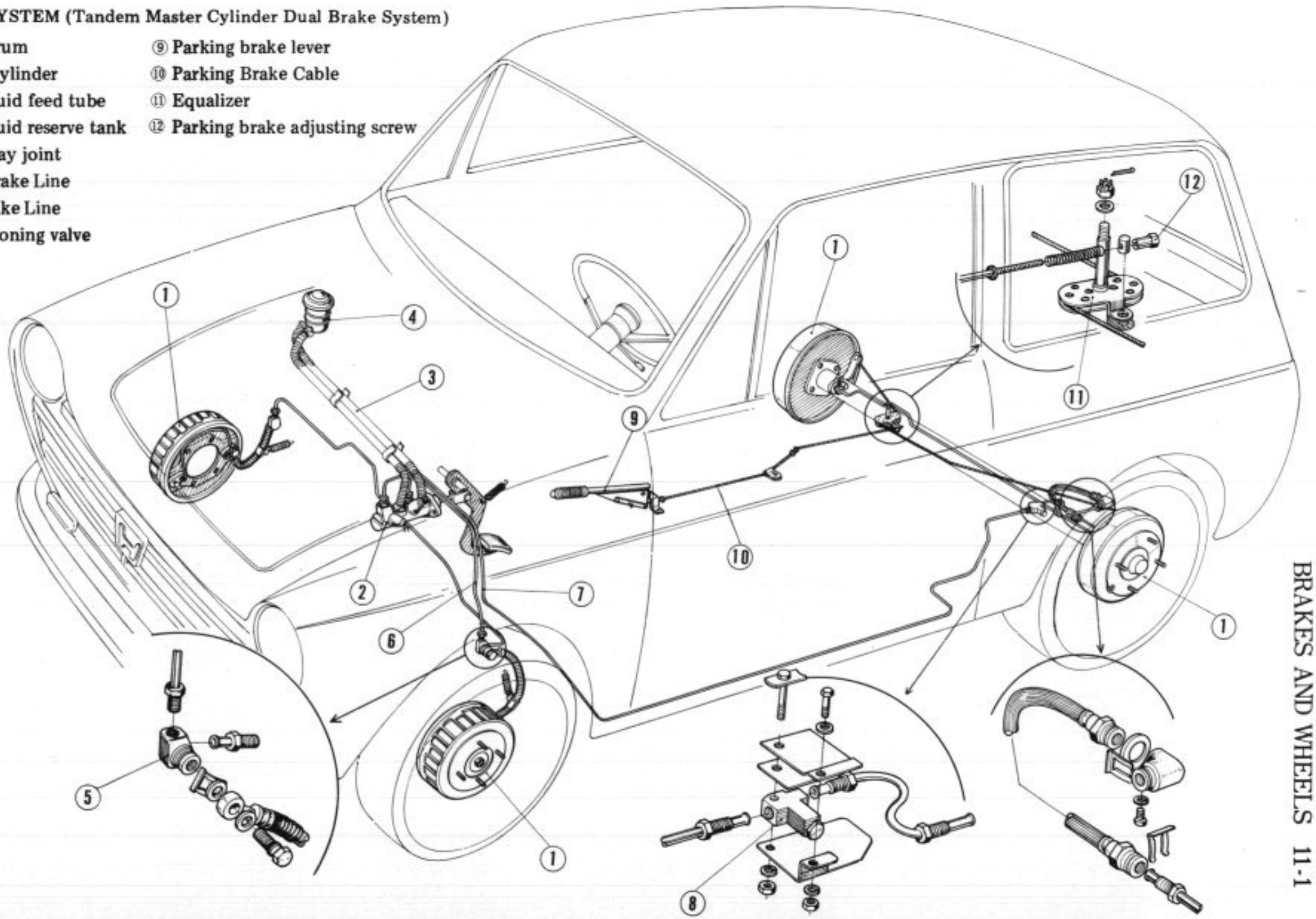
SECTION 11

BRAKES AND WHEELS

BRAKE SYSTEM (Tandem Master Cylinder Dual Brake System)

① Brake drum
② Master cylinder
③ Brake fluid feed tube
④ Brake fluid reserve tank
⑤ Three-way joint
⑥ Front brake Line
⑦ Rear brake Line
⑧ Proportioning valve
⑨ Parking brake lever
⑩ Parking Brake Cable
⑪ Equalizer
⑫ Parking brake adjusting screw



A. General Description

The HONDA N-series sedans and vans incorporate two different brake systems. The first type is the single brake system which is used on the 360,400, and 600 vehicles not exported to the U.S., European countries, or Australia.

The second type is a dual brake system which offers inproved driving safety because the front and rear brake function independently and one system remains in operaiton if the other one fails. This dual brake system is utilized on the 600 series exported to the U.S., European countries, and Australia.

The dual brake system vehicles are divided into the following three types.

1. Parallel master cylinder vehicles
   Chassis No. N600-1000001~1010298
2. Tandem master cylinder vehicles
   Chassis No. N600-1010299~
3. Tandem master cylinder vehicles with a booster
   Chassis No. N600-1013096~

The leading/trailing type drum brake is employed for rear wheel braking on all models, and either the leading/trailing drum brake, two-leading type drum brake, or disk brake for front wheel brakes.

The parallel type master cylinder N600 is equipped with a bypass valve to balance the effect between the front and rear wheels during sudden braking.

All vehicles delivered to the United States are equipped with a warning lamp on the instrument panel. The lamp is positioned so that it can be easily observed, and it lights up on occurrence of a brake system defect. The dealers are advised to have the customer check to insure that the lamp is not lighted, and the dealer himself should verify this at regular inspections intervals.

B. Technical Data

(DRUM BRAKES) Unit: mm (inch)

MODEL	Drum inside diameter (Front and rear)		Shoe lining	
	Nominal	Serviceable limit	Front	Rear
360	180 (7.087)	181 (7.126)	Leading/Trailing 141.5×35×5-198 sq cm (5.56×1.38×0.20-31.54 sq in)	Leading/Trailing 141.5×35×5-198 sq cm (5.56×1.38×0.20-31.54 sq in)
400 600	180 (7.087)	181 (7.126)	Two Leading 141.5×35×5-198 sq cm (5.56×1.38×0.20-31.54 sq in)	

(DISK BRAKES)

Disk Diameter		
(outdise)	182 mm	(7.17 in)
(inside)	94 mm	(0.37 in)
Disk Thickness	9.5 mm	(0.374 in)
Caliper cylinder Bore Diameter	42.85 mm	(1.688 in)
Lining Pad Area	18.7 sq-cm	(2.89 sq-in) Per segment
Lining Pad Thickness		
(nominal)	10.3 mm	(0.406 in)
(serviceable limit)	2.0 mm	(0.079 in)

(MASTER CYLINDER)

MODEL		Bore diameter
		Front and Rear
360 and 400		19mm (0.748 in.)
600 (Single)		19mm (0.748 in.)
600 (Dual)	Parallel	14mm (0.551 in.)
	Tandem	19.05mm (0.750 in.)

(WHEEL CYLINDER)

Bore diameter	
Front	Rear
25.40mm (1.0000 in.)	14.29mm (0.5626 in.)
	15.87mm (0.6248 in.) for the U.S.

Tightening Torque

Front Wheel Hub Nut		
(20 mm)	14~20 kg-m	(101~145 lb-ft)
(22 mm)	14~20 kg-m	(101~145 lb-ft)
Rear Wheel Hub Nut	10~12 kg-m	(73~ 87 lb-ft)
Disk Brake Hub-to-knuckle	5~6 kg-m	(37~ 44 lb-ft)
Disk Brake Caliper Mounting Bolt	5.5~6.0 kg-m	(40~ 44 lb-ft)
Brake pipe	1.8~2.0 kg-m	(13~114 lb-ft)
Rear Brake Hose	2.0~2.4 kg-m	(15~18 lb-ft)

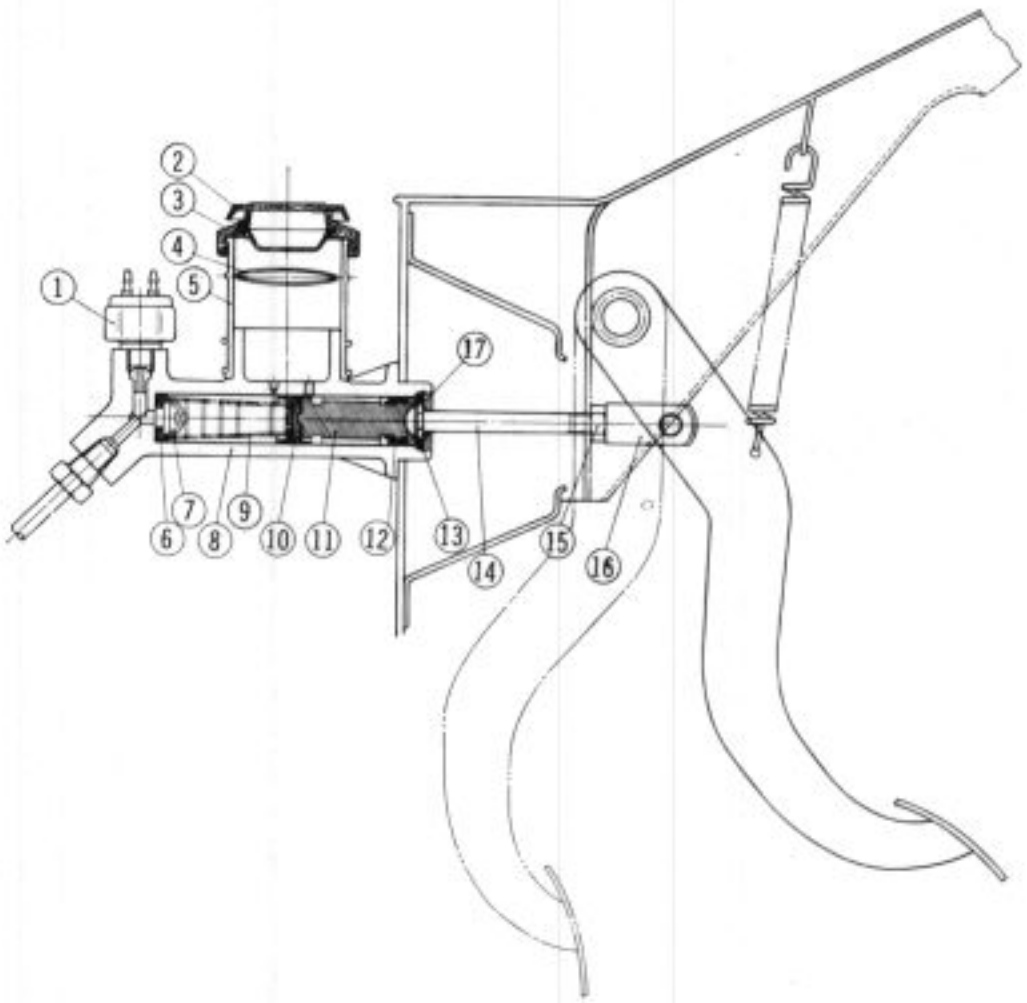
C. Master Cylinder

Description

The master cylinder piston is joined to the brake pedal by the push rod. Force on the brake pedal is doubled mechanically because of the linkage and is applied to the piston.

The brake fluid reservoir is made of a clear material so that the fluid level can be readily observed.

The pressure-actuated stop switch is installed on the end of the master cylinder and is operated by fluid pressure to close the contact which completes the stop light circuit.



