SECTION 10

CHARGING SYSTEM

NOTE:
For the items not found in this section, refer to the same section of '88 MODEL SERVICE MANUAL.

CONTENTS

10-1. ALTERNATOR

GENERAL DESCRIPTION

The maximum output of this alternator is 50A. Its structure and operation are the same as the one used for the '88 model vehicle. The component parts also remain the same except the rotor.

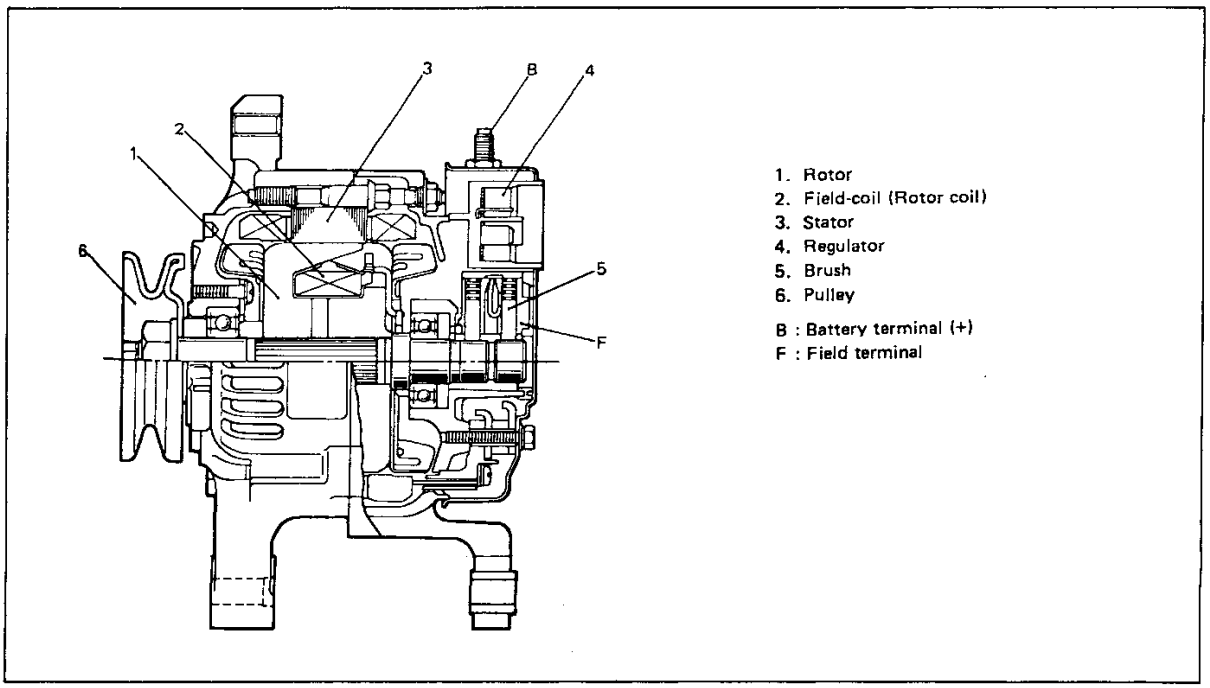
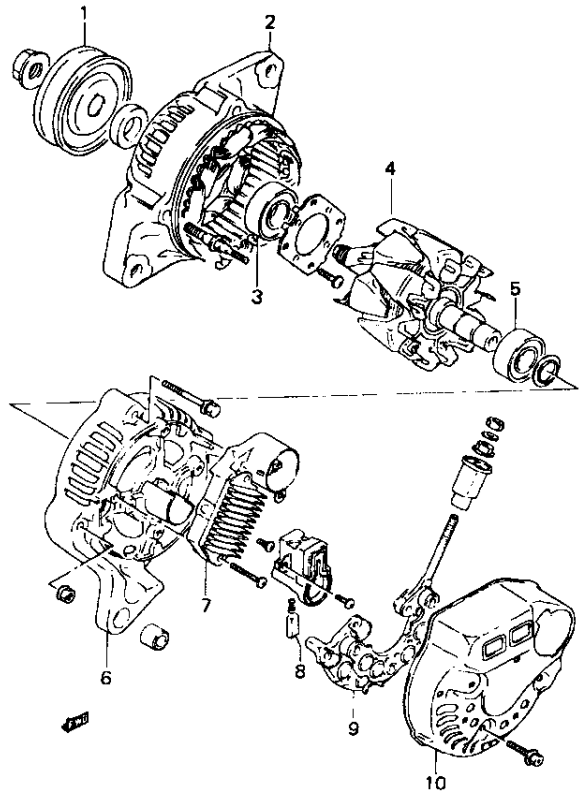


Fig. 10-1



1. Generator pulley
2. Drive end frame
3. Drive end frame bearing
4. Rotor
5. Rear end frame bearing
6. Rear end frame
7. Regulator ass'y
8. Brush
9. Rectifier
10. Rear end cover

Fig. 10-2

DATA AND SPECIFICATION

Nominal operating voltage	12 volts
Max. alternator output	50A
Polarity	Negative ground
No-load alternator speed	1,110 rpm (r/min)
Regulated voltage	14.5 ± 0.3V
Direction of rotation	Clockwise as viewed from pulley side
Maximum permissible alternator speed	15,000 rpm (r/min)
Working temperature range	−30 ~ 90° C (−22 ~ 194° F)
Rectification	Full wave rectification

The graph given below shows the alternator frame temperature to output voltage relationship. Use it as reference when checking output of the alternator.

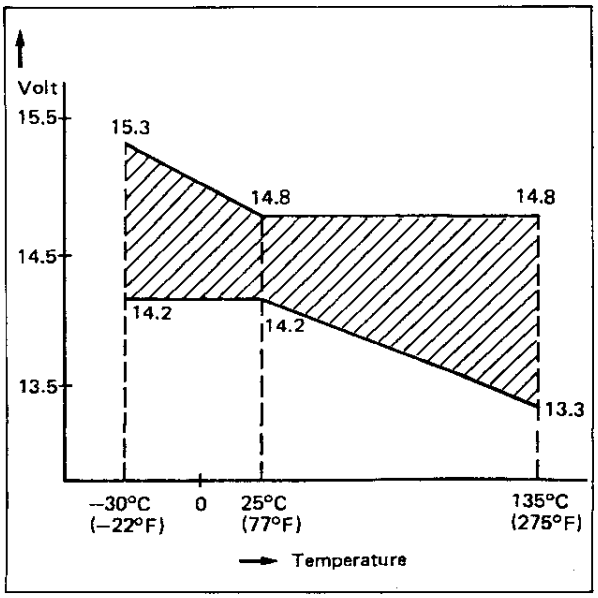


Fig. 10-3

SECTION 11

CLUTCH

NOTE:
For the items not found in this section, refer to the same section of '88 MODEL SERVICE MANUAL.

CONTENTS

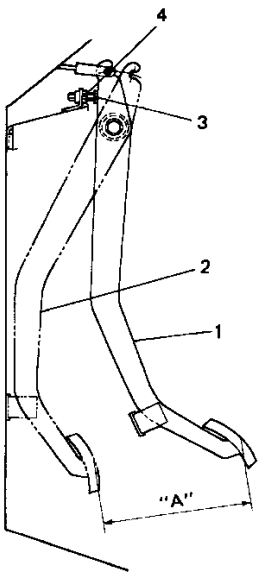
11-5. MAINTENANCE SERVICES

NOTE:
For the maintenance service procedure not found in this section, refer to the same section of '88 MODEL SERVICE MANUAL.

Clutch Pedal Height
Check to make sure that clutch pedal height is within "A" range as illustrated.

Clutch pedal height "A"	148 – 154 mm (5.83 – 6.06 in.)

If clutch pedal height is out of above specification, adjust it by turning pedal stopper bolt.
Be sure to tighten lock nut after adjustment.



1. Clutch pedal free position
2. Fully depressed position
3. Clutch pedal stopper bolt
4. Lock nut

A: Clutch pedal height

SECTION 15

PROPELLER SHAFTS

NOTE:
For the items not found in this section, refer to the same section of '88 MODEL SERVICE MANUAL.

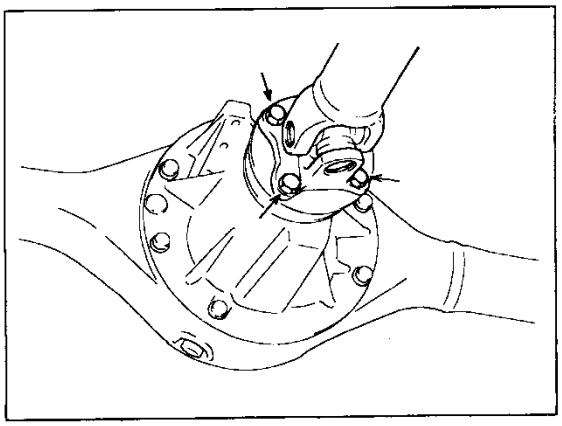
CONTENTS

15-5. TIGHTENING TORQUE

Bolts & Nuts

Check following bolts and nuts for tightness and retighten them as necessary:

Tightening torque for propeller shaft (Universal joint flange) bolts and nuts	N·m	kg-m	lb-ft
	50 – 60	5.0 – 6.0	36.5 – 43.0



SECTION 19

BRAKES

NOTE:
For the items not found in this section, refer to the same section of '88 MODEL SERVICE MANUAL.

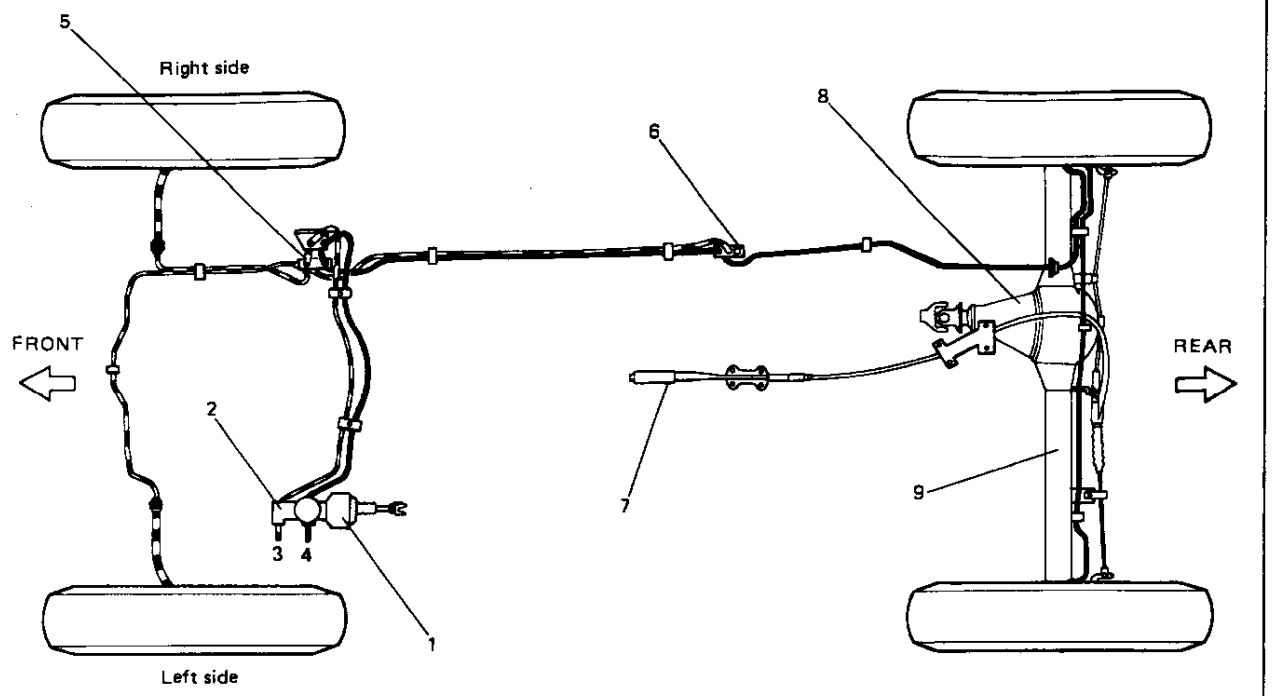
CONTENTS

NOTE:
All brake fasteners are important attaching parts in that they could affect the performance of vital parts and systems, and/or could result in major repair expense. They must be replaced with one of same part number or with an equivalent part if replacement becomes necessary. Do not use a replacement part of lesser quality or substitute design. Torque values must be used as specified during reassembly to assure proper retention of all parts. There is to be no welding as it may result in extensive damage and weakening of the metal.

WARNING:
When servicing wheel brake parts, do not create dust by grinding, sanding brake linings, or by cleaning wheel brake parts with a dry brush or with compressed air. Many wheel brake parts contain asbestos fibers which can become airborned if dust is created during servicing. Breathing dust containing asbestos fibers may cause serious bodily harm. A water dampened cloth or water based solution should be used to remove any dust on brake parts. Equipment is commercially available to perform this washing function. These wet methods will prevent asbestos fibers from becoming airborne.

19-1. GENERAL DESCRIPTION

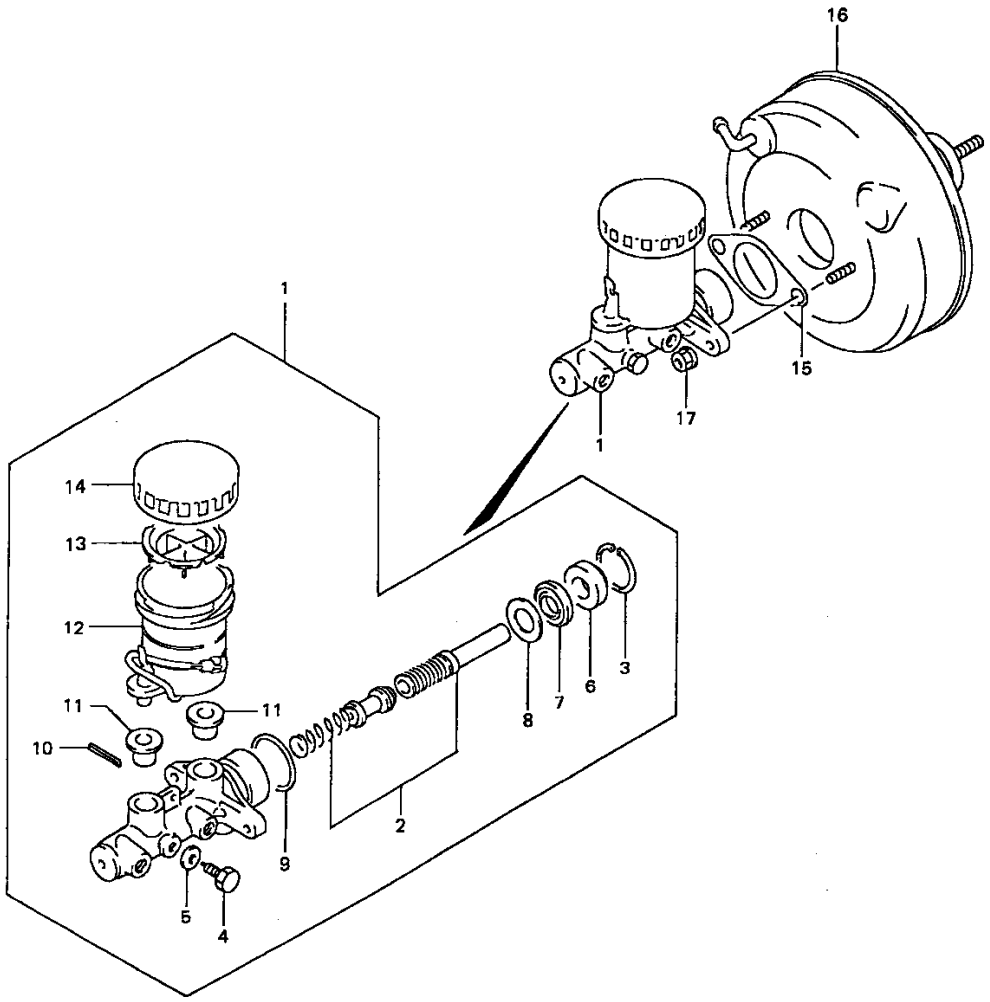
When the foot brake pedal is depressed, hydraulic pressure is developed in the master cylinder to actuate pistons (two in front and four in rear).
The master cylinder is a tandem master cylinder. Two brake pipes are connected to the master cylinder and they make two independent circuits. One connects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



1. Brake booster
2. Master cylinder
3. Secondary side
4. Primary side
5. 6 way joint
6. P & B (Proportioning and bypass) valve
7. Parking brake lever
8. Differential
9. Rear axle housing

Fig. 19-1

MASTER CYLINDER



1. Brake master cylinder assembly
2. Brake master cylinder piston set
3. Piston stopper circlip
4. Secondary piston stopper bolt
5. Seal ring
6. Piston stopper
7. Cylinder cup
8. Plate
9. Master cylinder seal ring
10. Pin
11. Reservoir connector grommet
12. Master cylinder reservoir
13. Cylinder reservoir strainer
14. Cylinder reservoir cap
15. Master cylinder gasket
16. Brake booster assembly
17. Master cylinder mounting nut

Fig. 19-2

MASTER CYLINDER ASSEMBLY

[GENERAL DESCRIPTION]

The master cylinder has two pistons and three piston cups. Its hydraulic pressure is produced in the primary ("a" in the below figure) and secondary ("b") chambers. The hydraulic pressure produced in the primary chamber ("a") acts on the rear wheel brakes (right & left).
Also, the hydraulic pressure produced in the secondary chamber ("b") acts on the front wheel brakes (right & left).

NOTE:
Replace all components included in repair kits to service this master cylinder. Lubricate rubber parts with clean, fresh brake fluid to ease assembly. Do not use lubricated shop air on brake parts as damage to rubber components may result. If any hydraulic component is removed or brake line disconnected, bleed the brake system. The torque values specified are for dry, unlubricated fasteners.

