SUZUKI

TECHNICAL DEPT.

SF413

SUPPLEMENTARY SERVICE MANUAL
GTi

USE THIS SUPPLEMENTARY SERVICE MANUAL
WITH SF413GTi SERVICE MANUAL (99500-64B01)

SUZUKI
Caring for Customers
99501-64B00-01E
(英)

IMPORTANT

WARNING/CAUTION/NOTE

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

> WARNING:
> **Indicates a potential hazard that could result in death or injury.**

> CAUTION:
> **Indicates a potential hazard that could result in vehicle damage.**

NOTE:

Indicates special information to make maintenance easier or instructions clearer.

FOREWORD

This SUPPLEMENTARY SERVICE MANUAL contains those items on the structure, service procedures, etc. that were modified for the FACE-LIFT model produced in and after June 1991.

Applicable model:
SF413 GTi of and after following body No. or vehicle identification number.

For European/ Australian markets	For other markets
JSAEAA34S00140001 ~	AA34S-200001 ~

When servicing a car with a body number after the above listed numbers, refer to this Supplementary Service Manual first. And then, for any section, item or description not found in this supplement, refer to "SF413GTi SERVICE MANUAL".

RELATED SERVICE MANUAL:
SF413GTi Service Manual (99500-64B01)

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

TABLE OF CONTENTS	SECTION

WIRING DIAGRAM

SUZUKI MOTOR CORPORATION
TECHNICAL DEPARTMENT
AUTOMOBILE SERVICE DIVISION

SECTION 0B

MAINTENANCE AND LUBRICATION

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

CONTENTS

MAINTENANCE SCHEDULE

Interval: This interval should be judged by odometer reading or months, whichever comes first.	This table includes services as scheduled up to 48,000 miles (80,000 km) mileage. Beyond 48,000 miles (80,000 km), carry out the same services at the same intervals respectively.								
	Km (x 1,000)	10	20	30	40	50	60	70	80
	Miles (x 1,000)	6	12	18	24	30	36	42	48
	Months	6	12	18	24	30	36	42	48
CHASSIS AND BODY									
Power steering (P/S) system		I	I	I	I	I	I	I	I

NOTE:
"I": Inspect and correct or replace if necessary

MAINTENANCE SERVICE

POWER STEERING (P/S) SYSTEM INSPECTION

1) Visually check power steering system for leaks or damage.
2) Remove oil tank cap and check fluid level indicated on level gauge, which should be between MAX and MIN marks. If it is lower than MIN, fill fluid up to MAX mark.

NOTE:
Fluid level should be checked when fluid is cool.

3) Make sure that power steering belt deflects 8 — 10 mm (0.31 — 0.39 in.) with 10 kg (22 lb) thumb pressure applied on the midway point between the pulleys.
   Also, visually check the belt for damage. If necessary, have the belt adjusted or replaced.

RECOMMENDED FLUIDS AND LUBRICANTS

Power steering fluid	Automatic transmission fluid DEXRON-II

SECTION 1A

HEATER AND VENTILATION

NOTE:

- For the descriptions (items) not found in this section of this manual, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.
- The blower motor installing position is different between the right-hand side steering car and the left-hand steering car. In either car, the motor is installed on assistant seat side. The illustration in this manuals shows the left hand steering car.

CONTENTS

GENERAL DESCRIPTION

HEATER

The heater and ventilation of this car consist of following parts.

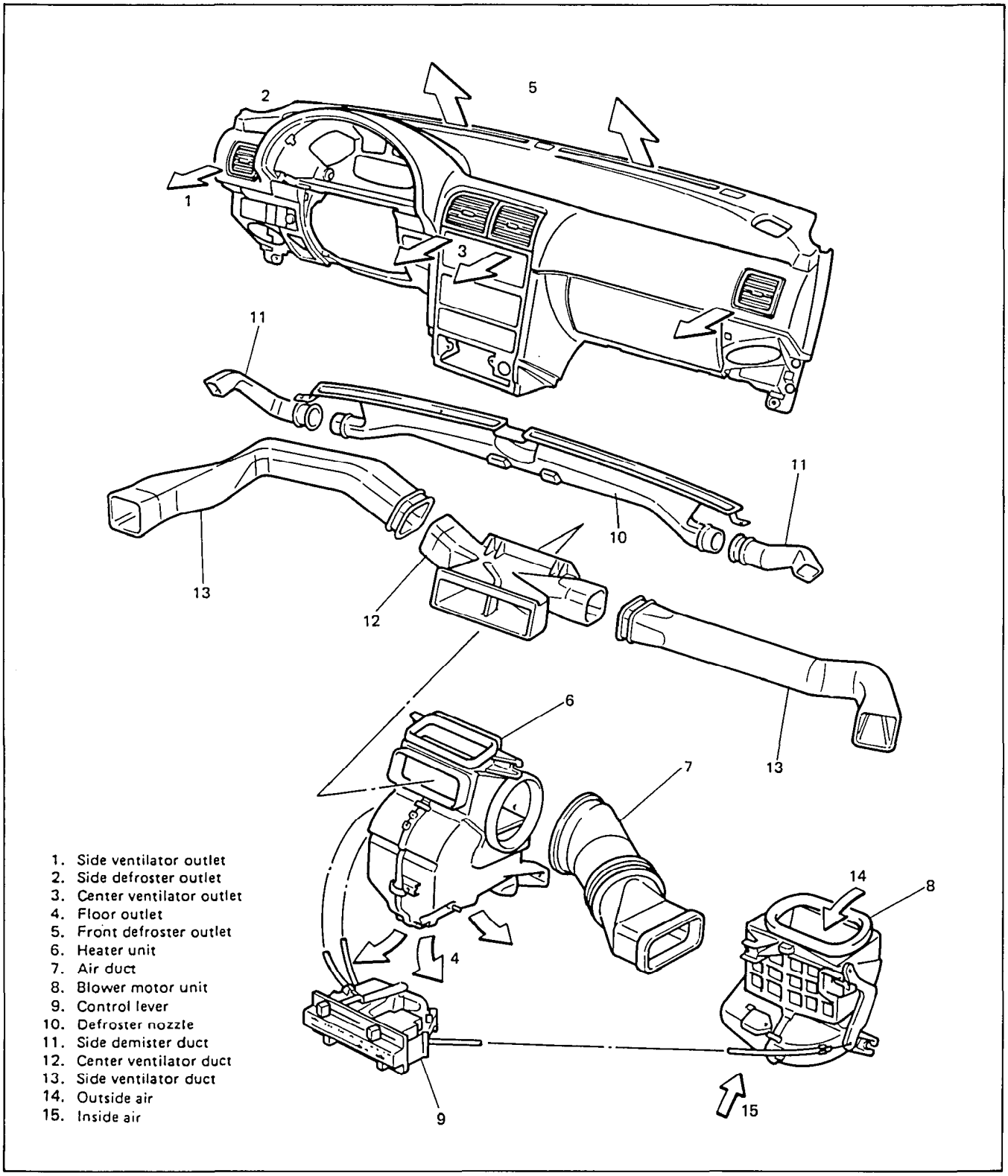


Fig. 1A-1

HEATER CONTROL OPERATION

Heater control panel is as shown below.

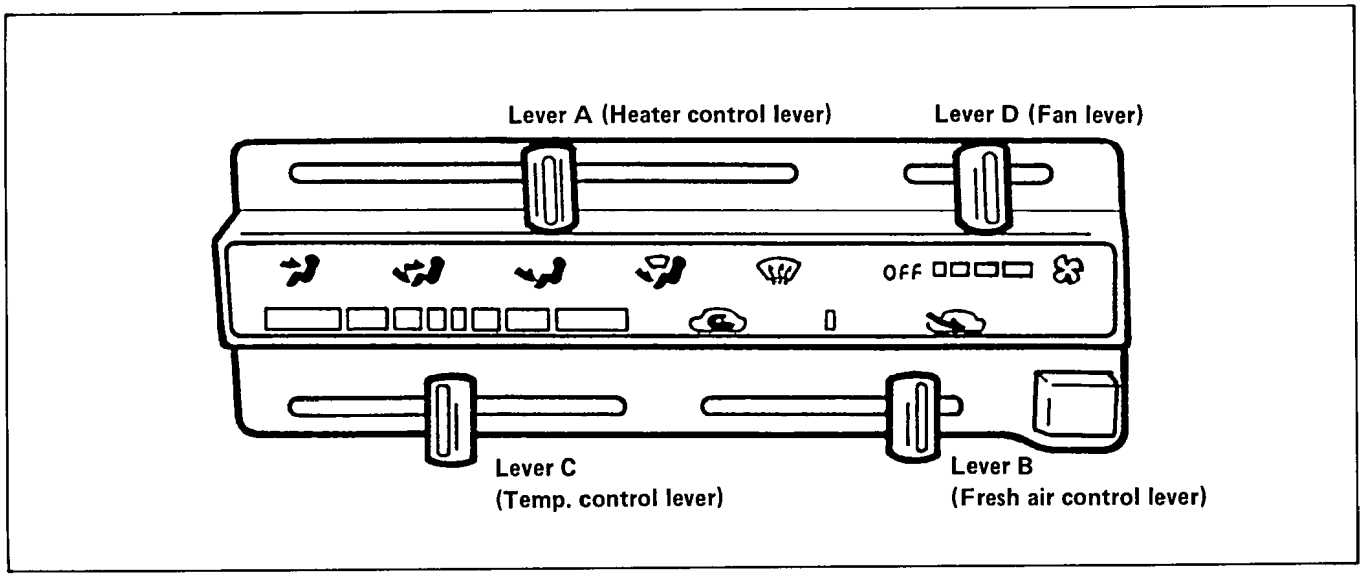


Fig. 1A-2

ON-CAR SERVICE

HEATER CONTROL CABLES

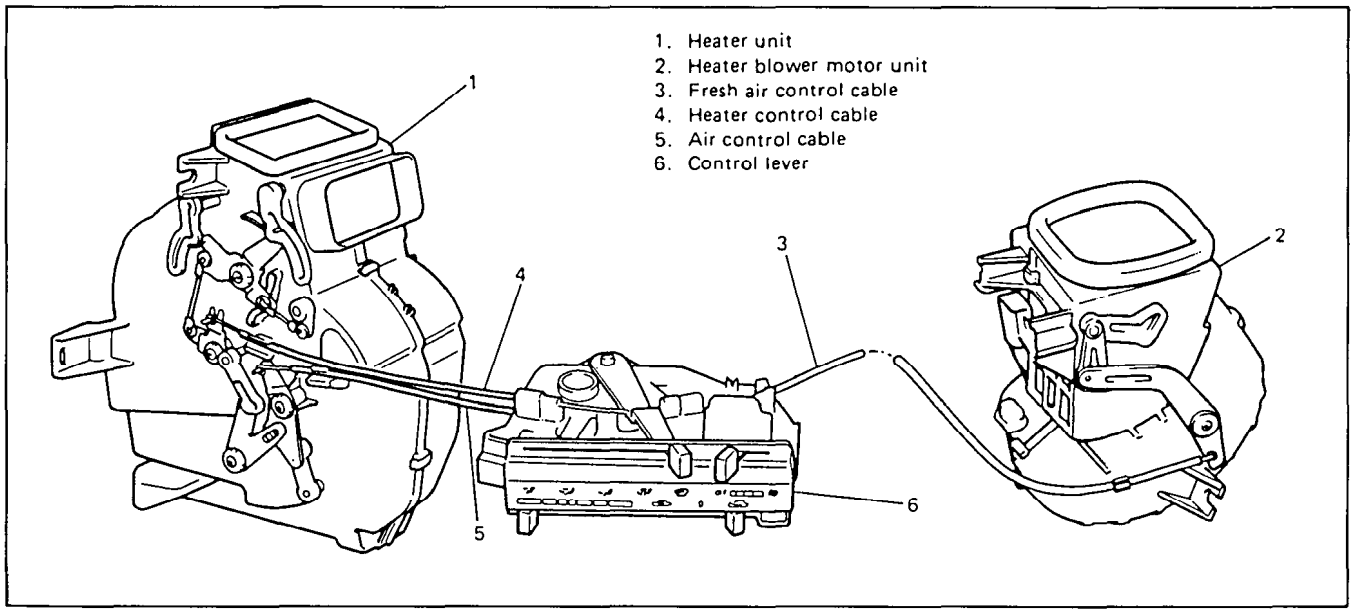


Fig. 1A-3

REMOVAL

1) Remove console box.
2) Remove asthray and ashtray upper plate.
3) Remove cigarette lighter.
4) Remove radio. (If equipped)
5) Remove control lever knobs and control panel garnish.
6) Remove control panel.
7) Disconnect lead wire from blower motor switch at coupler.
8) Disconnect control cables from blower motor unit and heater unit.
9) Remove control lever ass'y.
10) Disconnect control cables from control lever.

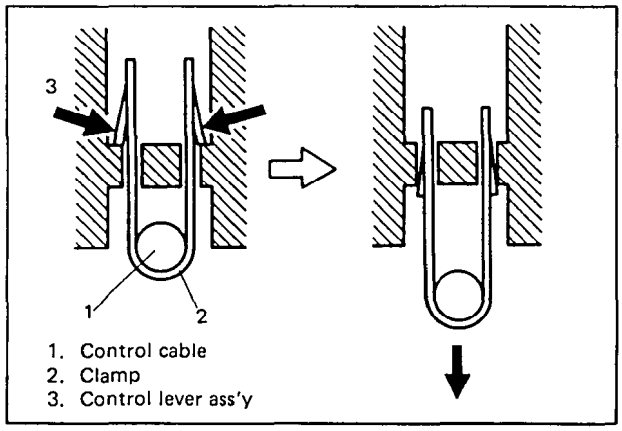


Fig. 1A-4

INSTALLATION

Install control cables by reversing removal procedure, noting the following point.

After installing control cables to control levers, move control levers to such position as to pull cables fully, then connect and clamp control cables to heater unit and blower motor unit levers as shown.

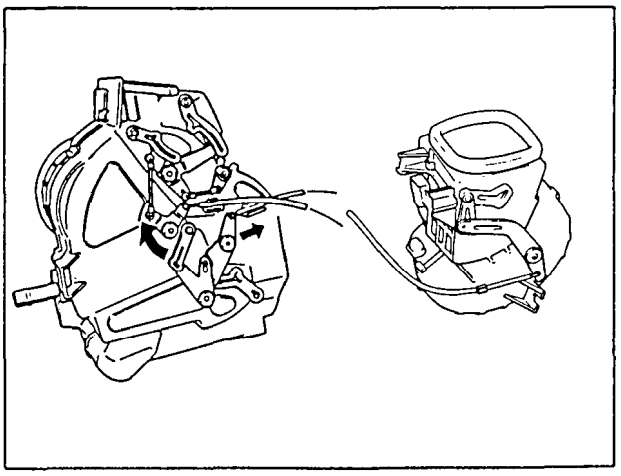


Fig. 1A-5

NOTE:

After installing control cables, be sure that control knobs move smoothly and stop at proper position.

HEATER UNIT

REMOVAL

1. Disconnect battery (–) leadwire, drain coolant and disconnect 2 water hoses from heater unit.
2. Remove instrument panel as follows.
   1) Remove console box.
   2) Disconnect wires and cables from heater and blower unit.
   3) Remove steering wheel, steering column unit and steering joint upper bolt. (Refer to SECTION 3C.)
   4) Remove front speaker covers and front speakers (if equipped).
   5) Disconnect speedometer cable and remove speedometer ass'y.
   6) Remove engine hood opener.
   7) Remove instrument panel member mounting bolts.

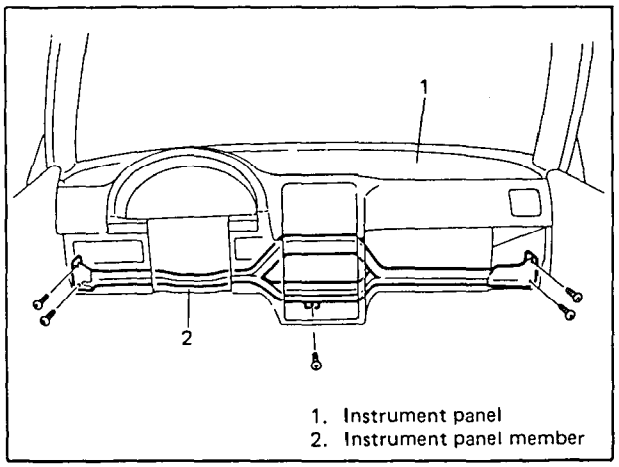


Fig. 1A-6

   8) Remove instrument panel together with instrument panel member.

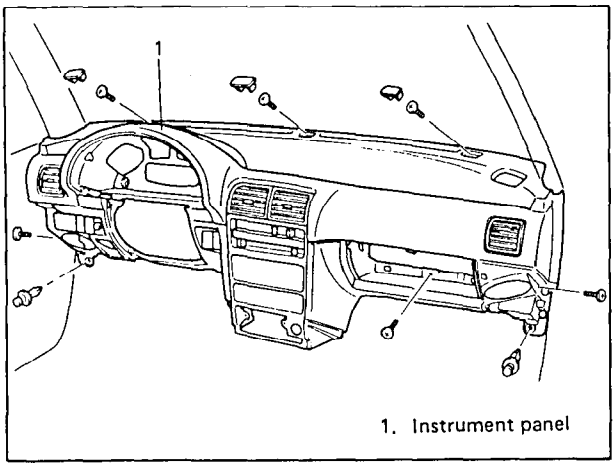


Fig. 1A-7

3. Remove heater unit.

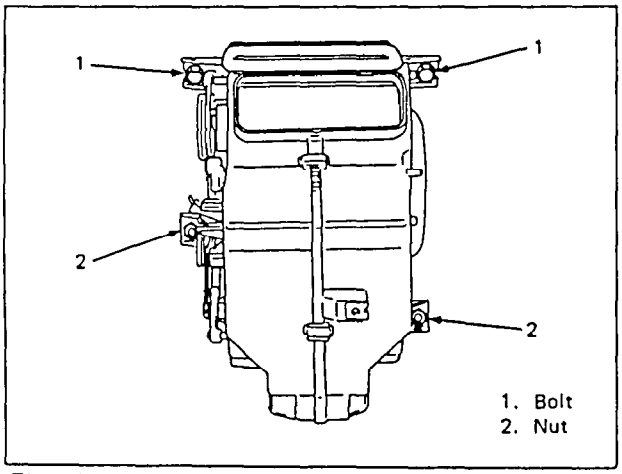


Fig. 1A-8

4. Remove heater unit clips and screws to separate heater unit.

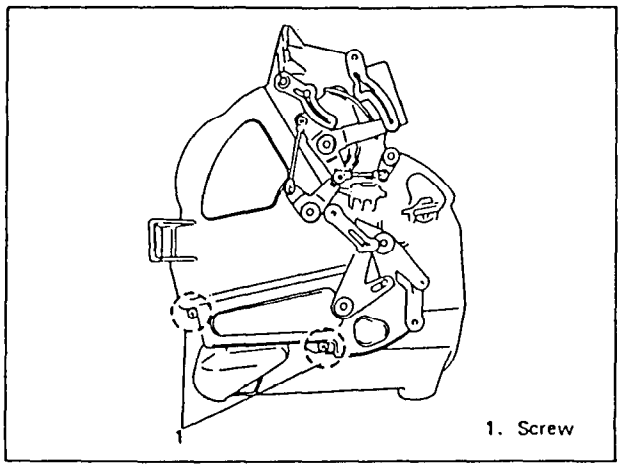


Fig. 1A-9

5. Pull out heater core from unit.

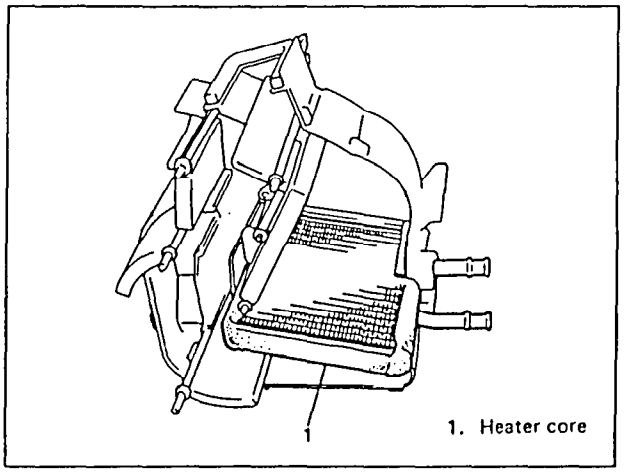


Fig. 1A-10

INSTALLATION

Install heater unit by reversing removal procedure, noting the following items.

1) Adjust control cables. (Refer to p. 1A-4)
2) Fill coolant to radiator.

NOTE:

- When installing each part, be careful not to catch any cable or wiring harness.
- When installing steering shaft to steering shaft joint, set front wheels (right and left) in the straight ahead state and check to make sure that steering wheel is also in that state.
- When fastening steering column ass'y to car body, start with lower nuts on column and then upper nuts. Be sure to tighten them to specified torque. **(Refer to SECTION 3C.)**

SECTION 2

BUMPERS AND SHEET METAL

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

CONTENTS

BUMPERS

NOTE:
Fasteners are important attaching parts in that they could affect the performance of vital components and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary.
Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.

FRONT BUMPER

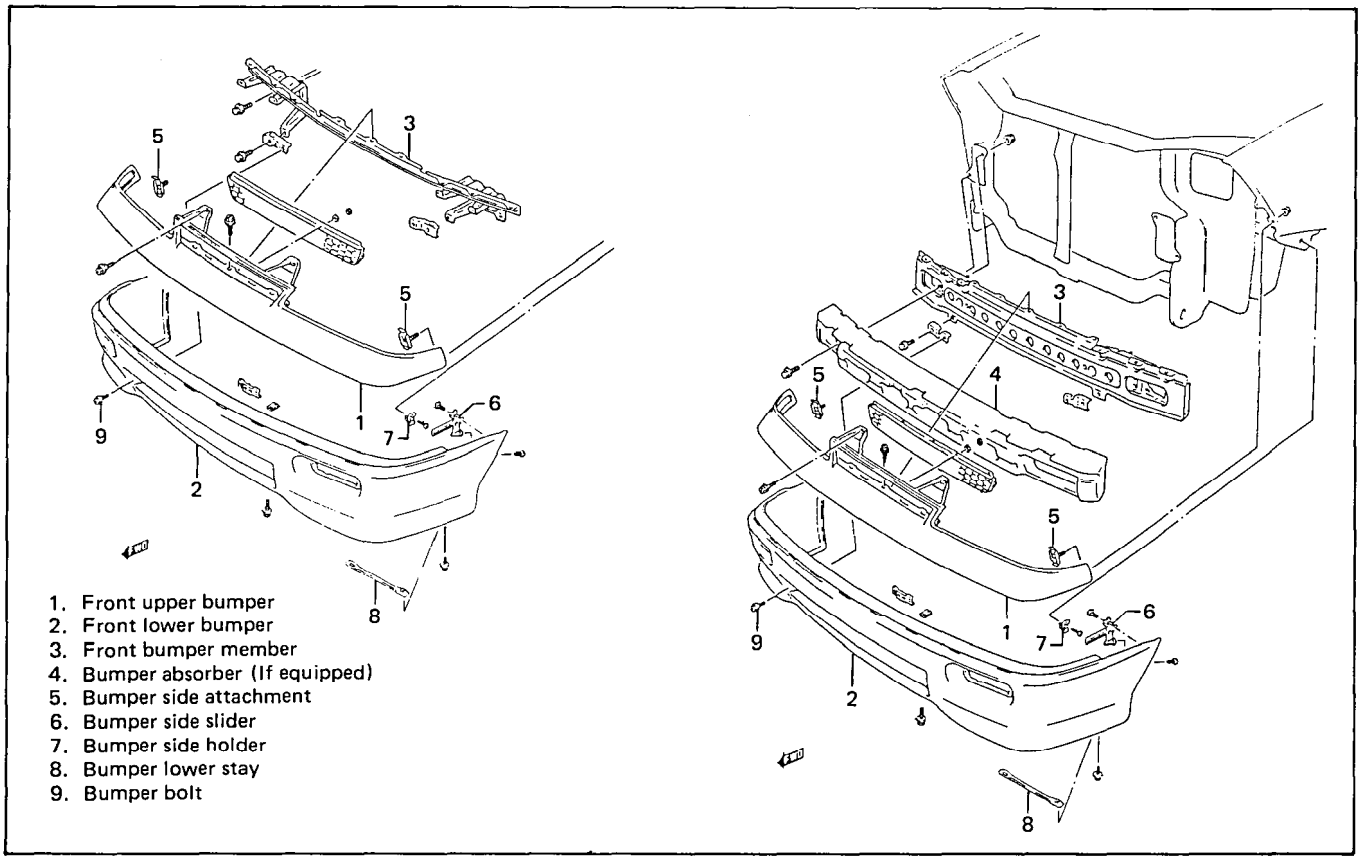


Fig. 2-1

REMOVAL

1) Remove front fender lining.
2) Remove front turn signal lamps.
3) Remove bumper fitting bolts and nuts shown in Fig. 2-2.

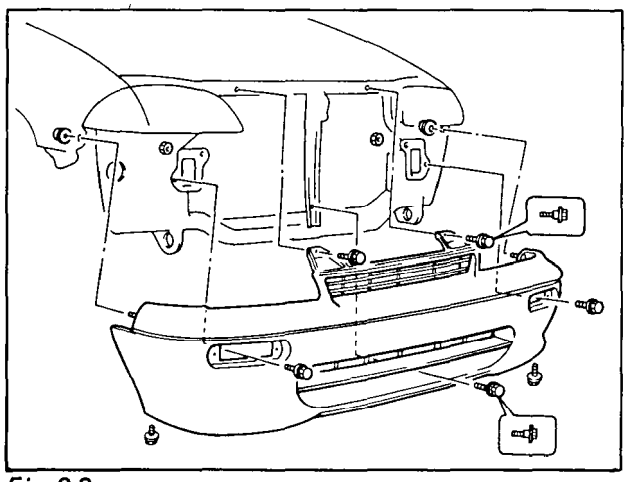


Fig. 2-2

4) Slide bumper (with bumper member) forward to remove it.

INSTALLATION

1) Slide bumper onto bumper side attachments on both fenders.
2) Use five bolts and four nuts to fix bumper in position.

REAR BUMPER

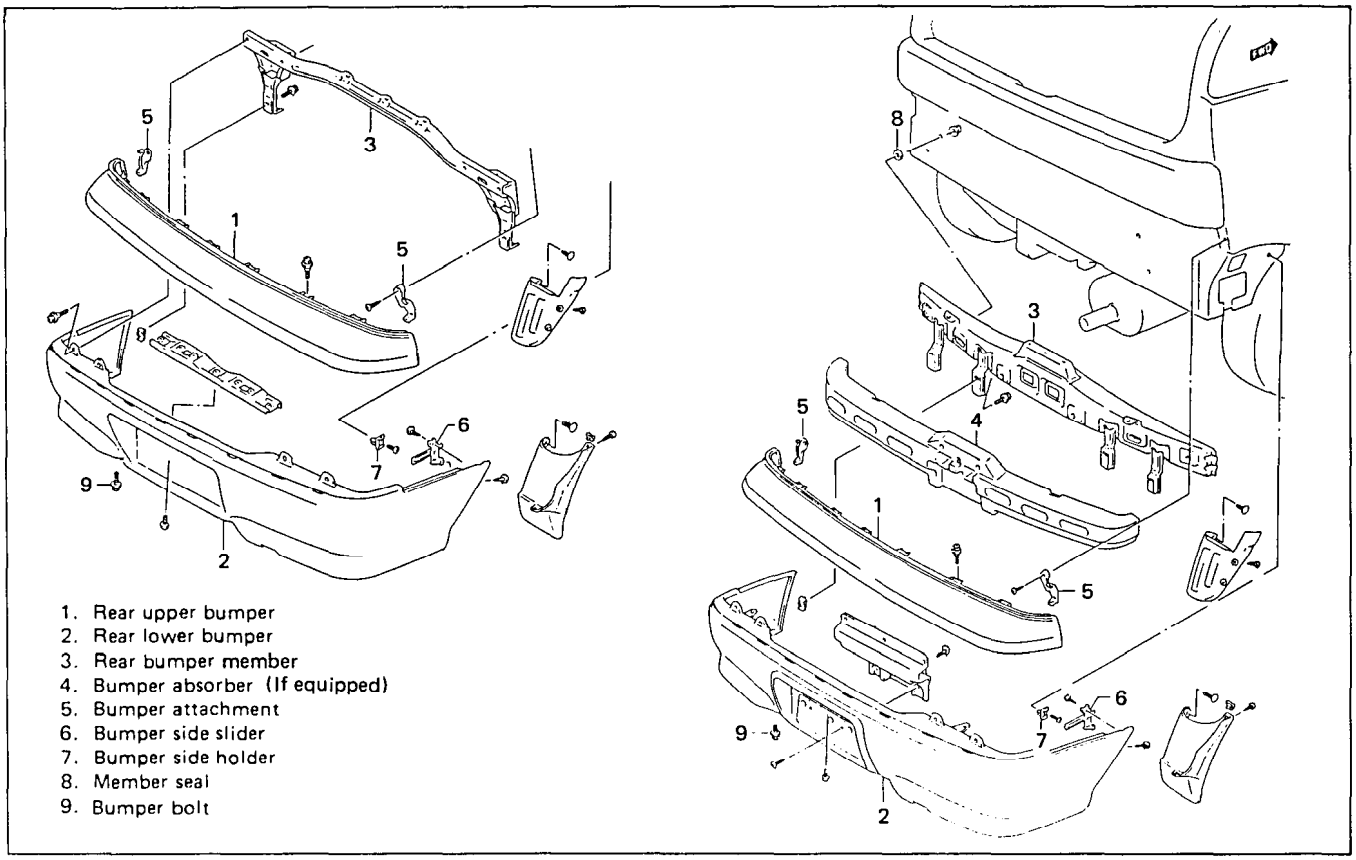


Fig. 2-3

REMOVAL

1) Remove rear garnish and then detach rear combination lights (R & L) from body without disconnecting coupler of combination rights.

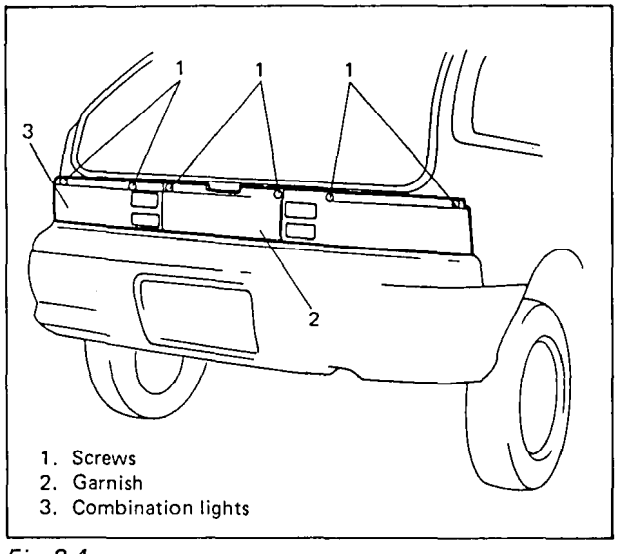


Fig. 2-4

2) Disconnect coupler of licence plate light.

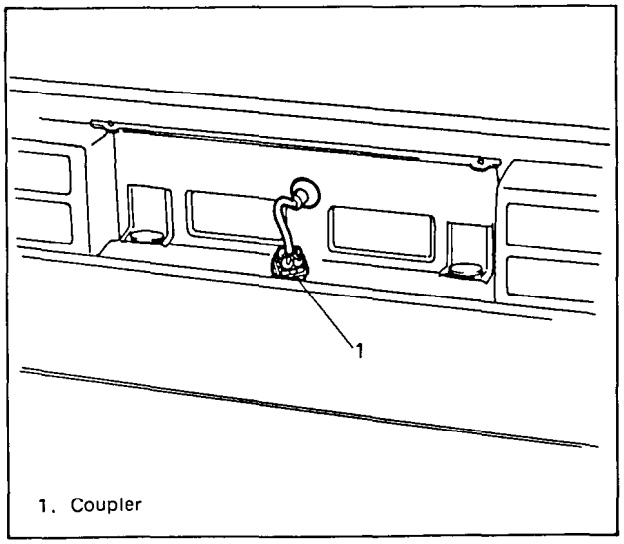


Fig. 2-5

3) Remove rear bumper bolts and nuts shown in figure below.
To remove nut "A", removal of back panel inner trim is prerequiste.

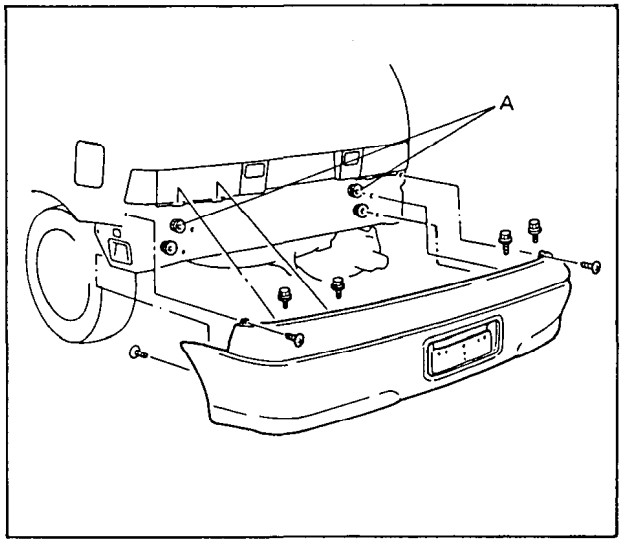


Fig. 2-6

4) Temporarily install rear combination lights in position with screws.
5) Slide bumper (with bumper member) backward to remove it.

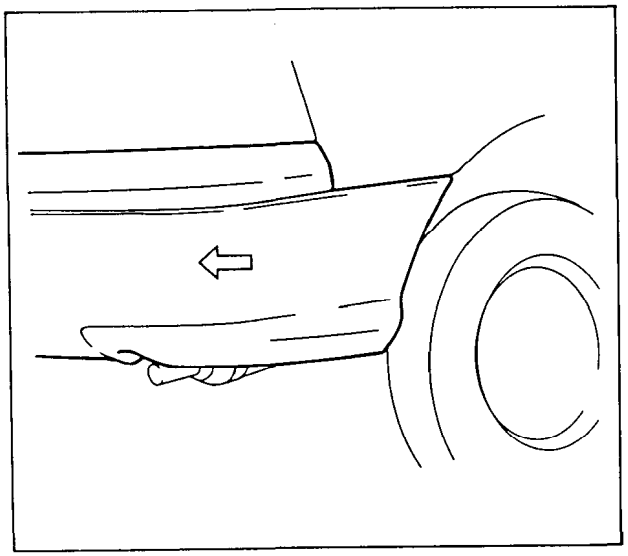


Fig. 2-7

INSTALLATION

1) Insert side sliders (R & L) of fenders and tighten bumper bolts and nuts.
2) Connect coupler of licence plate light securely.
3) Install combination lights (R & L) and then rear garnish.

SECTION 3B1

POWER STEERING (P/S) SYSTEM

(If equipped)

NOTE:

- All steering gear fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of these parts.
- For items related to the rack and pinion, if not included in this section, refer to SECTION 3B MANUAL RACK AND PINION of the Service Manual mentioned in the FOREWORD of this manual.

CONTENTS

GENERAL DESCRIPTION

The power steering (P/S) system in this car reduces the driver's effort needed in turning the steering wheel by unilizing the hydraulic pressure generated by the power steering (P/S) pump which is driven by the engine.
It is an integral type with the rack and pinion gears and the control valve unit, hydraulic pressure cylinder unit all built in the steering gear box.
There are two types of this system: one for the RH steering model and the other for the LH steering model.

For LH-steering model

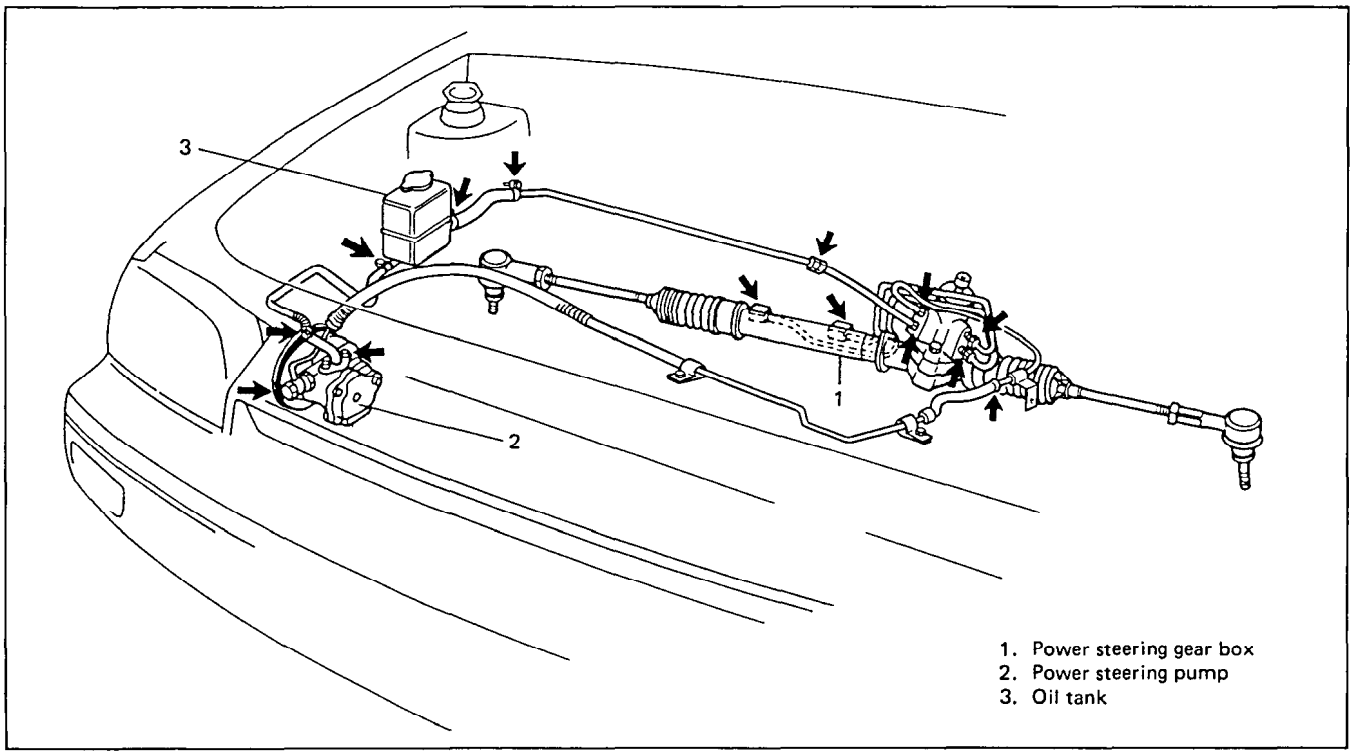


Fig. 3B1-1-1 Power Steering System Layout

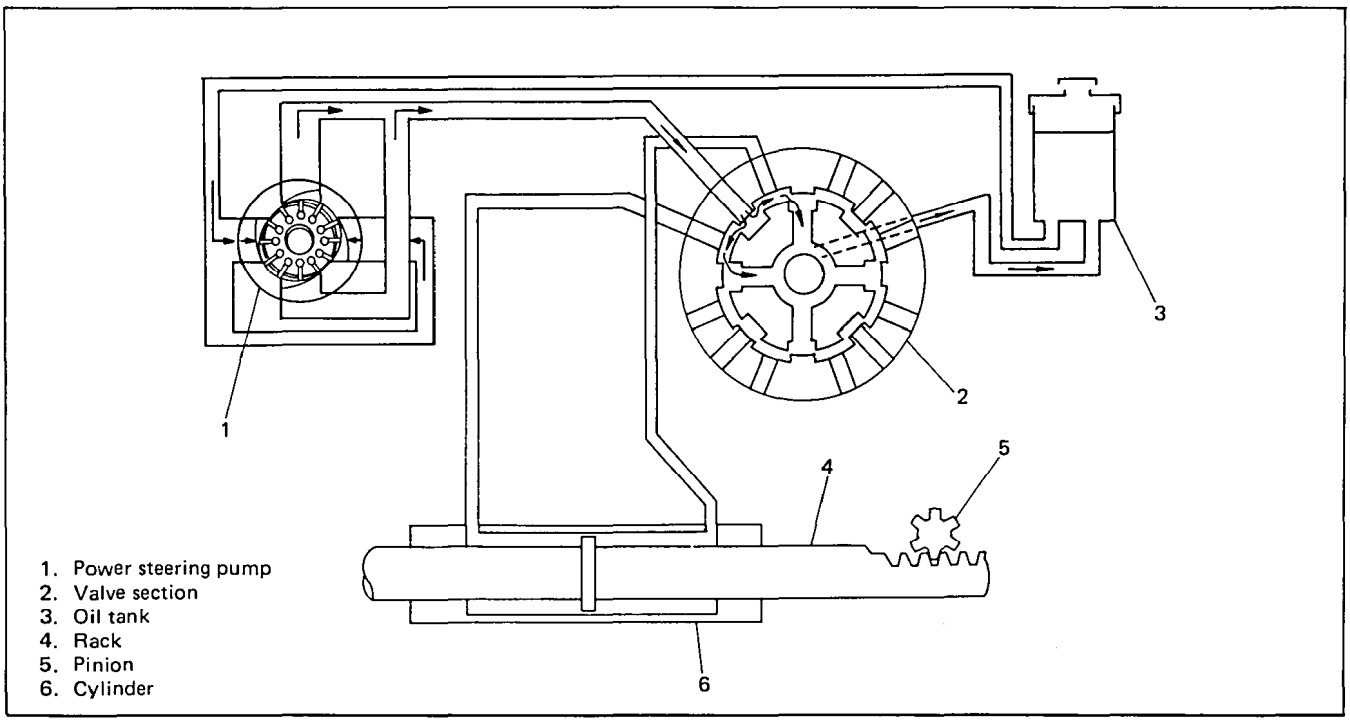


Fig. 3B1-1-2 Hydraulic Pressure Circuit

For RH-steering model

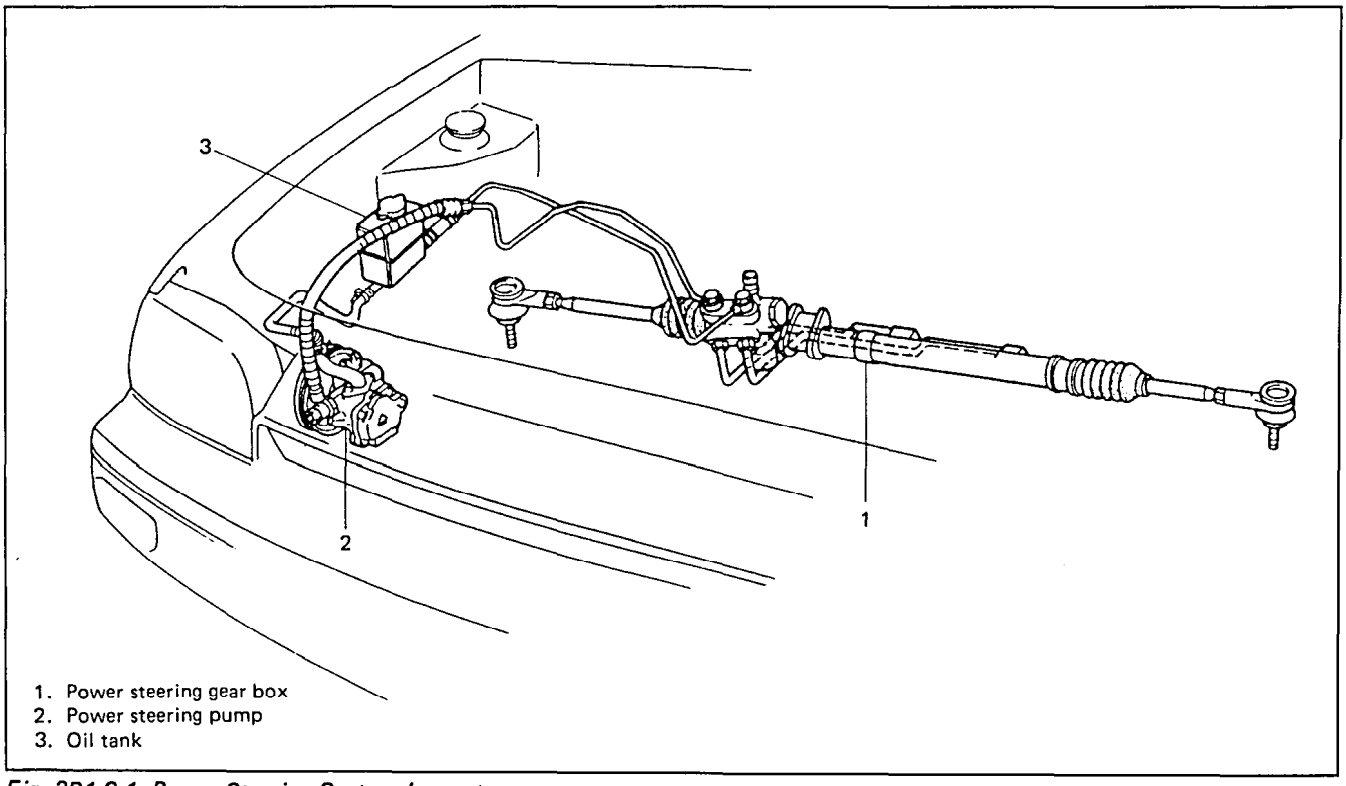


Fig. 3B1-2-1 Power Steering System Layout

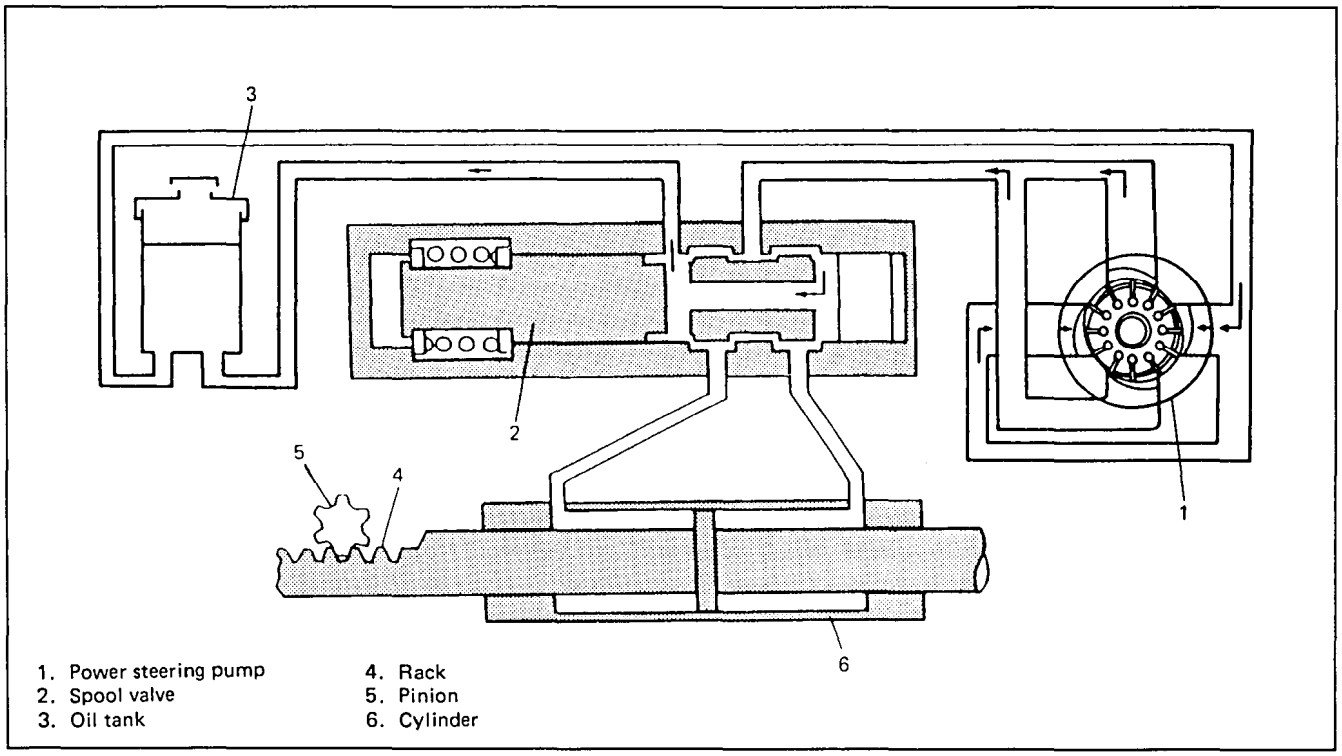


Fig. 3B1-2-2 Hydraulic Pressure Circuit

CONSTRUCTION AND OPERATION

STEERING GEAR BOX

- **For LH steering model**

The steering gear box consists of two sections: one including a cylinder and the other a valve. Main conponents of the cylinder section are a gear box, a rack and a tube and those of the valve section are a valve case, a sleeve and a stub shaft. The sleeve is linked with the pinion through a pin and the valve and stab shaft are integrated into one unit. Then the pinion and the stub shaft are linked to each other by means of the torsion bar.

Thus, when the stub shaft moves, the valve changes its position, thereby switching the hydraulic passage from the pump to the cylinder to help steering operation.

When turning the steering wheel feels heavy due to P/S fluid leakage or for some other reason (i.e., when in the manual steering mode), the stub shaft and pinion are in direct linkage and the force is output directly through the pinion and rack.

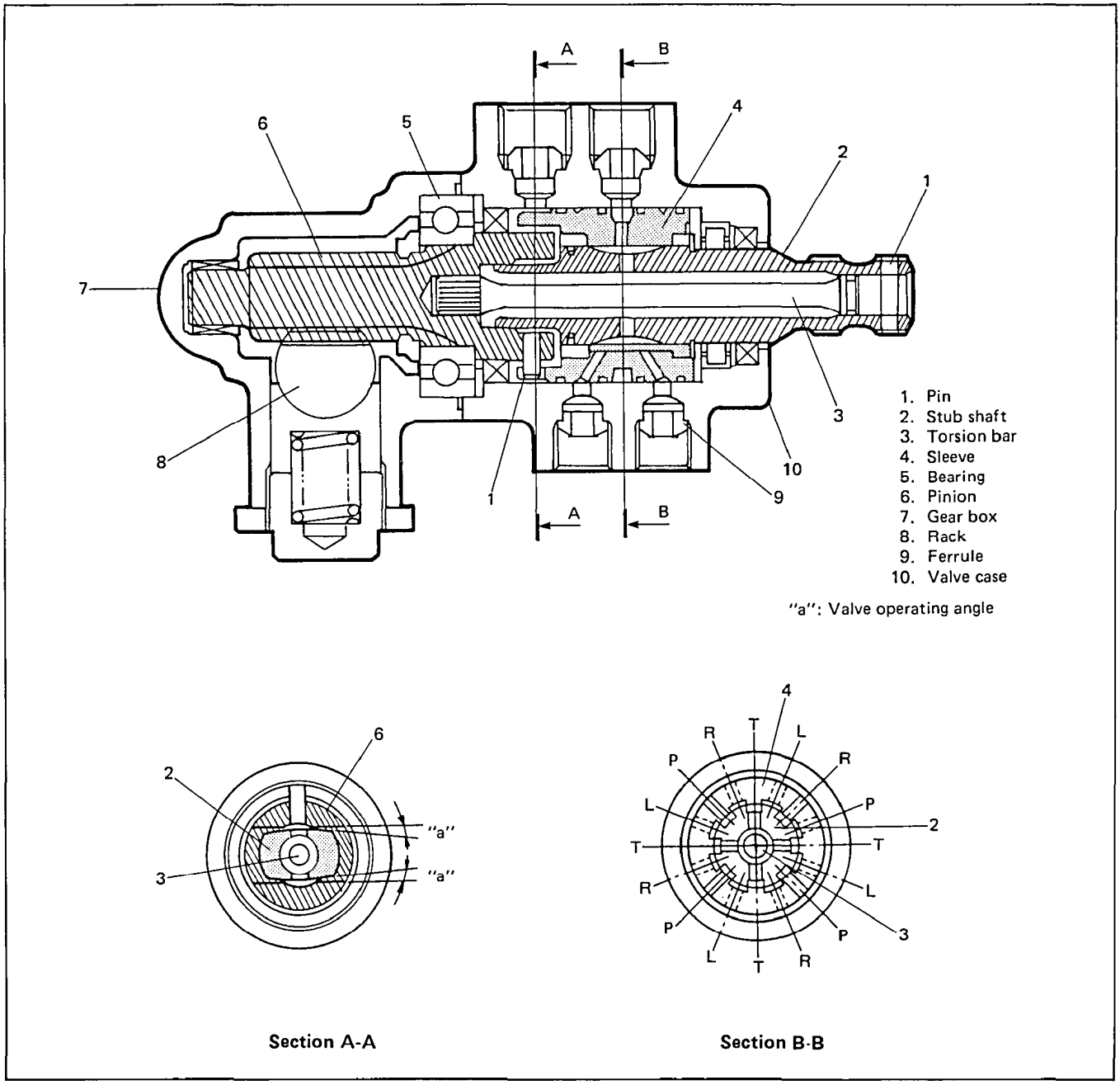


Fig. 3B1-3-1 Steering Gear and Valve Unit

WHEN STEERING WHEEL HELD AT STRAIGHT POSITION

When the steering wheel is not turned, the valve is held at the neutral position by the torsion bar and the fluid from the pump flows through the valve back to the tank.

