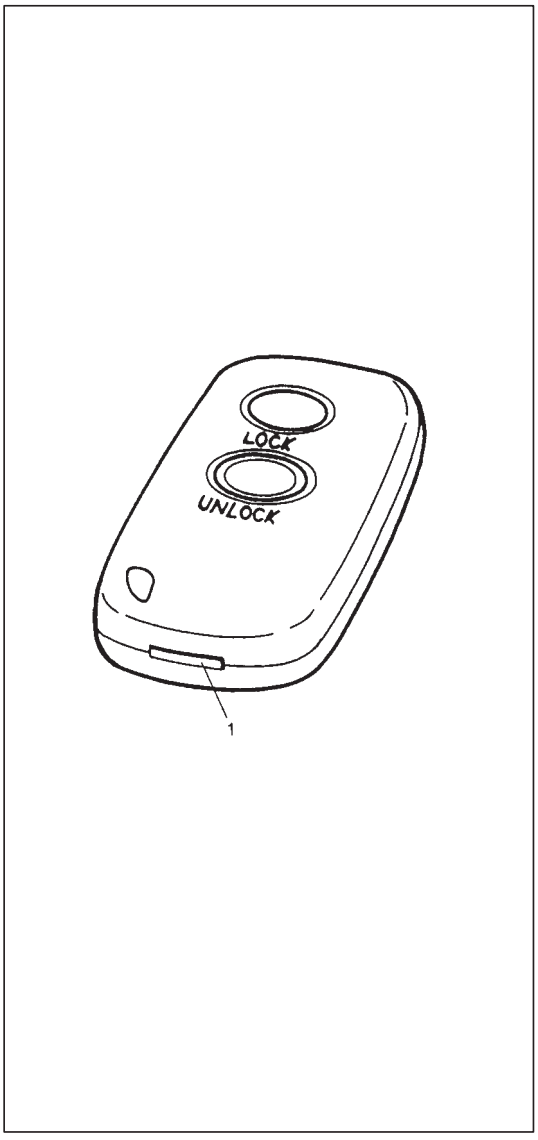
Washer Pump

Refer to FRONT WIPER AND WASHER INSPECTION in this section.



Wiper Motor

1) TESTING WIPER MOTOR
   As shown left, use a 12 V battery to connect its (+) and (–) terminals to terminal “D” and Black lead wire (2) respectively. Then motor (1) should rotate at 35 to 45 rpm.



TRANSMITTER

REPLACEMENT OF THE BATTERY

If the transmitter becomes unreliable, replace the battery.
As the battery power is consumed, the operation distance will be shorter.

1) Put the edge of a coin or a flat blade screw driver in the slot (1) of the transmitter and pry it open.
2) Replace the battery (lithium disc-type CR2032 or equivalent) so its ⊕ terminal faces the "+" mark of the transmitter.

CAUTION:
Use care not to allow grease or dirt to be attached on the printed circuit board and the battery.

3) Close the transmitter firmly.
4) Make sure the door locks can be operated with the transmitter.

NOTE:

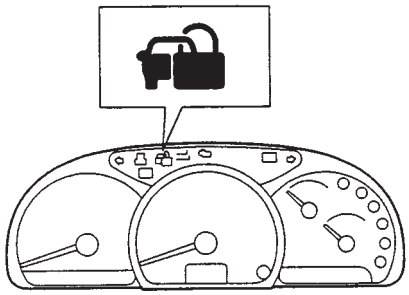
- **To prevent theft, be sure to break the transmitter before discarding it.**
- **Dispose of the used battery properly according to applicable rules or regulations. Do not dispose of lithium batteries with ordinary household trash.**

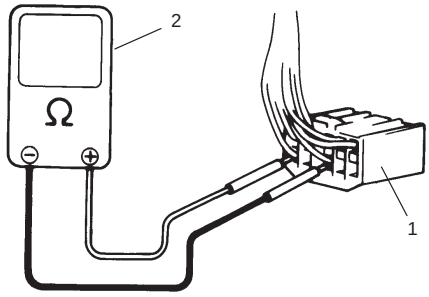
DIAGNOSTIC FLOW TABLE

<Vehicle not equipped with monitor coupler>

STEP	ACTION	YES	NO
1	1) Check immobilizer indicator lamp while ignition switch is ON (but without starting engine). See Fig. 1. Dose immobilizer indicator lamp flash?	Go to Step 3.	● If immobilizer indicator lamp remains ON, go to Step 2. ● If immobilizer indicator lamp remains OFF, go to "IMMOBILIZER INDICATOR LAMP CHECK" in this section.
2	1) Check DTC stored in ECM/PCM referring to "DIAGNOSTIC TROUBLE CODE CHECK (ECM/PCM)" in this section. Is there any DTC(s)?	Go to "IMMOBILIZER INDICATOR LAMP CHECK" in this section.	Immobilizer control system is in good condition.
3	1) Check DTC stored in immobilizer control module referring to "DIAGNOSTIC TROUBLE CODE CHECK (IMMOBILIZER CONTROL MODULE)" in this section. Is there any DTC(s)?	Go to flow table for DTC No.	Go to Step 4.
4	1) Check DTC stored in ECM/PCM referring to "DIAGNOSTIC TROUBLE CODE CHECK (ECM/PCM)" in this section. Is there any DTC(s) for immobilizer control system?	Go to flow table for DTC No.	Substitute a known-good ECM/PCM and recheck. NOTE: After replacing with a known-good ECM/PCM, register ECM/Immobilizer Control Module code in ECM/PCM by performing procedure described in "Procedure after ECM/PCM Replacement" section.

FIg. 1 for Step 1





1. Immobilizer Control Module coupler disconnected
2. Ohmmeter

Resistance Check

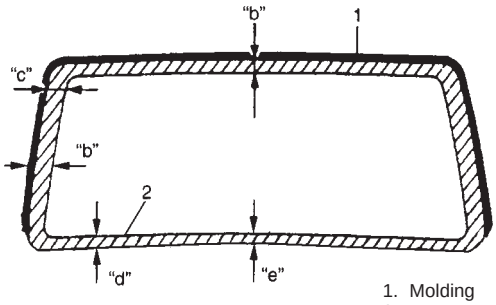
1) Disconnect Immobilizer Control Module couplers from Immobilizer Control Module with ignition switch OFF.

CAUTION:
Never touch terminals of Immobilizer Control Module itself or connect voltmeter or ohmmeter.

2) Check resistance between each terminal of coupler disconnected.

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

TERMINAL	CIRCUIT	NORMAL RESISTANCE	CONDITION
A1 – A2	Coil antenna	Continuity	–



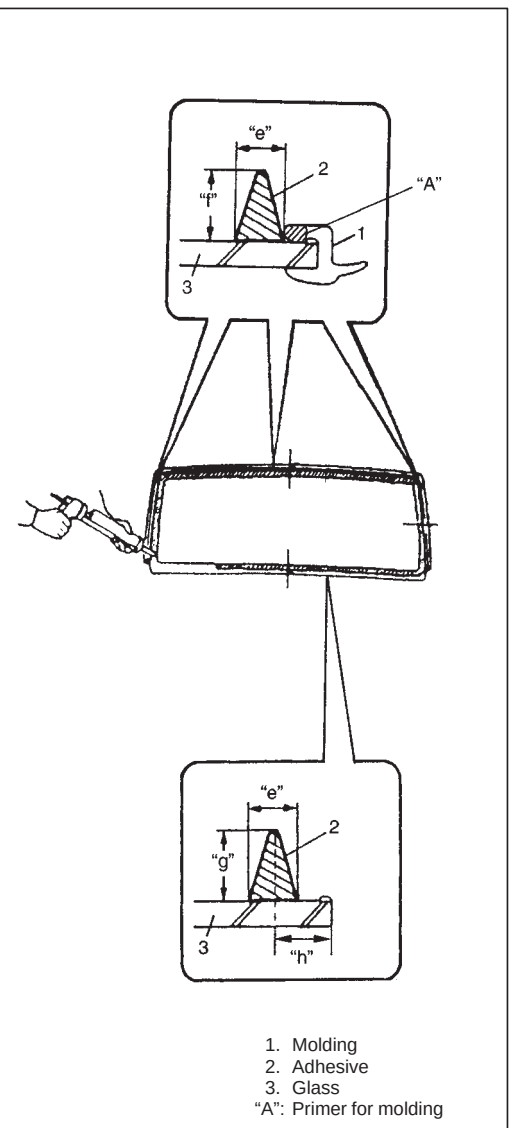
1. Molding
2. Fastener

7) Using new brush, apply sufficient amount of primer for glass along glass surface to be adhered to body.

NOTE:

- **Be sure to refer to maker's instruction for proper handling and drying time.**
- **Do not apply primer on outside of ceramic coated surface.**
- **Do not touch primer coated surface.**

Width "b": 18 – 19 mm (0.71 – 0.75 in.)
"c": 16 – 17 mm (0.63 – 0.67 in.)
"d": 24 mm (0.94 in.)
"e": 27 mm (1.06 in.)



1. Molding
2. Adhesive
3. Glass

"A": Primer for molding

8) Apply primer for molding along molding surface all around as shown in figure.

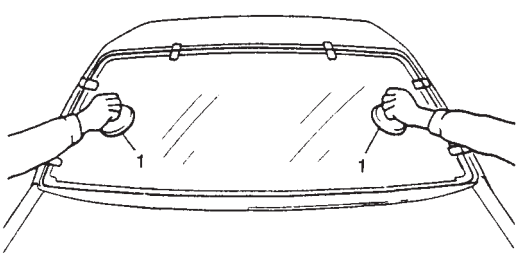
9) Apply adhesive referring to figure at the left.

NOTE:

- **Start from bottom side of glass.**
- **Be careful not to damage primer.**
- **Height of adhesive applied to lower side should be higher than that of other three sides.**

Upper, right and left sides
Width "e" : Approx. 11 mm (0.43 in.)
Height "f" : Approx. 17 mm (0.67 in.)
"g" : Approx. 25 mm (0.98 in.)
Distance "h" : Approx. 16 mm (0.63 in.)

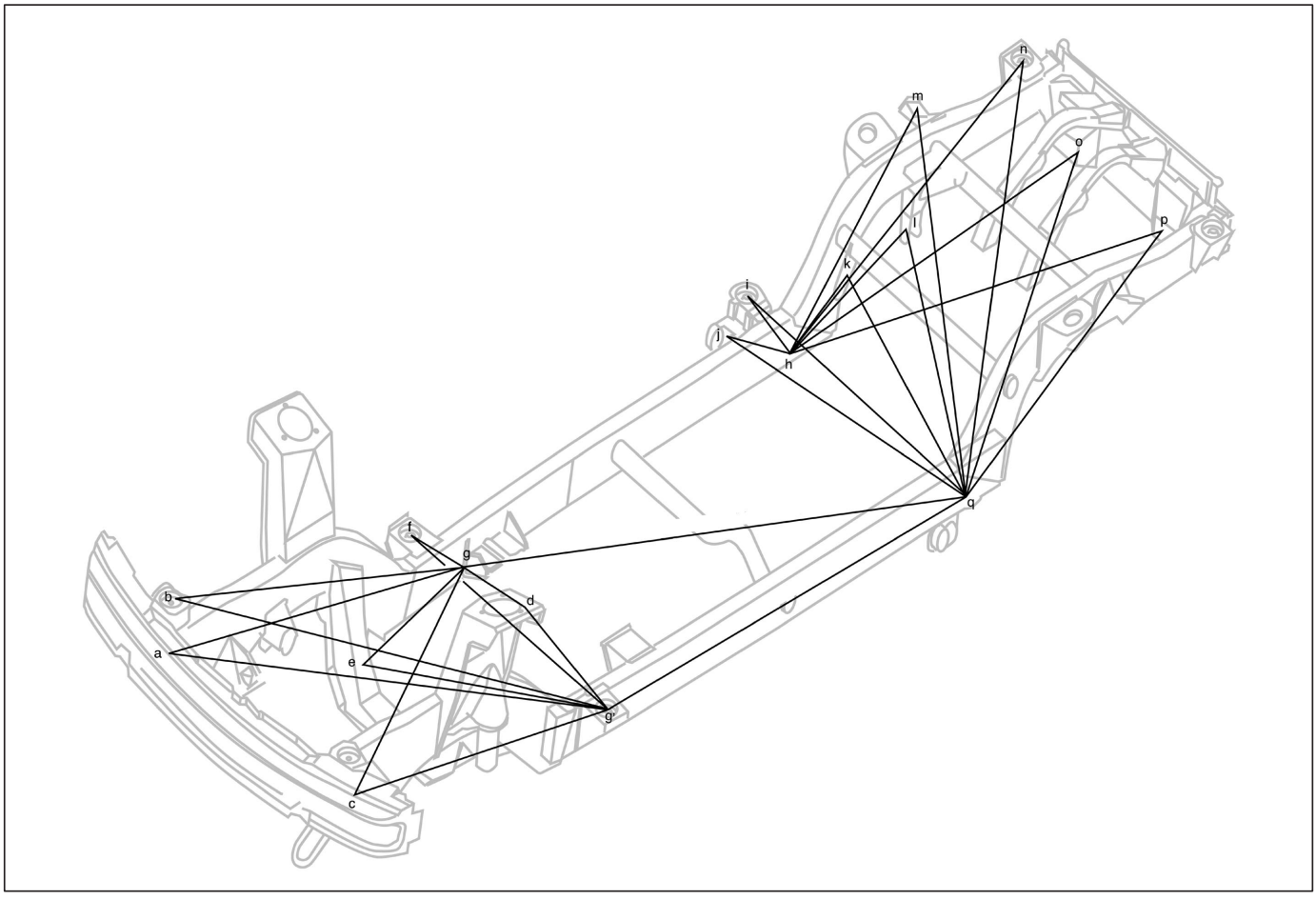
- **Press glass against body quickly after adhesive is applied.**
- **Use of rubber sucker grip is helpful to hold and carry glass after adhesive is applied.**
- **Perform steps 9) to 10) within 10 min. to ensure sufficient adhesion.**
- **Be sure to refer to adhesive maker's instruction for proper handling and drying time.**



1. Rubber sucker grip

10) Holding rubber sucker grips, place glass onto body by aligning mating marks marked in step 3) and press it.

UNDER BODY DIMENSIONS



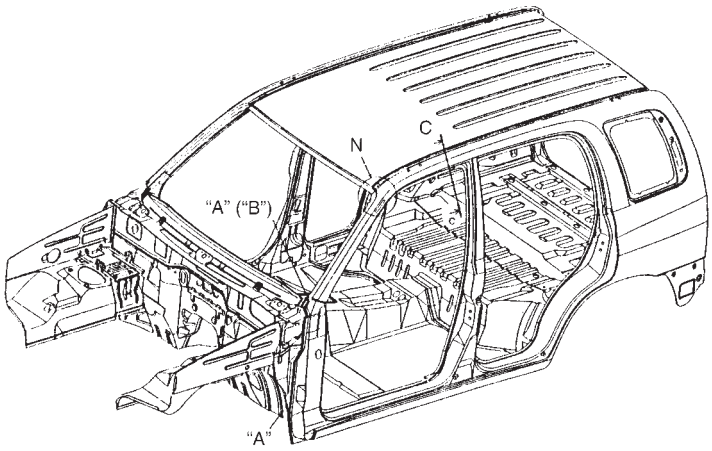
a. Front bumper
b. 1st mounting
c. Suspension frame
d. Front strut
e. Suspension arm
f. 2nd mounting
g(g'). Jig hole 20 mm in dia.
h(h'). Jig hole 20 mm in dia.
i. 3rd mounting
j. Lower rod
k. Upper rod
l. Lateral rod
m. Rear shock absorber
n. 4th mounting
o. Fuel tank
p. Fuel tank
q. Lower rod

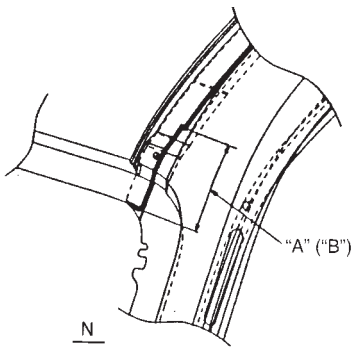
a – g : 1315 mm (51.77 in.)
a – g' : 1534 mm (60.39 in.)
b – g : 1243 mm (48.94 in.)
b – g' : 1518 mm (59.76 in.)
c – g : 1377 mm (54.21 in.)
c – g' : 1105 mm (43.50 in.)
d – g' : 1319 mm (51.93 in.)
d – f : 874 mm (34.41 in.)
e – g : 525 mm (20.67 in.)
e – g' : 857 mm (33.74 in.)
f – g' : 927 mm (36.50 in.)
h – i : 178 mm (7.01 in.)
h – j : 133 mm (5.24 in.)
h – k : 325 mm (12.80 in.)
h – l : 674 mm (26.54 in.)

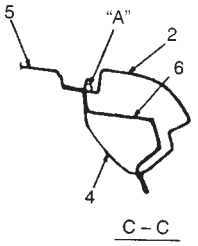
h – m : 803 mm (31.61 in.)
h – n : 1161 mm (45.71 in.)
h – o : 1184 mm (46.61 in.)
h – p : 1190 mm (46.85 in.)
i – q : 999 mm (39.33 in.)
j – q : 997 mm (39.25 in.)
k – q : 824 mm (32.44 in.)
l – q : 1130 mm (44.49 in.)
m – q : 1258 mm (49.53 in.)
n – q : 1483 mm (58.39 in.)
o – q : 1349 mm (53.11 in.)
p – q : 1334 mm (52.52 in.)

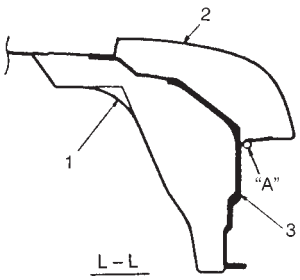
For 4 door model
g' – q : 1275 mm (50.20 in.)
g – q : 1534 mm (60.39 in.)

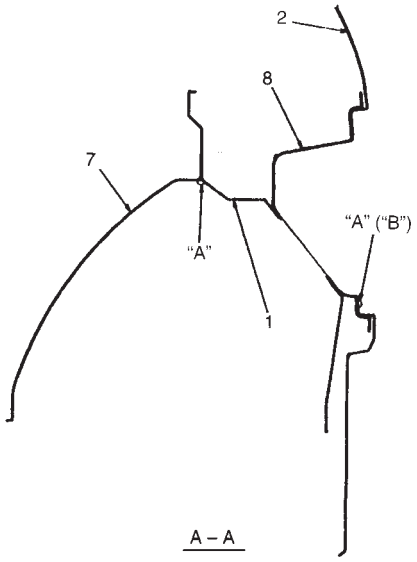
For 2 door model
g' – q : 995 mm (39.17 in.)
g – q : 1310 mm (51.57 in.)

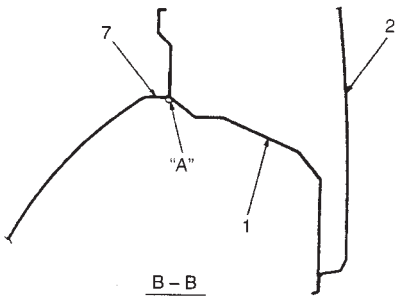


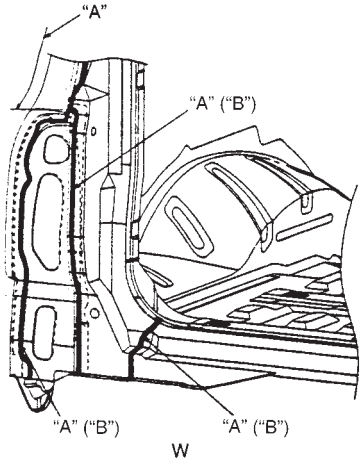


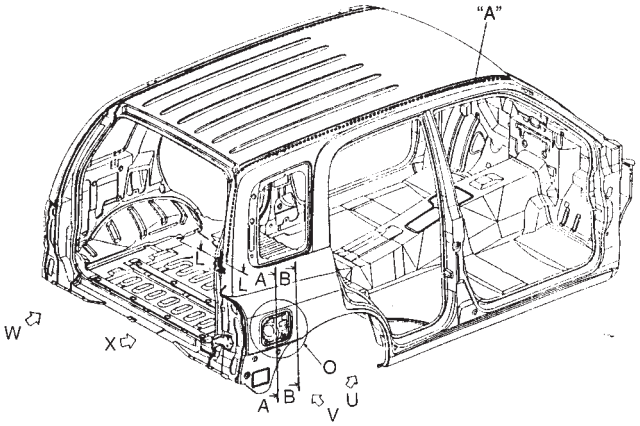








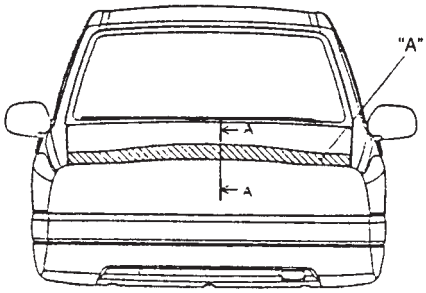


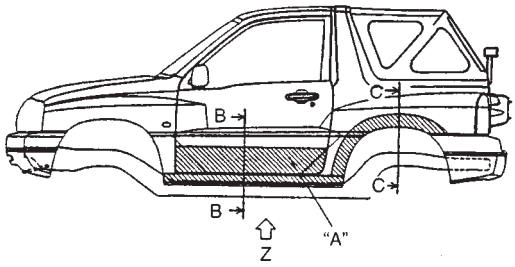


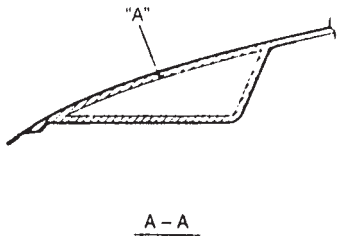
1. Side body inner panel
2. Side body outer panel
3. Back pillar outer panel
4. Front pillar inner panel
5. Roof panel
6. Front pillar upper reinforcement
7. Rear wheel housing panel
8. Fuel inlet box