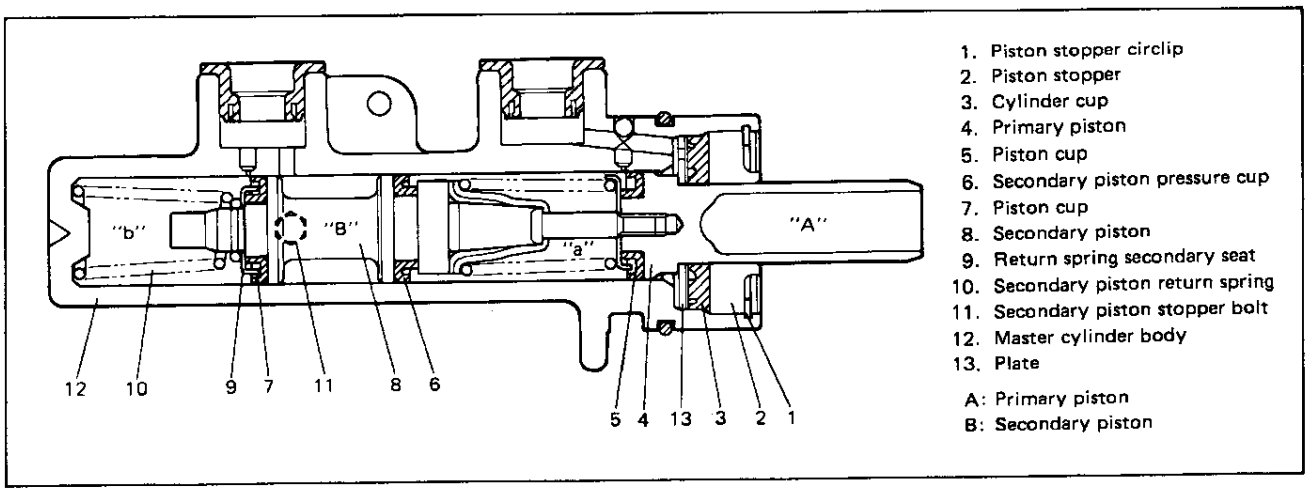


Fig. 19-3

[Master cylinder OPERATION]

Normal operation

Depressing the brake pedal forces the primary piston "A" to move to the left in the below figure and consequently the hydraulic pressure is produced in the chamber "a".
By means of this pressure and the return spring force, the secondary piston "B" is also pushed to the left and thus the hydraulic pressure is produced in the chamber "b".

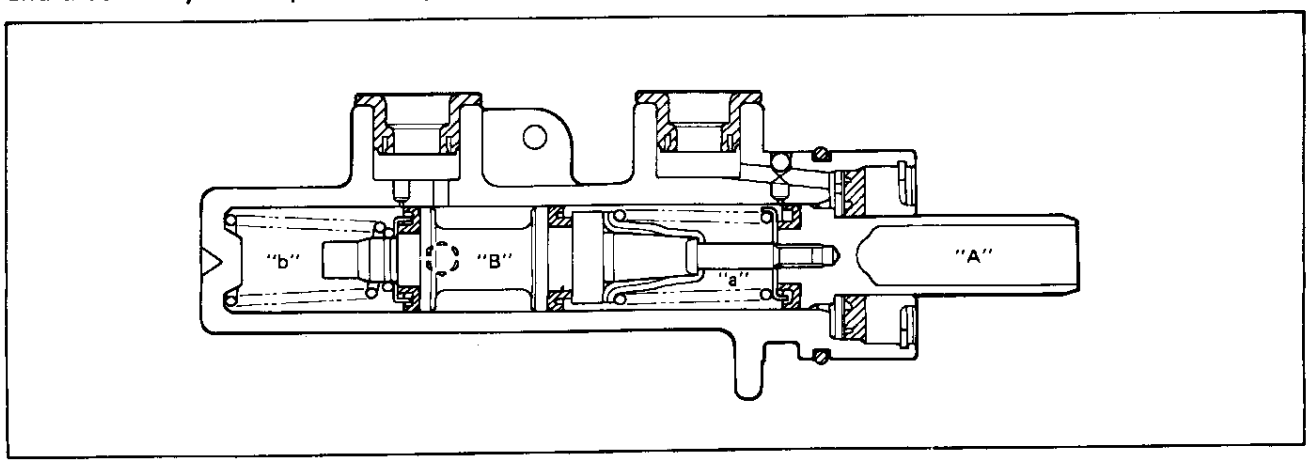


Fig. 19-3-1

One-circuit operation (Primary chamber "a" circuit failure)
Depressing the brake pedal forces the primary piston "A" to move as described previously, but since the brake circuit connected to the chamber "a" cannot hold the pressure, no pressure is produced in the fluid immediately ahead of the piston "A". The piston "A" keeps moving while compressing the spring and when it reaches the retainer, the piston "B" is pushed and begins to move. This causes the pressure to rise in the chamber "b" and the pressure acts on front wheel brakes (right & left).

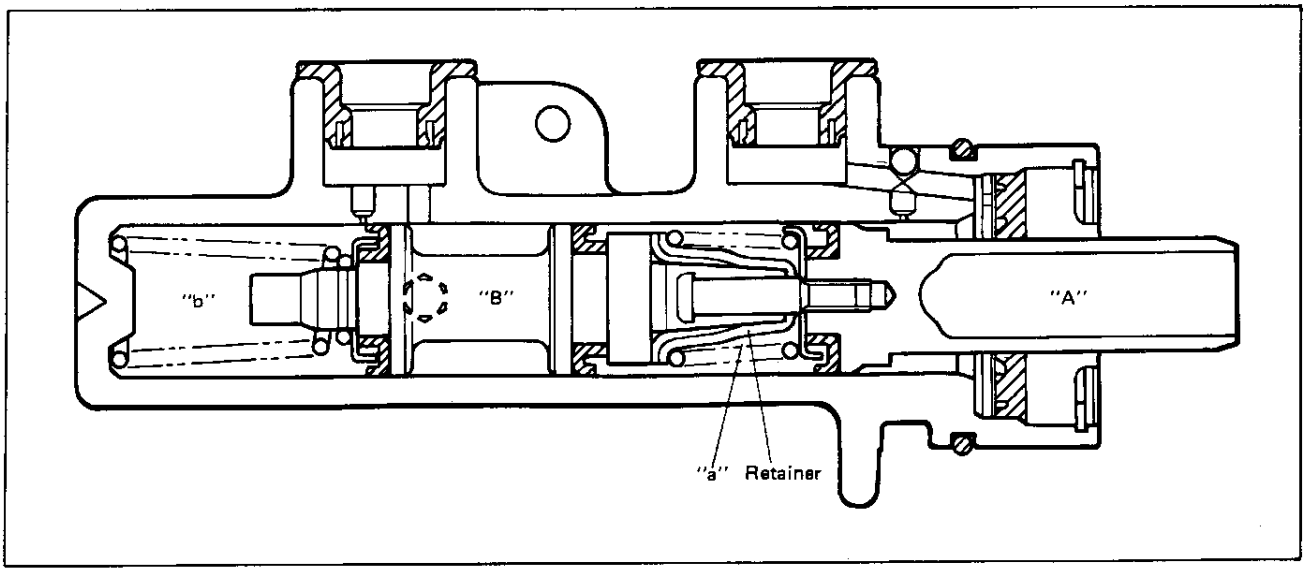


Fig. 19-4

One-circuit operation (Secondary chamber "b" circuit failure)
In this case, the leftward movement of the piston "A" has but little effect in causing the fluid pressure to rise in the chamber "a" in the beginning, because the initial rise of the fluid pressure causes the piston "B" to promptly yield and move to the left. However, when the forward end of the piston "B" comes to the head of the cylinder and stops there, the leftward movement of the piston "A" becomes effective. Thus the fluid pressure is produced in the chamber "a" and it acts on rear wheel brakes (right & left).
The below figure shows secondary piston "B" at halt.

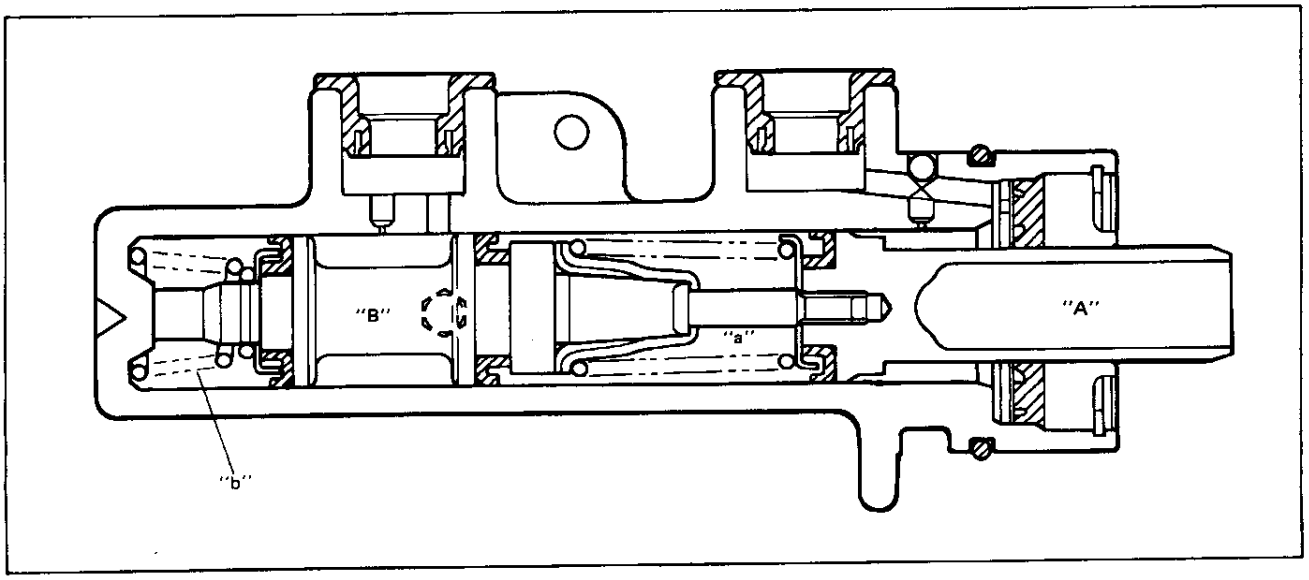


Fig. 19-4-1

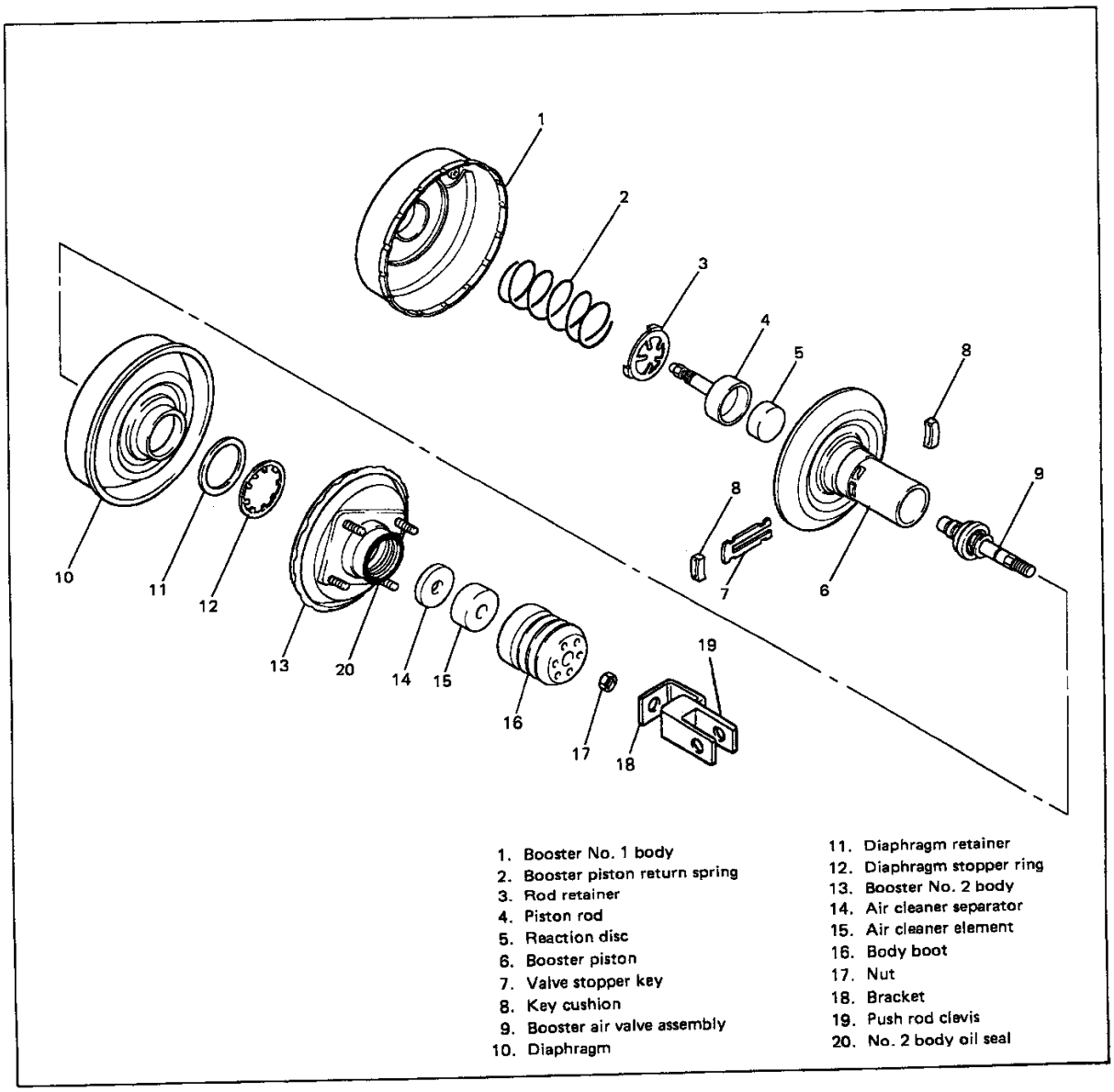
BOOSTER ASSEMBLY

[GENERAL DESCRIPTION]

The booster is located between the master cylinder and the brake pedal. It is so designed that the force created when the brake pedal is depressed is mechanically increased combined with the engine vacuum. The booster has a diaphragm of ϕ 180 mm effective diameter. Its operation is described in the following pages.

NOTE:

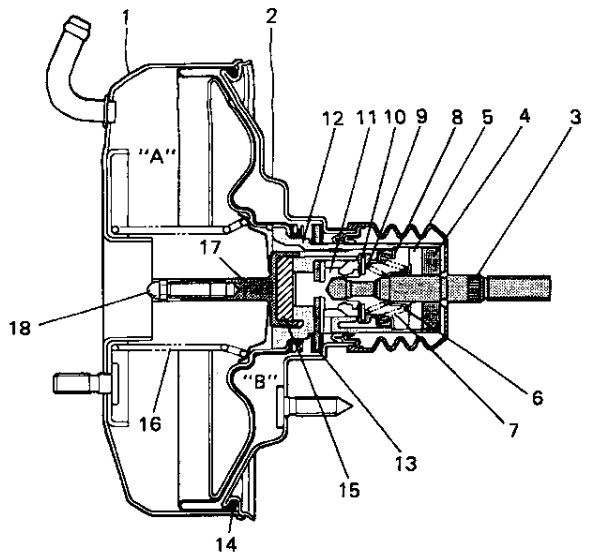
- **Use all components included in repair kits to service this booster. Lubricate rubber parts, where indicated, with silicone grease provided in kits. The torque values specified are for dry, unlubricated fasteners. If any hydraulic component is removed or brake line disconnected, bleed the brake system.**
- **Never lubricate any hydraulic component with silicone grease.**



1. Booster No. 1 body
2. Booster piston return spring
3. Rod retainer
4. Piston rod
5. Reaction disc
6. Booster piston
7. Valve stopper key
8. Key cushion
9. Booster air valve assembly
10. Diaphragm
11. Diaphragm retainer
12. Diaphragm stopper ring
13. Booster No. 2 body
14. Air cleaner separator
15. Air cleaner element
16. Body boot
17. Nut
18. Bracket
19. Push rod clevis
20. No. 2 body oil seal

Fig. 19-12

[Booster OPERATION]



1. Booster No. 1 body
2. Booster No. 2 body
3. Valve operating rod
4. Air cleaner element
5. Air cleaner separator
6. Air valve spring retainer
7. Air valve return spring
8. Control valve spring retainer
9. Control valve spring
10. Booster control valve
11. Booster air valve
12. Booster piston
13. Valve stopper key
14. Booster diaphragm
15. Reaction disc
16. Booster piston return spring
17. Booster piston rod
18. Booster rod adjust screw

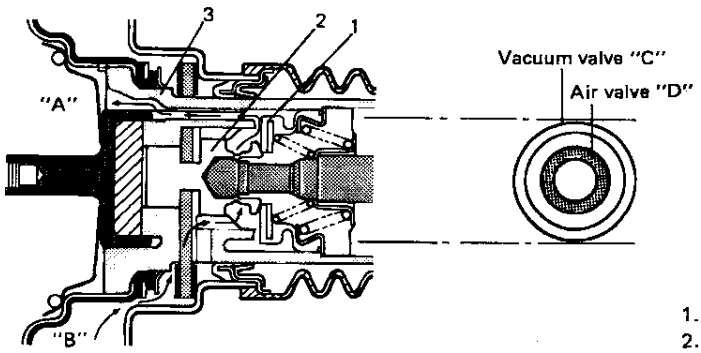
Fig. 19-13-1 Vacuum Booster Assembly

When the brake pedal is depressed, the force is transmitted to the piston of the master cylinder through the valve operating rod, booster air valve, reaction disc and piston rod. At the same time, the force of the booster piston developed due to the pressure difference between the two chambers "A" and "B" in the above figure is added to it.

The end of the booster control valve has a double function of a vacuum valve and air valve. That is, as shown in the figure, the booster control valve closes between the "A" and "B" chambers as its outer end "C" contacts the booster piston seat and opens as "C" leaves the booster piston seat (vacuum valve function). Also it closes between the "B" chamber and outside air as its inner end "D" contacts the air valve seat and opens as "D" leaves the air valve seat (air valve function).

When foot brake pedal is not depressed

The valve operating rod is pushed to the right by the spring force as shown. The air valve is also enough to the right to contact the valve stopper key as shown. In this state, the vacuum valve (control valve "C") is open and the air valve (control valve "D") is closed. Thus the chambers "A" and "B" conduct and share the same negative pressure (because of no pressure difference) which allows the return spring to push the booster piston to the right.