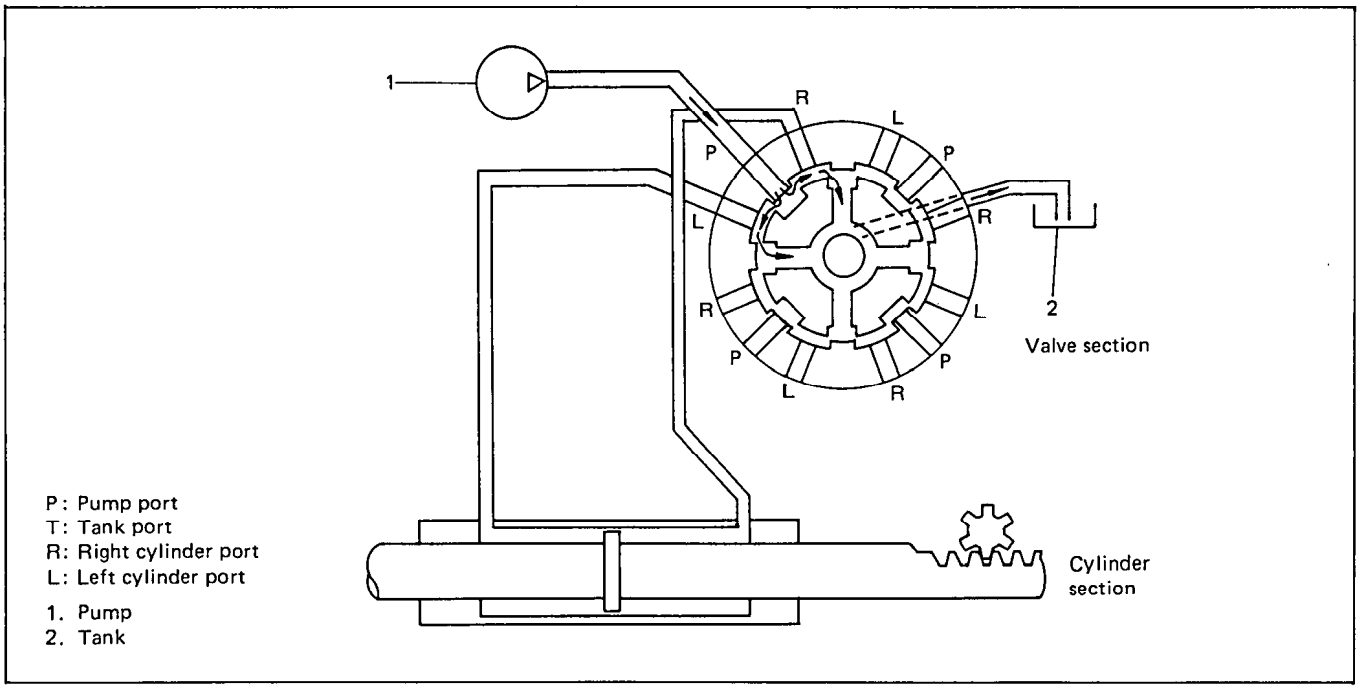


Fig. 3B1-4 Hydraulic Pressure Circuit When Steering Wheel at Straight

WHEN STEERING WHEEL TURNED (to the right)

Turning the steering wheel clockwise will cause the stub shaft to turn clockwise, twisting the torsion bar. Then the valve is switched to allow the fluid pressure to be applied to the cylinder which then pushes the rack.

As the rack moves, the pinion turns clockwise to actuate the torsion bar which then causes the valve to return to the neutral position. This is called the feed back operation of the power steering system.

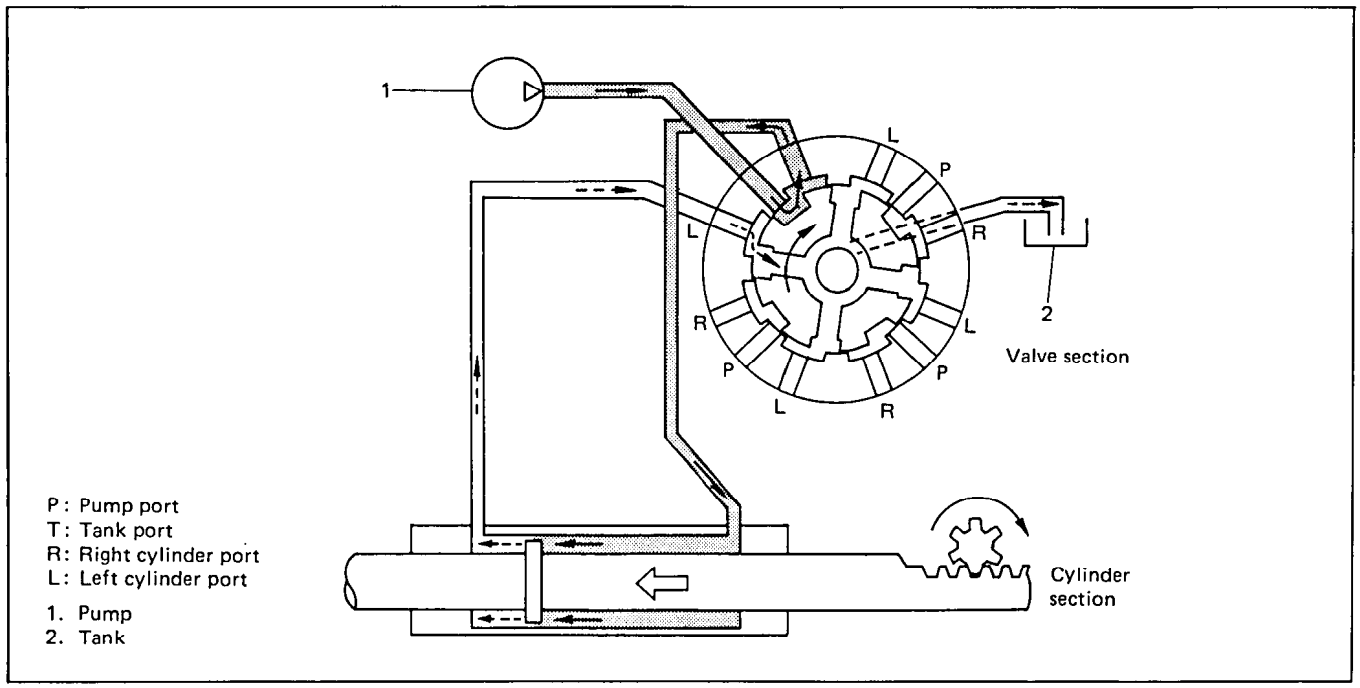
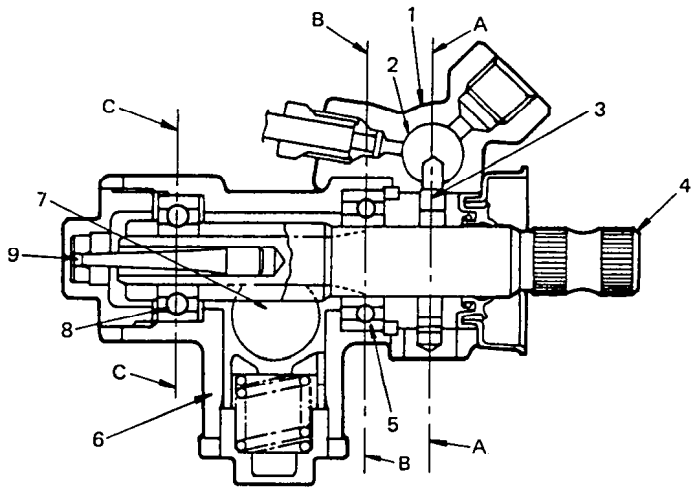
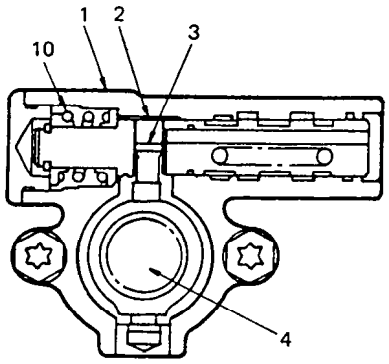


Fig. 3B1-5 Operation When Steering Wheel Turned to the Right

- **For RH steering model**

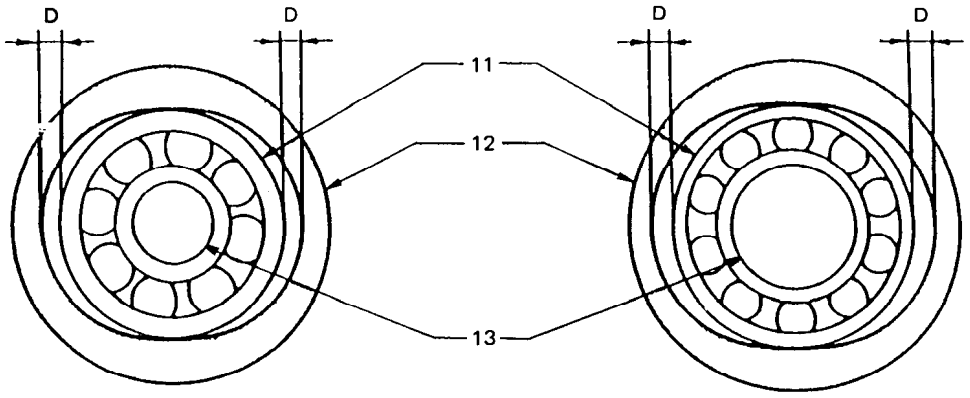
The steering gear box contains a gear, valve and cylinder sections. The gear and valve section consist of a valve case, spool valve, lever, pinion and other parts. There are two bearings to support the pinion in the gear case whose section is an oblong hole so that the bearing and pinion shaft can move to the right and left. And as the pinion shaft moves, the spool valve moves in the same direction, for they are connected. Such valve movement opens and closes the hydraulic pressure passage from the pump to either right or left cylinder port to assist the steering operation.





Section A – A

1. Valve case
2. Spool valve
3. Lever
4. Pinion
5. Bearing
6. Gear case
7. Rack
8. Bearing
9. Spring pin
10. Spring



Section B – B

Section C – C

D: Play
11. Bearing
12. Gear case
13. Pinion

Fig. 3B1-3-2 Steering Gear and Valve Unit

WHEN STEERING WHEEEL HELD AT STRAIGHT POSITION

When the steering wheel is not turned in either way, the spool valve is kept at its neutral position by the spring force and the hydraulic pressure from the pump passes through the short circuit.

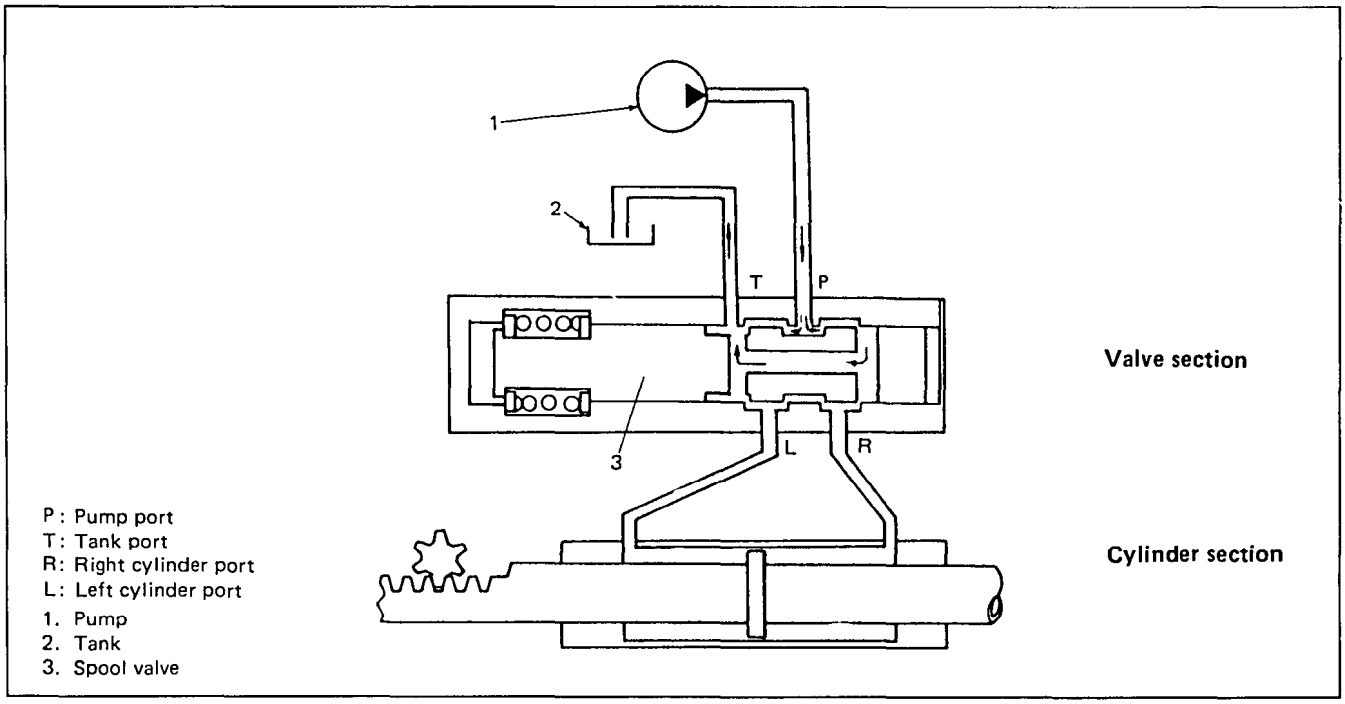


Fig. 3B1-4 Hydraulic Pressure Circuit When Steering Wheel at Straight Position

WHEN STEERING WHEEL TURNED (to the right)

Turning the steering wheel to the right causes the pinion shaft to move to the right by the amount equal to the play in the oblong hole provided in the periphery of the bearing. At the same time, the spool valve moves to the right through the lever, allowing hydraulic pressure to flow into the cylinder and push the rack shaft. When the force in the rotation direction of the pinion is released, the spool valve is returned to its neutral position by the reaction of the spring, thus shutting off the hydraulic pressure to the cylinder.

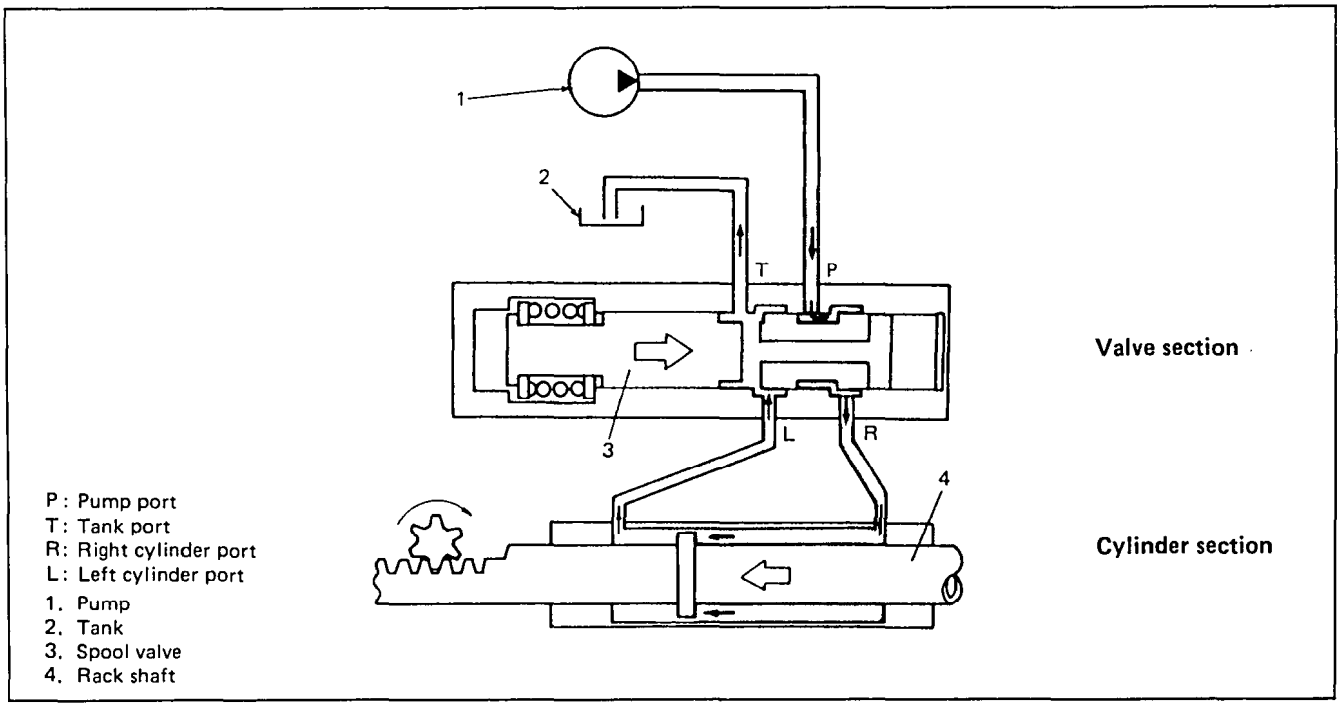


Fig. 3B1-5 Operation When Steering Wheel Turned to the Right

POWER STEERING (P/S) PUMP

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

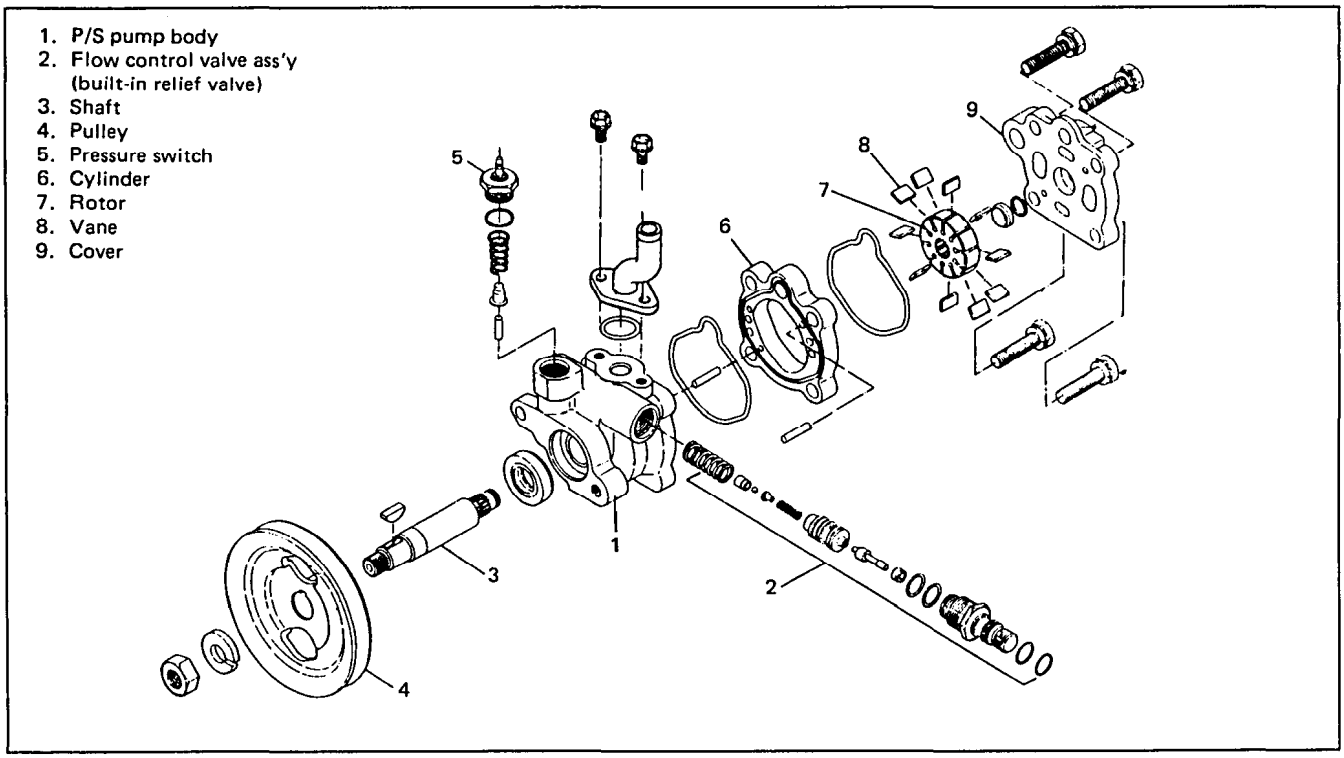


Fig. 3B1-6 Components of P/S Pump

Model		Vane type
Discharge rate		5.1 cm^3/rev
Hydraulic pressure control	Hydraulic pressure	4900 kPa 50 kg/cm^2 711 psi
	Control device	Flow control valve
		Relief valve
Specified fluid		DEXRON-II A/T fluid
Capacity		600 – 650 cm^3 (1.27/1.06 – 1.37/1.14 US/Imp. pt)
Idle-up system		Idle-up function performed when hydraulic pressure in P/S pump rises higher than following value. 1470 – 1960 kPa 15 – 20 kg/cm^2 213 – 284 psi

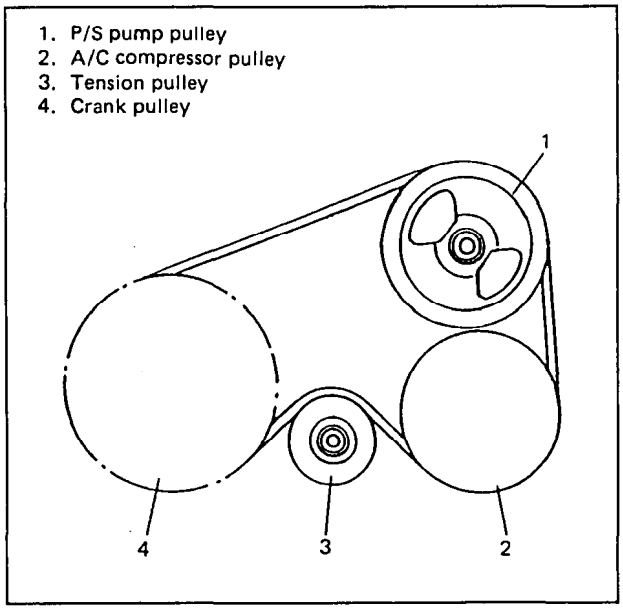


Fig. 3B1-7 P/S Pump Layout (Vehicle with A/C)

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.

When Idling

The fluid discharged from the pump is supplied through the clearance around the rod in orifice A_1 to the gear box.

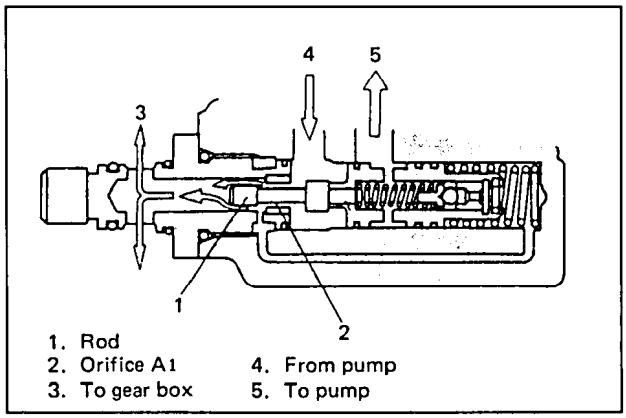


Fig. 3B1-8 Operation of Flow Control Valve (When Idling)

When Running at Low Speed

As the engine speed rises, the pump discharge rate increases and causes a pressure difference to occur between both ends of the orifice (P_1 – P_2). Thus the pressure exceeding the flow control spring force pushes the flow control valve to the right in the below figure, making the opening in the orifice narrower through which only a necessary amount of fluid is fed to the gear box and the excess fluid is returned to the pump.

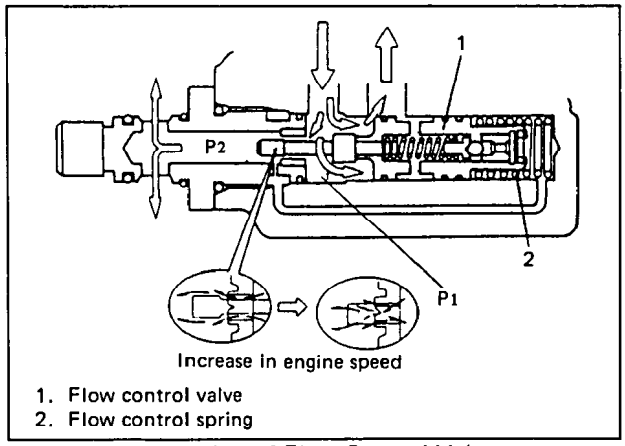


Fig. 3B1-9 Operation of Flow Control Valve (When Running at Low Speed)

When Running at High Speed

As the engine speed rises higher, opening in the orifice is made narrower and fluid flow to the gear box reduces. As a result, hydraulic pressure application is slow at the start of the steering wheel turn. This provides straight-ahead stability to suit the driving condition with the steering wheel operated near its neutral position.

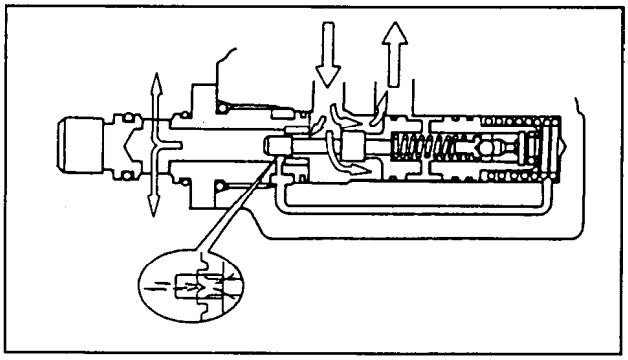


Fig. 3B1-10 Operation of Flow Control Valve (When Running at High Speed)

RELIEF VALVE

The relief valve located in the flow control valve controls the maximum hydraulic pressure.
The steel ball in the relief valve is under the hydraulic pressure in the circuit coming through orifice A_2. When the steering wheel is turned and the hydraulic pressure increases higher than 4900 kPa (50 kg/cm², 711 psi), it compresses the relief spring to push the steel ball which then allows the fluid to flow to the P/S pump.
Such relief valve operation causes a pressure difference to occur between chambers A and B. Then the flow control valve moves to the right to make opening in orifice A_1 narrower, maintaining the hydraulic pressure constant.

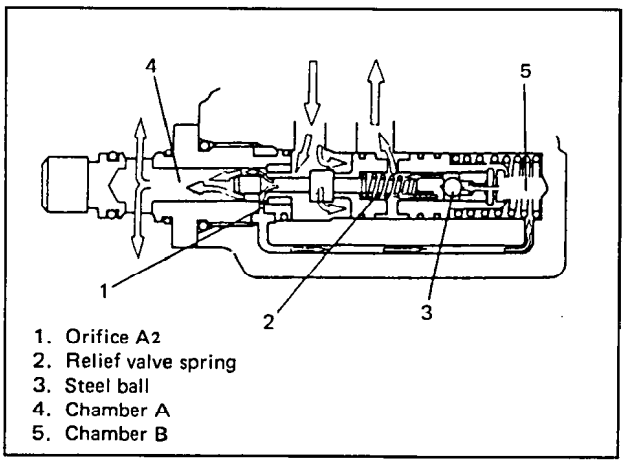


Fig. 3B1-11 Operation of Relief Valve

DIAGNOSIS

Condition	Possible Cause	Correction
Steering wheel feels heavy (at low speed)	1. Fluid deteriorated, low viscocity, different type of fluid mixed	Replace fluid.
	2. Pipes or hoses deformed, air entering through joint	Replace defective part.
	3. Insufficient air purging from P/S circuit	Purge air.
	4. P/S belt worn, lacking in tension	Adjust belt tension or replace belt as necessary.
	5. Tire inflation pressure excessively low	Inflate tire.
	6. Front end alignment maladjusted	Check and adjust front end alignment.
	7. Steering wheel installed improperly (twisted)	Install steering wheel correctly.
	8. Bind in tie rod or tie rod end ball joint	Replace defective part.
	9. P/S pump hydraulic pressure fails to increase	Replace P/S pump.
	10. P/S pump hydraulic pressure increases but slowly	Replace P/S pump.
	NOTE: **Make sure to warm up engine fully before measuring hydraulic pressure from pump.**	
Steering wheel feels heavy momentarily when turning it to the left (right)	1. Air drawn in due to insufficient amount of fluid	Add fluid and purge air.
	2. Slipping P/S belt	Adjust belt tension or replace belt as necessary.
	3. Refer to check items 9 and 10 in above section	
No idle-up	1. P/S pump pressure switch defective	Replace P/S pump pressure switch.
Poor recovery from turns	NOTE: **To check steering wheel for recovery, with car running at 22 mile/h (35 km/h), turn it 90° and let it free. It should return more than 60°.**	
	1. Deformed pipes or hoses	Replace defective part.
	2. Steering column installed improperly	Install steering column correctly.
	3. Front end alignment maladjusted	Check and adjust front end alignment.
	4. Ball joints binding	Replace defective part.
	5. Refer to items 9 and 10 in above section	

Condition	Possible Cause	Correction
Vehicle pulls to one side during straight driving	1. Low or uneven tire inflation pressure	Inflate tires to proper pressure or adjust right & left tires inflation pressure.
	2. Front end alignment maladjusted	Check and adjust front end alignment.
	3. Malfunction of control valve in gear box	Replace gear box.
	4. Refer to check items 9 and 10 in previous page	
Steering wheel play is large and vehicle wanders	1. Loose steering shaft nut	Retighten.
	2. Loose linkage or joints	Retighten.
	3. Loose gear box fastening bolt	Retighten.
	4. Front wheel bearing worn	Replace wheel bearing.
Oil leakage	1. Loose joints of (hydraulic pressure) pipes and hoses	Retighten.
	2. Deformed or damaged pipes or hoses	Replace defective part.
Abnormal noise	**NOTE: (For RH steering model)** **Some sound may be heard through steering column when turning steering wheel with vehicle at a stop but it is not an abnormal noise but operating sound of valve in gear box.**	
	1. Air drawn in due to insufficient amount of fluid	Add fluid and purge air.
	2. Air mixed into fluid from pipes or hoses	Replace pipes or hoses.
	3. Slipping (loose) P/S belt	Adjust belt tension.
	4. Worn P/S belt	Replace belt.
	5. Loose gear box fastening bolt	Retighten bolts.
	6. Loose pitman arm nut	Retighten nut.
	7. Loose linkage or joints	Retighten.
	8. Pipes or hoses in contact with part of vehicle body	Install pipes and hoses correctly.
	9. Vanes of P/S pump defective	Replace pump.
	10. Malfunction of control valve in gear box	Replace gear box.
	11. Bearing of P/S pump shaft defective	Replace pump.

ON CAR SERVICE

INSPECTION

STEERING WHEEL PLAY

- With engine stopped, check steering wheel play as follows. Move steering wheel from its straight-ahead position lightly in both directions and measure distance along its circumference it must be turned before wheels start to move. It should be within below specification.

Steering wheel play	Less than 30 mm (1.2 in.)

- Check steering wheel for looseness or rattle by trying to move it in its shaft direction and lateral direction.

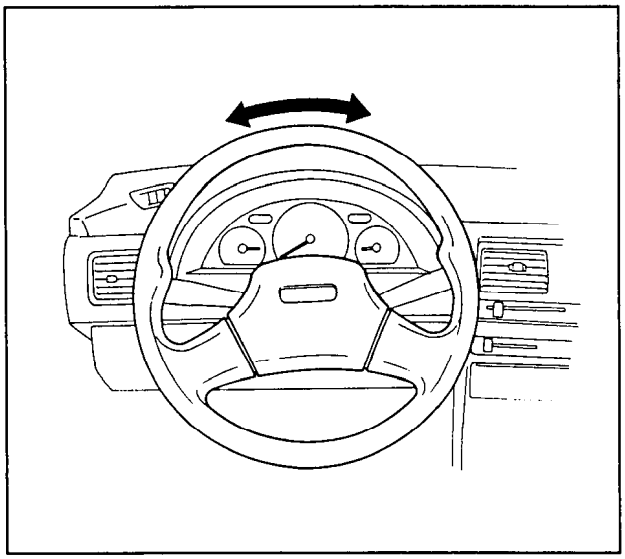


Fig. 3B1-12 Steering Wheel Play

STEERING FORCE

1) Place vehicle on level road and set steering wheel at straight-ahead position.
2) Check that tire inflation pressure is as specified. (Refer to tire placard).
3) Start engine and keep it running till power steering fluid is warmed to 50 to 60° C (122 to 140° F).

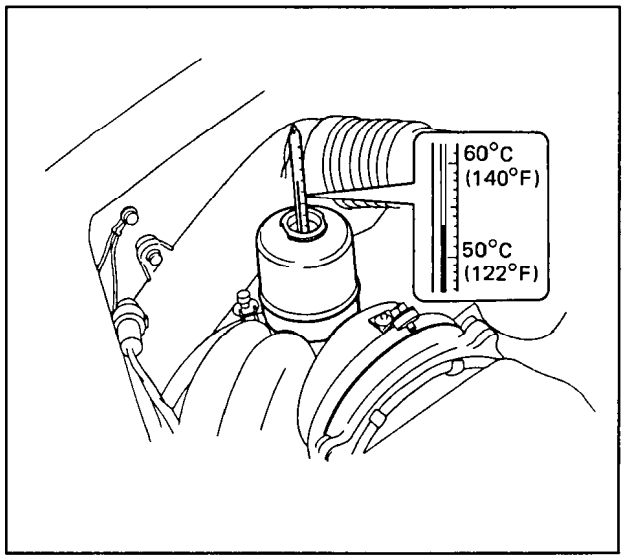


Fig. 3B1-13 Checking Fluid Temperature

4) With engine idling, measure steering force by pulling spring balancer hooked on steering wheel in tangential direction.

Steering force	Less than 4.0 kg (8.8 lb)

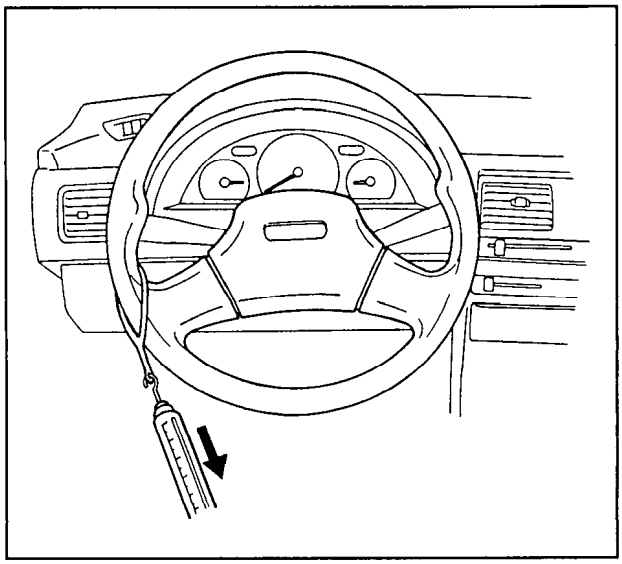


Fig. 3B1-14 Checking Steering Force

POWER STEERING FLUID LEVEL

With engine stopped, remove oil tank cap and check fluid level indicated on level gauge, which should be between MAX and MIN marks.
If it is lower than MIN, fill fluid up to MAX mark.

NOTE:

- **Be sure to use A/T fluid DEXRON-II.**
- **Fluid level should be checked when fluid is cool.**

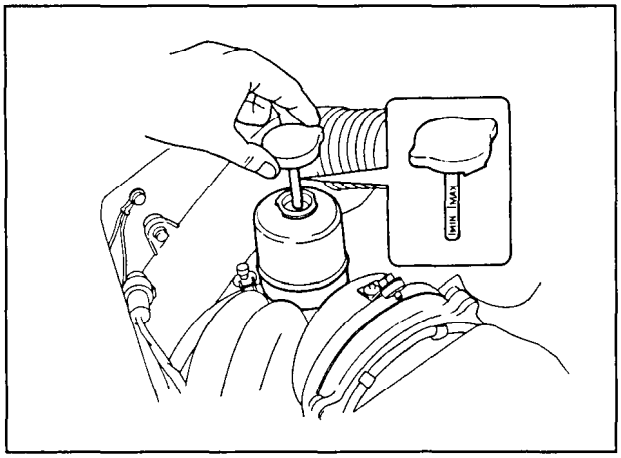


Fig. 3B1-15 Checking P/S Fluid Level

POWER STEERING BELT TENSION

- Check that belt is free from any damage and properly fitted in pulley groove.
- Check belt tension by measuring how much it deflects when pushed at intermediate point between P/S pump pulley and crank pulley with about 10 kg (22 lb) force.

Deflection of P/S belt (A)	8 – 10 mm (0.31 – 0.39 in.)

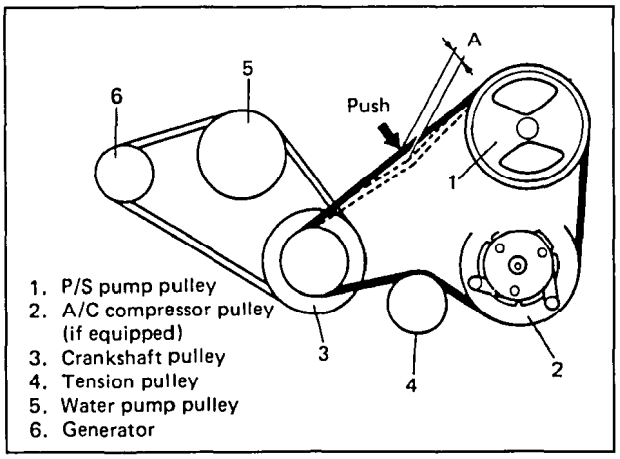


Fig. 3B1-16 Checking P/S Belt Tension

POWER STEERING BELT TENSION ADJUSTMENT

1. Remove splash cover and loosen tension nut.
2. Adjust belt tension. With A/C equipped vehicles, turning tension bolt counterclockwise causes pulley to rise, increasing belt tension. With A/C non-equipped vehicles, turning tension bolt clockwise causes pulley to lower, increasing belt tension. In both cases, turning tension bolt in the other way decreases belt tension.
   Be sure to tighten tension nut after adjusting belt tension.

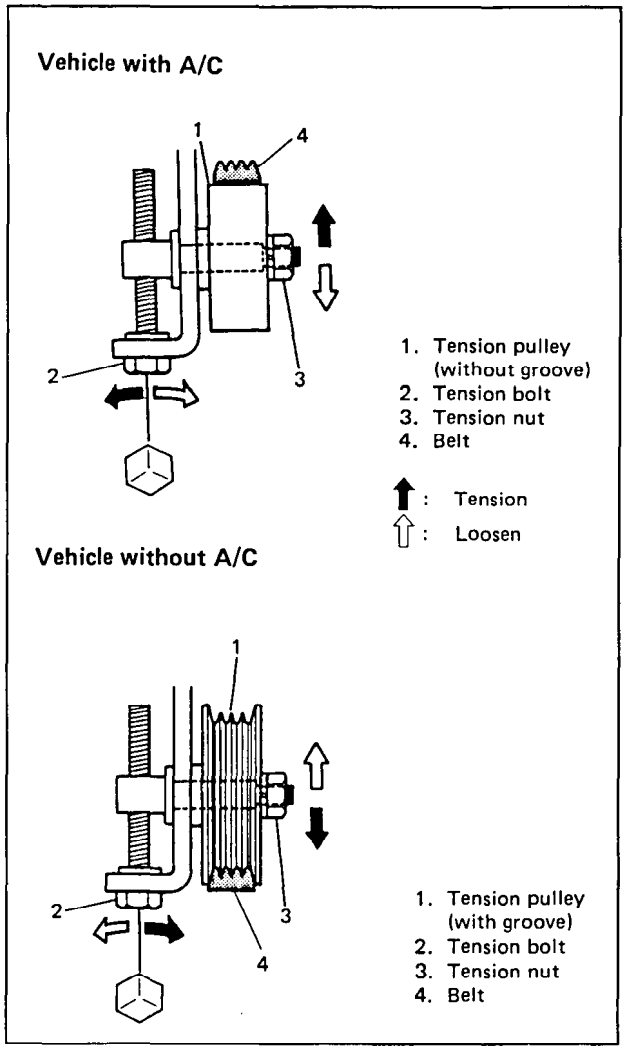


Fig. 3B1-17 Adjusting P/S Belt Tension

IDLE UP SYSTEM

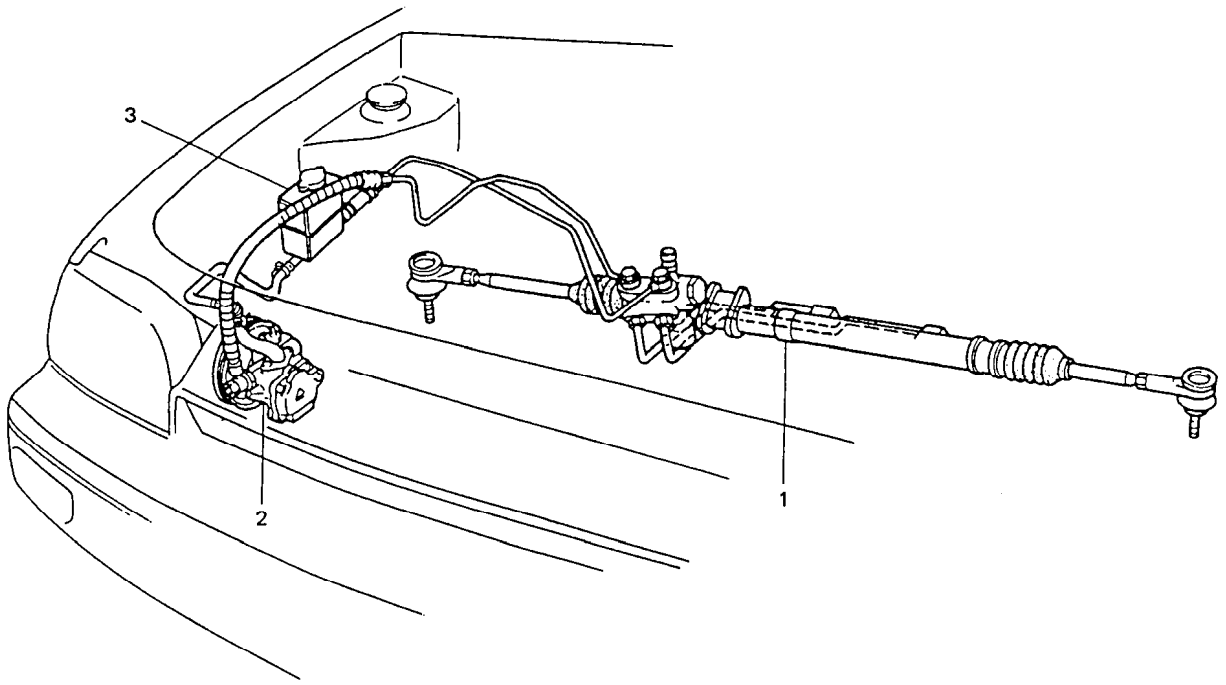
With air conditioner turned OFF (if equipped, turn steering wheel and check that engine idling speed is not slowed down even when load is imposed on engine by P/S pump.

FLUID LEAKAGE

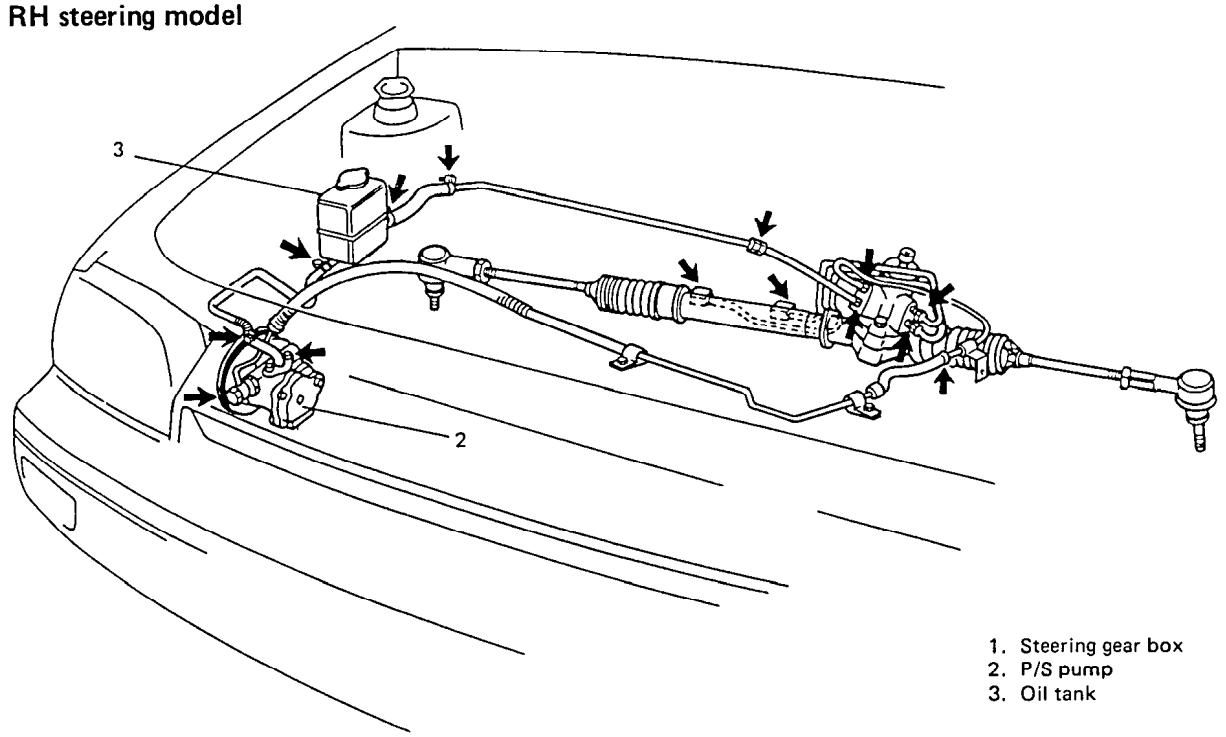
Start engine and turn steering wheel fully to the right and left so that maximum hydraulic pressure is provided. Then visually check gear box, P/S pump and oil tank themselves and each joint of their connecting pipes for leakage.

CAUTION: Never keep steering wheel turned fully for longer than 10 seconds.

For LH steering model



For RH steering model



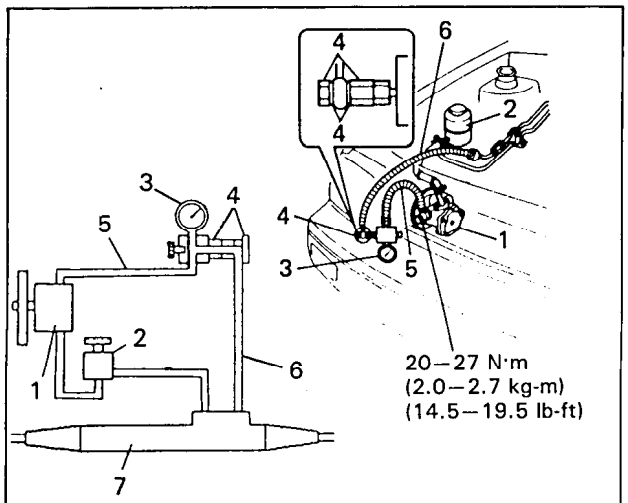
1. Steering gear box
2. P/S pump
3. Oil tank

Fig. 3B1-18 Check for Fluid Leakage

HYDRAULIC PRESSURE IN P/S CIRCUIT

1. After cleaning joint of high pressure hose and oil pump thoroughly, disconnect it and install oil pressure gauge, oil pressure gauge attachment and hose (Spare part).

CAUTION:
Take care not to cause damage to air-conditioner condenser during service operation.



1. P/S pump
2. Oil tank
3. Oil pressure gauge (09915-77410)
4. Oil pressure gauge attachment (09915-77430)
5. Hose (Spare part: 49221-70C10)
6. High pressure side
7. P/S gear box

Fig. 3B1-19 Setting Oil Pressure Gauge

2. Bleed air. (Refer to AIR BLEEDING PROCEDURE.)
3. With engine idling, turn steering wheel and warm up engine till temperature of fluid in tank rises to 50 – 60°C (122 – 140°F).

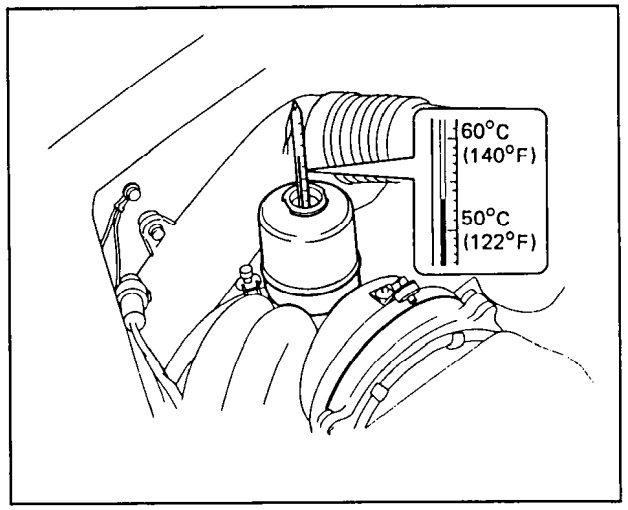
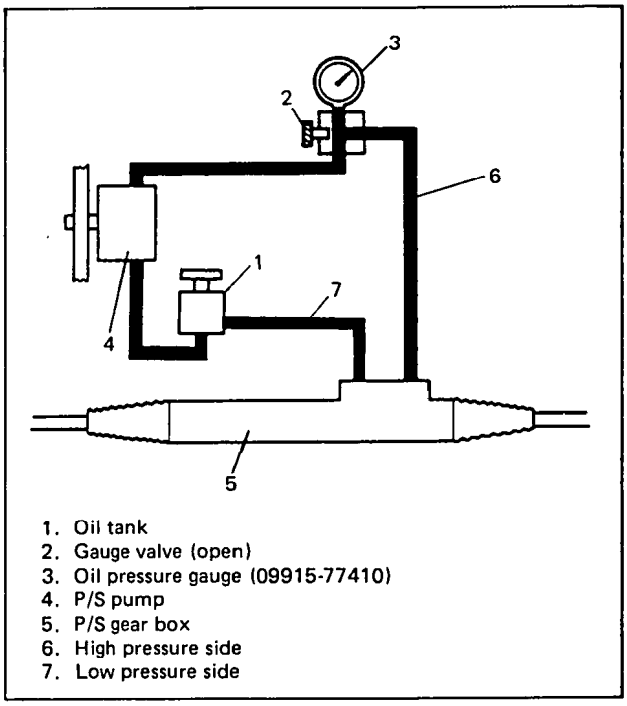


Fig. 3B1-20 Checking Fluid Temperature

4. Back pressure check
   Check back pressure by measuring hydraulic pressure with engine idling and hands off steering wheel.

Back pressure	Lower than 980 kPa (10 kg/cm², 142 psi)

When back pressure is higher than 980 kPa (10 kg/cm², 142 psi), check control valve and piping for clogging.



1. Oil tank
2. Gauge valve (open)
3. Oil pressure gauge (09915-77410)
4. P/S pump
5. P/S gear box
6. High pressure side
7. Low pressure side

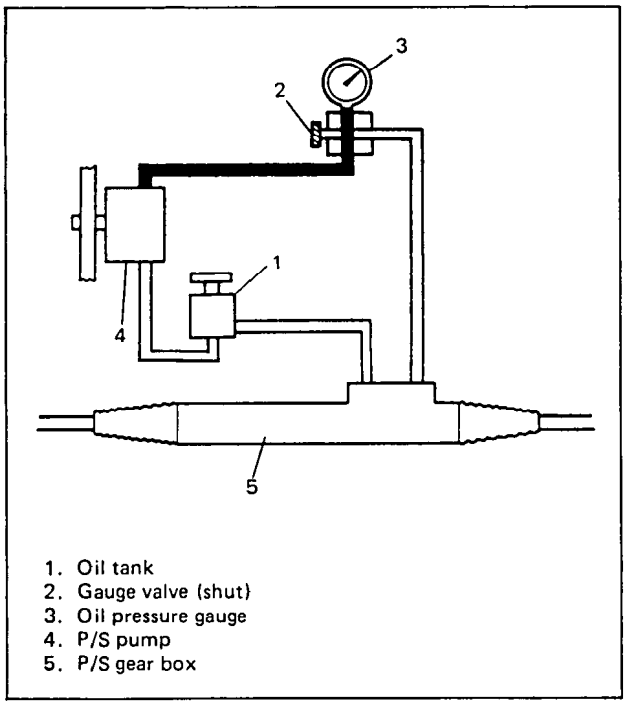
Fig. 3B1-21 Checking Back Pressure

5. Relief pressure check
   - Increase engine speed to about 1,500 r/min (rpm). Close gauge valve gradually while watching pressure increase indicated by gauge and take reading of relief pressure (maximum hydraulic pressure).

Relief pressure	4400 – 6400 kPa (45 – 65 kg/cm²) (640 – 924 psi)

   - When it is higher than 6400 kPa (65 kg /cm², 924 psi), possible cause is malfunction of relief valve.
     Replace steering gear box comp.
   - When it is lower than 4400 kPa (45 kg/cm², 640 psi), possible cause is either failure of P/S pump or settling of relief valve spring.

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



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

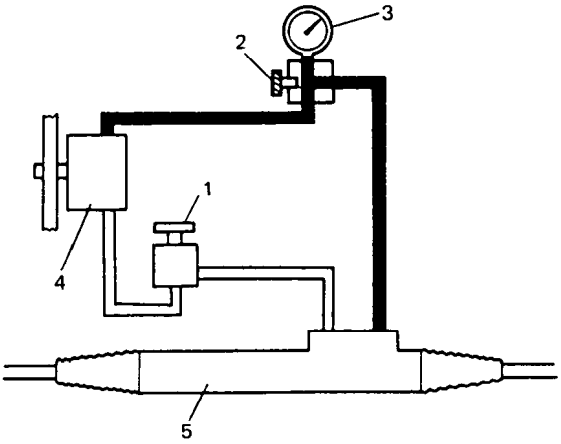
Fig. 3B1-22 Relief Pressure Check

Next, open gauge valve fully and increase engine speed to about 1,500 r/min. Then turn steering wheel to the left or right fully and take reading of relief pressure.

Relief pressure	4400 – 6400 kPa (45 – 65 kg/cm⊕) (640 – 924 psi)

   - When it is lower than 4400 kPa (45 kg/cm², 640 psi), possbile cause is failure in steering gear box.
     Replace gear box.

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



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

Fig. 3B1-23 Relief Pressure Check

STEERING RACK BOOT

Check boot for crack and damage which, if any, means possibility of rusty gear, entry of dust or lack of grease. Also, check if any of such faulty conditions exists.

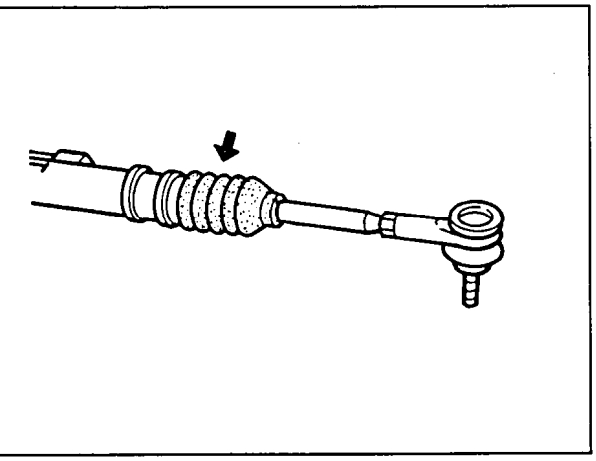


Fig. 3B1-24

TIE ROD END BOOT

Check boot for crack and damage and if any, replace it with a new one.