"A": Apply sealant
"B": Brush treatment

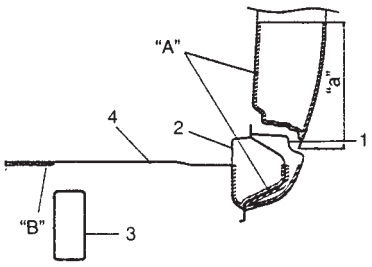
2 DOOR MODEL



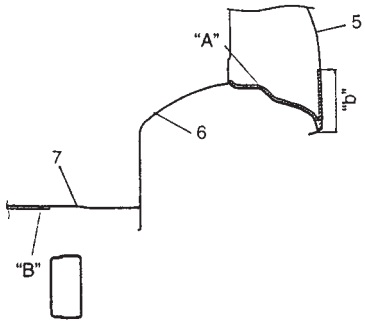




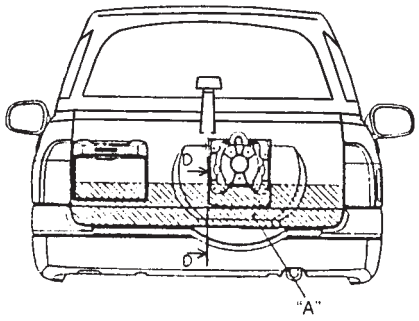
A – A

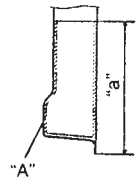


B – B

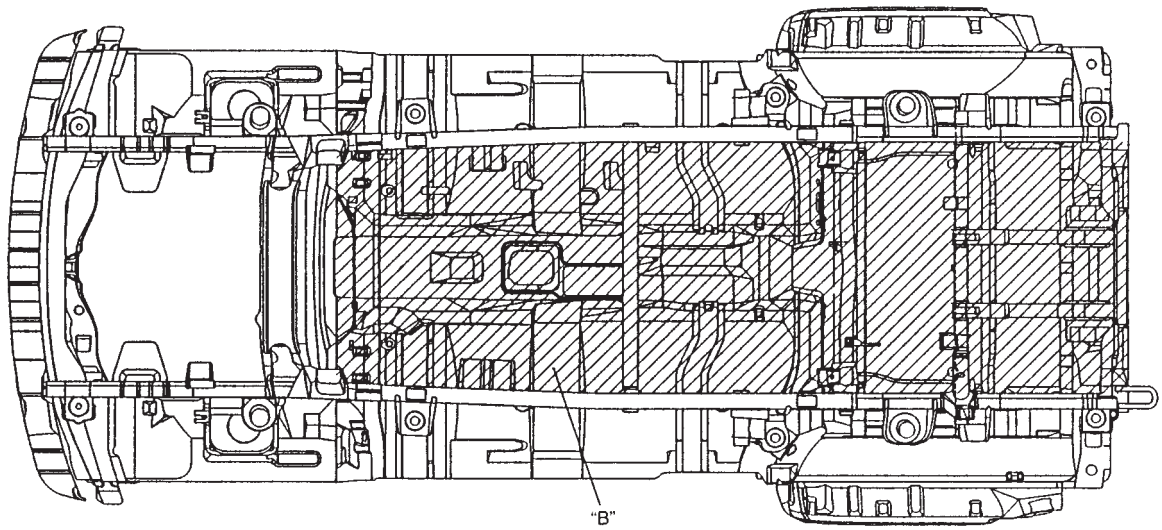


C – C





D – D

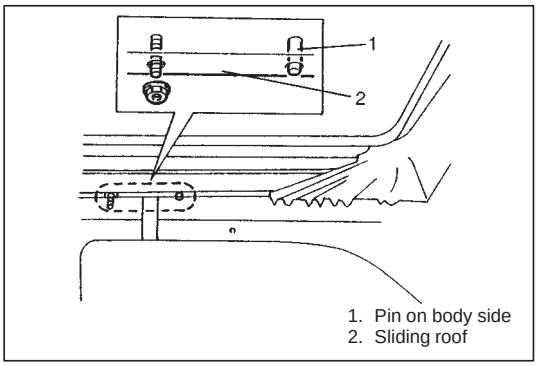


VIEW: Z

"a": 200 mm (7.87 in.)
"b": 100 mm (3.94 in.)

"A": Apply rust proof wax (hot wax 50 μm or more)
"B": Apply rust proof wax (high viscosity wax 50 μm or more)

1. Side body outer
2. Side sill inner
3. Frame
4. Main floor
5. Rear fender
6. Rear wheel housing
7. Center floor

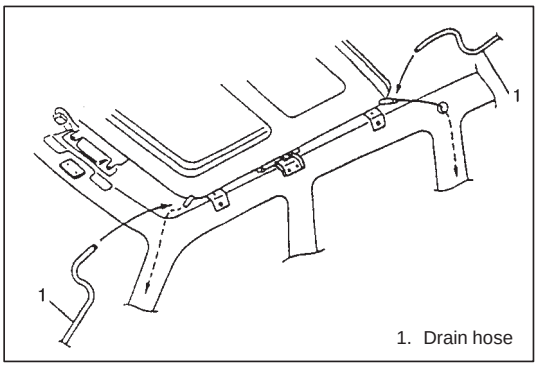


1. Pin on body side
2. Sliding roof

INSTALLATION

For installation, reverse removal procedure, noting following points.

- Align positioning holes in sliding roof assembly at right and left and pins on body side for installation.



1. Drain hose

- Connect drain hoses to sliding roof assembly at 4 locations. Pass front drain hose between roof panel and inner panel and through front pillar down to sill side. Pass rear drain hose into baring hole in rear quarter inner panel and through C pillar down to jig hole in rear side bumper.

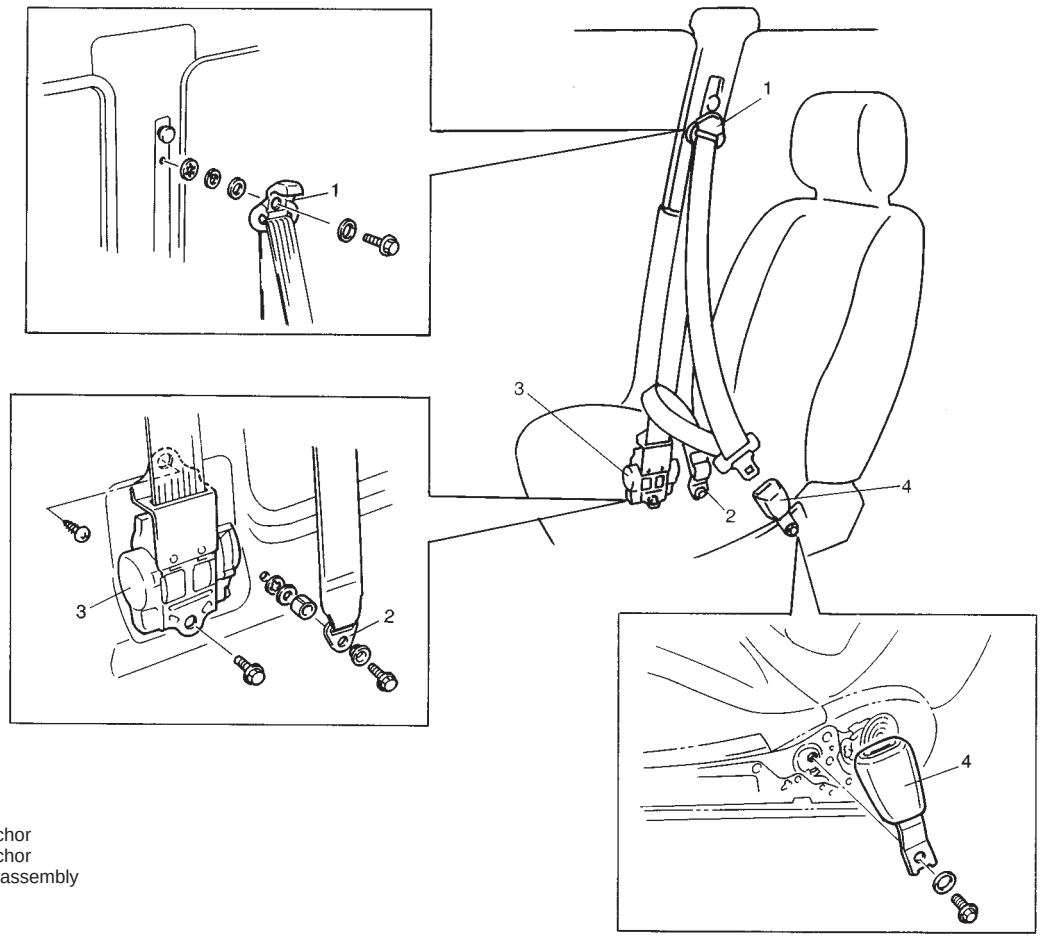
NOTE:
After reinstalling sliding roof assembly, be sure to make glass adjustment. (Refer to SLIDING ROOF GLASS ADJUSTMENT described previously.)

FRONT SEAT BELT

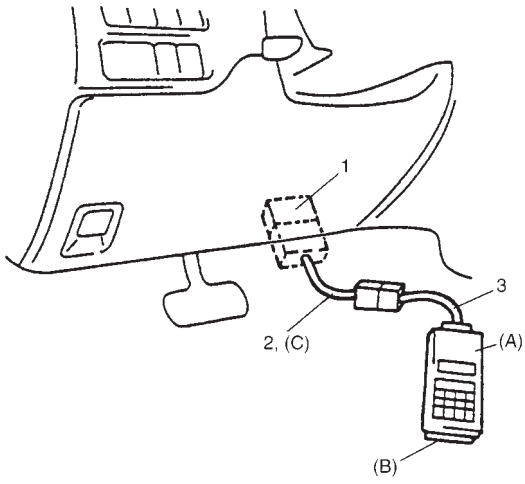
WARNING:
Be sure to read “Service Precautions” before starting to work and observe every precaution during work.

REMOVAL

Refer to the figure below to remove front seat belts.



1. Upper anchor
2. Lower anchor
3. Retractor assembly
4. Buckle



1. Data link connector (DLC)
2. DLC cable adapter
3. DLC cable

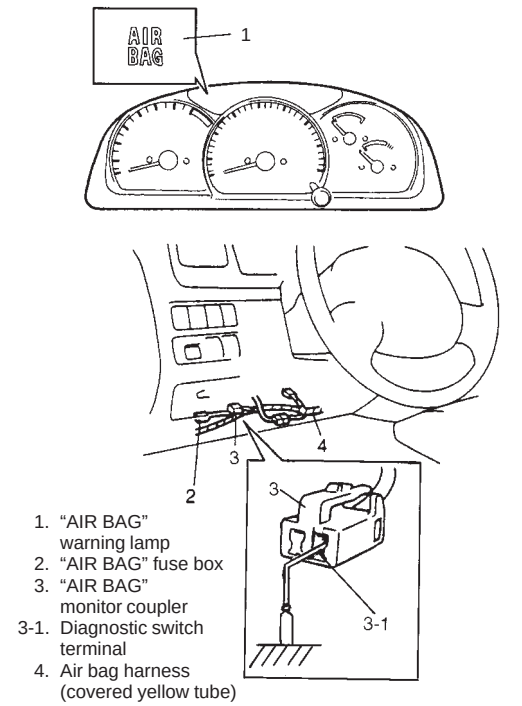
DIAGNOSTIC TROUBLE CODE (DTC) CHECK

[Using SUZUKI scan tool]

1) Turn ignition switch OFF.
2) After setting cartridge to Tech 1, connect it to data link connector (DLC) located on underside of instrument panel at driver's seat side.

Special Tool
(A): 09931-76011 (Tech 1)
(B): Mass storage cartridge
(C): 09931-76030

3) Turn ignition switch ON.
4) Read DTC according to instructions displayed on Tech 1 and print it or write it down. Refer to Tech 1 operator's manual for further details.
5) After completing the check, turn ignition switch OFF and disconnect Tech 1 from data link connector (DLC).



1. "AIR BAG" warning lamp
2. "AIR BAG" fuse box
3. "AIR BAG" monitor coupler

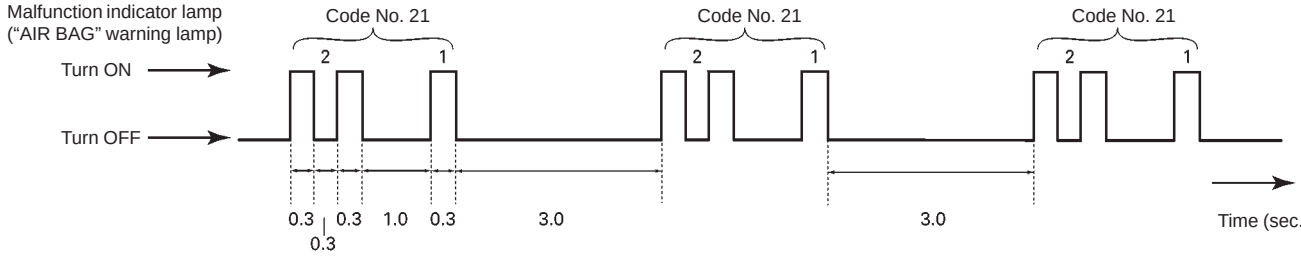
3-1. Diagnostic switch terminal

4. Air bag harness (covered yellow tube)

[Not using SUZUKI scan tool]

1) Check that malfunction indicator lamp ("AIR BAG" warning lamp) comes ON when ignition switch is turned ON.
   If it does not come "ON", proceed to "Table B" on p.10B-18.
2) Using service wire, ground diagnosis switch terminal in monitor coupler.
3) Read DTC from flashing pattern of malfunction indicator lamp ("AIR BAG" warning lamp). (Refer to "Diagnostic Trouble Code Table" on p.10B-14 and 10B-15.)
4) After completing the check, turn ignition switch OFF and disconnect service wire from "AIR BAG" monitor coupler.

EXAMPLE: When driver air bag initiator circuit resistance high (Code No.21) is set



CODE 16 – PASSENGER AIR BAG INITIATOR CIRCUIT RESISTANCE LOW (Page 2 of 2)

NOTE:
Before executing items in this table, be sure to perform "Air Bag Diagnostic Check Flow Table".

STEP	ACTION	YES	NO
1	1) With ignition switch OFF, disconnect passenger air bag (inflator) module connector behind the glove box. 2) Check proper connection to passenger air bag (inflator) module at terminals in "B" connector. 3) If OK then connect Special Tool (B) to passenger air bag (inflator) module connector disconnected at the step 1). 4) With ignition switch ON, is DTC 16 current?	Go to step 2.	1) Ignition switch OFF. 2) Replace passenger air bag (inflator) module.
2	1) With ignition switch OFF, disconnect SDM. 2) Check proper connection to SDM at terminals "A2" and "A3". 3) Release shorting bar in SDM connector by inserting a piece of paper, referring to the figure below. 4) If OK then measure resistance between "A2" and "A3" terminals with connected Special Tool (B). 5) Is resistance 1.7 Ω or more?	Substitute a known-good SDM and recheck.	Repair short from "Y" wire circuit to "Y/R" wire circuit or from "Y" or "Y/R" wire circuit to other wire circuit.

Fig. for STEP 1 and 2

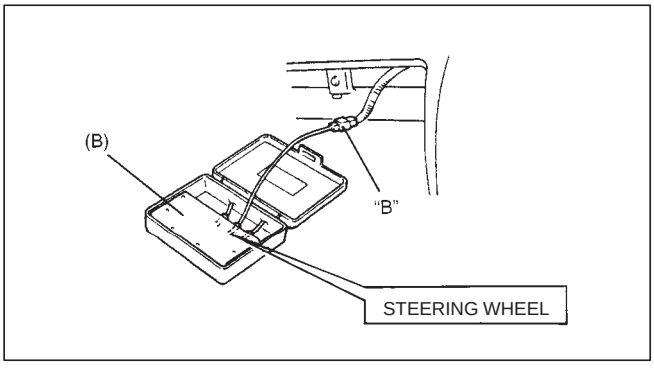
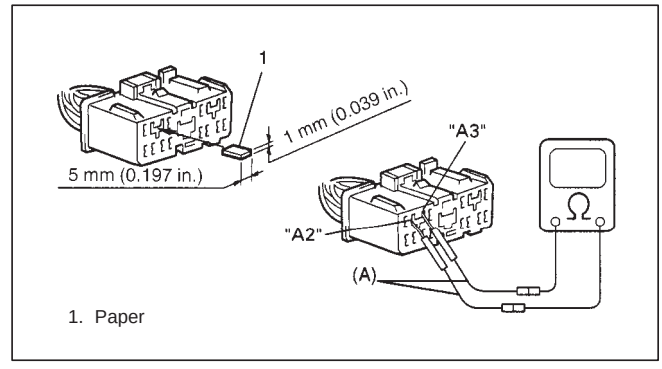


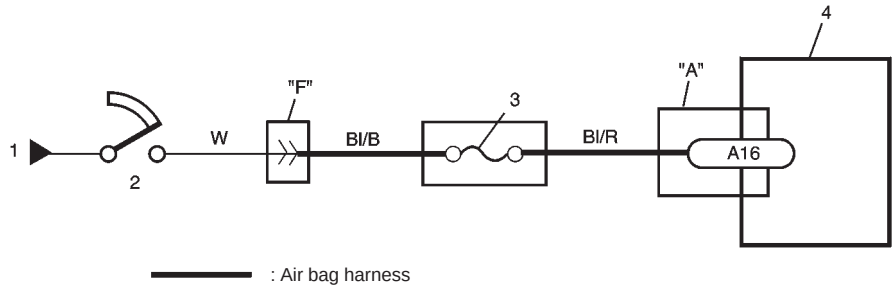
Fig. for STEP 2



Special Tool
(A): 09932-76010
(B): 09932-75010

NOTE:
Upon completion of inspection and repair work, perform following items.
1) Reconnect all air bag system components, ensure all components are properly mounted.
2) Clear diagnostic trouble codes (refer to "Diagnostic Trouble Code (DTC) Clearance"), if any.
3) Repeat "Air Bag Diagnostic System Check Flow Table", referring to p.10B-11 to confirm that the trouble has been corrected.

CODE 32 – POWER SOURCE VOLTAGE LOW (Page 1 of 2)



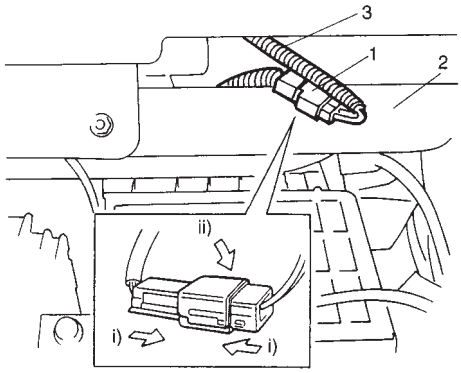
1. From main fuse
2. Ignition switch
3. "AIR BAG" fuse in "AIR BAG" fuse box
4. SDM

CAUTION:

- **When measurements are requested in this chart use specified digital multimeter with correct terminal adapter from special tool (Connector test adapter kit).**
- **When a check for proper connection is requested refer to "Intermittent and Poor Connections" in this section.**
- **When an open in air bag wire harness, damaged wire harness, connector or terminal is found, replace wire harness, connectors and terminals as an assembly.**

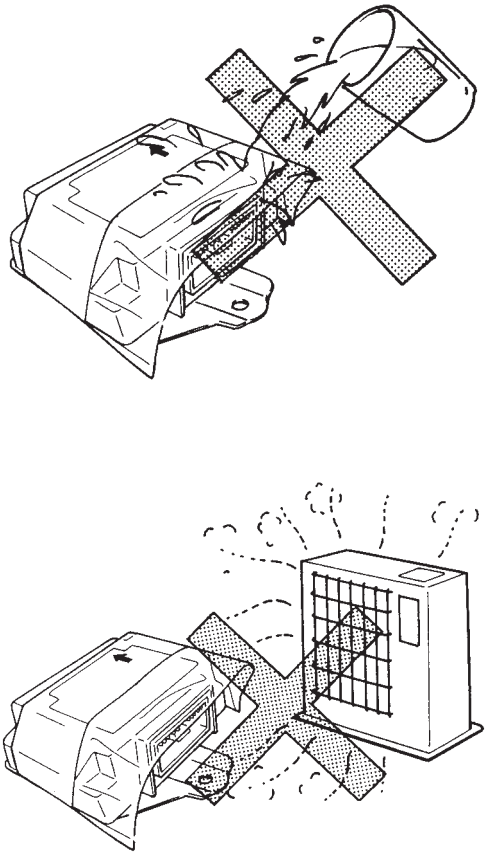
DTC WILL SET WHEN:

The power source voltage is below an approx. 8 V for specified time.



1. Yellow connector of passenger air bag (inflator) module
2. Steering support member
3. Air bag harness

3) Connect Yellow connector of passenger air bag (inflator) module, and be sure to lock connector with lock lever.
   i) Connect connector.
   ii) Lock connector with lock lever.
4) Install glove box.
5) Install "AIR BAG" fuse to "AIR BAG" fuse box.
6) Turn ignition switch to ON and verify that "AIR BAG" warning lamp flashes 6 times and then turns off.
   If it does not operate as described, perform "Air Bag Diagnostic System Check" in this section.



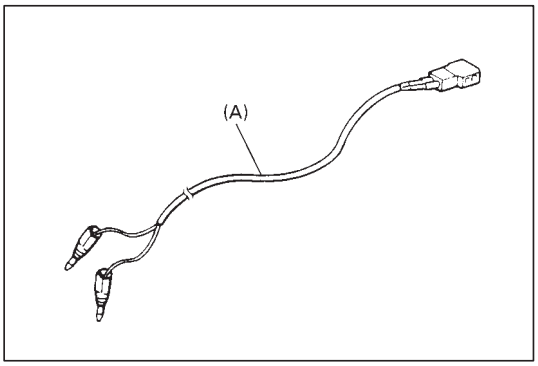
HANDLING AND STORAGE

SDM

WARNING:
Never power up air bag system when SDM is not rigidly attached to the vehicle. Otherwise, personal injury may result.