① Stop switch
② Reservoir cap
③ Reflector
④ Float
⑤ Brake fluid reservoir
⑥ Check valve seat
⑦ Check valve
⑧ Cylinder body
⑨ Return spring
⑩ Primary cup
⑪ Piston
⑫ Secondary cup
⑬ Circlip
⑭ Push-rod
⑮ Lock nut
⑯ Clevis
⑰ Dust seal

Fig. 11C-1 Brake master cylinder and linkage.
(Single Brake System)

There are five types of master cylinders differing according to vehicles; model 360 and 400 vehicle employ a single-cylinder master cylinder since they use a drum type single brake system: while the 600 vehicle is manufactured in two models, one employing a single brake system, the other a dual brake system, itself further classified into the drum brake and disk brake. The master cylinder for the drum brake and that for the disk brake differ in construction of the check valve (Fig. 11C-1 No. 7) housed in the master cylinder. The check valve for the drum brake is designed to provide a residual pressure to prevent vapor lock caused by air mixed in the brake fluid, while the check valve for the disk brake is not designed to provide a residual pressure to make a complete release of the disk brake.

600 vehicles having a dual brake system and bearing a chassis No. from N600-1000001 to N600-1010298 are equipped with parallel master cylinder, and those bearing a chassis No. N600-1010299 and above are equipped with a tandem master cylinder.

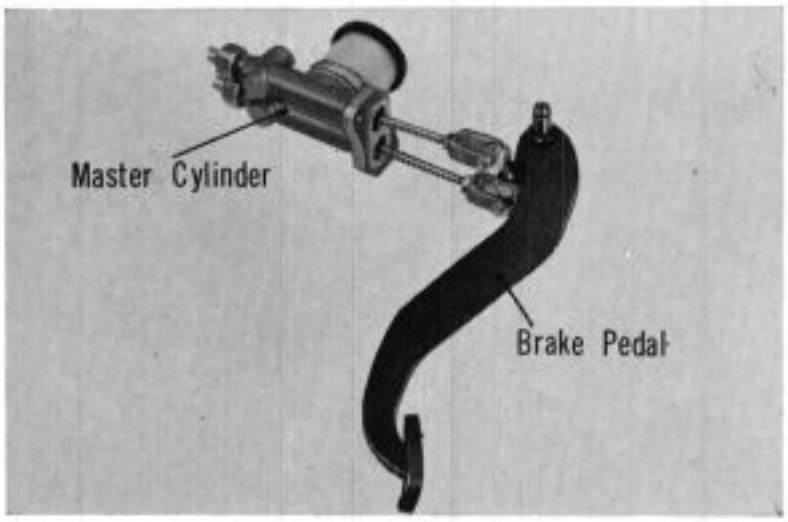


Fig. 11C-2

(parallel master cylinder)

The front and rear master cylinders are arranged as a unit in parallel. The pedal linkage consists of two push rods connected by the equalizer, which is installed on the brake pedal and serves to balance the braking force applied on the front and rear wheel.

(Tandem master cylinder)

Arranged end to end in the same cylinder, the primary piston and the floating secondary piston operate synchronously to cause independent actuations of the front and rear brakes. The tandem master cylinder has no equalizer.

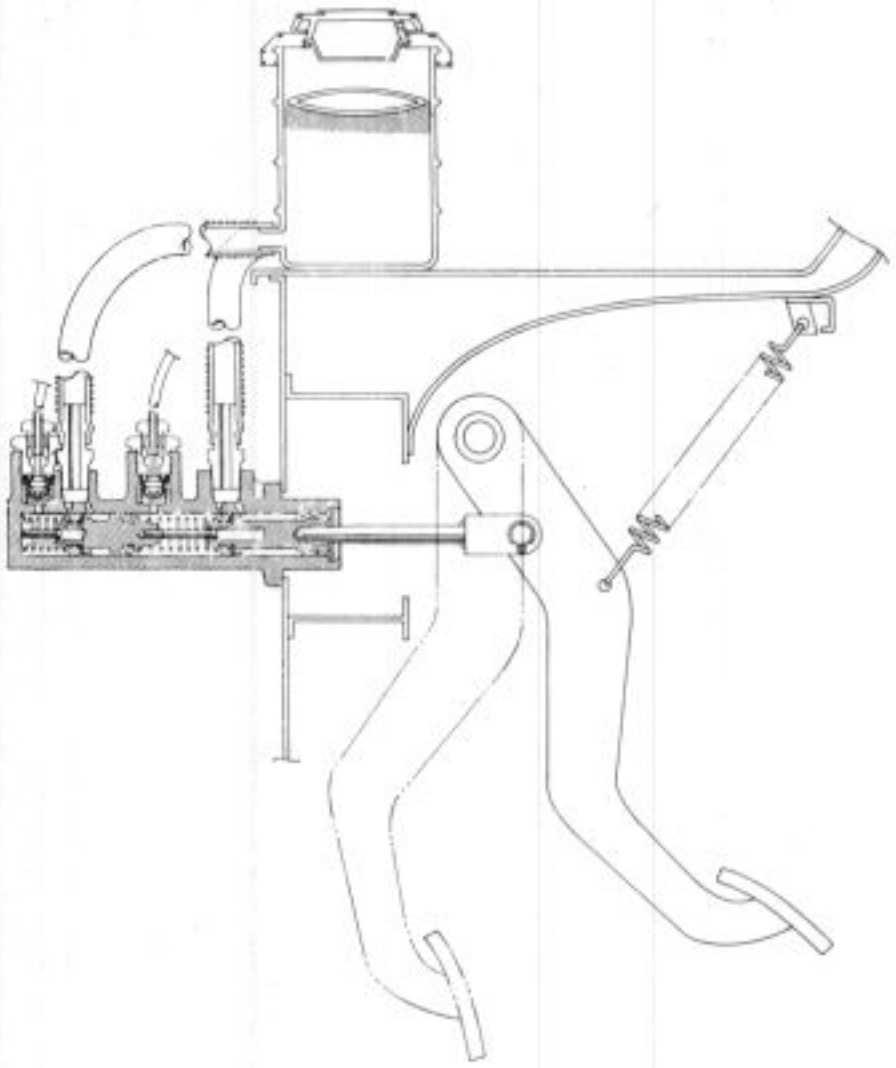


Fig. 11C-3

Removal and Disassembly

1. Disconnect the brake pedal and the master cylinder push rod by removing the lock pin (Fig. 11C-4). For the parallel type master cylinder, disconnect the equalizer link and the master cylinder push rod by removing the lock pin.

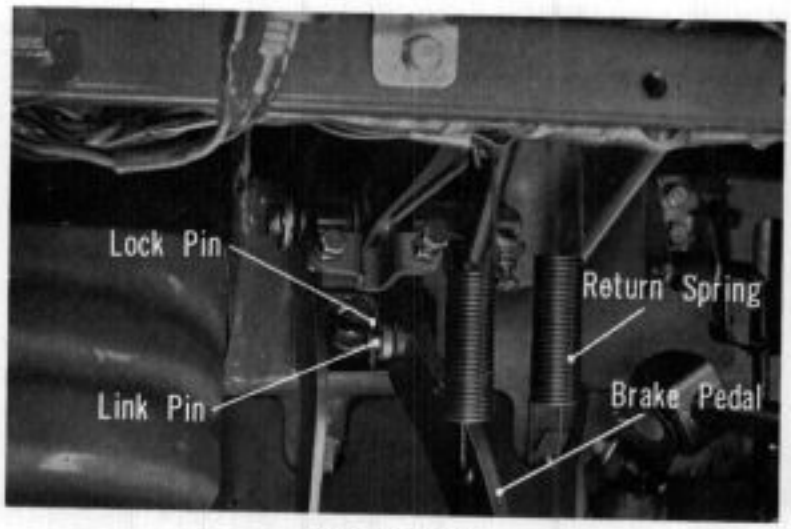


Fig. 11C-4

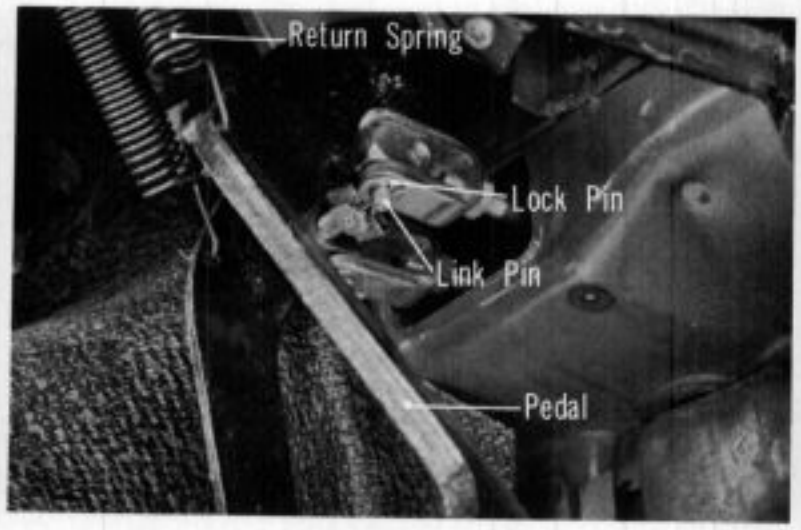


Fig. 11C-5

2. Disconnect master cylinder electrical wiring, and remove the brake fluid pipe connecting the wheel and the master cylinder, and the pipe connecting the reservoir and the master cylinder on the master cylinder side. Remove the mounting master cylinders bolts.

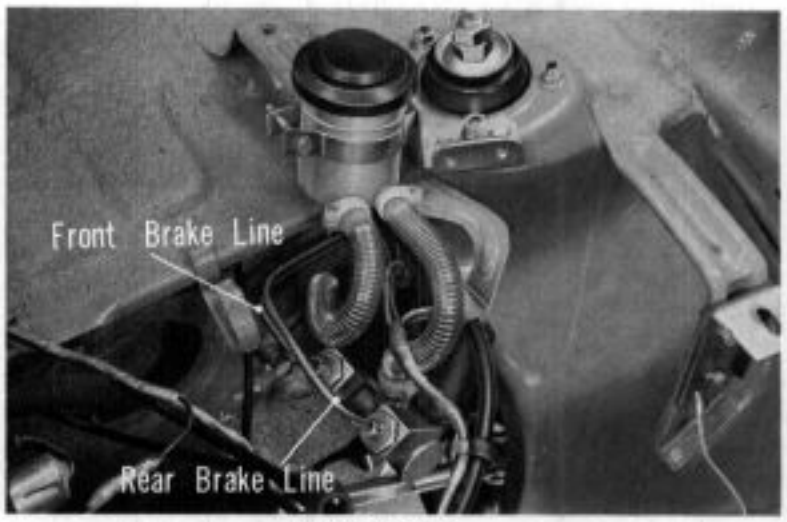


Fig. 11C-6

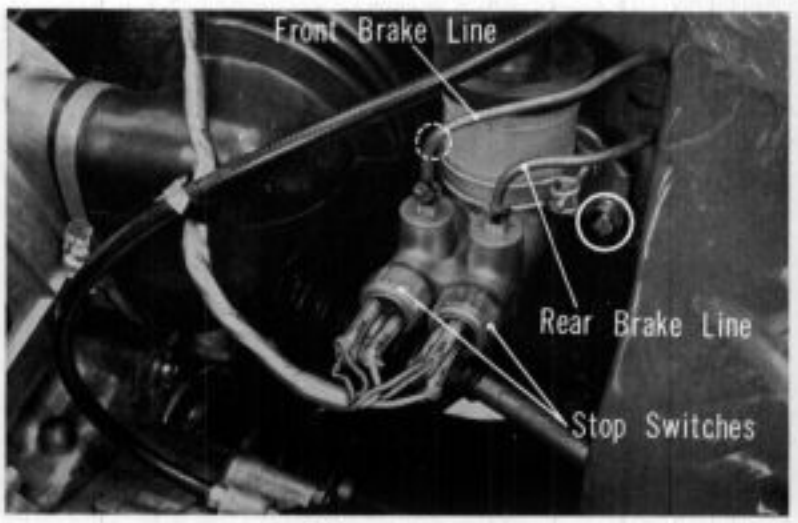


Fig. 11C-7

3. Remove the circlip and extract the push rod, piston, return spring and check valve from the cylinder body. For the tandem type master cylinder, the push rod can be extracted without removing the circlip.