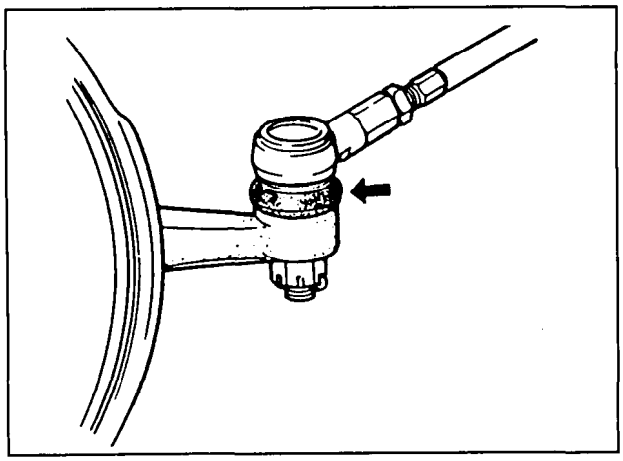


Fig. 3B1-25

STEERING SHAFT JOINT

Check each shaft joint for wear, breakage and any other damage and if any, replace it with a new one.

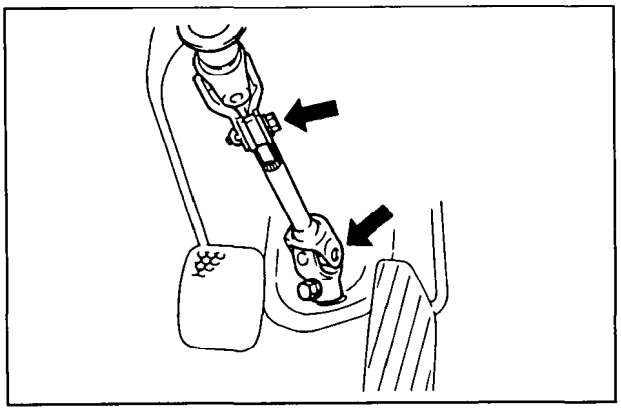


Fig. 3B1-26

AIR BLEEDING PROCEDURE

1. Jack up the front end of car and apply rigid rack.
2. Fill oil tank with fluid up to specified level. Then turn steering wheel to the right and left for 3 or 4 times.
3. After running engine at idling speed for 3 to 5 seconds, stop it and add fluid to satisfy specification.
4. With engine stopped, turn steering wheel to the right and left as far as it stops, repeat it a few times and fill fluid to specified level.
5. With engine running at idling speed, repeat stop-to-stop turn of steering wheel till all foams in oil tank are gone.

NOTE:

Make sure to bleed air completely. If air remains in fluid, P/S pump may make humming noise or steering wheel may feel heavy.

6. Finally check to make sure that fluid is filled to specified level.

REMOVE AND INSTALL TIE ROD END

REMOVAL

1. Jack up vehicle and remove wheel.
2. Remove split pin and tie rod end castle nut.

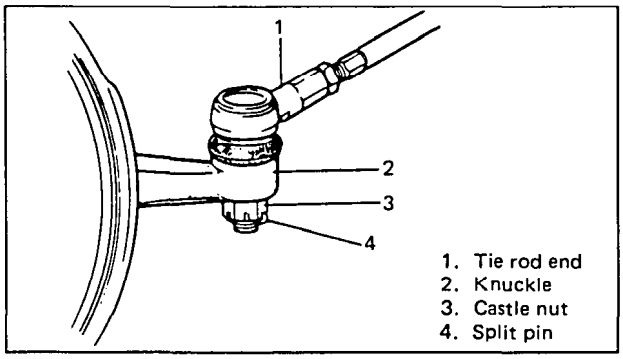


Fig. 3B1-27 Tie Rod End

3. Using special tool, remove tie rod end from knuckle.

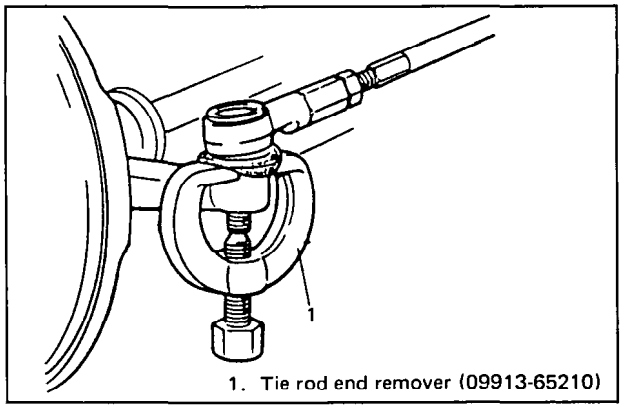


Fig. 3B1-28 Removing Tie Rod End

4. To facilitate adjustment after installation, put a mark on tie rod thread indicating position of tie rod end lock nut. Then loosen lock nut and remove tie rod end from tie rod.

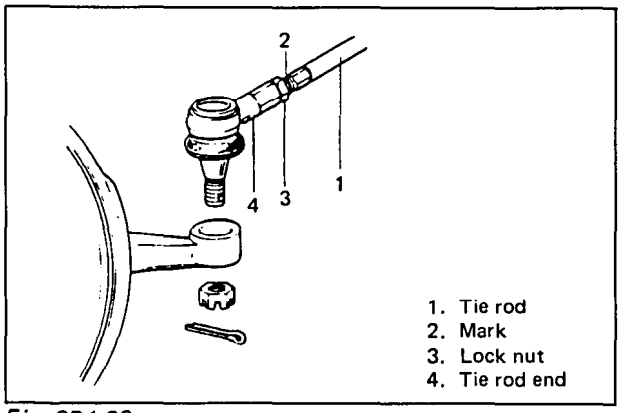


Fig. 3B1-29

INSPECTION

Tie-rod End Ball Joint

Inspect for play in tie-rod end ball joint. If found defective, replace.

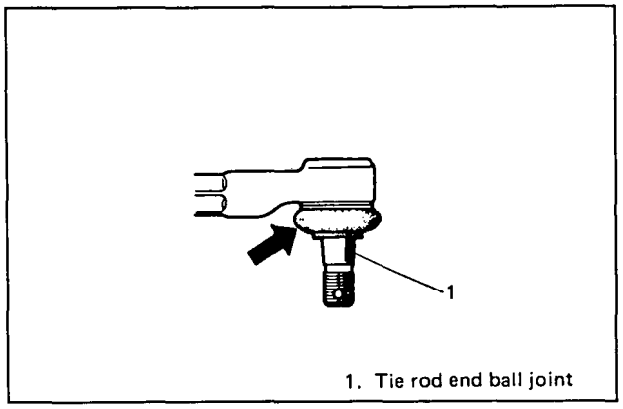


Fig. 3B1-30 Inspection of Ball Joint

INSTALLATION

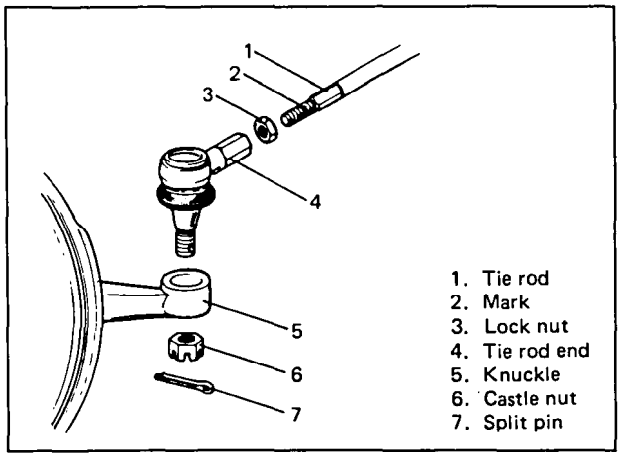


Fig. 3B1-31

1. Install tie rod end lock nut and tie rod end to tie rod. Tighten lock nut to mark on tie rod thread.
2. Install tie rod end to knuckle. Tighten castle nut till holes for split pin are aligned but within specified torque range.

Tightening torque	N·m	kg-m	lb-ft
	30 – 55	3.0 – 5.5	22.0 – 39.5

3. Bend split pin as shown in figure.

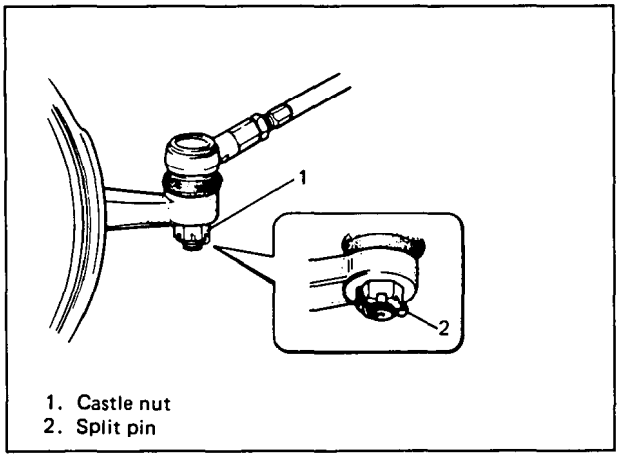


Fig. 3B1-32 Tightening Castle Nut

4. Check that proper amount of toe-in is obtained. (Refer to FRONT WHEEL ALIGNMENT.)
5. After confirming proper amount of toe-in, tighten tie rod end lock nut to specified torque.

Tightening torque	N·m	kg-m	lb-ft
	35 – 55	3.5 – 5.5	25.5 – 39.5

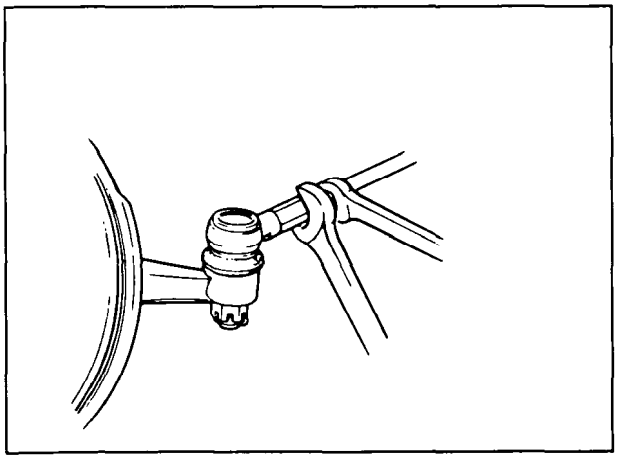


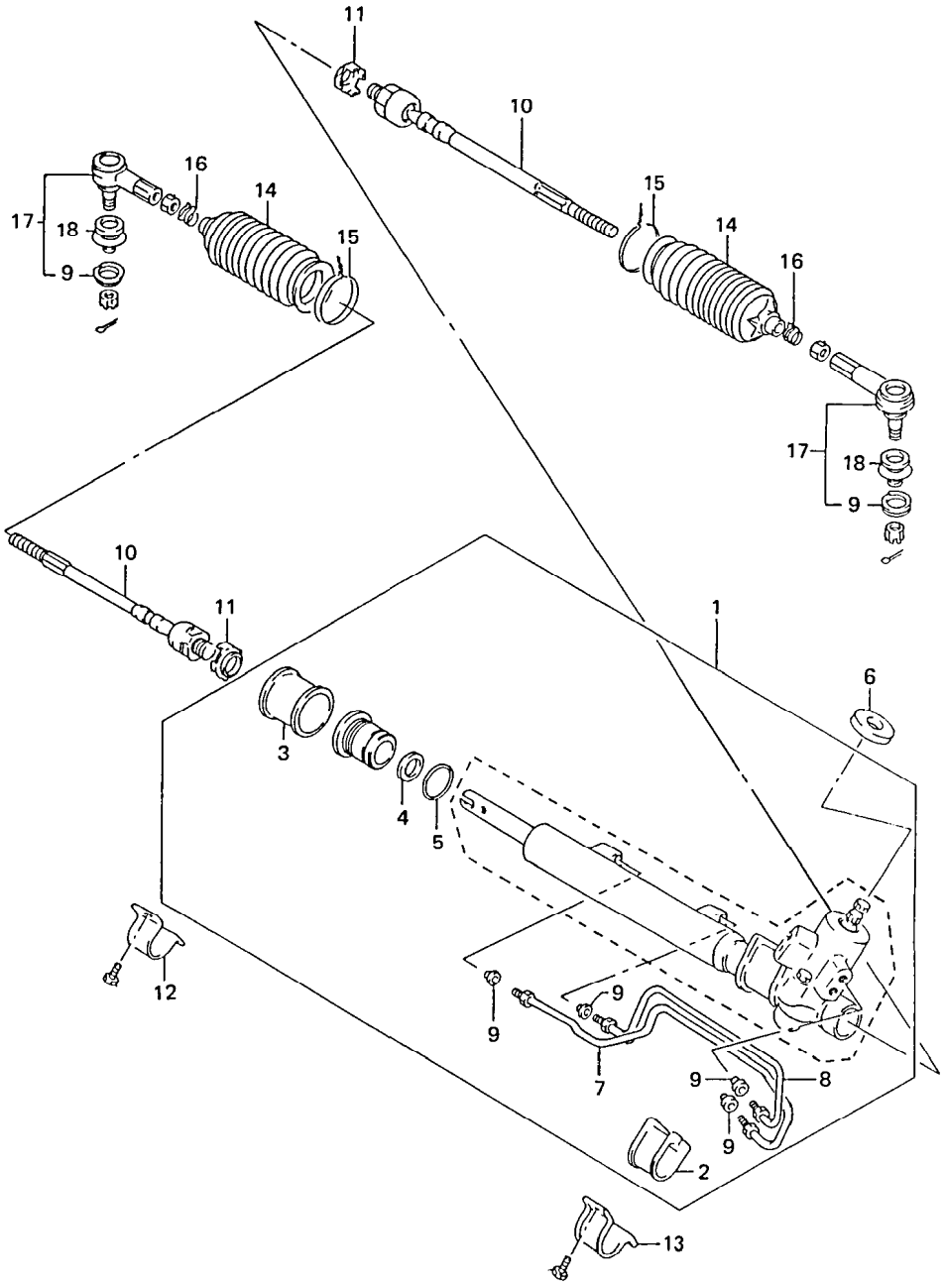
Fig. 3B1-33 Tightening Lock Nut

6. After installing wheels, lower car and tighten wheel nuts to specified torque.

REMOVE AND INSTALL POWER STEERING GEAR BOX

POWER STEERING GEAR BOX COMPONENTS

For LH steering model



1. Steering gear
2. Steering pinion side mount
3. Steering rack side mount
4. U-packing
5. O-ring
6. Gasket
7. Pipe ass'y A
8. Pipe ass'y B
9. Clip
10. Tie rod
11. Tie rod lock washer
12. Rack side bracket
13. Pinion side bracket
14. Steering boot
15. Rack boot wire
16. Rack boot clip
17. Steering tie rod end
18. Boot set

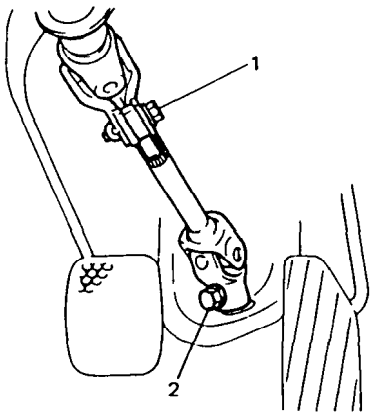
NOTE:
Component enclosed in broken line cannot be disassembled.

Fig. 3B1-34 Exploded View of Power Steering Gear Box

STEERING GEAR BOX

Removal

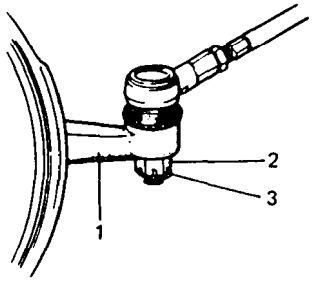
1. Loosen steering shaft upper joint bolt (but it must not be removed).
2. Remove lower joint bolt and separate pinion and lower joint.



1. Steering shaft upper joint bolt
2. Steering shaft lower joint bolt

Fig. 3B1-35 Removing Joint Bolt

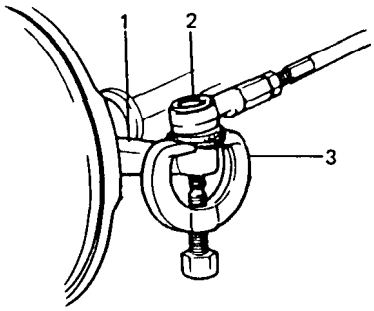
3. Jack up vehicle and remove both right and left wheels.
4. Remove split pin and then remove tie rod castle nut from steering knuckle.



1. Steering knuckle
2. Castle nut
3. Split pin

Fig. 3B1-36

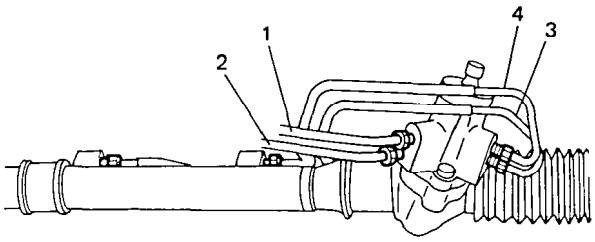
5. Using special tool, remove tie rod end from knuckle.



1. Knuckle
2. Tie rod end
3. Tie rod end remover (09913-65210)

Fig. 3B1-37 Removing Tie Rod End

6. Remove exhaust pipe.
7. Disconnect both gear shift control shaft and extension rod at their transmission side.
8. Remove all pipes from steering gear box.



1. High pressure pipe
2. Low pressure pipe
3. Pipe ass'y A
4. Pipe ass'y B

Fig. 3B1-38 Removing Pipes

9. Remove steering gear box mounting bolts and then remove steering gear box from car.

Installation

Reverse removal procedure for installation of steering gear box.

	Tightening torque		
	N·m	kg-m	lb-ft
Gear box mounting bolt	20 – 30	2.0 – 3.0	14.5 – 21.5

For specific tightening torque for each part, refer to respective section as indicated in below table.

• Rear torque rod bolt • Rear torque rod bracket bolts	SECTION 6A
• Gear shift control shaft bolt/nut • Extension rod nut	SECTION 7A
• Exhaust pipe bolts and nuts	SECTION 6K
• Castle nut • Steering shaft lower joint bolts	SECTION 3B

- Tighten flare nuts to specified torque.

	N·m	kg-m	lb-ft
"A"	40 – 50	4.0 – 5.0	29.0 – 36.0
"B"	30 – 40	3.0 – 4.0	22.0 – 28.5
"C"	20 – 30	2.0 – 3.0	14.5 – 21.5

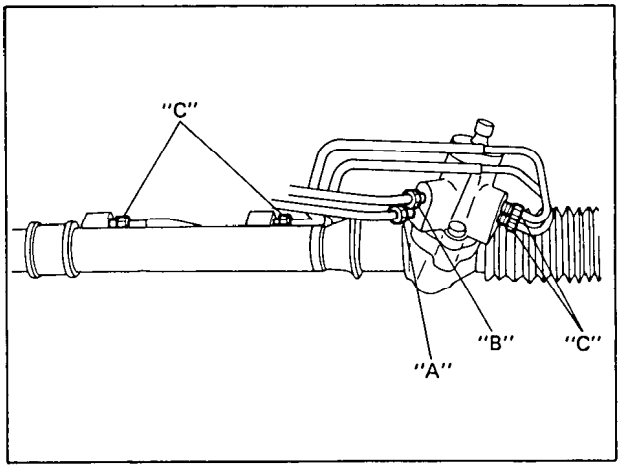


Fig. 3B1-38-1

NOTE:

After installation, be sure to fill A/T fluid (DEXRON-II) and bleed air.

OIL SEAL

Removal

1. Remove gear box from car.
   Refer to item STEERING GEAR BOX.
2. As shown below, move boot so that joint section of tie rod and steering rack is exposed.

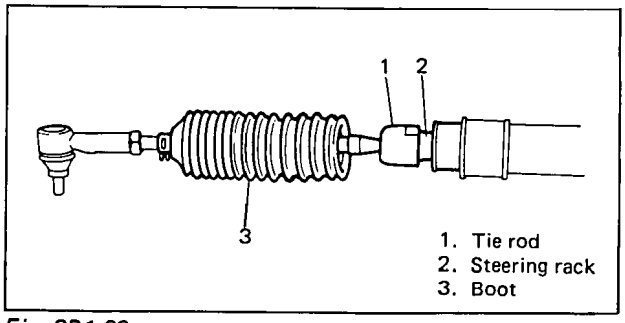


Fig. 3B1-39

3. Remove tie rod with tie rod end from gear box as shown below.

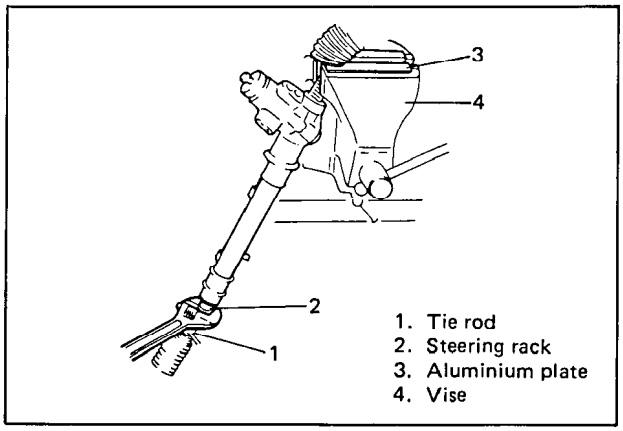


Fig. 3B1-40

4. Using special tool, remove box.

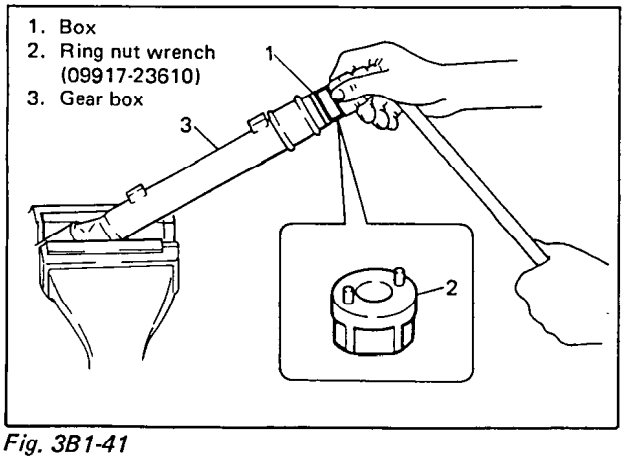


Fig. 3B1-41

5. Remove O-ring and/or U-packing.

Installation

Reverse removal procedure to install oil seals noting following points.

- Apply SUZUKI SUPER GREASE E to O-ring and U-packing of box and install them into groove in box.

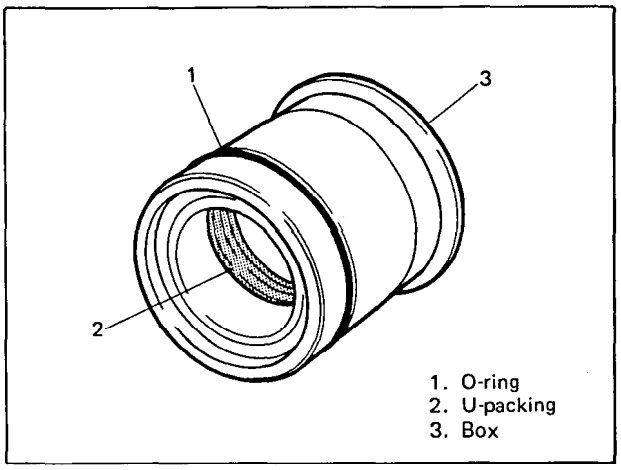


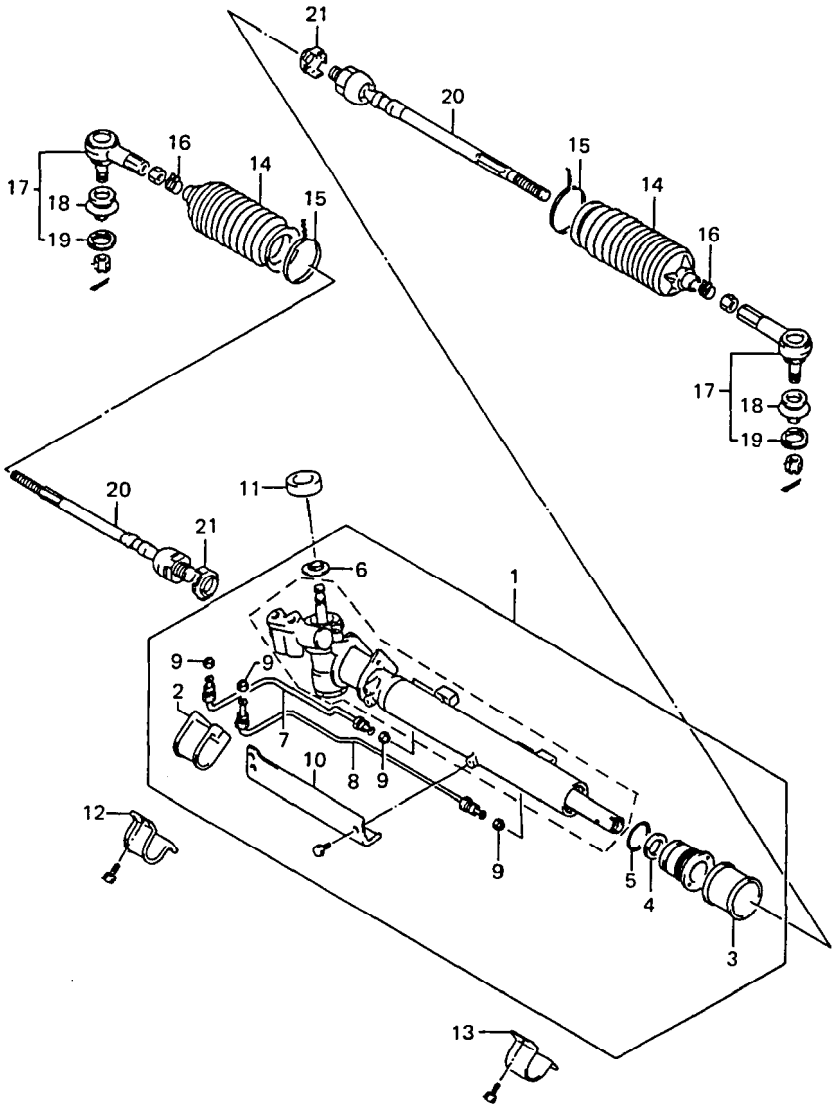
Fig. 3B1-42

- Tighten box and tie rod to specified torque.

	N·m	kg-m	lb-ft
Tightening torque for box	40 – 50	4.0 – 5.0	29.0 – 36.0
Tightening torque for tie rod	60 – 80	6.0 – 8.0	43.5 – 57.5

- Make sure to use new tie rod lock washer and caulk it after installation.

For RH steering model



1. Right steering gear
2. Steering pinion-side mount
3. Steering rack-side mount
4. U-packing
5. O-ring
6. Oil seal
7. Pipe ass'y A
8. Pipe ass'y B
9. Ferrule
10. Power steering cover
11. Steering gear case packing
12. Pinion side bracket
13. Rack side bracket
14. Steering boot
15. Rack boot wire
16. Rack boot clip
17. Tie rod end
18. Boot set
19. Clip
20. Steering tie rod
21. Tie rod lock washer

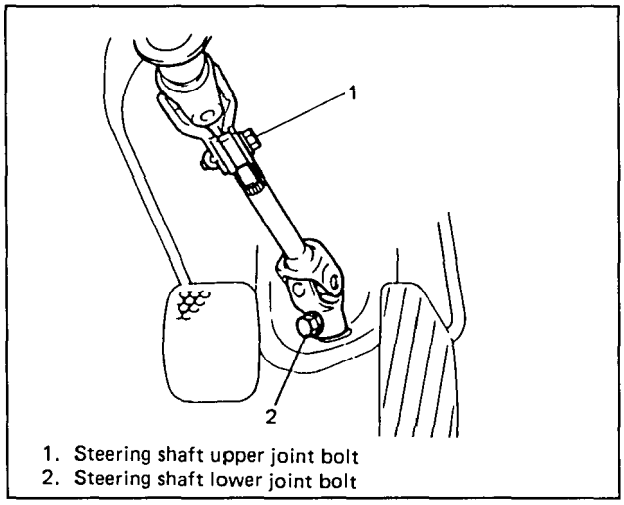
NOTE:
Component enclosed in broken line cannot be disassembled.

Fig. 3B1-34 Exploded View of Power Steering Gear Box

STEERING GEAR BOX

Removal

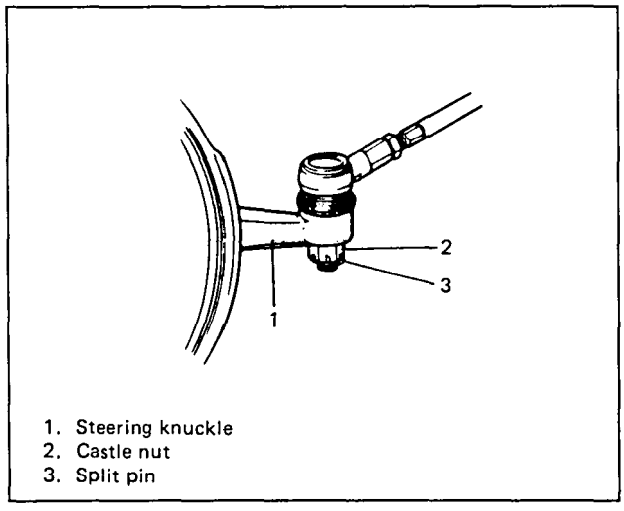
1. Loosen steering shaft upper joint bolt (but it must not be removed).
2. Remove lower joint bolt and separate pinion and lower joint.



1. Steering shaft upper joint bolt
2. Steering shaft lower joint bolt

Fig. 3B1-35 Removing Joint Bolt

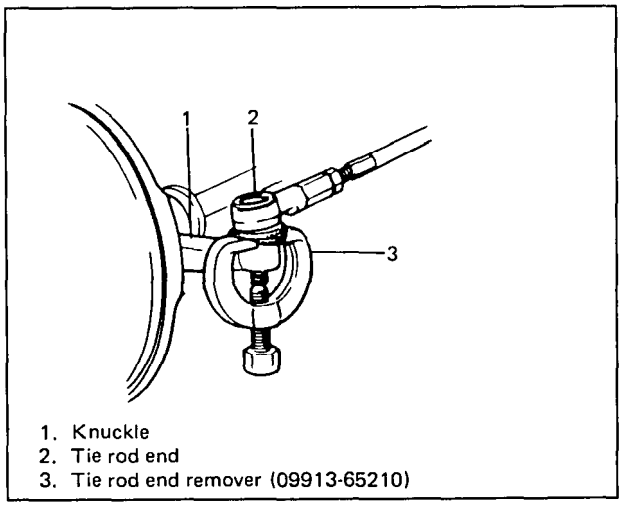
3. Jack up vehicle and remove both right and left wheels.
4. Remove split pin and then remove tie rod castle nut from steering knuckle.



1. Steering knuckle
2. Castle nut
3. Split pin

Fig. 3B1-36

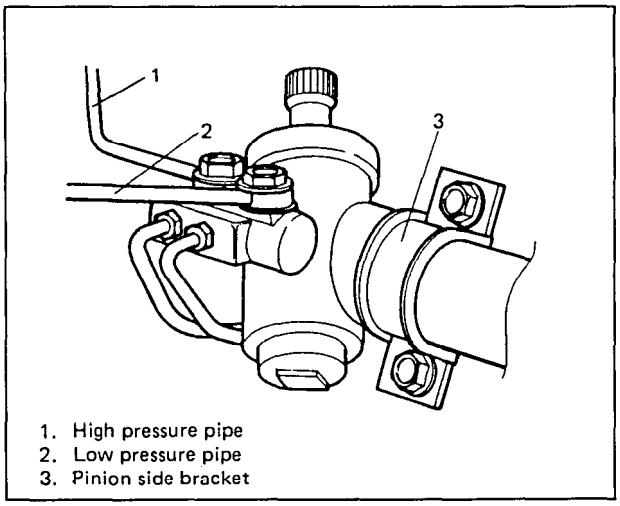
5. Using special tool, remove tie rod end from knuckle.



1. Knuckle
2. Tie rod end
3. Tie rod end remover (09913-65210)

Fig. 3B1-37 Removing Tie Rod End

6. Remove high pressure pipe and low pressure pipe from steering gear box.



1. High pressure pipe
2. Low pressure pipe
3. Pinion side bracket

Fig. 3B1-38 Removing Pressure Pipe

7. Remove steering gear box mounting bolts and then remove steering gear box from vehicle.

Installation

Reverse removal procedure for installation of steering gear box.

	Tightening torque		
	N·m	kg-m	lb-ft
Gear box mounting bolt	20 – 30	2.0 – 3.0	14.5 – 21.7
Castle nut	30 – 55	3.0 – 5.5	21.7 – 39.8
Joint bolt	20 – 30	2.0 – 3.0	14.5 – 21.7

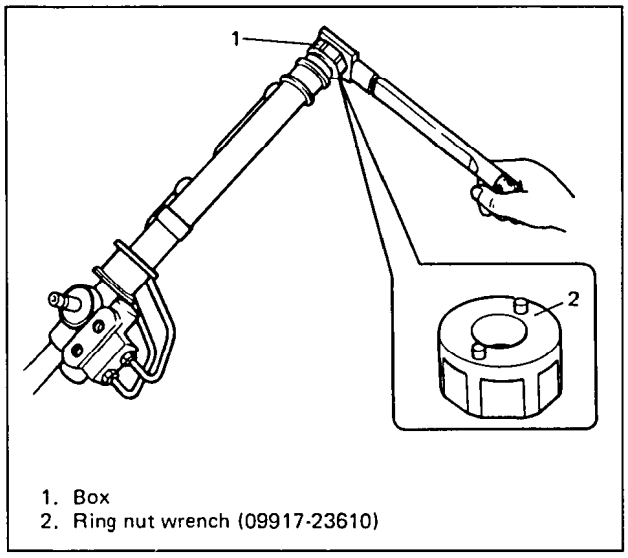
NOTE:

After installation, be sure to fill A/T fluid (DEXRON-II) and bleed air.

OIL SEAL

Removal

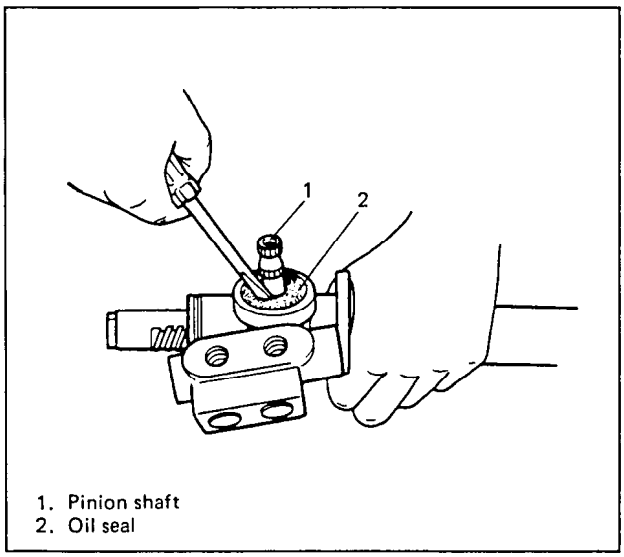
1. Remove gear box, tie rod end and tie rod.
2. Using special tool, remove box.



1. Box
2. Ring nut wrench (09917-23610)

Fig. 3B1-39 Removing Box

3. Remove oil seal by using screwdriver or the like.



1. Pinion shaft
2. Oil seal

Fig. 3B1-40 Removing Oil Seal

NOTE:

Use care not to damage pinion shaft with screwdriver.

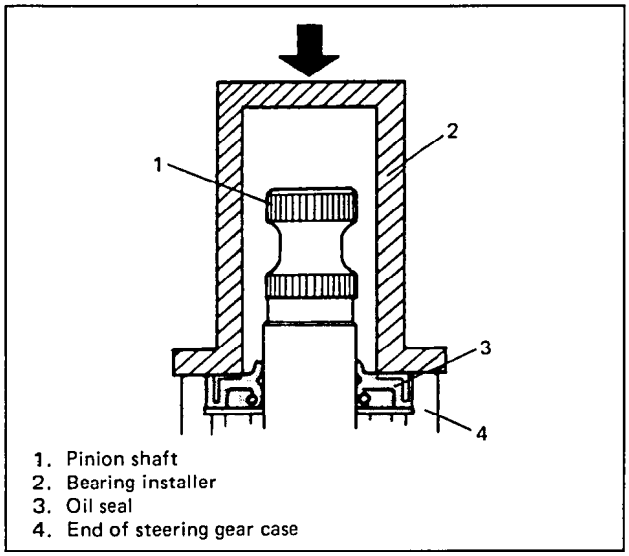
Installation

Reverse removal procedure, noting the following.

- Apply SUZUKI SUPER GREASE E to inside and outside of oil seal lip and press-fit it till its upper surface becomes flush with end face of steering gear case.

NOTE:

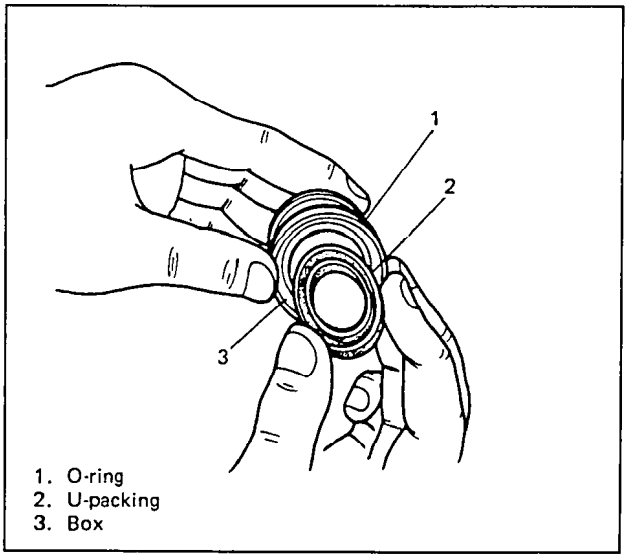
- **Cover serrated part of pinion shaft with vinyl tape or the like so as to prevent damage to oil seal lip.**
- **Use care not to allow oil seal lip to turn over.**



1. Pinion shaft
2. Bearing installer
3. Oil seal
4. End of steering gear case

Fig. 3B1-41 Press-fitting Oil Seal

- Apply SUZUKI SUPER GREASE E to O-ring and U-packing of box and install them into groove in box.

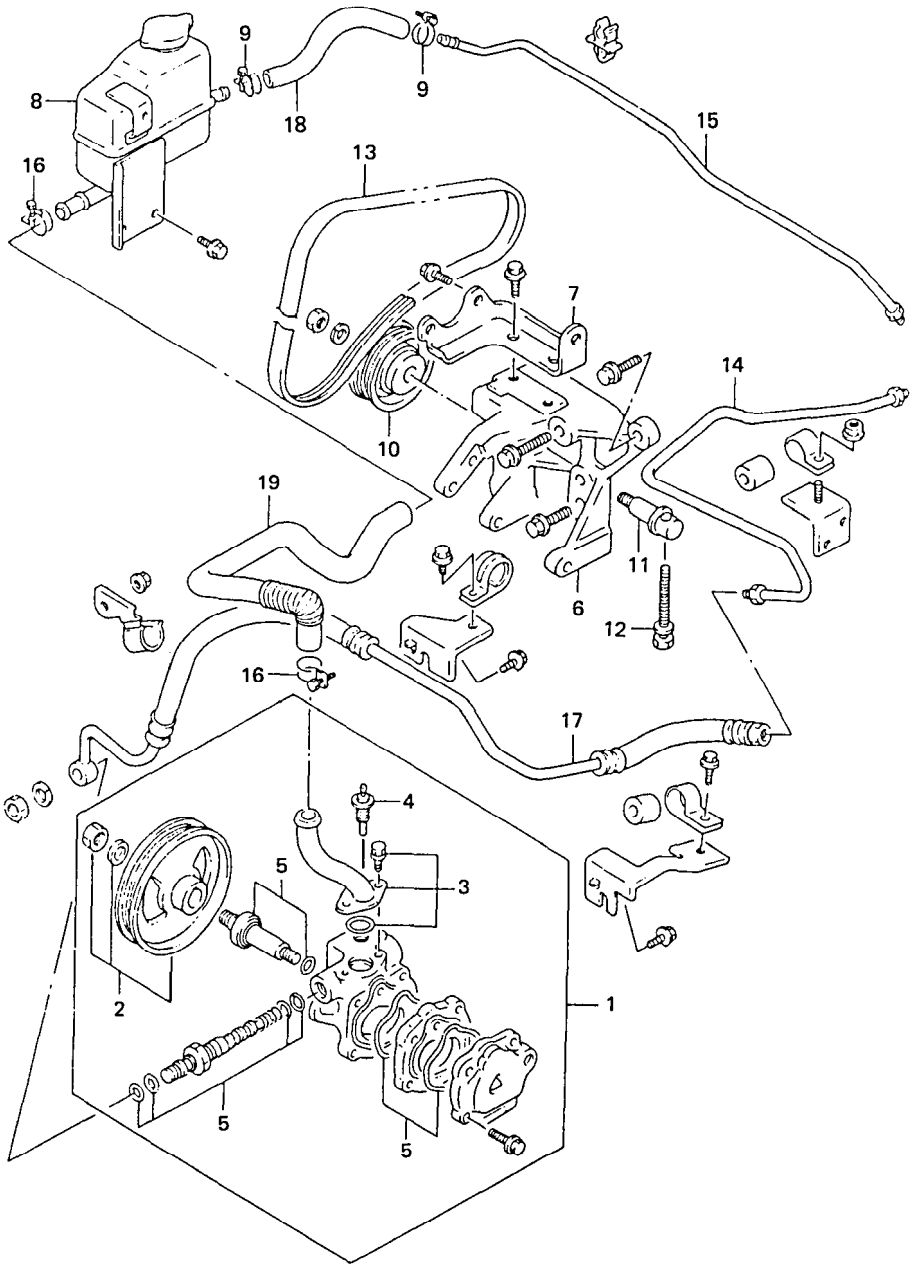


1. O-ring
2. U-packing
3. Box

Fig. 3B1-42 Installing U-packing

REMOVE AND INSTALL POWER STEERING PUMP

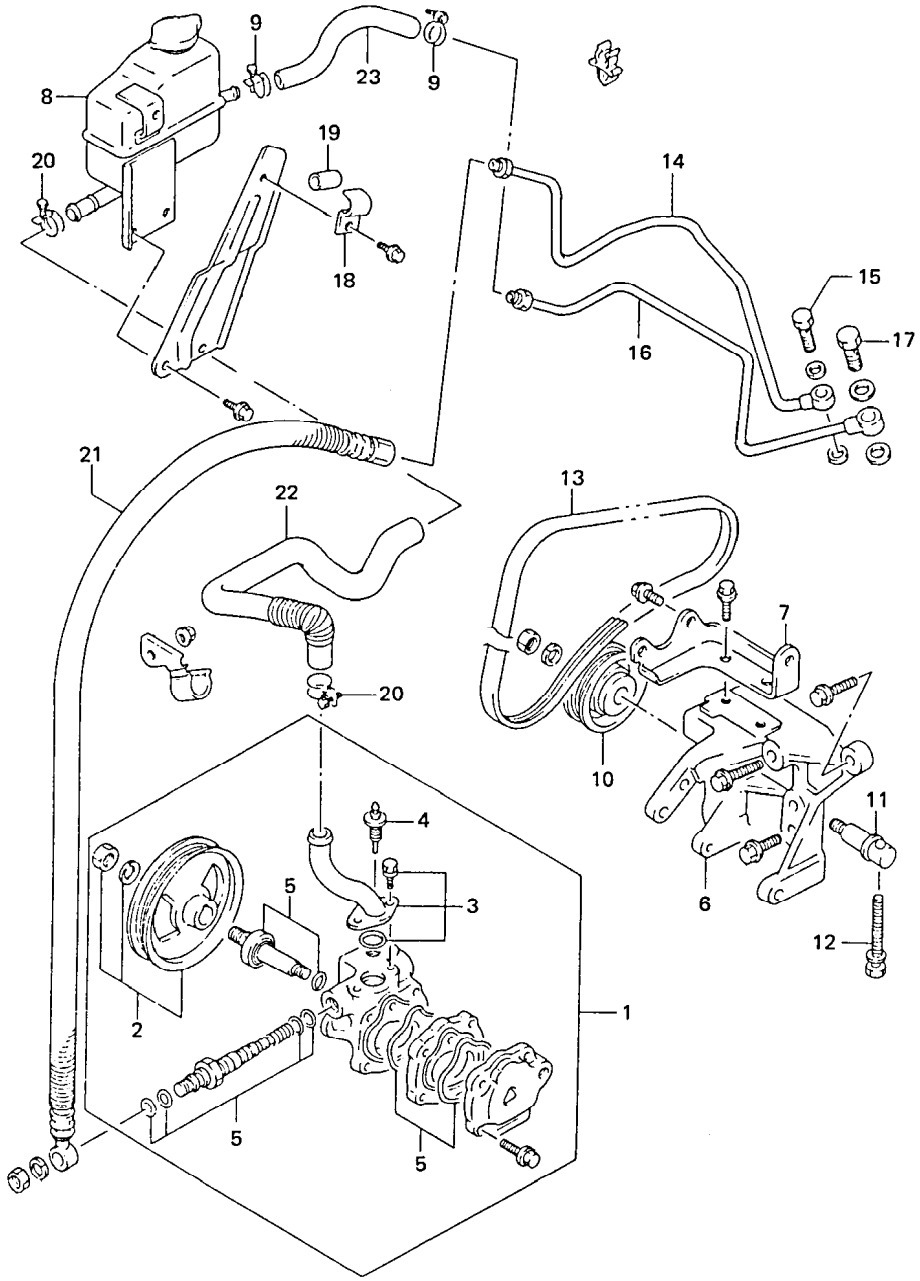
Components (For LH steering model)



1. Power steering pump assembly
2. Pulley set
3. Connector set
4. Terminal set (Including pressure switch)
5. Seal set
6. Power steering bracket
7. Pump bracket
8. Power steering oil tank
9. Low pressure hose No. 2 clamp
10. Belt tension pulley
11. Belt tension pulley bolt
12. Belt tension bolt
13. Power steering belt
14. High pressure pipe
15. Low pressure pipe
16. Low pressure hose No. 1 clamp
17. High pressure hose
18. Low pressure hose No. 1
19. Low pressure hose No. 2

Fig. 3B1-43 P/S Pump Components

Components (For RH steering model)



1. Power steering pump assembly
2. Pulley set
3. Connector set
4. Terminal set (Include pressure switch)
5. Seal set
6. Power steering bracket assembly
7. Pump bracket
8. Power steering oil tank
9. Low pressure hose No. 2 clamp
10. Belt tension pulley
11. Belt tension pulley bolt
12. Belt tension bolt
13. Power steering belt
14. High pressure pipe
15. High pressure union bolt
16. Low pressure pipe
17. Low pressure union bolt
18. Pipe clamp
19. Bushing
20. Low pressure hose No. 1 clamp
21. High pressure hose
22. Low pressure hose No. 1
23. Low pressure hose No. 2

Fig. 3B1-43 P/S Pump Components

Removal

1. Remove splash cover, loosen belt tension pulley and remove P/S V-ribbed belt.
2. Disconnect high pressure hose and low pressure hose.
3. Disconnect pressure switch lead harness.
4. Remove compressor and bracket.
   Compressor needs not be removed with A/C equipped vehicle.
5. Remove oil pump together with its bracket (and 3 fixing bolts).

NOTE:

- **Be sure to clean each joint of suction and discharge sides thoroughly before removal.**
- **Plug each port of removed pump to prevent dust or any other foreign matter from entering.**

Installation

Reverse removal procedure.

NOTE:

Fill A/T fluid (DEXRON-II) after installation and bleed air without failure.

Disassembly

1. Using special tool, remove oil pump pulley.

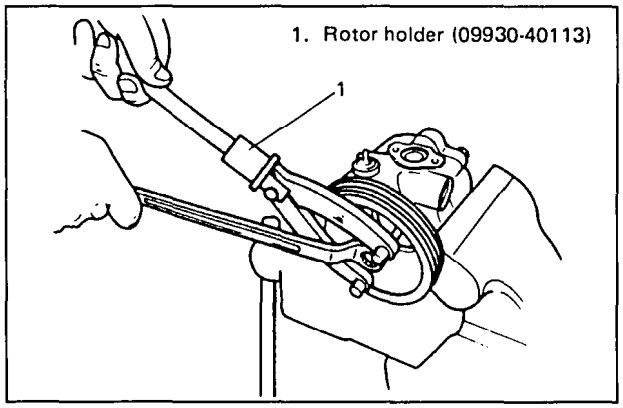


Fig. 3B1-44 Removing Oil Pump Pulley

2. Remove suction connector by removing its fixing bolts (M6, 2 pcs).
3. Remove terminal assembly and discharge connector.

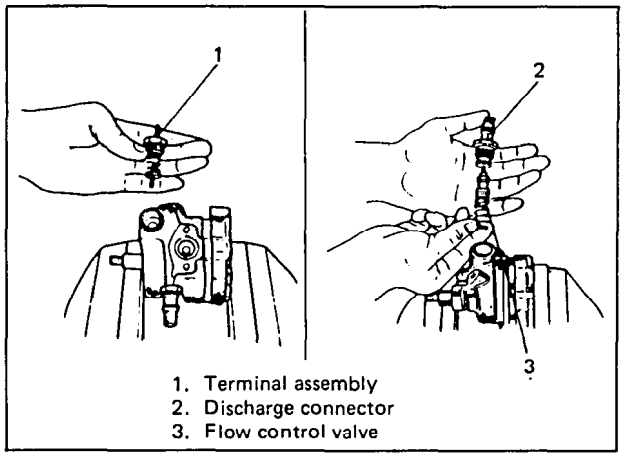


Fig. 3B1-45 Removing Terminal Assembly and Discharge Connector

4. Remove oil pump cover by removing its fixing bolts (M8, 4 pcs).

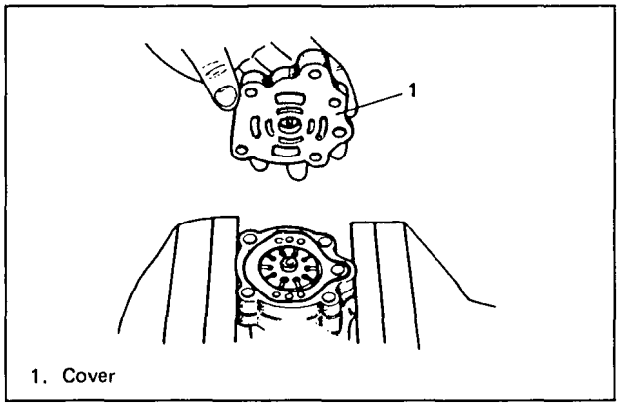


Fig. 3B1-46 Removing Oil Pump Cover

5. Remove cam ring.

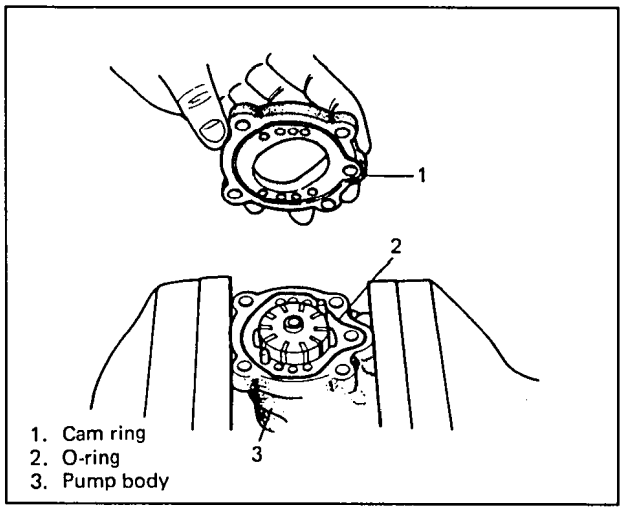


Fig. 3B1-47 Removing Cam Ring

6. Remove snap ring and pull out rotor.

NOTE:
When pulling rotor out of shaft, be careful not to lose vane.

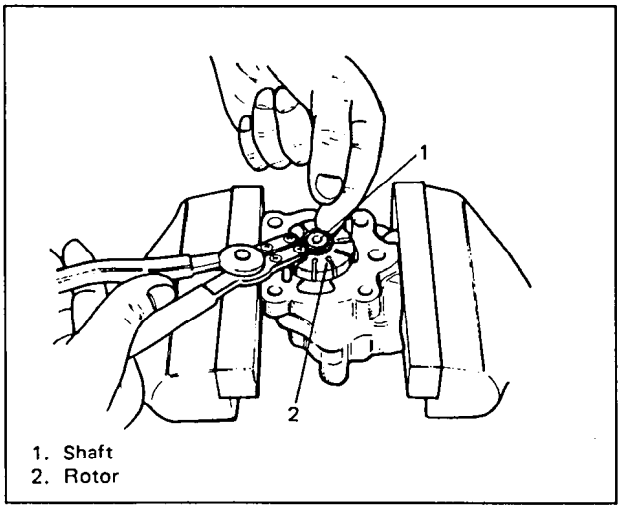


Fig. 3B1-48 Removing Rotor

7. Pull out shaft.
8. Remove oil seal.

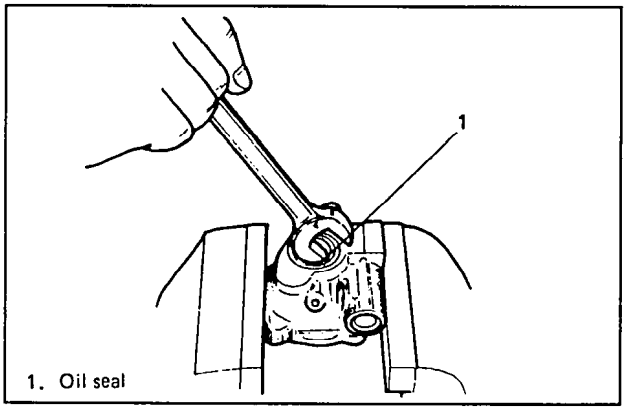


Fig. 3B1-49 Removing Oil Seal

Assembly

Reverse disassembly procedure for assembly, noting the following.