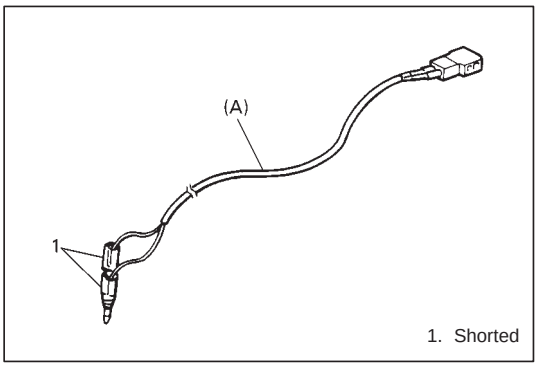
CAUTION:
After detecting one time of such collision as to meet deployment conditions, the SDM must not be used.
Refer to "Diagnosis" when checking the SDM.

- Never attempt disassembly of SDM.
- When storing SDM, select a place where neither high temperature nor high humidity is anticipated and oil, water and dust are kept off.
- If SDM was dropped from a height of 90 cm (3 ft) or more or if it is found to be damaged or deformed, replace it with a new one.
- If installation part of SDM was damaged, repair that part completely before reinstallation.
- All SDM and mounting bracket fasteners must be carefully torqued and the arrow must be pointed toward the front of the vehicle to ensure proper operation of the air bag system.



1) Turn ignition switch to “LOCK”, remove key and put on safety glasses.
2) Check that there is no open, short or damage in special tool (deployment harness). If any faulty is found, do not use it and be sure to use new deployment harness.

Special Tool
(A): 09932-75030



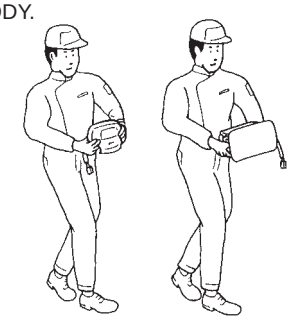
1. Shorted

3) Short the two deployment harness leads together by fully seating one banana plug into the other.

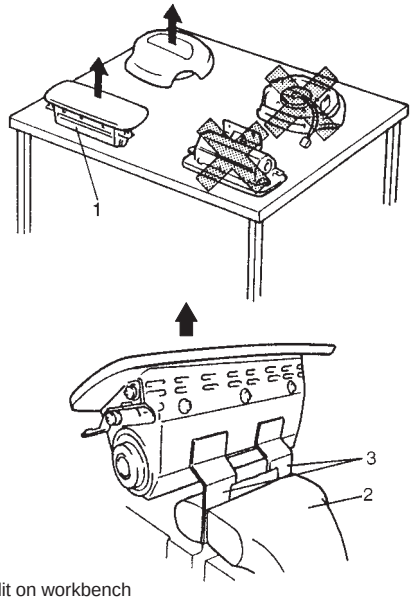
WARNING:
Deployment harness shall remain shorted and not be connected to a power source until the air bag is to be deployed.

Special Tool
(A): 09932-75030

ALWAYS CARRY AIR BAG (INFLATOR) MODULE WITH TRIM COVER (AIR BAG OPENING) AWAY FROM BODY.



ALWAYS PLACE AIR BAG (INFLATOR) MODULE ON WORKBENCH WITH TRIM COVER (AIR BAG OPENING) UP, AWAY FROM LOOSE OBJECTS.



1. Slit on workbench
2. Workbench vise
3. Lower mounting bracket

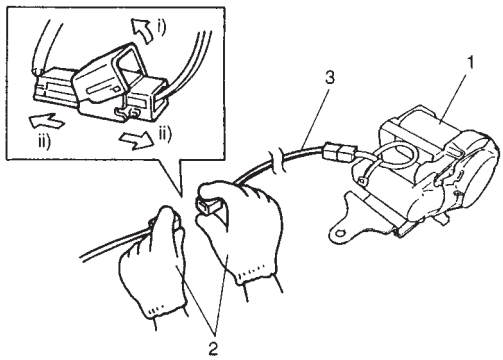
4) Remove driver or passenger air bag (inflator) module from vehicle, referring to SECTION 3C1 or 10B.

WARNING:
- **Always carry live air bag (inflator) module with trim cover away from you.**
- **When storing a live air bag (inflator) module or when leaving a live air bag (inflator) module unattended on a bench or other surface, always face the bag and trim cover up and away from the surface. As the live passenger air bag (inflator) module must be placed with its bag (trim cover) facing up, place it on the workbench with a slit or use the workbench vise to hold it securely at its lower mounting bracket.**
  This is necessary so that a free space is provided to allow the air bag to expand in the unlikely event of accidental deployment.

Failure to follow procedures may result in personal injury.

5) Temporarily place driver or passenger air bag (inflator) module on the workbench or the vise according to above WARNING.

18) In the unlikely event that the seat belt pretensioner did not activate after following these procedures, proceed immediately with Steps 23) through 26). If the the seat belt pretensioner did activate, proceed with Steps 19) through 22).

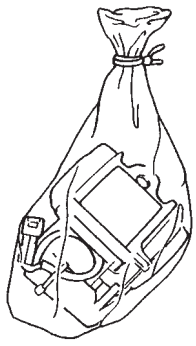


1. Activated seat belt pretensioner
2. Gloves
3. Pretensioner harness

19) Put on a pair of shop gloves to protect your hands from possible irritation and heat when handling the activated seat belt pretensioner.

NOTE:
As a precaution, gloves and safety glasses are recommended to prevent any possible irritation of the skin or eyes.

20) Disconnect the deployment harness from the seat belt pretensioner as soon after activation as possible. This will prevent damage to the deployment harness due to possible contact with the hot seat belt pretensioner canister. The deployment harness are designed to be reused. They should, however, be inspected for damage after each activation and replaced if necessary.



21) Dispose of the activated seat belt pretensioner through normal refuse channels after it has cooled for at least 30 minutes and tightly seal the seat belt pretensioner in a strong vinyl bag. (Refer to “Activated Seat Belt Pretensioners Disposal” in detail.)

22) Wash your hands with mild soap and water afterward.

CONTENTS

FAIL-SAFE TABLE

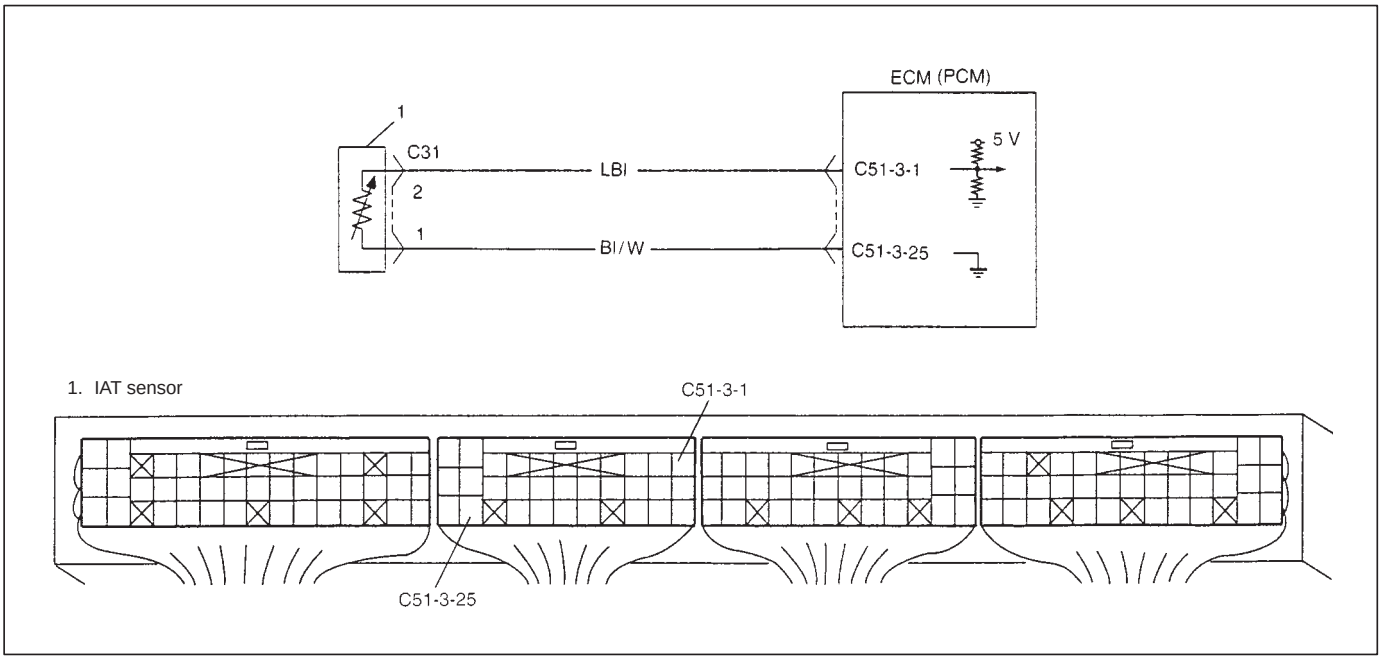
When any of the following DTCs is detected, ECM (PCM) enters fail-safe mode as long as malfunction continues to exist but that mode is canceled when ECM detects normal condition after that.

DTC NO.	TROUBLE AREA	FAIL SAFE OPERATION
P0100 (No.33, 34)	MAF SENSOR	● Injector drive time (fuel injection volume) is determined according to throttle valve opening and engine speed. ● EGR valve stops. ● Air flow of IAC valve is limited.
P0110 (No.23, 25)	IAT SENSOR	Each control is performed on the basis of 21.8°C intake air temp.
P0115 (No.14, 15)	ECT SENSOR	● Each control except 4-A/T is performed on the basis of 30.1°C engine coolant temp. ● 4-A/T control is performed assuming 31°C (engine warmed up) or higher after 15 min. from engine start.
P0120 (No.21, 22)	TP SENSOR	● Each control except 4-A/T is performed on the basis of 124.5° throttle valve opening. ● 4-A/T control is performed on the basis of 0° throttle valve opening.
P0500 (No.24)	VEHICLE SPEED SENSOR	Air flow of IAC valve is limited.
P1450	BAROMETRIC PRESSURE SENSOR	Each control is performed based on 760 mmHg barometric pressure.
P0705 (No.72)	TR SWITCH	A/T control is performed in priority order of L, 2, N, D, R and P.
P0720 (No.75)	OUTPUT SPEED SENSOR CIRCUIT MALFUNCTION	A/T control is performed by using signal from VSS.
P0753 (No.61, 62)	SHIFT SOLENOID A (#1)	● A/T control using 3rd gear is performed when D range, 1st, or 2nd gear is used. ● TCC solenoid OFF
P0758 (No.63, 64)	SHIFT SOLENOID B (#2)	● A/T control using 4th gear is performed when D range, 2nd or 3rd gear is used. ● When both shift solenoids A (#1) and B (#2) failed simultaneously, A/T control using 4th gear is always performed in D range. ● TCC solenoid OFF
P0743 (No.65, 66)	TCC (Lock-up) SOLENOID	TCC (Lock-up) solenoid OFF

Condition	Possible Cause	Reference Item
Overheating	● Inoperative thermostat	Thermostat in Engine Cooling Section.
	● Poor water pump performance	Water pump in Engine Cooling Section.
	● Clogged or leaky radiator	Radiator in Engine Cooling Section.
	● Improper engine oil grade	Engine oil and oil filter change in Maintenance and Lubrication Section.
	● Clogged oil filter or oil strainer	Oil pressure check in Engine Mechanical Section.
	● Poor oil pump performance	Oil pressure check in Engine Mechanical Section.
	● Dragging brakes	Diagnosis in BRAKES Section.
	● Slipping clutch	Diagnosis in Clutch Section.
	● Blown cylinder head gasket	Cylinder head inspection in Engine Mechanical Section.
Poor gasoline mileage	**Ignition system out of order.**	
	● Faulty spark plug (improper gap, heavy deposits, and burned electrodes, etc.)	Spark plugs in Ignition System Section.
	Engine and emission control system out of order.	
	● Fuel pressure out of specification	Diag. Flow Table B-3 in this Section.
	● Faulty TP sensor, ECT sensor or MAF sensor	TP sensor, ECT sensor or MAF sensor in Engine and Emission Control System Section.
	● Faulty EGR system	DTC P0400 Diag. Flow Table in this Section.
	● Faulty injector	Fuel injector in Engine and Emission Control System Section.
	● Faulty ECM (PCM)	Inspection of ECM (PCM) and its circuit in this Section.
	Low compression	Previously outlined.
	Others	
	● Poor valve seating	Valves inspection in Engine Mechanical Section.
	● Dragging brakes	Diagnosis in BRAKES Section.
	● Slipping clutch	Diagnosis in Clutch Section.
	● Thermostat out of order	Thermostat in Engine Cooling Section.
	● Improper tire pressure	
Excessive engine oil consumption	**Oil entering combustion chamber**	
	● Sticky piston ring	Piston cleaning in Engine Mechanical Section.
	● Worn piston and cylinder	Cylinders, pistons and piston rings inspection in Engine Mechanical Section.
	● Worn piston ring groove and ring	Pistons and piston rings inspection in Engine Mechanical Section.
	● Improper location of piston ring gap	Pistons installation in Engine Mechanical Section.
	● Worn or damaged valve stem seal	Valves and cylinder head in Engine Mechanical Section.
	● Worn valve stem	Valves inspection in Engine Mechanical Section.

DTC P0110 (DTC No.23, 25) INTAKE AIR TEMP. (IAT) CIRCUIT MALFUNCTION

WIRING DIAGRAM



DTC DETECTING CONDITION AND TROUBLE AREA

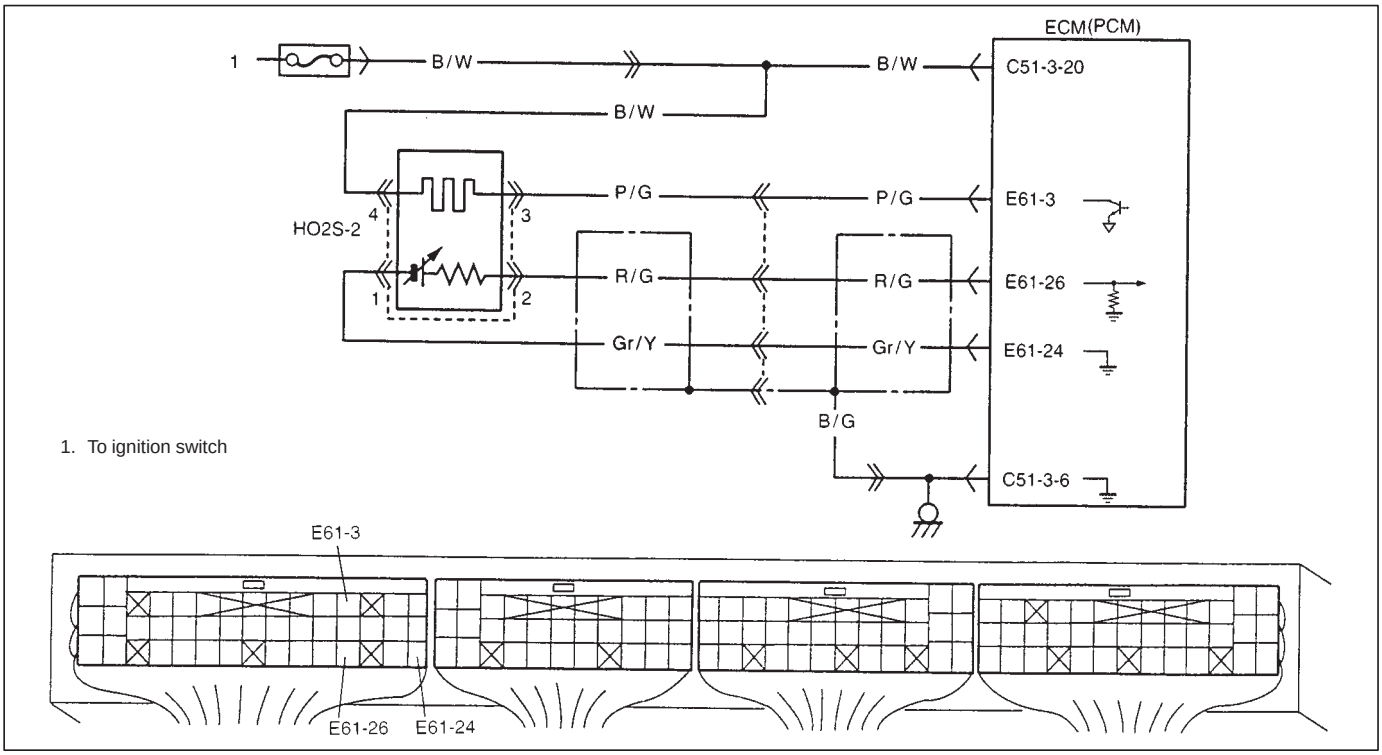
DTC DETECTING CONDITION	TROUBLE AREA
Following conditions are detected. ● Engine running ● High intake air temperature or low temperature (Low voltage – Low resistance or High voltage – High resistance)	● IAT sensor circuit short ● IAT sensor ● ECM (PCM)

DTC CONFIRMATION PROCEDURE

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and run engine at idle speed and engine coolant temp. 110°C, 230°F or lower for 10 sec. or more.
3) Check DTC and pending DTC by using scan tool.

DTC P0136 HO2S-2 CIRCUIT MALFUNCTION

WIRING DIAGRAM



DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
DTC will set when any one of following conditions is detected. ● 4.5 V or more HO2S circuit voltage is detected when 5 V power is connected to HO2S circuit in ECM (PCM). ● While running with A/F feed back, average output voltage during specified time is too high or too low. or ● while running with A/F feed back, max output voltage during specified time is lower than specified value or min. output voltage during specified time is higher than specified value. (2 driving cycles detection logic)	● HO2S-2 or its circuit ● Fuel system ● ECM (PCM)

TROUBLESHOOTING (DTC P0340/DTC No.42)

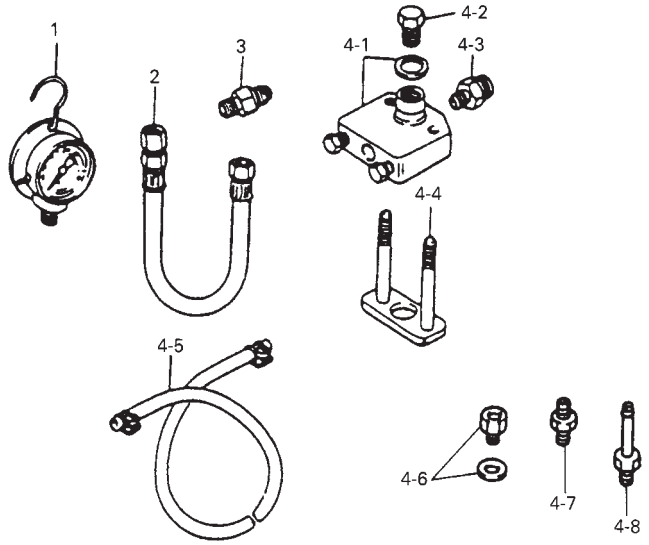
STEP	ACTION	YES	NO
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE”.
2	Is engine cranked?	Go to Step 3.	Go to “CRANKING SYSTEM” section.
3	Is there DTC P1500 (Engine starter signal circuit)?	Go to DTC P1500 Diag. Flow Table.	Go to Step 4.
4	Check CMP Sensor and connector for proper installation. Is CMP sensor installed properly and connector connected securely?	Go to Step 5.	Correct.
5	Check Wire Harness and Connection. 1) Disconnect connector from CMP sensor. 2) Check for proper connection to CMP sensor at each terminal. 3) If OK, turn ignition switch ON and check for voltage between “Bl/B” and “V/R” terminals of sensor connector disconnected. Is voltage 10 – 14 V?	Go to Step. 6.	“Bl/B” or “V/R” wire open, short or poor connection.
6	Check for voltage between “Y/Bl” and “V/R” terminals of sensor connector disconnected. Is voltage 4 – 5 V?	Go to Step 5.	“Y/Bl” wire open, short or poor connection. If wire and connection are OK, substitute a known-good ECM (PCM) and recheck.
7	Check CMP Sensor for Operation. G16 Engine: 1) Remove CMP sensor from sensor case. 2) Remove metal particles on end face of CMP sensor, if any. 3) Connect connector to CMP sensor. Disconnect connectors from ignition coil assemblies and fuel injectors. 4) Turn ignition switch ON. 5) Check for voltage at terminal C51-2-26 of connector connected to ECM (PCM) by passing magnetic substance (iron) while keeping approximately 1 mm (0.03 in.) gap with respect to end face of CMP sensor. Does voltage vary from low (0 – 1 V) to high (4 – 6 V) or from high to low? J20 Engine: 1) Remove CMP sensor. 2) Connect connector to CMP sensor. Disconnect connectors from ignition coil assemblies and fuel injectors. 3) Turn ignition switch ON. 4) Check for voltage between C51-2-26 and C51-3-26 of connector connected to ECM (PCM) by rotating CMP sensor coupling. Does voltage vary from low (0 – 1 V) to high (4 – 6 V) or from high to low?	Go to Step 8.	Replace CMP sensor.

1) Connect scan tool to DLC with ignition switch OFF.
2) Turn ON ignition switch and clear DTC, pending DTC and freeze frame data by using scan tool and warm up engine completely.
3) Run engine at idle speed for 1 min.
4) Check DTC and pending DTC by using scan tool.