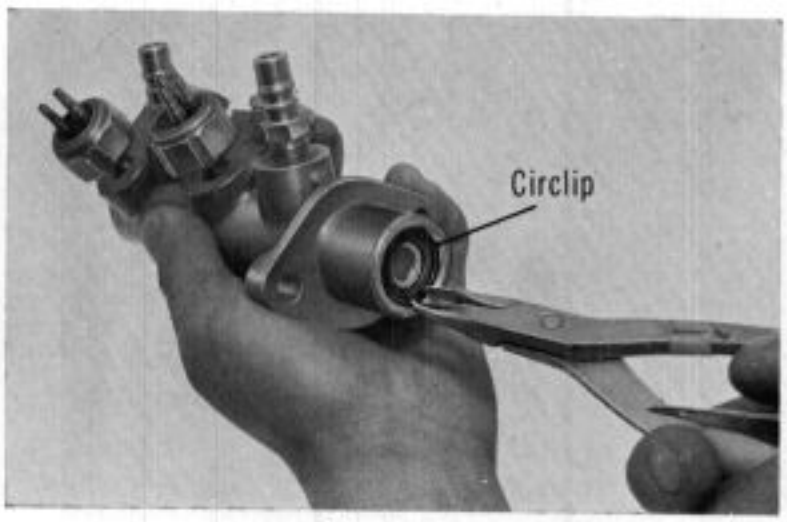


Fig. 11C-8

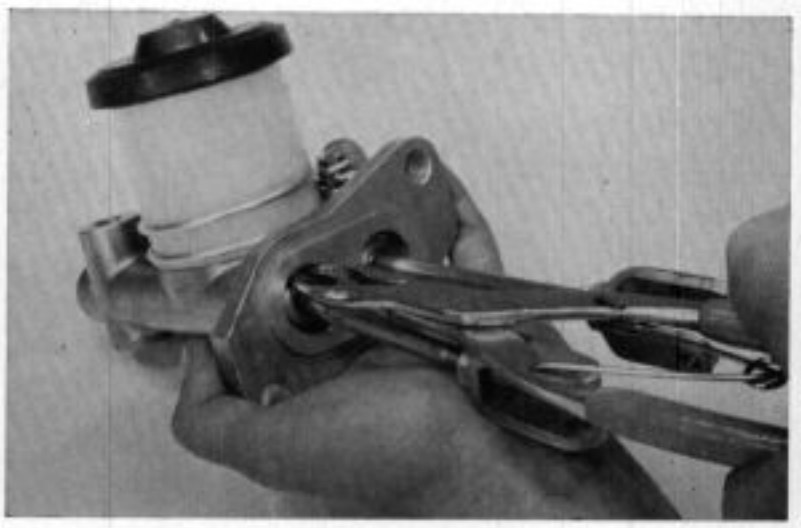


Fig. 11C-9

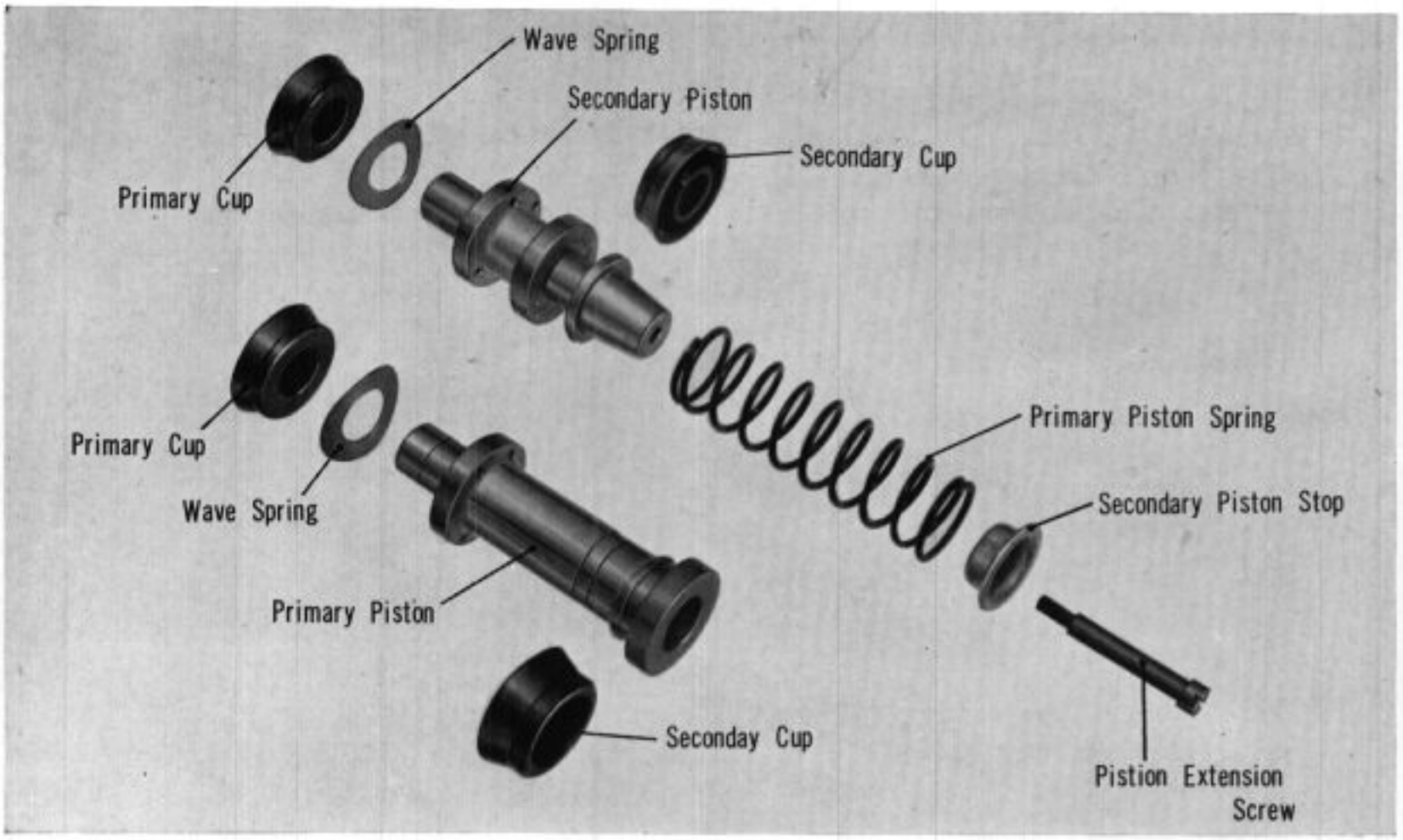


Fig. 11C-10 Tamdem Master Cylinder Piston

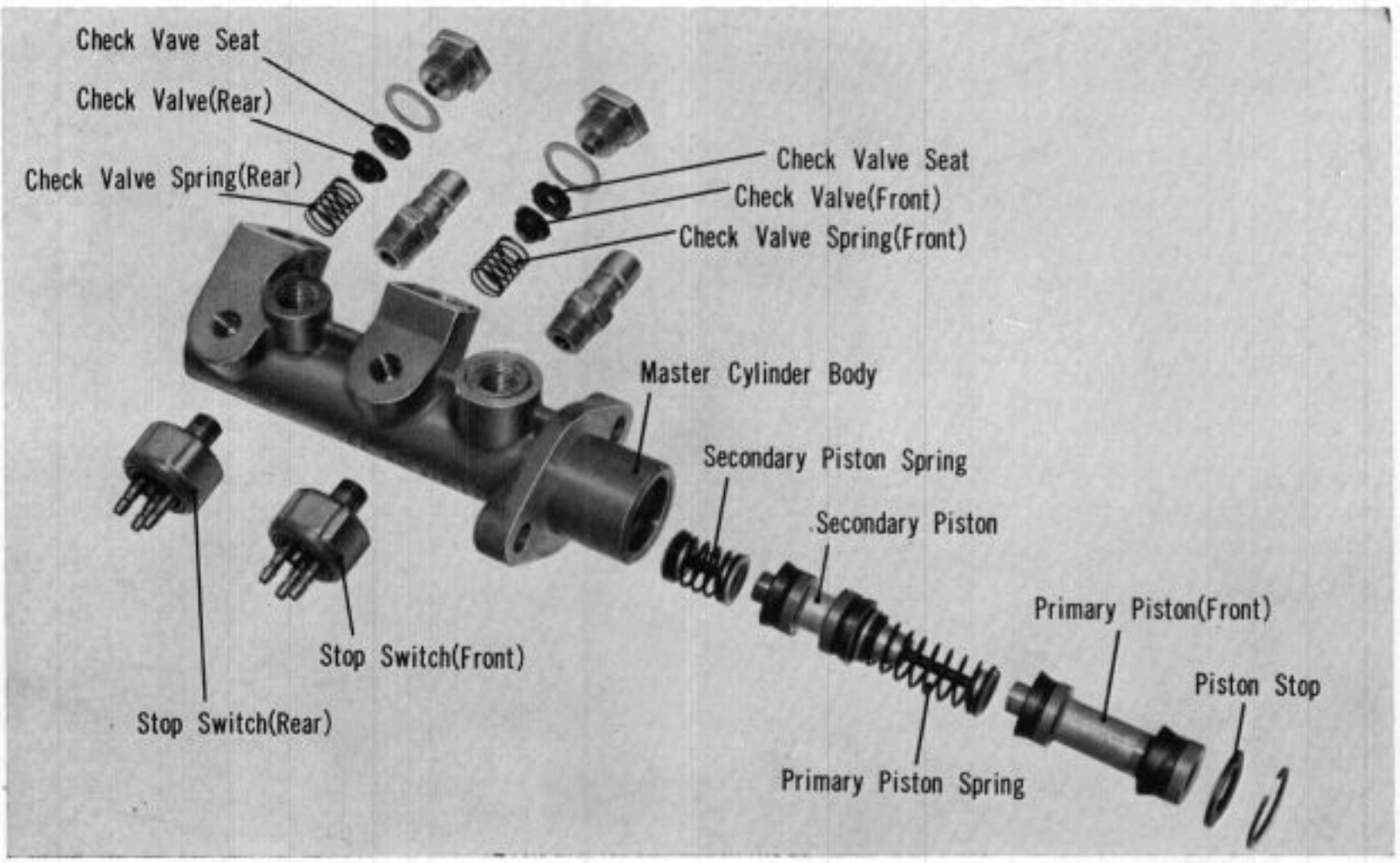


Fig. 11C-11 Tandem Master Cylinder

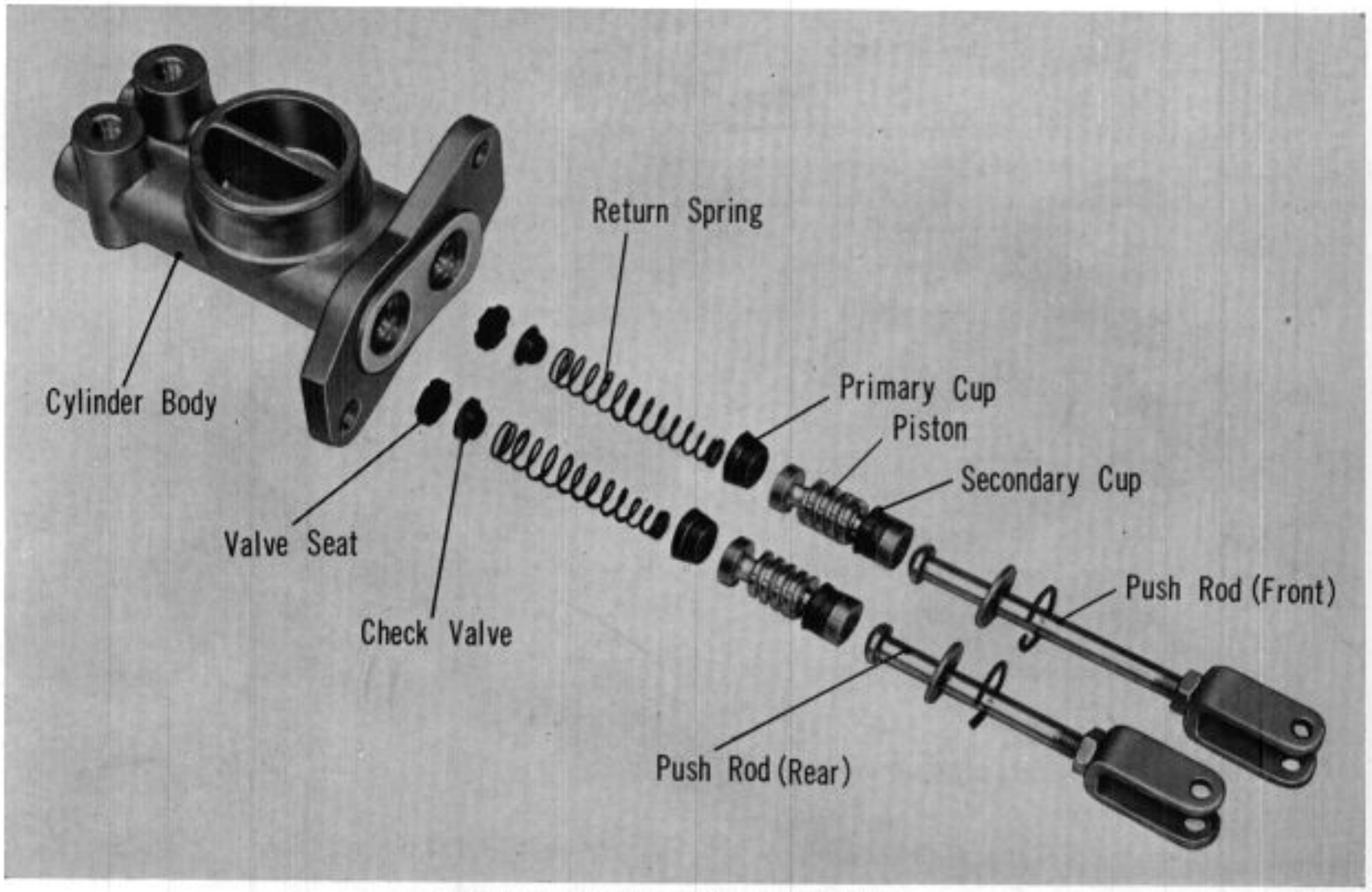


Fig. 11C-12 Parallel Master Cylinder.

4. Remove the valve seat using a wire. Avoid damaging the cylinder during removal.

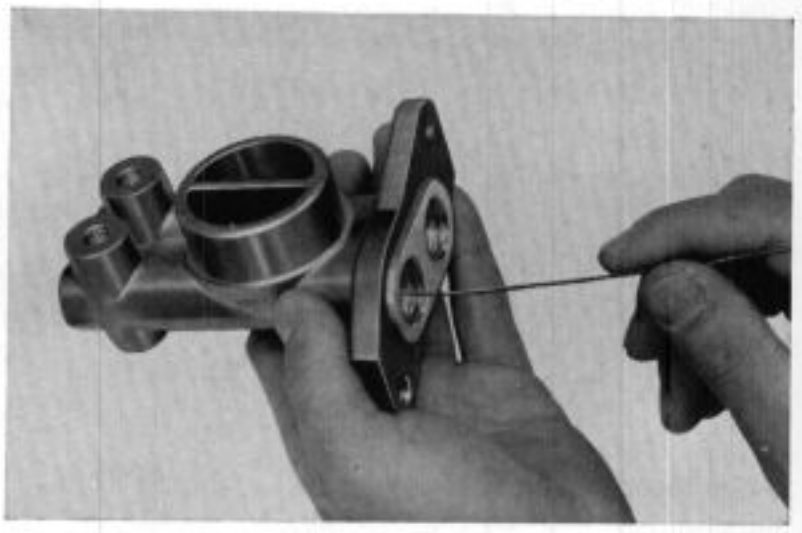


Fig. 11C-13

Cleaning and Inspection

1. Immerse all disassembled parts in clean alcohol or brake fluid, and clear them with a brush. Dry the parts with compressed air and blow air through the compensating port, fluid inlet port, piston bleeder holes, etc.

   Note:
   Do not clean parts in use mineral oil or gasoline.

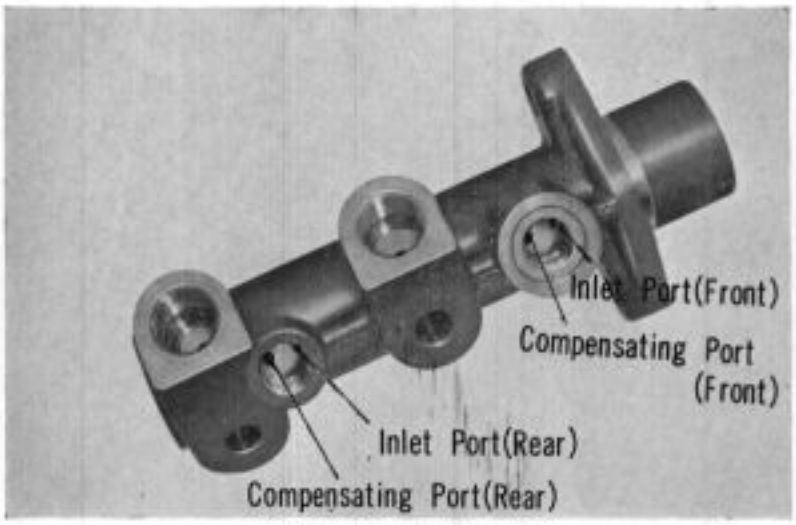


Fig. 11C-14

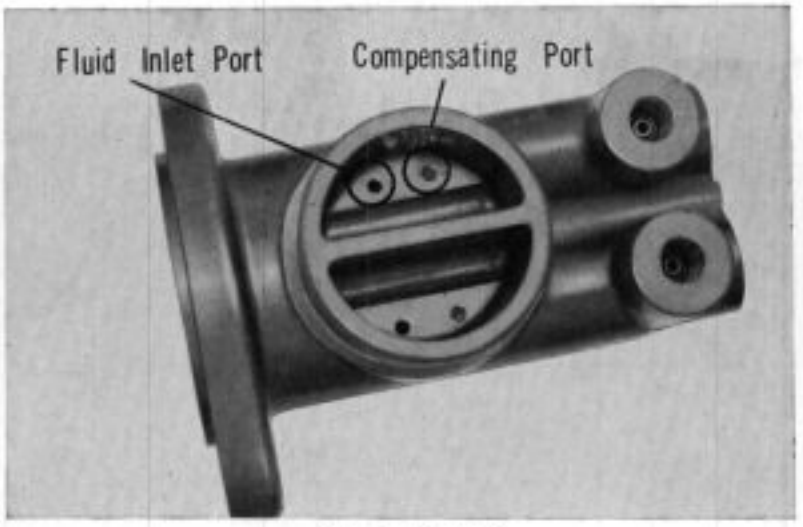


Fig. 11C-15

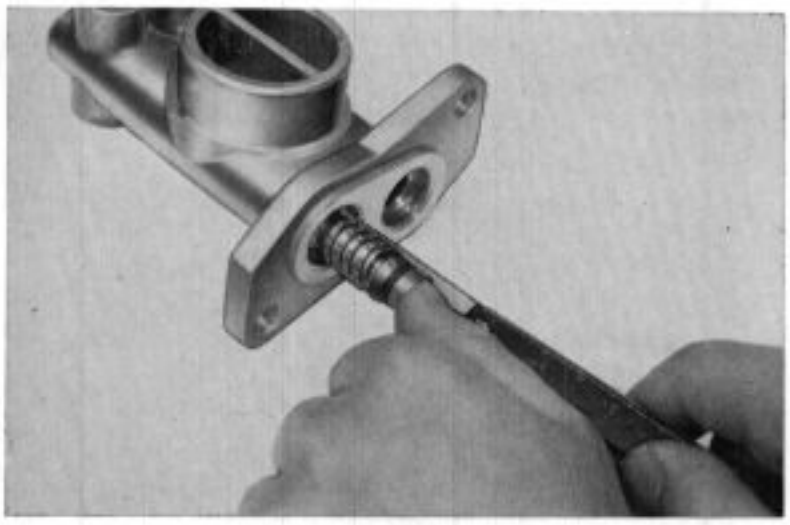


Fig. 11C-16

2. Check the cylinder bore for smoothness.