1. Apply DEXRON-II to shaft where bushing slides against and insert shaft from oil seal side.

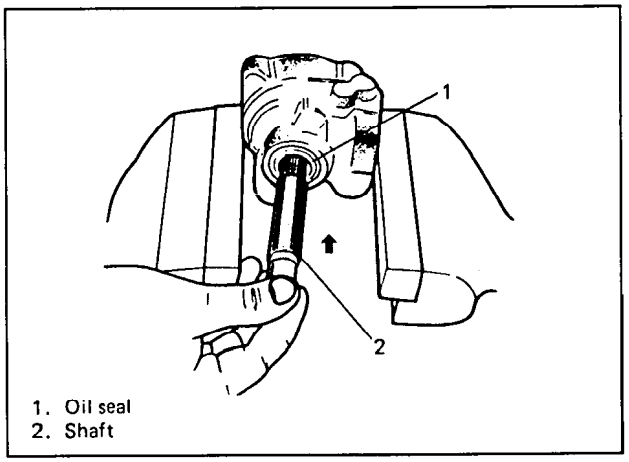


Fig. 3B1-50 Installing Shaft

2. Install rotor to shaft facing its splined part chamfered side up (to cover).

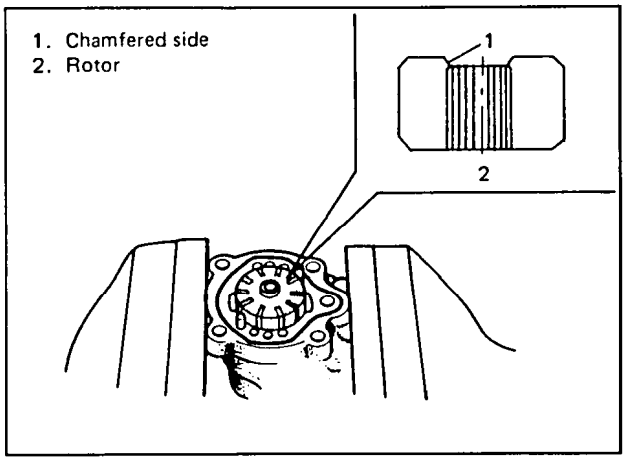


Fig. 3B1-51 Installing Rotor

3. Apply DEXRON-II to each vane and install it to rotor with its R part faced outward as shown below.

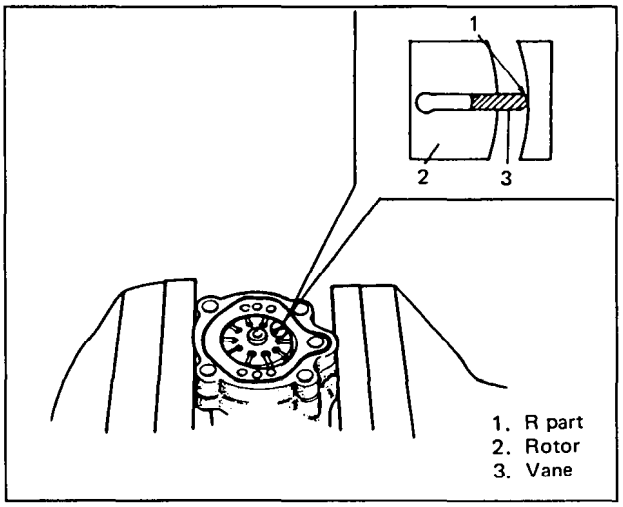


Fig. 3B1-52 Installing Vane

4. Apply DEXRON-II to O-ring and install it to pump body securely.
5. Install cam ring.

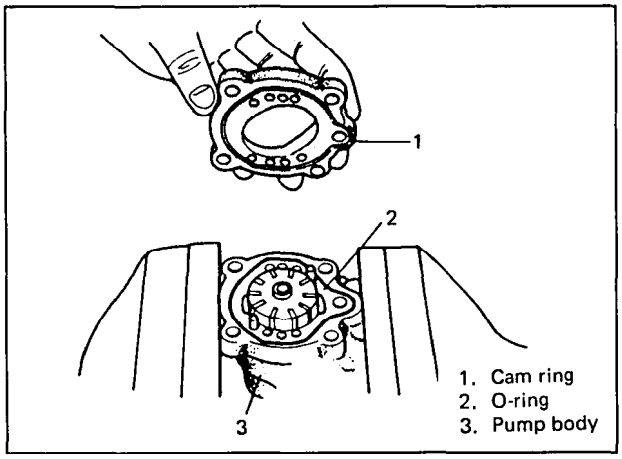


Fig. 3B1-53 Installing Cam Ring

6. Install snap ring to shaft.
7. Tighten cover bolts to specified torque.

Tightening torque for cover bolts	N·m	kg-m	lb-ft
	18 – 22	1.8 – 2.2	13.5 – 15.5

NOTE:
After installing cover, check to make sure that shaft can be turned by hand.

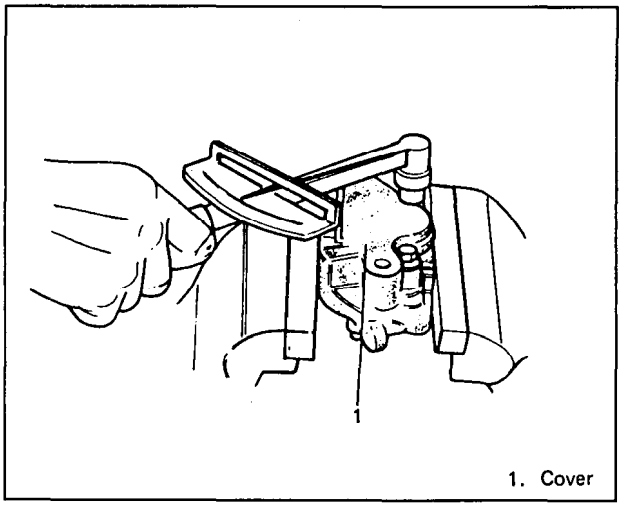


Fig. 3B1-54 Installing Cover

8. Check that flow control valve slides smoothly and tighten discharge (delivery) connector to specified torque.

Tightening torque for discharge connector	N·m	kg-m	lb-ft
	40 – 60	4.0 – 6.0	29.0 – 43.0

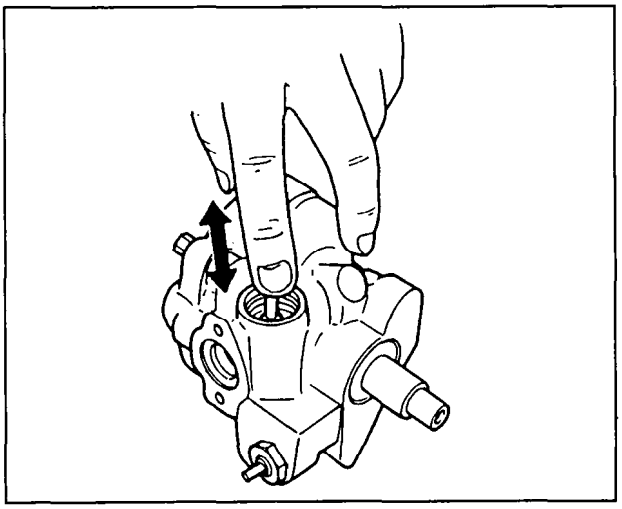


Fig. 3B1-55 Installing Flow Control Valve

9. Tighten terminal ass'y (pressure switch) to specified torque.

Tightening torque for terminal ass'y	N·m	kg-m	lb-ft
	25 – 30	2.5 – 3.0	18.5 – 21.5

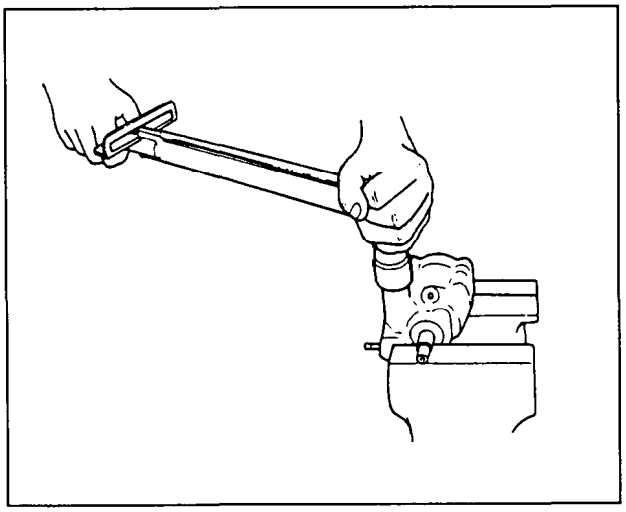


Fig. 3B1-56 Installing Terminal

10. Tighten suction connector bolts to specified torque.

Tightening torque for suction connector bolts	N·m	kg-m	lb-ft
	6 – 10	0.6 – 1.0	4.5 – 7.0

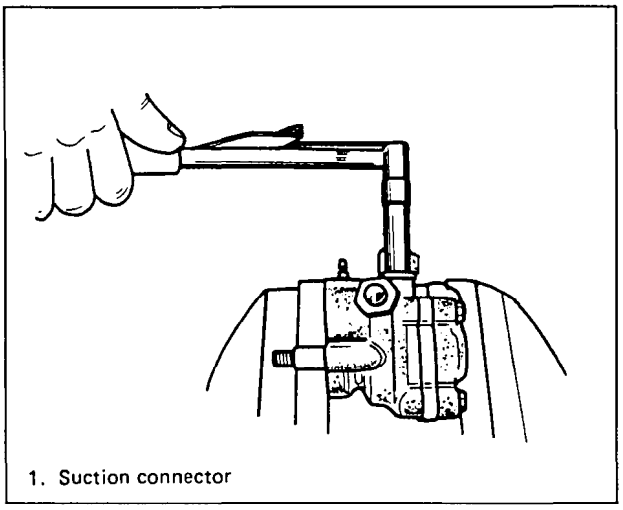


Fig. 3B1-57 Installing Suction Connector

INSPECTION

P/S Pump Body and Shaft

- Wear and damage of pump body sliding surface.
- Stepped wear and damage of shaft where bushing slides against.

Replace P/S pump if any of the above is found.

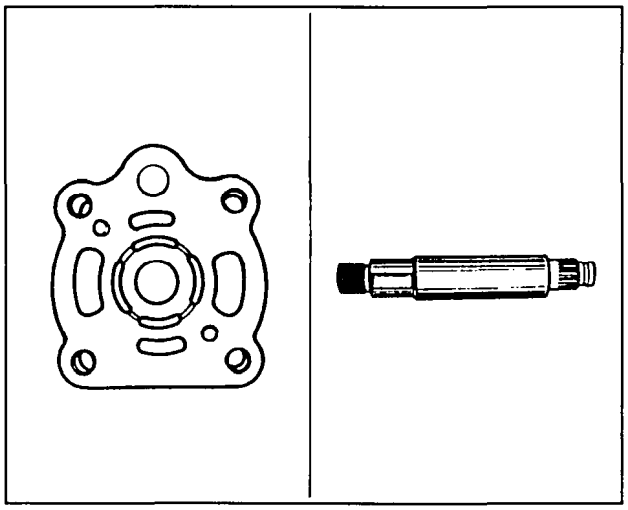


Fig. 3B1-58 Inspecting Pump Body and Shaft

Cam Ring

Inspect vane sliding surface of cam ring for wear and damage. Replace P/S pump if either of the above is found.

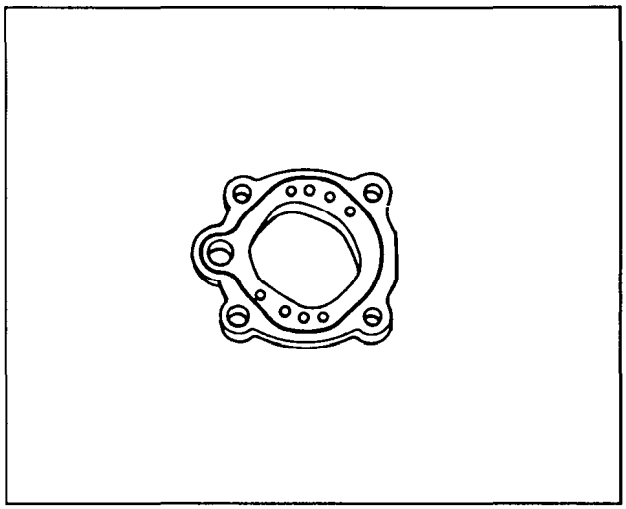


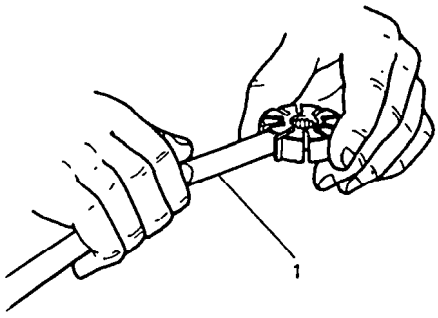
Fig. 3B1-59 Inspecting Cam Ring

Rotor and Vane

- Wear and damage of rotor sliding surface against pump body.
- Wear and damage of vane sliding surface against cam ring.
- Vane to rotor clearance.

Standard	0.01 mm (0.0004 in.)
Limit	0.06 mm (0.0023 in.)

Replace P/S pump if any of the above is found.



1. Thickness gauge

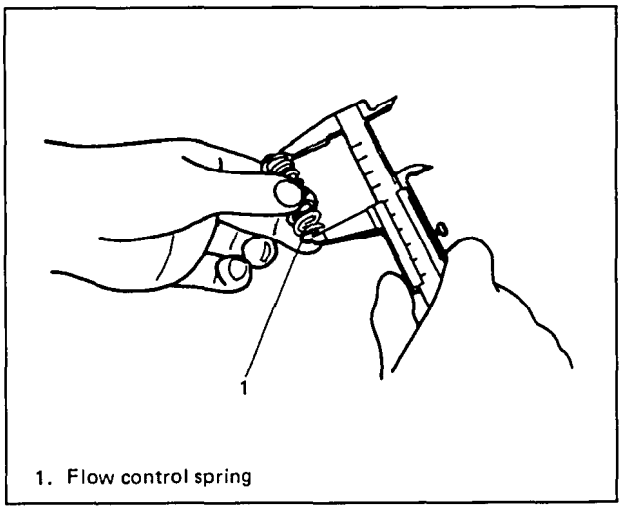
Fig. 3B1-60 Inspecting Rotor and Vane

Flow Control Valve

- Wear and damage on outside of valve.
- Obstruction in connector orifice.
- Free length of flow control spring.

Standard	36.5 mm (1.43 in.)
Limit	33.5 mm (1.32 in.)

Replace P/S pump if any of the above is found.



1. Flow control spring

Fig. 3B1-61 Inspecting Flow Control Spring

SPECIAL TOOLS

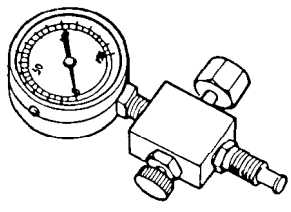
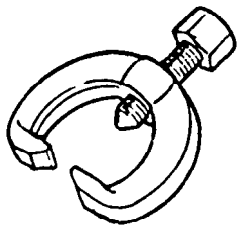
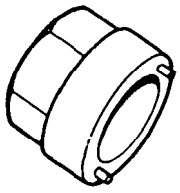
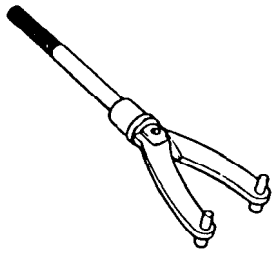
			
09915-77410 Oil pressure gauge	09913-65210 Tie-rod end remover	09917-23610 Ring nut wrench	09930-40113 Transfer flange lock holder

Fig. 3B1-62

SECTION 3C

STEERING WHEEL AND COLUMN

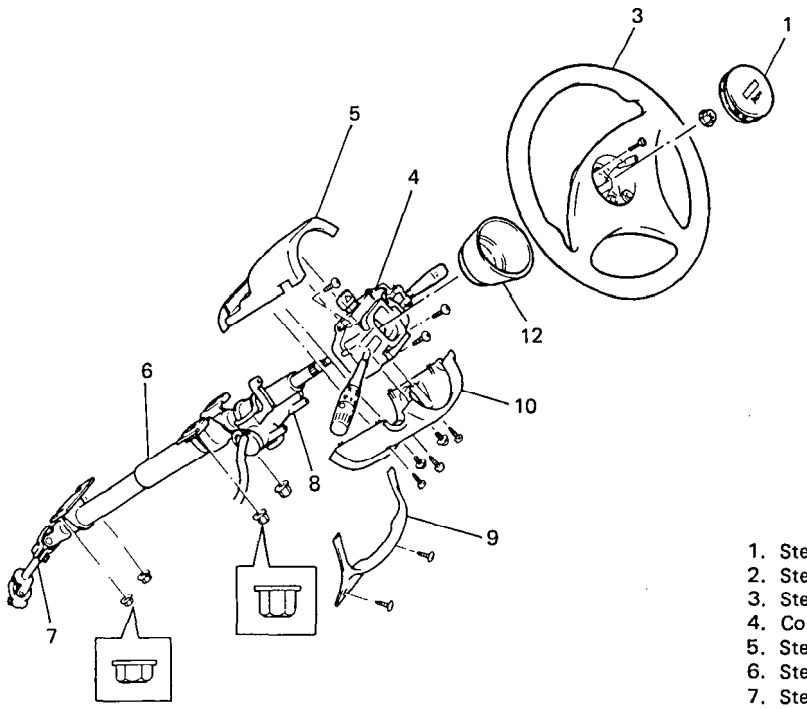
NOTE:

- All steering wheel and column fasteners are important parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of the same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of this part.
- For the descriptions (items) not found in this section of this manual, refer to the same section of Service Manual mentioned in the FOREWORD of this manual.

CONTENTS

GENERAL DESCRIPTION

The steering wheel and column consist of following parts.



1. Steering wheel pad
2. Steering wheel bumper
3. Steering wheel
4. Combination switch
5. Steering column upper cover
6. Steering column assembly
7. Steering shaft lower joint
8. Steering lock assembly
9. Steering column under cover
10. Steering column lower cover
11. Steering column mounting nut
12. Steering wheel lower cover

NOTE:
Use of steering column mounting nuts is different between key cylinder side and lower joint side. Refer to above figure for proper installation.

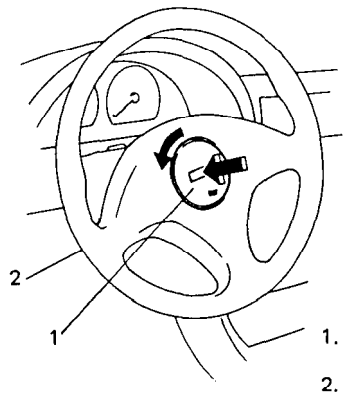
Fig. 3C-1 Steering Wheel and Column

ON CAR SERVICE

REMOVE AND INSTALL STEERING WHEEL

REMOVAL

1) Disconnect negative battery cable.
2) Remove steering wheel pad by turning it counterclockwise while pressing it till it stops and disconnect horn wire.



1. Steering wheel pad
2. Steering wheel

Fig. 3C-2

3) Pull off pad seat from steering wheel.
4) Remove steering shaft nut.
5) Make alignment marks on steering wheel and shaft for a guide during reinstallation.

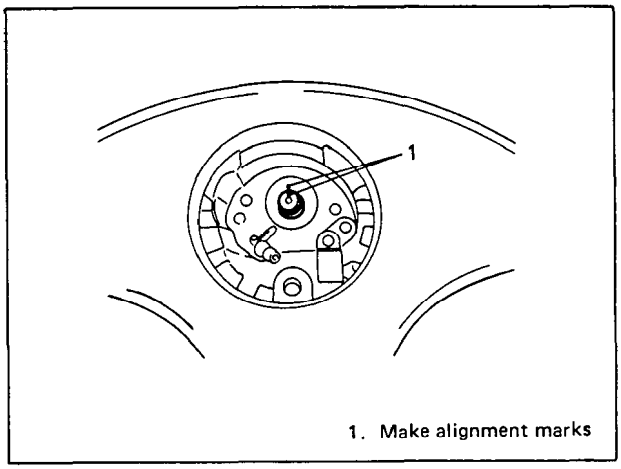


Fig. 3C-3

6) Remove steering wheel with special tool (A).

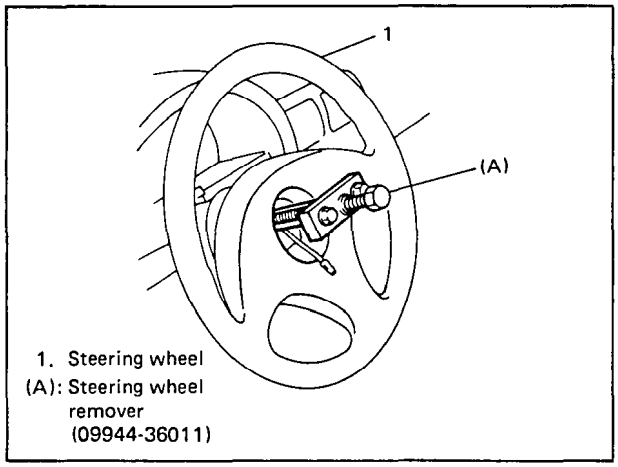


Fig. 3C-4

INSTALLATION

1) Assemble steering wheel pad and pad seat as shown below.

NOTE:
For their correct assembly, use special care for relation in position between contact point of horn switch on steering wheel pad and boss on pad seat.

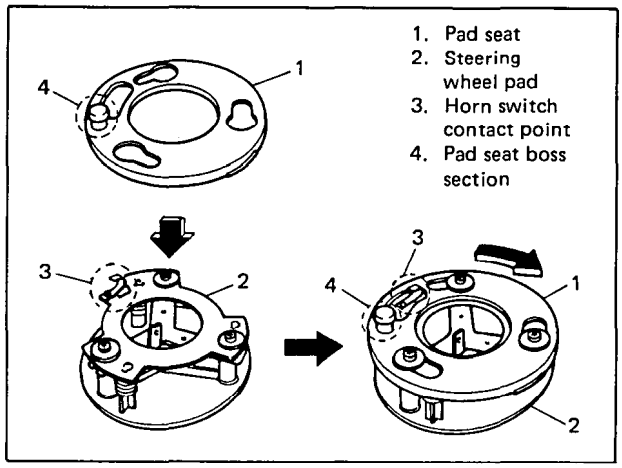


Fig. 3C-5

2) Install steering wheel onto shaft, aligning alignment marks on them.
3) Torque steering shaft nut to specification as given below.
4) Connect horn wire to steering wheel pad and then, install pad with seat to steering wheel.

NOTE:
Boss "A" on pad seat should go into hole "B" in steering wheel.

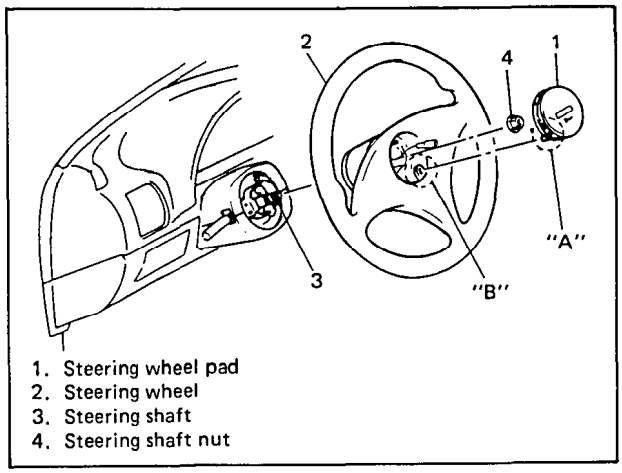


Fig. 3C-6

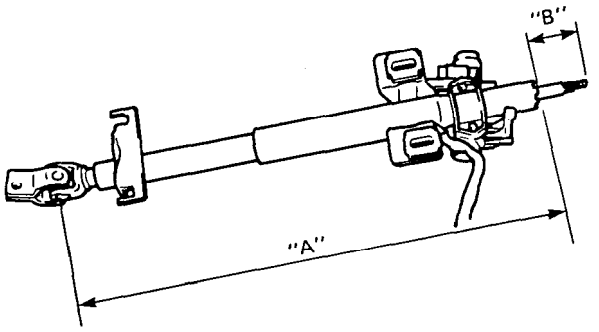
CHECKING STEERING COLUMN FOR ACCIDENT DAMAGE

NOTE:
Cars involved in accidents resulting in body damage or where the steering column has been impacted may also have a damaged or misaligned steering column.

CHECKING PROCEDURE

Take measurement "A" as shown. If it is shorter than specified length, replace column assembly with new one.

NOTE:
Specified length "A" varies depending on vehicle specifications. Measure measurement "B" first and by using that data, check specified length "A" applicable to specifications and then take measurement "A".

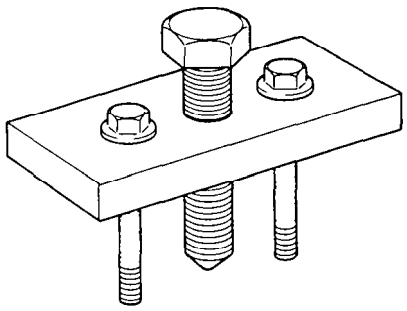


A: 528 mm (20.79 in) [B: 62.5 mm (2.46 in)]
A: 524 mm (20.63 in) [B: 66.5 mm (2.62 in)]

Fig. 3C-5

NOTE:
For any checking prodedure other than the above, consult the Service Manual mentioned in the FOREWORD of this manual.

SPECIAL TOOL



09944-36011
Steering wheel remover

Fig. 3C-6

SECTION 5

BRAKES

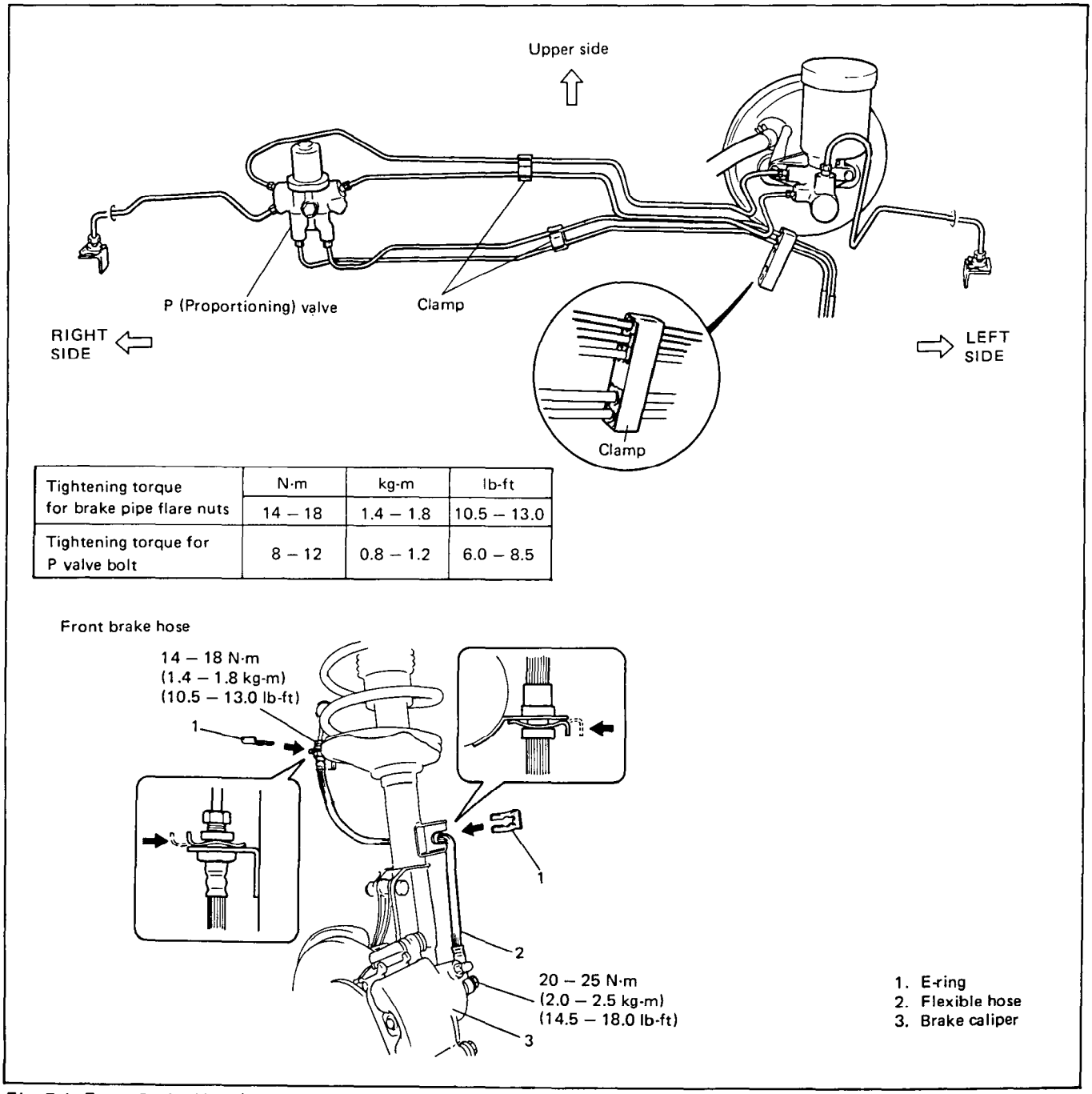
NOTE:
For the descriptions (items) not found in this section of this manual, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.

CONTENTS

BRAKE HOSE/PIPE R & I

1. REMOVE AND INSTALL FRONT BRAKE HOSE/PIPE

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



	N·m	kg-m	lb-ft
Tightening torque for brake pipe flare nuts	14 – 18	1.4 – 1.8	10.5 – 13.0
Tightening torque for P valve bolt	8 – 12	0.8 – 1.2	6.0 – 8.5

Fig. 5-1 Front Brake Hose/Pipe R & I

SECTION 6A

ENGINE MECHANICAL

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

CONTENTS

ON CAR SERVICE

OIL PRESSURE CHECK

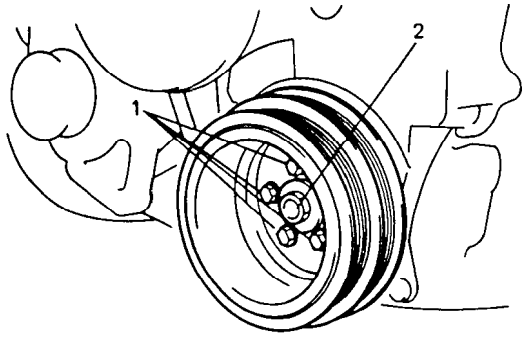
Check engine oil pressure according to the same procedure as that in the Service Manual mentioned in the FOREWORD of this manual.

Oil pressure specification	3.8 – 4.8 kg/cm² 54.1 – 68.2 psi at 4,000 r/min.

CRANKSHAFT PULLEY

Following bolts are used for crankshaft pulley. Tighten them to specified torque below.

Tightening torque for pulley bolts	N·m	kg-m	lb-ft
	14 – 18	1.4 – 1.8	10.5 – 13.0



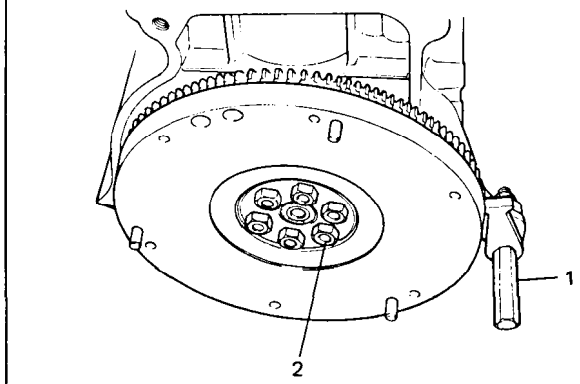
1. Crankshaft pulley bolts
2. Crankshaft timing belt pulley bolt

Fig. 6A-1 Crankshaft Pulley Bolt

FLYWHEEL

Following bolts are used for flywheel. Tighten them to specified torque.

Tightening torque for flywheel	N·m	kg-m	lb-ft
	68 – 72	6.8 – 7.2	49.5 – 52.0

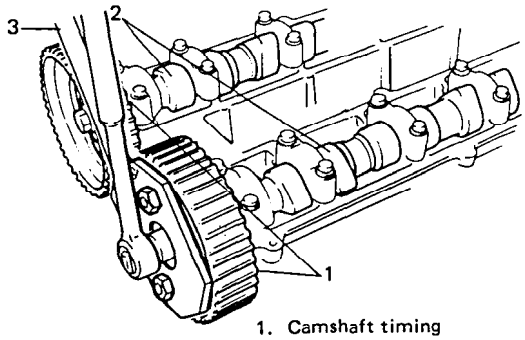


1. Special tool (Flywheel holder 09924-17810)
2. Flywheel bolts

Fig. 6A-1-1 Flywheel

CAMSHAFT TIMING BELT PULLEY

When loosening or tightening pulley bolt, lock camshaft pulley with special tool.



1. Camshaft timing belt pulleys
2. Camshafts
3. Special tool (Camshaft pulley holder 09917-68220)

Fig. 6A-2 Loosening Pulley Bolt

VALVES AND VALVE GUIDES

Check stem-to-guide clearance according to the same procedure as that in the Service Manual mentioned in the FOREWORD of this manual.

Item		Standard	Limit
Valve stem diameter	In	5.465 – 5.480 mm (0.2152 – 0.2157 in.)	———
	Ex	5.440 – 5.455 mm (0.2142 – 0.2148 in.)	———
Valve guide I.D.	In & Ex	5.500 – 5.512 mm (0.2165 – 0.2170 in.)	———
Stem-to-guide clearance	In	0.020 – 0.047 mm (0.0008 – 0.0018 in.)	0.07 mm (0.0027 in.)
	Ex	0.045 – 0.072 mm (0.0018 – 0.0028 in.)	0.09 mm (0.0035 in.)

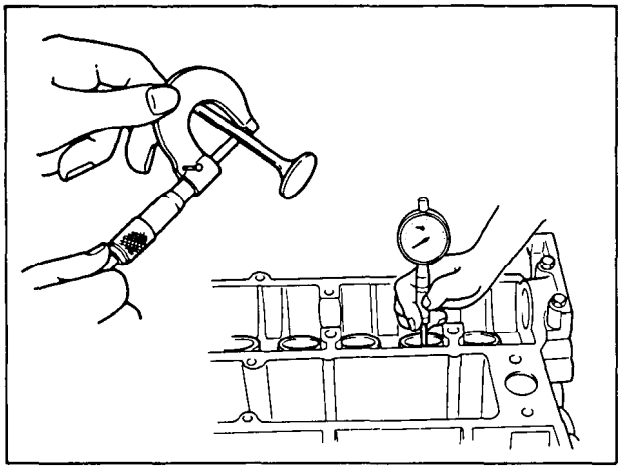
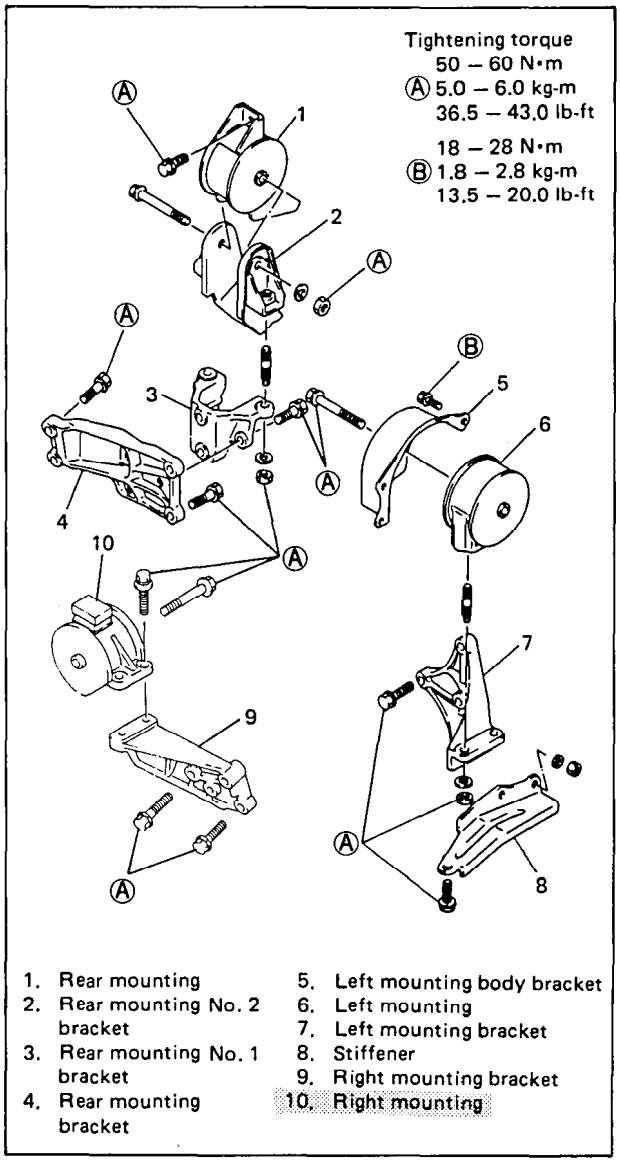


Fig. 6A-3 Measuring Valve Stem Dia. and Valve Guide I.D.

ENGINE MOUNTING

Right mounting with damper is used for this model.

When removing or installing, refer to following figure.

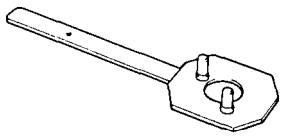


1. Rear mounting
2. Rear mounting No. 2 bracket
3. Rear mounting No. 1 bracket
4. Rear mounting bracket
5. Left mounting body bracket
6. Left mounting
7. Left mounting bracket
8. Stiffener
9. Right mounting bracket
10. Right mounting

Fig. 6A-4 Engine Mounting

SPECIAL TOOL

Following special tool is used to lock camshaft pulley.



09917-68220
Camshaft pulley holder

SECTION 6E

ELECTRONIC FUEL INJECTION SYSTEM

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

CONTENTS

GENERAL DESCRIPTION

The Electronic Fuel Injection System in this car supplies the combustion chambers with air/fuel mixture of optimized ratio under widely varying driving conditions.
It uses the multi-point fuel injection system which injects fuel into each intake port of the cylinder head.

This system has 3 major sub-systems: air intake system, fuel delivery system and electronic control system.
Air intake system includes air cleaner, air flow meter, throttle body, air valve, ISC solenoid valve and intake manifold.
Fuel delivery system includes fuel pump, delivery pipe (fuel pressure regulator), etc.

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

This section explains the system related to the electronic fuel injection as well as such functions of ECM as listed below.

- EGR control system equipped in only California spec. model.
- Evaporative emission control system.
- ESA (Electronic Spark Advance) system.

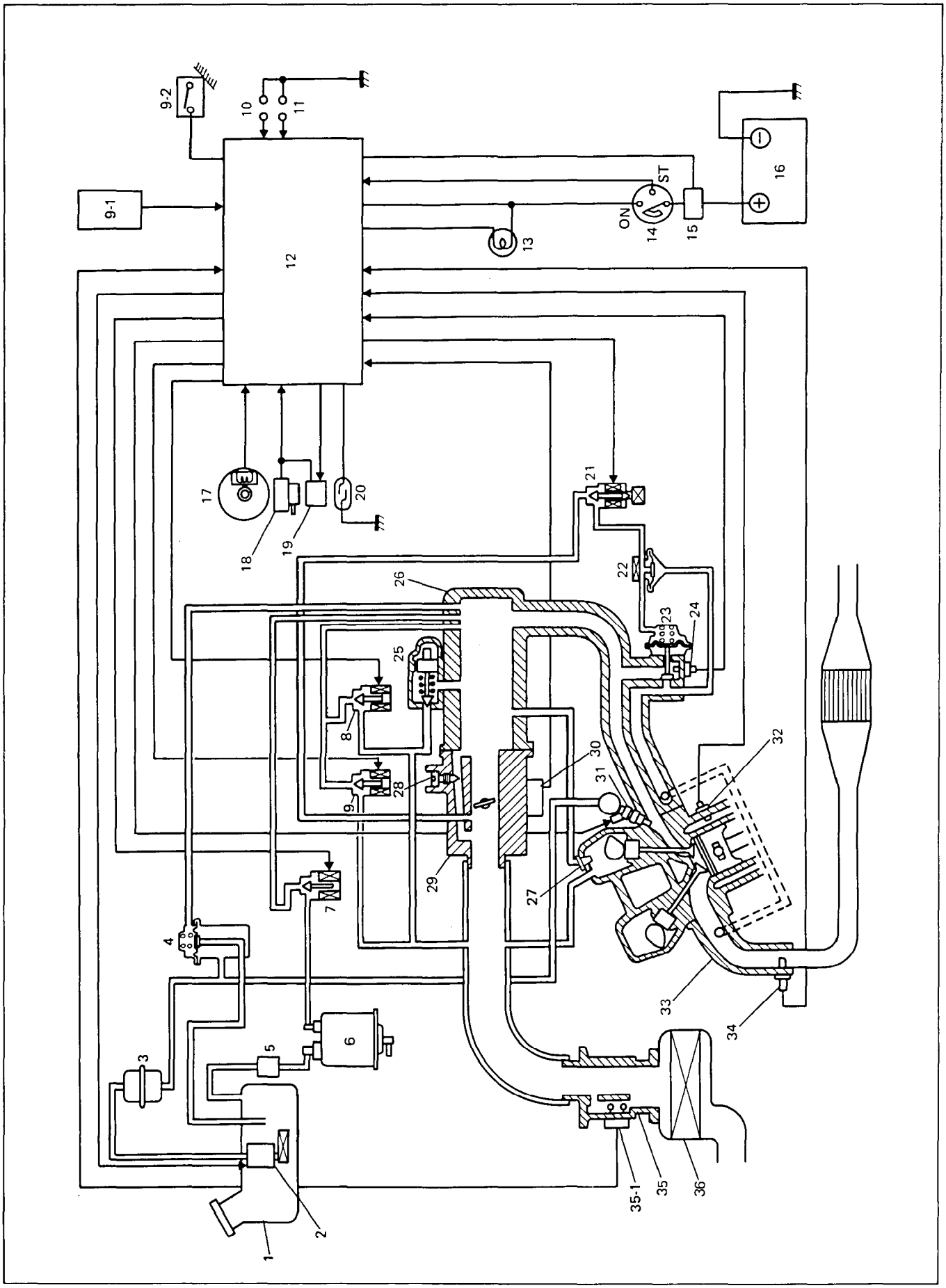


Fig. 6E-1 Electronic Fuel Injection System

1. Fuel tank
2. Fuel pump
3. Fuel filter
4. Fuel pressure regulator
5. 2-way check valve
6. Charcoal canister (if equipped)
7. Canister purge VSV (if equipped)
8. ISC solenoid valve
9. Power steering VSV (if equipped)
9-1. Electric load signal
   - Radiator fan
   - Heater blower
   - Rear window defogger
   - Stop light
   - Headlight or small light
9-2. Power steering pressure switch (if equipped)
10. Diagnosis switch terminal
11. Test switch terminal
12. ECM
13. "CHECK ENGINE" light
14. Main switch
15. Main fuse
16. Battery
17. CAS (in distributor)
18. Ignition coil
19. Power unit
20. Speed sensor (in speedometer)
21. EGR VSV
22. EGR modulator
23. EGR valve
24. REGTS

(21–24: California spec. model only)

25. Air valve
26. Intake manifold
27. PCV valve
28. Idle speed adjusting screw
29. Throttle body
30. TPS
31. Fuel injector
32. WTS
33. Exhaust manifold
34. Oxygen sensor (if equipped)
35. AFM
35-1. AFS
36. Air cleaner

FUEL DELIVERY SYSTEM

FUEL INJECTOR

There are 4 injectors (one for each cylinder), each of which is installed between the cylinder head and delivery pipe. It is an electromagnetic type injection nozzle which injects fuel into the intake port of the cylinder head according to the signal from ECM.

Operation

When the solenoid coil of the injector is energized by ECM, it becomes an electromagnet and attracts the plunger. At the same times, the ball valve which is incorporated with the plunger opens and the injector which is under the fuel pressure injects fuel. As the lift stroke of the ball valve of the injector is set constant, the amount of fuel injected at one time is determined by the length of time during which the solenoid coil is energized (injection time).

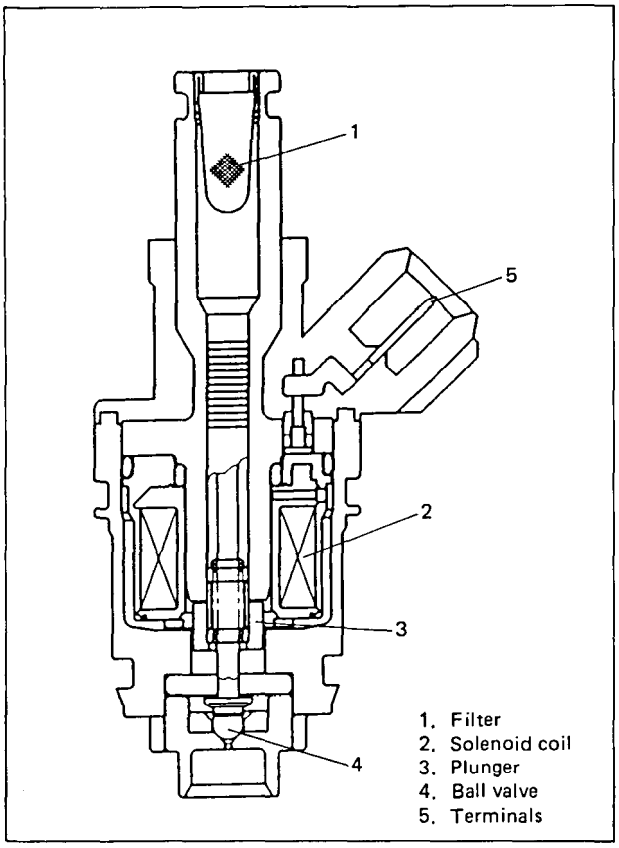
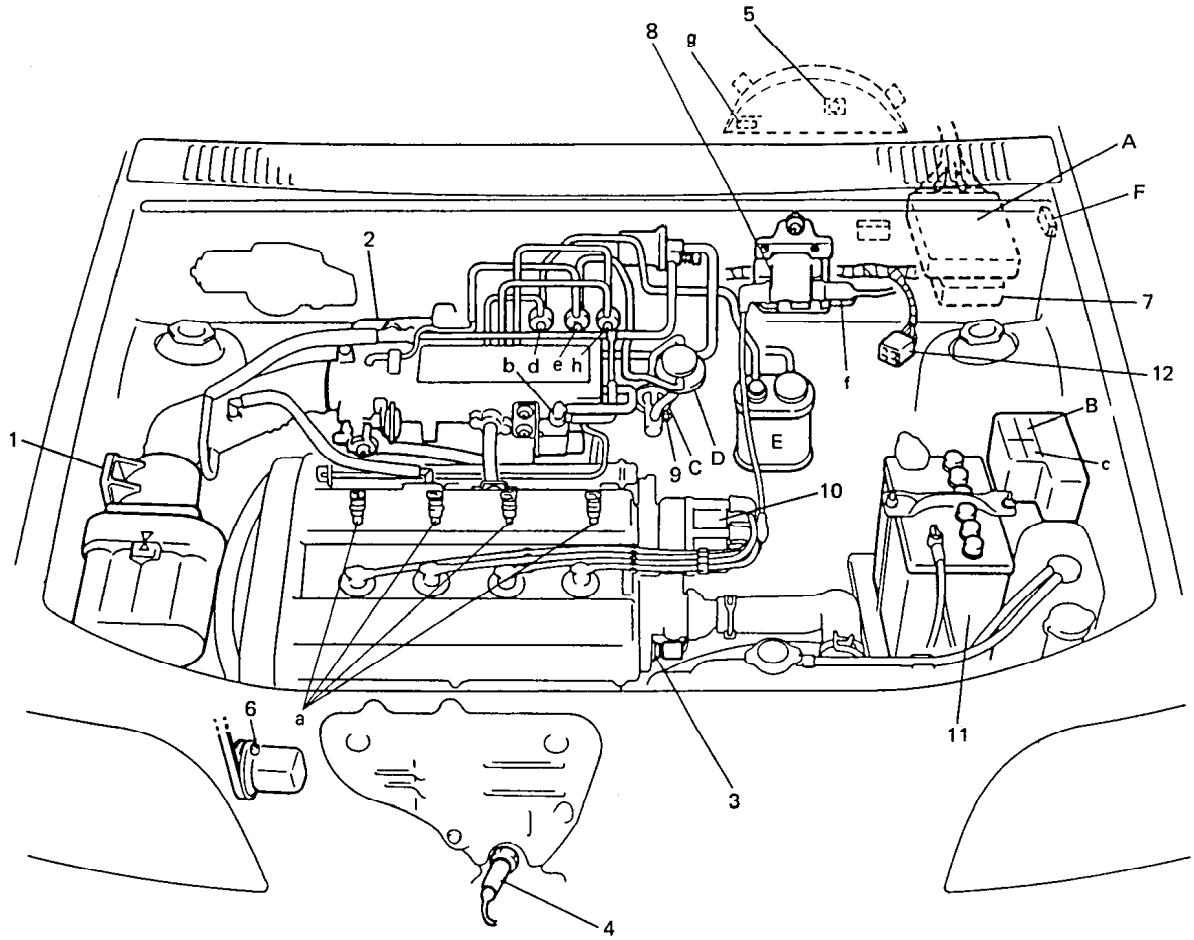


Fig. 6E-2 Fuel Injector Cross-Section

ELECTRONIC CONTROL SYSTEM

The electronic control system consists of 1) various sensors which detect the state of engine and driving conditions, 2) ECM which controls various devices according to the signals from the sensors and 3) various controlled devices.
Functionally, it is divided into six sub systems:

- Fuel injection control system
- ISC solenoid valve control system
- Fuel pump control system
- EGR control system (For California spec. model only)
- Evaporative emission control system
- ESA (Electronic Spark Advance) system



INFORMATION SENSORS
1. AFS
2. TPS
3. WTS
4. Oxygen sensor (if equipped)
5. Speed sensor
6. P/S pressure switch (if equipped)
7. Junction/fuse block (Diagnosis switch terminal)
8. Ignition coil
9. REGTS (California spec. model only)
10. CAS (in distributor)
11. Battery
12. Monitor coupler (Test switch terminal)

CONTROLLED DEVICES
a : Fuel injector
b : ISC solenoid valve
c : Fuel pump relay
d : Canister purge VSV (if equipped)
e : EGR VSV (California spec. model only)
f : Ignition power unit
g : "CHECK ENGINE" light
h : P/S VSV (if equipped)

OTHERS
A : ECM
B : Main relay
C : EGR valve } California spec. model only
D : EGR modulator }
E : Charcoal canister
F : Electric load diode

Fig. 6E-3 Parts Location

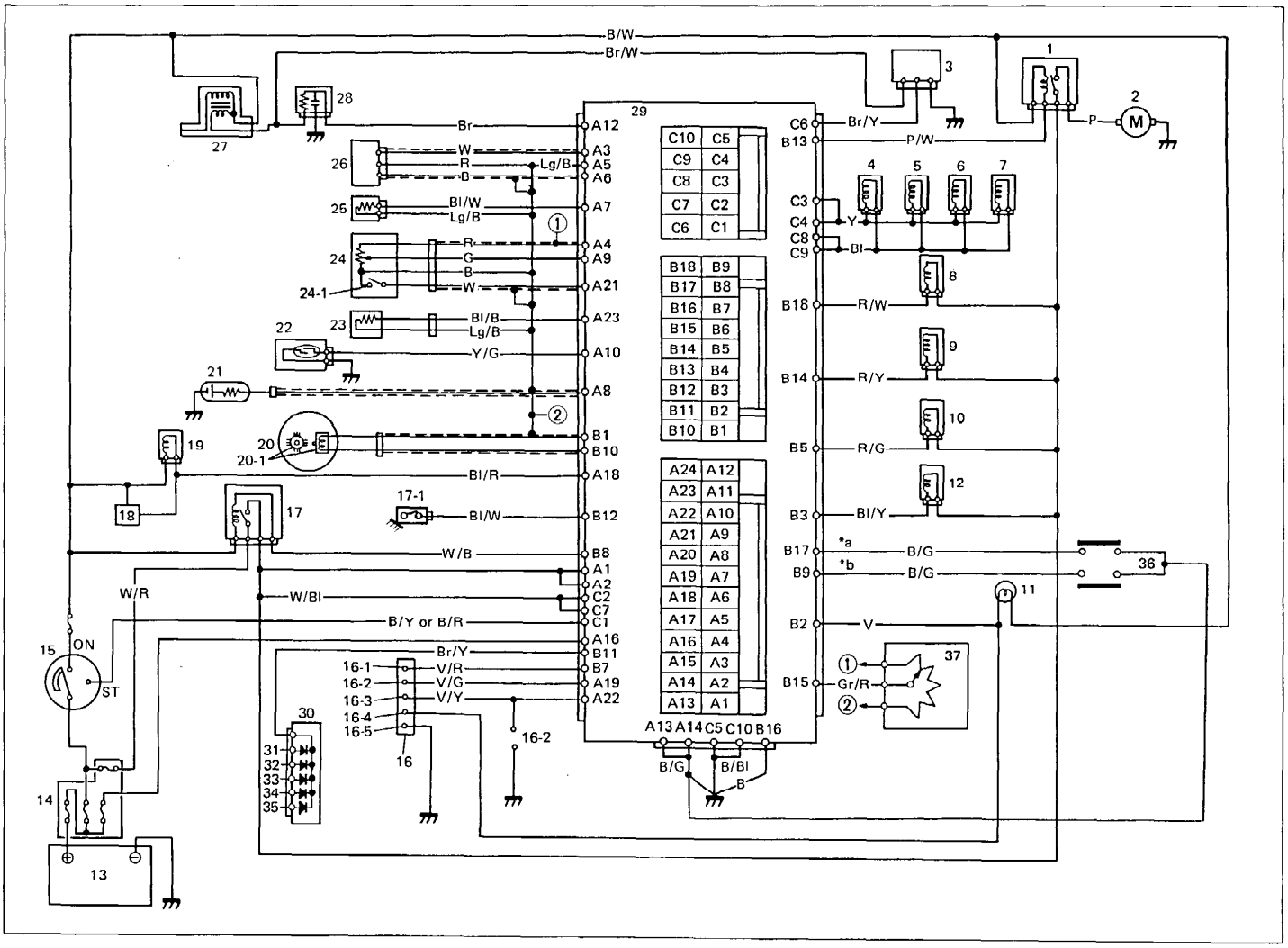


Fig. 6E-4 System Wiring Diagram

NOTE:
Whether equipped with ground circuit(s) *a and/or *b or not depends on car specifications.