TROUBLESHOOTING (P0505)

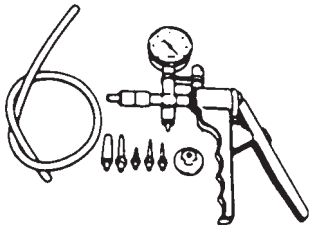
STEP	ACTION	YES	NO
1	Was "ENGINE DIAG. FLOW TABLE" performed?	Go to Step 2.	Go to "ENGINE DIAG. FLOW TABLE".
2	Idle Speed Check: 1) Check engine idle speed referring to "Idle Speed/Idle Air Control Duty Inspection" in Section 6E1. Is engine idle speed within specification?	Intermittent trouble or faulty ECM (PCM). Check for intermittent referring to "Intermittent and Poor Connection" in Section 0A.	Go to Step 3.
3	IAC Valve Check: 1) Check IAC valve referring to "IAC Valve Inspection" in Section 6E1. Is check result as specified?	Go to Step 6.	Go to Step 4.
4	IAC Valve Circuit Check: 1) With ignition switch OFF, disconnect ECM (PCM) couplers. 2) Check for proper connection to IAC valve at C51-2-3, C51-2-12, C51-2-11 and C51-2-10 terminals. 3) If OK, check resistance between C51-2-3 and C51-2-12, C51-2-10 and C51-2-11. Is each resistance 70 – 86 Ω?	Go to Step 5.	"Lg/B", "V/B", "Gr/Bl" or "V/Y" wire open or short. If wire and connections are OK, replace IAC valve.
5	IAC Valve Power Supply Voltage Check: 1) Connect ECM (PCM) couplers. 2) With ignition switch OFF, disconnect C29 coupler of IAC valve. 3) With ignition switch ON, check voltage between C29-2 and ground, C29-5 and ground. Is each voltage 10 – 14 V?	IAC valve or ECM (PCM) malfunction.	Open "Bl/B" wire.
6	Was idle speed higher than specification in Step 2?	Check abnormal air inhaling from intake manifold, throttle body, PCV valve and EVAP canister purge control system.	Check parts or system which can cause engine low idle. – Air inhaling from between throttle body and MAF sensor. – EGR valve malfunction (leakage from valve seat) – Accessary engine load – Clog of idle air passage – Engine mechanical – Engine overheat – Etc.

SPECIAL TOOLS

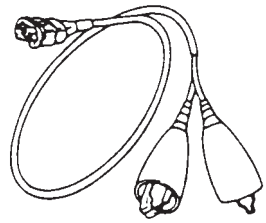


1. Pressure gauge
   09912-58441
2. Pressure hose
   09912-58431
3. Attachment
   09919-46010
4. Checking tool set
   09912-58421

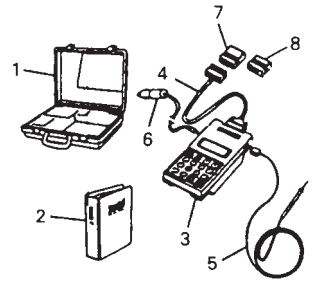
4-1. Tool body & washer
4-2. Body plug
4-3. Body attachment
4-4. Holder
4-5. Return hose & clamp
4-6. Body attachment-2 & washer
4-7. Hose attachment-1
4-8. Hose attachment-2



09917-47010
Vacuum pump gauge

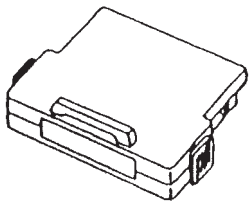


09930-88530
Injector test lead

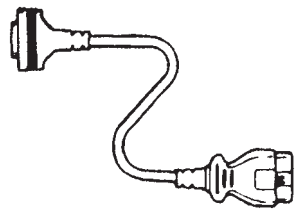


1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adaptor
8. Self–test adaptor

09931-76011
SUZUKI scan tool (tech 1) kit



Mass storage cartridge



09931-76030
16 / 14 pin DLC cable

ENGINE DIAGNOSTIC FLOW TABLE

Refer to following pages for the detail of each step.

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

SCAN TOOL DATA DEFINITIONS

COOLANT TEMP (ENGINE COOLANT TEMP., °C/°F)
It is detected by engine coolant temp. sensor.

INTAKE AIR TEMP (°C/°F)
It is detected by intake air temp. sensor.

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

CLOSED THROT POS (CLOSED THROTTLE POSITION ON/OFF)
This parameter will read ON when the throttle valve is fully closed. Or OFF when the throttle is not fully closed.

IAC FLOW DUTY (%)
This parameter indicates ON (valve open) time rate within a certain set cycle of IAC valve which controls bypass air flow.

ENGINE SPEED (RPM)
It is computed by reference pulses from the Camshaft Position Sensor.

SHORT FT B1 (SHORT TERM FUEL TRIM BANK 1, %)
SHORT FT B2 (SHORT TERM FUEL TRIM BANK 2, %)
Short term fuel trim value represents short term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

LONG FT B1 (LONG TERM FUEL TRIM BANK 1, %)
LONG FT B2 (LONG TERM FUEL TRIM BANK 2, %)
Long term fuel trim value represents long term corrections to the air/fuel mixture computation. A value of 0 indicates no correction, a value greater than 0 means an enrichment correction, and a value less than 0 implies an enleanment correction.

IGNITION ADVANCE (IGNITION TIMING ADVANCE FOR NO.1 CYLINDER, deg)
Ignition timing of No.1 cylinder is commanded by ECM (PCM). The actual ignition timing should be checked by using the timing light.

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

MAF (MASS AIR FLOW RATE, g/s, lb/min.)
It represents total mass of air entering intake manifold which is measured by mass air flow sensor.

INJ PULSE WIDTH B1 (FUEL INJECTION PULSE WIDTH BANK 1, msec)
INJ PULSE WIDTH B2 (FUEL INJECTION PULSE WIDTH BANK 2, msec)
This parameter indicates time of the injector drive (valve opening) pulse which is output from ECM (PCM).

THROTTLE POS (ABSOLUTE THROTTLE POSITION, %)
When throttle position sensor is fully closed position, throttle opening is indicated as 0 % and 100 % for full open position.

TP SENSOR VOLT (TP SENSOR OUTPUT VOLTAGE, V)
Throttle Position Sensor reading provides throttle valve opening information in the from of voltage.

OXYGEN SENSOR B1 S1 (HO2S BANK 1 SENSOR 1 OUTPUT VOLTAGE, V)
OXYGEN SENSOR B2 S1 (HO2S BANK 2 SENSOR 1 OUTPUT VOLTAGE, V)
It indicates output voltage of HO2S SENSOR 1 installed on exhaust manifold (pre-catalyst).

OXYGEN SENSOR B1 S2 (HO2S BANK 1 SENSOR 2 OUTPUT VOLTAGE, V)
OXYGEN SENSOR B1 S2 (HO2S BANK 2 SENSOR 2 OUTPUT VOLTAGE, V)
It indicates output voltage of HO2S SENSOR 2 installed on exhaust pipe (post-catalyst). It is used to detect catalyst deterioration.

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

DTC P0121 THROTTLE POSITION CIRCUIT PERFORMANCE PROBLEM

WIRING DIAGRAM

Refer to DTC P0120 (DTC No.21, 22).

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Throttle opening is detected as small (rationality-low) while engine is running under high road and high speed conditions or as large (rationality-high) while engine is running under low load and low speed conditions.	Air intake system TP sensor TP sensor circuit ECM (PCM)

DTC CONFIRMATION PROCEDURE

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

NOTE:
Check to make sure that following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.
- **Intake air temperature: between –14°C and 70°C (6.8°F and 158°F)**
- **Atmospheric pressure: higher than 560 mmHg (Altitude: lower than 2790 m (9150 ft))**

(1) With ignition switch OFF, connect scan tool.
(2) Turn ON ignition switch and clear DTC by using scan tool if any.
(3) Start engine and warm up to normal operating temperature.
(4) Increase vehicle till engine speed is reach ed 3300 – 3700 r/min. for 10 sec.
(5) Stop vehicle and run engine at idle speed for 10 sec.
(6) Check DTC and pending DTC by using scan tool.

DTC P0153 HO2S (BANK-2 SENSOR-1) CIRCUIT SLOW RESPONSE

WIRING DIAGRAM

Refer to DTC P0150 (DTC No.26).

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Hi/Low switch cycle average of HO2S voltage is longer than 5 sec.	HO2S HO2S circuit ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

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

WARNING:

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

- **Intake air temperature: between –14°C and 70°C (6.8°F and 158°F)**
- **Atmospheric pressure: higher than 560 mmHg (Altitude: lower than 2790 m (9150 ft))**
- **Following DTC is not detected: P0135**

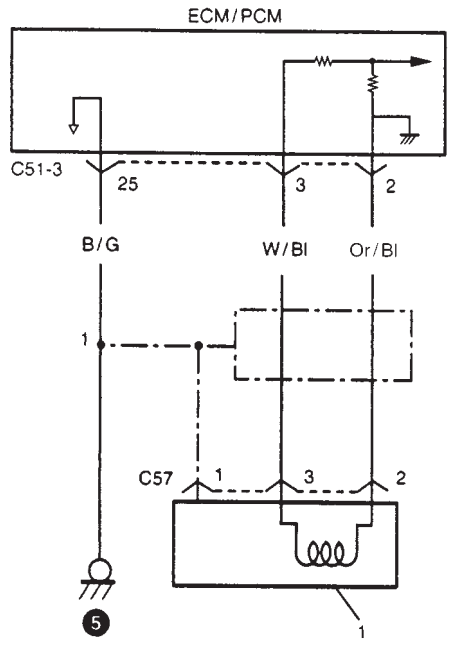
(1) With ignition switch OFF, connect scan tool.
(2) Turn ON ignition switch and clear DTC by using scan tool if any.
(3) Start engine and warm up to normal operating temperature.
(4) Increase vehicle speed to 80 – 100 km/h (50 – 60 mph). (engine speed; 2500 – 3000 r/min.)
(5) Keep above vehicle speed for 1 min. (Throttle valve operating is kept constant in this step.)
(6) Stop vehicle and check DTC and pending DTC by using scan tool.

DTC TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE”.
2	Wire Harness check: (1) Check “R/Bl” and “Gr/Y” wire. Are they in good condition?	Go to Step 3.	Repair or replace.
3	(1) Replace HO2S (B-2 S-1) and recheck. Is DTC P0153 detected?	Substitute a known-good ECM (PCM) and recheck.	Faulty HO2S (B-2 S-1).

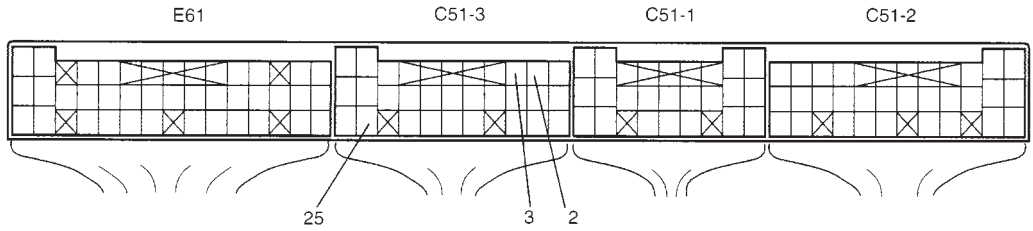
DTC P0335 CRANKSHAFT POSITION SENSOR CIRCUIT MALFUNCTION

WIRING DIAGRAM



1. CKP sensor

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



DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
CKP sensor signal is not input for 3 sec. after engine start.	CKP sensor CKP sensor circuit ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

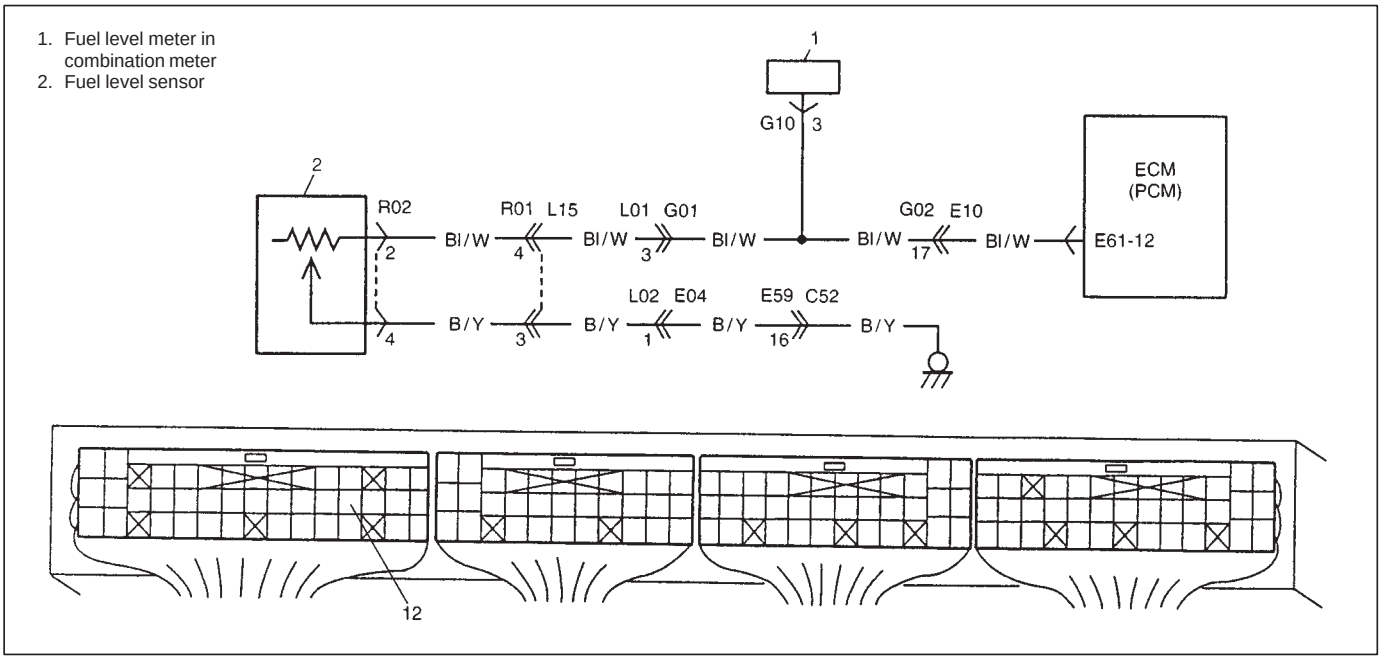
Check to make sure that following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

- **Intake air temperature: between –14 °C and 70 °C (6.8 °F and 158 °F)**
- **Atmospheric pressure: higher than 560 mmHg (Altitude: lower than 2790 m (9150 ft))**
- **Following DTC is not detected: P0340 (No.42)**

(1) With ignition switch OFF, connect scan tool.
(2) Turn ON ignition switch and clear DTC by using scan tool if any.
(3) Start engine and run it for 10 sec.
(4) Check DTC by using scan tool.

DTC P0460 FUEL LEVEL SENSOR CIRCUIT HIGH INPUT

WIRING DIAGRAM/CIRCUIT DESCRIPTION



DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Fuel level sensor voltage higher than specified value.	Fuel level sensor and/or its circuit Fuel level meter and/or its circuit ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

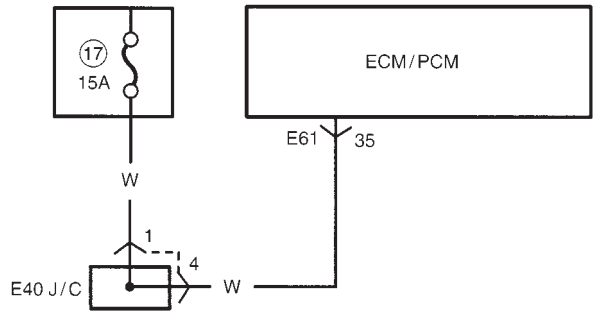
Check to make sure that the following conditions are satisfied when using this DTC CONFIRMATION PROCEDURE.

- **Intake air temperature: between −14 °C and 70 °C (6.8 °F and 158 °F)**
- **Atmospheric pressure: higher than 560 mmHg (Altitude: lower than 2790 m (9150 ft))**

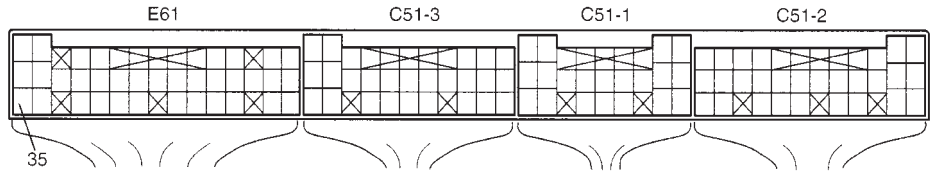
(1) With ignition switch OFF, connect scan tool.
(2) Turn ON ignition switch and clear DTC by using scan tool if any.
(3) Start engine and run it for 10 sec.
(4) Check DTC and pending DTC by using scan tool.

DTC P1510 ECM BACK-UP POWER SUPPLY MALFUNCTION

WIRING DIAGRAM



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



CIRCUIT DESCRIPTION

Battery voltage is translated to 5 V in ECM (PCM) back-up circuit. The voltage is supplied to keep DTC memory, values that ECM (PCM) has learned to control engine, etc. in ECM (PCM) even when ignition switch is turned OFF.

DTC DETECTING CONDITION AND TROUBLE AREA

DTC DETECTING CONDITION	TROUBLE AREA
Back-up circuit voltage is out of specification.	Battery voltage supply circuit ECM (PCM)

DTC CONFIRMATION PROCEDURE

NOTE:

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

- **Intake air temperature: between –14 °C and 70 °C (6.8 °F and 158 °F)**
- **Atmospheric pressure: higher than 560 mmHg (Altitude: lower than 2790 m (9150 ft))**

(1) With ignition switch OFF, connect scan tool.
(2) Turn ON ignition switch and clear DTC by using scan tool if any.
(3) Start engine and run it for 10 sec.
(4) Check DTC by using scan tool.

DTC TROUBLESHOOTING

STEP	ACTION	YES	NO
1	Was “ENGINE DIAG. FLOW TABLE” performed?	Go to Step 2.	Go to “ENGINE DIAG. FLOW TABLE”.
2	Battery Voltage Supply Circuit check: (1) Remove ECM (PCM) cover. (2) While engine running, check voltage between E61-35 and ground. Is voltage 10 – 14 V?	Intermittent trouble. If OK, substitute a known-good ECM (PCM) and recheck.	Fuse 17 is blown or faulty “W” wire.

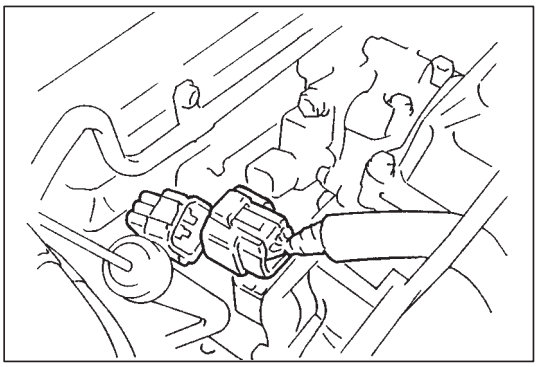
ON-VEHICLE SERVICE

COMPRESSION CHECK

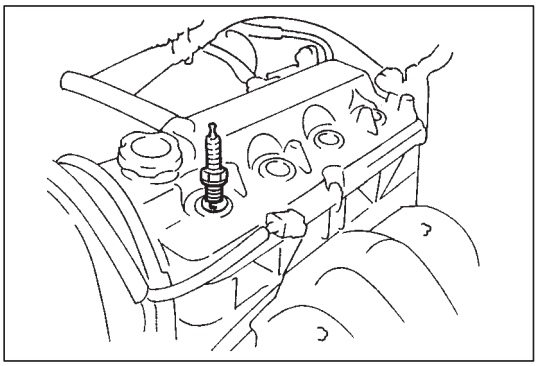
Check compression pressure on all four cylinders as follows:

1) Warm up engine.
2) Stop engine after warming up.

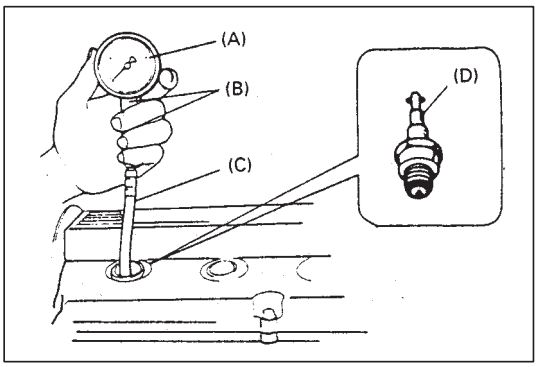
NOTE:
After warming up engine, place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake and block drive wheels.



3) Disconnect fuel injector wire harness connector.

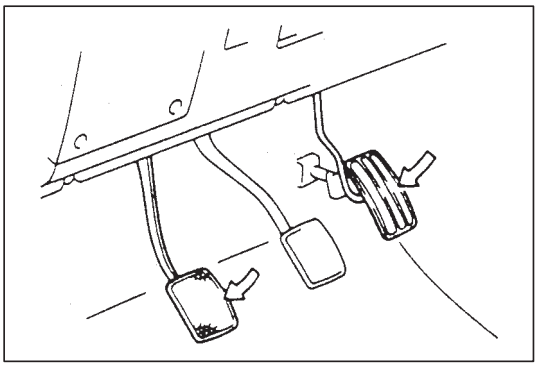


4) Remove ignition coil assemblies and all spark plugs referring to section 6F1.

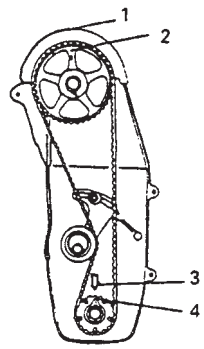


5) Install special tool (Compression gauge) into spark plug hole.

Special Tool
(A): 09915-64510-001
(B): 09915-64510-002
(C): 09915-64530
(D): 09915-67010

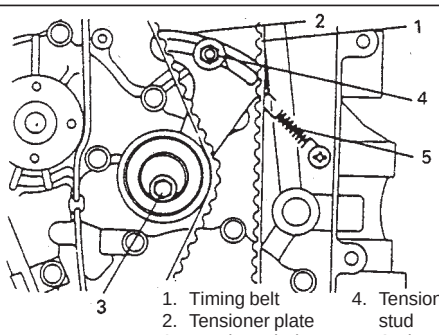


6) Disengage clutch (to lighten starting load on engine) for M/T model, and depress accelerator pedal all the way to make throttle valve full-open.



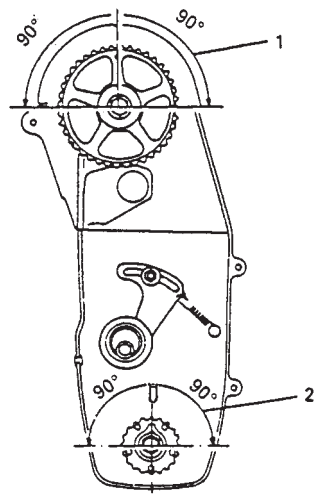
1. "V" mark on cylinder head cover
2. Timing mark by "E" on camshaft timing belt pulley
3. Arrow mark on oil pump case
4. Punch mark on crankshaft timing belt pulley

7) For installation of timing belt, align 4 timing marks as shown in figure by turning crankshaft.