1. Booster control valve
2. Booster air valve
3. Booster piston

Fig. 19-13-2 Vacuum Booster Assembly

When foot brake pedal is depressed

Being pushed by the operating rod, the booster air valve moves to the left as shown. Then the control valve is pushed against the booster *piston seat closely by the valve spring force.* Thus the vacuum valve (control valve "C") is closed to cut off between the chambers "A" and "B". At this time the air valve (control valve "D") is still closed.

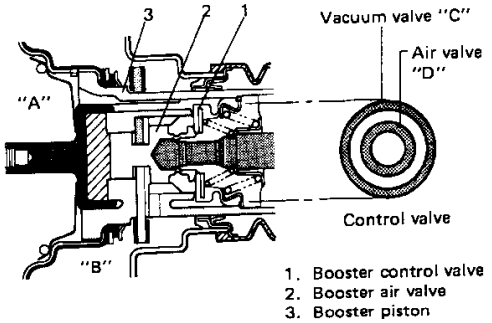


Fig. 19-14-1

As the booster air valve moves further to the left, it leaves the control valve and the air valve (control valve "D") opens to allow the air to flow into the chamber "B". The entry of air causes a difference in pressures between the chambers "A" and "B" When this pressure difference grows greater than the piston return spring force, the booster piston moves to the left and the booster control valve also moves to the left. The resulting air valve (control valve "D") closure stops the air flow into the chamber "B" and its pressure remains as it is. In this way, a small brake pedal depressing force is made into a strong push to the master cylinder push rod to produce high hydraulic pressure.

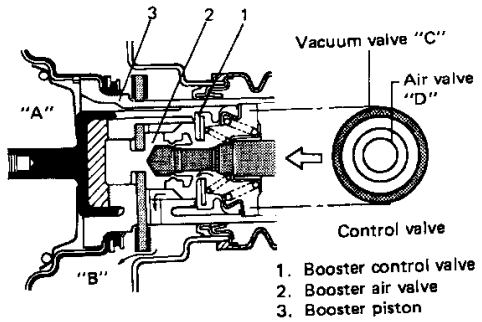


Fig. 19-14-2

When foot brake pedal is released

When the brake pedal is released, the booster air valve returns to the right by the master cylinder piston return force and the air valve return spring force as shown. Then the vacuum valve (control valve "C") opens and causes negative pressure in the chamber "B". The result is that the master cylinder piston and booster piston return to their original positions. This is the same state as described under "**When foot brake pedal is not depressed**".

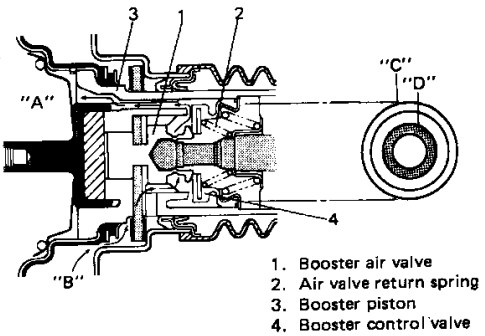


Fig. 19-14-3

Reference

Should any of the vacuum related parts in the booster be faulty, the brake force is not increased. Even then, however, the brake depressing force is transmitted to the valve operating rod, booster air valve, valve stopper key and booster piston in that order, to push the master cylinder push rod. Thus, the braking operation itself will not fail.

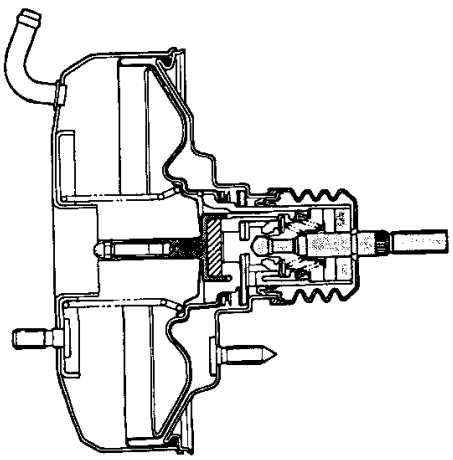
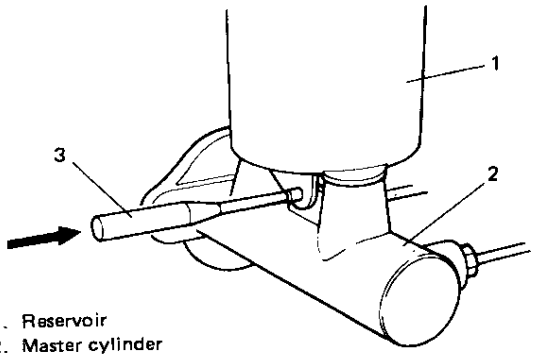


Fig. 19-14-4

19-4. MASTER CYLINDER

REMOVAL

1) Remove air cleaner case. (For right hand steering vehicle)
2) Disconnect reservoir lead wire at coupler.
3) Clean outside of reservoir.
4) Take out fluid with syringe or such.
5) Remove reservoir connector pin by using special tool.



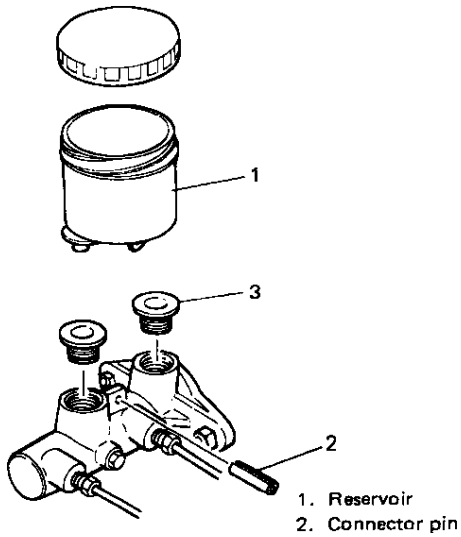
1. Reservoir
2. Master cylinder
3. Special tool (Connector pin remover 09922-85811)

Fig. 19-56

6) Remove reservoir.
7) Disconnect two brake pipes from master cylinder.

NOTE:
Do not allow brake fluid to get on painted surfaces.

8) Remove master cylinder mounting nuts.
9) Remove master cylinder.

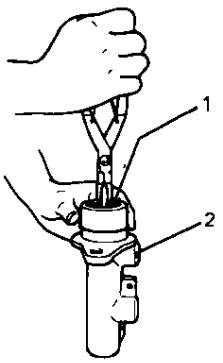


1. Reservoir
2. Connector pin
3. Grommets

Fig. 19-56-1

DISASSEMBLY

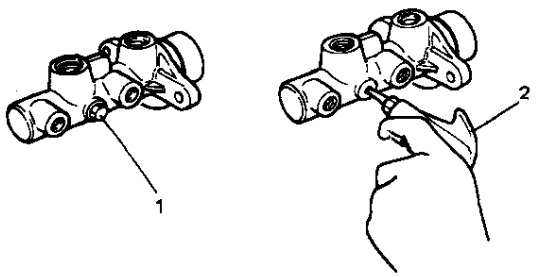
1) Remove circlip.
2) Remove primary piston.



1. Circlip
2. Master cylinder

Fig. 19-57

3) Remove piston stopper bolt. Then remove secondary piston by blowing compressed air into hole from which piston stopper bolt was removed.
Be cautious during removal as secondary piston jumps out.



1. Stopper bolt
2. Compressed air

Fig. 19-58

INSPECTION OF COMPONENTS

Master Cylinder Inner Parts

Inspect all disassembled parts for wear or damage, and replace parts if necessary.

NOTE:

- Wash disassembled parts with brake fluid.
- Do not reuse piston cups.

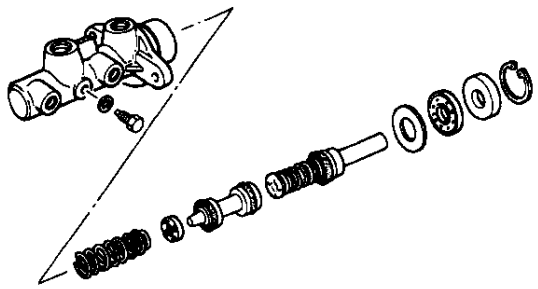


Fig. 19-59

Inspect master cylinder bore for scoring or corrosion. It is best to replace a corroded cylinder. Corrosion can be identified as pits or excessive roughness.

NOTE:

Polishing bore of master cylinder with cast aluminum body with anything abrasive is prohibited, as damage to cylinder bore may occur.

Rinse cylinder in clean brake fluid. Shake excess rinsing fluid from cylinder. Do not use a cloth to dry cylinder, as lint from cloth will remain on cylinder bore surface.

Reservoir

NOTE:

Do not use shock absorber fluid or any other fluid which contains mineral oil. Do not use a container which has been used for mineral oil or a container which is wet from water. Mineral oil will cause swelling and distortion of rubber parts in the hydraulic brake system and water will mix with brake fluid, lowering the fluid boiling point. Keep all fluid containers capped to prevent contamination.

Fluid to fill reservoir with is indicated on reservoir cap of the vehicle with embossed letters or in owner's manual supplied with the vehicle. Add fluid up to MAX line.

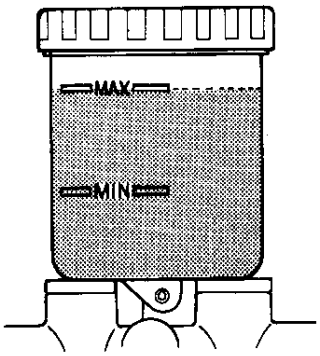


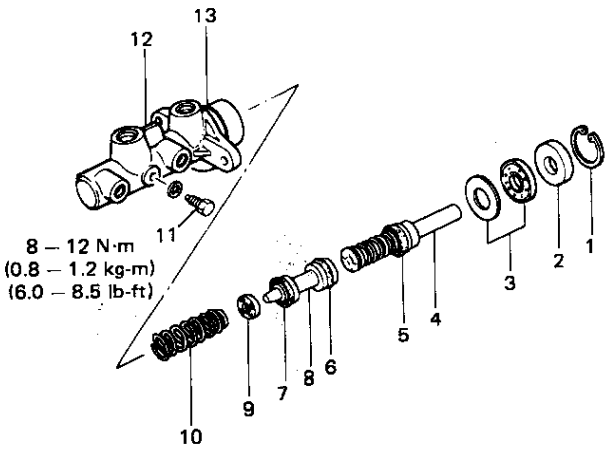
Fig. 19-60

ASSEMBLY

NOTE:

Before assembling, wash each part in fluid recommended to use for that vehicle.

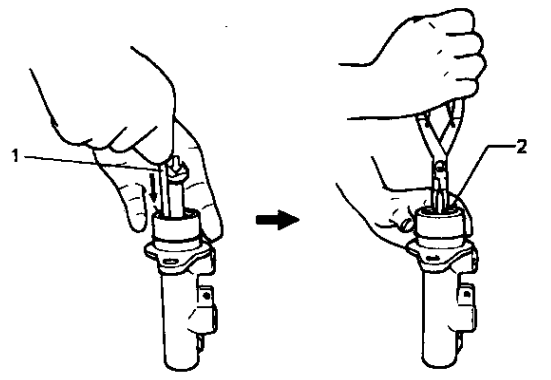
1) Assemble secondary piston as shown below.
2) Install secondary piston assembly into cylinder.



1. Piston stopper circlip
2. Piston stopper
3. Cylinder cup and plate
4. Primary piston
5. Piston cup
6. Secondary piston pressure cup
7. Piston cup
8. Secondary piston
9. Return spring secondary seat
10. Secondary piston return spring
11. Secondary piston stopper bolt
12. Master cylinder body
13. Sealing

Fig. 19-61

3) Install primary piston in cylinder.
4) Depress, and install circlip.



1. Rod
2. Circlip

Fig. 19-62

5) Install piston stopper bolt with pistons pushed in all the way and tighten it to specified torque.
6) For installation on vehicle, refer to INSTALLATION.

PRECAUTION OF INSTALLATION

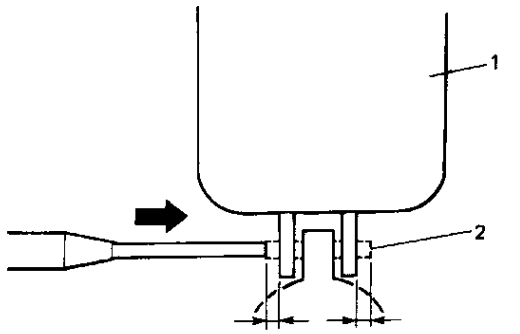
NOTE:

Adjust clearance between booster piston rod and primary piston with special tool (See page 19-20).

1) Install master cylinder as shown and torque attaching nuts to specification.
2) Connect 2 hydraulic lines and torque flare nuts to specification.
3) When using new grommets, lubricate them with the same fluid as the one to fill reservoir with. Then press-fit grommets to master cylinder. Grommets must be seated in place.
4) Install reservoir and drive in reservoir pin.

NOTE:

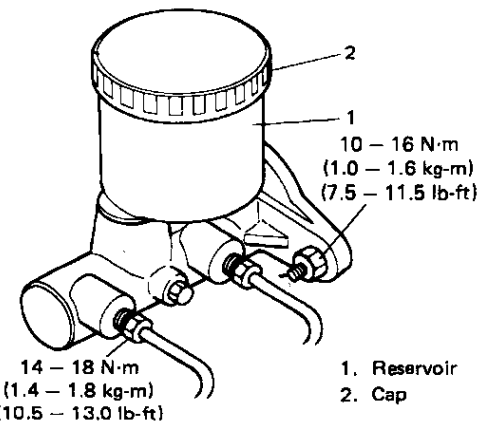
Drive in reservoir pin till both of its ends at the right and left of reservoir become the same length.



1. Reservoir
2. Pin

Fig. 19-63

5) Connect reservoir lead wire.
6) Fill reservoir with specified fluid.
7) Upon completion of installation, check for fluid leakage.



1. Reservoir
2. Cap

Fig. 19-64

19-5. BRAKE BOOSTER

REMOVAL

1) Remove master cylinder assembly, referring to steps 1) – 4) and 7) – 9) of its REMOVAL on page 19-9.
2) Disconnect vacuum hose from booster.
3) Disconnect push rod clevis from brake pedal arm.
4) Remove attaching nuts and then booster as shown.

INSTALLATION

NOTE:

- ***Adjust clearance between booster piston rod and master cylinder piston with special tool. (See page 19-20.)***
- **Check length of push rod clevis. (See page 19-19.)**

1) Install booster to dash panel as shown. Then connect booster push rod clevis to pedal arm with clevis pin and split pin.
2) Torque booster attaching nuts to specification.
3) Install master cylinder to booster and torque master cylinder mounting nuts to specification.
4) Connect two brake pipes and torque flare nuts to specification.
5) Connect booster vacuum hose.
6) Connect reservoir lead wire at coupler.
7) Install air cleaner case.
8) Fill reservoir with specified fluid.
9) Bleed air from brake system.
10) After installing, check pedal height and play.
11) Perform brake test and check each installed part for fluid leakage.

1. Vacuum hose
2. Booster
3. Push rod clevis lock nut
4. Split pin
5. Gasket
6. Dash panel
7. Master cylinder mounting nut
8. Master cylinder
9. Push rod bracket
10. Push rod clevis
11. Clevis pin
12. Attaching nut

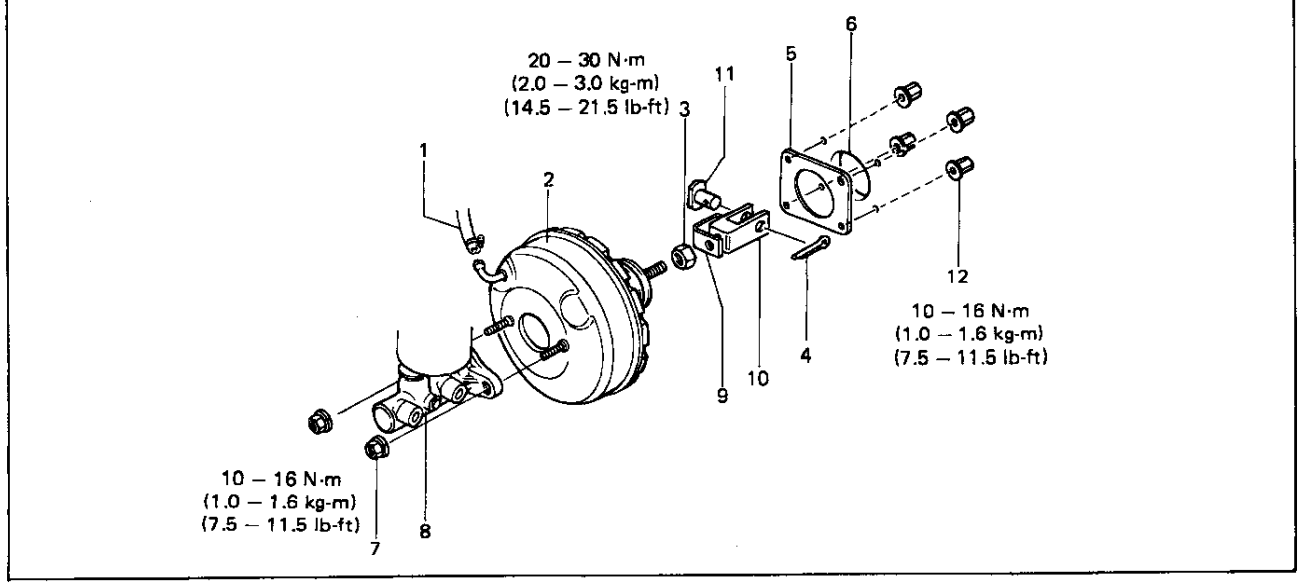


Fig. 19-65

DISASSEMBLY

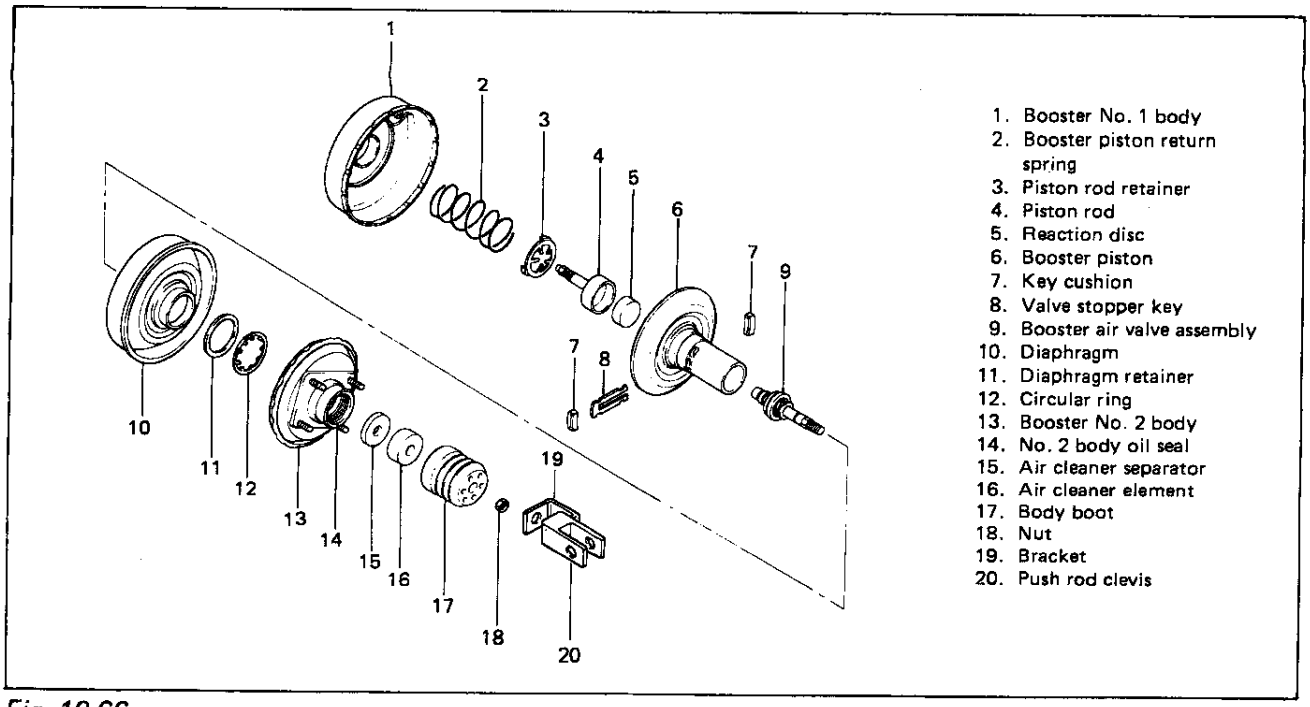


Fig. 19-66

1) Remove push rod clevis and nut.