3. Measure the clearance between the piston and cylinder bore with a feeler gauge.

Unit: mm (inch)

	Standard value	Serviceable limit
Clearance	0.020~0.105 (0.00079~0.00413)	Replace if more than 0.15 (0.0059)

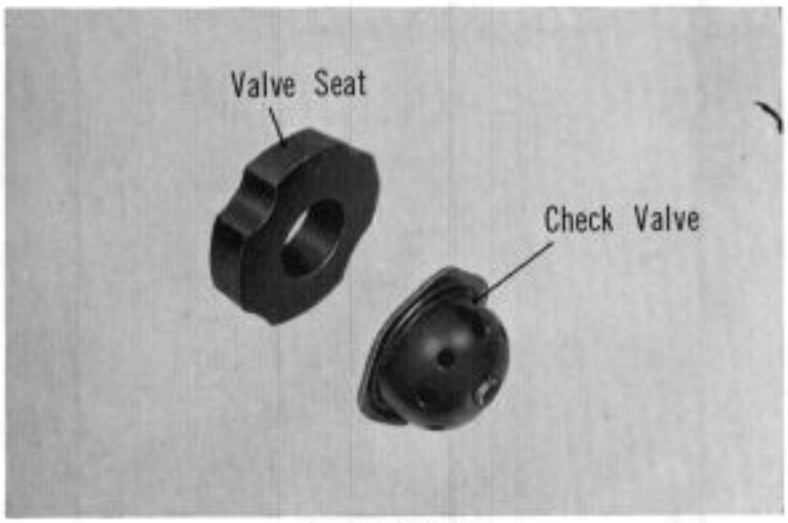


Fig. 11C-17

4. Check for any damage (including permanent strain) to the primary cup, secondary cup, valve, and valve seat. Permanent strain is the result of cleaning the parts in mineral oil, gasoline, or a fluid other than clean alcohol or brake fluid.
   Replace any defective parts.

(PARALLEL MASTER CYLINDER)

The cylinder bores and piston on the front and rear sides are the same size, but the push rods on both sides are not. The front push rod is longer than the rear push rod, so be careful not to reverse their order when installing. Each push rod is installed in accordance with its size.

Therefore, do not adjust the length by loosening the lock nut. If it is necessary to remove the clevis, record the threaded clevis position before removal, and reinstall to this point.