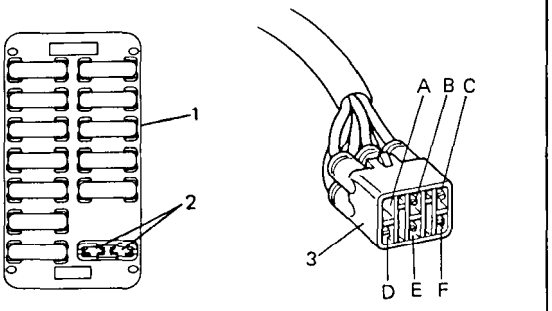
1. Fuel pump relay
2. Fuel pump
3. Ignition power unit
4. Fuel injector No. 1
5. Fuel injector No. 2
6. Fuel injector No. 3
7. Fuel injector No. 4
8. ISC solenoid valve
9. EGR VSV (California spec. model only)
10. Canister purge VSV (if equipped)
11. "CHECK ENGINE" light
12. Power steering VSV (if equipped)
13. Battery
14. Main fuse
15. Main switch
16. Monitor coupler
16-1. Duty output terminal
16-2. Test switch terminal
16-3. Diagnosis switch terminal
16-4. Diagnosis output terminal
17. Main relay
17-1. Power steering pressure switch (if equipped)
18. A/C amplifier (only for car with A/C)
19. A/C VSV (only for car with A/C)
20. Distributor
20-1. Crank angle sensor
21. Oxygen sensor (if equipped)
22. Speed sensor
23. REGTS (California spec. model only)
24. TPS
24-1. Idle switch
25. WTS
26. AFS
27. Ignition coil
28. Noise suppressor
29. ECM
30. Diodes
31. Radiator fan switch
32. Heater blower switch
33. Rear window defogger switch
34. Stop light switch
35. Lighting switch
36. Ground circuit (if equipped)
37. CO adjuster (if equipped)

Wire color

B	: Black	Lg/W	: Light green/White
B/Bl	: Black/Blue	Lg/Y	: Light green/Yellow
B/G	: Black/Green	P	: Pink
B/R	: Black/Red	P/W	: Pink/White
B/W	: Black/White	R	: Red
B/Y	: Black/Yellow	R/B	: Red/Black
Bl	: Blue	R/G	: Red/Green
Bl/B	: Blue/Black	R/Y	: Red/Yellow
Bl/R	: Blue/Red	R/W	: Red/White
Bl/W	: Blue/White	Sb	: Skyblue
Br	: Brown	V	: Violet
Br/B	: Brown/Black	V/G	: Violet/Green
Br/R	: Brown/Red	V/R	: Violet/Red
Br/W	: Brown/White	V/Y	: Violet/Yellow
Br/Y	: Brown/Yellow	W	: White
G	: Green	W/Bl	: White/Blue
Gr	: Gray	W/R	: White/Red
Gr/W	: Gray/White	Y	: Yellow
Lg	: Light green	Y/B	: Yellow/Black

Diagnosis Switch Terminal

There are two diagnosis switch terminals; one included in the junction/fuse block and the other in the monitor coupler in the engine room. When either diagnosis switch terminal is grounded, a diagnosis signal is fed to ECM which then outputs self-diagnosis code and at the same time outputs ISC duty through duty output terminal.



1. Junction/fuse block
2. Diagnosis switch terminal
3. Monitor coupler

A: Blank
B: Diagnosis switch terminal
C: Diagnosis output terminal
D: Ground terminal
E: Test switch terminal
F: Duty output terminal

Fig. 6E-5 Diagnosis and Test Switch Terminals

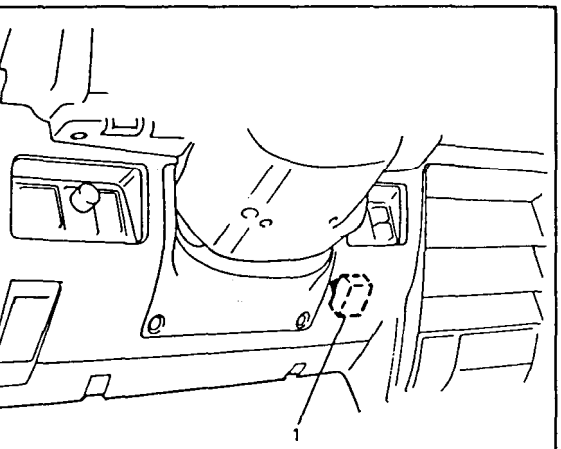
Test Switch Terminal

The test switch terminal is included in the monitor couper. When this terminal is grounded, ECM sets the ignition timing to the initial ignition timing.

When both test switch terminal and diagnosis switch terminal are gounded, ECM outputs A/F duty through the A/F duty check terminal. Also, "CHECK ENGINE" light stays ON at this time, but it is nothing abnormal.

NOTE:

Germany specification car is not provided with a diagnosis switch terminal in the fuse box but instead a diagnosis switch is installed to the underside of the instrument panel as shown below.



1. Diagnosis switch

Fig. 6E-5-1 Diagnosis Switch

DIAGNOSIS

DIAGNOSTIC FLOW CHART

INSPECTION OF ECM AND ITS CIRCUITS

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

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

Voltage Check

1. Remove ECM from body according to the same procedure as that in Service Manual mentioned in the FOREWORD of this manual.
2. Connect ECM couplers to ECM.
3. Check voltage at each terminal of couplers connected.

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

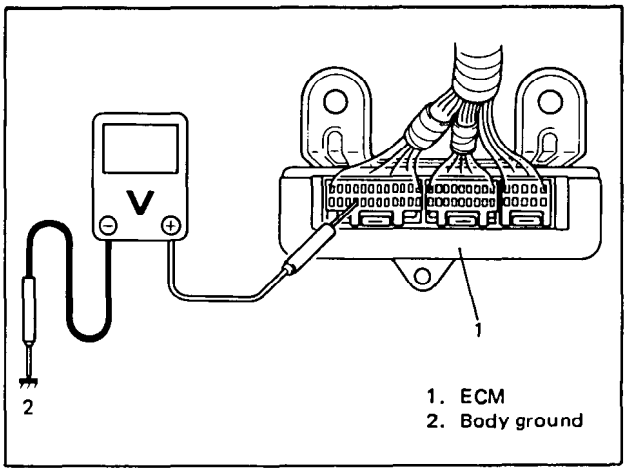


Fig. 6E-6 Checking Voltage

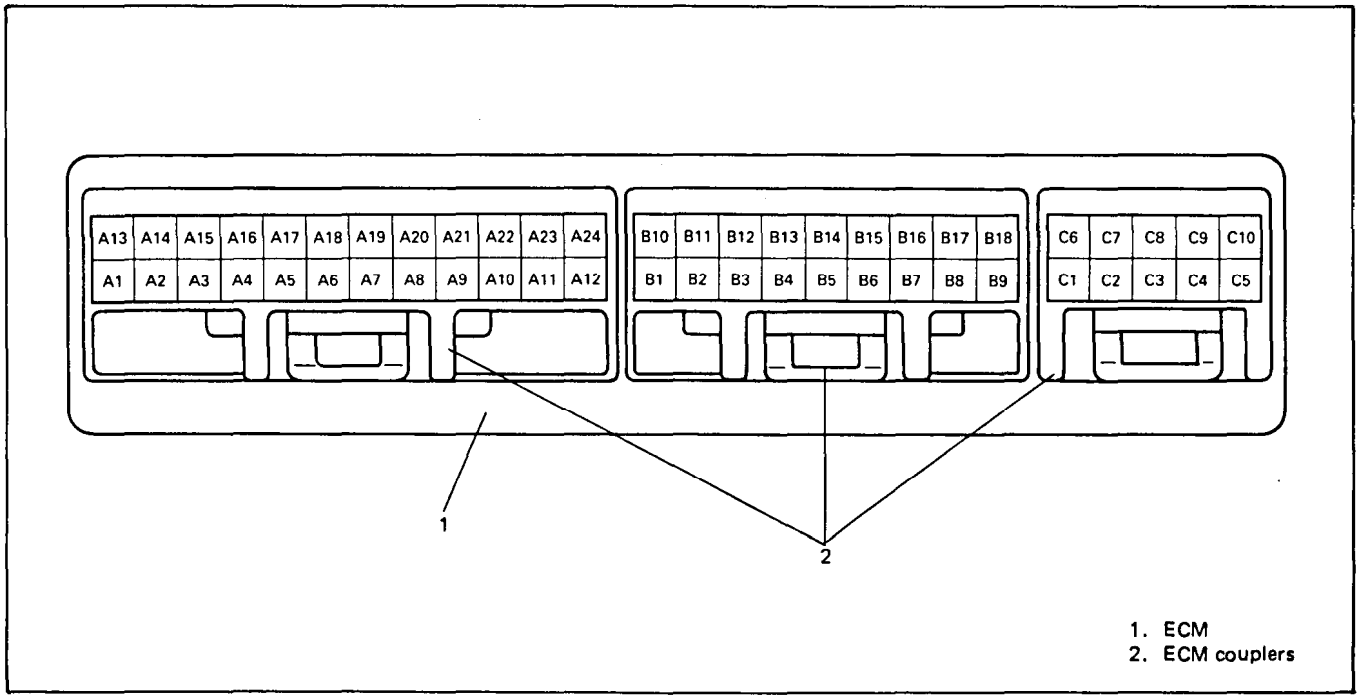


Fig. 6E-7 ECM Coupler Terminals

TERMINAL	CIRCUIT	STANDARD VOLTAGE	CONDITION
A1 A2	Power source	10 – 14V	Ignition switch ON
A3	Power source of AFS	10 – 14V	Ignition switch ON
A4	Power source of TPS	4.0 – 5.5V	Ignition switch ON
A5	Sensor ground	———	———
A6	AFS signal	0.2 – 0.8V	Ignition switch ON
A7	WTS	1.0 – 3.0V	Ignition switch ON Engine cooling water temp.: 80°C (176°F)
A8	Oxygen sensor (if equipped)	Indicator deflection repeated between over and under 0.45V	While engine running at 2000 r/min for 1 minute or longer after warmed up
A9	TPS signal	0 – 1V	Ignition switch ON Throttle valve at idle position
		3.0 – 5.0V	Ignition switch ON Throttle valve at full open position
A10	Speed sensor signal	Indicator deflection repeated between 0V and 3 – 5V	Ignition switch ON Front left tire turned slowly with front right tire locked
A12	Ignition signal	10 – 14V	Ignition switch ON
A13 A14	Ground	———	———
A15	———	———	———
A16	Power source for back up circuit	10 – 14V	Ignition switch ON and OFF
A18	Air-conditioner ON/OFF signal (if equipped)	8 – 14V	Ignition switch ON
		0 – 2V	While engine running at idle speed, Air-conditioner ON
A19	Test switch terminal	10 – 14V	Ignition switch ON
		0 – 1V	Ignition switch ON Test switch terminal grounded
A21	Idle switch (in TPS)	0 – 1V	Ignition switch ON Throttle valve at idle position
		3.0 – 5.0V	Ignition switch ON Throttle valve opens larger than idle position
A22	Diagnosis switch terminal	10 – 14V	Ignition switch ON
		0 – 1V	Ignition switch ON Diagnosis switch terminal grounded

TERMINAL	CIRCUIT	STANDARD VOLTAGE	CONDITION
A23 (California spec. model only)	REGTS	4.0 – 5.0V	Ignition switch ON Sensor ambient temp.: 20°C (68°F)
A24	———	———	———
B1	CAS (positive)	———	———
B2	"CHECK ENGINE" light	0 – 3V	Ignition switch ON Diagnosis switch terminal ungrounded
		10 – 14V	Engine running Diagnosis switch terminal ungrounded
B3	P/S VSV (if equipped)	10 – 14V	Ignition switch ON
B5	Canister purge VSV (if equipped)	10 – 14V	Ignition switch ON
B6	———		———
B7	Duty output terminal	0V	Ignition switch ON
B8	Main relay ground	0 – 2V	Ignition switch ON
B9	———	———	———
B10	CAS (negative)	———	———
B11	Electric load signal	0V	Ignition switch ON Headlight, small light, heater fan, radiator fan, stop light and rear defogger all turned OFF
		10 – 14V	Ignition switch ON Headlight, small light, heater fan, radiator fan, stop light or rear defogger turned ON
B12	Power steering pressure switch (if equipped)	10 – 14V	Ignition switch ON
		0 – 1V	With engine running at idle speed, turning steering wheel to the right and left as far as it stop, repeating it a few times
B13	Fuel pump relay ground	0 – 4V	For 3 seconds after ignition switch ON
		10 – 14V	When over 3 seconds after ignition switch ON
B14 (California spec. modle only)	EGR VSV	10 – 14V	Ignition switch ON
B15	———	———	———

TERMINAL	CIRCUIT	STANDARD VOLTAGE	CONDITION
B16	Ground	———	———
B17	———	———	———
B18	ISC solenoid valve	10 – 14V	Ignition switch ON
C1	Engine start signal (Engine start switch)	6 – 12V	While engine cranking
		0 – 1V	Other than above
C2 C7	Power source for injector	10 – 14V	Ignition switch ON
C3 C4	Injector (positive)	———	———
		———	———
C5 C10	Ground for injector	———	———
C6	Ignition output signal	0V	Ignition switch ON
		1 – 3V	While engine cranking
C8 C9	Injector (negative)	———	———
		———	———

Resistance Check

Refer to the Service Manual mentioned in the FOREWORD of this manual.

ON CAR SERVICE

IDLE SPEED/ISC DUTY ADJUSTMENT (INCLUDING AIR-CONDITIONER VSV ADJUSTMENT)

Before idle speed/ISC duty check and adjustment, make sure of the following.

- Lead wires and hoses of Electronic Fuel Injection and engine emission control systems are connected securely.
- Accelerator cable has some play, that is, it is not tight.
- Ignition timing is within specification.
- All of electrical loads except ignition are switched off.
- Air-conditioner is OFF, if equipped.
- Air cleaner has been properly installed and is in good condition.

After above items are all confirmed, check idle speed and ISC duty as follows.

NOTE:

Before starting engine, place transmission gear shift lever in "Neutral", and set parking brake and block drive wheels.

1. Warm up engine to normal operating temperature.
2. Set tachometer
3. Using serrice wire, ground "Diagnosis switch terminal" in monitor coupler so that ECM output ISC duty through "Duty output terminal" and make sure that "CHECK ENGINE" light indicate diagnostic code No. 12.

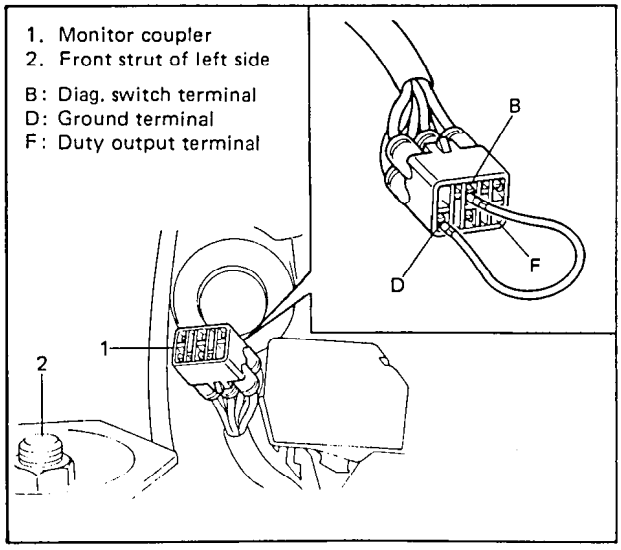


Fig. 6E-8 Grounding Diag. Switch Terminal

4. Connect duty meter between "Duty output terminal" and "Ground terminal" of monitor coupler.

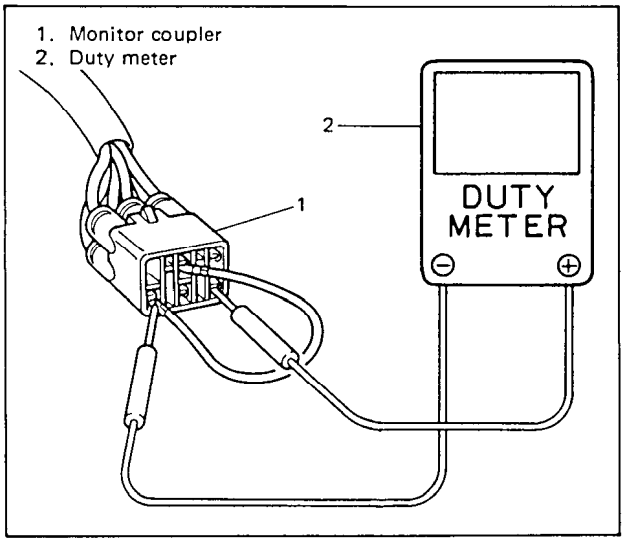


Fig. 6E-9 Connecting Duty Meter

5. Check to ensure that idle speed and ISC duty are as specified. If ISC duty and/or idle speed is not within specification range, adjust it by turning idle speed adjusting screw.

ENGINE IDLE SPEED	850 ± 50 r/min
ISC DUTY AT SPECIFIED IDLE SPEED	35 ± 5% (ON duty meter indication)
	4.9 ± 0.7V when battery voltage is 14V

NOTE:

ISC duty can be checked by using analog type voltmeter. ISC duty to voltage relation is as follows.

ON DUTY METER INDICATION (%)	OFF DUTY METER INDICATION (%)	VOLMETER INDICATION (V)
0	100	0
30	70	0.3 x V_B
40	60	0.4 x V_B
100	0	V_B

- "OFF DUTY METER" is such duty meter that indicates approx. 100% when terminal voltage is approx. "0V".
- "V_B" represents battery voltage while engine of vehicle being checked is running.

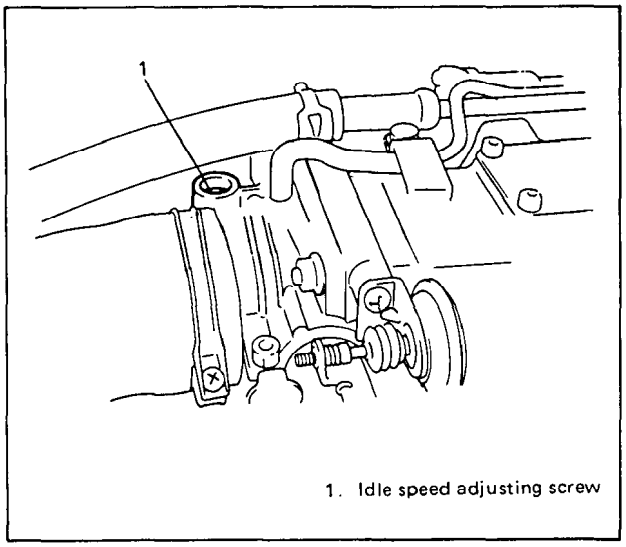


Fig. 6E-10 Idle Speed Adjusting Screw

6. Upon completion of adjustment, install adjusting screw cap to throttle body.
7. This step is for checking and/or adjusting engine idle speed and ISC duty when air-conditioner is working.
   With car without air-conditioner, advance to step 8. With air-conditioner equipped ones, follow procedure described below.
   1) Turn air-conditioner switch ON and set heater blower switch to high (max.) speed position. Then check that air-conditioner is working.
   2) Check to ensure that idle speed and ISC duty are as specified respectively.

ENGINE IDLE SPEED WITH A/C ON	900 ± 50 r/min
ISC DUTY AT SPECIFIED IDLE SPEED	35 ± 5% (ON duty meter indication)
	4.9 ± 0.7V when battery voltage is 14V

NOTE:
ISC duty can be checked by using analog type voltmeter. ISC duty to voltage relation is as follows.

ON DUTY METER INDICATION (%)	OFF DUTY METER INDICATION (%)	VOLTMETER INDICATION (V)
0	100	0
30	70	0.3 x V_B
40	60	0.4 x V_B
100	0	V_B

- "OFF DUTY METER" is such duty meter that indicates approx. 100% when terminal voltage is approx. "0V".
- "V_B" represents battery voltage while engine of vehicle being checked is running.

   3) If idle speed and/or ISC duty is not within specified range, adjust it by turning adjusting screw of air conditioner VSV.

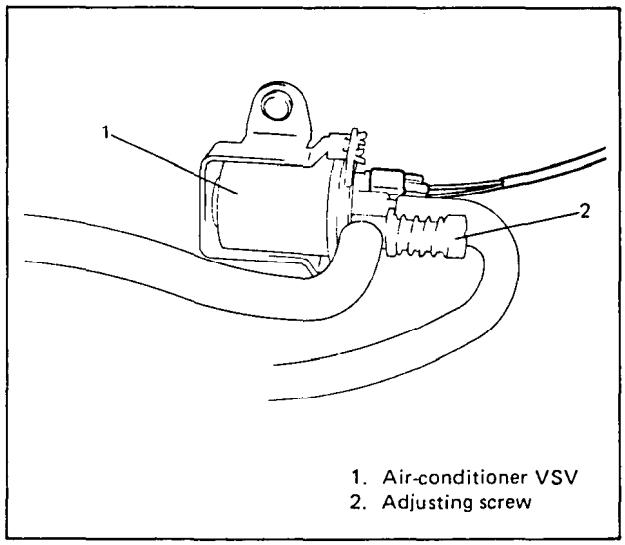


Fig. 6E-11 Adjusting Screw for Air-Con. VSV

8. Upon completion of adjustment, disconnect service wire from monitor coupler and install cap to monitor coupler.

ELECTRONIC CONTROL SYSTEM

SPEED SENSOR

Inspection

1. Disconnect negative cable at battery.
2. Remove combination meter from instrument panel.
3. Connect ohmmeter between "GND" terminal and "VSS" terminal of combination meter and turn cable joint of speedometer with a screwdriver. Ohmmeter indicator should move back and forth between 0 (zero) and ∞ (infinity) 4 times while cable joint is turned one full revolution.

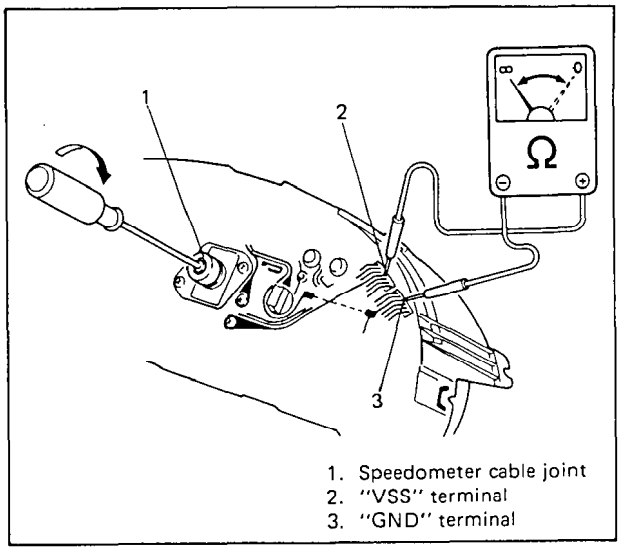


Fig. 6E-12 Checking Speed Sensor

Replace speedometer is check result is not satisfactory.

4. Install combination meter to instrument panel.
5. Connect negative cable to battery.

SECTION 6F

IGNITION SYSTEM

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

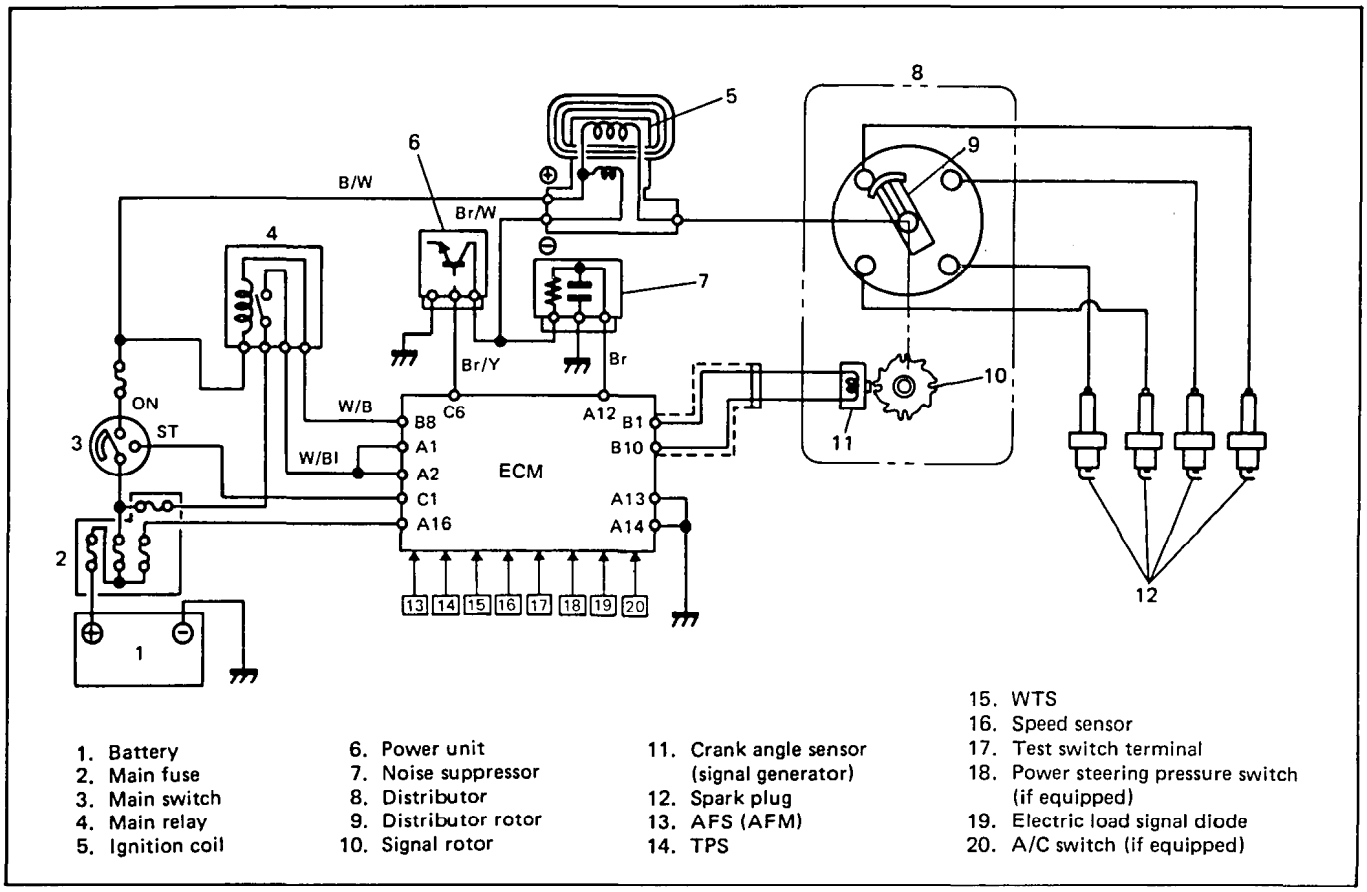
CONTENTS

GENERAL DESCRIPTION

The ignition system used for this car has an ESA (Electronic Spark Advance) system and consists of the following parts.

- ECM
  It detects the engine condition through the signals from the sensors, determines the most suitable ignition timing and time for electricity to flow to the primary coil and sends a signal to the power unit.
- Power unit
  It turns ON and OFF the primary current of the ignition coil according to the signal from ECM.
- Ignition coil
  When the ignition coil primary current is turned OFF, a high voltage is induced in the secondary winding.
- Distributor
  It distributes a high voltage current to each plug.
- High-tension cords and spark plugs
- CAS (Crank Angle Sensor)
  Located in the distributor, it converts the crank angle into voltage variation and sends it to ECM. For its details, refer to Section 6E.
- AFM, TPS, WTS, P/S pressure switch, electric load signal diode, A/C switch and speed sensor
  For their details, refer to Section 6E.

In ESA system, the ECM is programmed for the best ignition timing under every engine condition. Receiving signals which indicate the engine condition from the sensors, e.g., engine revolution, intake air volume, coolant temperature, etc., it selects the most suitable ignition timing from its memory and operates the power unit.
Thus ignition timing is controlled to yield the best engine performance.
For more information, refer to Section 6E.



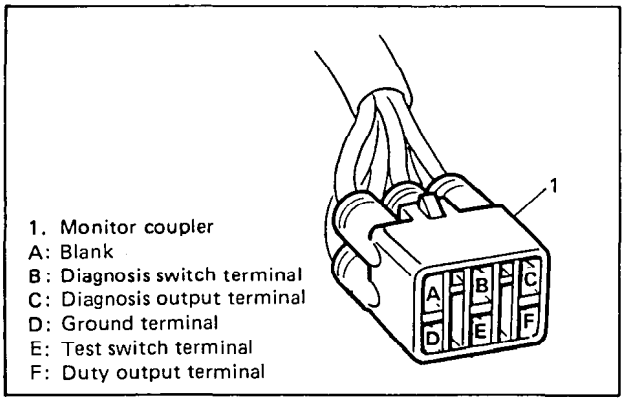
1. Battery
2. Main fuse
3. Main switch
4. Main relay
5. Ignition coil
6. Power unit
7. Noise suppressor
8. Distributor
9. Distributor rotor
10. Signal rotor
11. Crank angle sensor (signal generator)
12. Spark plug
13. AFS (AFM)
14. TPS
15. WTS
16. Speed sensor
17. Test switch terminal
18. Power steering pressure switch (if equipped)
19. Electric load signal diode
20. A/C switch (if equipped)

Fig. 6F-1 Ignition Circuit Diagram for ESA Ignition System

IGNITION TIMING

INSPECTION AND ADJUSTMENT

1. Start engine and warm it up to normal operating temperature.
2. Make sure that all of electrical loads except ignition are switched off.
3. Check to be sure that idle speed is within specification.
4. Set timing light to No. 1 high tension cord.
5. Remove monitor coupler cap beside ignition coil.
6. Connect D and E terminals of monitor coupler or E to body by using service wire so that ignition timing is fixed on initial one.



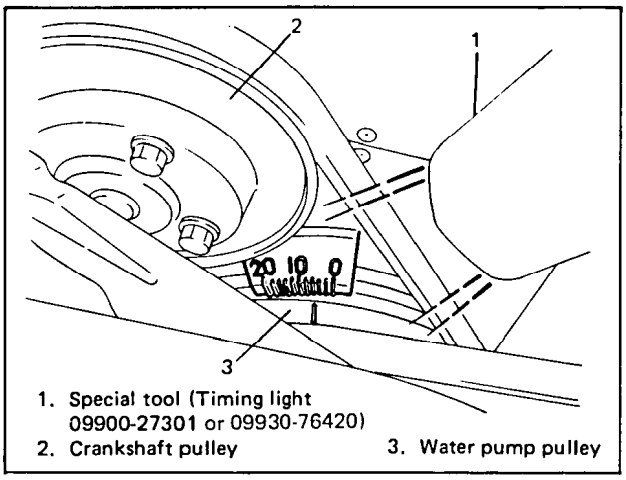
1. Monitor coupler
A: Blank
B: Diagnosis switch terminal
C: Diagnosis output terminal
D: Ground terminal
E: Test switch terminal
F: Duty output terminal

Fig. 6F-2 Fixing Ignition Timing

7. Using timing light, check that timing is within specification.

Initial ignition timing (Test switch terminal grounded)	6 ± 1° BTDC at 850 ± 50 r/min.

Ignition order	1 – 3 – 4 – 2

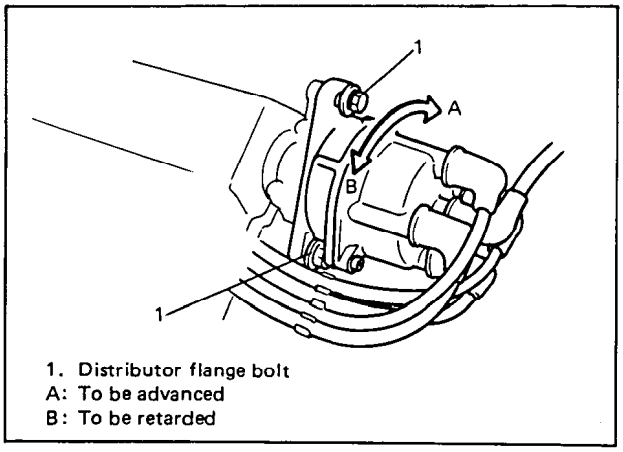


1. Special tool (Timing light 09900-27301 or 09930-76420)
2. Crankshaft pulley
3. Water pump pulley

Fig. 6F-3 Checking Ignition Timing

8. If ignition timing is out of specification, loosen flange bolts, adjust timing by turning distributor assembly while engine is running, and then tighten bolts.
9. After tightening distributor flange bolts, recheck that ignition timing is within specification.

Tightening torque for distributor flange bolts	N·m	kg-m	lb-ft
	10 – 16	1.0 – 1.6	7.0 – 11.5



1. Distributor flange bolt
A: To be advanced
B: To be retarded

Fig. 6F-4 Adjusting Ignition Timing

10. After checking and/or adjusting, disconnect service wire from monitor coupler.

NOTE:
In this state (test switch terminal ungrounded, idle switch ON and car stopped), ignition timing may vary more or less of initial ignition timing but it is nothing abnormal.

11. Check that increasing engine speed advances ignition timing. If not, check TPS (idle switch), test switch terminal circuit, engine start signal circuit and ECM.

SECTION 6G1
CRANKING SYSTEM
(1.2 kW and 1.4 kW type)

NOTE:
Two types of starting motors are used for this model. They are, 1.2 and 1.4 kW types. Which one is used depends on specifications. For its identification, a label in one of following colors indicative of each type is attached to starting motor itself.

LABEL COLOR	White	Red
OUT PUT (kW)	1.2	1.4

CONTENTS

GENERAL DESCRIPTION

CRANKING CIRCUIT

The cranking circuit consists of the battery, starting motor, ignition switch, and related electrical wiring. These components are connected electrically as shown in Fig. 6G1-1. Only the starting motor will be covered in this portion.

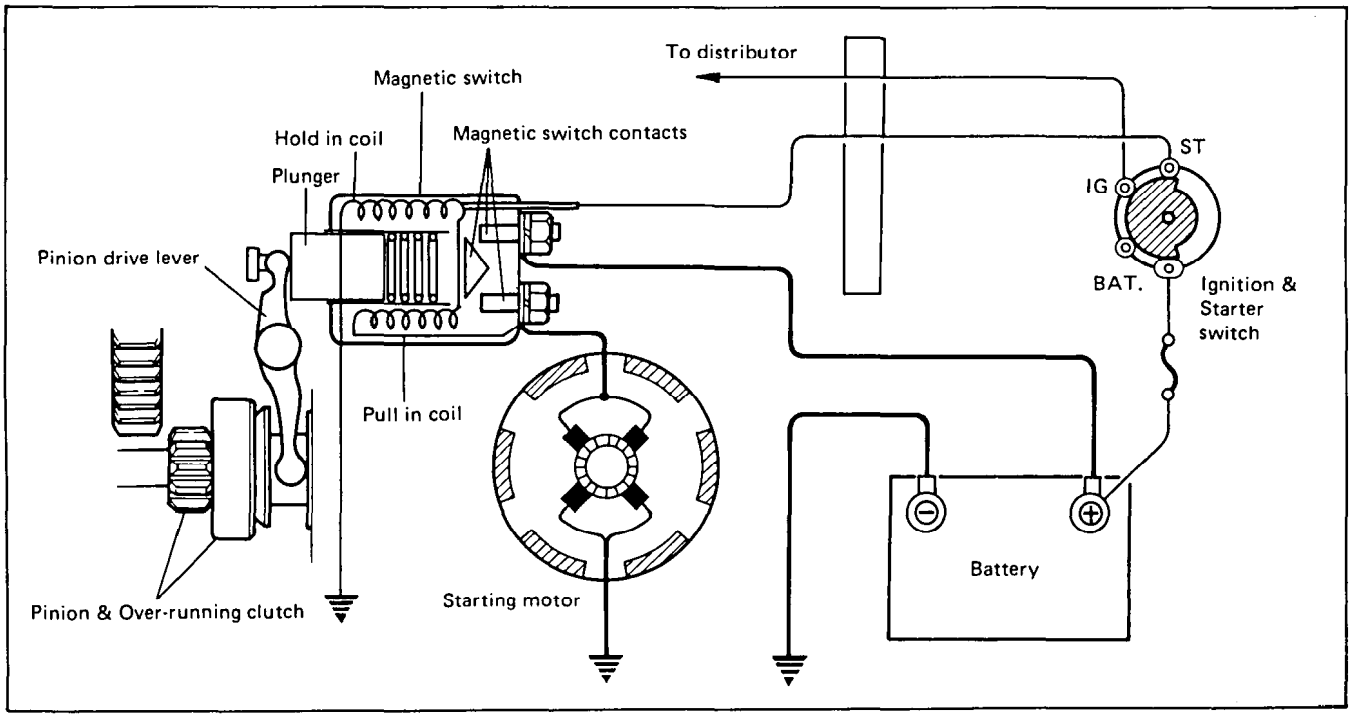


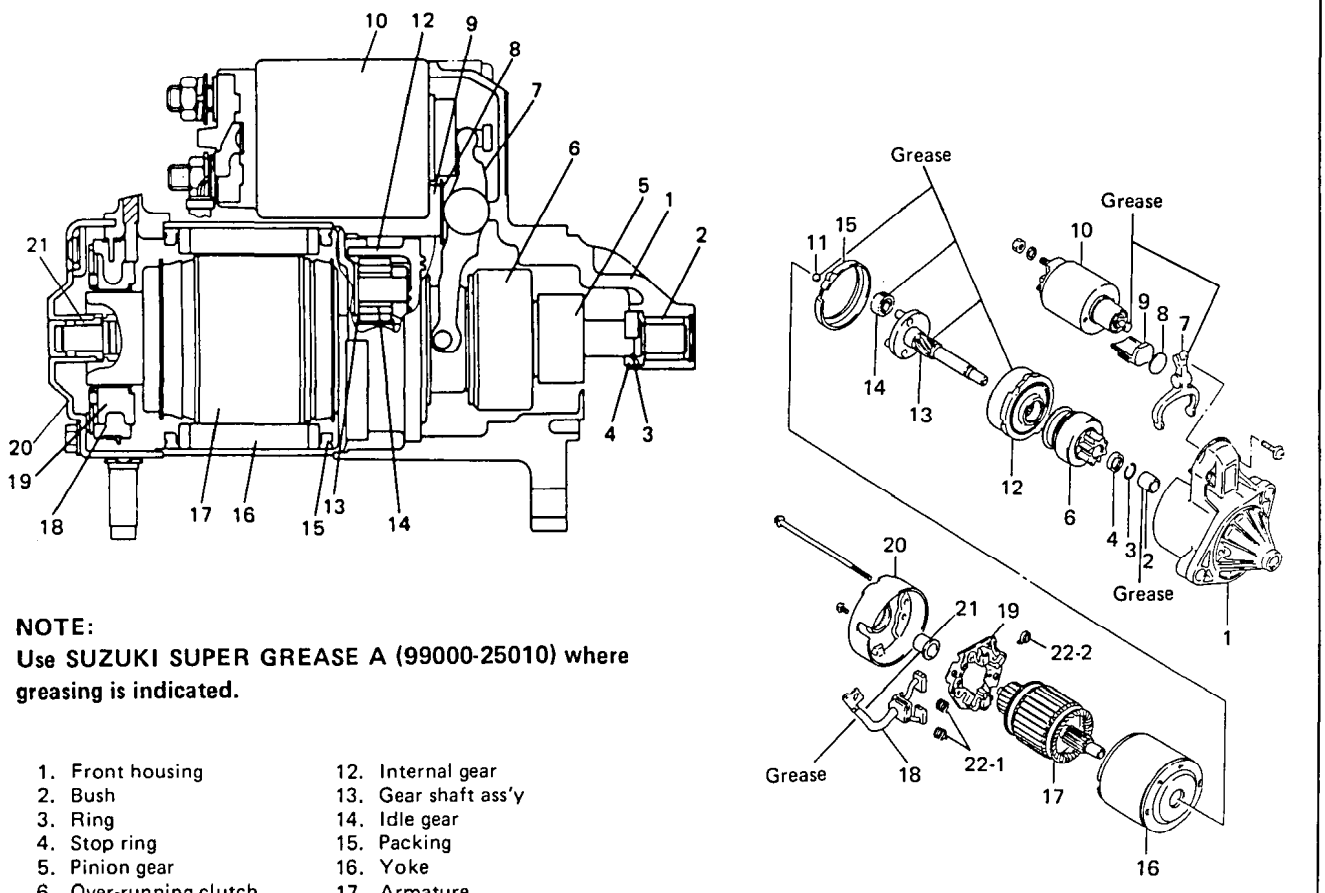
Fig. 6G1-1 Cranking Circuit

STARTING MOTOR

The starting motor consists of parts shown in Fig. 6G1-2 and has permanent magnets mounted in starting motor yoke (frame).
The magnetic switch assembly and parts in the starting motor are enclosed in the housings so that they will be protected against possible dirt and water splash.
In the circuit shown in Fig. 6G1-1, the magnetic (motor) switch coils are magnetized when the ignition switch is closed. The resulting plunger and pinion drive lever movement causes the pinion to engage the engine flywheel gear and the magnetic switch main contacts to close, and cranking takes place. When the engine starts, the pinion over-running clutch protects the armature from excessive speed until the switch is opened, at which time the return spring causes the pinion to disengage.

NOTE:

- **Make sure to apply grease before assembly where so indicated in the figure below.**
- **The two types of starting motors are different only in length, weight of the armature/yoke and their output but the same description of structure, procedures of disassembly, assembly and inspection is applicable. For specifications, refer to the last page of this section.**



NOTE:
Use SUZUKI SUPER GREASE A (99000-25010) where greasing is indicated.

1. Front housing
2. Bush
3. Ring
4. Stop ring
5. Pinion gear
6. Over-running clutch
7. Lever
8. Plate
9. Seal rubber
10. Magnetic switch
11. Ball
12. Internal gear
13. Gear shaft ass'y
14. Idle gear
15. Packing
16. Yoke
17. Armature
18. Brush
19. Brush holder
20. Rear bracket
21. Rear bush
22-1. Brush spring (For 1.2 kW type)
22-2. Brush spring (For 1.4 kW type)

Fig. 6G1-2

DIAGNOSIS

Possible symptoms due to starting system trouble are:

- Starting motor does not run (or runs slowly),
- Starting motor runs but fails to crank engine, or
- 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.

Don't 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**	
	1. Battery run down.	Recharge battery.
	2. Battery voltage too low due to battery deterioration.	Replace battery.
	3. Poor contact in battery terminal connection.	Retighten or replace.
	4. Loose grounding cable connection.	Retighten.
	5. Fuse set loose or blown off.	Tighten or replace.
	6. Poor contacting action of ignition switch.	Replace.
	7. Lead wire socket loose in place.	Retighten.
	8. Open-circuit between ignition switch and magnetic switch.	Repair.
	9. Open-circuit in pull-in coil.	Replace magnetic switch.
	10. Poor sliding of plunger and/or pinion.	Repair.
	Operating sound of magnetic switch heard.	
	1. Battery run down.	Recharge battery.
	2. Battery voltage too low due to battery deterioration.	Replace battery.
	3. Loose battery cable connections.	Retighten.
	4. Burnt main contact point, or poor contacting action of magnetic switch.	Replace magnetic switch.
	5. Brushes are seating poorly or worn down.	Repair or replace.
	6. Weakened brush spring.	Replace.
	7. Burnt commutator.	Replace.
	8. Layer short-circuit of armature.	Replace.

Condition	Possible Cause	Correction
Starting motor running but too slow (small torque).	**If battery and wiring are satisfactory, inspect starting motor.**	
	1. Insufficient contact of magnetic switch main contacts.	Replace.
	2. Layer short-circuit of armature.	Replace.
	3. Disconnected, burnt or worn commutator.	Repair or replace.
	4. Worn brushes.	Replace brush.
	5. Weakened brush springs.	Replace spring.
	6. Burnt or abnormally worn end bushings.	Replace bushing.
Starting motor running, but not cranking engine.	1. Worn pinion tip.	Replace over-running clutch.
	2. Poor sliding of over-running clutch.	Repair.
	3. Clutch slipping (idling).	Replace over-running clutch.
	4. Worn teeth of ring gear.	Replace flywheel.
Noise	1. Abnormally worn bush.	Replace bush.
	2. Worn pinion or worn teeth of ring gear.	Replace pinion or flywheel.
	3. Poor sliding of pinion (failure in return movement).	Repair or replace.
	4. Worn internal or idle gear teeth.	Replace.
	5. Lock of oil in each part.	Lubricate.
Starting motor does not stop running.	1. Fused contact points of magnetic switch.	Repair or replace.
	2. Short-circuit between turns of magnetic switch coil (layer short-circuit).	Replace.
	3. Failure of returning action in ignition switch.	Replace.

ON VEHICLE SERVICE

Starting motors do not require lubrication except during overhaul. When the motor is disassembled for any reason, lubricate as shown in Fig. 6G1-2.

REMOVAL AND INSTALLATION

STARTING MOTOR

Use following procedure to remove starter:

1) Disconnect negative battery lead at battery.
2) Disconnect magnetic switch lead wire and battery cable from starting motor terminals.
3) Remove two starting motor mount bolts.
4) Remove starting motor.
5) To install, reverse the above procedure.

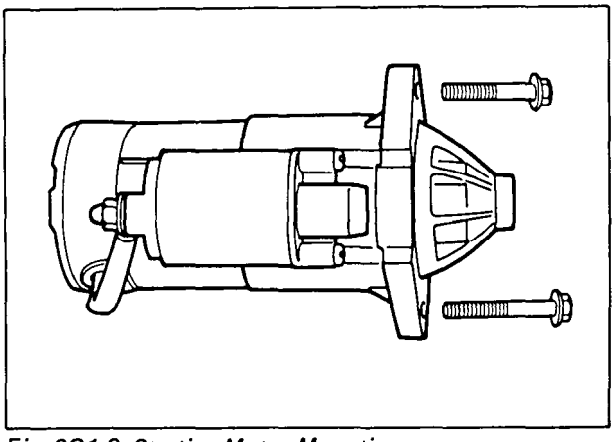


Fig. 6G1-3 Starting Motor Mounting

STARTING MOTOR REPAIR

MAGNETIC SWITCH

REMOVAL

NOTE:

Before disassembling starting motor, be sure to put match mark as shown in the figure below so that any possible mistake can be avoided.

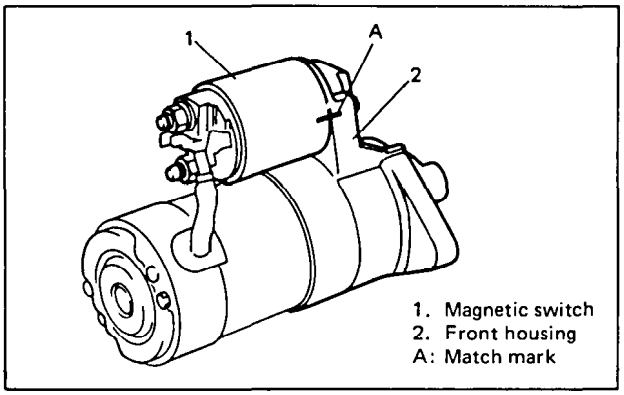


Fig. 6G1-4

1) Disconnect wire (switch to motor) from magnetic switch terminal.

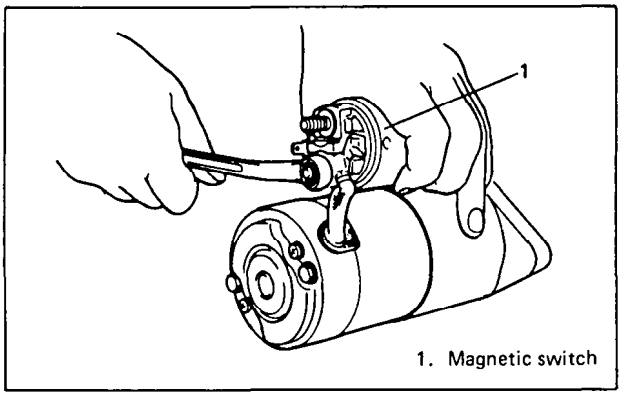


Fig. 6G1-5

2) Remove magnetic switch assembly.

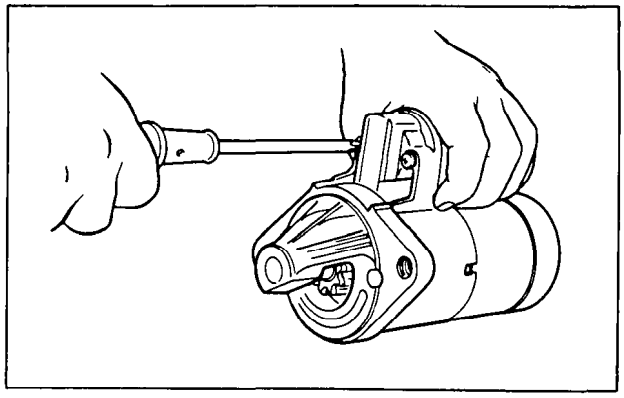


Fig. 6G1-6

NOTE:

Don't disassemble this switch. If defective, replace as a complete assembly.

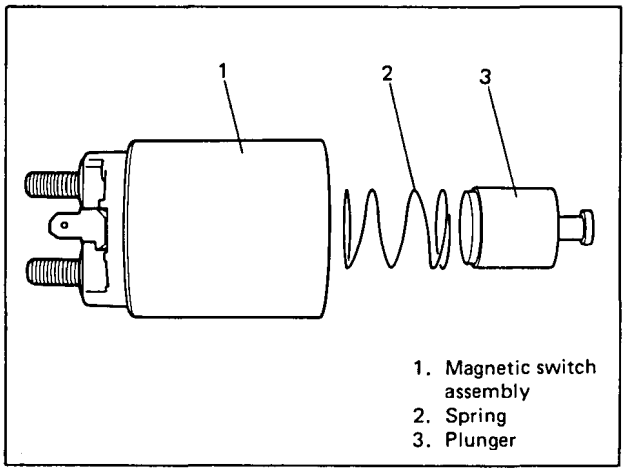


Fig. 6G1-7

INSTALLATION

Before installation, inspect plunger joint for wear and replace defective parts.

1) Apply grease. (Refer to Fig. 6G1-2)
2) Install switch assembly into front housing, referring to below figure especially for its vertical direction. And then tighten screws.

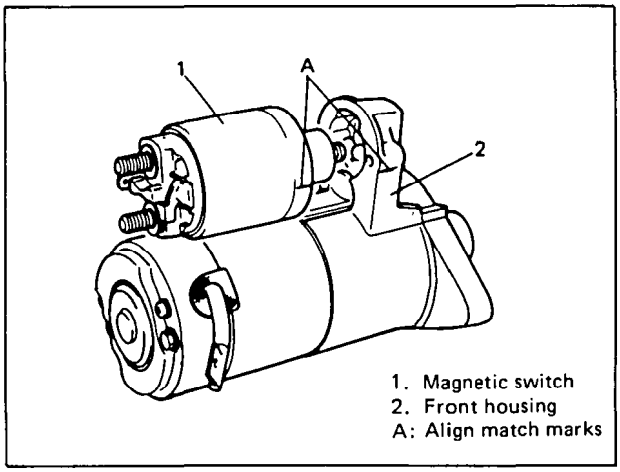


Fig. 6G1-8

3) Connect wire from motor to magnetic switch terminal.
4) Check switch for operation. (See page 6G1-15)

MOTOR BRUSH

REMOVAL

1) Remove rear bracket.

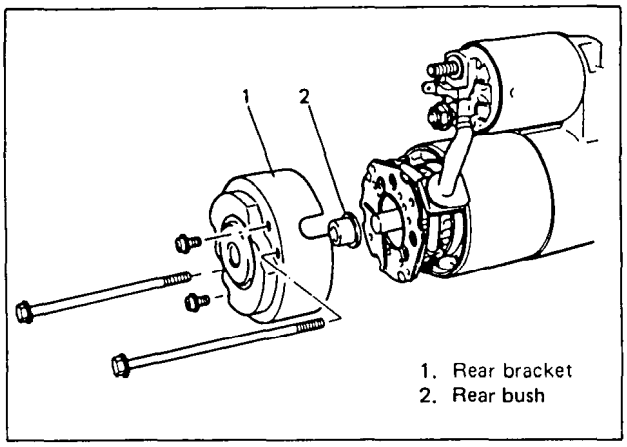


Fig. 6G1-9

2) Remove brush holder and brushes.

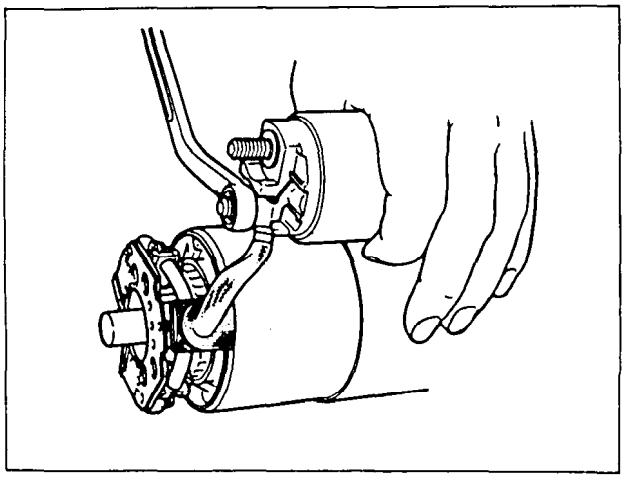


Fig. 6G1-10

INSTALLATION

Install in reverse order of REMOVAL, noting the following.

1) Apply grease. (Refer to Fig. 6G1-2.)
2) Install brush holder to armature while pushing 4 brushes outward.

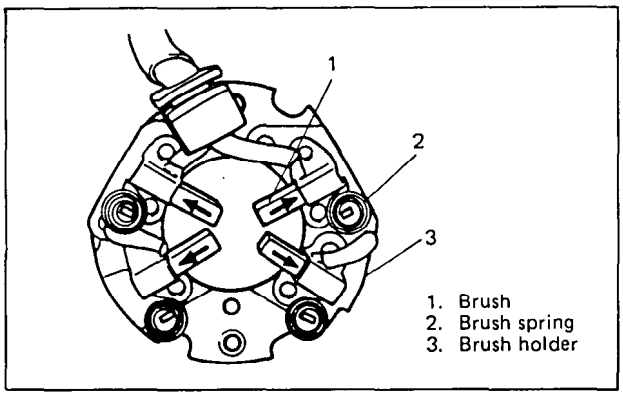


Fig. 6G1-11

3) Install rear bracket.
4) Check motor for operation. (See page 6G1-15.)

REAR BUSH (BEARING)

REMOVAL

1) Remove rear bracket.
2) Remove rear bracket cap, and then remove rear bush.