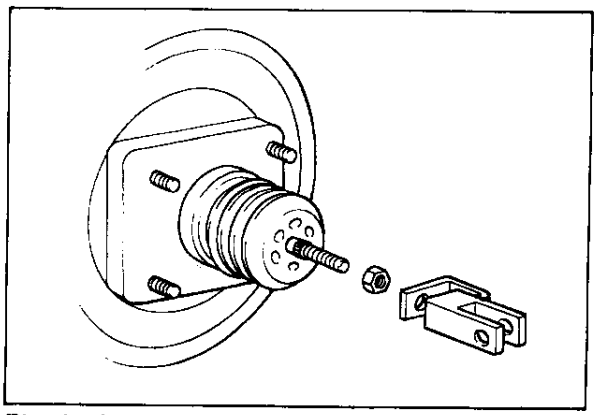


Fig. 19-67

2) Attach booster to special tool (A) as shown and install special tool (B) to booster as shown.

NOTE:

- **When attaching, check to be sure that booster vacuum pipe is not in faulty contact with base of special tool (A).**
- **Be careful not to over-tighten nuts, or booster body will be deformed.**

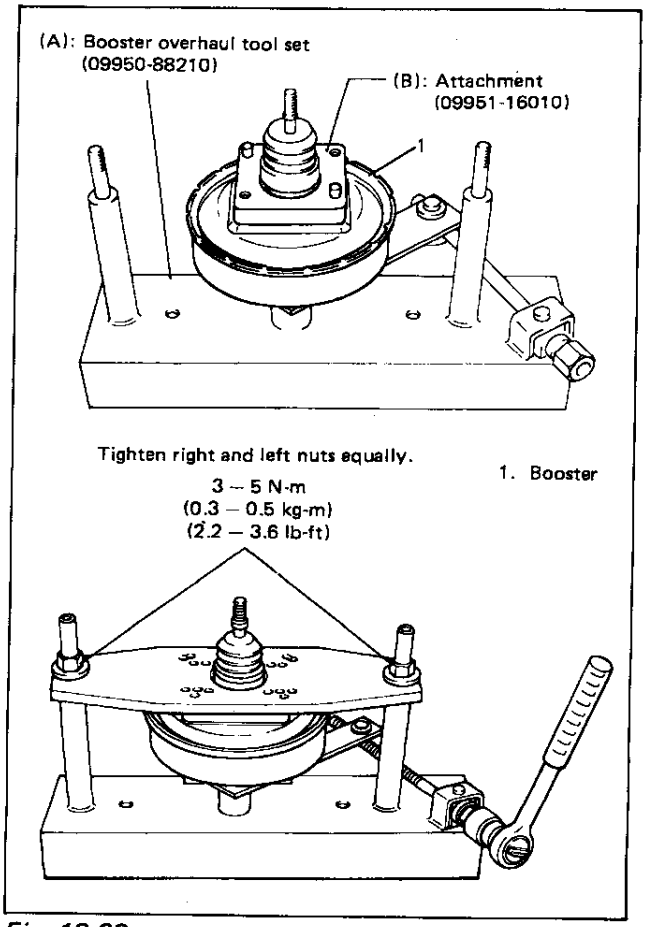


Fig. 19-68

3) Turn special tool bolt clockwise until No. 1 body projecting part and No. 2 body depressed part fit each other.
Once they are matched, make match marking on No. 1 and No. 2 bodies to facilitate their installation.

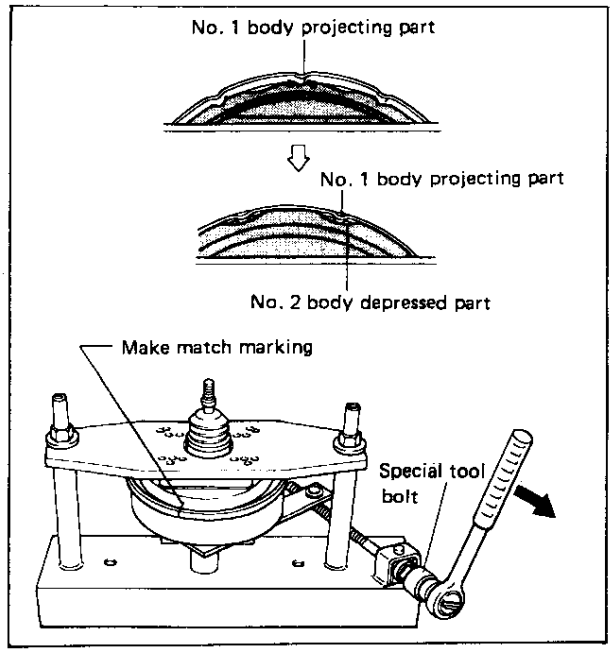


Fig. 19-69

4) Detach booster from special tool and separate No. 1 body and No. 2 body. Remove piston return spring.

WARNING:
When separating two bodies, carefully hold both bodies to prevent either body from jumping off by spring force.

5) From booster No. 2 body, remove piston rod, boot, air cleaner element and air cleaner separator in this order.

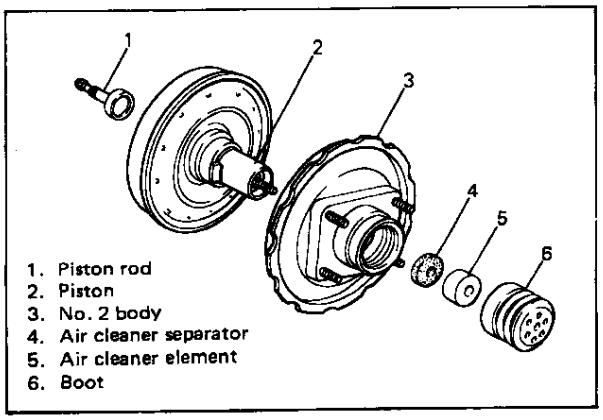


Fig. 19-70

6) Remove valve stopper key cushion from stopper key.

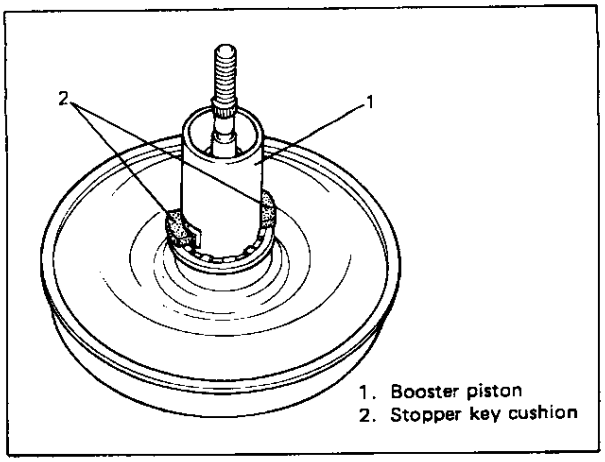


Fig. 19-71

7) While compressing air valve spring (by moving rod up and down as shown), remove valve stopper key. Then remove booster air valve assembly from booster piston.

NOTE:
Booster air valve assembly can't be disassembled.

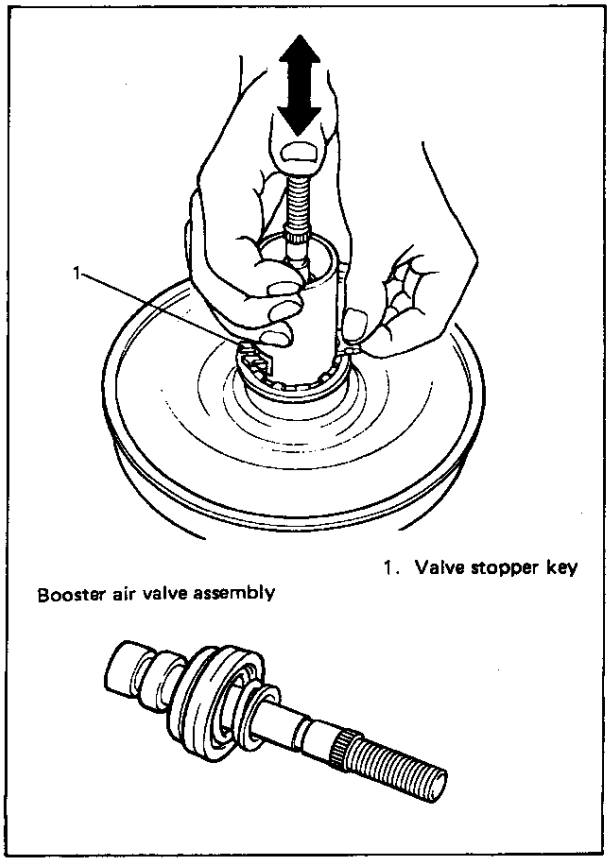


Fig. 19-72

8) Remove diaphragm circular ring from booster piston.

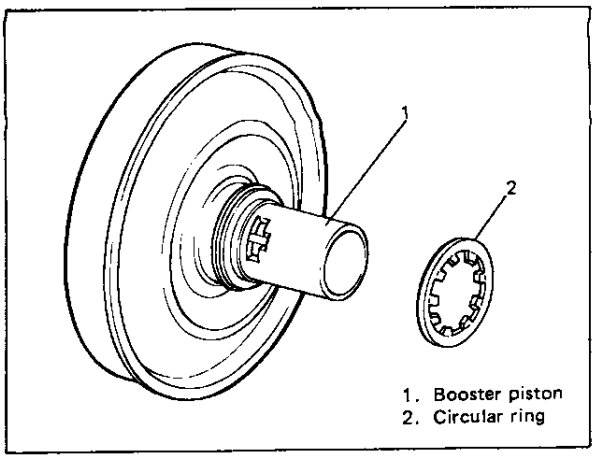


Fig. 19-72-1

9) Remove diaphragm from booster piston.

NOTE:
Don't use driver or other tool for removal. Pull it off by hand carefully handling piston groove area where diaphragm is fitted.

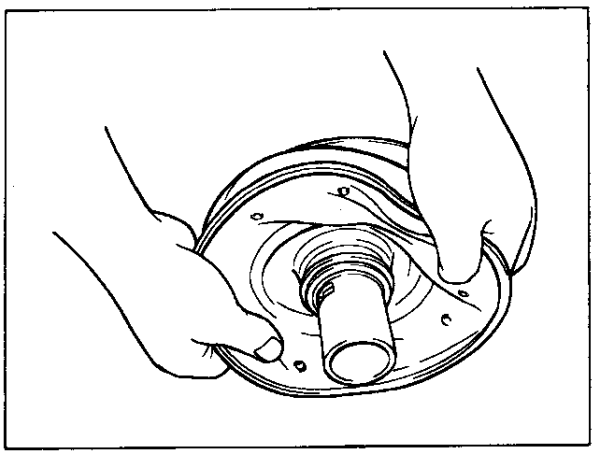


Fig. 19-73

10) Remove reaction disc from booster piston rod.

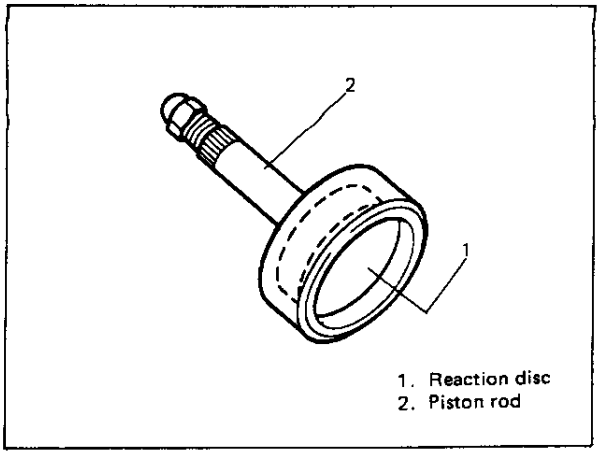


Fig. 19-74

11) Remove oil seal from booster No. 2 body with special tools as shown.

NOTE:
Removed oil seal must not be reused.

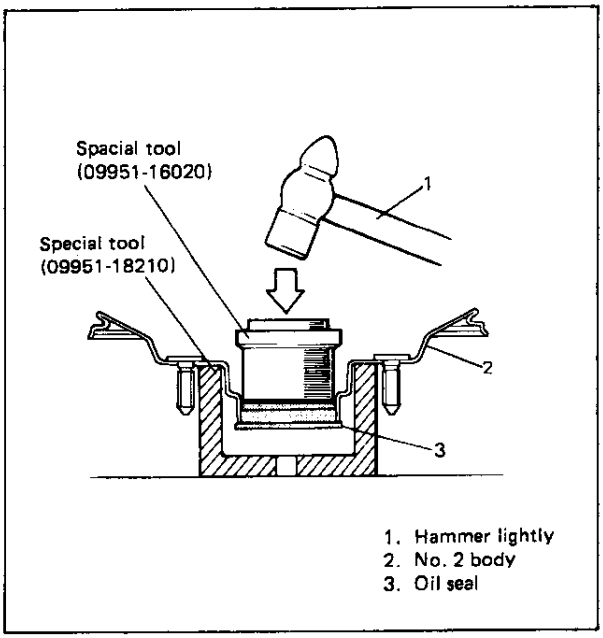


Fig. 19-75

ASSEMBLY

NOTE:
Be sure to use silicon grease wherever application of grease is instructed during assembly.

1) Apply grease to new oil seal outer surface and oil seal lip as shown.
Press-fit new oil seal to booster No. 2 body by using special tools (C) and (D).

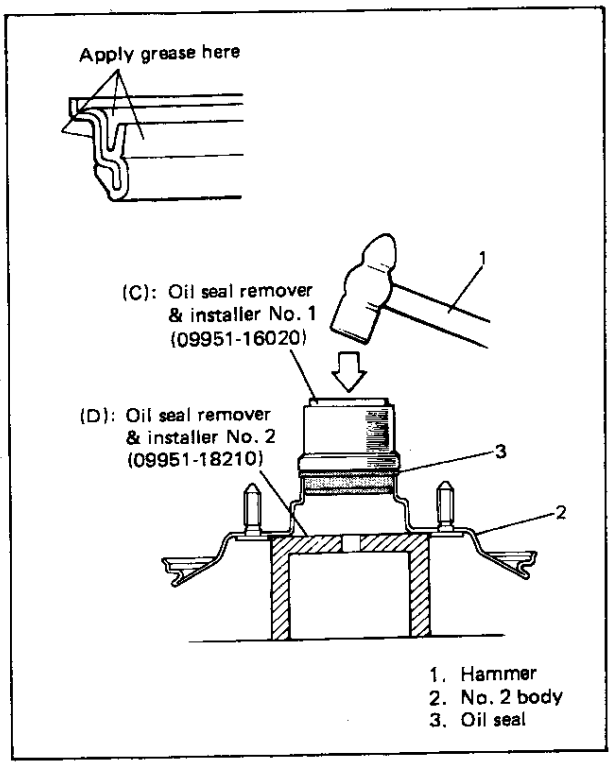


Fig. 19-76

2) Install retainer to diaphragm.

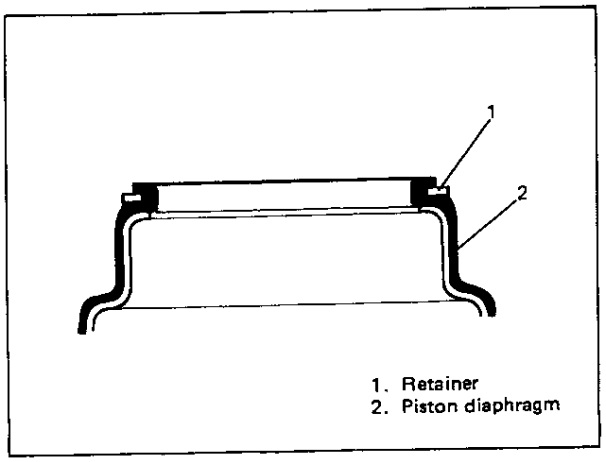


Fig. 19-77

3) Install diaphragm to booster piston by hand.