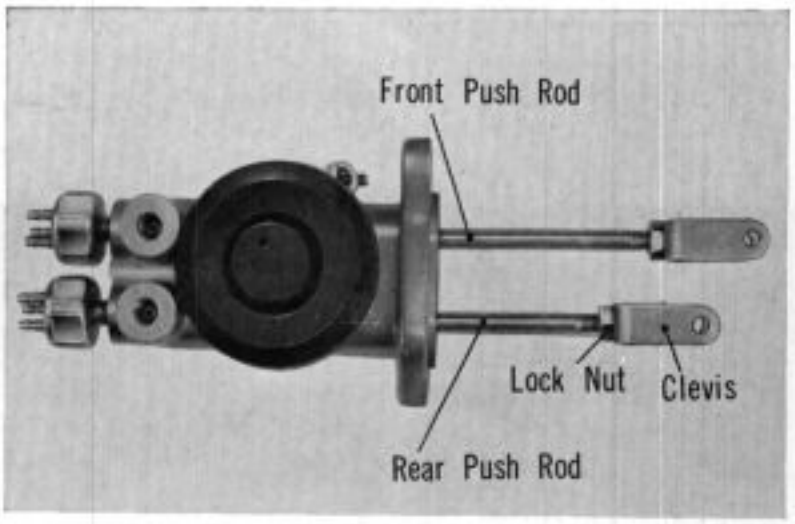


Fig. 11C-18

The equalizer joints on the right and left sides are interchangeable. These are threaded to half length. Install with the threaded side out.

Also, install the front push rod on the side marked "F" on the equalizer.
The equalizer joint should be tightened so that one thread projects from it.

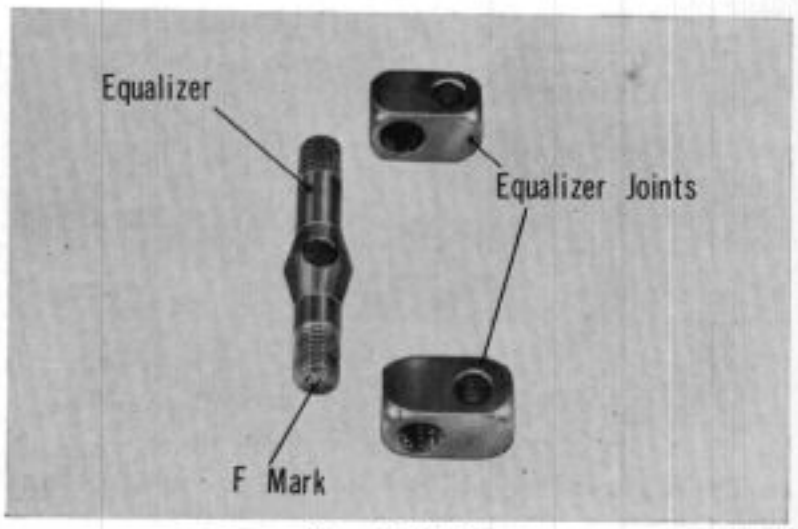


Fig. 11C-19

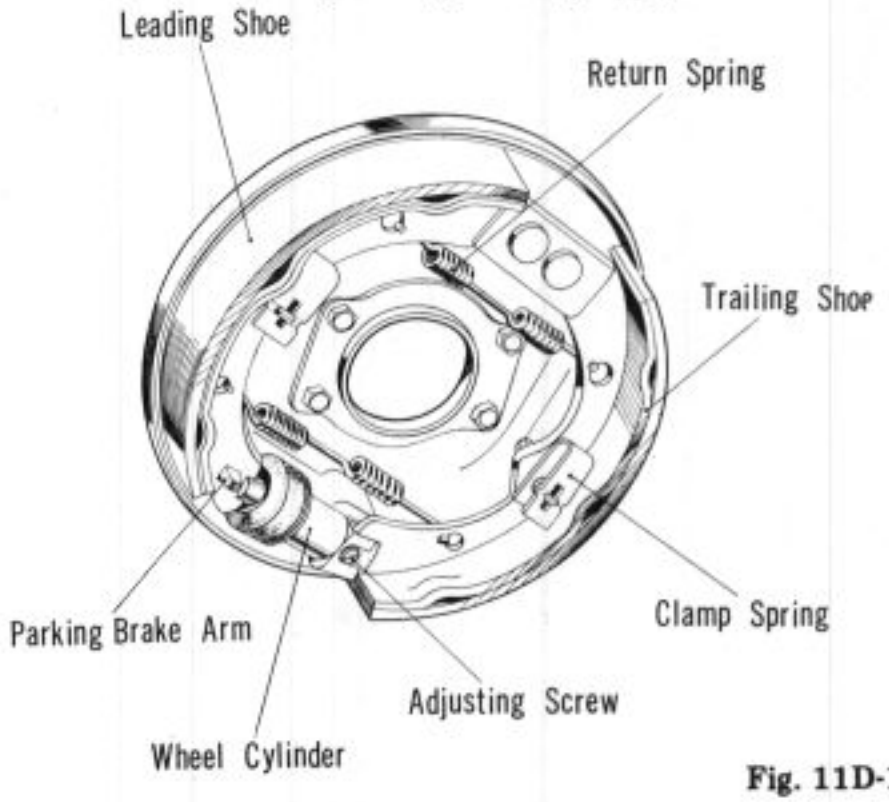
D. Drum Brake

Description

The drum of the front and rear wheel brakes is an external expansion type. The front brake is either a leading/trailing type or a two-leading type, and the rear brake is a leading/trailing type for all model vehicles.

In the leading/trailing brake system, two brake shoes are supported by anchor plate and wheel cylinder, and pulled to the inside by two return springs. Simultaneously, they are pressed against the backing plate by shoe clamp springs. The parking brake arm is installed on the rear brake leading shoe.

(Leading/Trailing Type)



(Two Leading Type)

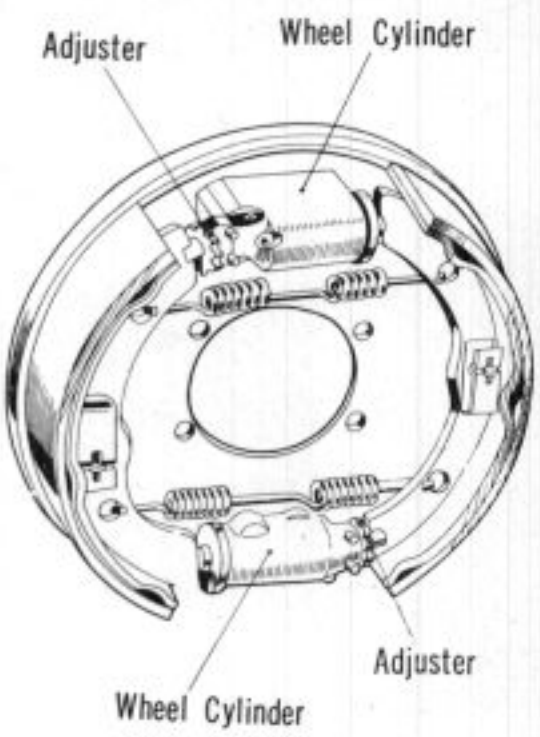


Fig. 11D-1

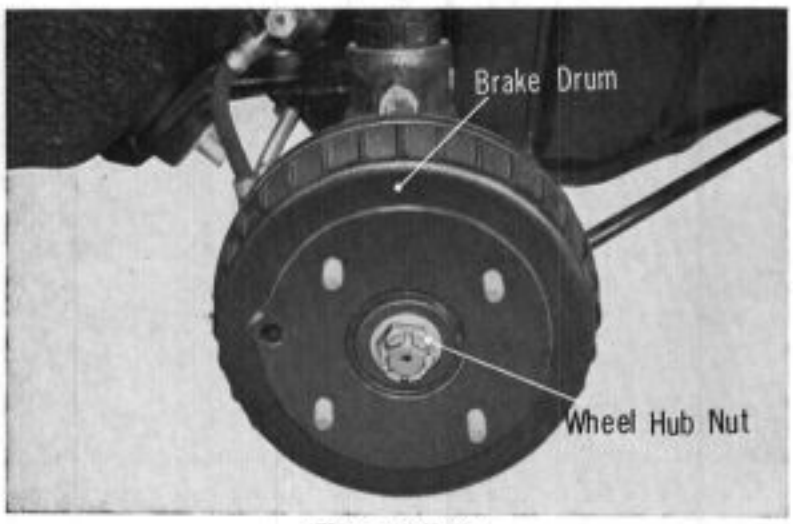


Fig. 11D-2

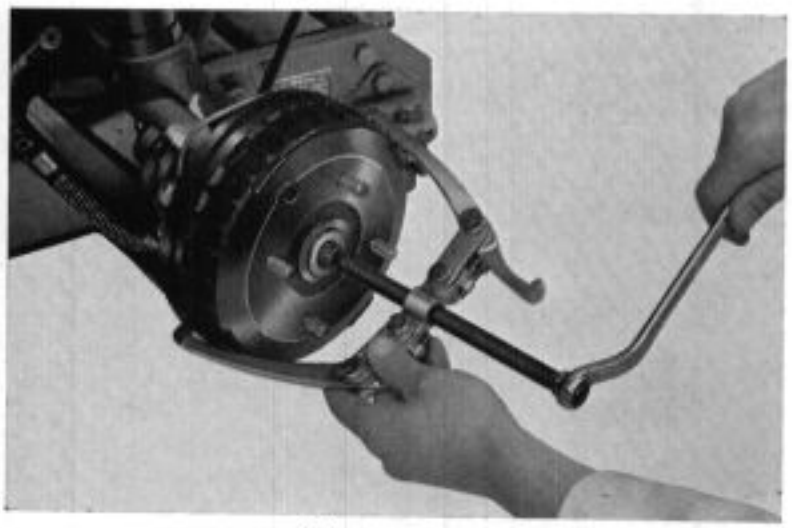


Fig. 11D-3

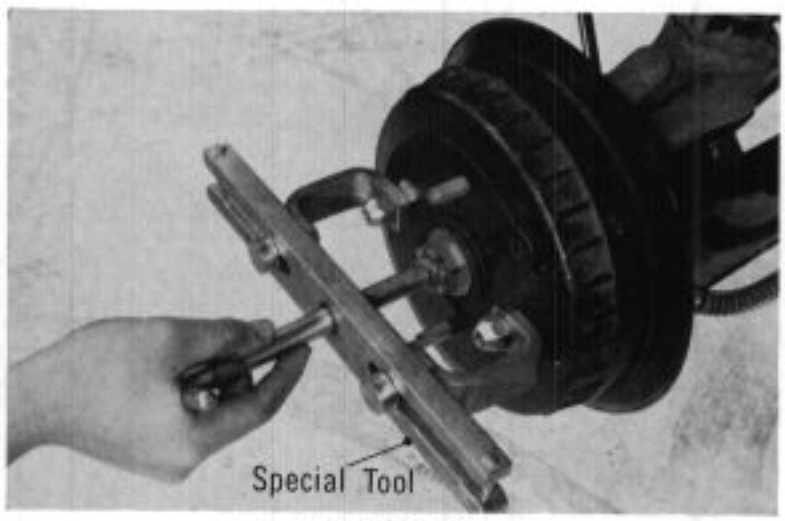


Fig. 11D-3a

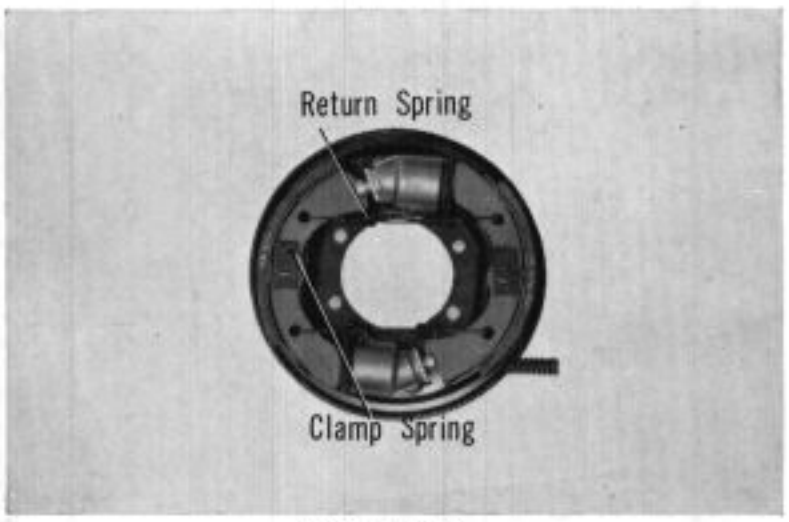


Fig. 11D-4

Removal and Disassembly

a. Brake Drum and Shoe

1. Remove the wheel cap and loosen the wheel nut.
2. Remove the cotter pin, and loosen the wheel hub nut with a wrench (special tool). This nut should be slightly loosened so that it can be easily removed after the vehicle is jacked up.
3. Jack the vehicle up and provide additional support.
4. Remove the wheel nuts and the wheel.
5. Remove the wheel bearing nut and then the brake drum with a puller or special tool—Brake Drum Puller.
6. When replacing shoes, separate the brake shoe from the backing plate by unhooking the shoe return spring and clamp spring.