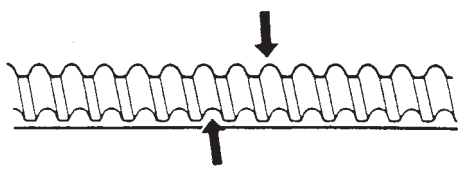
1. Timing belt
2. Tensioner plate
3. Tensioner bolt
4. Tensioner stud
5. Spring

8) Remove timing belt tensioner, tensioner plate, tensioner spring and timing belt.



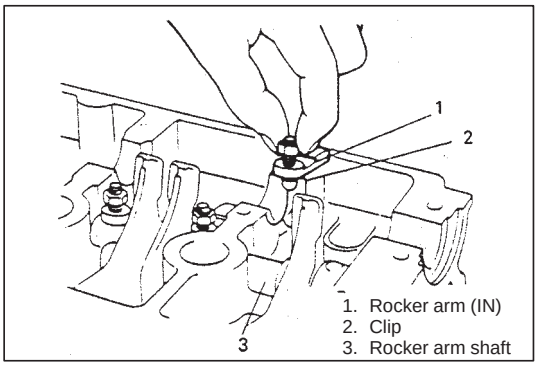
1. Camshaft allowable turning range - - - By timing mark, within 90° from "V" mark on head cover on both right and left.
2. Crankshaft allowable turning range - - - By punch mark, within 90° from arrow mark on oil pump case on both right and left.

CAUTION:
- **After timing belt is removed, never turn camshaft and crankshaft independently more than such an extent as shown in figure. If turned, interference may occur among piston and valves, and parts related to piston and valves may be damaged.**
- **Never bend timing belt.**



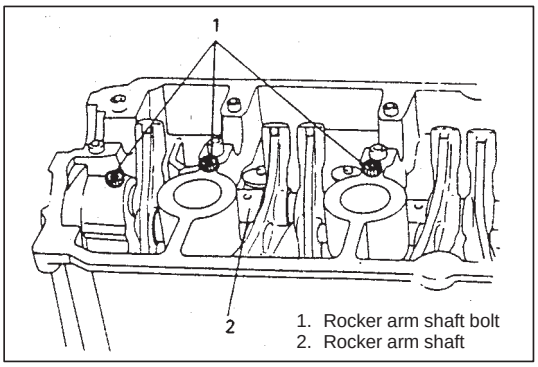
INSPECTION

- Inspect timing belt for wear or crack.
  Replace it as necessary.

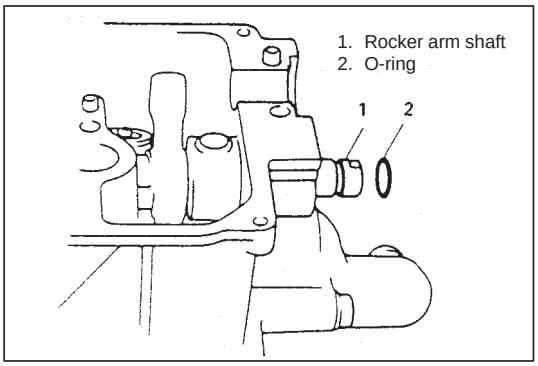


11) Remove intake rocker arm with clip from rocker arm shaft.

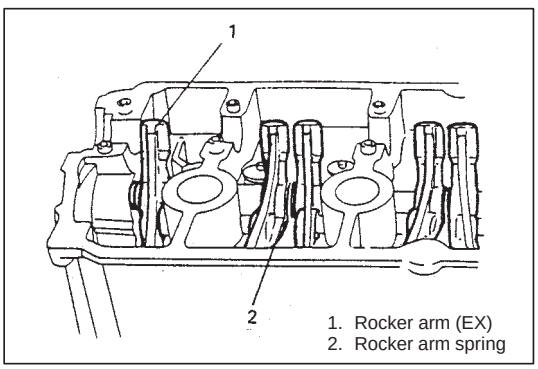
NOTE:
Do not bend clip when removing intake rocker arm.



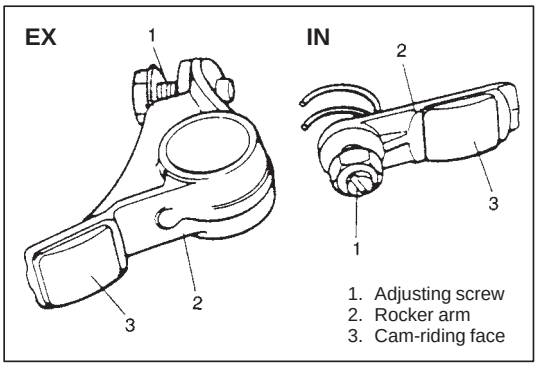
12) Remove rocker arm shaft bolts.



13) Push off rocker arm shaft end to CMP sensor case side and remove O-ring from shaft.



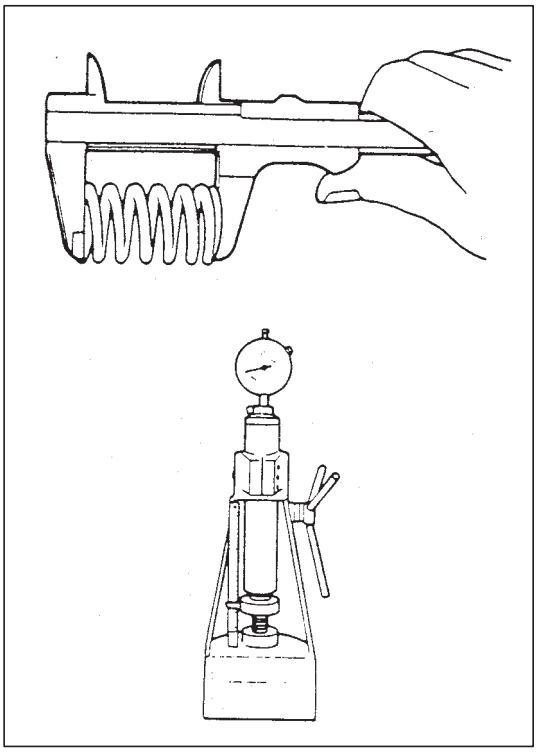
14) Remove exhaust rocker arms and rocker arm spring by pulling rocker arm shaft to front side.



INSPECTION

Adjusting Screw and Rocker Arm

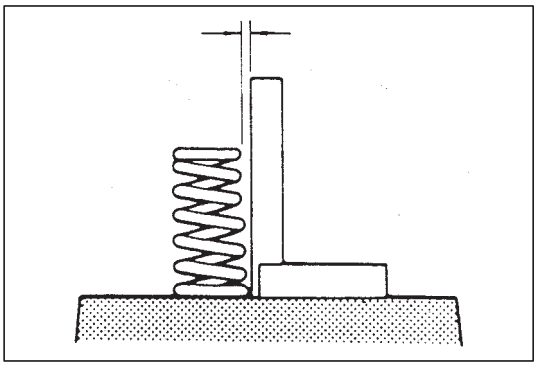
If tip of adjusting screw is badly worn, replace it.
Rocker arm must be replaced if its cam-riding face is badly worn.



Valve Springs

- Referring to data given below, check to be sure that each spring is in sound condition, free of any evidence of breakage or weakening. Remember, weakened valve springs can cause chatter, not to mention possibility of reducing power output due to gas leakage caused by decreased seating pressure.

Item	Standard	Limit
Valve spring free length	36.83 mm (1.4500 in.)	35.67 mm (1.4043 in.)
Valve spring preload	10.7 – 12.5 kg for 31.5 mm (23.6 – 27.5 lb/ 1.24 in.)	9.3 kg for 31.5 mm (20.5 lb/ 1.24 in.)



- Spring squareness:
  Use a square and surface plate to check each spring for squareness in terms of clearance between end of valve spring and square. Valve springs found to exhibit a larger clearance than limit given below must be replaced.

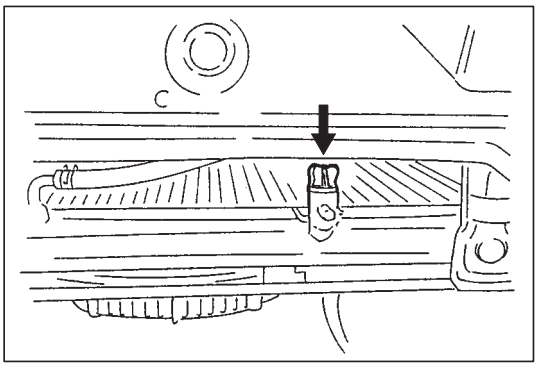
  Valve spring squareness limit: 2.0 mm (0.079 in.)

UNIT REPAIR OVERHAUL

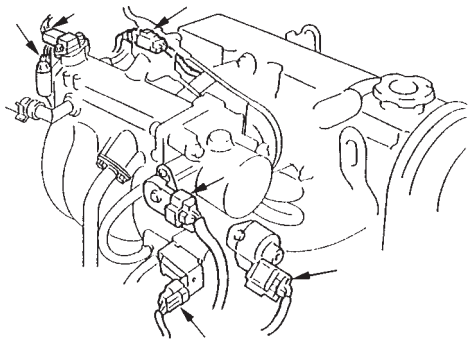
ENGINE ASSEMBLY

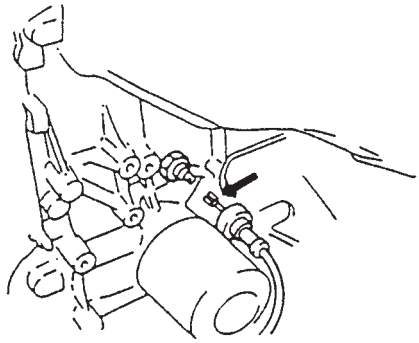
REMOVAL

1) Release fuel pressure in fuel feed line by referring to Fuel Pressure Relief Procedure in section 6.
2) Disconnect negative cable from battery.
3) Remove engine hood.



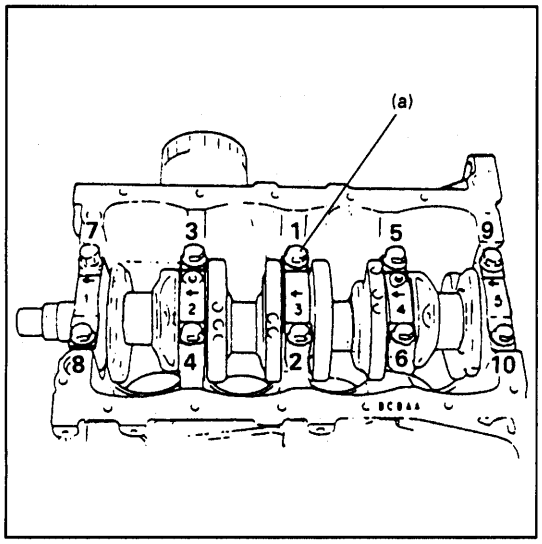
4) Drain cooling system.
5) Remove radiator fan and fan shroud.
   Refer to “ENGINE COOLING” section.





6) Remove air intake hose.
7) Disconnect following electric wires:
   - Ground wires from intake manifold
   - Manifold differential pressure sensor
   - Camshaft position sensor
   - EGR valve
   - EVAP canister purge valve
   - Engine coolant temp. sensor
   - Throttle position sensor
   - Idle air control valve
   - Fuel injector wire at the connector
   - Intake air temp. sensor
   - Mass air flow sensor
   - Tank pressure control solenoid valve
   - EVAP canister air valve
   - Crankshaft position sensor
   - Generator
   - Ground cable from cylinder block (if equipped)
   - Heated oxygen sensor-1 and -2
   - Engine oil pressure switch
   - Power steering pressure switch (if equipped)

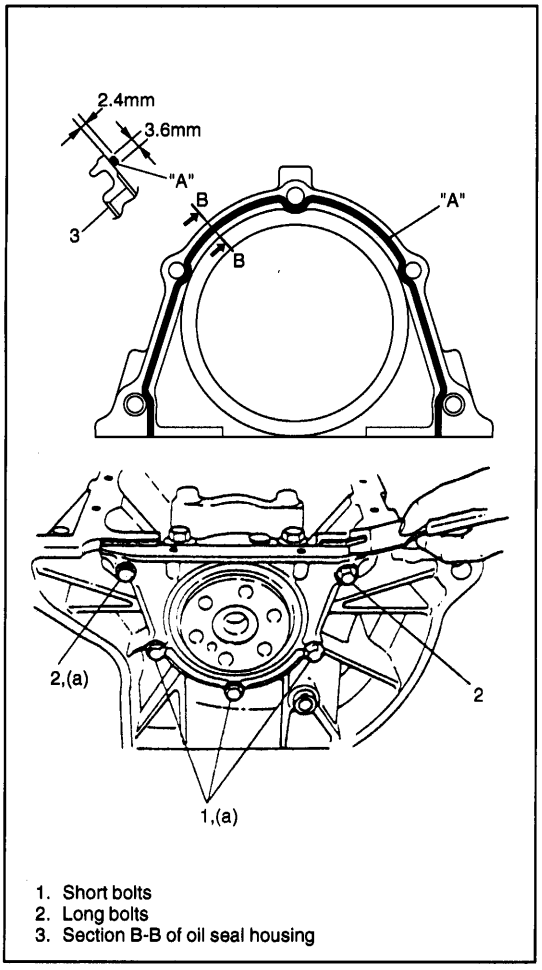
   and then release wire harnesses from clamps.
8) Remove starter motor.



3) Install crankshaft to cylinder block.
4) Install bearing cap to cylinder block, making sure to point arrow mark (on each cap) to crankshaft pulley side. Fit them sequentially in ascending order, 1, 2, 3, 4 and 5, starting from pulley side. After installing bearing cap stiffeners, tighten bearing cap bolts in such order as shown in figure a little at a time and repeat it till they are tightened to specified torque.

Tightening Torque
(a): 54 N·m (5.4 kg-m, 39.0 lb-ft)

NOTE:
After tightening cap bolts, check to be sure that crankshaft rotates smoothly when turning it by 8.0 N·m (0.8 kg-m, 5.8 lb-ft) torque or below.



1. Short bolts
2. Long bolts
3. Section B-B of oil seal housing

5) Install new gasket or apply sealant to mating surface of oil seal housing as shown in figure, and then install oil seal housing.

CAUTION:
Be sure to use gasket for cylinder block with P/No.11200-XXXX1 and/or crankshaft oil seal housing with P/No.11341-82000 or when reassembling engine that gasket is used originally. Otherwise, oil leakage may result.

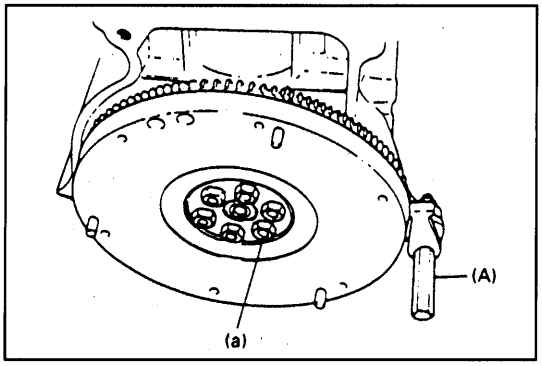
Do not reuse gasket removed in disassembly. Apply engine oil to oil seal lip before installation. Tighten housing bolts to specification.

"A": Sealant 99000-31250

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

NOTE:
As there are 2 types of housing bolts, refer to figure for their correct use.

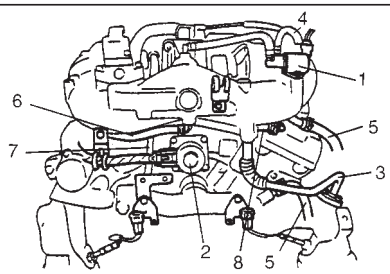
After installing oil seal housing, gasket edges might bulge out; if so, cut them off to make them flush with cylinder block and oil seal housing.
6) Install oil pump.
Refer to item "Oil pump" for installation of oil pump.



7) Install flywheel (M/T model) or drive plate (A/T model).
Using special tool, lock flywheel or drive plate, and torque its bolts to specification.

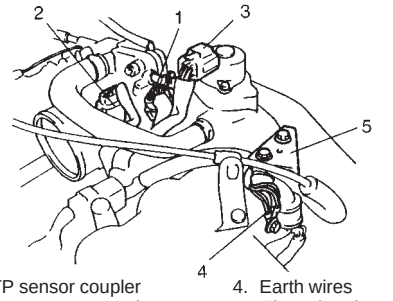
Special Tool
(A): 09924-17810

Tightening Torque
(a): 78 N·m (7.8 kg-m, 56.5 lb-ft)



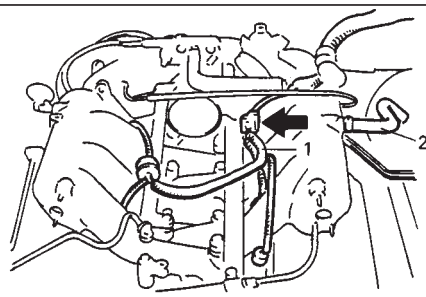
1. EVAP canister purge valve
2. EGR valve
3. EGR pipe
4. EVAP canister purge valve hose
5. Heater hose
6. PCV hose
7. Water hose
8. Breather hose

7) Install EGR pipe with new gaskets.
8) Connect hoses of EVAP canister purge valve and heater.
9) Connect hoses of PCV, breather and water.
10) Connect couplers of manifold absolute pressure (MAP) sensor, EVAP canister purge valve and EGR valve.
Fix wire harness with clamps.



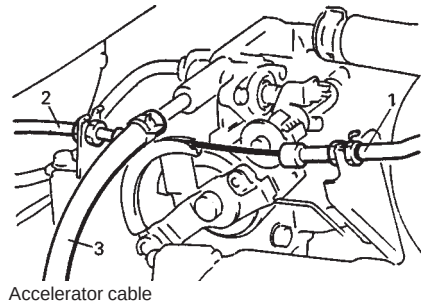
1. TP sensor coupler
2. MAF sensor coupler
3. IAC valve coupler
4. Earth wires
5. Clamp bracket

11) Install clamp bracket to intake collector.
12) Connect earth terminal to intake collector.
13) Connect couplers of TP sensor, MAF sensor and IAC valve.



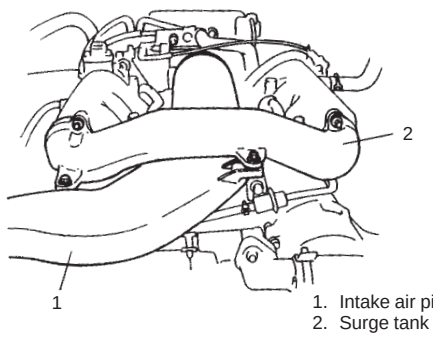
1. Injector wire
2. Brake booster hose

14) Connect brake booster hose to intake manifold.
15) Connect injector wire coupler.



1. Accelerator cable
2. A/T throttle cable
3. Water hose

16) Connect water hoses to throttle body.
17) Connect accelerator cable and A/T throttle cable (for A/T vehicle) to throttle body.

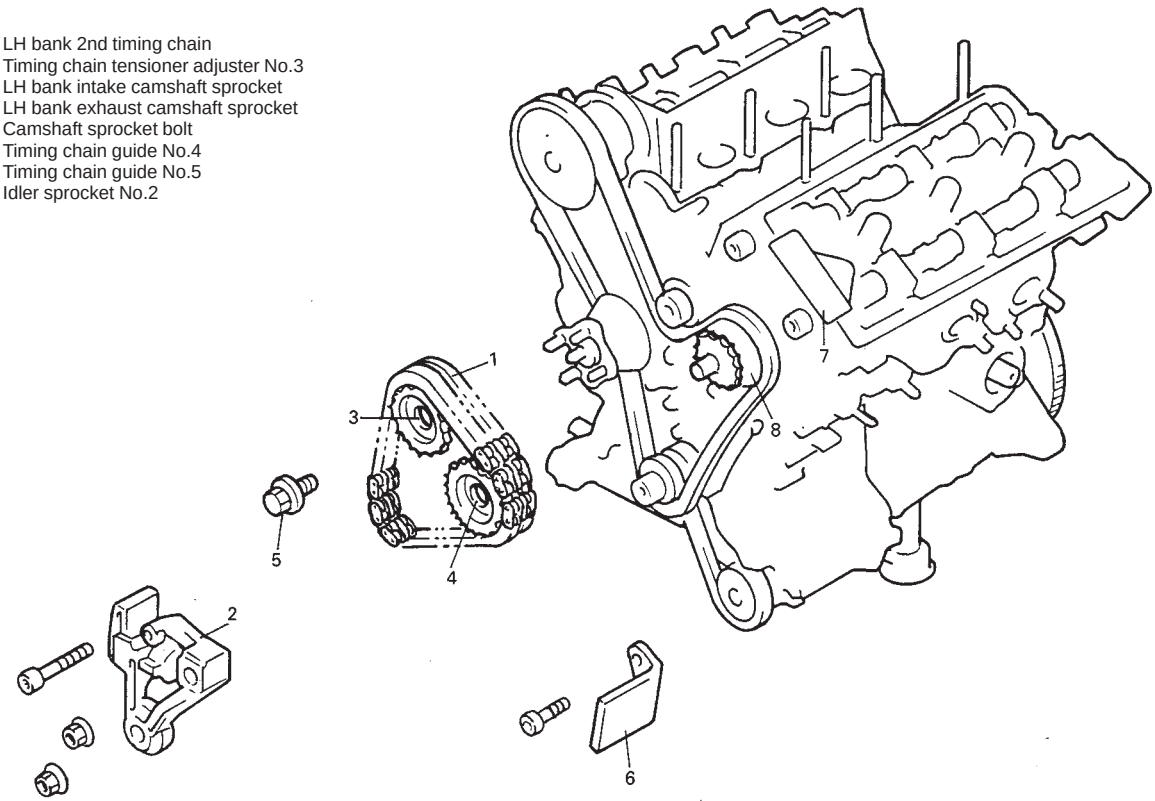


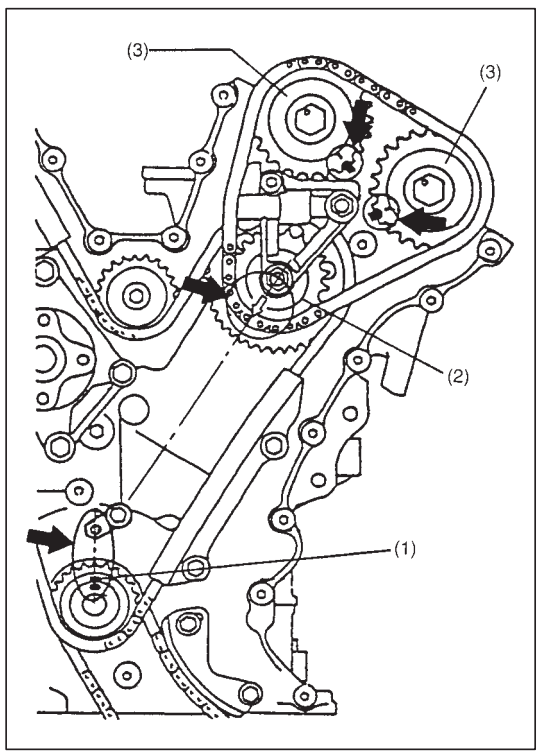
1. Intake air pipe
2. Surge tank pipe

18) Install surge tank pipe to intake manifold with new gaskets and intake air pipe to throttle body.