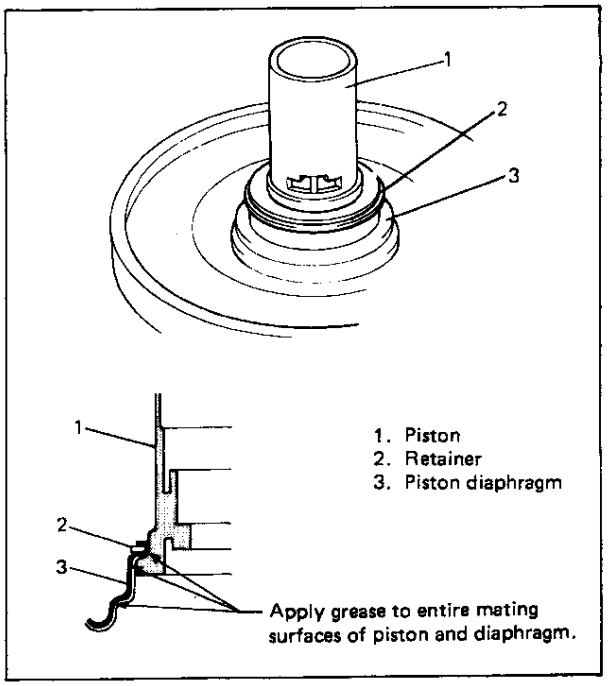


Fig. 19-78

4) Install new diaphragm circular ring, referring to figure below for its proper installing direction.

NOTE:
Be careful not to cause damage to piston when installing.

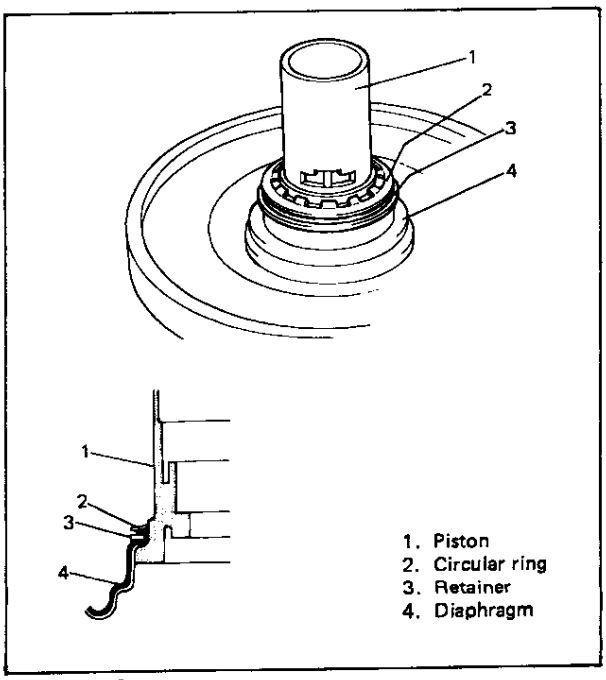


Fig. 19-79

5) Install booster air valve assembly to booster piston. Before installation, apply grease as shown.

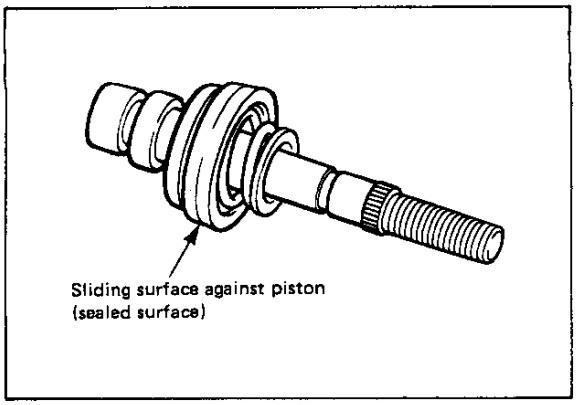


Fig. 19-80

6) Compress air valve assembly and insert valve stopper key.

NOTE:
Don't compress air valve assembly forcibly.

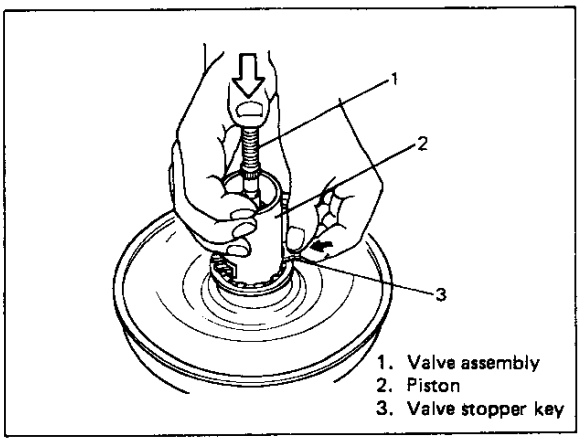


Fig. 19-81

7) Install valve stopper key cushions.

NOTE:
Make sure that it is installed in proper direction and cushion is fitted to notch in key.

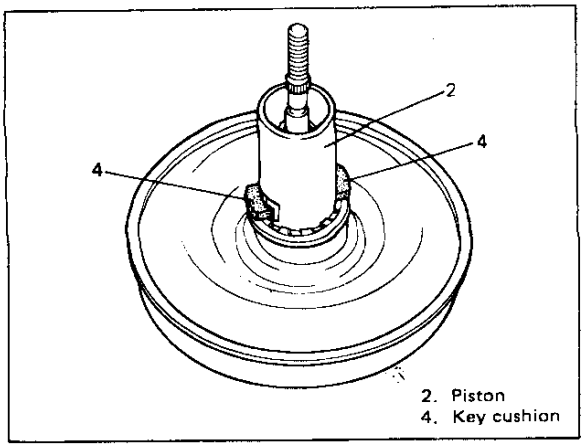


Fig. 19-82

8) Install booster piston to booster No. 2 body.

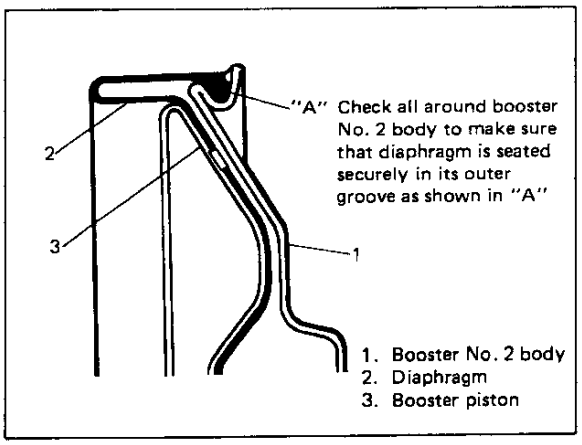


Fig. 19-83

9) Install air cleaner separator and then element to rod of air valve assembly.
10) Install body boot to booster No. 2 body. Both ends of boot must be fitted securely as shown.

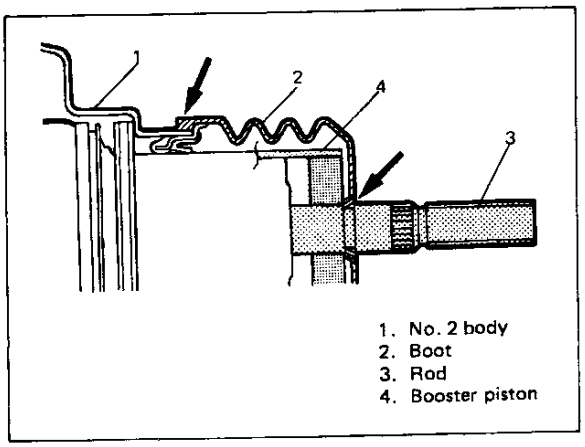


Fig. 19-84

11) Install reaction disc to booster piston rod after greasing its outer face.

NOTE:
Make sure that no air exists between piston rod and reaction disc.

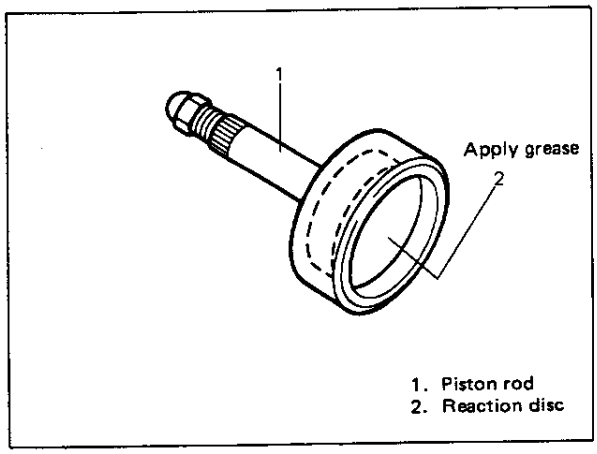


Fig. 19-85

12) Place No. 1 body on special tool (A).

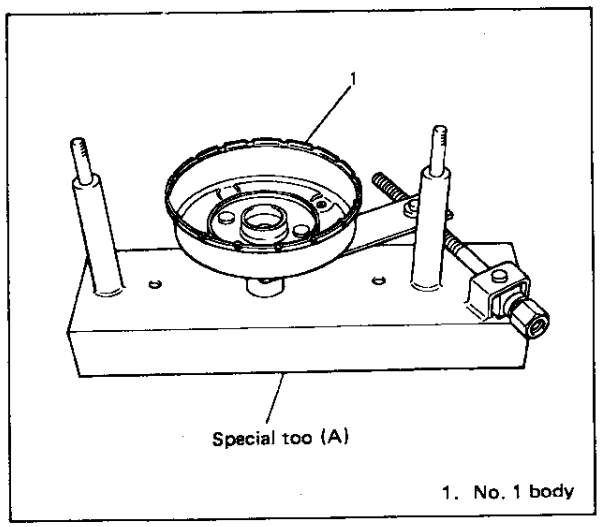


Fig. 19-86

13) Install piston rod, rod retainer and piston return spring to booster piston as shown below. Then install them to booster No. 1 body.

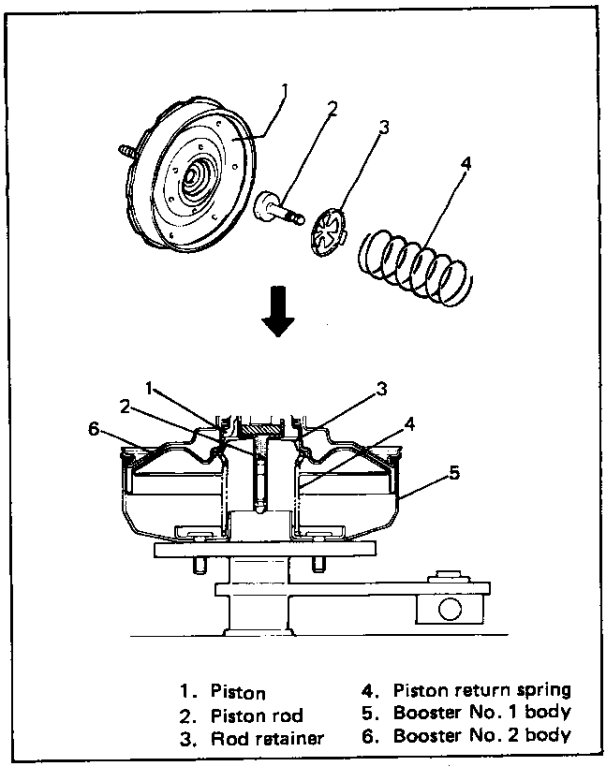


Fig. 19-87

14) Put No. 1 and No. 2 bodies together by aligning markings made before disassembly.
Holding No. 2 body with upper plate (special tool) as shown, torque two nuts equally to specification.

Special tool nuts tightening torque	N·m	kg-m	lb-ft
	3 – 5	0.3 – 0.5	2.2 – 3.6

NOTE:
When holding No. 2 body, use care so that diaphragm is not caught by projections at 16 locations around No. 1 body.

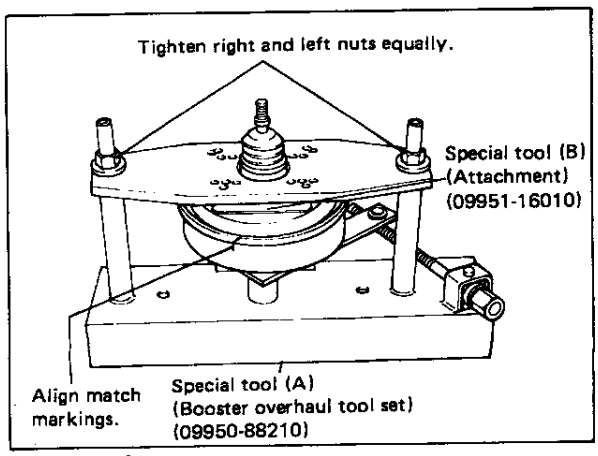


Fig. 19-88

15) Turn special tool bolt counterclockwise until No. 1 body projecting part comes to mid-position of No. 2 body depressed parts as shown.

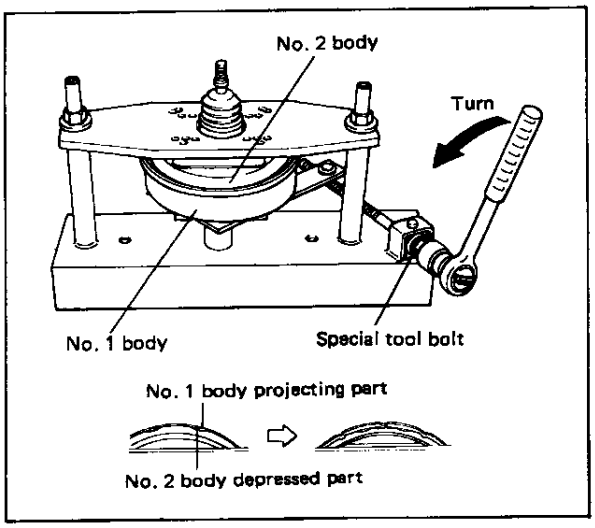


Fig. 19-89

16) Install push rod clevis so that below measurement "A" is obtained and torque nut to specification.

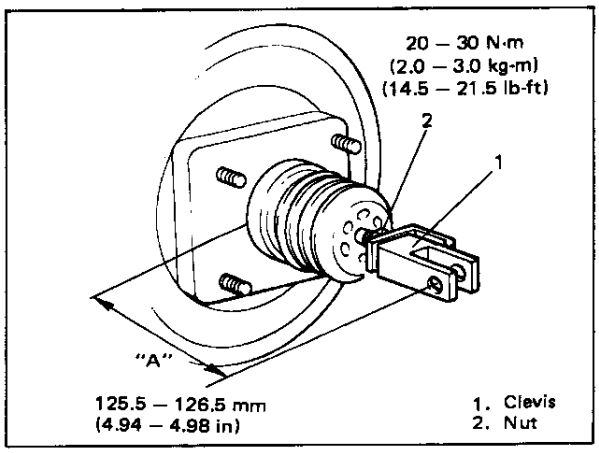


Fig. 19-90

17) Remove booster from special tool.

NOTE:
Whenever booster was disassembled, make sure to check clearance between piston rod and master cylinder piston after reassembly. (For details, refer to page 19-20.)

18) For installation of booster, see steps 1) to 11) of its INSTALLATION on page 19-12.

INSPECTION

1. INSPECT BOOSTER INNER PARTS

NOTE:
After disassembly, soak all metal parts in ethyl alcohol. Wipe rubber diaphragm and plastic parts with a clean cloth. Use ethyl alcohol damped cloth to wipe out heavy dirt. Application of much ethyl alcohol especially to rubber parts is prohibited.

RUBBER PARTS
Wipe fluid from rubber parts and carefully inspect each rubber part for cuts, nicks or other damage. These parts are key to air flow control. If there is any question as to serviceability of rubber parts, **REPLACE** them.

METAL PARTS
BADLY DAMAGED ITEMS, OR THOSE WHICH WOULD TAKE EXTENSIVE WORK OR TIME TO REPAIR, SHOULD BE REPLACED. IN CASE OF DOUBT, INSTALL NEW PARTS.

2. INSPECT/ADJUST CLEARANCE BETWEEN BOOSTER PISTON ROD AND MASTER CYLINDER PISTON

The length of booster piston rod is adjusted to provide specified clearance between piston rod end and master cylinder piston.

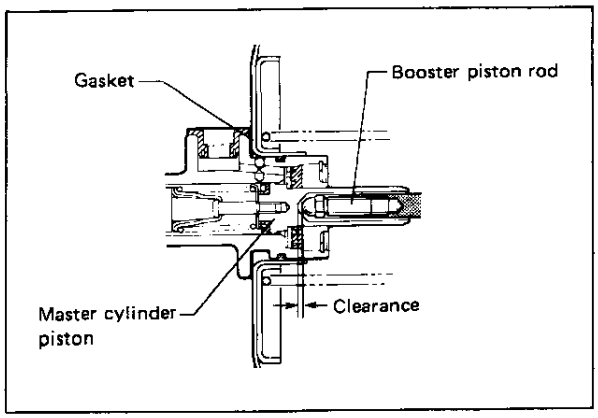


Fig. 19-91

- Before measuring clearance, push piston rod several times so as to make sure reaction disc is in place.
- Take measurement with gasket installed to master cylinder.
- Keep inside of booster at atmospheric pressure for measurement.

1) Set special tool (E) on master cylinder and push pin until contacts piston.

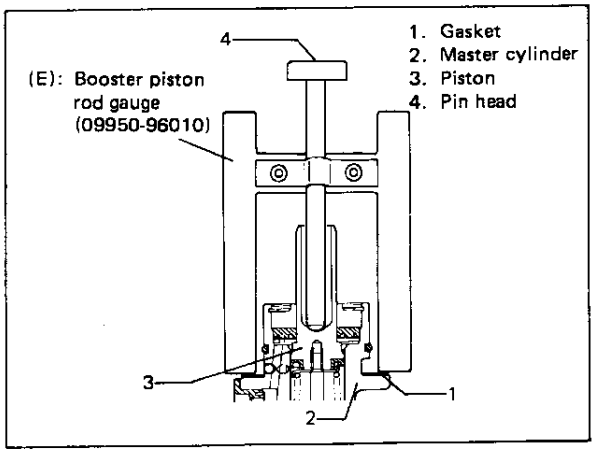


Fig. 19-92

2) Turn special tool upside down and place it on booster. Adjust booster piston rod length until rod end contacts pin head.
3) Adjust clearance by turning adjusting screw of piston rod.