b. Wheel Cylinder

(Leading/Trailing type)

1. Drain the brake fluid.
2. Separate the brake shoe from the backing plate.
3. Remove the flexible brake hose from the wheel cylinder.
4. Remove the parking brake cable from the parking brake arm of the rear brake.
5. Remove the backing plate from the rear axle or knuckle.

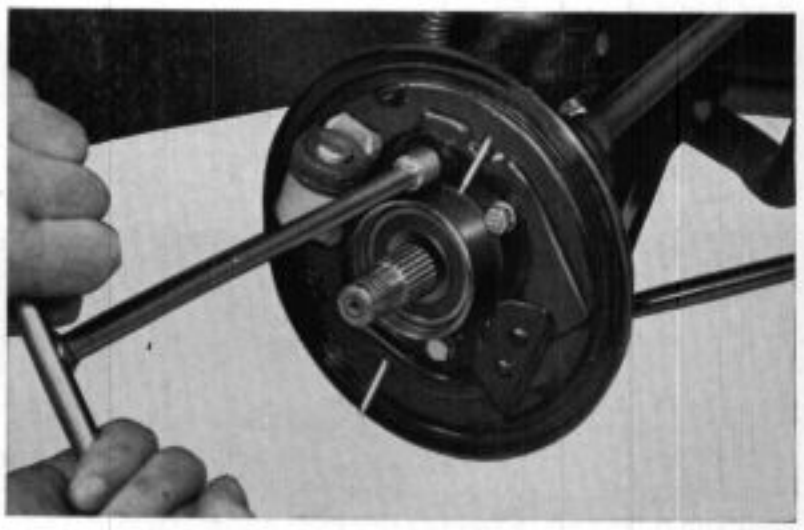


Fig. 11D-5

6. Remove the dust seal and take out the clip plate with long nose pliers. Separate the wheel cylinder from the backing plate by removing the pressure spring.
7. Remove the parking brake arm of the rear brake.

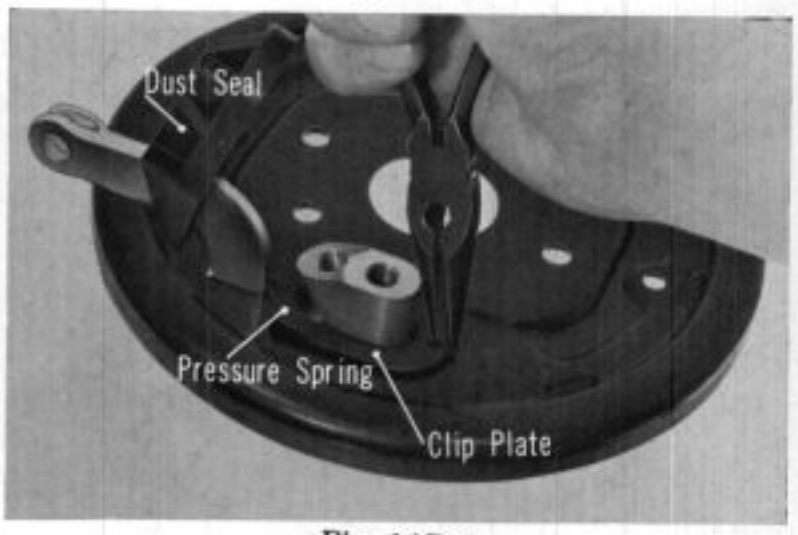


Fig. 11D-6

8. Remove the clip, the rubber boot and the piston from the cylinder body.

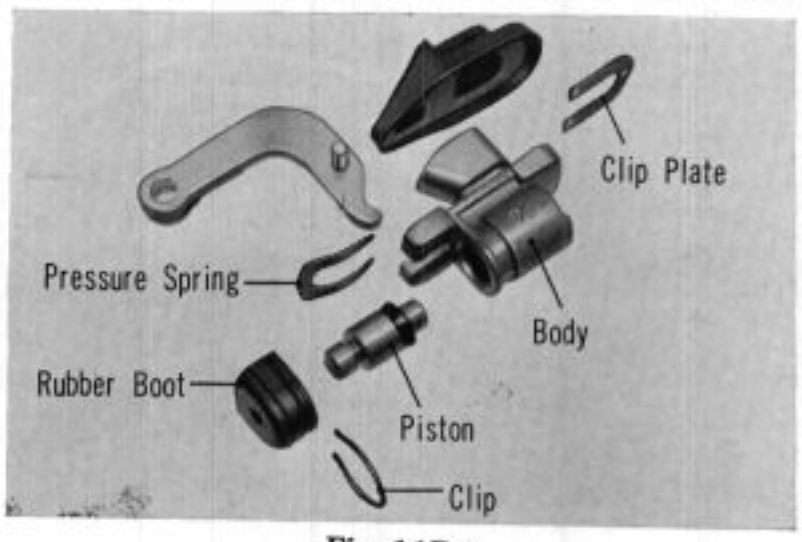


Fig. 11D-7

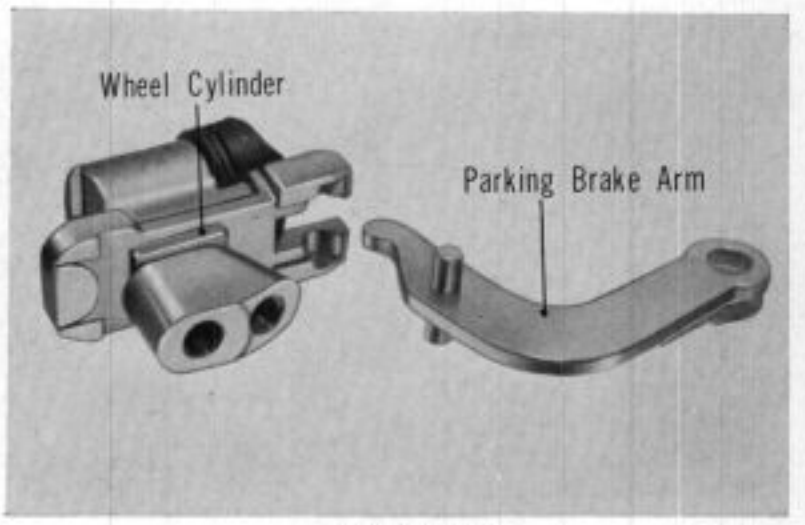


Fig. 11D-8

1. Remove the brake hose, the bridge line, and the wheel cylinder mounting nuts and spring washers. The wheel cylinder can be separated from the backing plate.