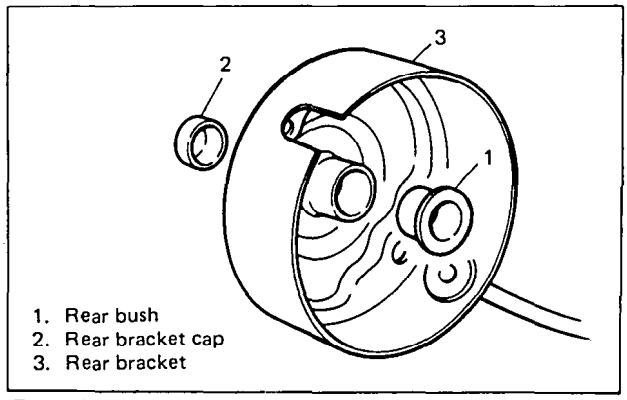


Fig. 6G1-12

INSTALLATION

1) Install rear bush as shown below.

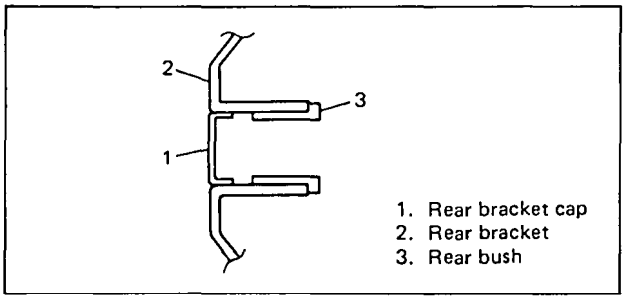


Fig. 6G1-13

2) Install rear bracket cap as shown above.
3) Apply grease. (Refer to Fig. 6G1-2.)
4) Install rear bracket.

ARMATURE/YOKE

REMOVAL

NOTE:

Before disassembling starting motor, be sure to put match marks at two locations (A & B) as shown in figure below so that any possible mistake can be avoided.

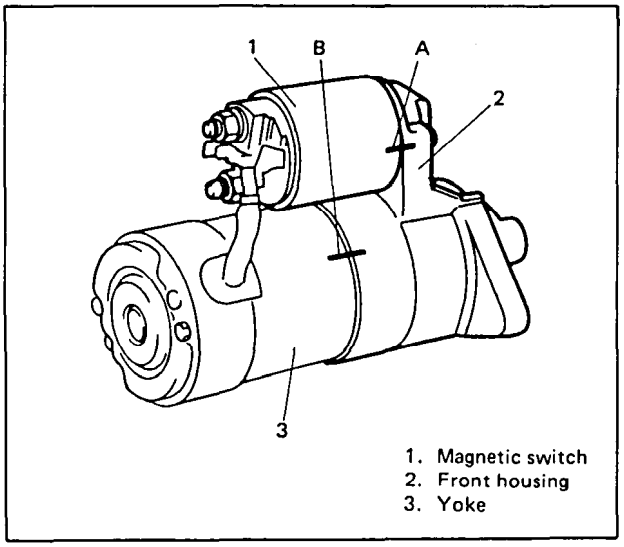


Fig. 6G1-14

1) Remove magnetic switch. (Refer to page 6G1-5.)
2) Remove brush holder. (Refer to page 6G1-6.)
3) Remove armature and yoke.

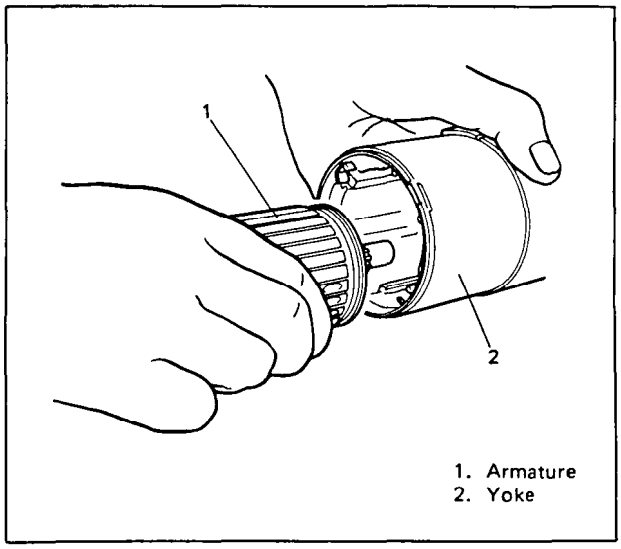


Fig. 6G1-15

INSTALLATION

Install in reverse order of REMOVAL, noting the following.

1) Apply grease. (Refer to Fig. 6G1-2.)

NOTE:

If ball of armature shaft came out when removed, be sure to apply grease to ball and put it back in.

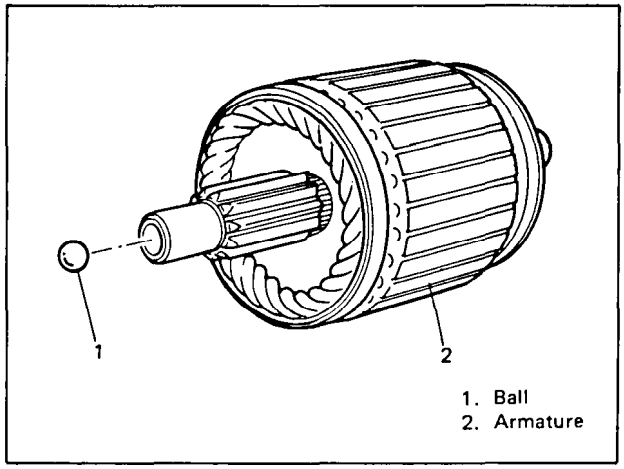


Fig. 6G1-16

2) Install armature into yoke.

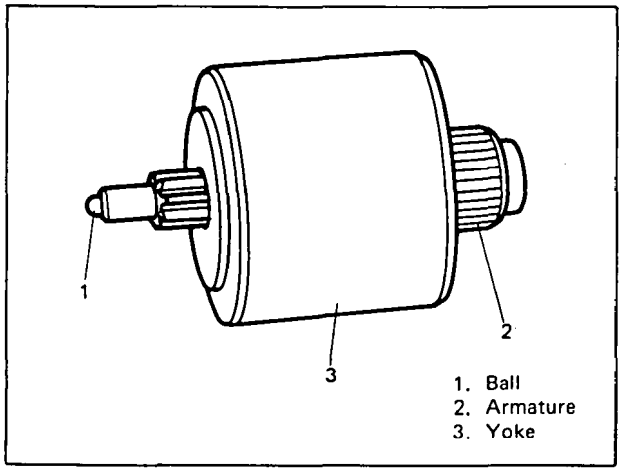


Fig. 6G1-17

3) Install yoke and armature into front housing while aligning match mark "B" provided before disassembly.
4) Install brush holder. (Refer to page 6G1-6.)
5) Install magnetic switch. (Refer to page 6G1-5.)
6) Carry out PERFORMANCE TEST referring to page 6G1-15 in this section.

OVER-RUNNING CLUTCH

REMOVAL

NOTE:
Before disassembling starting motor, be sure to put match marks at two locations (A & B) as shown in figure below so that any possible mistake can be avoided.

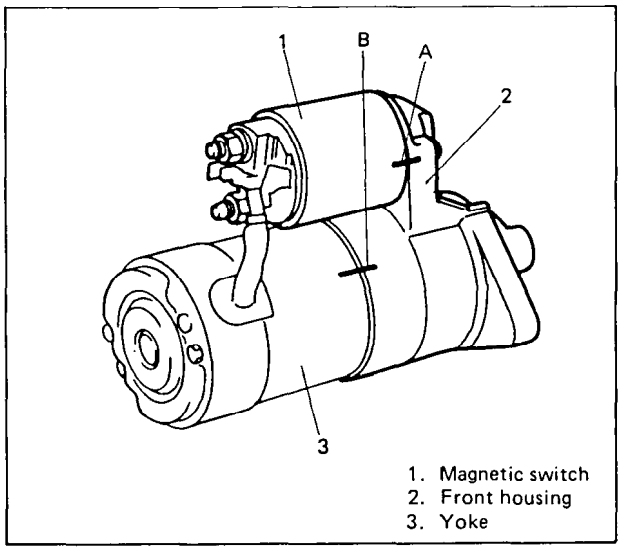


Fig. 6G1-18

1) Remove magnetic switch assembly. (For details, refer to steps 1) and 2) of MAGNETIC SWITCH REMOVAL described on page 6G1-5.)
2) Remove rear bracket.
3) Remove brush holder and brushes.

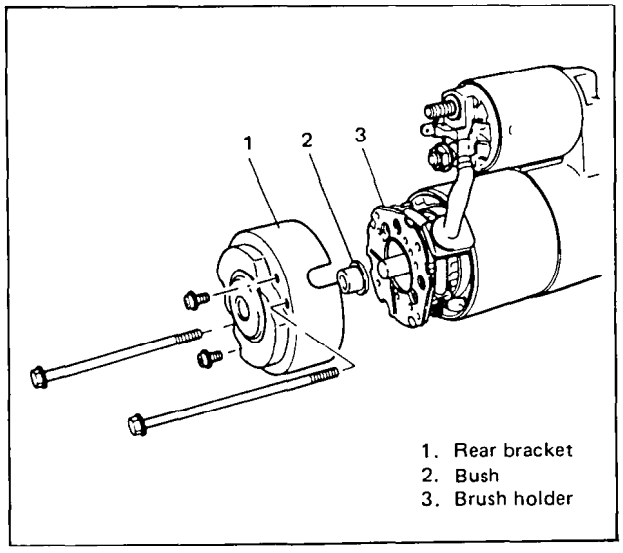


Fig. 6G1-19

4) Remove yoke and armature.

5) Remove packing and idle gears.

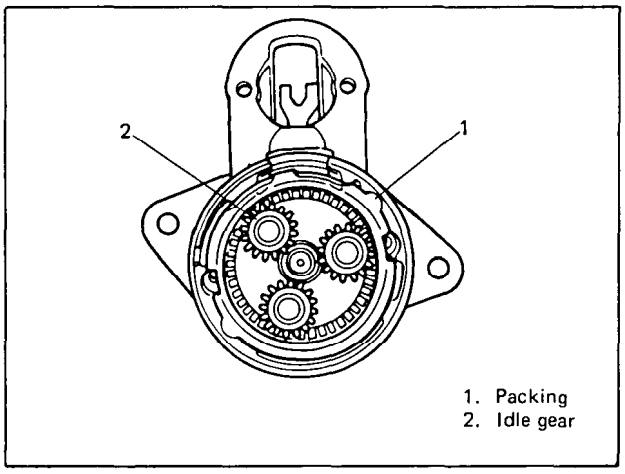


Fig. 6G1-20

6) Remove seal rubber and plate.

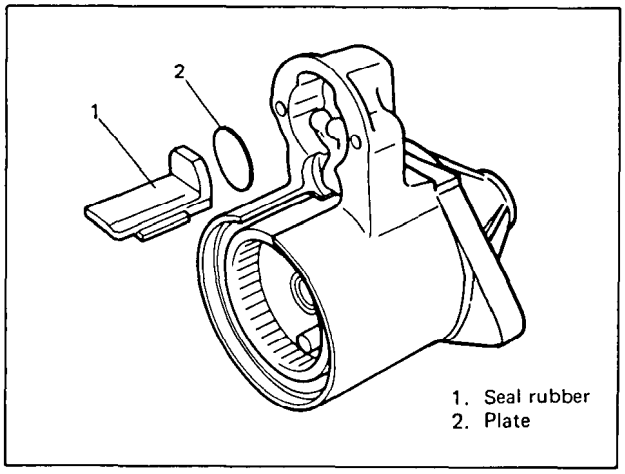


Fig. 6G1-21

7) Remove shaft assembly with lever.

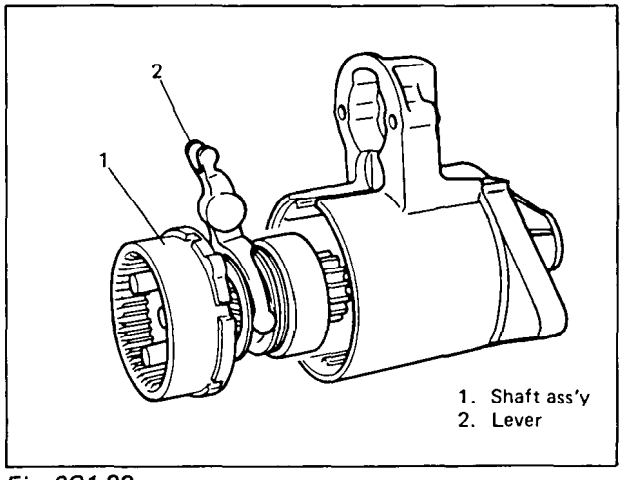


Fig. 6G1-22

8) Remove over-running clutch by removing rings.

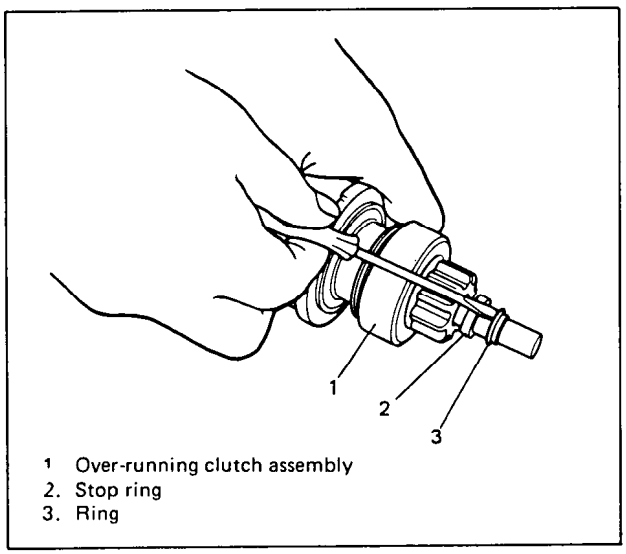


Fig. 6G1-23

INSTALLATION

Install in reverse order of REMOVAL, noting the following.

1) Apply grease. (Refer to Fig. 6G1-2.)
2) Install over-running clutch assembly to gear shaft, using care for installing direction of gear shaft stop ring.

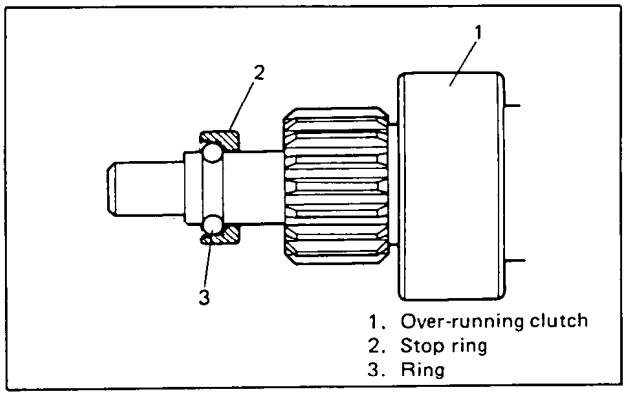


Fig. 6G1-24

3) Insert shaft ass'y into front housing with lever positioned as shown below.

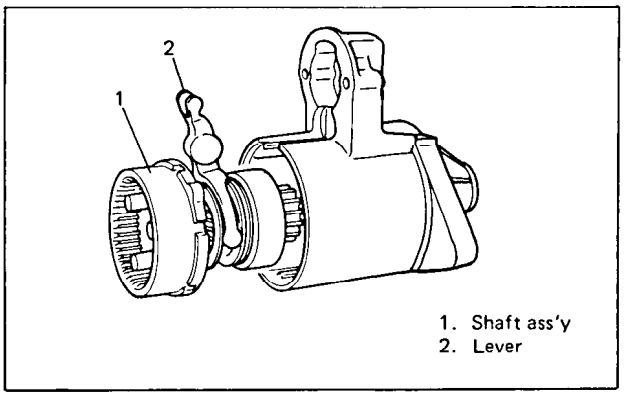


Fig. 6G1-25

4) Install packing so that cuts in packing align with holes for through bolt in front housing.

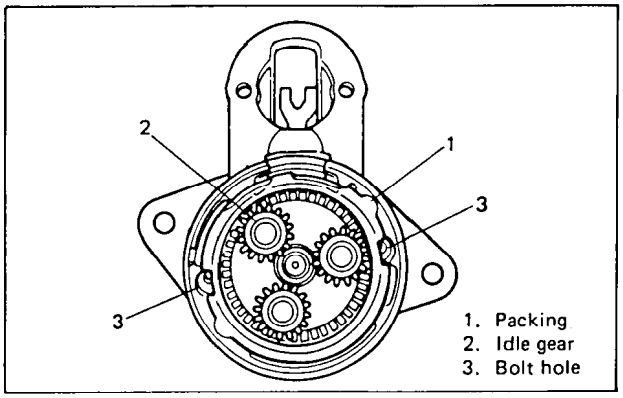


Fig. 6G1-26

5) Install plate and seal rubber to front housing.

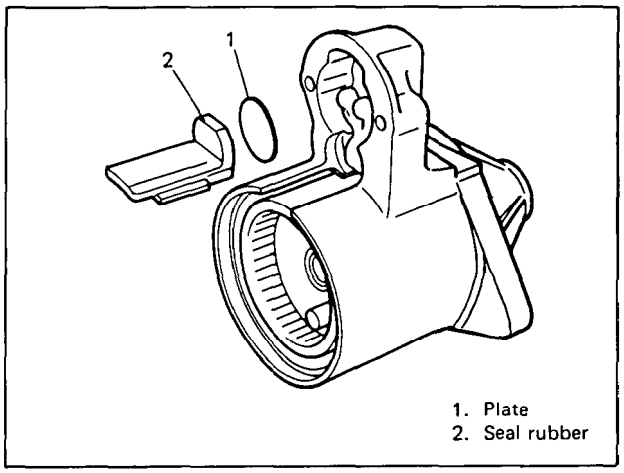


Fig. 6G1-27

6) Apply grease to ball and install ball into shaft hole.

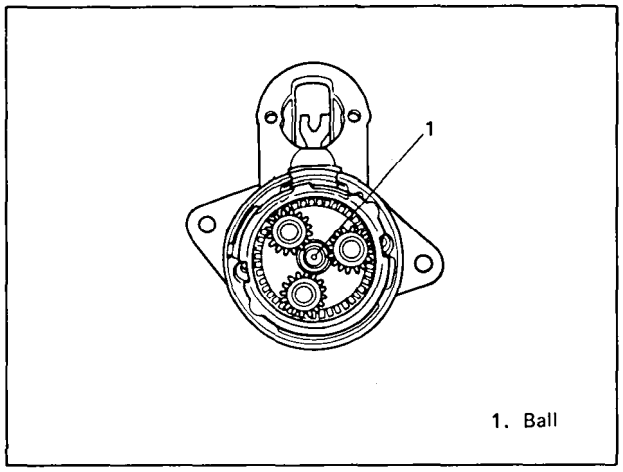


Fig. 6G1-28

7) Install yoke and armature to front housing by aligning match marks provided before removal.

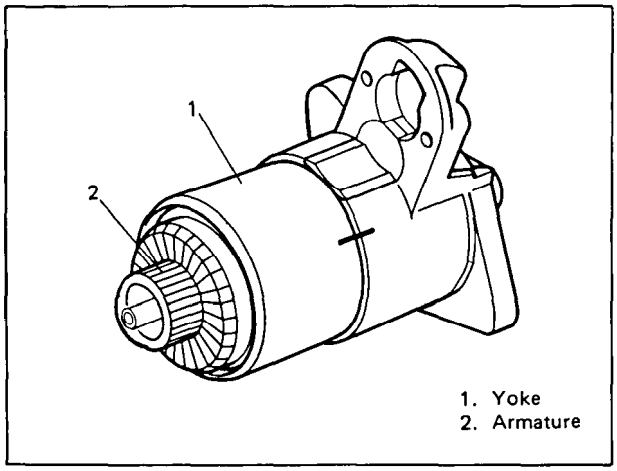


Fig. 6G1-29

8) Install brushes and brush holder. (For details, refer to steps 1) to 4) of BRUSH INSTALLATION on page 6G1-6.)
9) Tighten rear bracket bolts and brush holder screws.
10) Install magnetic switch assembly and connect wire (switch to motor) to switch terminal. (For details, refer to steps 1) to 3) of MAGNETIC SWITCH INSTALLATION on page 6G1-5.)

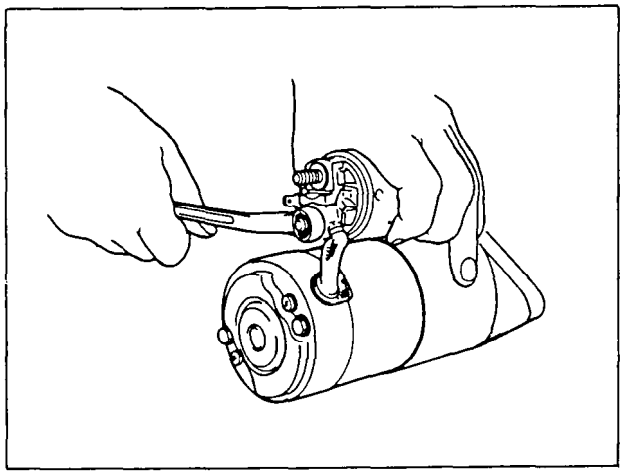


Fig. 6G1-30

11) Upon completion of assembly, carry out PERFORMANCE TEST referring to page 6G1-15 in this section.

STARTING MOTOR INSPECTION

1. INSPECT ARMATURE

Inspect commutator for dirt or burn. Correct with sandpaper or lathe, if necessary.

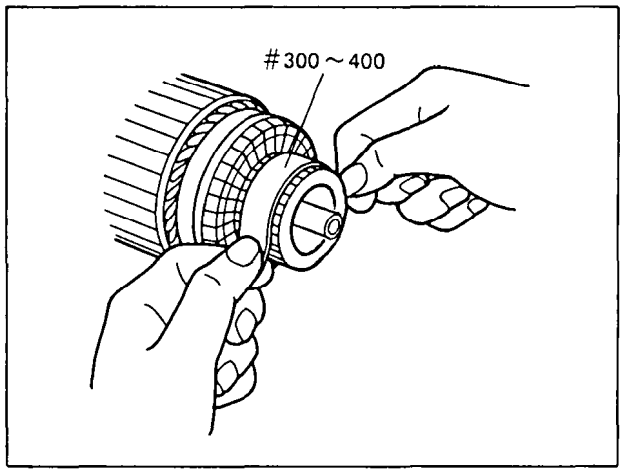


Fig. 6G1-31

Check commutator for uneven wear. If deflection of dial gauge pointer exceeds limit, repair or replace.

NOTE:
Below specification presupposes that armature is free from bend. Bent shaft must be replaced.

	Standard	Limit
Commutator out of round	0.05 mm (0.0019 in.) or less	0.4 mm (0.015 in.)

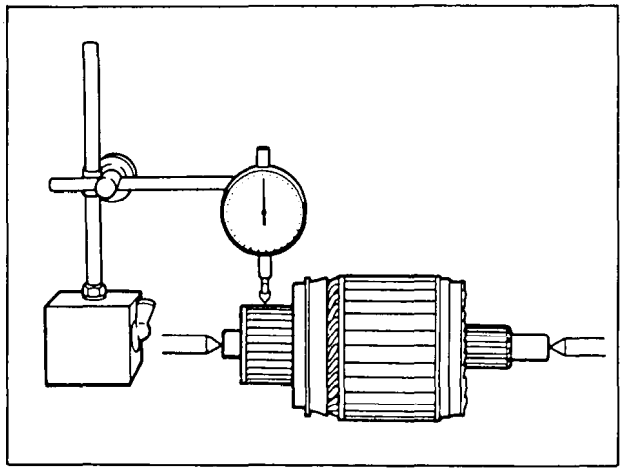


Fig. 6G1-32

Inspect commutator for wear. If below limit, replace armature.

	Standard	Limit
Commutator outside diameter	29.4 mm (1.16 in.)	28.8 mm (1.13 in.)

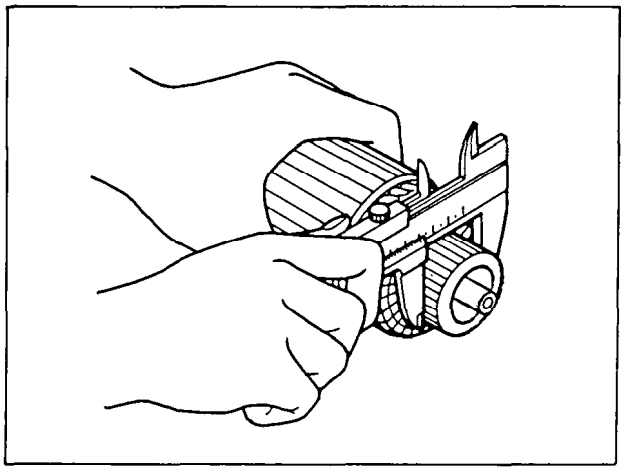


Fig. 6G1-33

Inspect commutator for insulator depth. Correct or replace if below limit.

	Standard	Limit
Commutator insulator depth	0.5 – 0.8 mm (0.0196 – 0.0314 in.)	0.2 mm (0.0078 in.)

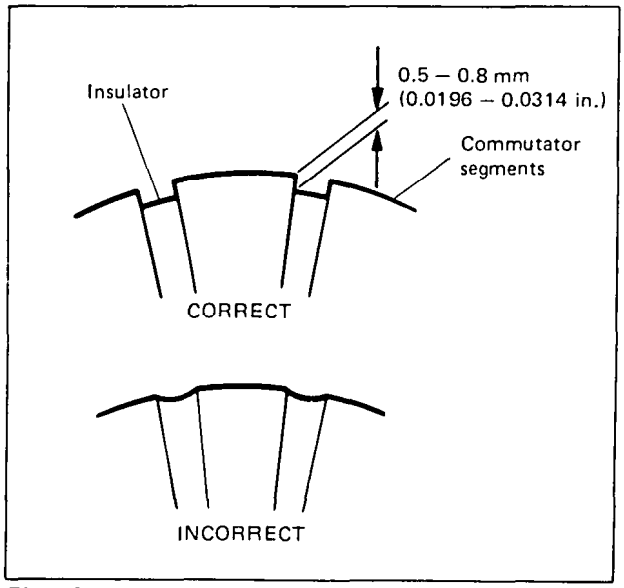


Fig. 6G1-34

Ground Test

Check commutator and armature core. If there is continuity, armature is grounded and must be replaced.

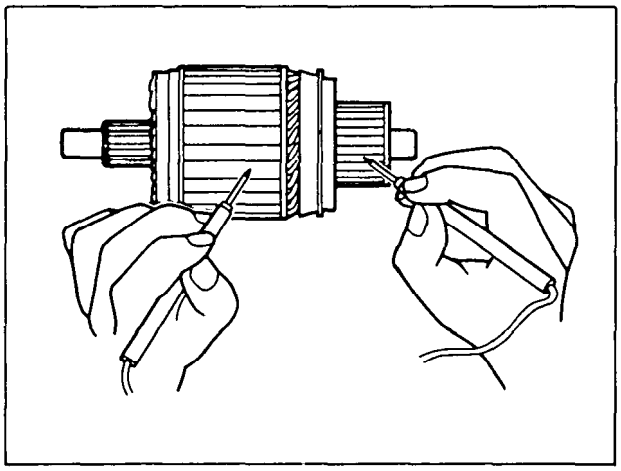


Fig. 6G1-35

Open Circuit Test

Check for continuity between segments. If there is no continuity at any test point, there is an open circuit and armature must be replaced.

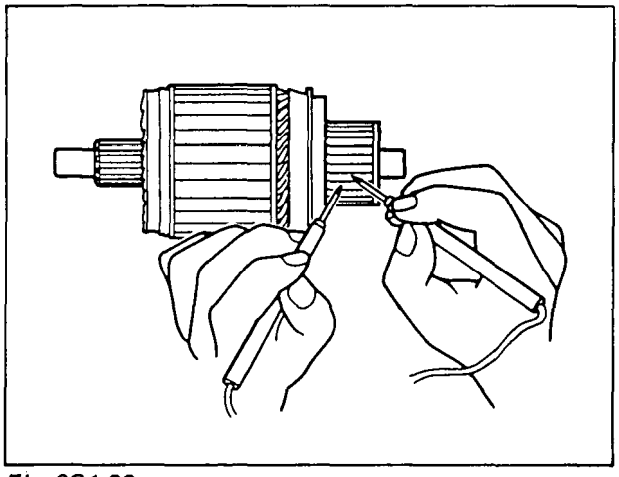


Fig. 6G1-36

2. INSPECT PLUNGER

Inspect plunger for wear. Replace if necessary.

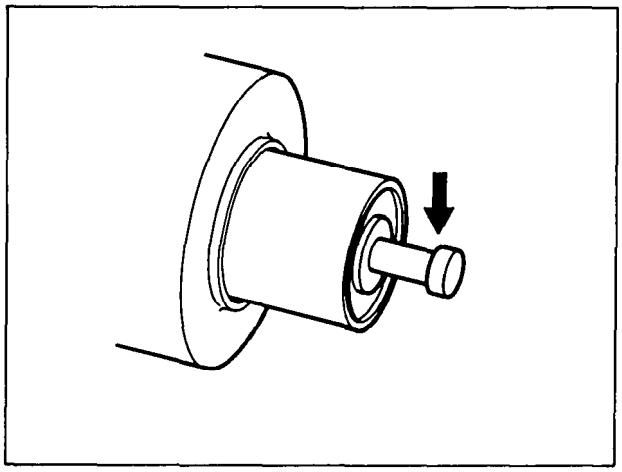


Fig. 6G1-37

3. INSPECT BRUSH

- Check brushes for wear. If below limit, replace brush.

	Standard	Limit
Brush length	17.5 mm (0.69 in.)	12 mm (0.47 in.)

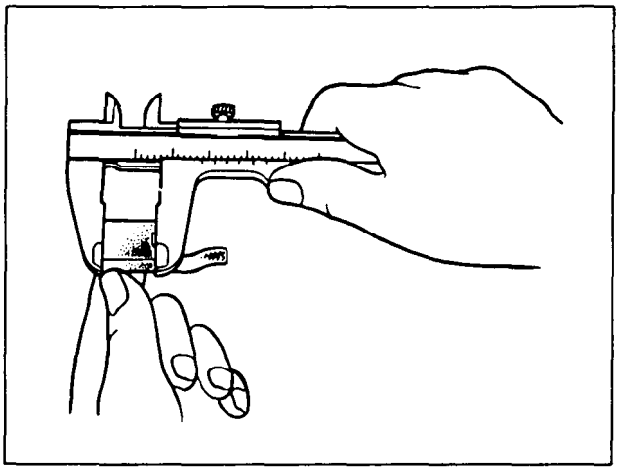


Fig. 6G1-38

- Install brushes to each brush holder and check for smooth movement.

4. INSPECT BRUSH HOLDER AND SPRING

Check movement of brush in brush holder. If brush movement within brush holder is sluggish, check brush holder for distortion and sliding faces for contamination.

Clean or correct as necessary.

Check for continuity across insulated brush holder (positive side) and grounded brush holder (negative side).

If continuity exists, brush holder is grounded due to defective insulation and should be replaced.

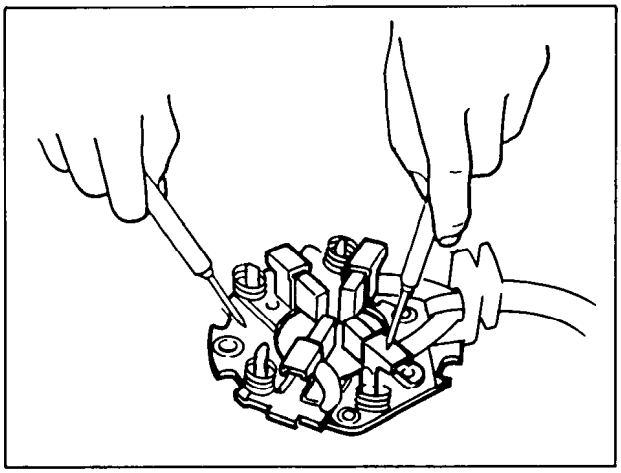


Fig. 6G1-39

Inspect brush springs for wear, damage or other abnormal conditions. Replace if necessary.

Brush spring tension (with brush holder removed from commutator.)	Standard	Limit
	2.1 kg (4.63 lb)	0.7 kg (1.54 lb)

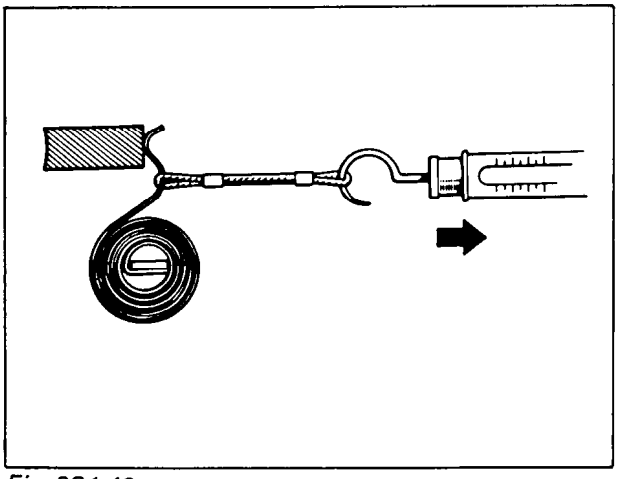


Fig. 6G1-40

5. INSPECT PINION AND OVER-RUNNING CLUTCH

Inspect pinion for wear, damage or other abnormal conditions. Check that clutch locks up when turned in direction of drive and rotates smoothly in reverse direction. Replace if necessary.

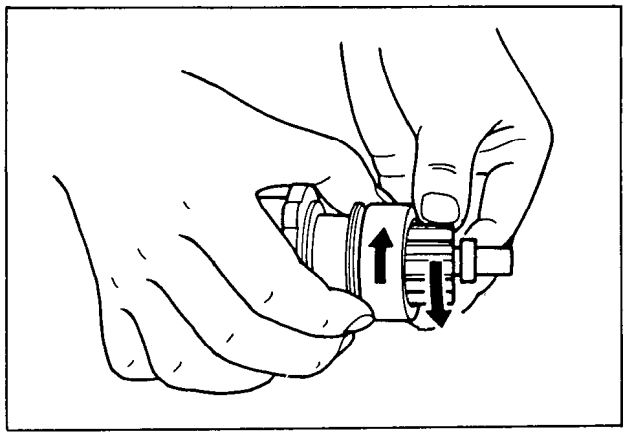


Fig. 6G1-41

Inspect spline teeth for wear or damage. Replace if necessary. Inspect pinion for smooth movement.

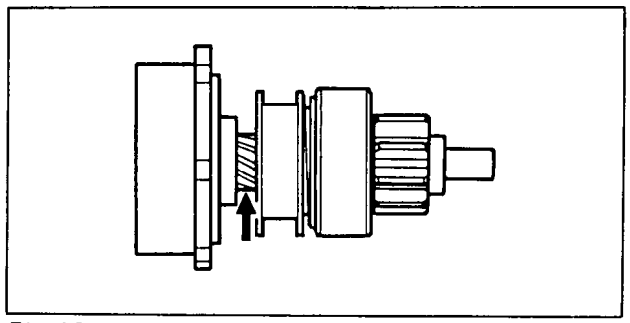


Fig. 6G1-42

6. INSPECT ARMATURE SHAFT BUSHES

Inspect bushes for wear or damage. Replace if necessary.

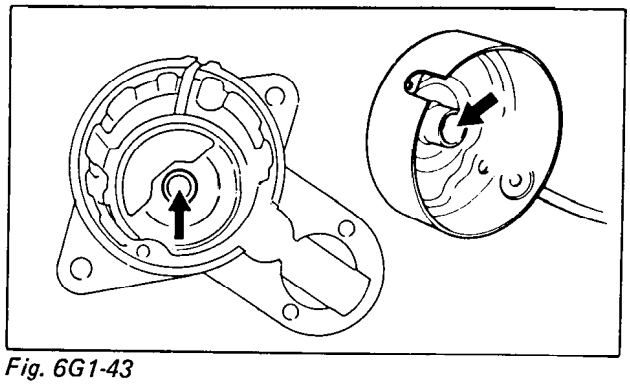


Fig. 6G1-43

7. INSPECT MAGNETIC SWITCH

Push in plunger and release it. The plunger should return quickly to its original position. Replace if necessary.

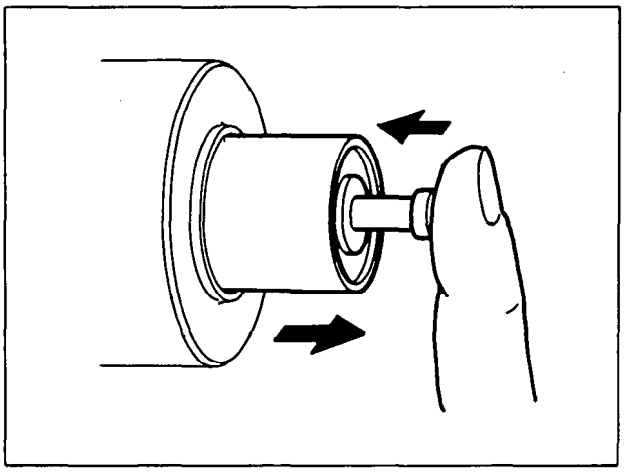


Fig. 6G1-44

Pull-In Coil Open Circuit Test

Check for continuity across magnetic switch 'S' terminal and 'M' terminal. If no continuity exists, coil is open and should be replaced.

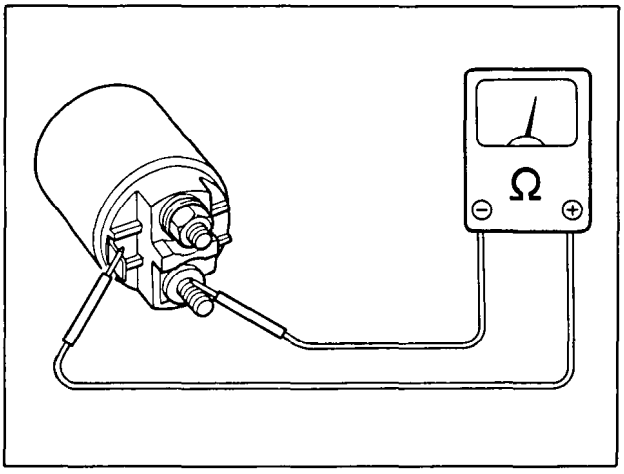


Fig. 6G1-45

Hold In Coil Open Circuit Test

Check for continuity across magnetic switch 'S' terminal and coil case. If no continuity exists, coil is open and should be replaced.

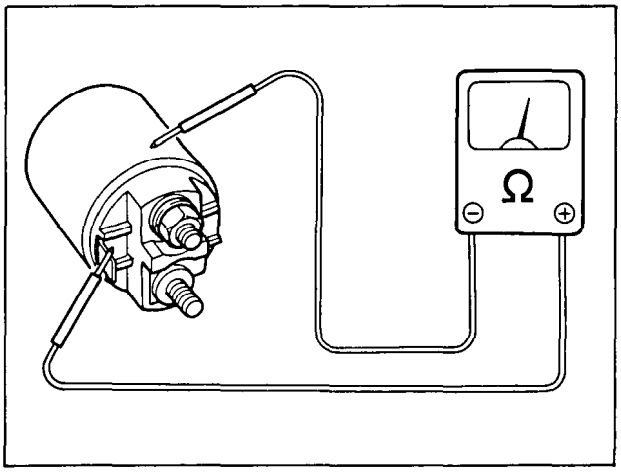


Fig. 6G1-46

8. INSPECT GEARS

Inspect internal gear and idle gears for wear, damage or other abnormal conditions. Replace if necessary.

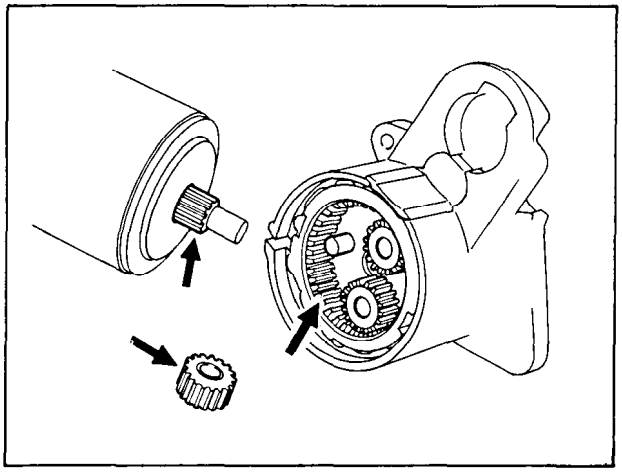


Fig. 6G1-47

9. PERFORMANCE TEST

CAUTION:
These test must be performed within 3 – 5 seconds to avoid burned coil.

1) Pull-In Test

Connect battery to magnetic switch as shown.
Check that plunger and pinion move outward.
If plunger and pinion don't move, replace magnetic switch.

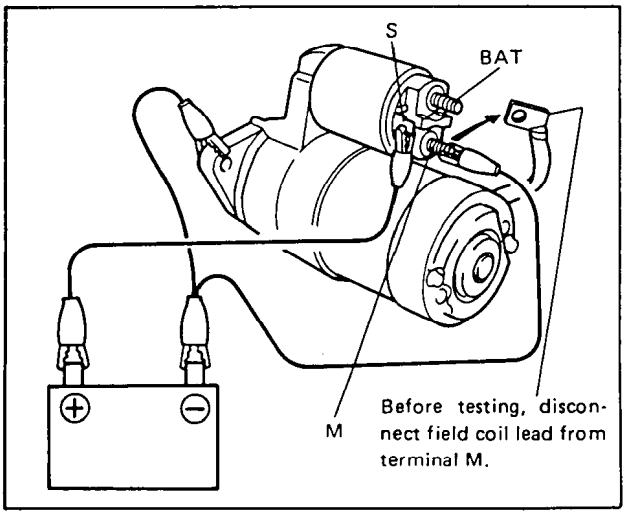


Fig. 6G1-48

2) Hold-In Test

While connected as above with plunger out, disconnect negative lead from terminal 'M'.
Check that plunger and pinion remain out.
If plunger and pinion return inward, replace magnetic switch.

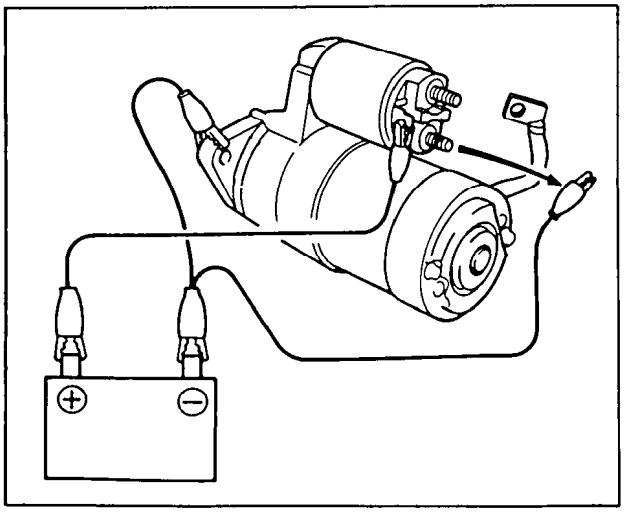


Fig. 6G1-49

3) Check Plunger and Pinion Return

Disconnect negative lead from switch body.
Check that plunger and pinion return inward.
If plunger and pinion don't return, replace magnetic switch.

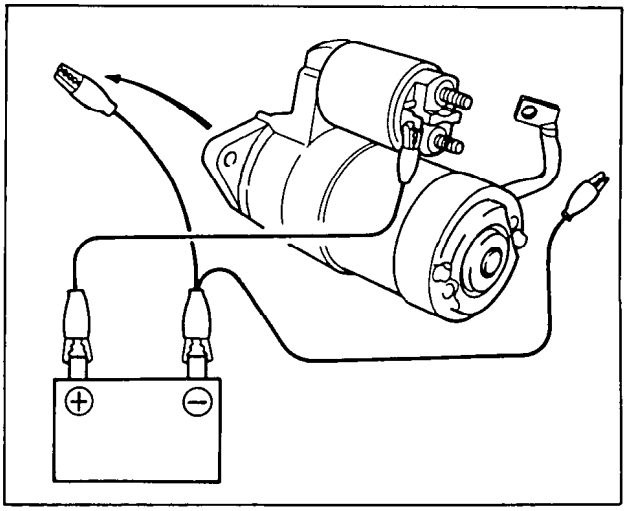


Fig. 6G1-50

4) No-Load Performance Test

a) Connect battery and ammeter to starter as shown.
b) Check that starter rotates smoothly and steadily with pinion moving out. Check that ammeter indicates specified current.

Specified current
50 – 75A at 11V

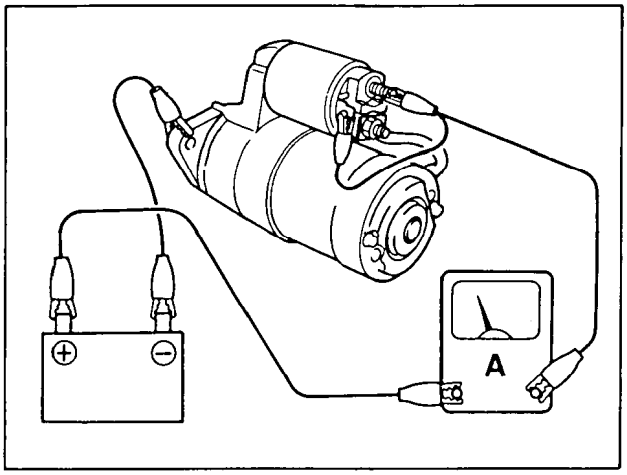


Fig. 6G1-51

SPECIFICATIONS

Voltage	12 volts
Output	1.2 kW
	*1.4 kW
Rating	30 seconds
Direction of rotation	Clockwise as viewed from pinion side
Brush length	17.5 mm (0.69 in.)
Number of pinion teeth	8
No-load characteristic	50 – 75A maximum at 11.0 volts, 3,000 r/min (rpm) minimum
	*50 – 75A maximum at 11.0 volts, 2,900 r/min (rpm) minimum
Load characteristic	300A maximum at 7.7 volts, 0.93 kg-m torque, 850 r/min (rpm) minimum
	*300A at 7.7 volts, 1.06 kg-m torque, 930 r/min (rpm) minimum
Locked rotor current	780A maximum at 4.0 volts, 1.9 kg-m minimum
	*980A maximum at 4.0 volts, 2.6 kg-m minimum
Magnetic switch operating voltage	8 volts maximum

NOTE:
Data marked with asterisk (*) is applicable to power steering system equipped car.

SECTION 6J

EMISSION CONTROLS

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

CONTENTS

GENERAL DESCRIPTION

POSITIVE CRANKCASE VENTILATION (PCV) SYSTEM

The term "blow-by gas" stands for the compressed gas and exploded gas which blow through cylinder-to-piston clearance, which contain a large amount of unburned gases such as CO and HC. The PCV (Positive Crankcase Ventilation) system is provided to prevent the blow-by gas from being emitted into atmosphere and it operates as follows.

When the vacuum in the intake manifold is low (throttle valve open), the PCV valve is wide open due to its spring force. Thus a large amount of the blow-by gas is drawn into the intake manifold.

On the other hand, when the vacuum in the manifold is high, the PCV valve opening is limited due to the high vacuum. Thus the amount of the blow-by gas drawn into the intake manifold is small.

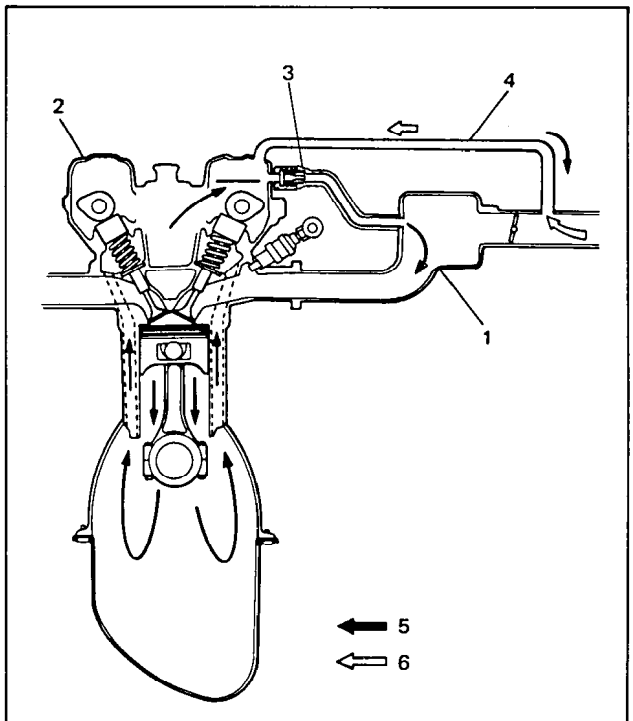


Fig. 6J-1 PCV System Operation

ON CAR SERVICE

PCV SYSTEM

NOTE:
Be sure to check that there is no obstruction in PCV valve or its hoses before adjusting engine idle speed, for obstructed PCV valve or hose hampers its accurate adjustment.

PCV HOSE INSPECTION

Check hoses for connection, leakage, clog, and deterioration. Replace as necessary.

PCV VALVE INSPECTION

1. Remove PCV valve with hose from cylinder head cover.
2. Run engine at idle.
3. Place your finger over end of PCV valve to check for vacuum. If there is no vacuum, check for clogged valve. Replace as necessary.

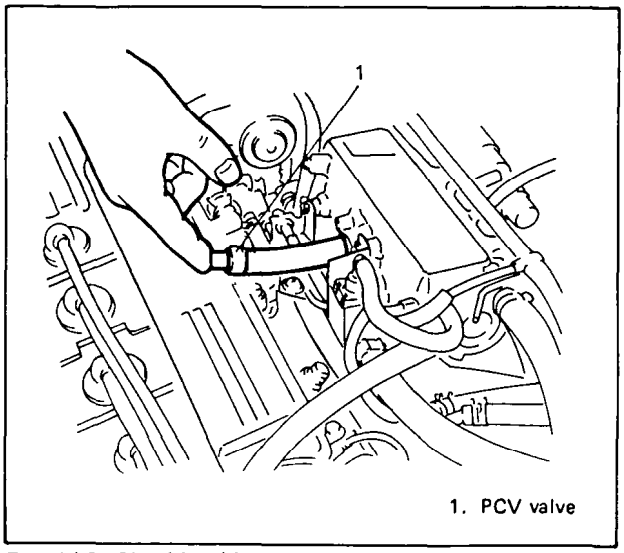


Fig. 6J-2 Checking Vacuum

4. After checking vacuum, stop engine and remove PCV valve.
   Shake valve and listen for the rattle of check needle inside the valve. If valve does not the rattle, replace valve.

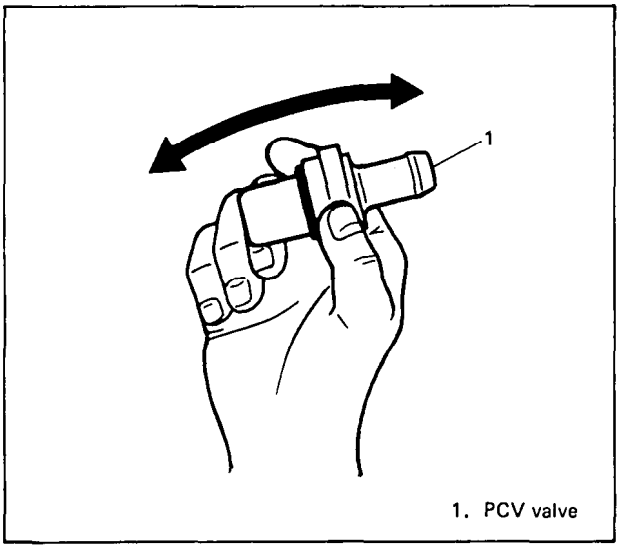


Fig. 6J-3 Checking PCV Valve for Sticking

5. After removing the hose, connect PCV hose.

SECTION 6K

EXHAUST SYSTEM

NOTE:

- **For the descriptions (items) not found in this section of this manual, refer to the same section of the Service Manual mentioned in the FOREWORD of this manual.**
- **Whether being equipped with catalytic converter or not depends on regulations of each country. There are two types of catalytic converter.**
- **What is enclosed in parentheses (*) in the below description is applicable to the car which has an O_2 sensor on the exhaust manifold.**

GENERAL DESCRIPTION

The exhaust system consists of an exhaust manifold, an exhaust No. 1 pipe, an exhaust No. 2 pipe, a muffler, a tail pipe and seals and gasket etc., and the exhaust No. 2 pipe has the catalytic converter.

The catalytic converter is an emission control device added to the exhaust system to lower the (CO), (*and Oxides of Nitrogen (NOx)) pollutants in the exhaust gas.

- **The catalytic converter requires use of unleaded fuel only.**
- **Two types of muffler mounting are used. Refer to figure below for their correct installation.**

NOTE:
The exhaust pipe form varies with specifications.

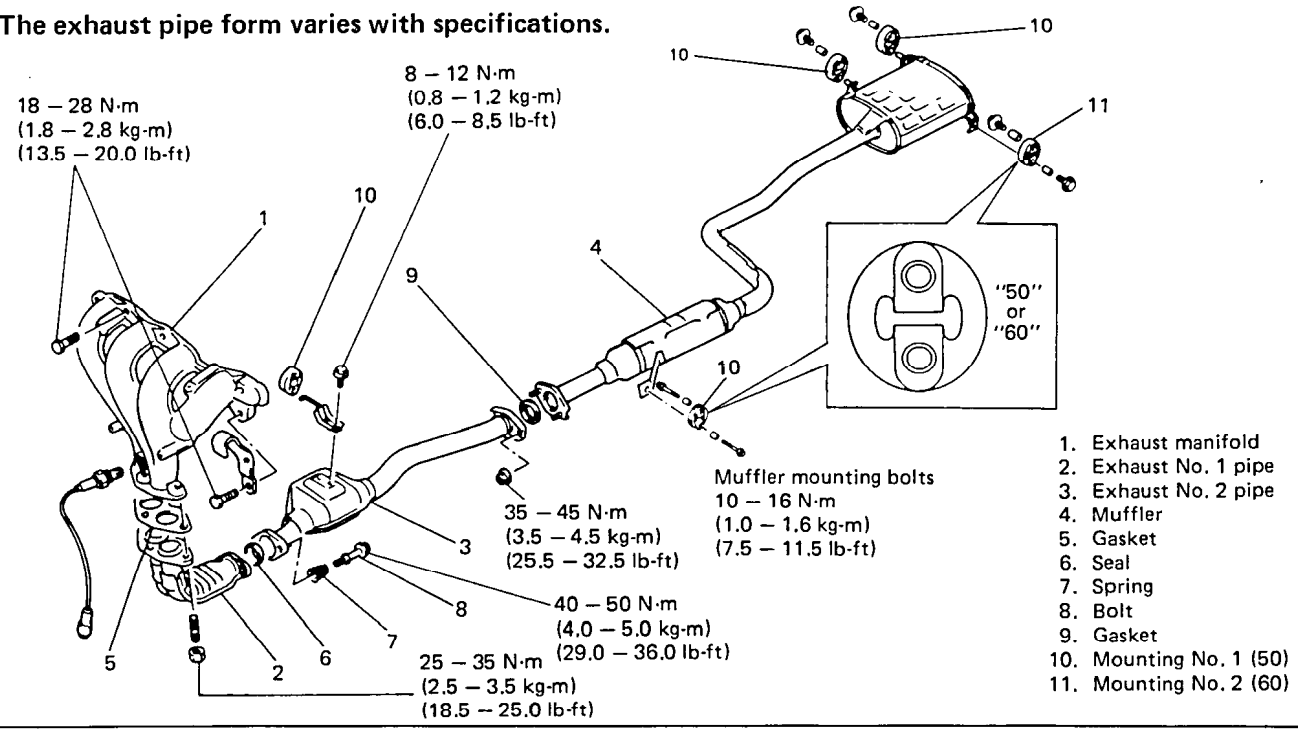


Fig. 6K-1 Exhaust System

SECTION 7A

MANUAL TRANSMISSION

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

ON-CAR SERVICE

GEAR SHIFT CONTROL

REMOVAL AND INSTALLATION

For removal and installation of gear shift control other than its lever adjustment after installation, use the same procedures as those described in Service Manual mentioned in the FOREWORD of this manual. Shift control lever adjustment is as follows.