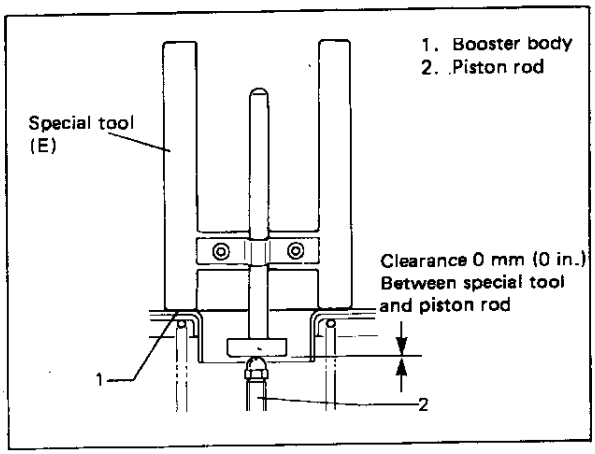


Fig. 19-93

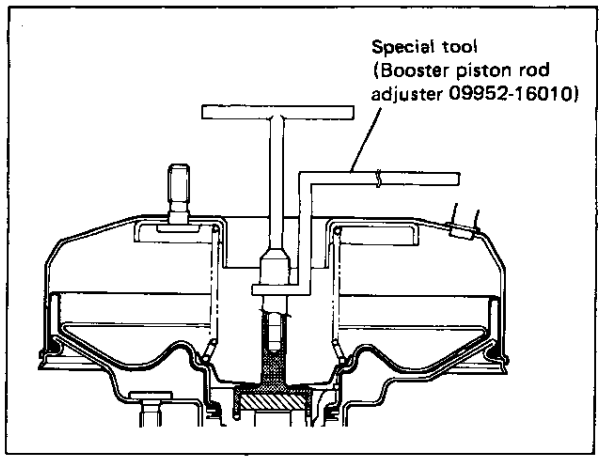


Fig. 19-94

Reference
When adjusted as above, if negative pressure is applied to booster with engine at idle, piston to piston rod clearance should become 0.25 – 0.5 mm (0.010 – 0.020 in.).

3. INSPECT BOOSTER OPERATION

There are two ways to perform this inspection, with and without a tester. Ordinarily, it is possible to roughly determine its condition without using a tester.

NOTE:
For this check, make sure that no air is in hydraulic line.

INSPECTION WITHOUT TESTER

Check Air Tightness

1) Start engine.
2) Stop engine after running for 1 to 2 minutes.
3) Depress brake pedal several times with the same load as in ordinary braking and observe pedal travel. If pedal goes down deep the first time but its travel decreases as it is depressed the second and more times, air tightness is obtained.

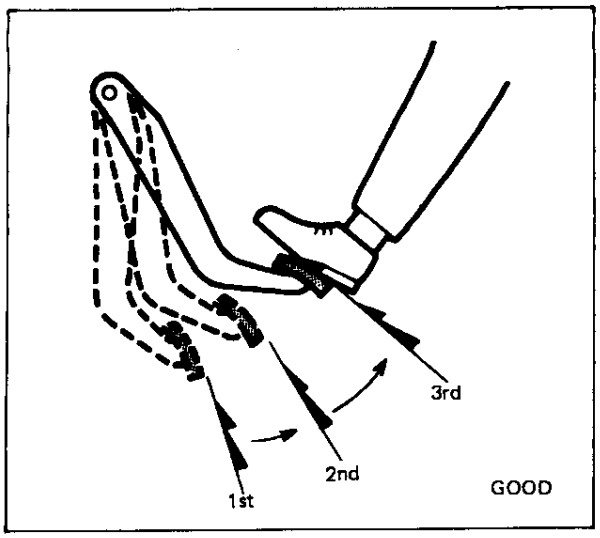


Fig. 19-95

4) If pedal travel doesn't change, air tightness isn't obtained.

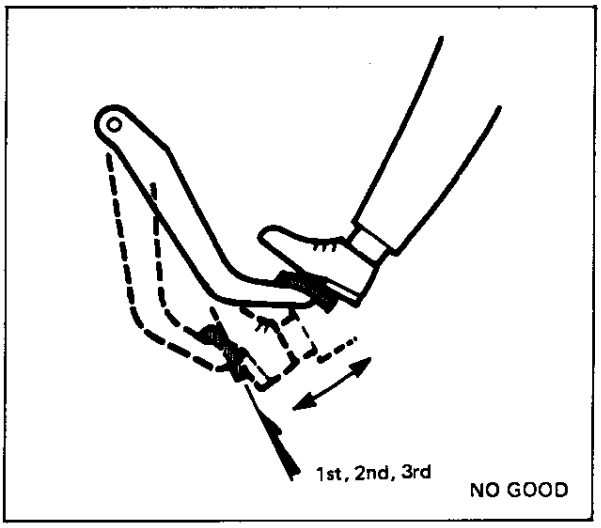


Fig. 19-96

NOTE:
If defective, inspect vacuum lines and sealing parts, and replace any faulty part.
When this has been done, repeat the entire test!

Check Operation

1) With engine stopped, depress brake pedal several times with the same load and make sure that pedal travel doesn't change.

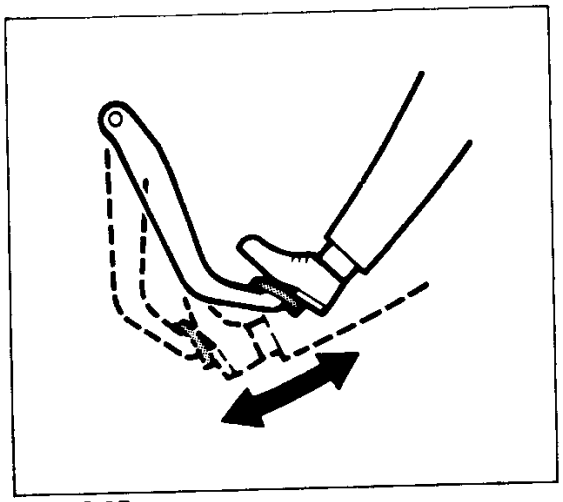


Fig. 19-97

2) Start engine while depressing brake pedal. If pedal travel increases a little, operation is satisfactory. But no change in pedal travel indicates malfunction.

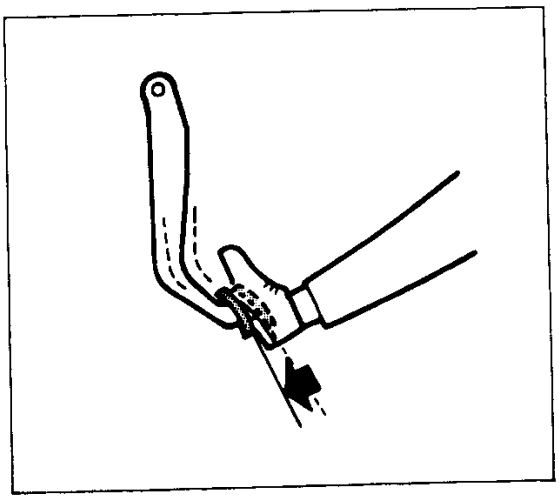


Fig. 19-98

Check Air Tightness Under Load

1) With engine running, depress brake pedal. Then stop engine while holding brake pedal depressed.

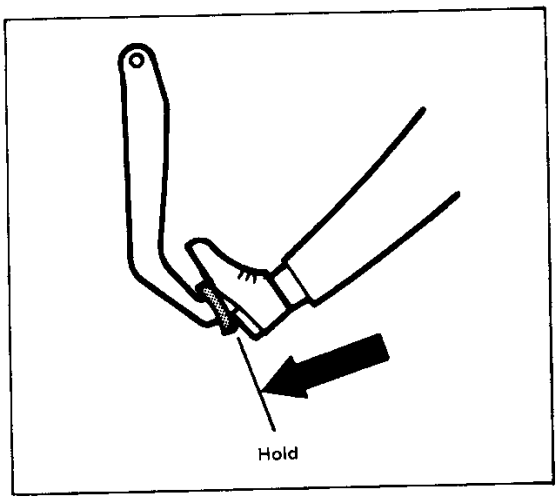


Fig. 19-99

2) Hold brake pedal depressed for 30 seconds. If pedal height does not change, condition is good. But it isn't if pedal rises.

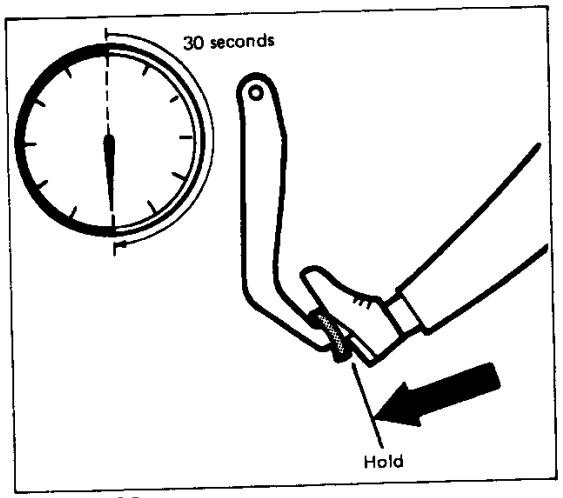


Fig. 19-100

4. BOOSTER INSPECTION TABLE

Part	Inspect For	Corrective Action
1. Booster piston	Cracks, distortion or damage.	Replace.
2. Air valve ass'y (Control valve and spring)	Damaged or worn seal surfaces.	Replace.
3. Reaction disc	Damage or wear.	Replace.
4. Diaphragm, boot and rubber	Damage.	Replace.
5. Piston rod	Damage or bend.	Replace.
6. Booster No. 1 & No. 2 body	1. Scratches, scores, pits, dents, or other damage affecting rolling or sealing of diaphragm or other seals.	Replace, unless easily repaired.
	2. Cracks, damage at ears, damaged threads on studs.	Replace, unless easily repaired.
	3. Bent or nicked locking lugs.	Replace, unless easily repaired.
	4. Loose studs.	Replace.
7. Air filters and separator	Dirt.	Replace.

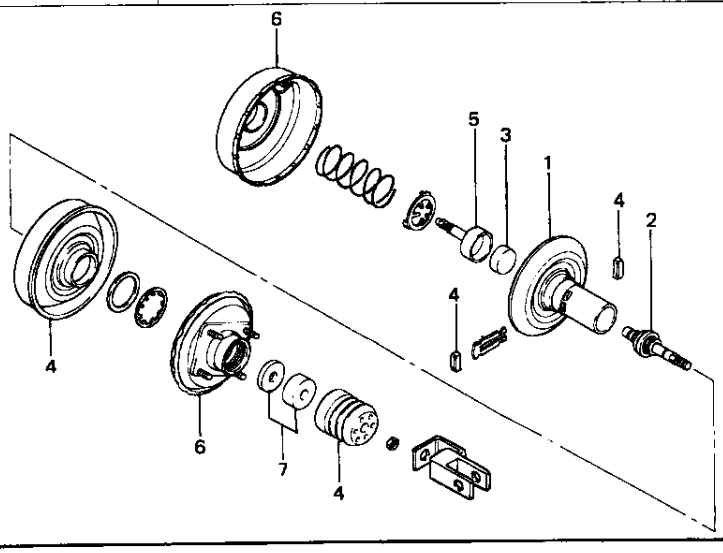


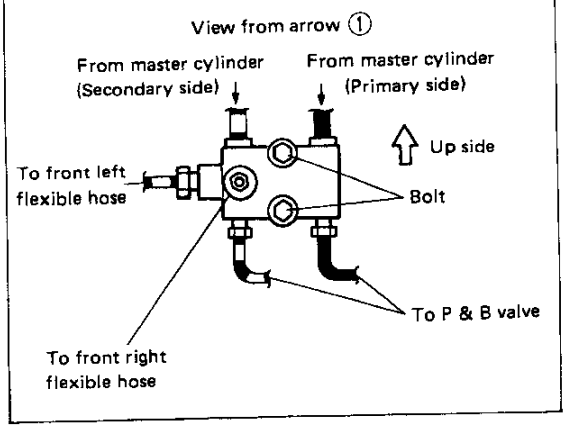
Fig. 19-101

19-7. BRAKE PIPES AND HOSES

NOTE:
For the service informations not found in this section, refer to the same section of '88 MODEL SERVICE MANUAL.

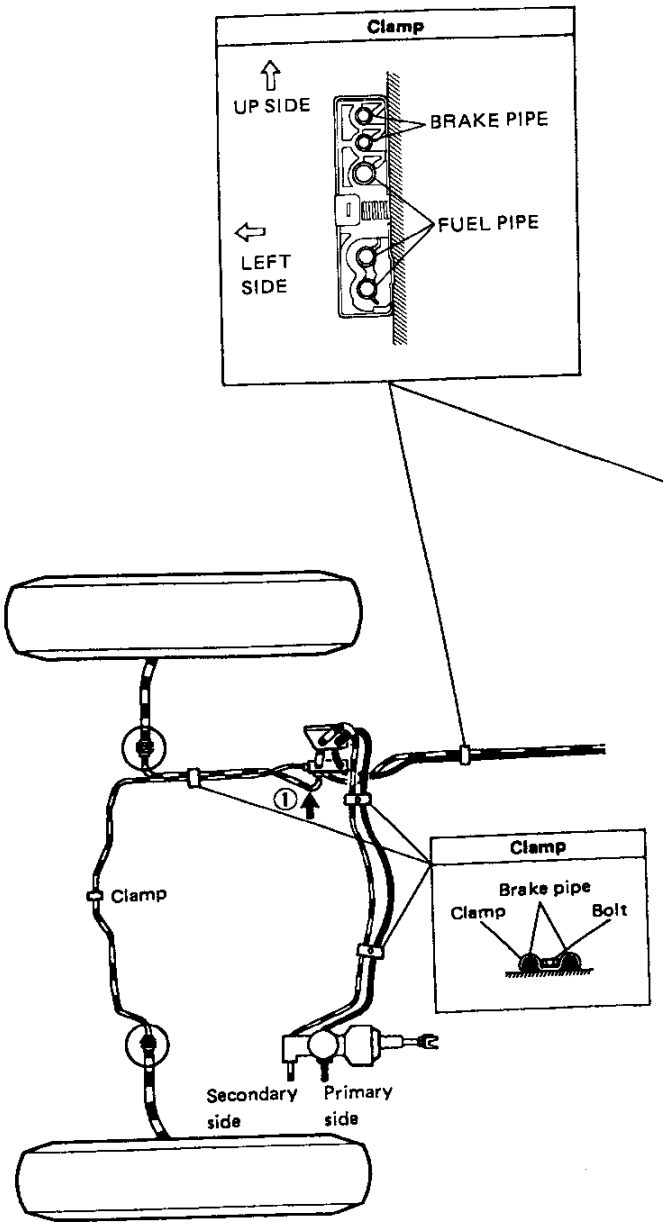
REMOVAL AND INSTALLATION

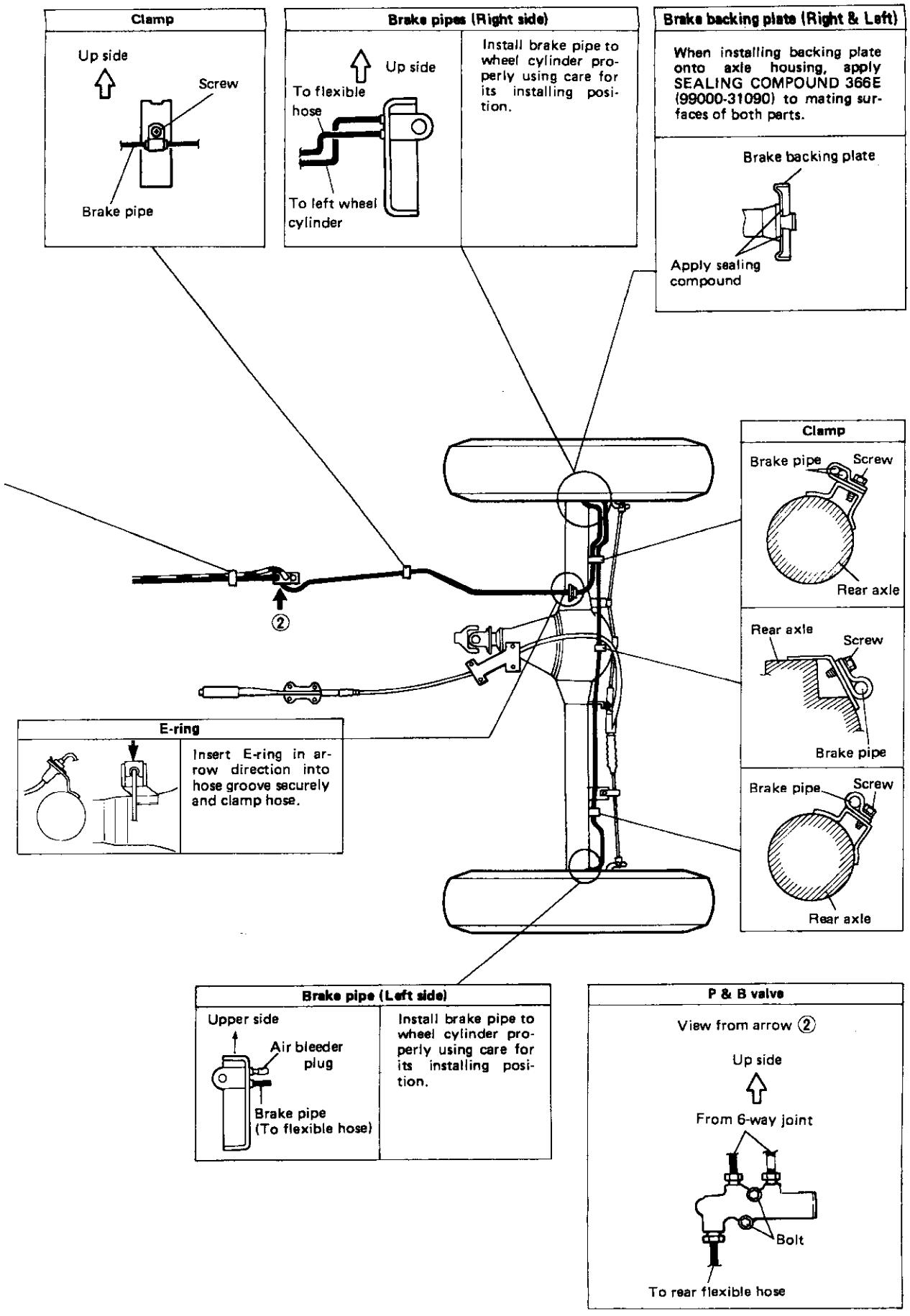
6-way joint



Brake flexible hose and E-ring

- Make sure that flexible hose is not twisted when it is installed or connected to the pipe.
- When installing flexible hose to bracket, align 6 vertexes of metal fixture on hose with internal angles of bracket.
- Insert E-ring till E-ring end surface is flush with or lower than bracket end surface.
- Install the flexible hose so that it won't be kinked when the steering wheel is straightened.
  After installing the flexible hose, turn the steering wheel to the right fully and check that the clearance between the wheel/tire and flexible hose is larger than 25 mm (0,984 in) in that state and then chock likewise with the steering wheel turned to the full left position. (This is to ensure that more than 25 mm (0.984 in) clearance is maintained even when bumping or rebounding fully).