LH (NO.1) BANK 2ND TIMING CHAIN AND CHAIN TENSIONER

1. LH bank 2nd timing chain
2. Timing chain tensioner adjuster No.3
3. LH bank intake camshaft sprocket
4. LH bank exhaust camshaft sprocket
5. Camshaft sprocket bolt
6. Timing chain guide No.4
7. Timing chain guide No.5
8. Idler sprocket No.2



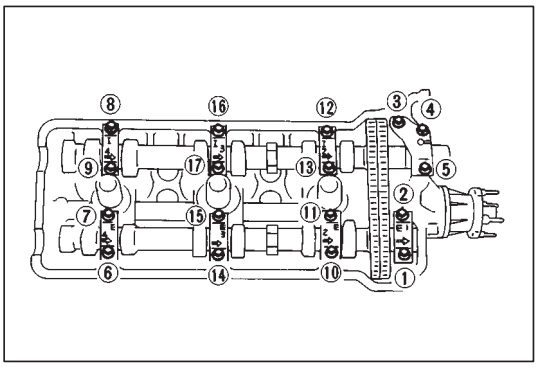


REMOVAL

1) Disconnect negative cable at battery.
2) Drain engine oil.
3) Drain coolant.
4) Remove timing chain cover.
   Refer to item “TIMING CHAIN COVER” in this section for removal.
5) Turn crankshaft to meet following condition.
   - Key (1) on crankshaft positions as shown.
   - Arrow mark on idler sprocket No.2 (2) points the center of crankshaft.
   - The marks on sprockets (3) match with marks on cylinder head.

   Note that this step must be followed for reinstallation of timing chain.

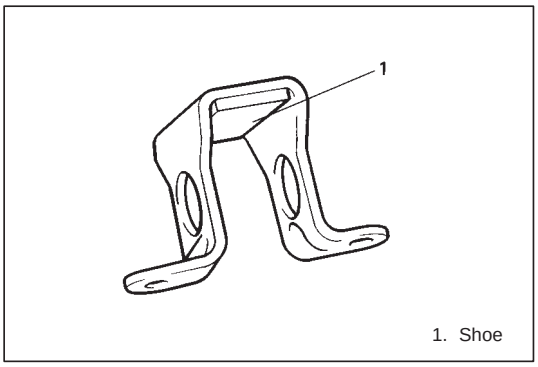
2) Remove LH bank 2nd timing chain.
   Refer to item “LH (NO.1) BANK 2ND TIMING CHAIN AND CHAIN TENSIONER” in this section for removal.
3) Remove 1st timing chain.
   Refer to item “1ST TIMING CHAIN AND CHAIN TENSIONER” in this section for removal.
4) Remove timing chain guide No.3.



5) Loosen camshaft housing bolts in such order as indicated in figure and remove them.
6) Remove camshaft housings.

7) Remove RH bank intake camshaft, RH bank exhaust camshaft, and RH bank 2nd timing chain as a set.

8) Remove timing chain tensioner adjuster No.2.



INSPECTION

Timing chain guide No.3

Check shoe for wear or damage.

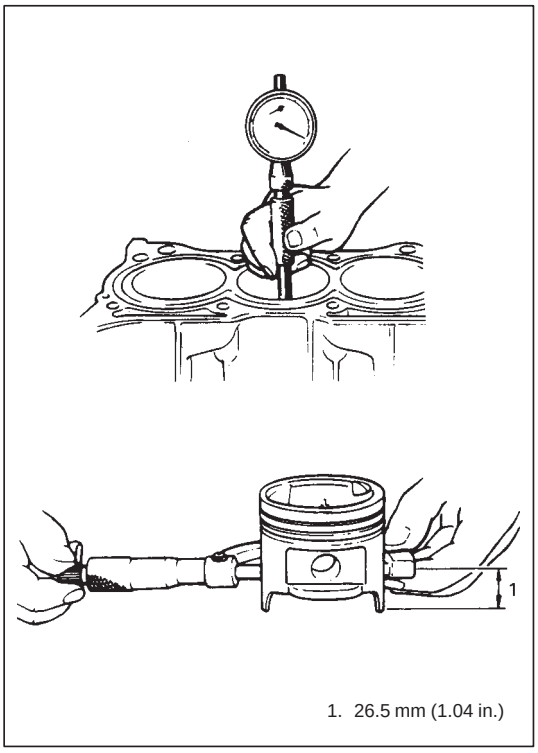
VALVE LASH ADJUSTER NOISE DIAGNOSIS

In case of the followings, valve lash adjuster noise may be caused by air trapped into valve lash adjusters.

- Vehicle is left for 24 hours or more.
- Engine oil is changed.
- Hydraulic lash adjuster is replaced or reinstalled.
- Engine is overhauled.

If noise from valve lash adjusters is suspected, perform the following checks.

1) Check engine oil for the followings.
   - Oil level in oil pan
     If oil level is low, add oil up to Full level hole on oil level gauge.
   - Oil quality
     If oil is discolored, or deteriorated, change it.
     For particular oil to be used, refer to Section 0B.
   - Oil leaks
     If leak is found, repair it.
   - Oil pressure (refer to Oil Pressure Check in this section)
     If defective pressure is found, repair it.
2) Run engine for about half an hour at about 2,000 to 3,000 r/min., and then air will be purge and tapping sound will cease.
3) Should tapping sound not cease, it is possible that hydraulic valve lash adjuster is defective.
   Replace it if defective.
   If defective adjuster can't be located by hearing among 24 of them, check as follows.
   i) Stop engine and remove cylinder head cover.
   ii) Push adjuster downward by hand (with less than 20 kg or 44 lbs. Force) when cam crest is not on adjuster to be check if clearance exists between cam and adjuster.
   If it does, adjuster is defective and needs replacement.

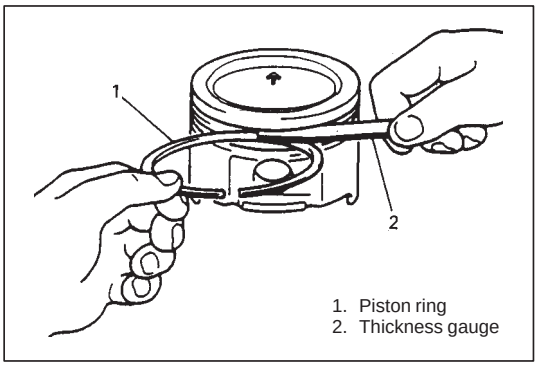


1. 26.5 mm (1.04 in.)

- Piston clearance:
  Measure cylinder bore diameter and piston diameter to find their difference which is piston clearance. Piston clearance should be within specification as given below. If it is out of specification, re-bore cylinder and use oversize piston.

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

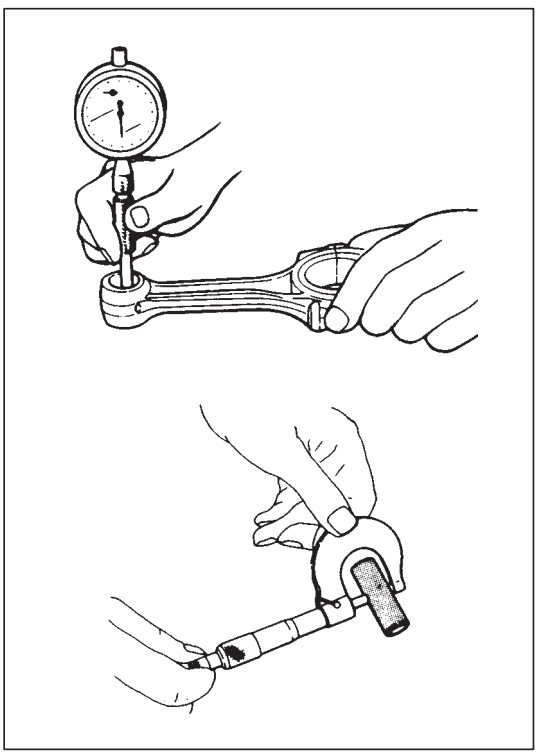
  NOTE:
  Cylinder bore diameters used here are measured in thrust direction at two positions.



1. Piston ring
2. Thickness gauge

- Ring groove clearance:
  Before checking, piston grooves must be clean, dry and free of carbon.
  Fit new piston ring into piston groove, and measure clearance between ring and ring land by using thickness gauge. If clearance is out of specification, replace piston.

  Ring groove clearance:
  Top: 0.03 – 0.07 mm (0.0012 – 0.0027 in.)
  2nd: 0.02 – 0.06 mm (0.0008 – 0.0023 in.)



Piston Pin

- Check piston pin, connecting rod small-end bore and piston bore for wear or damage, paying particular attention to condition of small-end bore bush. If pin, connecting rod small-end bore or piston bore is badly worn or damaged, replace pin, connecting rod or piston.
- Piston pin clearance:
  Check piston pin clearance in small-end. Replace connecting rod if its small end is badly worn or damaged or if measured clearance exceeds limit.

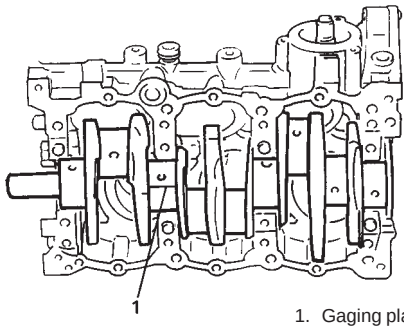
Item	Standard
Piston clearance in small end	0.003 – 0.014 mm (0.0001 – 0.0005 in.)

Small-end bore:
21.003 – 21.011 mm (0.8269 – 0.8272 in.)

Piston pin dia.:
20.997 – 21.000 mm (0.8266 – 0.8268 in.)

Inspect

Check bearings for pitting, scratches, wear or damage.
If any malcondition is found, replace both upper and lower halves.
Never replace either half without replacing the other half.

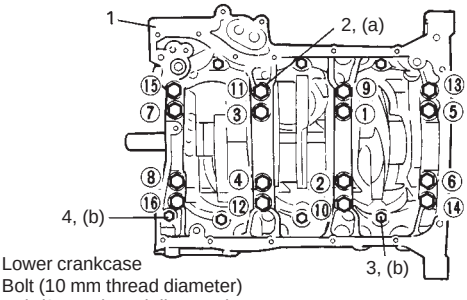


1. Gaging plastic

Main bearing clearance

Check clearance by using gaging plastic according to following procedure.

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



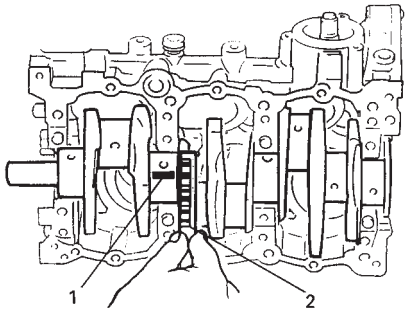
1. Lower crankcase
2. Bolt (10 mm thread diameter)
3. Bolt (8 mm thread diameter)
4. Long bolt (8 mm thread diameter)

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

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

Tightening Torque
(a): 60 N·m (6.0 kg-m, 43.5 lb-ft)
(b): 27 N·m (2.7 kg-m, 19.5 lb-ft)

NOTE:
Do not rotate crankshaft while gaging plastic is installed.

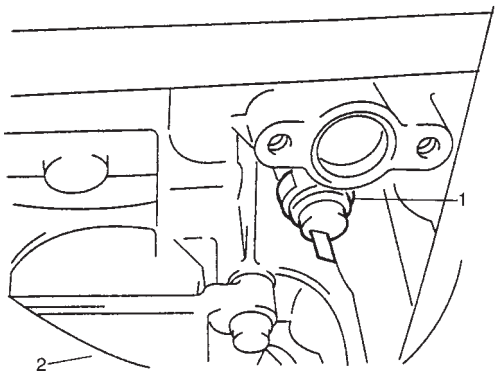


1. Gaging plastic
2. Scale

5) Remove crankcase and using scale on gaging plastic envelop, measure gaging plastic width at its widest point. If clearance exceeds its limit, replace bearing. Always replace both upper and lower inserts as a unit.
A new standard bearing may produce proper clearance. If not, it will be necessary to regrind crankshaft journal for use of 0.25 mm undersize bearing.
After selecting new bearing, recheck clearance.

Bearing Clearance

Standard: 0.026 – 0.046 mm (0.0010 – 0.0018 in.)
Limit: 0.060 mm (0.0023 in.)



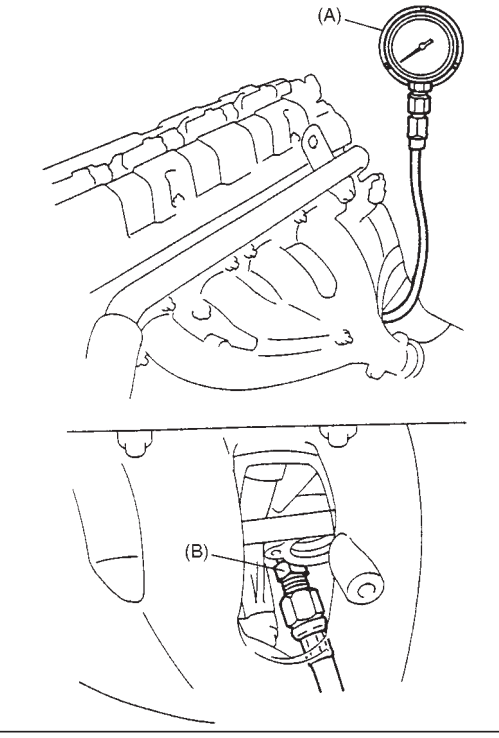
1. Oil pressure switch
2. Exhaust manifold

OIL PRESSURE CHECK

WARNING:
To avoid danger of being burned, do not touch exhaust manifold when exhaust system is hot.
When servicing, be sure to perform it after exhaust system has cooled down.

NOTE:
Prior to checking oil pressure, check the followings.
- **Oil level in oil pan.**
  If oil level is low, add oil up to full level hole on oil level gauge.
- **Oil quality.**
  If oil is discolored, or deteriorated, change it.
  For particular oil to be used, refer to Section 0B.
- **Oil leaks.**
  If leak is found, repair it.

1) Remove exhaust manifold cover and then oil pressure switch from cylinder block.



2) Install special tool (Oil pressure gauge) to vacated threaded hole.

Special Tool
(A): 09915-77310
(B): 09915-78211

CAUTION:
Be careful not to make special tool touch exhaust manifold when installing because exhaust manifold becomes very hot.

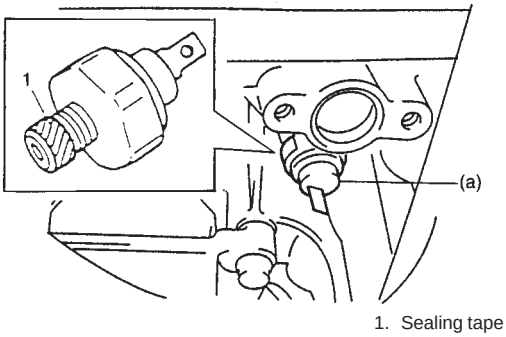
3) Start engine and warm it up to normal operating temperature.

NOTE:
Be sure to place transmission gear shift lever in "Neutral" (shift selector lever to "P" range for A/T model), and set parking brake and block drive wheels.

4) After warming up, raise engine speed to 4,000 r/min and measure oil pressure.

Oil pressure specification:
390 – 470 kPa (3.9 – 4.7 kg/cm^2, 55.5 – 66.8 psi) at 4,000 r/min (rpm)

5) After checking oil pressure, stop engine and remove oil pressure gauge.



1. Sealing tape

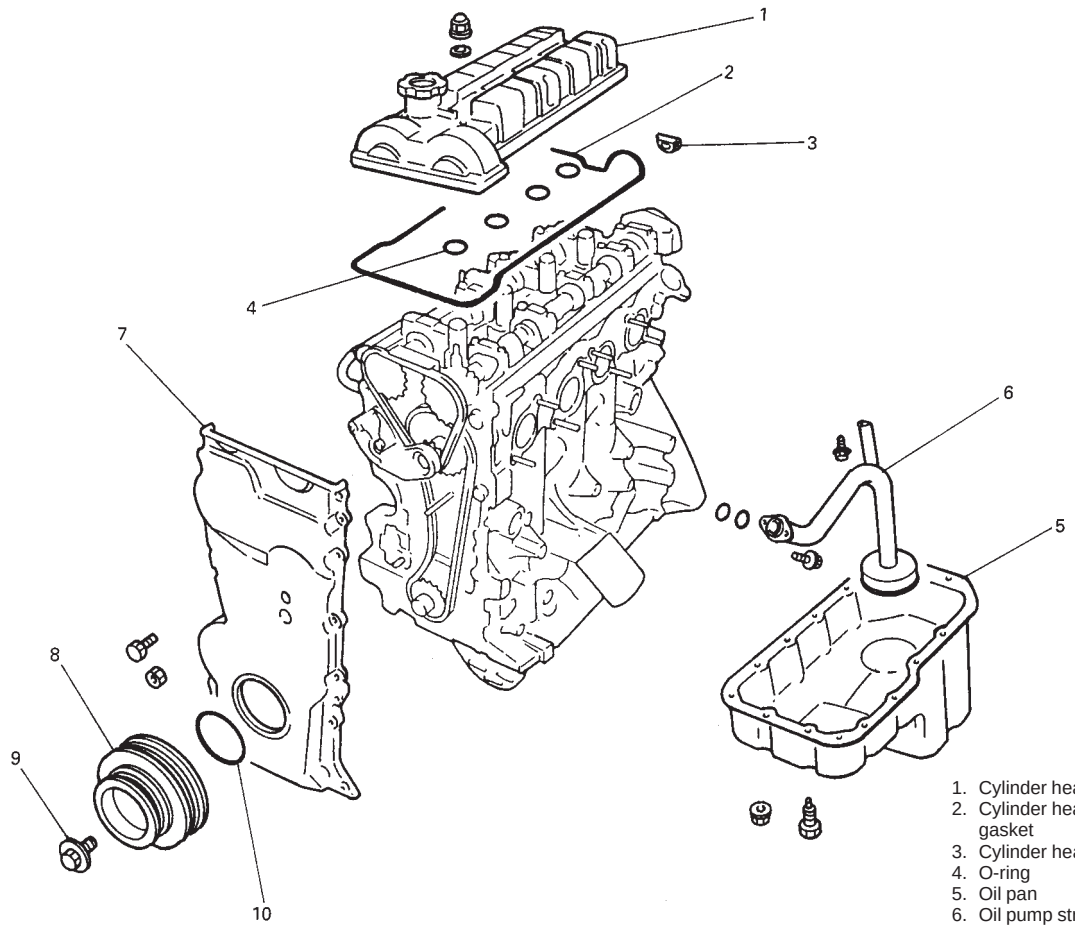
6) Before reinstalling oil pressure switch, be sure to wrap its screw threads with sealing tape and tighten switch to specified torque.

Tightening Torque
(a): 14 N·m (1.4 kg-m, 10.5 lb-ft)

NOTE:
If sealing tape edge is bulged out from screw threads of switch, cut it off.

7) Start engine and check oil pressure switch for oil leakage.

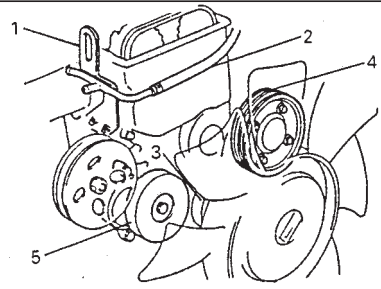
TIMING CHAIN COVER



1. Cylinder head cover
2. Cylinder head cover gasket
3. Cylinder head side seal
4. O-ring
5. Oil pan
6. Oil pump strainer
7. Timing chain cover
8. Crankshaft pulley
9. Crankshaft pulley bolt
10. Oil seal

REMOVAL

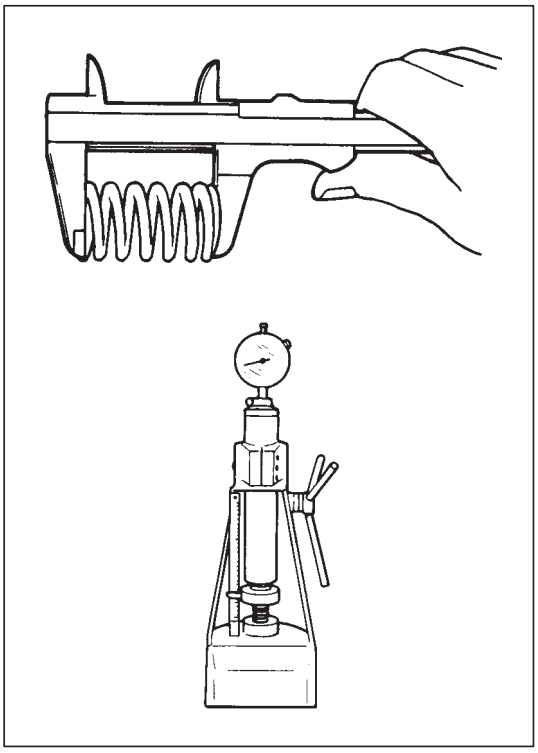
1) Disconnect negative cable at battery.
2) Drain engine oil.
3) Drain coolant.
4) Remove oil pan and oil pump strainer.
   Refer to item “OIL PAN AND OIL PUMP STRAINER” in this section for removal.
5) Remove cylinder head cover.
   Refer to item “CYLINDER HEAD COVER” in this section for removal.