For positioning control lever, loosely install 4 guide plate bolts and 4 control lever housing nuts first, adjust position and then tighten those nuts and bolts.

Control lever position distance "A"	215 mm (8.5 in.)

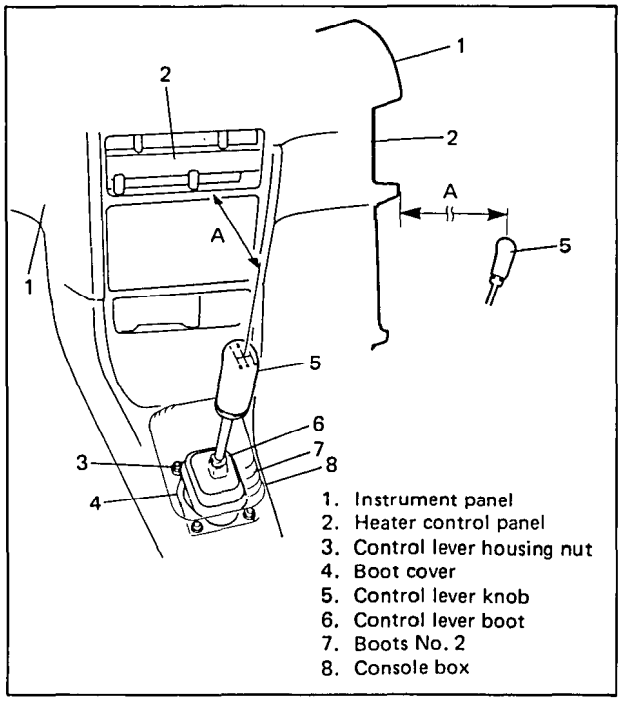


Fig. 7A-1

SECTION 8

BODY ELECTRICAL SYSTEM

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

CONTENTS

BODY ELECTRICAL SYSTEM

FUSES

The main fuse block is located on the fender apron panel in the engine room and junction/ fuse block is installed to underside of instrument cover panel.
The designation and location of each fuse, refer to Service Manual mentioned in the FOREWORD of this manual.

CAUTION:
- When replacing a fuse, be sure to use one having a correct rated amperage.
- Before replacing a fuse, turn OFF every switch of electric equipments including main switch.

MAIN FUSE BLOCK CIRCUIT

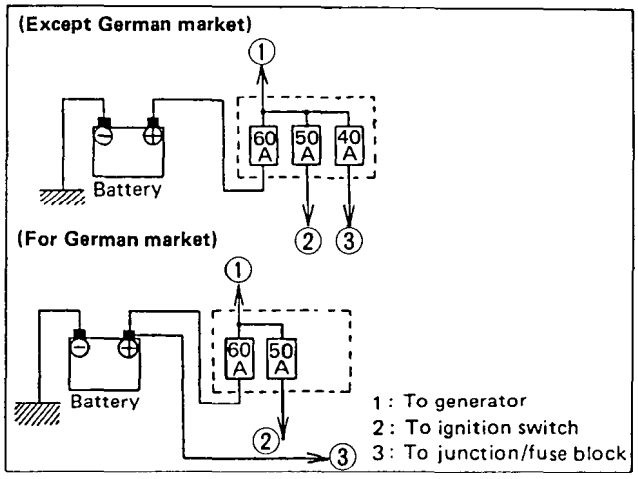
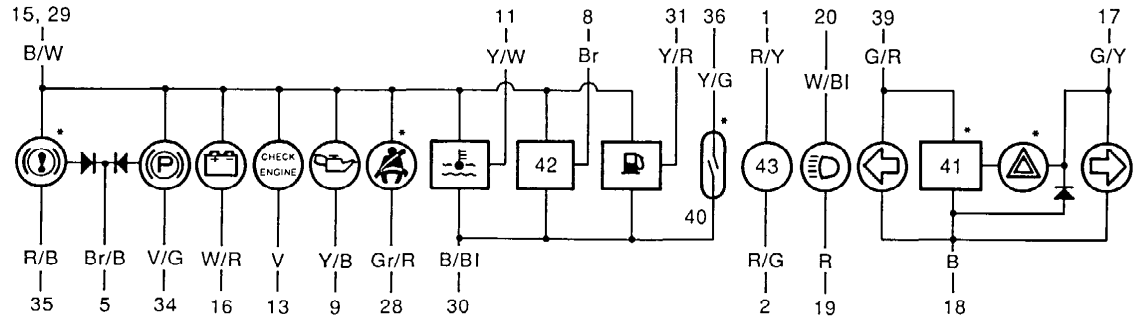


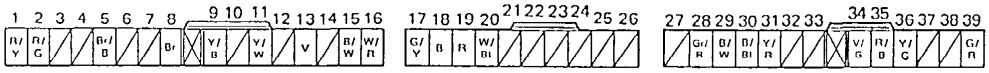
Fig. 8-1 Main Fuse Block Circuit

COMBINATION METER WIRING



NOTE:
Whether equipped with * marked parts or not depends on car specification.

Terminals position

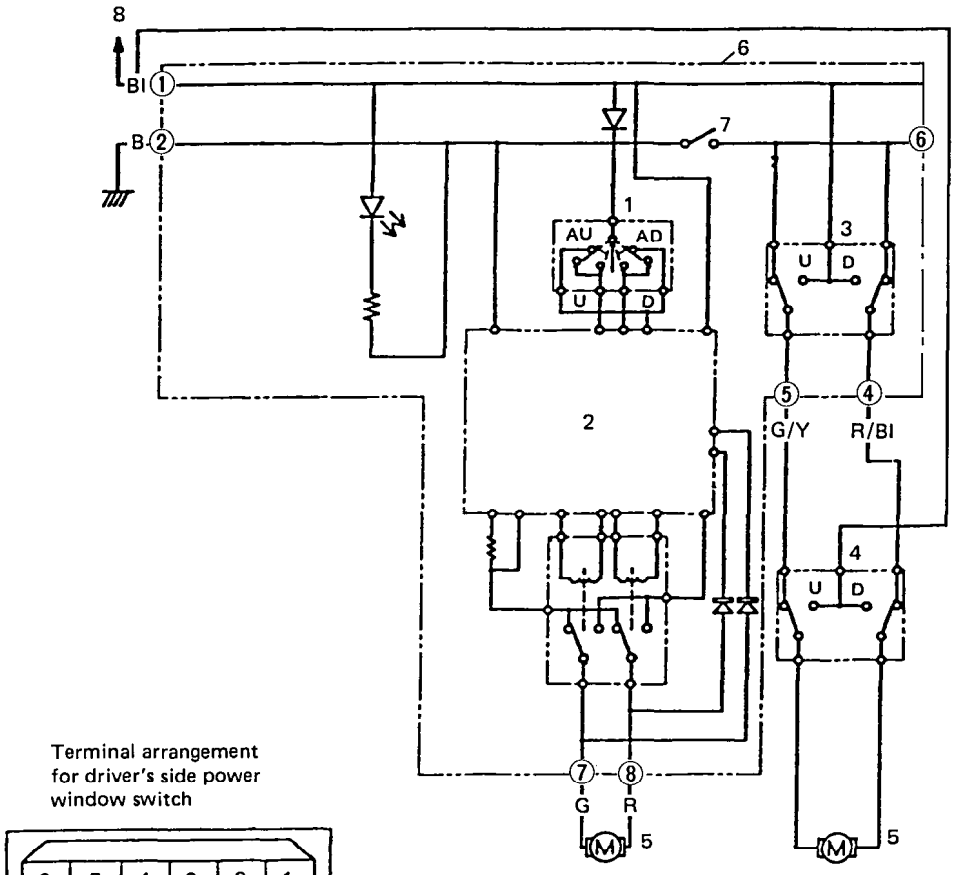


1. To lighting switch
2. To illumination controller
3. Blank
4. Blank
5. To ignition
6. Blank
7. Blank
8. To ignition coil ⊖ (for vehicle with tachometer)
9. To oil pressure switch
10. Blank
11. To water temperature gauge unit
12. Blank
13. To ECM
14. Blank
15. To ignition switch
16. To generator
17. To turn signal switch (Right)
18. To ground
19. To dimmer
20. To fuse block
21. 22. 23. 24. 25. 26. 27. Blank
28. To seat belt switch (Left)
29. To ignition switch
30. To ground
31. To fuel level gauge unit
32. 33. Blank
34. To parking brake switch
35. To brake fluid level switch and parking brake switch
36. To ECM
37. Blank
38. Blank
39. To turn signal switch (Left)
40. Speed sensor
41. Hazard circuit
42. Tachometer
43. Illumination

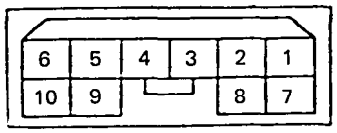
Fig. 8-2

POWER WINDOW CONTROL SYSTEM (If equipped)

WIRING DIAGRAM



Terminal arrangement for driver's side power window switch



1. Auto switch
2. Auto circuit
3. Passenger's side power window main switch
4. Passenger's side power window assistant switch
5. Actuator
6. Driver's side power window switch
7. Window lock switch
8. From battery

U : UP
D : DOWN
AU : AUTO UP
AD : AUTO DOWN

Fig. 8-3

Trouble Diagnosis

Condition	Possible cause	Correction
All power window motors do not operate.	• Main fuse and/or fuses blown	Replace main fuse and/or fuses to check for short.
	• Wiring or grounding faulty	Repair as necessary.
Some switches do not operate.	• Wiring or socket faulty	Repair as necessary.
	• Window lock switch faulty	Replace.
Only one actuator does not faulty.	• Wiring or socket faulty	Repair as necessary.
	• Actuator faulty	Replace.

MAIN SWITCH KEY REMAINDER WARNING BUZZER

DESCRIPTION OF CIRCUIT

The main switch key remainder warning buzzer circuit is a system to sound the buzzer if the driver leaves the car with the main switch key inserted so as to urge him to take it out.

INSPECTION

If main switch key remainder warning buzzer does not sound, use its wiring diagram in figure below as reference to check buzzer, wiring, etc.

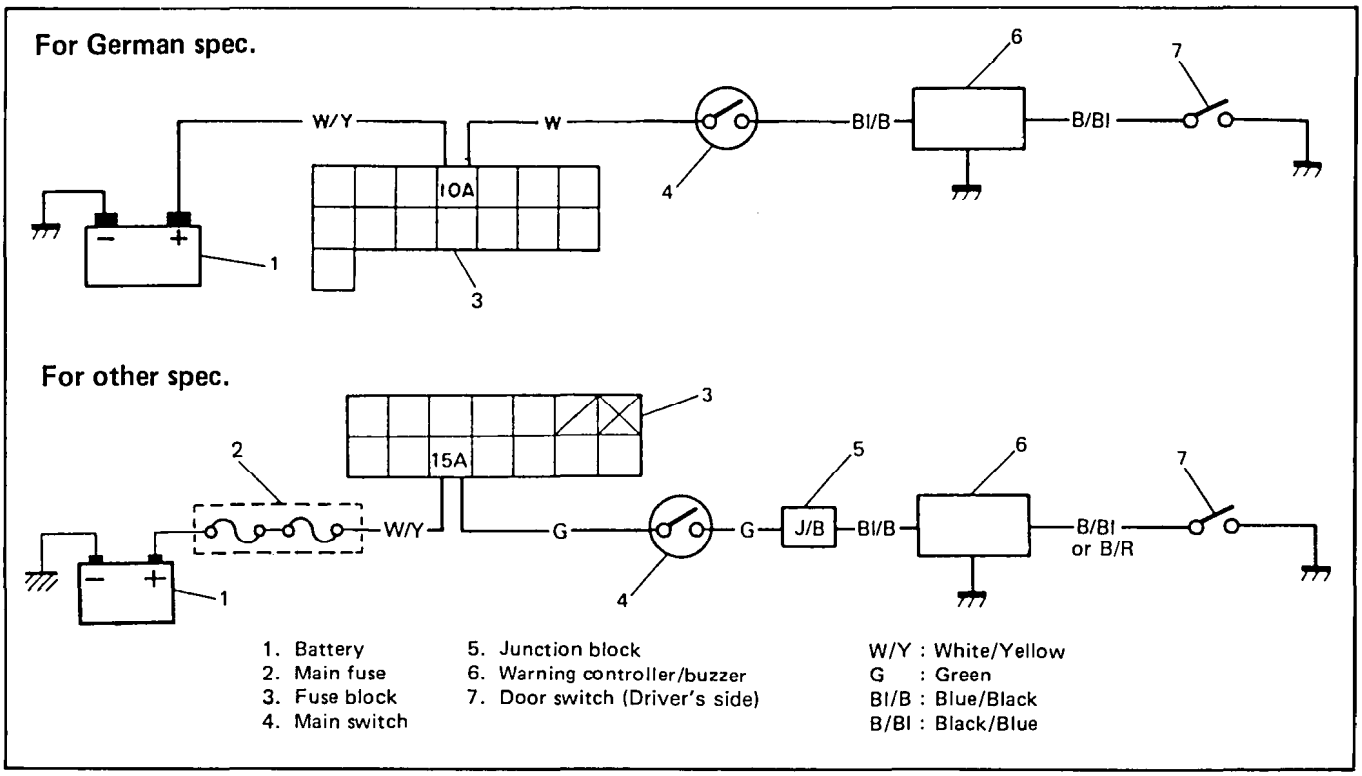


Fig. 8-4 Main Switch Key Remainder Warning Buzzer Circuit

INSPECTION OF WARNING CONTROLLER/ BUZZER

With positive (+) terminal of battery connected to terminal ⑥ of controller and negative (–) one to ④, also connect negative (–) one to ③ as shown in figure.

If buzzer emits buzzing sound then, controller is in good condition. If not, replace.

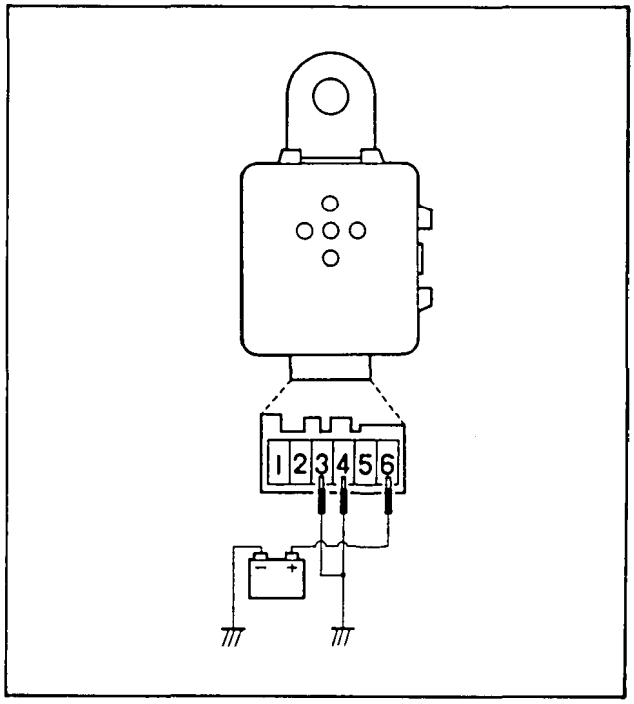


Fig. 8-5 Checking Warning Controller/Buzzer

LIGHT WARNING BUZZER

DESCRIPTION OF CIRCUIT

The light warning buzzer circuit is a system to sound the buzzer when ignition switch turns OFF and door switch (driver's side) turns ON (i.e. driver's side door opens) while lighting switch turns still ON, warning driver to turn off the lights.

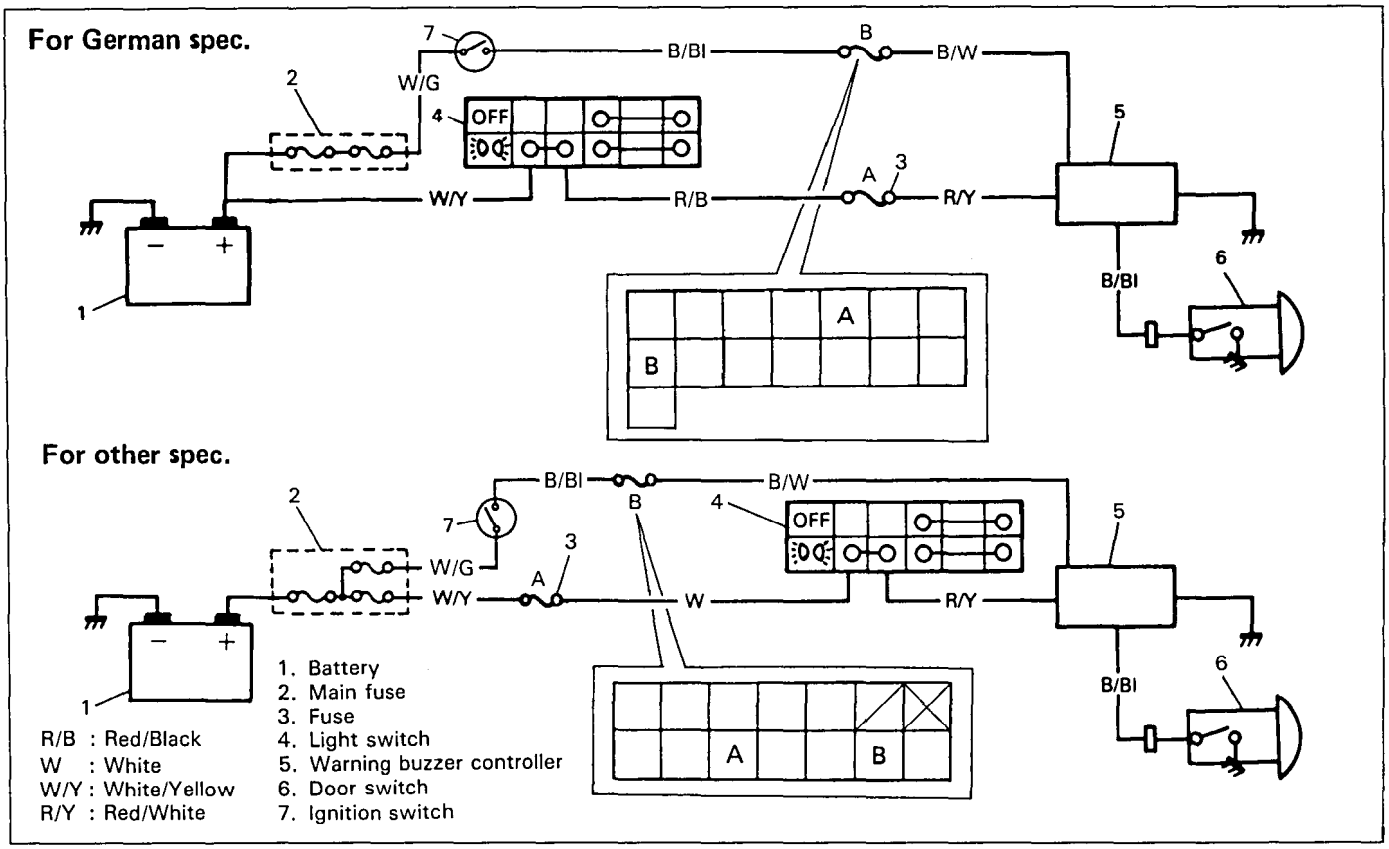


Fig. 8-6

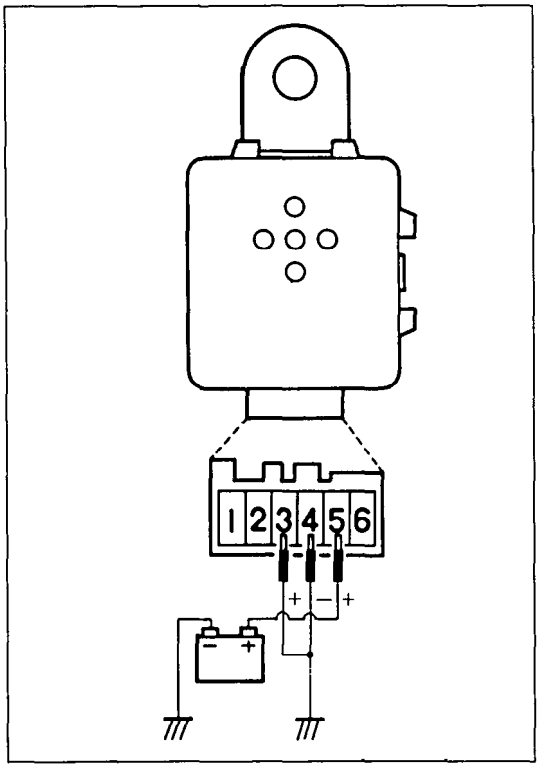


Fig. 8-7

INSPECTION

When the warning buzzer does not make sounding, use the above circuit diagram as reference to check the buzzer, wiring, etc.

INSPECTION OF WARNING CONTROLLER

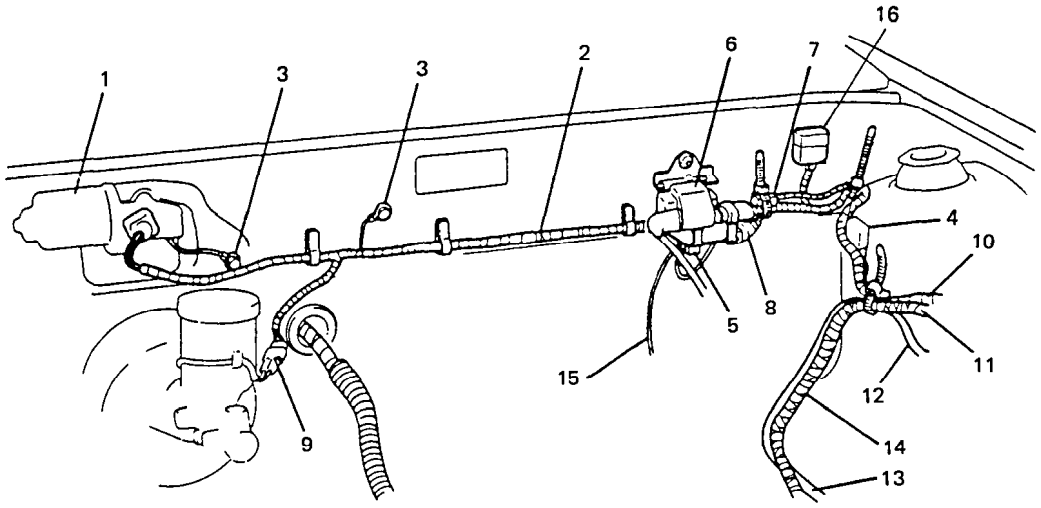
First, connect positive (+) terminal of battery to terminal ⑤ of controller and negative (—) one to ③ and ④.
If buzzer emits buzzing sound then, controller is in good condition. If not, replace.

WIRING HARNESS ROUTING

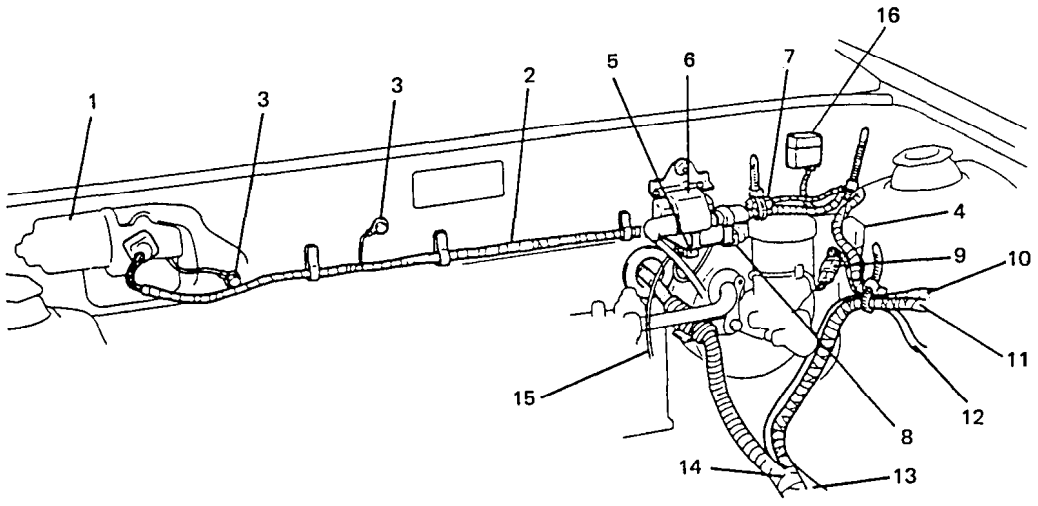
For the wirings not found in this section, refer to the Service Manual mentioned in the FOREWORD of this manual.

COWL TOP PANEL WIRING

Right Hand Steering Car



Left Hand Steering Car

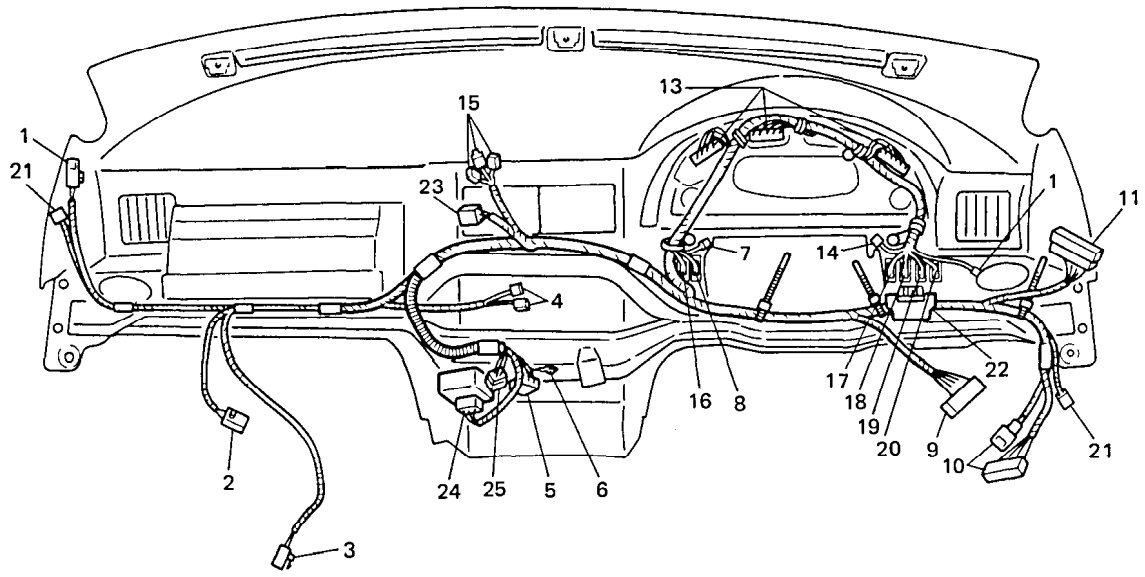


1. Wiper motor
2. Main wiring harness No. 1
3. Ground
4. Noise suppressor
5. Condenser
6. Ignition coil
7. Moniter coupler for Electronic Fuel Injection system
8. To power unit
9. To brake fluid level switch
10. To left headlight, turn signal and small light
11. To main fuse and main wiring harness No. 1
12. To battery positive terminal
13. To starting motor
14. Engine wiring harness No. 5
15. To ground
16. Radiator fan fuse

Fig. 8-8 Cowl Top Panel Wiring

INSTRUMENT PANEL WIRING

(Left hand steering car)



1. To front speaker (Optional)
2. To blower resister
3. To blower motor
4. To heater fan switch
5. To cigar lighter (Optional)
6. Ground
7. To rear wiper/washer switch (If equipped)
8. To illumination controller (If equipped)
9. To floor wiring harness No. 3 (Except West German market)
10. To junction block (or main wiring harness No. 1)
11. To main wiring harness No. 1
12. To front fog light switch (If equipped)
13. To combination meter
14. To rear defogger and front fog light switch (If equipped)
15. To radio (Optional)
16. To seat heater switch (R) (Optional)
17. To head light washer switch (If equipped) or to head light leveling switch (If equipped)
18. To seat heater switch (L) (Optional)
19. To rear fog light switch (If equipped)
20. To mirror switch (Optional)
21. To mirror motor (Optional)
22. ALDL connector
23. To clock
24. To warning controller/buzzer
25. To ash tray illumination

(Right hand steering car)

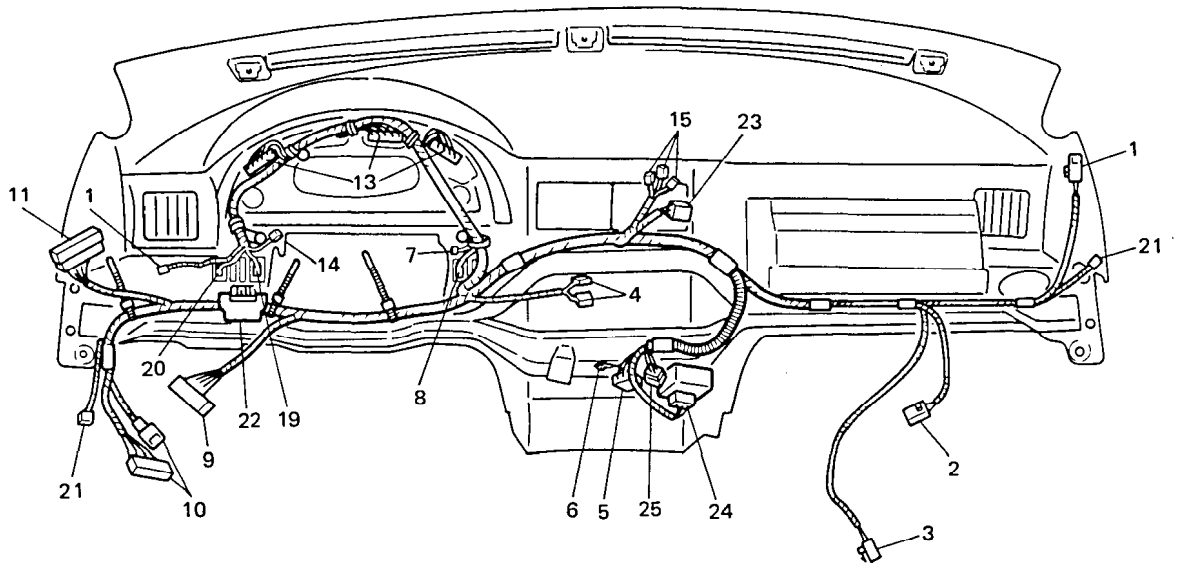


Fig. 8-11 Instrument Panel Wiring

SECTION 9

BODY SERVICE

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

CONTENTS

ON CAR SERVICE

FRONT DOOR

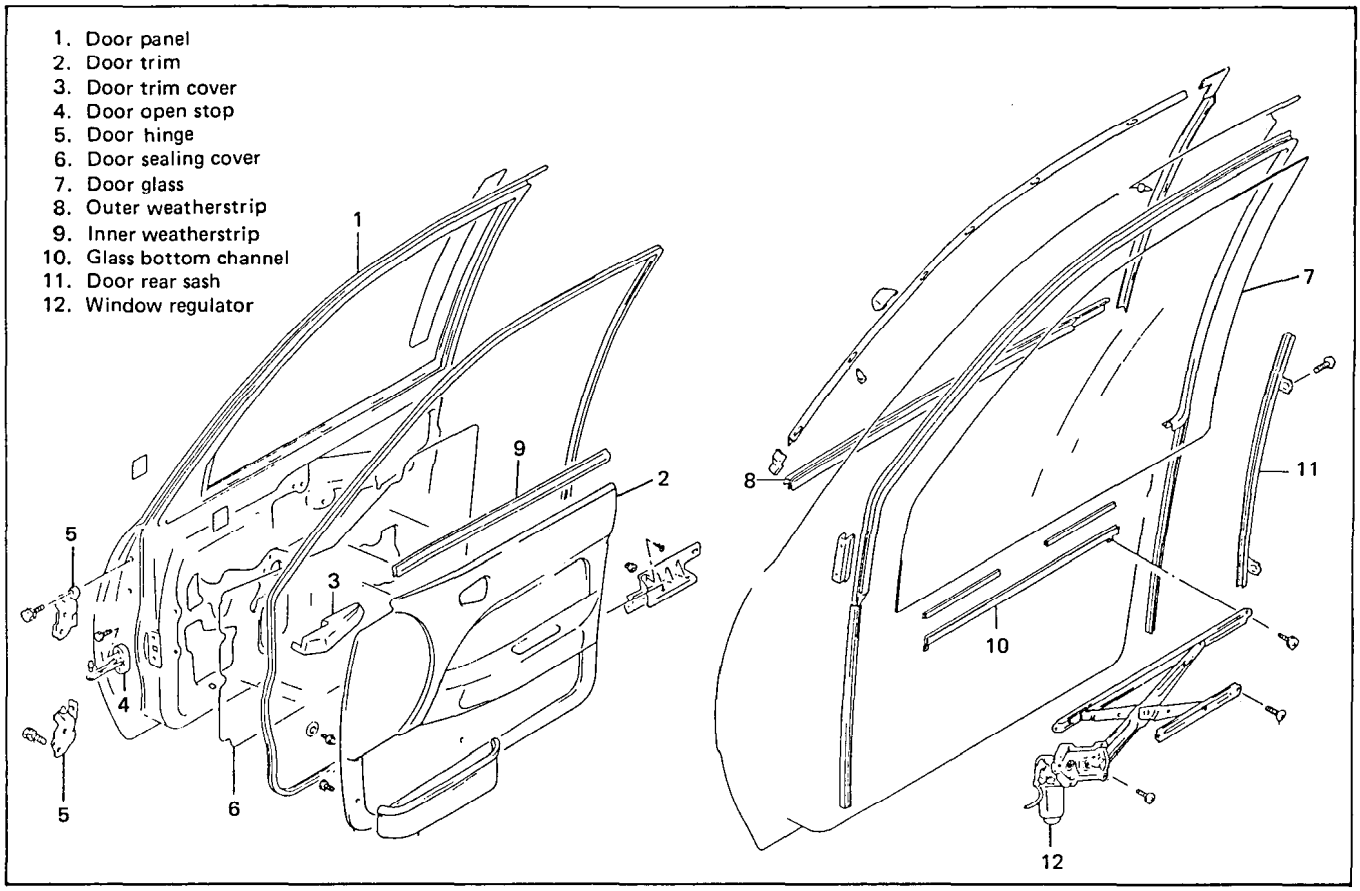


Fig. 9-1 Front Door Assembly

DOOR GLASS

REMOVAL

Remove following parts.

1) Inside handle bezel.
2) Trim mounting screw.
3) Door mirror inner garnish.
4) Door trim, and power window switch lead wire at coupler.

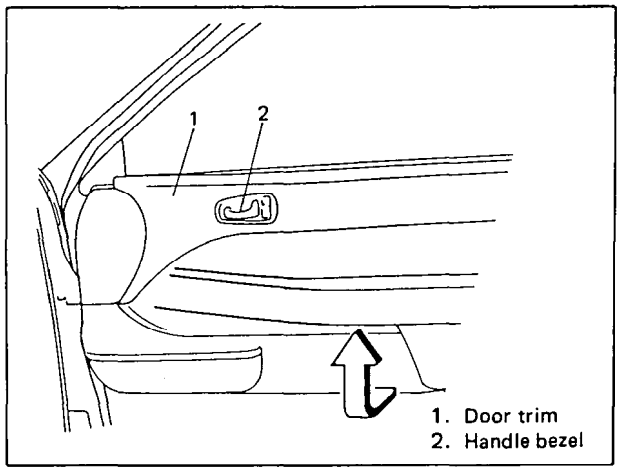


Fig. 9-3 Removing Door Trim

5) Door sealing cover.
6) Door outside weatherstrip.
7) Glass bottom channel attaching screws.

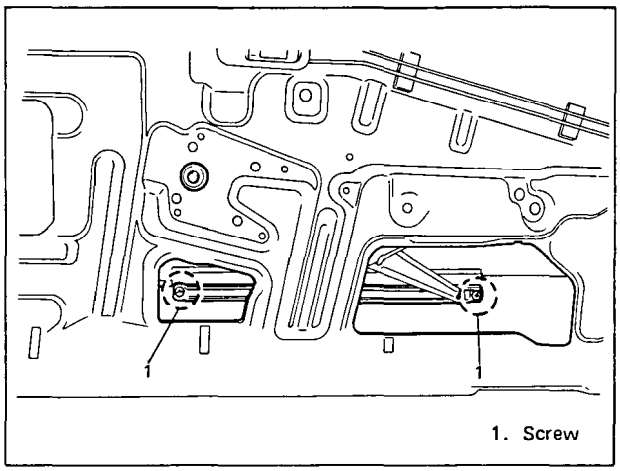


Fig. 9-4

8) Take out door glass together with bottom channel.
9) Detach glass from bottom channel.

INSTALLATION

Reverse the removal sequence to install door glass noting the following points:

1) When installing glass to bottom channel, coat channel with soap water and tap it with a plastic hammer.
   Glass-fitted position of bottom channel is as shown below.

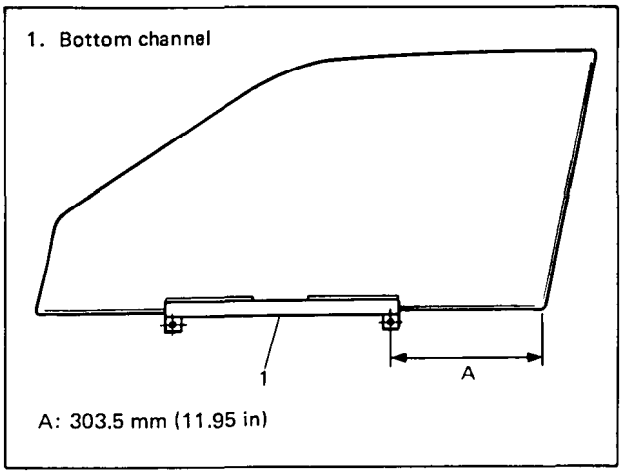


Fig. 9-5

2) Adjust equalizer of window regulator so that measurements A and B in Fig. 9-7 are equal to each other.

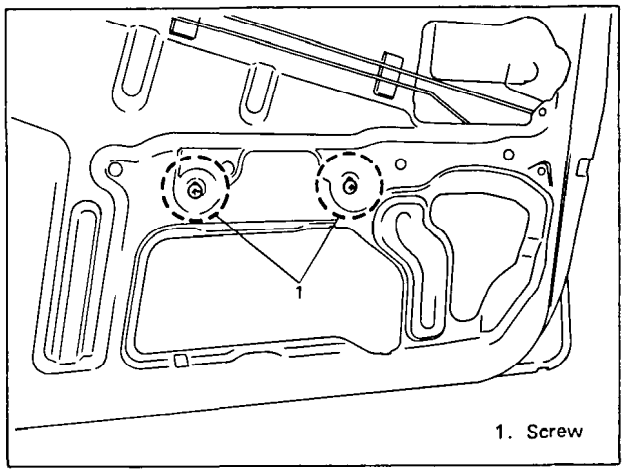


Fig. 9-6 Adjusting Equalizer

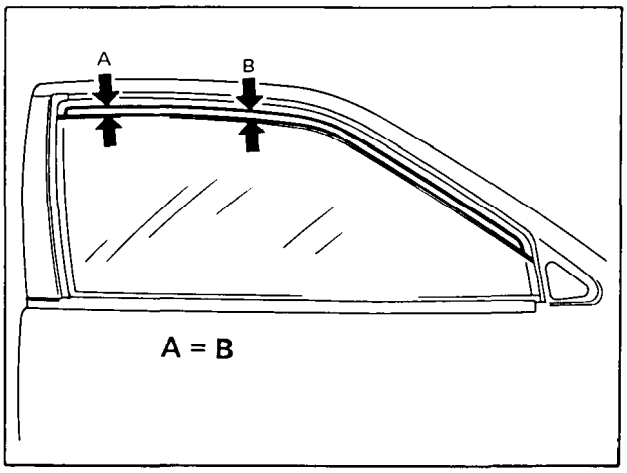


Fig. 9-7

3) Securely seal door sealing cover with adhesive.

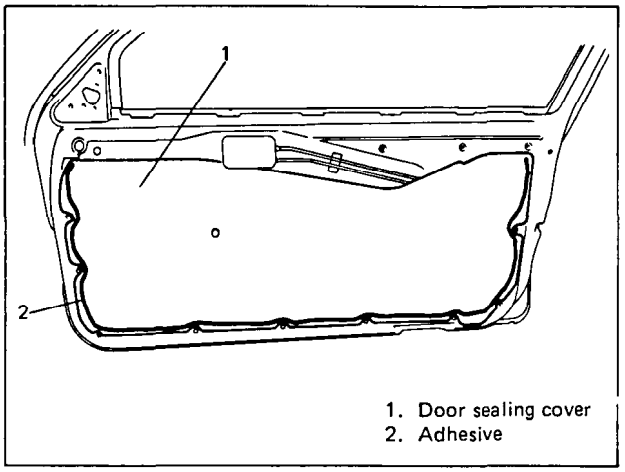


Fig. 9-8

DOOR WINDOW REGULATOR

REMOVAL

Remove following parts.

1) Door glass. (See previous section.)
2) Front door trim bracket.
3) Power window motor lead wire at coupler.
4) Door window regulator attaching screws (six pcs.) Take out regulator through hole "A".

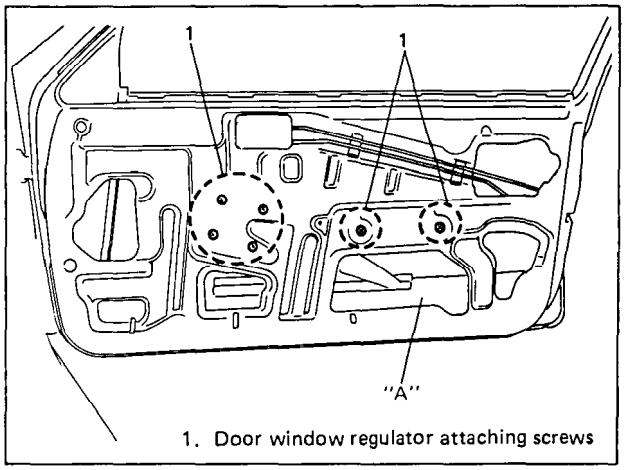


Fig. 9-10

INSPECTION

a. Check gear for wear or damage.
b. Check spring for weakened condition.

INSTALLATION

Reverse removal sequence to install door window regulator.

1) Apply multi-purpose grease to sliding parts.

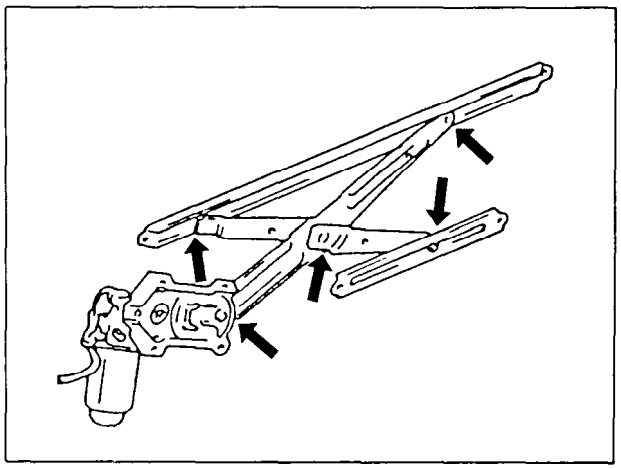


Fig. 9-11 Greasing Sliding Points

FRONT DOOR LOCK

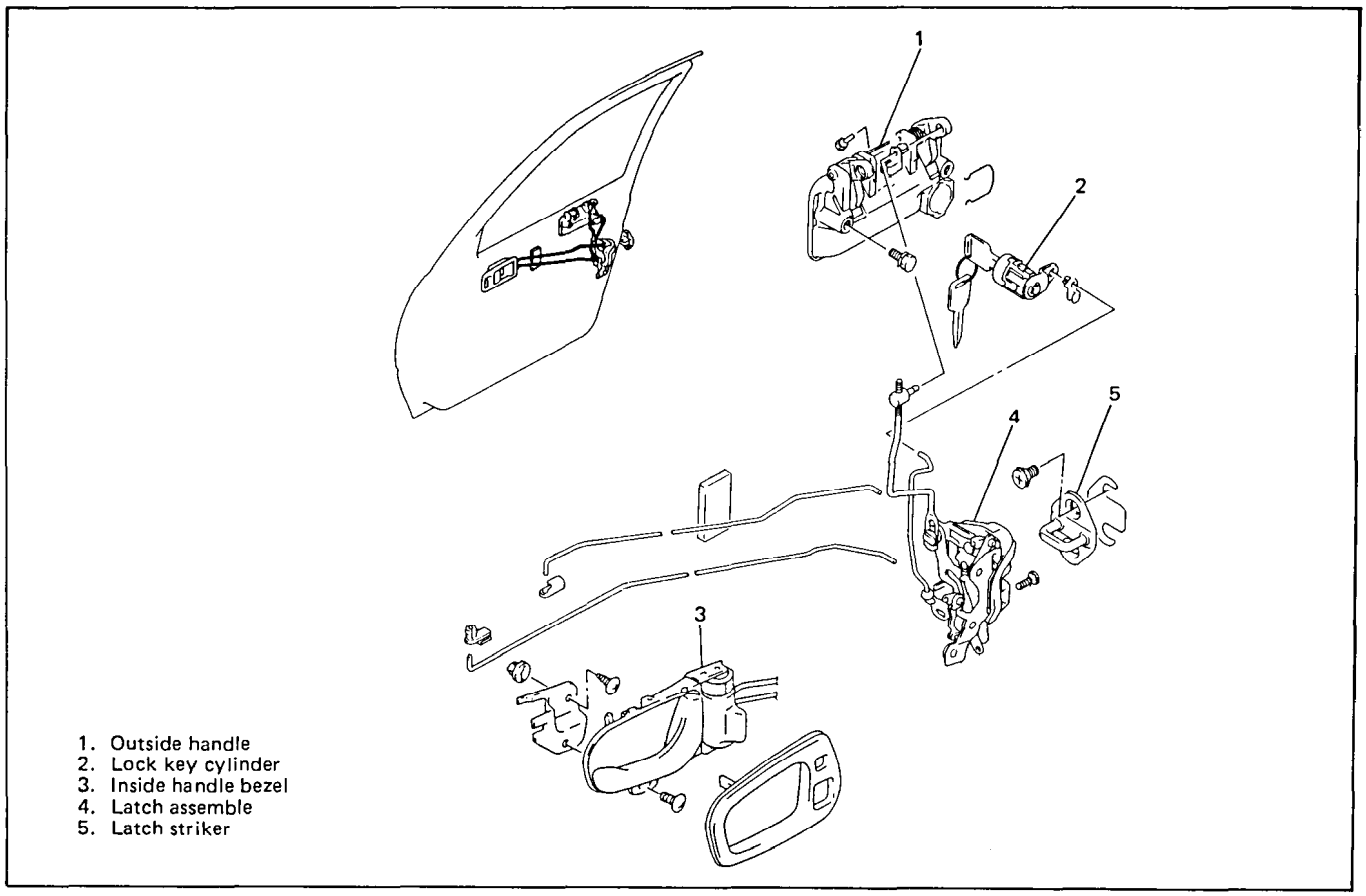


Fig. 9-12 Front Door Lock Assembly

REMOVAL

Remove following parts.

1) Inside handle bezel.
2) Trim mounting screw.
3) Door trim and power window switch.
4) Door sealing cover.
5) Front door rear sash.
6) Door inside handle and door latch ass'y.
   After disconnecting each joint of control link, remove door inside handle and door latch ass'y.

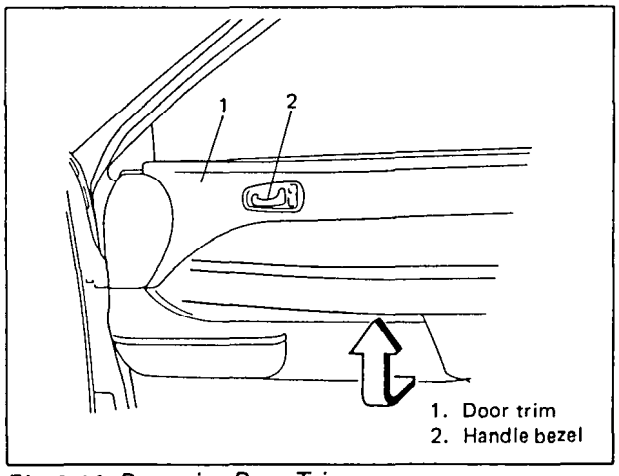


Fig. 9-14 Removing Door Trim

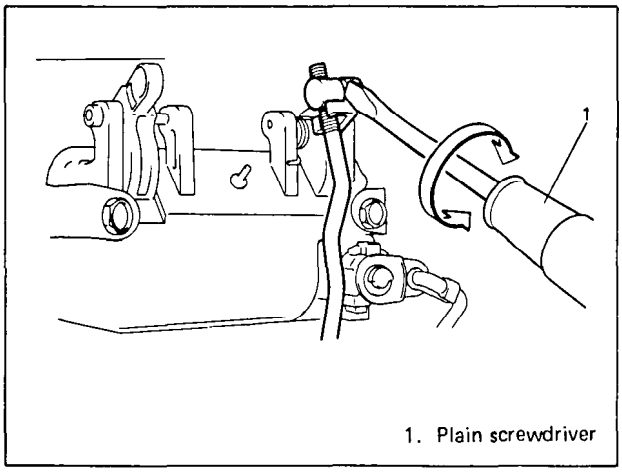


Fig. 9-15 Disconnecting Door Opening Control Link

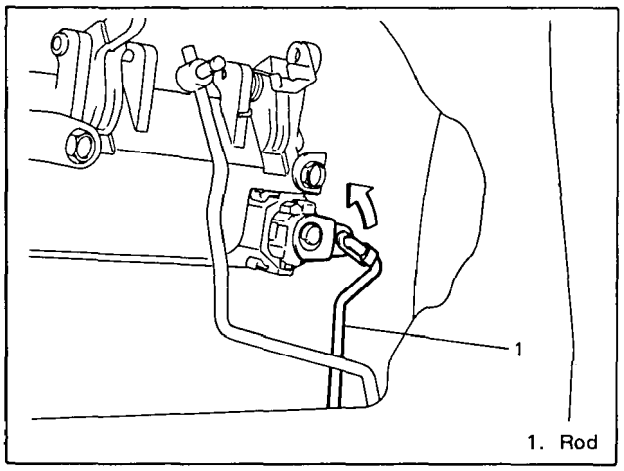


Fig. 9-16 Disconnecting Rod

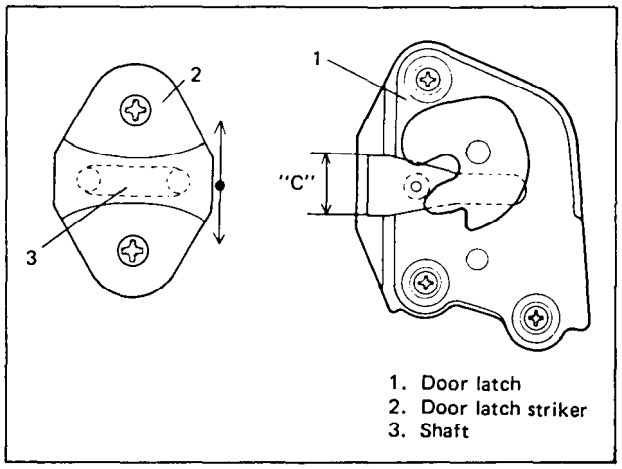


Fig. 9-18

INSTALLATION

Reverse removal sequence for installation while using care for following items.

1) Door outside opening rod

When installing opening rod 1 to outside handle 2, turn joint 3 to adjust distance "A" to 0 to 2 mm (0 to 0.08 in.) as shown below.

NOTE:

Do not push down opening link 6 when adjusting and installing opening rod.

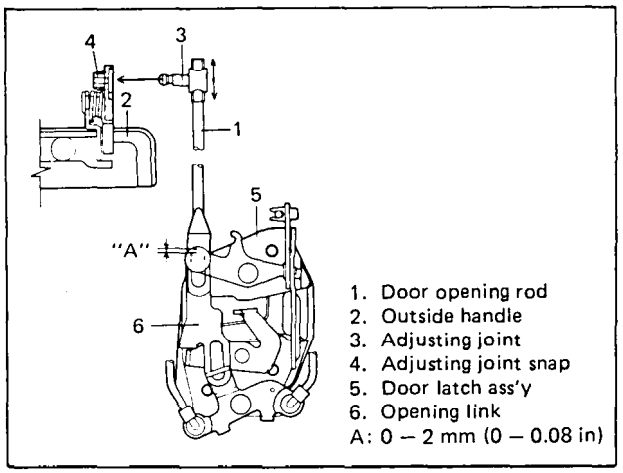


Fig. 9-17

2) Door latch striker

Move door latch striker up and down so that its shaft 3 approximately aligns with the center of groove "C" of door latch.

NOTE:

Striker should be placed level and moved vertically. Do not adjust door latch.

Move door latch striker sideways to adjust to 0 mm (0 in.) the door surface-to-body surface difference with door closed.