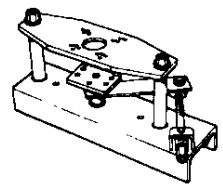
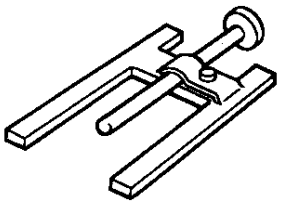
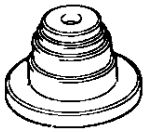
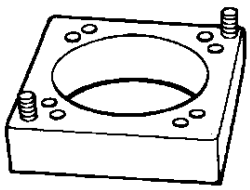
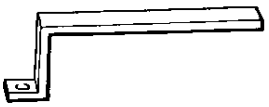
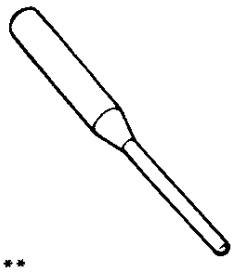
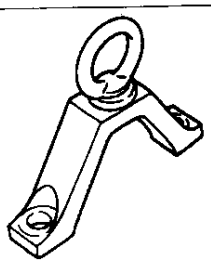
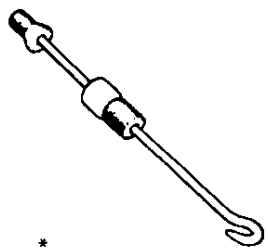

Clamp
Up side
Screw
Brake pipe
Brake pipes (Right side)
Up side
To flexible hose
To left wheel cylinder
Install brake pipe to wheel cylinder properly using care for its installing position.
Brake backing plate (Right & Left)
When installing backing plate onto axle housing, apply SEALING COMPOUND 366E (99000-31090) to mating surfaces of both parts.
Brake backing plate
Apply sealing compound
Clamp
Brake pipe
Screw
Rear axle
Rear axle
Screw
Brake pipe
Brake pipe
Screw
Rear axle
②
E-ring
Insert E-ring in arrow direction into hose groove securely and clamp hose.
Brake pipe (Left side)
Upper side
Air bleeder plug
Brake pipe (To flexible hose)
Install brake pipe to wheel cylinder properly using care for its installing position.
P & B valve
View from arrow ②
Up side
From 6-way joint
Bolt
To rear flexible hose

19-10. SPECIAL TOOLS

Shown below are special tools necessary when servicing brake system of '90 MODEL. The same ones are currently used for other models.

*: marked ones are used for SAMURAI '88 MODEL.

**: marked ones are used for SIDEKICK.

 * 09950-88210 Booster overhaul tool set	 * 09950-78210 Flare nut wrench (10 mm)	 ** 09950-96010 Booster piston rod gauge	 ** No. 1 09951-16020  * No. 2 09951-18210 Booster No. 2 body Oil seal remover & Installer No. 1, No. 2
 ** 09951-16010 Booster overhaul attachment	 ** 09952-16010 Booster piston rod adjuster	 ** 09922-85811 Connector pin remover	 * 09943-35511 Brake drum remover (Front wheel hub remover)
 * 09942-15510 Sliding hammer			

SECTION 21

BODY ELECTRICAL EQUIPMENT

NOTE:
For the items not found in this section, refer to the same section of '88 MODEL SERVICE MANUAL.

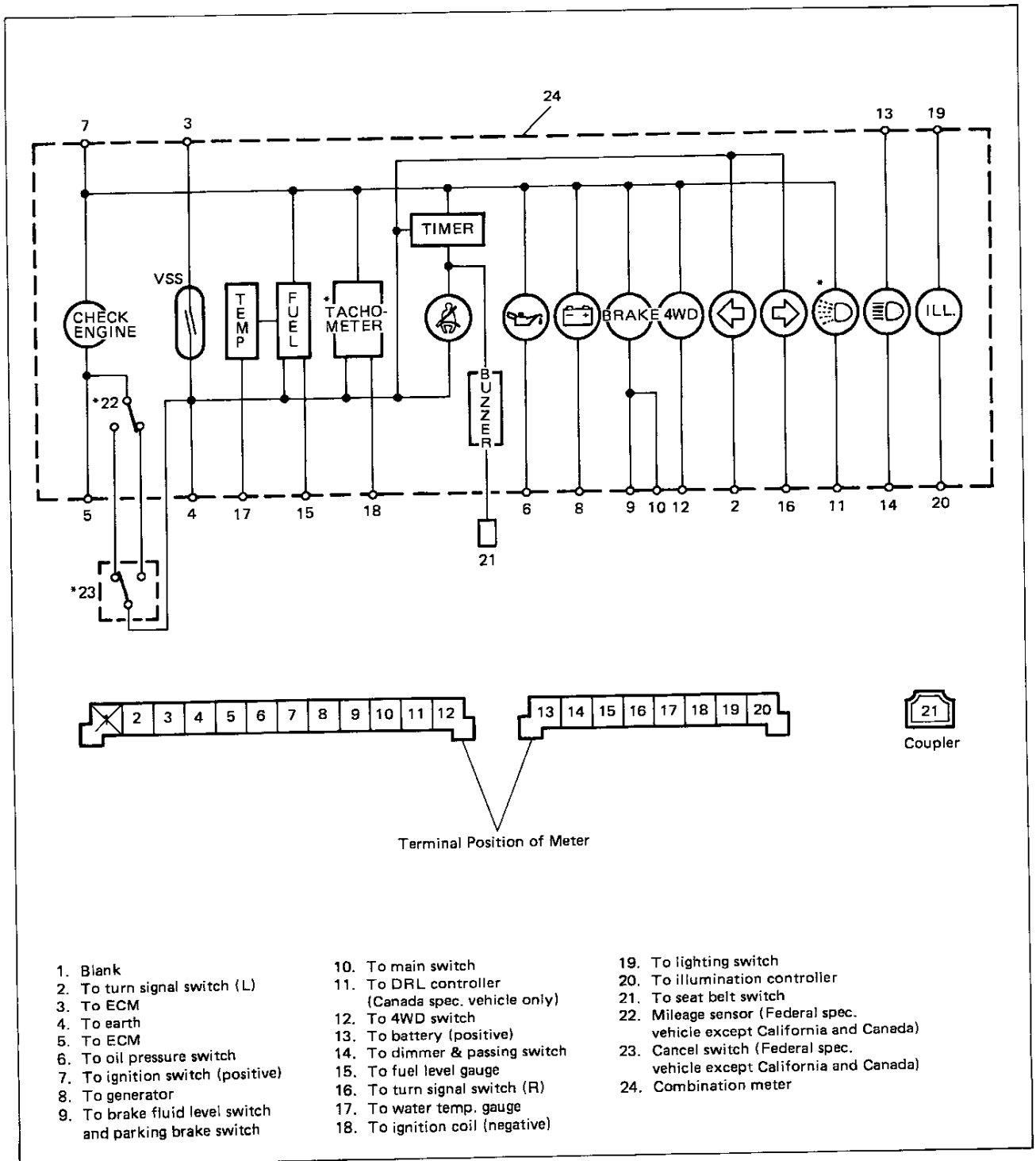
CONTENTS

21-1. COMBINATION METER

COMBINATION METER CIRCUIT

The '90 model combination meter includes a vehicle speed sensor (VSS) in addition to the same components as the '88 model combination meter.

NOTE:
Whether equipped with *marked parts or not depends on vehicle specifications.



1. Blank
2. To turn signal switch (L)
3. To ECM
4. To earth
5. To ECM
6. To oil pressure switch
7. To ignition switch (positive)
8. To generator
9. To brake fluid level switch and parking brake switch
10. To main switch
11. To DRL controller (Canada spec. vehicle only)
12. To 4WD switch
13. To battery (positive)
14. To dimmer & passing switch
15. To fuel level gauge
16. To turn signal switch (R)
17. To water temp. gauge
18. To ignition coil (negative)
19. To lighting switch
20. To illumination controller
21. To seat belt switch
22. Mileage sensor (Federal spec. vehicle except California and Canada)
23. Cancel switch (Federal spec. vehicle except California and Canada)
24. Combination meter

Fig. 21-1 Combination Meter Wiring

21-17. DAYTIME RUNNING LIGHT (D.R.L.) SYSTEM (If equipped)

GENERAL DESCRIPTION

If equipped with this system, the headlights light, though dimmer than the low beam, when the following three conditions are all met. Also, D.R.L. indicator light in the combination meter comes ON at the same time.

Conditions for D.R.L. system operation

1. The engine is running.
2. The parking brake is not applied.
3. The lighting switch is at either "OFF" or "clearance light" position.

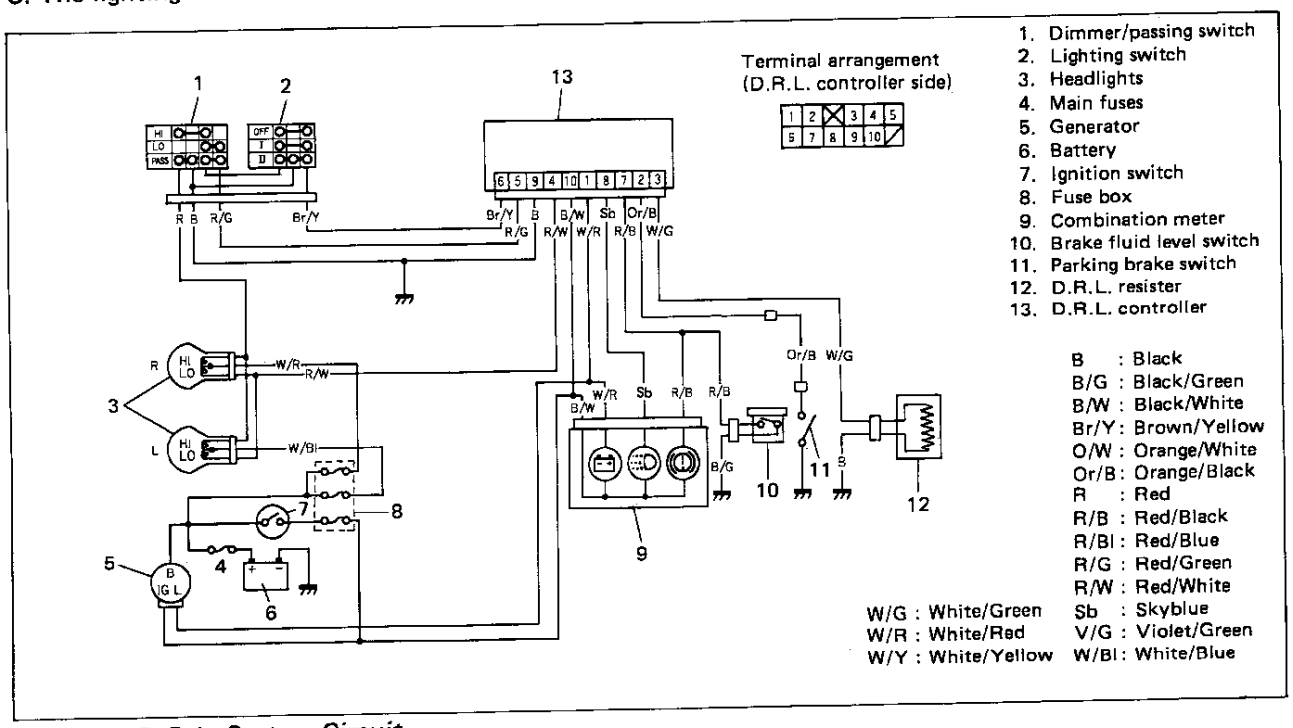


Fig. 21-2 D.R.L. System Circuit

NOTE:

- **D.R.L. controller is located at the backside of glove box.**

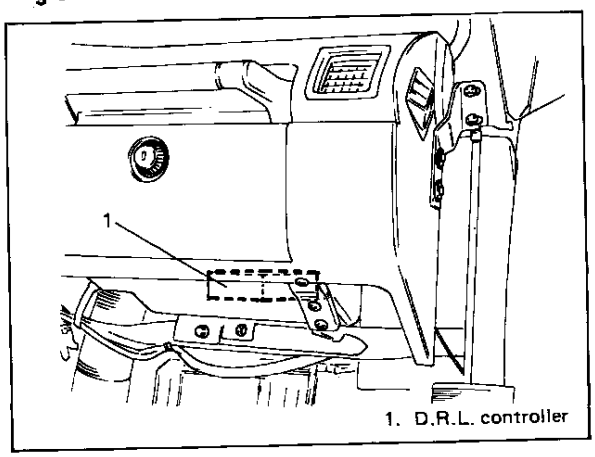


Fig. 21-3

- **D.R.L. resister is located inside front fender LH panel at fender apron panel.**

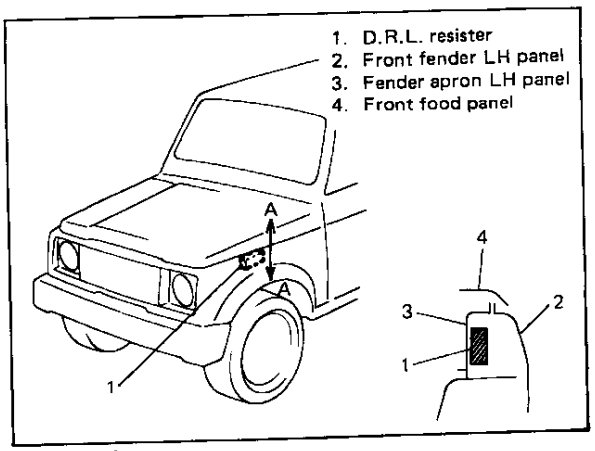
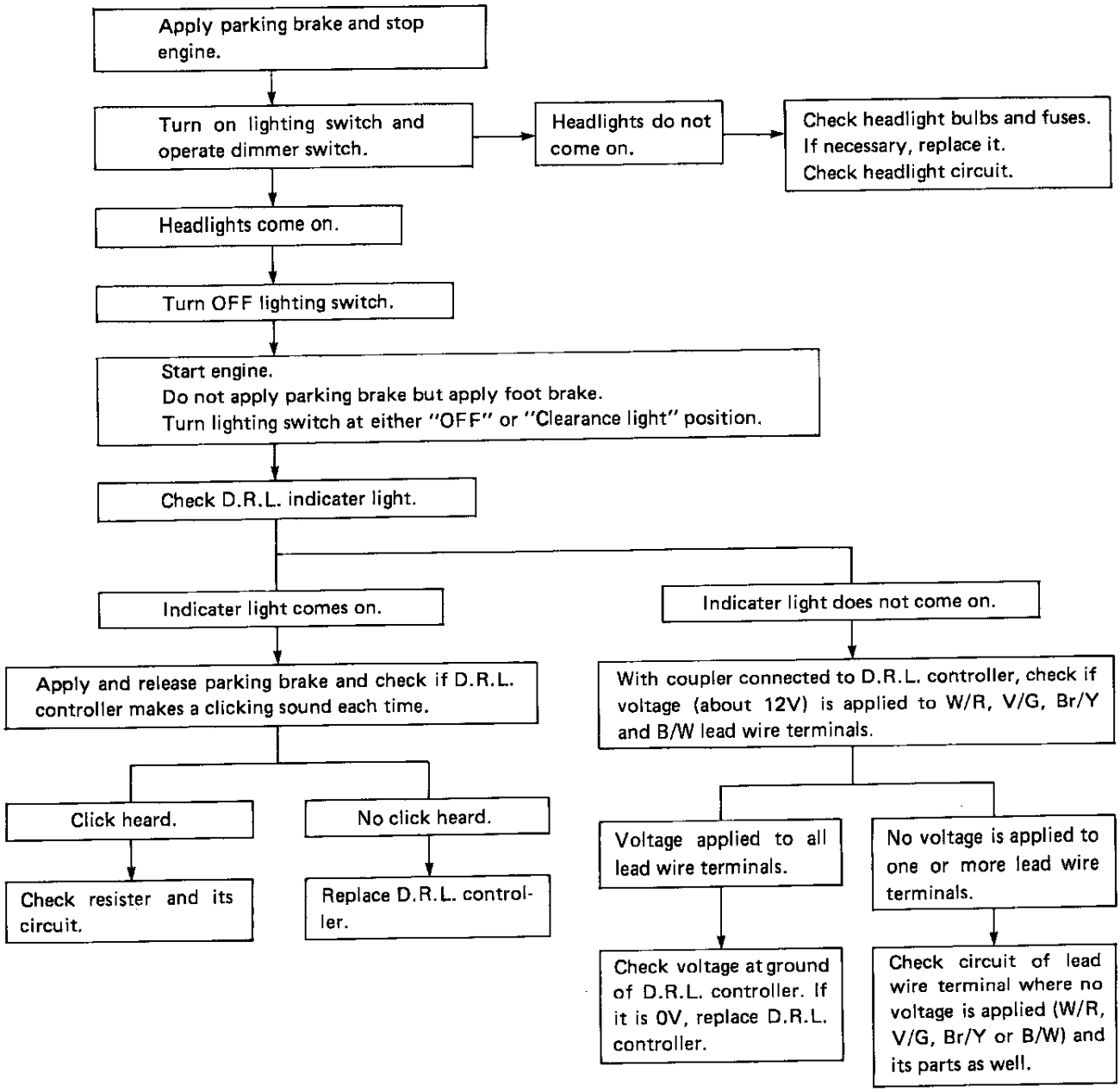


Fig. 21-4

TROUBLE DIAGNOSIS

When a trouble has occurred in this system, check it by using the following flow chart 1) or trouble-diagnosis chart 2) depending on symptom.