1. Water bypass pipe
2. Water bypass hose No.2
3. Cooling fan pulley
4. Water pump pulley
5. Generator belt tensioner

6) Remove water bypass pipe and bypass hose No.2.
7) Remove cooling fan and fan shroud referring to Section 6B. And then remove cooling fan belt and cooling fan pulley.
8) Remove generator belt by turning generator belt tensioner center bolt clockwise to loosen tension of generator belt. Refer to Section 6H for removal.
9) Remove water pump pulley.
10) Remove generator belt tensioner.

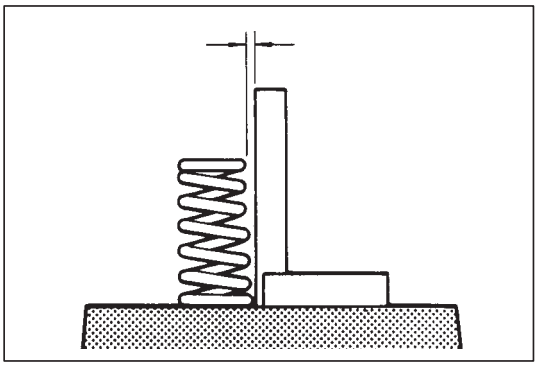
13) Install 2nd timing chain.
    Refer to item “2ND TIMING CHAIN AND CHAIN TENSIONER” in this section for installation.
14) Install timing chain cover.
    Refer to item “TIMING CHAIN COVER” in this section for installation.
15) Install cylinder head cover.
    Refer to item “CYLINDER HEAD COVER” in this section for installation.
16) Install oil pan and oil pump strainer.
    Refer to item “OIL PAN AND OIL PUMP STRAINER” in this section for installation.
17) Install cooling system and other parts.
18) Refill cooling system with coolant, front differential with gear oil, engine with engine oil and power steering system with specified fluid.
19) Verify that there is no coolant leakage, power steering fluid leakage, exhaust gas leakage and oil leakage at each connection.



Valve Springs

- Referring to data given below, check to be sure that each spring is in sound condition, free of any evidence of breakage or weakening. Remember, weakened valve springs can cause chatter, not to mention possibility of reducing power output due to gas leakage caused by decreased seating pressure.

Item		Standard	Limit
Valve spring free length	Inner	36.08 mm (1.4204 in.)	35.00 mm (1.3780 in.)
	Outer	40.44 mm (1.5921 in.)	39.22 mm (1.5441 in.)
Valve spring preload	Inner	6.9 – 7.9 kg for 27.5 mm (15.2 – 17.4 lb/ 1.08 in.)	6.2 kg for 27.5 mm (13.6 lb/ 1.08 in.)
	Outer	15.4 – 17.8 kg for 31.7 mm (33.9 – 39.2 lb/ 1.25 in.)	13.8 kg for 31.7 mm (30.4 lb/ 1.25 in.)

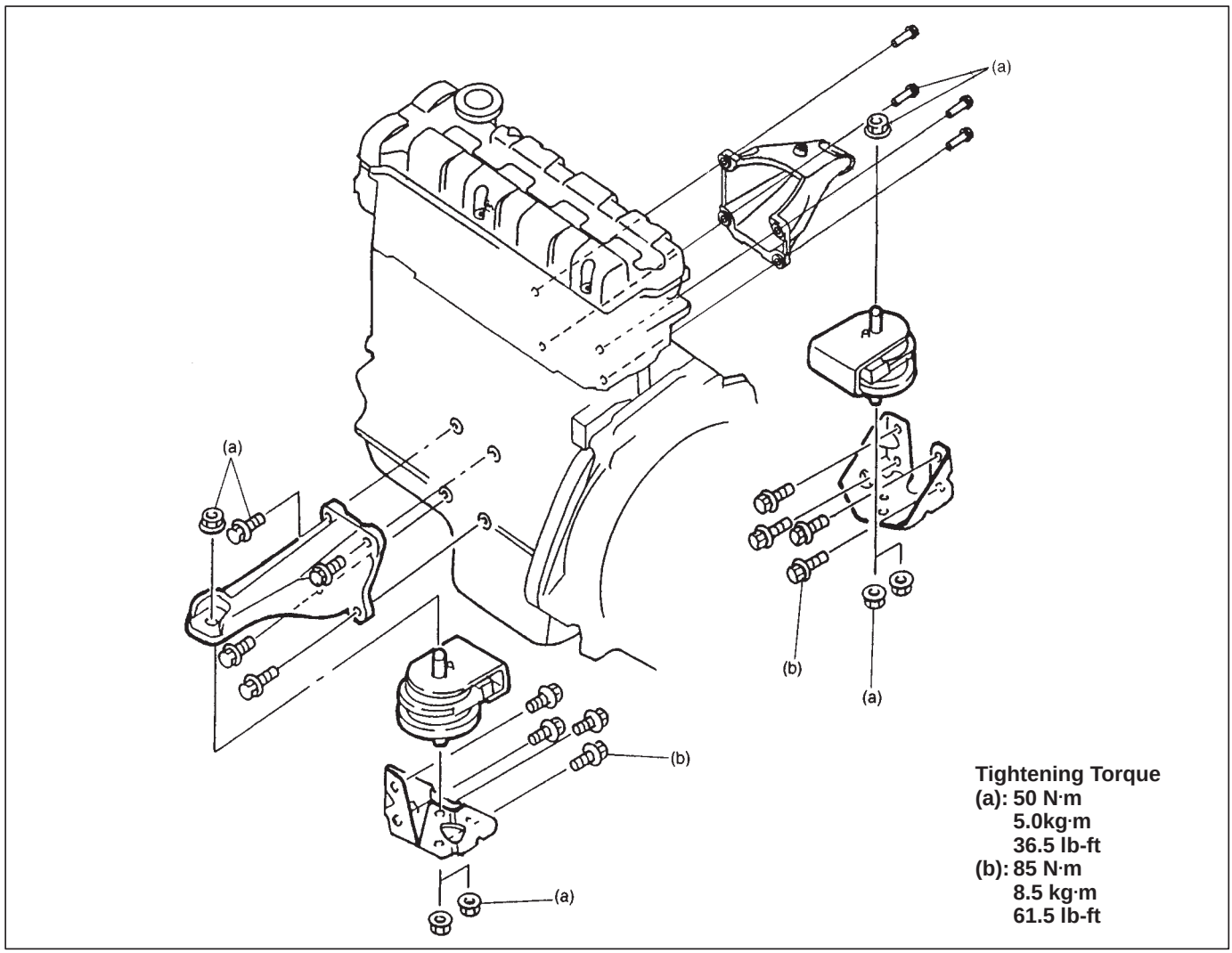


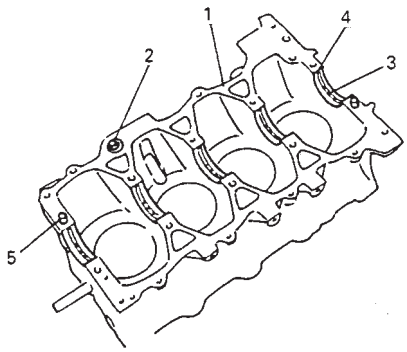
- Spring squareness:
  Use a square and surface plate to check each spring for squareness in terms of clearance between end of valve spring and square. Valve springs found to exhibit a larger clearance than limit given below must be replaced.

  Valve spring squareness limit: 2.0 mm (0.079 in.)

6) Reverse removal procedure for installation, as previously outlined.
7) Adjust cooling fan belt tension.
   Refer to Section 6B for adjusting procedure.
8) Adjust accelerator cable play and A/T throttle cable play (for vehicle with A/T). Refer to Section 6E1.
9) Check to ensure that all removed parts are back in place.
   Reinstall any necessary parts which have not been reinstalled.
10) Refill engine with engine oil, referring to item “ENGINE OIL CHANGE” in Section 0B.
11) Refill cooling system referring to Section 6B.
12) Refill front differential housing with gear oil, referring to “DIFFERENTIAL” section.
13) Refill power steering system with specified fluid referring to Section 3B1.
14) Connect negative cable at battery.
15) Verify that there is no fuel leakage, coolant leakage, oil leakage and exhaust gas leakage at each connection.
16) Check ignition timing and adjust as necessary, referring to Section 6F2.

ENGINE MOUNTINGS





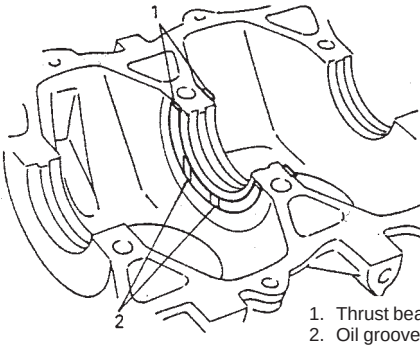
1. Cylinder block
2. O-ring
3. Oil groove
4. Bearing
5. Knock pin

INSTALLATION

NOTE:

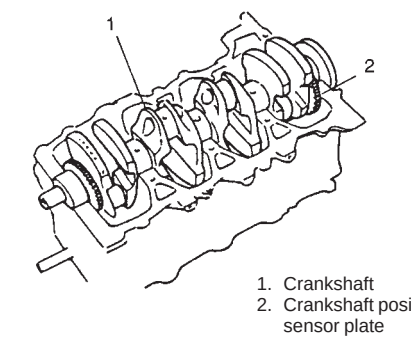
- **All parts to be installed must be perfectly clean.**
- **Be sure to oil crankshaft journals, journal bearings, thrust bearings, crank pins, connecting rod bearings, pistons, piston rings and cylinder bores.**
- **Journal bearings, crankcase (bearings caps), connecting rods, rod bearings, rod bearing caps, pistons and piston rings are in combination sets. Do not disturb combination and try to see that each part goes back to where it came from, when installing.**
- **Clean mating surface of cylinder block and lower crankcase, remove oil, old sealant and dust from mating surface.**

1) Fit main bearings to cylinder block.
   One of two halves of main bearing, has oil groove. Install this half with oil groove to cylinder block, and another half without oil groove to lower crankcase.
   Make sure that two halves are painted in the same color.
2) Install O-ring to cylinder block.



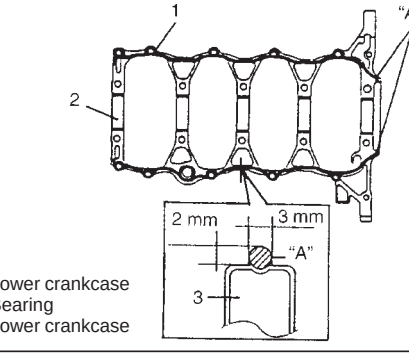
1. Thrust bearing
2. Oil groove

3) Fit thrust bearings to cylinder block between No.2 and No.3 cylinders. Face oil groove sides to crank webs.



1. Crankshaft
2. Crankshaft position sensor plate

4) Put crankshaft with oil pump drive chain to cylinder block.
   Check to make sure that crankshaft position sensor plate is free from metal particles and damage.



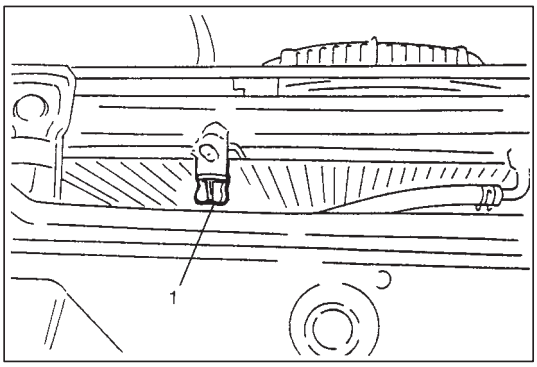
1. Lower crankcase
2. Bearing
3. Lower crankcase

5) Apply sealant "A" to lower crankcase mating surface area as shown in figure.

   "A": Sealant 99000-31150

ON-VEHICLE SERVICE

WARNING:
- **Check to make sure that engine coolant temperature is cold before removing any part of cooling system.**
- **Also be sure to disconnect negative cable from battery terminal before removing any part.**



COOLANT DRAINING

1) Remove radiator cap.
2) Loosen drain plug (1) on radiator to drain coolant.
3) After draining coolant, be sure to tighten drain plug securely.
4) Fill cooling system.
   Refer to "COOLANT" and steps 8) to 10) of "COOLING SYSTEM FLUSH AND REFILL" in this section.

COOLING WATER PIPES OR HOSES

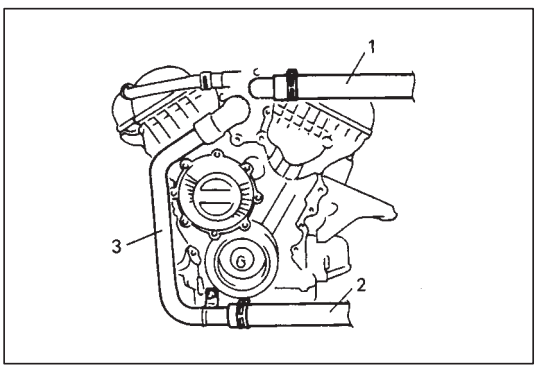
REMOVAL

For G16 and J20 engines

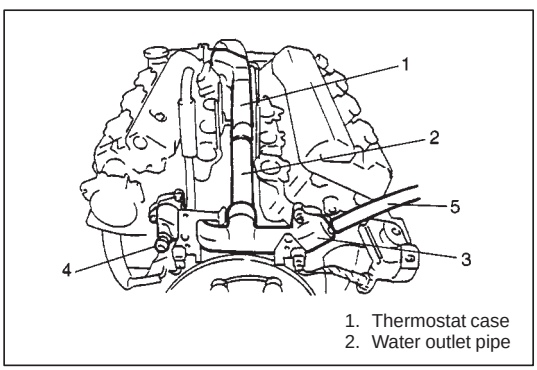
1) Disconnect negative (–) cable at battery.
2) Drain cooling system.
3) To remove these pipes or hoses, loosen screw on each pipe or hose clip and pull hose end off.

For H25 engine

1) Disconnect negative (–) cable at battery.
2) Drain cooling system.



3) Remove radiator inlet, outlet hoses (1), (2) and radiator outlet pipe (3).
4) Remove throttle body and intake manifold.
   Refer to Section 6A2 for removal.



1. Thermostat case
2. Water outlet pipe

5) Disconnect ECT sensor (4) coupler.
6) Disconnect heater inlet hose (5) from water outlet cap (3).

DIAGNOSIS

DIAGNOSIS TABLE

Refer to ENGINE DIAGNOSIS in SECTION 6.

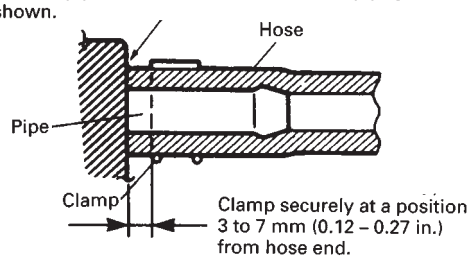
ON-VEHICLE SERVICE

PRECAUTIONS

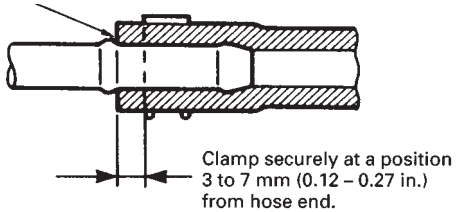
WARNING:
Before attempting service of any type on fuel system, following cautions should be always observed.

- **Disconnect negative cable at battery.**
- **DO NOT smoke, and place "NO SMOKING" signs near work area.**
- **Be sure to have CO_2 fire extinguisher handy.**
- **Be sure to perform work in a well-ventilated area and away from any open flames (such as gas hot heater).**
- **Wear safety glasses.**
- **To release fuel vapor pressure in fuel tank, remove fuel filler cap from fuel filler neck and then reinstall it.**
- **As fuel feed line is still under high fuel pressure even after engine was stopped, loosening or disconnecting fuel feed line directly may cause dangerous spout of fuel to occur where loosened or disconnected. Before loosening or disconnecting fuel feed line, make sure to release fuel pressure according to procedure described in SECTION 6 or SECTION 6-1.**
- **A small amount of fuel may be released after the fuel line is disconnected.**
  In order to reduce the chance of personal injury, cover the fitting to be disconnected with a shop cloth. Put that cloth in an approved container when disconnection is completed.
- **Note that fuel hose connection varies with each type of pipe. Be sure to connect and clamp each hose correctly referring to the following.**
- **When performing any work that requires to lift up vehicle, check fuel hose clamp for rust.**
- **For other information, refer to "PRECAUTIONS" in SECTION 0A and SECTION 6 or SECTION 6-1 of this manual.**

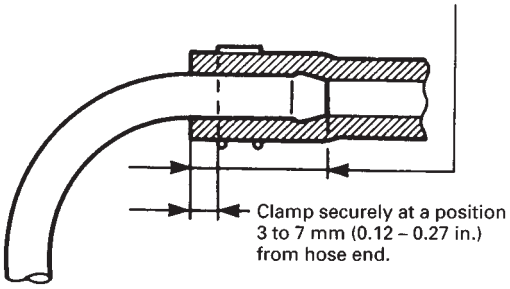
With short pipe, fit hose as far as it reaches pipe joint as shown.



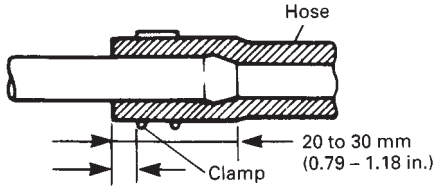
With following type pipe, fit hose as far as its peripheral projection as shown.



With bent pipe, fit hose as far its bent part as shown or till pipe is about 20 to 30 mm (0.79 – 1.18 in.) into the hose.



With straight pipe, fit hose till pipe is about 20 to 30 mm (0.79 – 1.18 in.) in the hose.



Clamp securely at a position 3 to 7 mm (0.12 – 0.27 in.) from hose end.

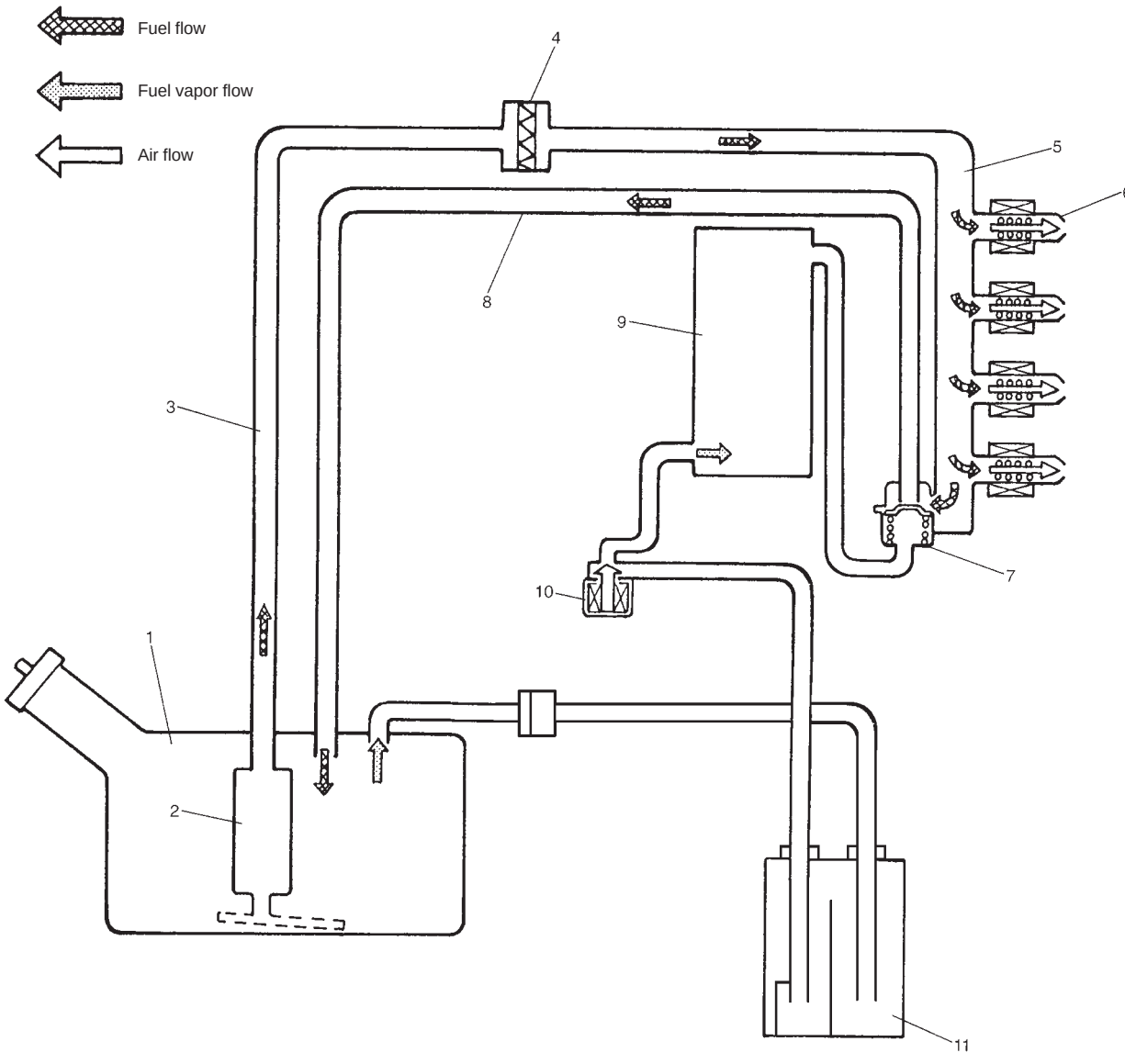
FUEL DELIVERY SYSTEM

The fuel delivery system consists of the fuel tank, fuel pump, fuel filter, fuel pressure regulator, delivery pipe and fuel injectors.