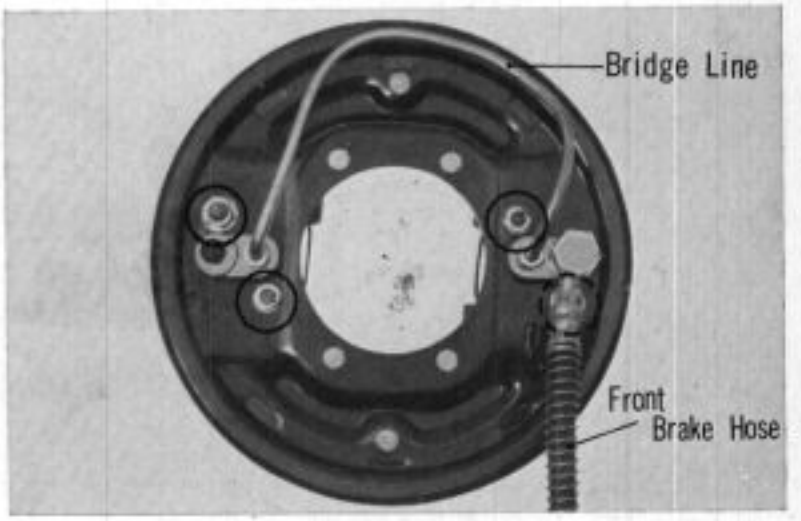


Fig. 11D-9

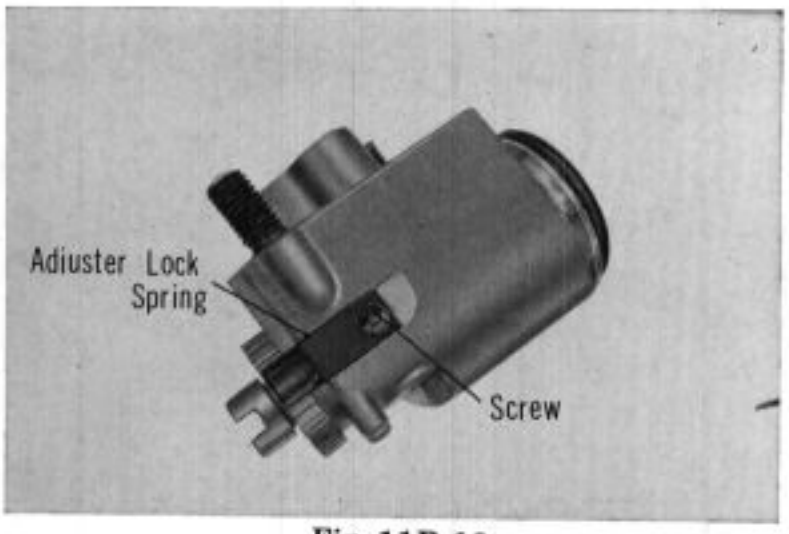


Fig. 11D-10

2. Loosen the adjuster lock spring screw and remove the adjuster and adjusting screw.

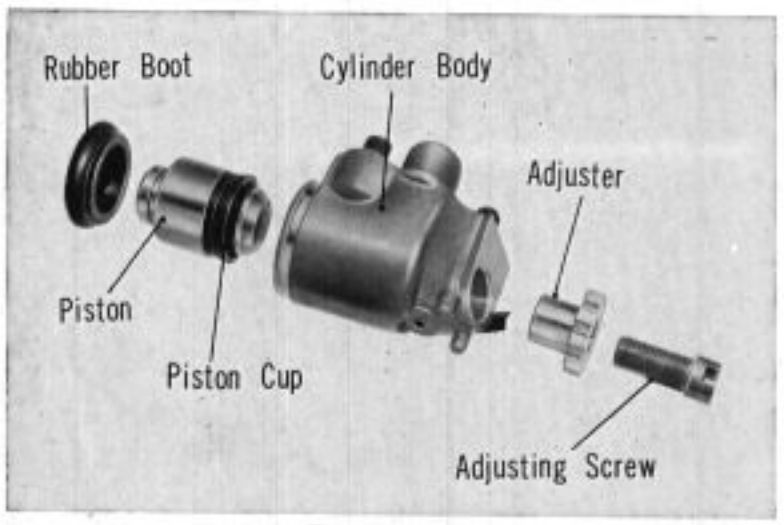


Fig. 11D-11

3. Disassemble the wheel cylinder as shown in the figure.

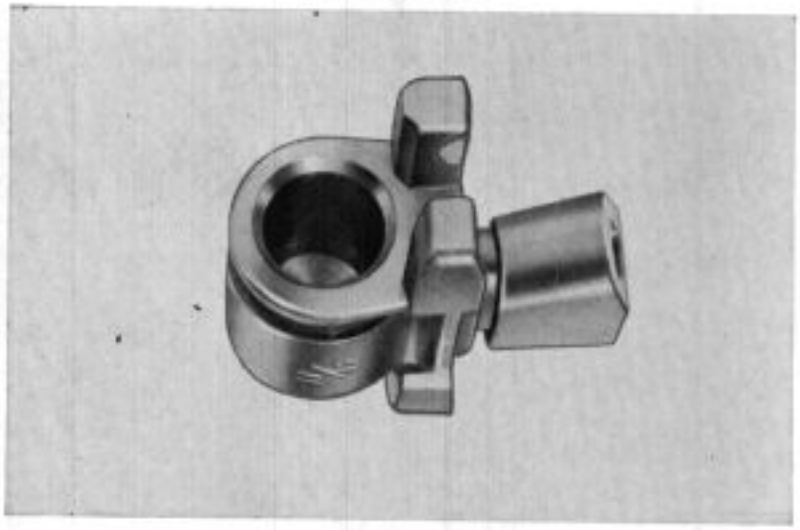


Fig. 11D-12

Inspection and Assembly

a. Wheel Cylinder

1. Wash all metal parts in clean alcohol or brake fluid.
2. Check the cylinder bore. If scratches or other damage is found, replace the cylinder.

Fig. 11D-13

3. Check the piston cup for damage or swelling. Replace the cup if necessary.

4. Check clearance between the piston and the cylinder bore. This is accomplished by inserting a feeler gauge, or measuring the piston with a micrometer and the cylinder bore with a cylinder bore gauge and taking the difference.

Unit: mm (inch)

	Standard value	Serviceable limit
Clearance	0.0020~0.105 (0.00079~0.00413)	Replace if more than 0.15 (0.0059)

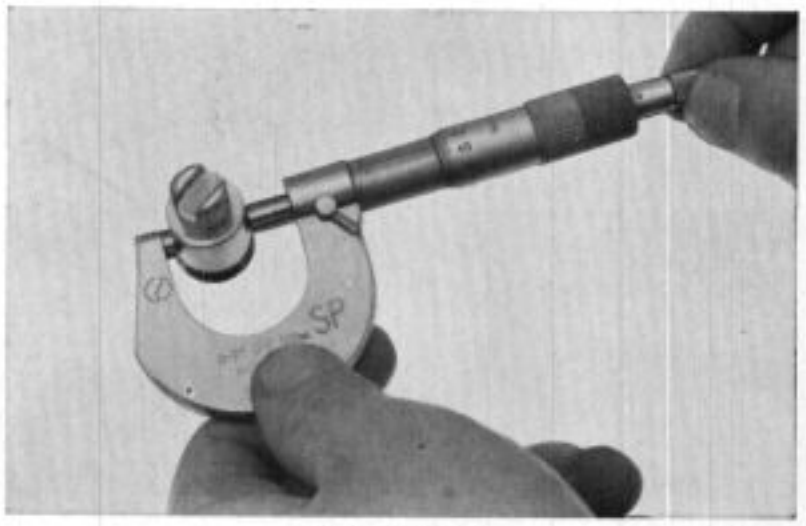


Fig. 11D-14

5. Install the wheel cylinder assembly on the backing plate.

   Note:

   (1) The wheel cylinder assembly of the leading/trailing type must move smoothly, so apply a light coating of grease around the contact surface.
   Assemble by placing the curved side of the pressure spring up, as shown in Fig. 11D-15.

   (2) Greasing, as mentioned above, is not necessary for the two-leading type. Tighten the nut (securing the wheel cylinder assembly to the backing plate) to a torque 2.1 to 2.4 kg-m (15.2~17.4 lb-ft).

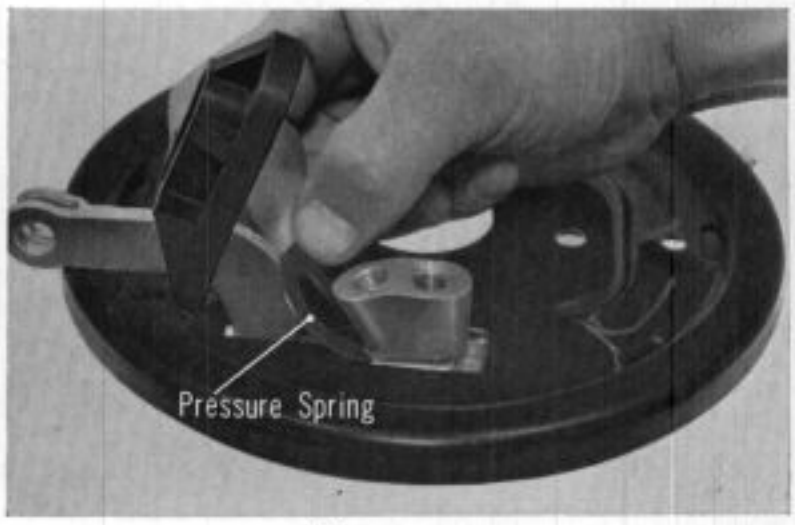


Fig. 11D-15

6. Check the O-ring for any damage.

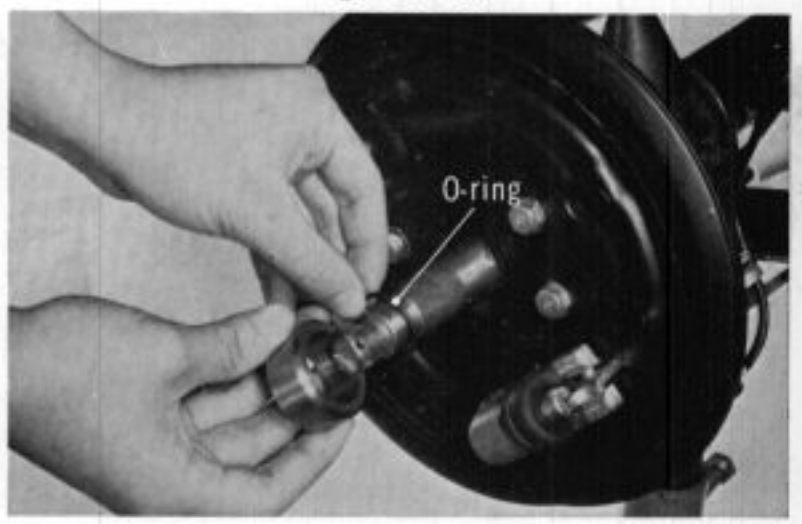


Fig. 11D-15a

7. Apply light coat of grease to the specified points on the backing plate.

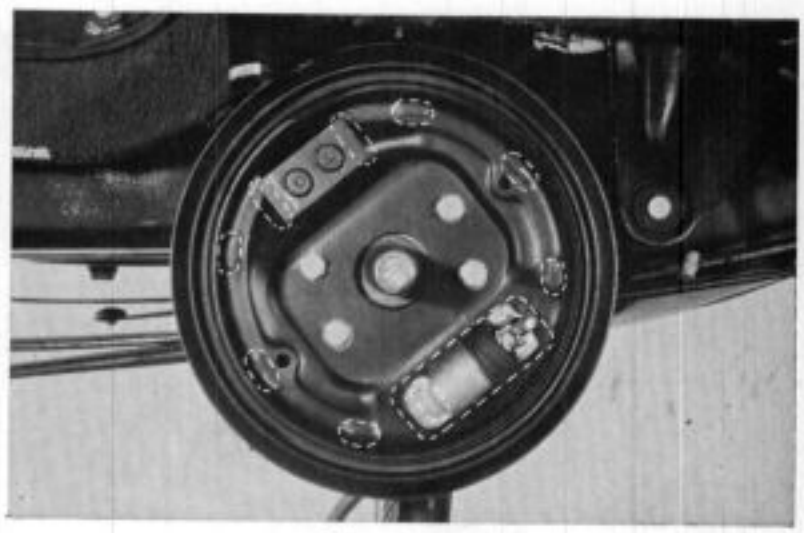


Fig. 11D-15b

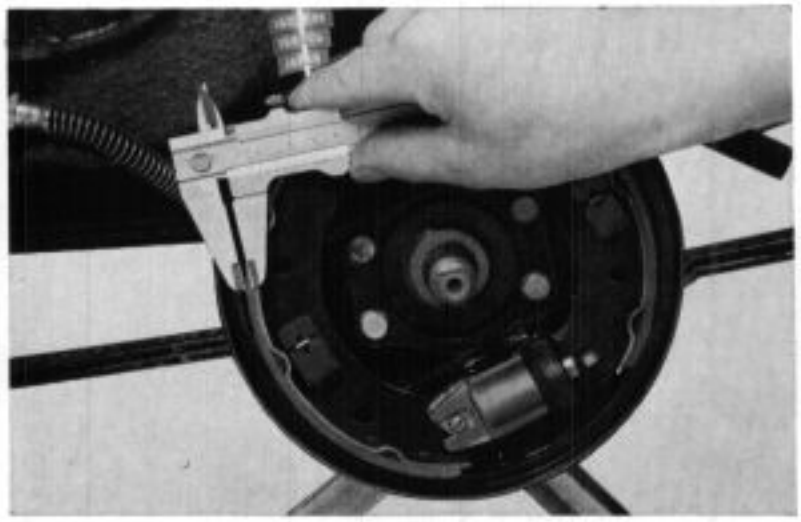


Fig. 11D-16

b. Brake Shoe

(Measuring thickness of the shoe lining.)
If the shoe lining is less than 1.4mm (0.055 in) thick when measured with vernier calipers, it should be replaced.

Note:
Replace the shoe on all four wheels at the same time. In case of uneven wear between the front and rear wheels, however, replace only the shoes of front wheels or rear wheels.

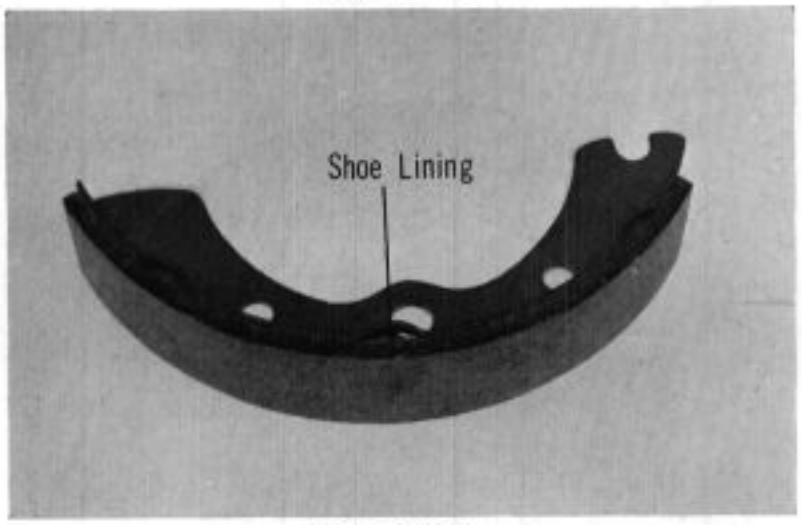


Fig. 11D-17

If shoe has been replaced, check the new lining for cracks and other damage.
Make sure that the lining surface is free from grease or oil. Always handle the shoe with clean hands.