1) D.R.L. system does not operate.



2) D.R.L. system fails to stop.

Trouble	Possible cause	Correction
D.R.L. system remains operating even after engine stop.	D.R.L. controller faulty. W/R circuit faulty.	Replace controller. Repair.
D.R.L. system remains operating even after parking brake applied.	Parking brake switch faulty. V/G circuit faulty.	Replace switch. Repair.
D.R.L system remains operating even after lighting switch turned ON.	Lighting switch faulty. Br/Y circuit or its ground faulty.	Repair or replace switch. Repair.

SECTION 22

SERVICE DATA

CONTENTS

22-1. SPECIFICATIONS

Item \ Models	Convertible/Hard Top
ENGINE	
Type	Four-stroke cycle, water cooled, OHC
Number of cylinders	4
Lubrication system	Wet sump
Bore	74.0 mm (2.91 in.)
Stroke	75.5 mm (2.97 in.)
Piston displacement	1,298 cm^3 (1,298 cc, 79.2 cu. in.)
Compression ratio	9.5 : 1
Electronic Fuel Injection system	Single-point throttle body fuel injection system
Air cleaner	Polyester fiber element (Dry type)
ELECTRICAL	
Ignition timing	8° B.T.D.C. at 800 r/min (rpm)
Standard spark plug	NGK BPR5ES or NIPPON DENSO W20EPR-U
Starter	Magnetic shift type
Generator	Alternator
Battery	12V, 137 kC (38 Ah)/5HR
Headlight	12V, 60/50W
Turn signal light	12V, 32 cp
Clearance light	12V, 4 cp

Item \ Models		Convertible/Hard Top
Tail/Brake light		12V, 3/32 cp
Side marker light		12V, 3.8W
License plate light		12V, 4 cp
Back-up light		12V 32 cp
Interior light		12V, 5W
Meter pilot light		12V,1.4W
Main fuse		0.5 mm^2 (fusible link)
Fuse box		10/10/15/15/15/20/15/15/10/15/15/20A
POWER TRANSMISSION		
Clutch type		Dry, single disc
Transmission type		5-forward all synchromesh, 1 reverse
Final reduction ratio (Differential)		3.727
Transmission gear ratios	low	3.652
	2nd	1.947
	3rd	1.423
	4th	1.000
	5th	0.864
	reverse	3.466
Transfer gear ratios	low range	2.268
	high range	1.409
Overall reduction ratios:		
Low range	low	30.869
	2nd	16.457
	3rd	12.028
	4th	8.452
	5th	7.303
	reverse	29.297
High range	low	19.177
	2nd	10.224
	3rd	7.472
	4th	5.251
	5th	4.537
	reverse	18.201

Item \ Models		Convertible/Hard Top
WHEEL AND SUSPENSION		
Tire size: front and rear		P205/70 R15
Tire pressure	front	140 kPa (1.40 kg/cm^2, 20 psi)
	rear	140 kPa (1.40 kg/cm^2, 20 psi)-unladen
		180 kPa (1.80 kg/cm^2, 26 psi)-laden
Suspension type	front	Leaf spring
	rear	Leaf spring
STEERING		
Turning radius		5.1 m (16.7 ft)
Steering gear box		Ball nut type
Toe-in		2 – 6 mm (0.08 – 0.24 in.)
Camber angle		1° 00′
Caster angle		3° 30′
King pin angle		9° 00′
BRAKE SYSTEM		
Type		4-wheel, hydraulic
Wheel brake	front	Disc brake (floating caliper type)
	rear	Drum brake (leading and trailing)
Parking brake		Mechanical actuated on rear wheels
CAPACITIES		
Cooling solution		4.8 ℓ (10.1/8.4 US/Imp pt)
Fuel tank		40ℓ (10.6/8.8 US/Imp gal)
Engine oil		3.5 ℓ (7.4/6.2 US/Imp pt)
Transmission oil		1.3 ℓ (2.7/2.3 US/Imp pt)
Differential gear box oil	front	2.0 ℓ (4.2/3.5 US/Imp pt)
	rear	1.5 ℓ (3.2/2.6 US/Imp pt)
Transfer gear box oil		0.8 ℓ (1.7/1.4 US/Imp pt)

22-2. SERVICE DATA

ENGINE

Item				Standard	Service Limit
Compression pressure				14.0 kg/cm² (199.0 psi)	12.0 kg/cm² (170.0 psi)
		Difference between cylinders		———	1.0 kg/cm² (14.2 psi)
Valve lash (clearance)		Cold (When coolant temperature is 15 ~ 25°C or 59 ~ 77°F)	Inlet	0.13 ~ 0.18 mm (0.0051 ~ 0.0071 in.)	———
			Exhaust	0.15 ~ 0.21 mm (0.0059 ~ 0.0083 in.)	———
		Hot (When coolant temperature is 60 ~ 68°C or 140 ~ 154°F)	Inlet	0.23 ~ 0.27 mm (0.009 ~ 0.011 in.)	———
			Exhaust	0.26 ~ 0.30 mm (0.0102 ~ 0.0118 in.)	———
Cylinder head	Flatness of gasketed surface			———	0.05 mm (0.002 in.)
	Flatness of manifold seat		Inlet	———	0.1 mm (0.004 in.)
			Exhaust	———	0.1 mm (0.004 in.)
	Valve seat	Seating width	Inlet	1.3 ~ 1.5 mm (0.0512 ~ 0.0590 in.)	———
			Exhaust	1.3 ~ 1.5 mm (0.0512 ~ 0.0590 in.)	———
		Seating angle		45°	———
	Valve guide hole diameter (In & Ex) (over size)			12.030 ~ 12.048 mm (0.4736 ~ 0.4743 in.)	———
Valve, valve spring & cam shaft	Camshaft/Journal clearance			0.050 ~ 0.091 mm (0.0020 ~ 0.0036 in.)	0.15 mm (0.0059 in.)
	Camshaft thrust clearance			———	0.75 mm (0.0295 in.)
	Cam height (Base circle + lift)		Inlet	38.136 mm (1.5014 in.)	38.036 mm (1.4975 in.)
			Exhaust	38.136 mm (1.5014 in.)	38.036 mm (1.4975 in.)
	Camshaft runout			———	0.10 mm (0.0039 in.)
	Valve stem diameter		Inlet	6.965 ~ 6.980 mm (0.2742 ~ 0.2748 in.)	———
			Exhaust	6.950 ~ 6.965 mm (0.2737 ~ 0.2742 in.)	———
	Valve guide I.D.		Inlet	7.000 ~ 7.015 mm (0.2756 ~ 0.2761 in.)	———
			Exhaust	7.000 ~ 7.015 mm (0.2756 ~ 0.2761 in.)	———
	Valve guide-to-valve stem clearance		Inlet	0.020 ~ 0.050 mm (0.0008 ~ 0.0019 in.)	0.07 mm (0.0027 in.)
			Exhaust	0.035 ~ 0.065 mm (0.0014 ~ 0.0025 in.)	0.09 mm (0.0035 in.)
	Thickness of valve head periphery		Inlet	1.0 mm (0.039 in.)	0.6 mm (0.0236 in.)
			Exhaust	1.0 mm (0.039 in.)	0.7 mm (0.0275 in.)
	Contact width of valve and valve seat		Inlet	1.3 ~ 1.5 mm (0.0512 ~ 0.0590 in.)	———
			Exhaust	1.3 ~ 1.5 mm (0.0512 ~ 0.0590 in.)	———
	Valve spring free length		Inlet	49.3 mm (1.9409 in.)	48.1 mm (1.8937 in.)
			Exhaust	49.3 mm (1.9409 in.)	48.1 mm (1.8937 in.)
	Valve spring preload		Inlet	24.8 ~ 29.2 kg (54.7 ~ 64.3 lb) for fitting length 41.5 mm (1.63 in.)	22.8 kg (50.2 lb) for fitting length 41.5 mm (1.63 in.)
			Exhaust	24.8 ~ 29.2 kg (54.7 ~ 64.3 lb) for fitting length 41.5 mm (1.63 in.)	22.8 kg (50.2 lb) for fitting length 41.5 mm (1.63 in.)

Item			Standard		Service Limit	
Valve, valve spring & cam shaft	Valve stem end deflection	Inlet	—		0.14 mm	(0.005 in.)
		Exhaust	—		0.18 mm	(0.007 in.)
	Stock allowance of valve stem end face		—		0.5 mm	(0.019 in.)
	Valve head radial runout		—		0.08 mm	(0.003 in.)
	Valve spring squareness		—		2.0 mm	(0.079 in.)
	Valve guide protrusion (In. & Ex.)		14 mm	(0.55 in.)	—	
Rocker arm shaft and rocker arm	Rocker shaft O.D.		15.973 ~ 15.988 mm	(0.628 ~ 0.629 in.)	—	
	Rocker arm I.D.		16.000 ~ 16.018 mm	(0.629 ~ 0.630 in.)	—	
	Shaft-to-arm clearance	Inlet	0.012 ~ 0.045 mm	(0.0005 ~ 0.0017 in.)	0.09 mm	(0.0035 in.)
		Exhaust	0.012 ~ 0.045 mm	(0.0005 ~ 0.0017 in.)	0.09 mm	(0.0035 in.)
	Rocker shaft runout		—		0.12 mm	(0.004 in.)
Cylinder	Flatness of gasketed surface		0.03 mm	(0.0012 in.)	0.06 mm	(0.0024 in.)
	Cylinder bore (S.T.D.)		74.00 ~ 74.02 mm	(2.9134 ~ 2.9142 in.)	74.15 mm	(2.9193 in.)
	Cylinder bore out-of-round and taper		—		0.10 mm	(0.0039 in.)
	Cylinder-to-piston clearance		0.02 ~ 0.04 mm	(0.0008 ~ 0.0015 in.)	—	
Piston	Piston diameter	Standard	73.970 ~ 73.990 mm	(2.9122 ~ 2.9129 in.)	—	
		Oversize: 0.25 mm (0.0098 in.)	74.220 ~ 74.230 mm	(2.9220 ~ 2.9224 in.)	—	
		Over size: 0.50 mm (0.0196 in.)	74.470 ~ 74.480 mm	(2.9319 ~ 2.9322 in.)	—	
	Piston ring groove width	Top ring	1.22 ~ 1.24 mm	(0.0480 ~ 0.0488 in.)	—	
		2nd ring	1.51 ~ 1.53 mm	(0.0594 ~ 0.0602 in.)	—	
		Oil ring	2.81 ~ 2.83 mm	(0.1106 ~ 0.1114 in.)	—	
	Piston pin diameter		16.995 ~ 17.000 mm	(0.6691 ~ 0.6693 in.)	—	
Piston ring	Piston ring thickness	Top ring	1.17 ~ 1.19 mm	(0.0461 ~ 0.0468 in.)	—	
		2nd ring	1.47 ~ 1.49 mm	(0.0578 ~ 0.0586 in.)	—	
		Oil ring	0.45 mm	(0.0177 in.)	—	
	Ring clearance in groove	Top ring	0.03 ~ 0.07 mm	(0.0012 ~ 0.0027 in.)	0.12 mm	(0.0047 in.)
		2nd ring	0.02 ~ 0.06 mm	(0.0008 ~ 0.0023 in.)	0.10 mm	(0.0039 in.)
	Piston ring end gap	Top ring	0.20 ~ 0.33 mm	(0.0079 ~ 0.0129 in.)	0.7 mm	(0.0275 in.)
		2nd ring	0.20 ~ 0.35 mm	(0.0079 ~ 0.0137 in.)	0.7 mm	(0.0275 in.)
		Oil ring	0.20 ~ 0.70 mm	(0.0079 ~ 0.0275 in.)	1.8 mm	(0.0708 in.)
Crank shaft	Crankshaft runout (middle)		—		0.06 mm	(0.0023 in.)
	Crank pin diameter		41.982 ~ 42.000 mm	(1.6529 ~ 1.6535 in.)	—	
	Crank pin clearance in con. rod		0.030 ~ 0.050 mm	(0.0012 ~ 0.0019 in.)	0.08 mm	(0.0031 in.)
	Connecting rod small end bore		16.968 ~ 16.979 mm	(0.6680 ~ 0.6684 in.)	—	
	Crank journal diameter		44.982 ~ 45.000 mm	(1.7710 ~ 1.7716 in.)	—	
	Bearing-to-journal clearance		0.020 ~ 0.040 mm	(0.0008 ~ 0.0016 in.)	0.06 mm	(0.0023 in.)
	Crank pin out-of-round and taper		—		0.01 mm	(0.0004 in.)

	Item		Standard	Service Limit
Crankshaft	Crank journal out-of-round and taper		———	0.01 mm (0.0004 in.)
	Flywheel runout		———	0.2 mm (0.0078 in.)
	Crankshaft thrust play		0.11 – 0.31 mm (0.0044 ~ 0.0122 in.)	0.38 mm (0.0149 in.)
	Connecting rod big end side clearance		0.10 ~ 0.20 mm (0.0039 ~ 0.0078 in.)	0.35 mm (0.0137 in.)
	Connecting rod	Twist	———	0.10 mm (0.0039 in.)
		Bow	———	0.05 mm (0.0020 in.)

CLUTCH & TRANSMISSION

	Item		Standard	Service Limit
Clutch	Facing wear (Rivet head depth)		1.2 mm (0.05 in.)	0.5 mm (0.02 in.)
	Facing-input shaft serration backlash		———	0.8 mm (0.03 in.)
Transmission	Clearance between gears and rings	Low & high	1.0 ~ 1.4 mm (0.039 ~ 0.055 in.)	0.5 mm (0.019 in.)
		5th speed	1.2 ~ 1.6 mm (0.047 ~ 0.063 in.)	0.5 mm (0.019 in.)
	Key slot width of synchronizer ring		10.1 mm (0.397 in.)	10.4 mm (0.409 in.)
	Gear shift fork shaft spring free length		25.5 mm (1.004 in.)	21.0 mm (0.826 in.)
	Gear backlash		0.06 ~ 0.15 mm (0.0024 ~ 0.0059 in.)	0.3 mm (0.0118 in.)

LUBRICATION

	Item		Standard	Service Limit
Lubrication	Radial clearance between outer rotor and case		———	0.310 mm (0.0122 in.)
	Oil pump side clearance (flatness)		———	0.15 mm (0.0059 in.)
	Oil relief valve spring	Free length	45 mm (1.77 in.)	———
	Set pressure of oil pressure switch		0.2 ~ 0.4 kg/cm^2 (2.84 ~ 5.68 psi)	———
	Engine oil pressure		3.0 ~ 4.2 kg/cm^2 (42.7 ~ 59.7 psi) at 3,000 r/min(rpm)	———

COOLING SYSTEM

	Item	Standard	Service Limit
Cooling system	Fan belt tension as deflection under 10 kg (22 lb) push applied to middle point between pulleys	6 ~ 9 mm (0.23 ~ 0.35 in.)	———
	Thermostat start-to-open temperature	*82°C (179°F) or 88°C (190°F)	———
	Thermostat full-open temperature	*95°C (203°F) or 100°C (212°F)	———
	Valve lift	8 mm (0.31 in.)	———

* There are two types of thermostat depending on specifications.

DIFFERENTIAL

	Item	Standard	Service Limit
Differential	Bevel gear backlash	0.10 ~ 0.15 mm (0.004 ~ 0.006 in.)	———
	Side gear thrust play	0.12 ~ 0.37 mm (0.005 ~ 0.014 in.)	———
	Pinion bearing preload	1.8 ~ 3.4 kg (4.0 ~ 7.5 lbs.)	———

SUSPENSION

	Item	Standard	Service Limit
Suspension	Front wheel bearing starting preload	1.0 ~ 3.0 kg (2.2 ~ 6.6 lbs.)	———
	Rear wheel bearing thrust play	———	0.8 mm (0.03 in.)
	Axial play in barfield joint	0 mm (No play)	1.5 mm (0.06 in.)
	Knackle arm starting torque (without oil seal)	1.0 ~ 1.8 kg (2.20 ~ 3.96 lbs.)	———

FUEL SYSTEM

Item	Standard	Limit
Engine idle speed	800 ± 50 r/min (rpm)	———
Engine idle speed when turning A/C "ON"	1,000 ± 50 r/min (rpm)	———

STEERING SYSTEM

Item	Standard	Service Limit
Gear ratio	15.6 ~ 18.1	———
Steering angle, inside	29°	———
Steering angle, outside	26°	———
Steering wheel play	10 ~ 30 mm (0.4 ~ 1.2 in.)	———

BRAKE

Item	Standard	Service Limit
Front brake disc thickness	10 mm (0.394 in.)	8.5 mm (0.334 in.)
Front brake disc deflection	———	0.15 mm (0.006 in.)
Front brake pad thickness (lining + pad rim)	15.0 mm (0.590 in.)	6.0 mm (0.236 in.)
Rear brake lining thickness (lining + shoe rim)	7.0 mm (0.28 in.)	3.0 mm (0.12 in.)
Rear brake drum inside diameter	220 mm (8.66 in.)	222 mm (8.74 in.)
Pedal-to-wall clearance: When pedal is depressed at 30 kg (66 lb)	75 mm (2.95 in.) minimum	———

ELECTRICAL

Item		Standard	Service Limit
Ignition system	Ignition order	1 – 3 – 4 – 2	———
	High tension cord resistance	10 ~ 22 kΩ/m 3.0 ~ 6.7 kΩ/ft	———
	Ignition coil; Primary coil resistance (20°C, 68°F)	0.9 ~ 1.1 ohms	———
	Ignition coil; Secondary coil resistance (20°C, 68°F)	10.2 ~ 13.8 kiloohms	———
	Spark plug gap	0.7 ~ 0.8 mm (0.027 ~ 0.031 in.)	———

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