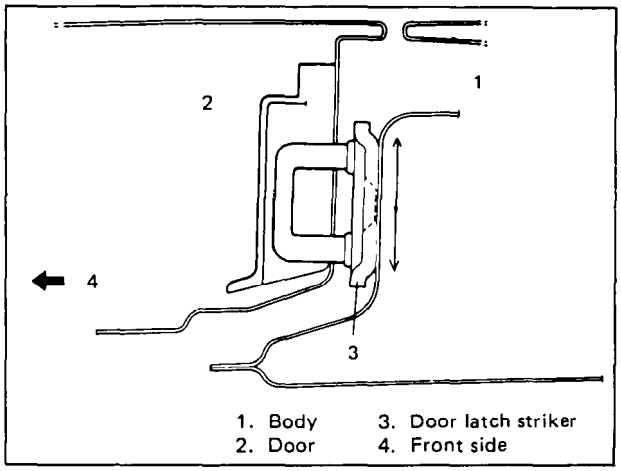
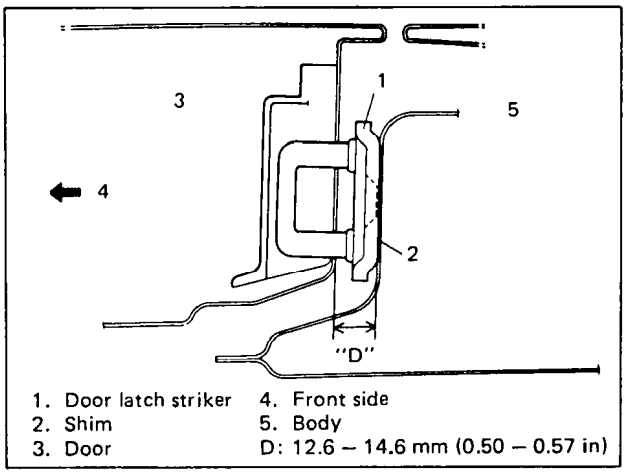


Fig. 9-19

In order to correctly obtain door striker position in fore-and-aft direction, increase or decrease number of spacers inserted between body and striker to adjust it. Dimension "D" should be adjusted to 12.6 to 14.6 mm (0.50 to 0.57 in.).



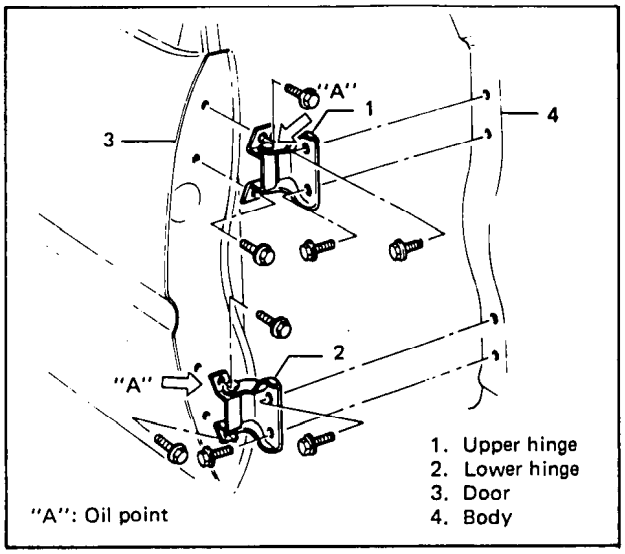
1. Door latch striker
2. Shim
3. Door
4. Front side
5. Body

D: 12.6 – 14.6 mm (0.50 – 0.57 in)

Fig. 9-20

NOTE:
Apply oil or grease to striker joints periodically.

DOOR ASSEMBLY



1. Upper hinge
2. Lower hinge
3. Door
4. Body

"A": Oil point

Fig. 9-21

REMOVAL

1) Remove stopper pin upward by tapping it with hammer.

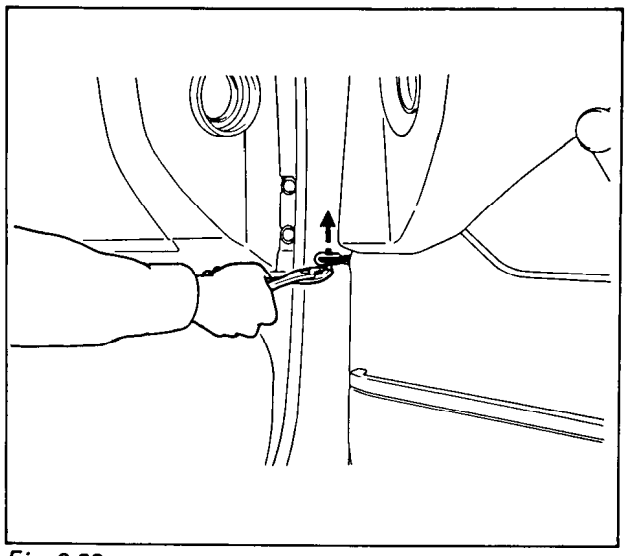
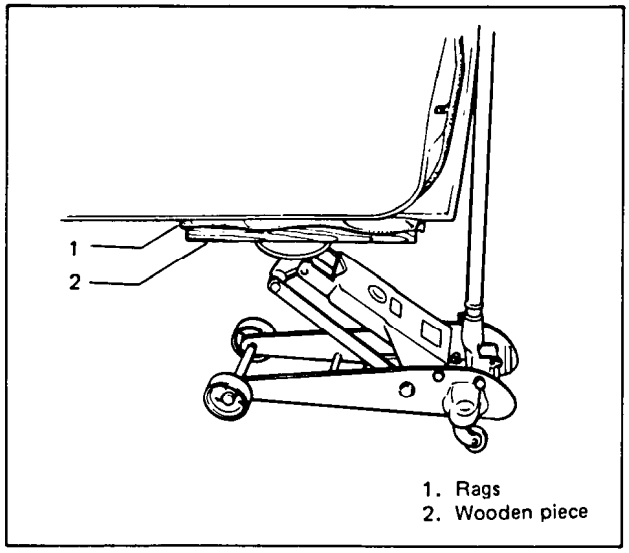


Fig. 9-22

2) Disconnect door harness at coupler.
3) Using a jack, support door panel with a piece of wood placed between jack and panel.
4) Remove door ass'y by loosening hinge mounting bolts.



1. Rags
2. Wooden piece

Fig. 9-23

INSTALLATION

Reverse removal sequence to install front door.

- When weatherstrip is hardened, water leak may develop. In such case, replace it with new one.
- After installing, adjust door latch striker position by referring to DOOR LOCK INSTALLATION section so that door is positioned correctly.

WINDSHIELD

The wind shield is installed by using a special type of adhesive (that is, one component urethane adhesive used with primer). For window glass replacement, it is important to use an adhesive which provides sufficient adhesion strength and to follow the proper procedure.

CAUTION:
Described here is the glass replacement by using one component urethane adhesive to be used with primer in combination. Each adhesive has its own drying and setting time and must be handled and used in a certain specific procedure. Negligence in following such procedure or misuse of the adhesive in any way hinders its inherent adhesive property. Therefore, before the work, make sure to read carefully the instruction and description given by the maker of the adhesive to be used and be sure to follow the procedure and observe each precaution throughout the work.

Use an adhesive of above mentioned type which has following property.

Shearing strength	40 kg/cm² or more (569 lb/in²)

Adhesive materials and tools required for removal and installation

- One component urethane adhesive and primers used in combination (For one sheet of window glass).
  Adhesive (600 g (21.2 oz.))
  Primer for glass (20 g (0.7 oz.))
  Primer for body (20 g (0.7 oz.))
  Primer for urethane (moulding) (20 g (0.7 oz))
- Eyeleteer
- Piano string
- Brush for primer application (3 pcs)
- Knife
- Rubber sucker grip
- Sealant gun (for filling adhesive)
- Putty spatula (for correcting adhered parts)

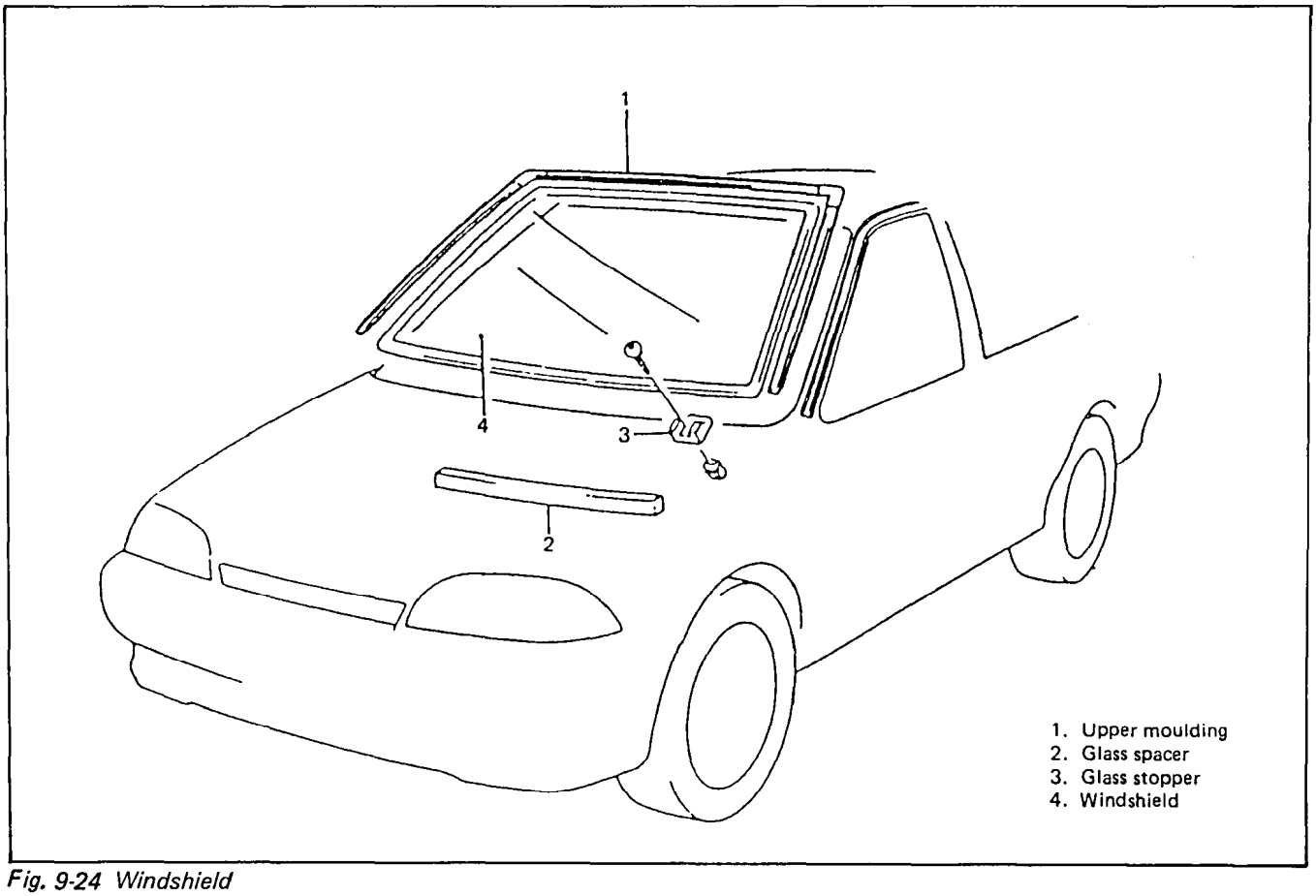


Fig. 9-24 Windshield

REMOVAL

1) Clean both inside and outside of glass and arount it.
2) Remove wiper arms, garnish and stoppers.
3) Remove moulding and moulding joints by cutting with knife.
4) Using tape, cover body surface around glass to prevent any damage.
5) Remove room mirror, sunshades, and front pillar trims (right & left).
6) Warm up font part of roof lining. Then, remove front side rib of roof lining from between front glass and body.

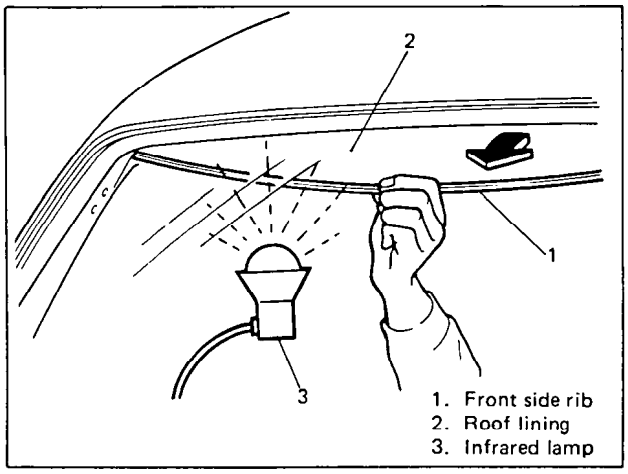


Fig. 9-25

7) Drill hole with eyeleteer through adhesive and let piano string through it.

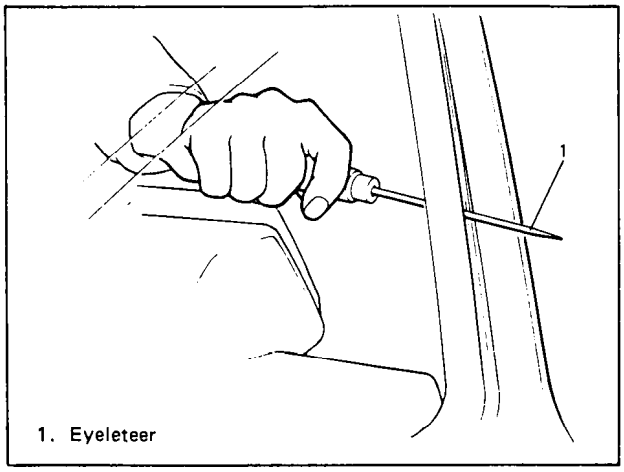


Fig. 9-26

8) Cut adhesive all around glass with piano string.

NOTE:
Use piano string as close to glass as possible so as to prevent damage to body.

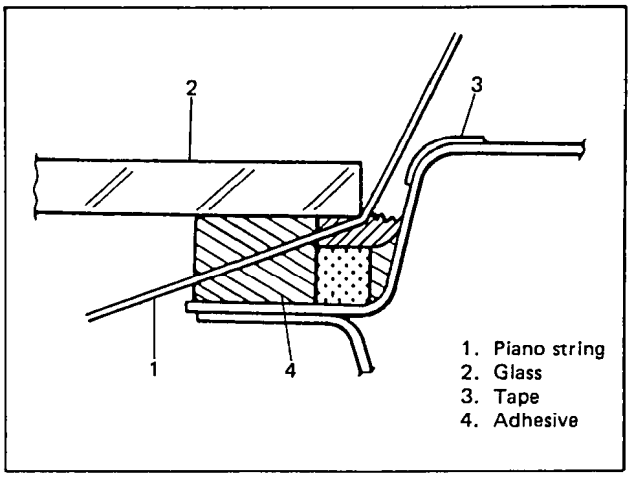


Fig. 9-27

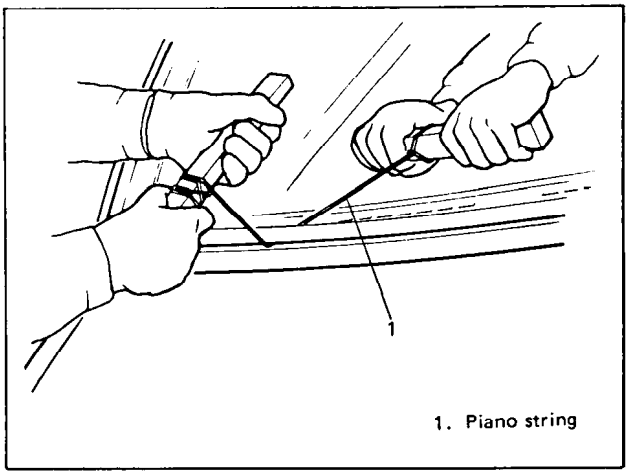


Fig. 9-28

9) Using knife, smooth adhesive remaining on body side so that it is 1 — 2 mm thick all around.

NOTE:
Before using knife, clean it with alcohol or the like to remove oil from it.

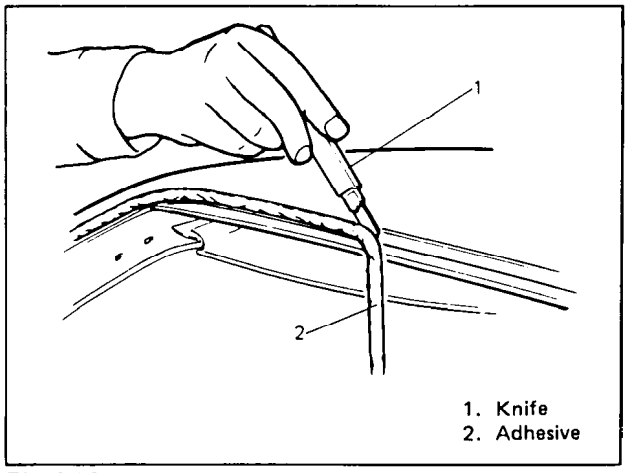


Fig. 9-29

10) When re-using glass, remove adhesive from glass, using care not to damage primer coated surface.

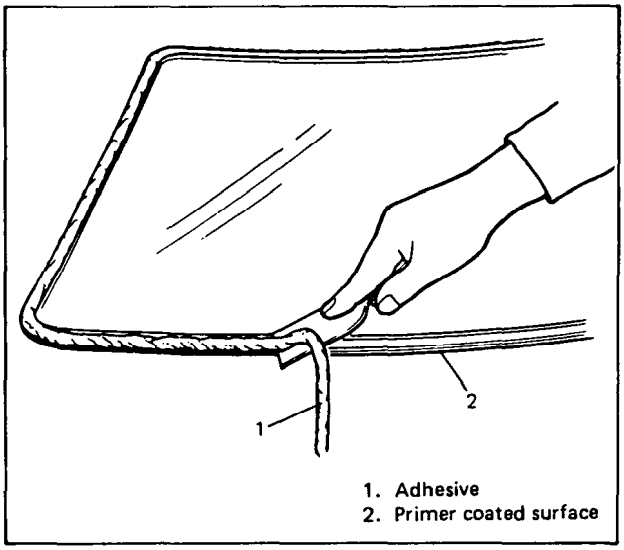


Fig. 9-30

INSTALLATION

1) Using cleaning solvent, clean window frame (body) where glass is to be adhered. (Let it dry for more than 10 minutes.)
2) Install stoppers (2 pcs) to lower side of window frame (body).
3) Peel paper from one side of new glass spacer and attach that lower side to windshield glass.

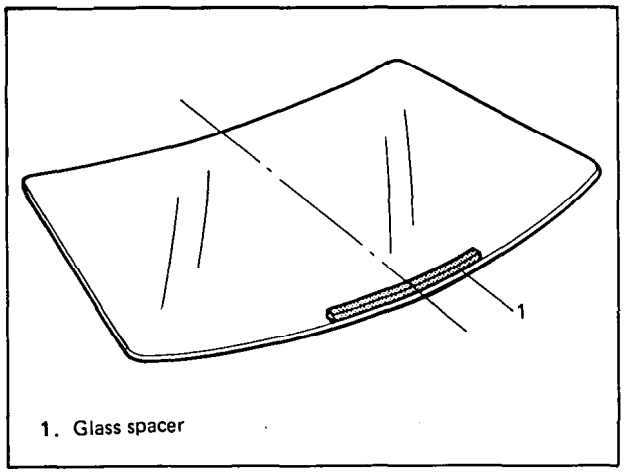


Fig. 9-31

4) Install new upper moulding to glass. Warming moulding for over half an hour at 35°C (95°F) temperature will facilitate work.

5) To determine installing position of glass to body, position glass against body so that clearance between upper end of glass and body is about 6 mm (0.236 in) and clearances between each side end (right & left) of glass and body are even. Then mark mating marks on glass and body as shown below. Upper clearance can be adjusted by moving stoppers position.

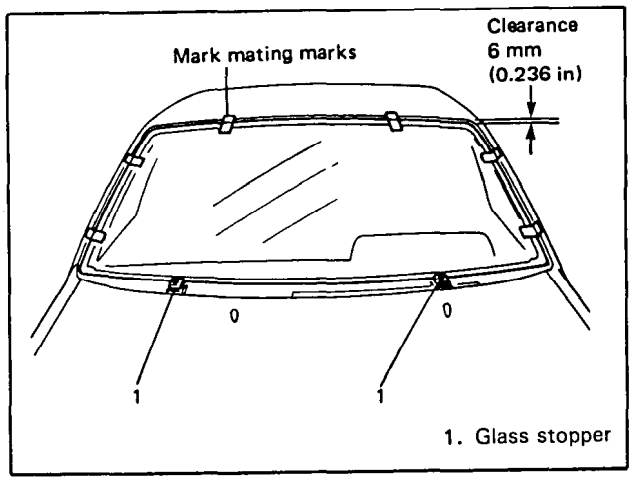


Fig. 9-32

6) Using new brush, apply sufficient amount of primer for body along body surface where window is to be adhered.

NOTE:
Be sure to refer to maker's instruction for proper handling and drying time.

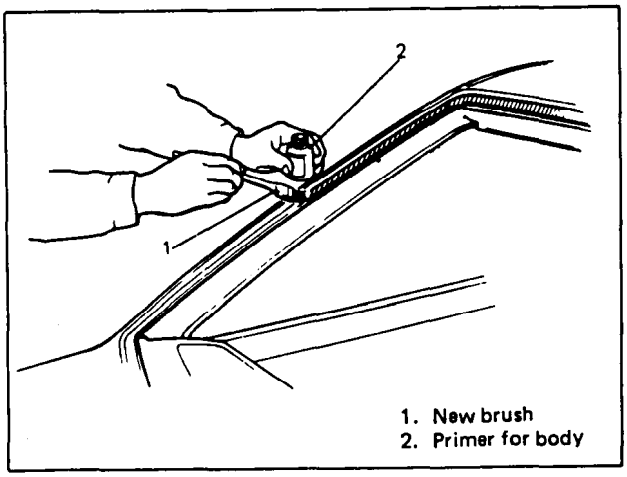


Fig. 9-33

7) Clean glass surface to be adhered to window with clean cloth. If cleaning solvent is used, let it dry for more than 10 minutes.
8) Clean moulding surface "A" with clean cloth. (Refer to below figure.)

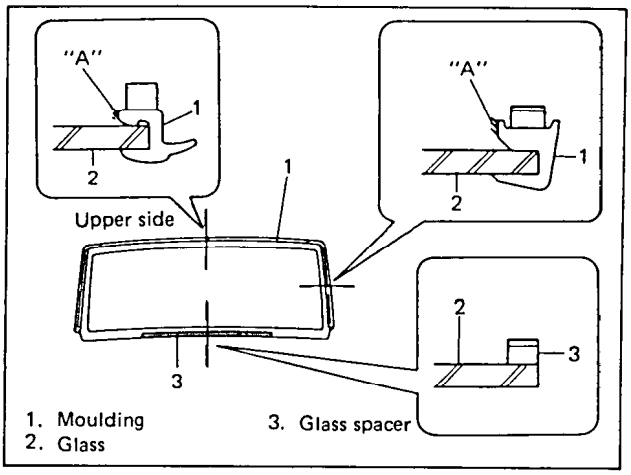


Fig. 9-34

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

NOTE:
- **Be sure to refer to maker's instruction for proper handling and drying time.**
- **Do not touch primer coated surface.**

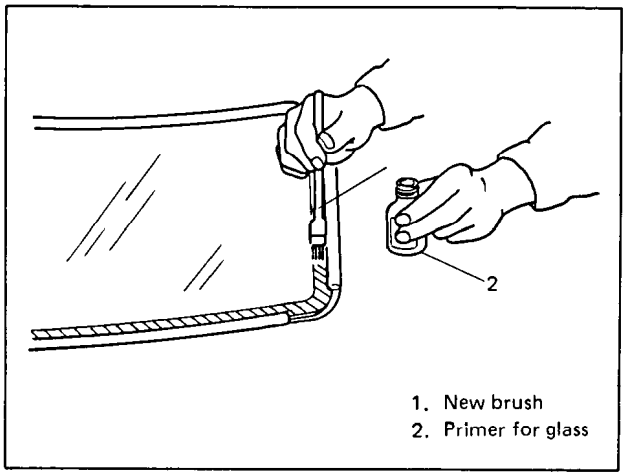


Fig. 9-35

10) Using new brush, apply sufficient amount of primer for moulding (Urethane) to surface "A" asshown in Fig. 9-34.

NOTE:
- **Be sure to refer to maker's instruciton for proper handling and drying time.**
- **Do not touch primer coated surface.**

11) Apply adhesive referring to Fig. 9-36.

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.**
- **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.**

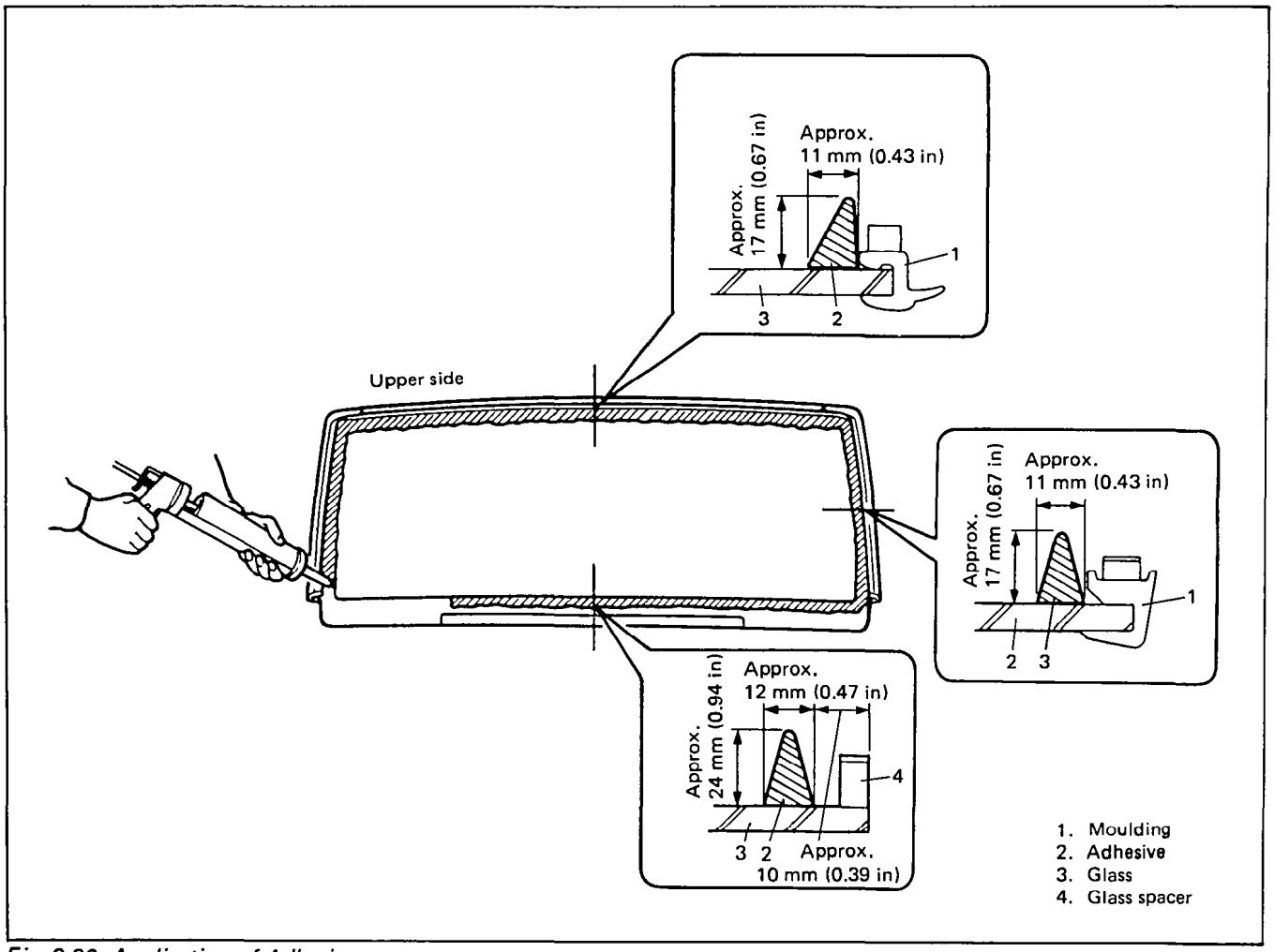


Fig. 9-36 Application of Adhesive

12) Peel remaining paper from moulding and glass spacer.
13) Holding rubber sucker grips, place glass onto body by aligning mating marks marked in step 4) and press it.

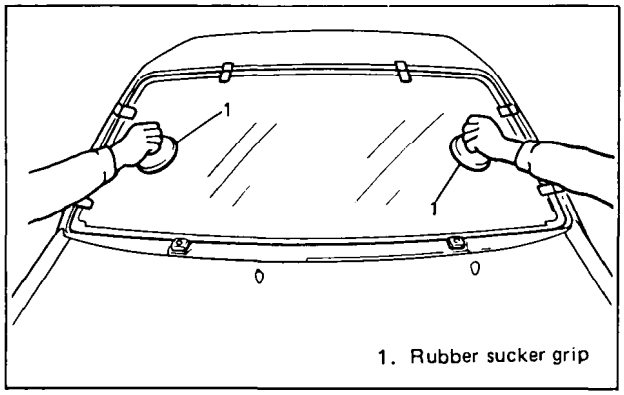


Fig. 9-37

14) Check for water leakage by pouring water over window through hose. If leakage is found, dry window and fill leaky point with adhesive. If water still leaks even after that, remove glass and start installation procedure all over again.

NOTE:

- **Do not use high pressure water.**
- **Do not blow compressed air directly at adhesive applied part when drying.**
- **Do not use infrared lamp or the like for drying.**

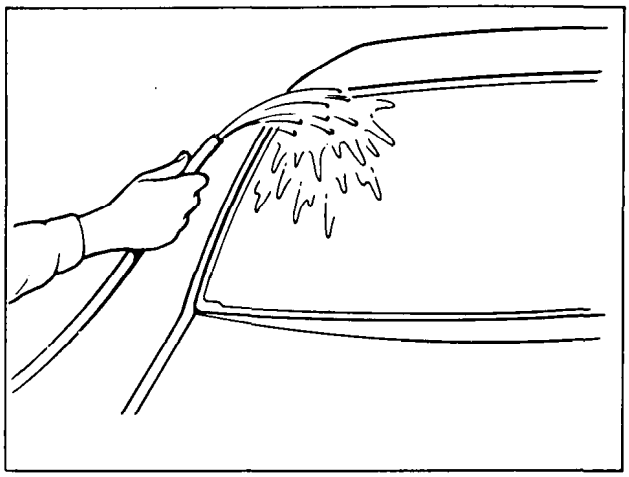


Fig. 9-38

CAUTION:
Upon completion of installation, note the following.

- Sudden closing of door before adhesive is completely set may cause glass to become loose or to come off. Therefore, if door is opened or closed before adhesive is completely set, make sure to open all door glasses and use proper care.
- If moulding is not securely in place, hold it down with a tape until adhesive is completely set.
- Each adhesive has its own setting time. Be sure to refer to maker's instruction, check setting time of adhesive to be used and observe precautions to be taken before adhesive is set.
- Refrain from driving till adhesive is completely set so as to ensure proper and sufficient adhesion.

SEAT BELTS (If equipped)

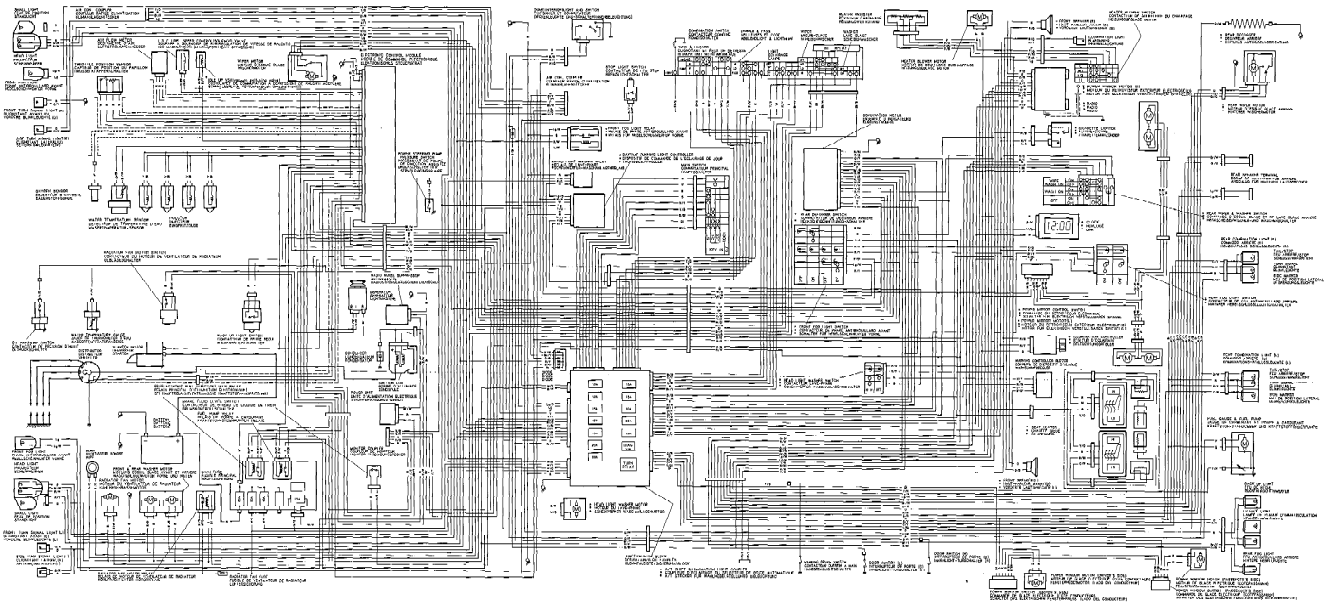
WARNING:
If replacing seat belt is necessary, replace buckle and ELR (or webbing) together as a set. This is for the reason of ensuring locking of tongue plate with buckle.
If these parts are replaced individually, such a locking condition may become unreliable. For this reason, Suzuki will supply only the spare buckle and ELR (or webbing) in a set part.

WIRING DIAGRAM

CONTENTS

WIRING DIAGRAM

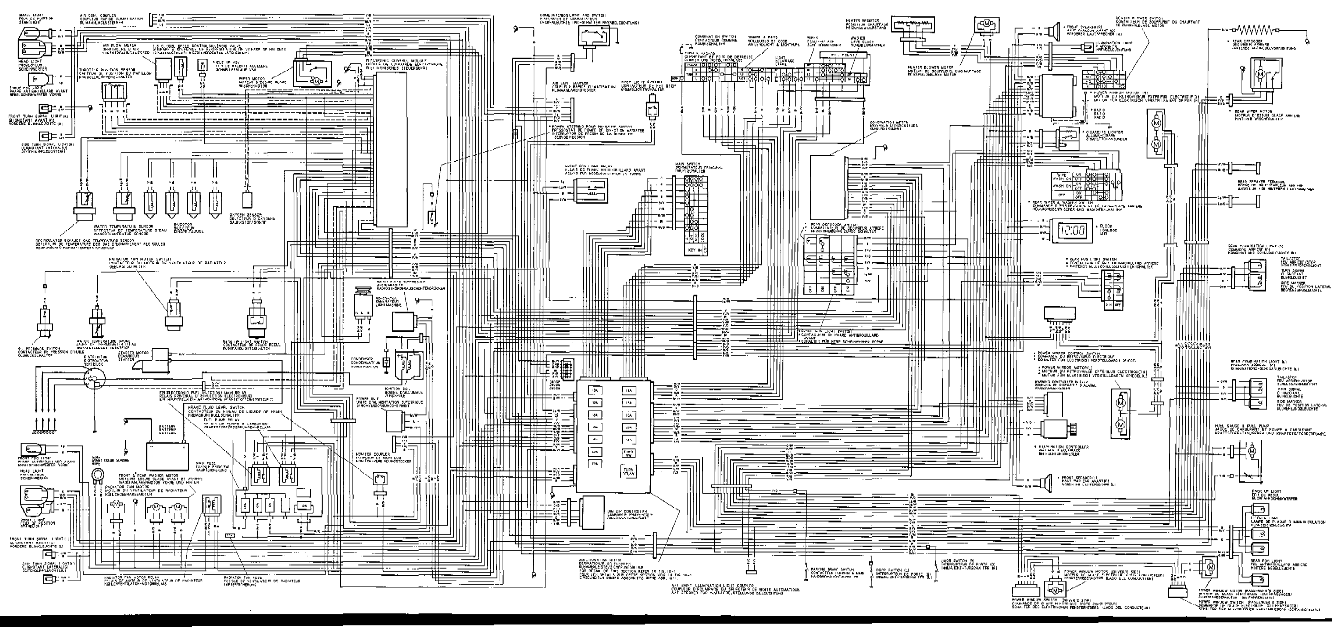
1 CAR WITH D.R.L. (DAYTIME RUNNING LIGHT) SYSTEM



WIRING DIAGRAM

2 CAR WITH DIM-DIP SYSTEM

NOTE: The parts with (*) are provided or not depending on specifications.



WIRE COLOR

B : Black
Bl : Blue
Br : Brown
G : Green
Gr : Gray
Lbl : Light blue
Lg : Light green
O : Orange
R : Red
W : White
Y : Yellow
P : Pink
V : Violet
B/Bl : Black with Blue tracer
B/G : Black with Green tracer
B/R : Black with Red tracer
B/W : Black with White tracer
B/Y : Black with Yellow tracer
Bl/B : Blue with Black tracer
Bl/G : Blue with Green tracer
Bl/R : Blue with Red tracer
Bl/W : Blue with White tracer
Bl/Y : Blue with Yellow tracer
Br/B : Brown with Black tracer
Br/R : Brown with Red tracer
Br/W : Brown with White tracer
Br/Y : Brown with Yellow tracer
G/B : Green with Black tracer
G/Bl : Green with Blue tracer
G/R : Green with Red tracer
G/W : Green with White tracer
G/Y : Green with Yellow tracer
Gr/B : Gray with Black tracer
Gr/W : Gray with White tracer
Gr/R : Gray with Red tracer
Gr/Y : Gray with Yellow tracer
Lg/B : Light green with Black tracer
Lg/R : Light green with Red tracer
Lg/W : Light green with White tracer
Lg/Y : Light green with Yellow tracer
O/B : Orange with Black tracer
O/Bl : Orange with Blue tracer
O/G : Orange with Green tracer
O/R : Orange with Red tracer
O/W : Orange with White tracer
O/Y : Orange with Yellow tracer
P/B : Pink with Black tracer
P/Bl : Pink with Blue tracer
P/G : Pink with Green tracer
V/G : Violet with Green tracer
V/Y : Violet with Yellow tracer
R/B : Red with Black tracer
R/Bl : Red with Blue tracer
R/G : Red with Green tracer
R/W : Red with White tracer
R/Y : Red with Yellow tracer
W/B : White with Black tracer
W/Bl : White with Blue tracer
W/G : White with Green tracer
W/R : White with Red tracer
W/Y : White with Yellow tracer
Y/B : Yellow with Black tracer
Y/Bl : Yellow with Blue tracer
Y/G : Yellow with Green tracer
Y/R : Yellow with Red tracer
Y/W : Yellow with White tracer

CODE DES COULEURS

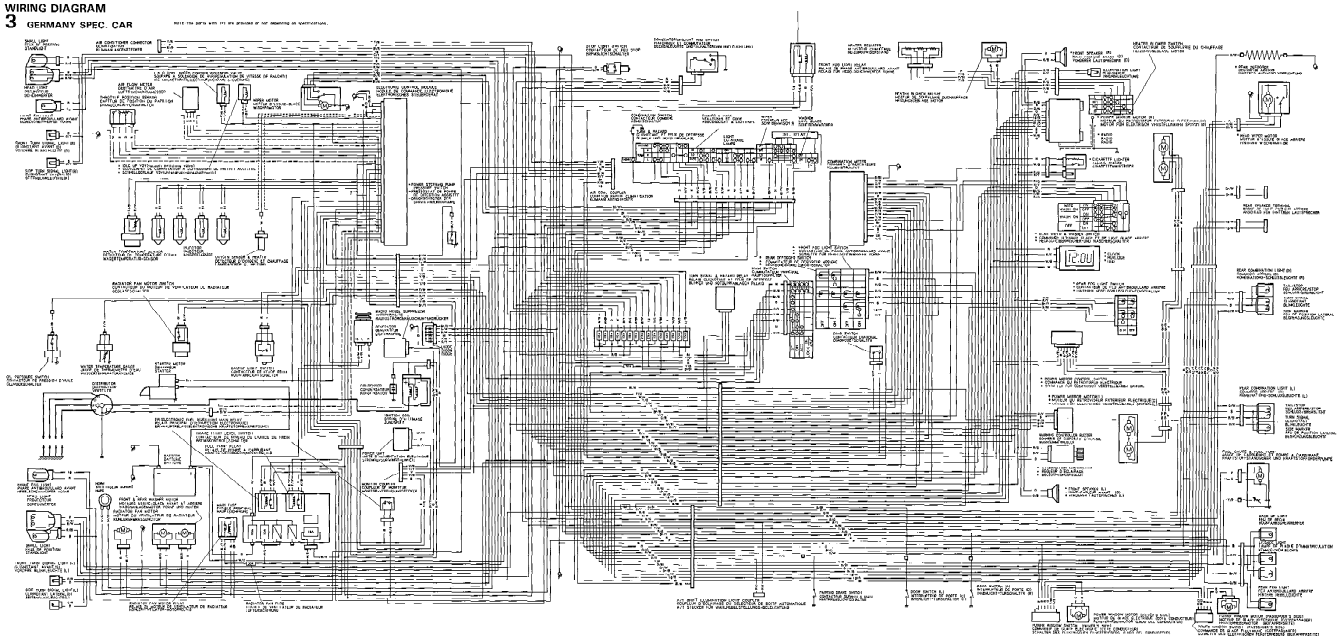
B : Noir
Bl : Bleu
Br : Brun
G : Vert
Gr : Gris
Lbl : Bleu clair
Lg : Vert clair
O : Orange
R : Rouge
W : Blanc
Y : Jaune
P : Rose
V : Violet
B/Bl : Noir avec filet bleu
B/G : Noir avec filet vert
B/R : Noir avec filet rouge
B/W : Noir avec filet blanc
B/Y : Noir avec filet jaune
Bl/B : Bleu avec filet noir
Bl/G : Bleu avec filet vert
Bl/R : Bleu avec filet rouge
Bl/W : Bleu avec filet blanc
Bl/Y : Bleu avec filet jaune
Br/B : Brun avec filet noir
Br/R : Brun avec filet rouge
Br/W : Brun avec filet blanc
Br/Y : Brun avec filet jaune
G/B : Vert avec filet noir
G/Bl : Vert avec filet bleu
G/R : Vert avec filet rouge
G/W : Vert avec filet blanc
G/Y : Vert avec filet jaune
Gr/B : Gris avec filet noir
Gr/W : Gris avec filet blanc
Gr/R : Gris avec filet rouge
Gr/Y : Gris avec filet jaune
Lg/B : Vert clair avec filet noir
Lg/R : Vert clair avec filet rouge
Lg/W : Vert clair avec filet blanc
Lg/Y : Vert clair avec filet jaune
O/B : Orange avec filet noir
O/Bl : Orange avec filet bleu
O/G : Orange avec filet vert
O/R : Orange avec filet rouge
O/W : Orange avec filet blanc
O/Y : Orange avec filet jaune
P/B : Rose avec filet noir
P/Bl : Rose avec filet bleu
P/G : Rose avec filet vert
V/G : Violet avec filet vert
V/Y : Violet avec filet jaune
R/B : Rouge avec filet noir
R/Bl : Rouge avec filet bleu
R/G : Rouge avec filet vert
R/W : Rouge avec filet blanc
R/Y : Rouge avec filet jaune
W/B : Blanc avec filet noir
W/Bl : Blanc avec filet bleu
W/G : Blanc avec filet vert
W/R : Blanc avec filet rouge
W/Y : Blanc avec filet jaune
Y/B : Jaune avec filet noir
Y/Bl : Jaune avec filet bleu
Y/G : Jaune avec filet vert
Y/R : Jaune avec filet rouge
Y/W : Jaune avec filet blanc

KABELFARBEN

B : Schwarz
Bl : Blau
Br : Braun
G : Grün
Gr : Grau
Lbl : Hellblau
Lg : Hellgrün
O : Orange
R : Rot
W : Weiß
Y : Gelb
P : Rosa
V : Lila
B/Bl : Schwarz mit blauem Streifen
B/G : Schwarz mit grünem Streifen
B/R : Schwarz mit rotem Streifen
B/W : Schwarz mit weißem Streifen
B/Y : Schwarz mit gelbem Streifen
Bl/B : Blau mit schwarzem Streifen
Bl/G : Blau mit grünem Streifen
Bl/R : Blau mit rotem Streifen
Bl/W : Blau mit weißem Streifen
Bl/Y : Blau mit gelbem Streifen
Br/B : Braun mit schwarzem Streifen
Br/R : Braun mit rotem Streifen
Br/W : Braun mit weißem Streifen
Br/Y : Braun mit gelbem Streifen
G/B : Grün mit schwarzem Streifen
G/Bl : Grün mit blauem Streifen
G/R : Grün mit rotem Streifen
G/W : Grün mit weißem Streifen
G/Y : Grün mit gelbem Streifen
Gr/B : Grau mit schwarzem Streifen
Gr/W : Grau mit weißem Streifen
Gr/R : Grau mit rotem Streifen
Gr/Y : Grau mit gelbem Streifen
Lg/B : Hellgrün mit schwarzem Streifen
Lg/R : Hellgrün mit rotem Streifen
Lg/W : Hellgrün mit weißem Streifen
Lg/Y : Hellgrün mit gelbem Streifen
O/B : Orange mit schwarzem Streifen
O/Bl : Orange mit blauem Streifen
O/G : Orange mit grünem Streifen
O/R : Orange mit rotem Streifen
O/W : Orange mit weißem Streifen
O/Y : Orange mit gelbem Streifen
P/B : Rosa mit schwarzem Streifen
P/Bl : Rosa mit blauem Streifen
P/G : Rosa mit grünem Streifen
V/G : Lila mit grünem Streifen
V/Y : Lila mit gelbem Streifen
R/B : Rot mit schwarzem Streifen
R/Bl : Rot mit blauem Streifen
R/G : Rot mit grünem Streifen
R/W : Rot mit weißem Streifen
R/Y : Rot mit gelbem Streifen
W/B : Weiß mit schwarzem Streifen
W/Bl : Weiß mit blauem Streifen
W/G : Weiß mit grünem Streifen
W/R : Weiß mit rotem Streifen
W/Y : Weiß mit gelbem Streifen
Y/B : Gelb mit schwarzem Streifen
Y/Bl : Gelb mit blauem Streifen
Y/G : Gelb mit grünem Streifen
Y/R : Gelb mit rotem Streifen
Y/W : Gelb mit weißem Streifen

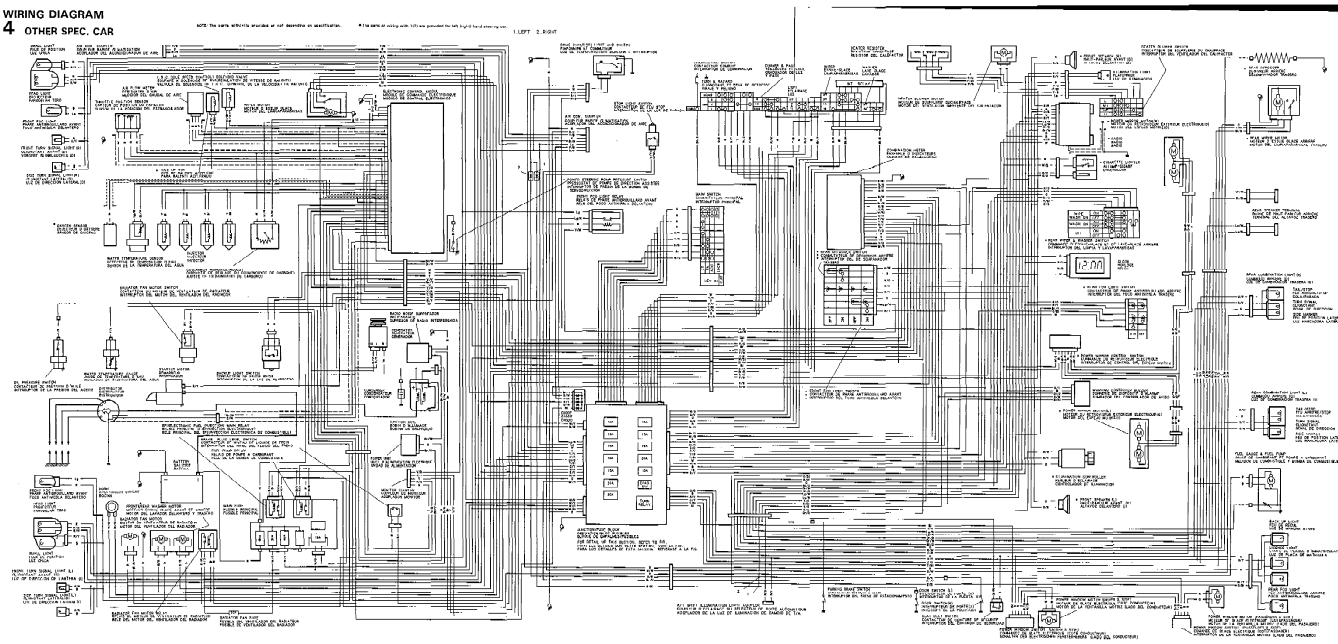
VAK 2
'91.9.10.

WIRING DIAGRAM
3 GERMANY SPEC. CAR



TW-3
91.9.10.

WIRING DIAGRAM
4 OTHER SPEC. CAR



WIRE COLOR

B	Black	G/Y	Green with Yellow tracer
L	Blue	L/B	Light green with Black tracer
Br	Brown	L/R	Light green with Red tracer
G	Green	L/W	Light green with White tracer
Gr	Gray	L/Y	Light green with Yellow tracer
LB	Light blue	O/B	Orange with Black tracer
LG	Light green	O/R	Orange with Red tracer
O	Orange	O/W	Orange with White tracer
R	Red	O/Y	Orange with Yellow tracer
W	White	W/B	White with Black tracer
Y	Yellow	W/R	White with Red tracer
B/R	Black with Red tracer	W/Y	White with Yellow tracer
B/W	Black with White tracer	Y/B	Yellow with Black tracer
B/Y	Black with Yellow tracer	Y/R	Yellow with Red tracer
R/B	Red with Black tracer	Y/W	Yellow with White tracer
R/W	Red with White tracer		
R/Y	Red with Yellow tracer		
W/B	White with Black tracer		
W/R	White with Red tracer		
W/Y	White with Yellow tracer		
Y/B	Yellow with Black tracer		
Y/R	Yellow with Red tracer		
Y/W	Yellow with White tracer		

CODE DES COULEURS

B	Noir	BR/R	Brun avec trait rouge
Bl	Bleu	G/Y	Vert avec trait jaune
Br	Brun	L/B	Vert clair avec trait noir
G	Vert	L/R	Vert clair avec trait rouge
Gr	Gris	L/W	Vert clair avec trait blanc
LB	Bleu clair	L/Y	Vert clair avec trait jaune
LG	Vert clair	O/B	Orange avec trait noir
O	Orange	O/R	Orange avec trait rouge
R	Rouge	O/W	Orange avec trait blanc
W	Blanc	O/Y	Orange avec trait jaune
Y	Jaune	P/B	Rose avec trait noir
B/R	Noir avec trait rouge	P/G	Rose avec trait vert
B/W	Noir avec trait blanc	P/R	Rose avec trait rouge
B/Y	Noir avec trait jaune	P/W	Rose avec trait blanc
Br/W	Brun avec trait blanc	R/B	Rouge avec trait noir
G/B	Vert avec trait noir	R/G	Rouge avec trait vert
G/R	Vert avec trait rouge	R/W	Rouge avec trait blanc
G/W	Vert avec trait blanc	R/Y	Rouge avec trait jaune
G/Y	Vert avec trait jaune	W/B	Blanc avec trait noir
Gr/R	Gris avec trait rouge	W/G	Blanc avec trait vert
L/W	Vert clair avec trait blanc	W/R	Blanc avec trait rouge
O/B	Orange avec trait noir	W/Y	Blanc avec trait jaune
O/W	Orange avec trait blanc	Y/B	Jaune avec trait noir
P/R	Rose avec trait rouge	Y/G	Jaune avec trait vert
R/B	Rouge avec trait noir	Y/R	Jaune avec trait rouge
R/W	Rouge avec trait blanc	Y/W	Jaune avec trait blanc

COLOR DE LOS HILOS

B	Negro	G/R	Verde con raya roja
Bl	Azul	G/Y	Verde con raya amarilla
Br	Marrón	L/B	Verde claro con raya negra
G	Verde	L/R	Verde claro con raya roja
Gr	Gris	L/W	Verde claro con raya blanca
LB	Azul claro	L/Y	Verde claro con raya amarilla
LG	Verde claro	O/B	Naranja con raya negra
O	Naranja	O/R	Naranja con raya roja
R	Rojo	O/W	Naranja con raya blanca
W	Blanco	O/Y	Naranja con raya amarilla
Y	Amarillo	P/B	Rosa con raya negra
B/R	Negro con raya roja	P/G	Rosa con raya verde
B/W	Negro con raya blanca	P/R	Rosa con raya roja
B/Y	Negro con raya amarilla	P/W	Rosa con raya blanca
Br/W	Marrón con raya blanca	R/B	Rojo con raya negra
G/B	Verde con raya negra	R/G	Rojo con raya verde
G/R	Verde con raya roja	R/W	Rojo con raya blanca
G/W	Verde con raya blanca	R/Y	Rojo con raya amarilla
G/Y	Verde con raya amarilla	W/B	Blanco con raya negra
L/W	Verde claro con raya blanca	W/G	Blanco con raya verde
O/B	Naranja con raya negra	W/R	Blanco con raya roja
O/W	Naranja con raya blanca	W/Y	Blanco con raya amarilla
P/R	Rosa con raya roja	Y/B	Amarillo con raya negra
R/B	Rojo con raya negra	Y/G	Amarillo con raya verde
R/W	Rojo con raya blanca	Y/R	Amarillo con raya roja
W/B	Blanco con raya negra	Y/W	Amarillo con raya blanca
W/R	Blanco con raya roja		
Y/B	Amarillo con raya negra		
Y/R	Amarillo con raya roja		
Y/W	Amarillo con raya blanca		

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