The fuel in the fuel tank is pumped up by the fuel pump, filtered by the fuel filter and fed under pressure to each injector through the delivery pipe.

As the fuel pressure applied to the injector (the fuel pressure in the fuel feed line) is always kept a certain amount higher than the pressure in the intake manifold by the fuel pressure regulator, the fuel is injected into the intake port of the cylinder head when the injector opens according to the injection signal from PCM (ECM).

The fuel relieved by the fuel pressure regulator returns through the fuel return line to the fuel tank.

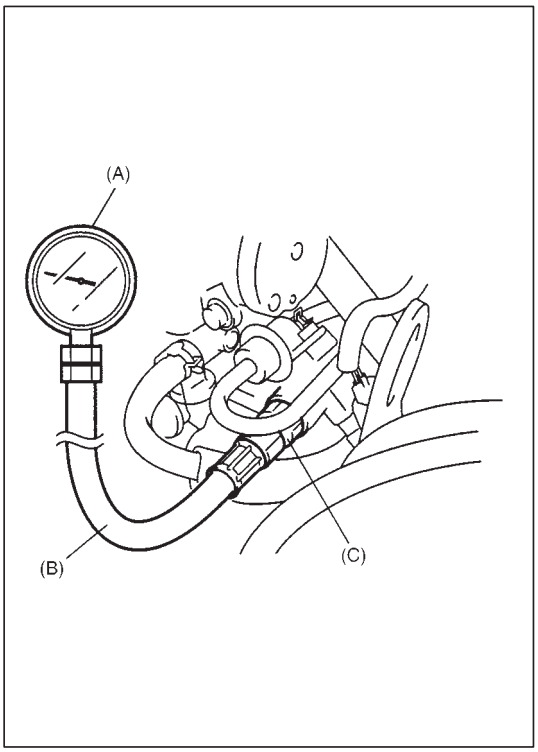


1. Fuel tank
2. Fuel pump
3. Fuel feed line
4. Fuel filter
5. Fuel delivery pipe
6. Fuel injectors
7. Fuel pressure regulator
8. Fuel return line
9. Intake manifold
10. EVAP canister purge valve
11. EVAP canister
12. Tank pressure control valve

FUEL DELIVERY SYSTEM

FUEL PRESSURE INSPECTION

1) Relieve fuel pressure in fuel feed line referring to p. 6-4.



2) Using backup wrench, loosen plug bolt on fuel delivery pipe and remove it. Connect special tools (fuel pressure gauge) to delivery pipe.

CAUTION:
A small amount of fuel may be released when plug bolt is loosened. Place container under the bolt or cover bolt hole with a shop cloth so that released fuel is caught in container or absorbed in cloth. Place that cloth in an approved container.

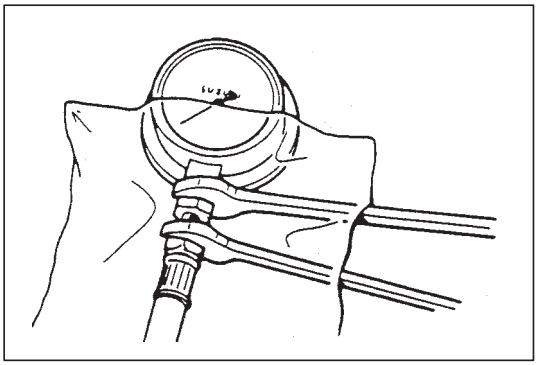
Special Tool
(A): 09912-58441
(B): 09912-58431
(C): 09919-46010

3) Check that battery voltage is above 11V.

CONDITION	FUEL PRESSURE
With fuel pump operating and engine stopped	250 – 300 KPa 2.5 – 3.0 kg/cm^2 35.6 – 42.7 psi
At specified idle speed	210 – 260 KPa 2.1 – 2.6 kg/cm^2 29.8 – 37.0 psi
With 1 min. after engine (fuel pump) stopped (Pressure reduces as time passes.)	over 180 kPa 1.8 kg/cm^2 25.6 psi

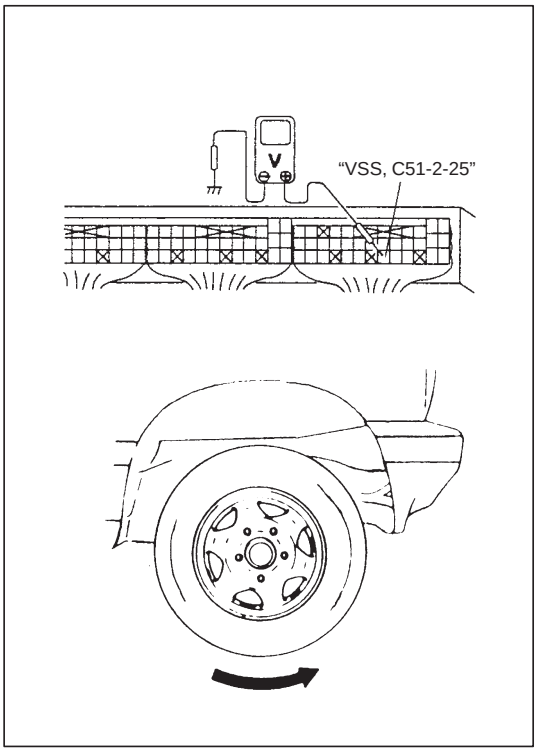
4) Turn ignition switch ON to operate fuel pump and after 3 seconds turn it OFF. Repeat this 3 or 4 times and then check fuel pressure.
5) Start engine.
6) Measure fuel pressure at idling.

If measured pressure doesn't satisfy specification, refer to "Diagnostic Flow Table B-3" in "ENGINE DIAGNOSIS" section and check each possibly defective part. Replace if found defective.



7) After checking fuel pressure, remove fuel pressure gauge.

CAUTION:
As fuel feed line is still under high fuel pressure, make sure to release fuel pressure according to following procedures.
- **Place fuel container under joint.**
- **Cover joint with rag and loosen joint nut slowly to release fuel pressure gradually.**



VEHICLE SPEED SENSOR (VSS)

On-Vehicle Inspection

1) Hoist vehicle.
2) Release parking brake lever, set transmission in neutral and transfer in "2H".
3) Remove ECM/PCM cover.
4) Connector voltmeter between VSS terminal of ECM/PCM connector and body ground.
5) Turn ignition switch ON and turn rear right tire slowly with rear left tire locked.
   Voltmeter should indicate deflection between 0 – 1 V and 8 – 14 V a few times while tire is turned one revolution.
   If check result is not satisfactory, proceed to Step 2 of "DTC P0500 (No.24) Diag. Flow Table" in "Engine Diagnosis" section.

CAMSHAFT POSITION SENSOR (CMP SENSOR)

On-Vehicle Inspection

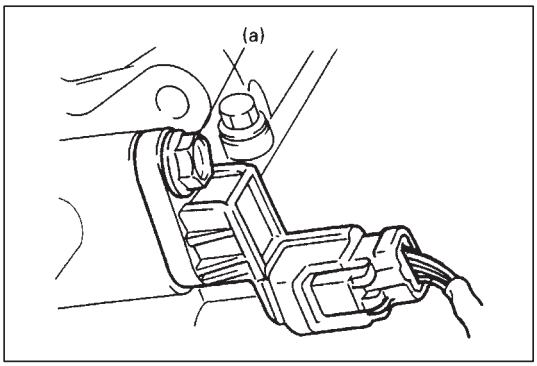
Check CMP sensor and its circuits referring to flow table of diagnostic trouble code P0340 in "Engine Diagnosis" section.
If malfunction is found, replace.

Removal and Installation (J20 Engine)

Refer to "CMP Sensor Removal/Installation" in Section 6F2.

Removal (G16 Engine)

1) Disconnect negative cable from battery.
2) Disconnect connector from CMP sensor.
3) Remove CMP sensor from sensor case.



Installation (G16 Engine)

1) Check that O-ring is free from damage.
2) Check that CMP sensor and signal rotor tooth are free from any metal particles and damage.
3) Install CMP sensor to sensor case.

   Tightening Torque
   (a): 9 N·m (0.9 kg-m, 6.5 lb-ft)

4) Connect connector to it securely.
5) Connect negative cable to battery.

GENERAL DESCRIPTION

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

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

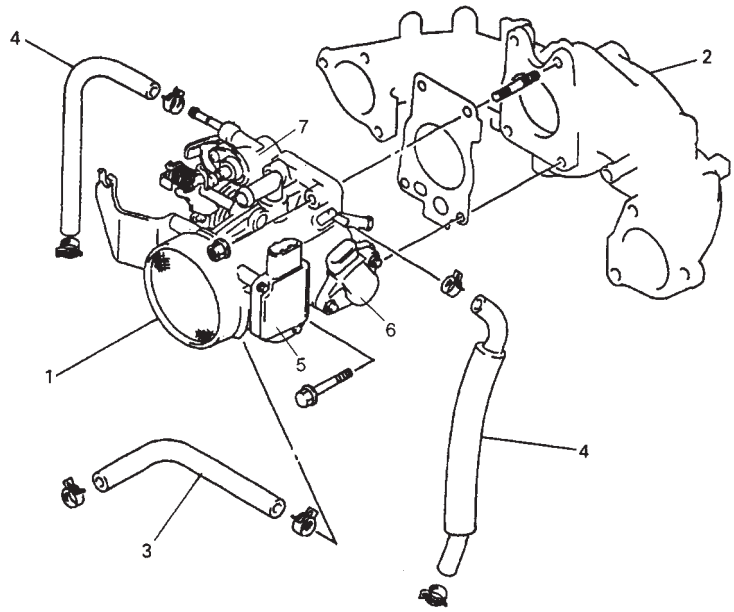
Fuel delivery system includes fuel pump, delivery pipe, fuel pressure regulator, fuel injectors, etc.

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

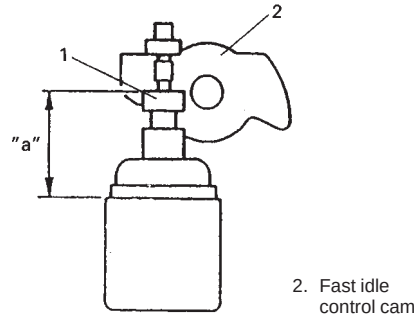
Emission control system includes EGR, EVAP and PCV systems.

AIR INTAKE SYSTEM

THROTTLE BODY



1. Throttle body
2. Intake collector
3. Breather hose
4. Water hose
5. MAF sensor
6. TP sensor
7. Fast idle up thermo wax

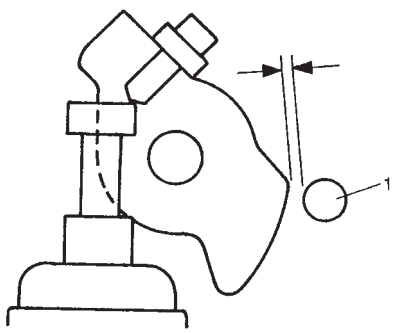


2. Fast idle control cam

On-Vehicle Inspection

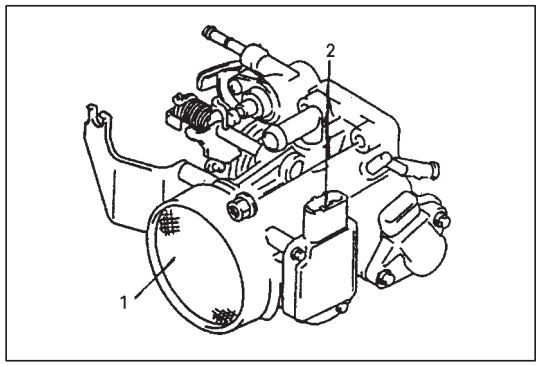
1) Check that throttle valve lever moves smoothly.
2) Measure plunger (1) protrusion "a" at engine coolant temp. is 25°C (77°F).

Plunger protrusion "a": 26.6 – 27.4 mm (1.048 – 1.078 in.)



3) Warm up engine and check to make sure that fast control cam is off cam follower lever (1) at engine coolant temp. is 52 – 68°C (126 – 154°F).

If check result in step 2) or 3) is out of specification, replace throttle body assembly.



Removal

1) Disconnect negative cable at battery and coupler from MAF sensor (2).
2) Remove throttle body (1), referring to “THROTTLE BODY REMOVAL” in this section.

NOTE:
Don’t remove MAF sensor.

CAUTION:
- **Do not expose MAF sensor (throttle body) to any shock.**
- **Do not blow compressed air by using air gun or the like.**
- **Do not put finger or any other object into MAF sensor and keep away from net. Malfunction may occur.**

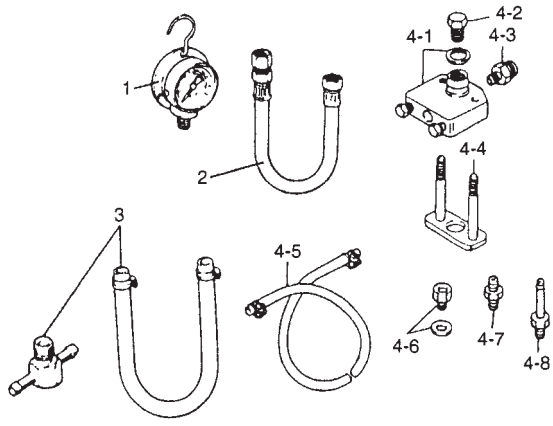
Installation

1) Install throttle body, referring to “THROTTLE BODY INSTALLATION” in this section.

TIGHTENING TORQUE SPECIFICATIONS

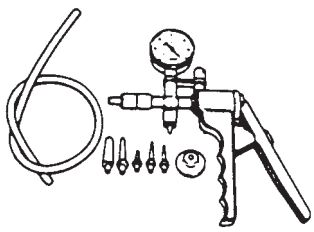
Fastening parts	Tightening torque		
	N·m	kg-m	lb-ft
Heated oxygen sensor	45	4.5	32.5
Fuel pressure regulator bolts	10	1.0	7.5
Fuel pipe union bolts	30	3.0	22.0
Engine coolant temp. sensor	15	1.5	11.0

SPECIAL TOOLS

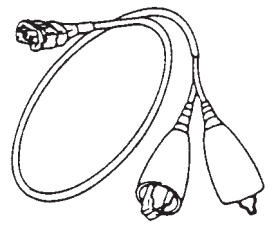


1. Pressure gauge 09912-58441
2. Pressure hose 09912-58431
3. 3-way joint & hose 09912-58490
4. Checking tool set 09912-58421

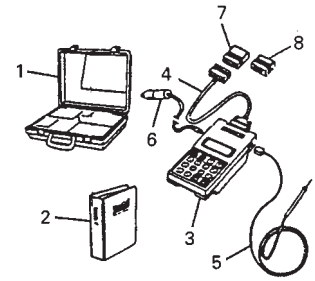
4-1. Tool body & washer
4-2. Body plug
4-3. Body attachment-1
4-4. Holder
4-5. Return hose & clamp
4-6. Body attachment-2 & washer
4-7. Hose attachment-1
4-8. Hose attachment-2



09917-47010
Vacuum pump gauge

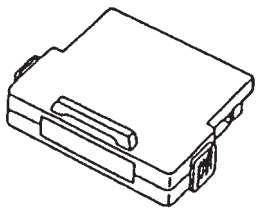


09930-88521
Injector test lead

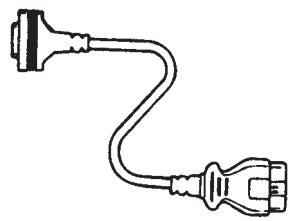


1. Storage case
2. Operator's manual
3. Tech 1A
4. DLC cable
5. Test lead/probe
6. Power source cable
7. DLC cable adaptor
8. Self-test adaptor

09931-76011
SUZUKI scan tool (Tech 1A)



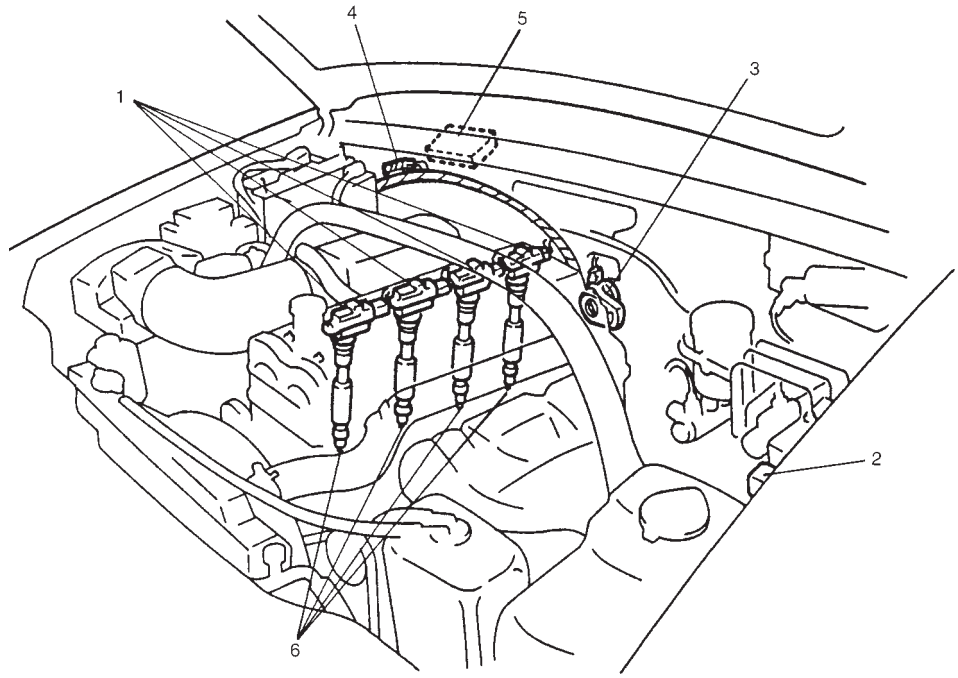
SUZUKI scan tool mass storage cartridge



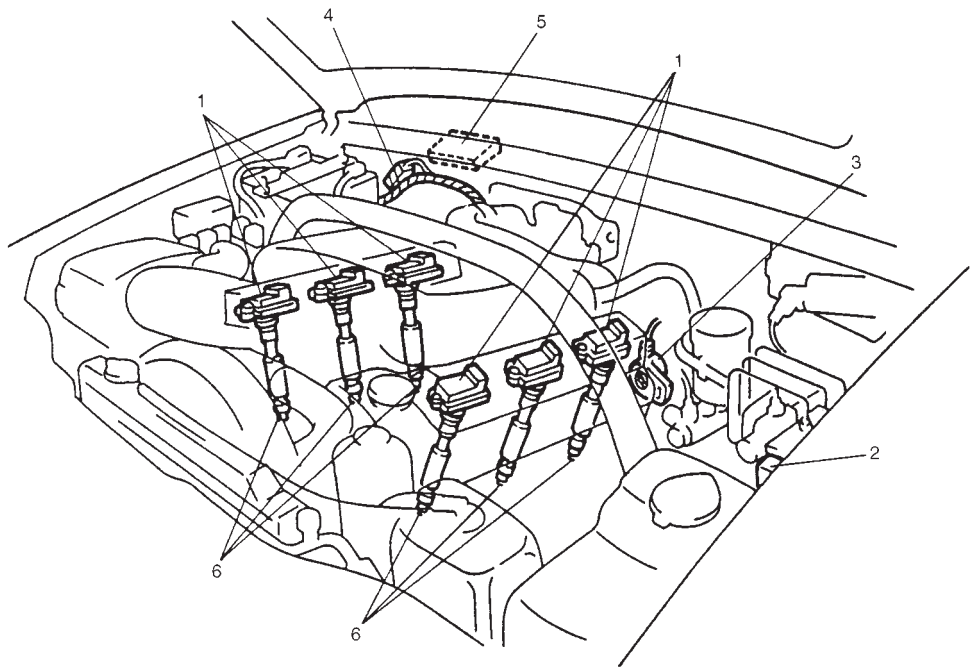
09931-76030
16/14 pin DLC cable

COMPONENTS

J20 Engine



H25 Engine



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

1. Ignition coil assembly (Igniter and ignition coil)
2. Monitor coupler (*) (if equipped)
3. CMP sensor
4. Noise suppressor
5. ECM (or PCM) (*)
6. Spark plug

DIAGNOSIS

Possible symptoms due to starting system trouble would be as follows:
° Starting motor does not run (or runs slowly)
° Starting motor runs but fails to crank engine
° Abnormal noise is heard

Proper diagnosis must be made to determine exactly where the cause of each trouble lies.....in battery, wiring harness, (including starting motor switch), starting motor or engine.

Do not remove motor just because starting motor does not run. Check following items and narrow down scope of possible causes.
1) Condition of trouble
2) Tightness of battery terminals (including ground cable connection on engine side) and starting motor terminals
3) Discharge of battery
4) Mounting of starting motor

Condition	Possible Cause	Correction
Motor not running	**No operating sound of magnetic switch**	
	° Shift lever switch is not in P or N, or not adjusted (A/T)	Shift in P or N, or adjust switch.
	° Battery run down	Recharge battery.
	° Battery voltage too low due to battery deterioration	Replace battery.
	° Poor contact in battery terminal connection	Retighten or replace.
	° Loose grounding cable connection	Retighten.
	° Fuse set loose or blown off	Tighten or replace.
	° Poor contacting action of ignition switch and magnetic switch	Replace.
	° Lead wire coupler loose in place	Retighten.
	° Open-circuit between ignition switch and magnetic switch	Repair.
	° Open-circuit in pull-in coil	Replace magnetic switch.
	° Brushes are seating poorly or worn down	Repair or replace.
	° Poor sliding or plunger and/or pinion	Repair.
	Operating sound of magnetic switch heard	
	° Battery run down	Recharge battery.
	° Battery voltage too low due to battery deterioration	Replace battery.
	° Loose battery cable connections	Retighten.
	° Burnt main contact point, or poor contacting action of magnetic switch	Replace magnetic switch.
	° Brushes are seating poorly or worn down	Repair or replace.
	° Weakened brush spring	Replace.

SECTION 6G1

CRANKING SYSTEM
(0.9 kW No-Reduction Type)

CONTENTS