Note:
Whenever checking the brake shoes, remove rust and dirt from the shoe contact faces on the backing plate and apply a light coating of grease on the faces.

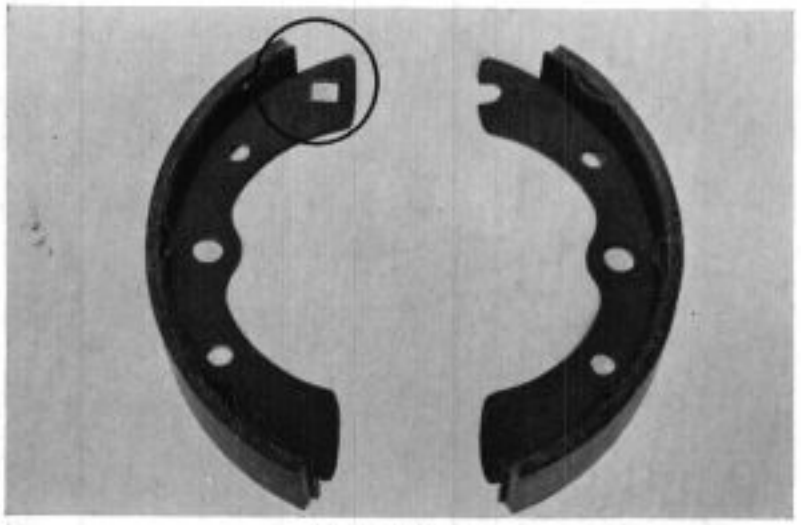


Fig. 11D-18

When replacing the rear brake shoes, make sure that positioning is correct. There is a groove into which the parking brake arm enters.

Before fitting the drum, turn the shoe-to-drum clearance adjusting screw counterclockwise for the "leading/trailing type" brake (Fig.11D-19) or the star adjusting screw inward for the "two leading type" (Fig.11D-20) to its extreme to obtain maximum clearance.

c. Brake Drum

Check the drum for cracks; the inner surface of the shoe for excessive wear and damage. Permissible play of the brake drum inner circumference is less than 0.05mm (0.00197 in) with respect to the center of the spline shaft. Deviation from the true should be less than 0.01mm (0.00039 in). A larger deformity can result in brake and squeaking which requires correction by grinding within the permissible depth of up to 0.5mm. Check the wheel bearings and oil seals for defects, then fit the brake drum and secure with the wheel hub nut.

Fig. 11D-18a

d. Brake Shoe Adjustment

After mounting the brake drum, adjust the clearance between the shoe and drum as follows.

1. Turn the adjusting screw clockwise for "leading/trailing type" Fig. 11D-19 or turn the star adjusting screw outward for "two leading type" Fig. 11D-20 to the point where the brake drum is locked.

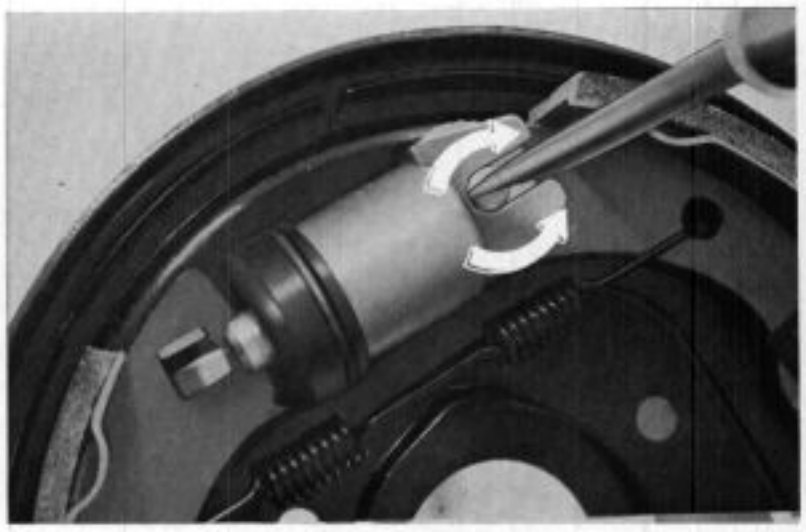


Fig. 11D-19

2. Back off the adjusting screw the minimum amount necessary to allow the drum to rotate freely.

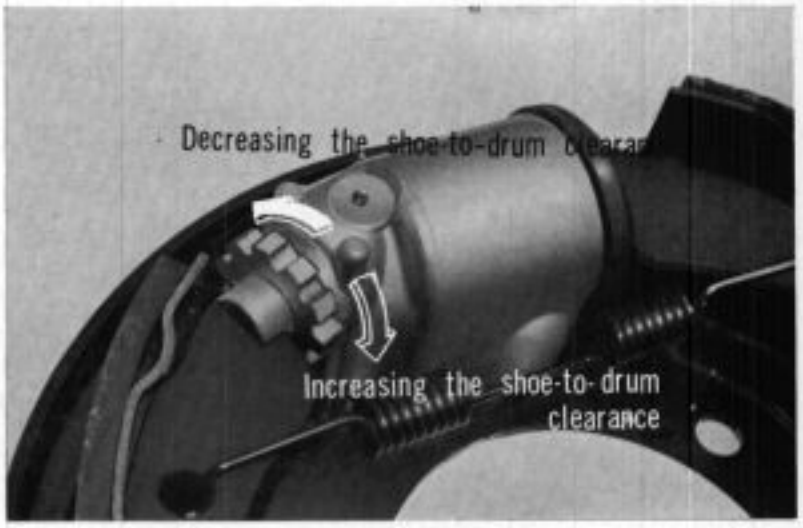


Fig. 11D-20

3. After adjustment, a check with respect to brake release should be made by turning the wheel after having actuated the shoes through a single depression of the brake pedal, otherwise, a proper brake shoe clearance can appear to be improper. This is, therefore a very important check and it should be conducted again after the brake pedal has been depressed several times.

Brake shoe adjustment for the two leading type, which has two cylinders per wheel, should be made independently for each wheel cylinder to insure equal performance of both, prevent brake squeaking, and at the same time insure the utmost braking efficiency.

E. Disc Brake

Description

The Annett type disc brake installed on Honda N600 consists of a cast steel cylinder body mounted on the spindle knuckle, and surrounding this cylinder is a yoke made of pressed steel plate incorporating a guide to permit movement.

There are two pistons within the cylinder, the outer piston axis is fitted through the yoke bias ring located at one end of the cylinder. When the hydraulic pressure is applied, the inner piston applies force directly to the inner pad while the outer piston applies force against the yoke on which the outer pad is mounted. This causes both pads to apply force against the brake disc from both sides to perform the braking function. The feature of the Annett type disc brake is that the outer pad which is supported by the yoke is moved along the cylinder axis by being guided along the groove in the body.

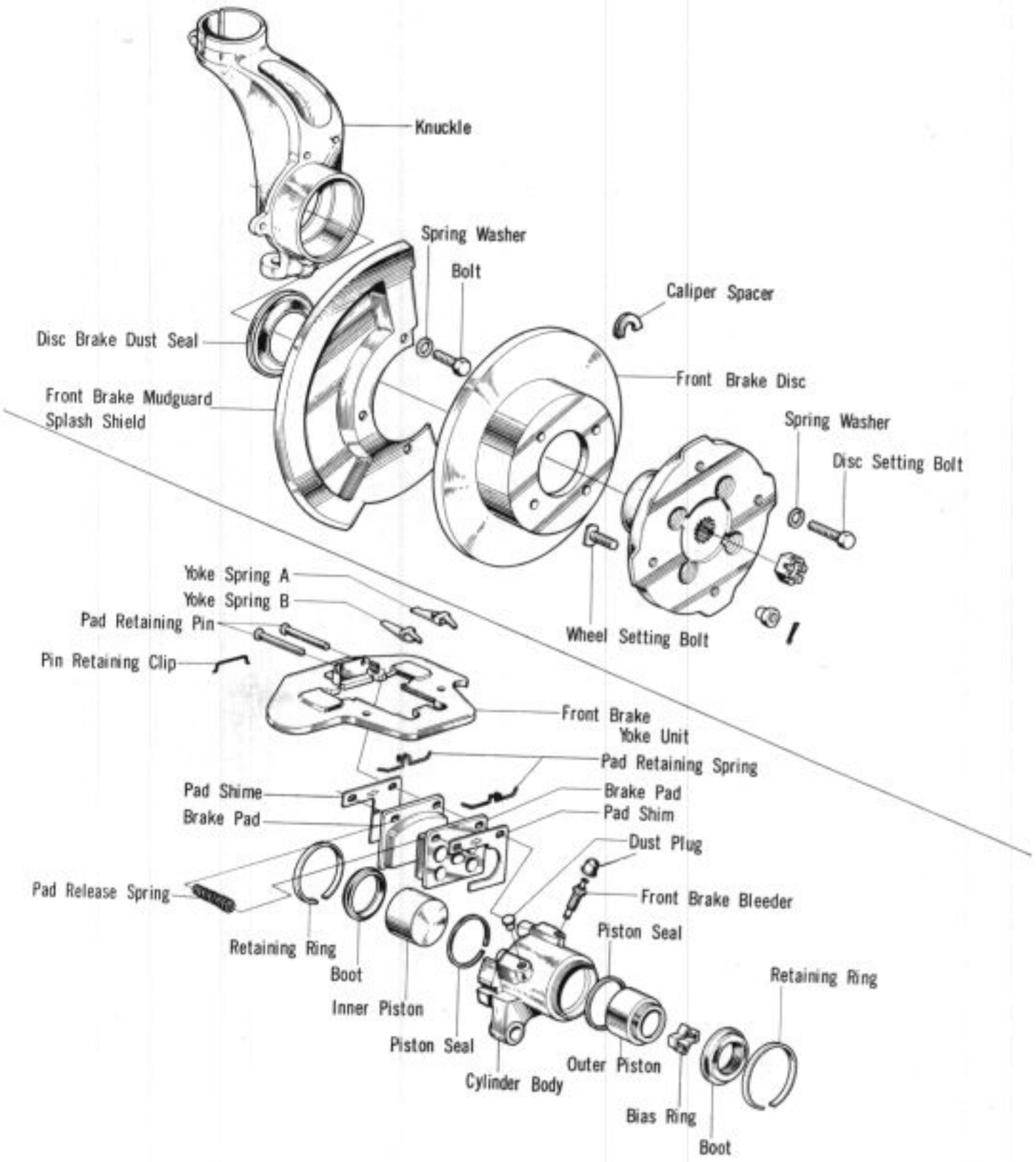


Fig. 11E-1

Specifications

The specifications of the annett type disc brake used on the N600 are as follows:

Designation	10/12A	
Cylinder diameter	42.87mm	(1.69 in.)
Cylinder area	14, 4cm^2	(2.23 sq in.)
Pad braking surface	20. 6cm^2	(3.20 sq in.)
Pad lining thickness	10. 3mm	(0.406 in.)
Pad lining effective thickness	8.3 mm	(0.327 in.)
Effective radius	70mm	(2.756 in.)

Inspection of Brake Pad

In addition to periodical check every 3000 miles, the disk brake lining should be inspected whenever the wheels are removed for any reason.

Fig. 11E-1a

Disk brake pads should be replaced when approximately 2.0mm (0.8 in) lining thickness remains. It is strongly advisable to replace all pads at the same time.

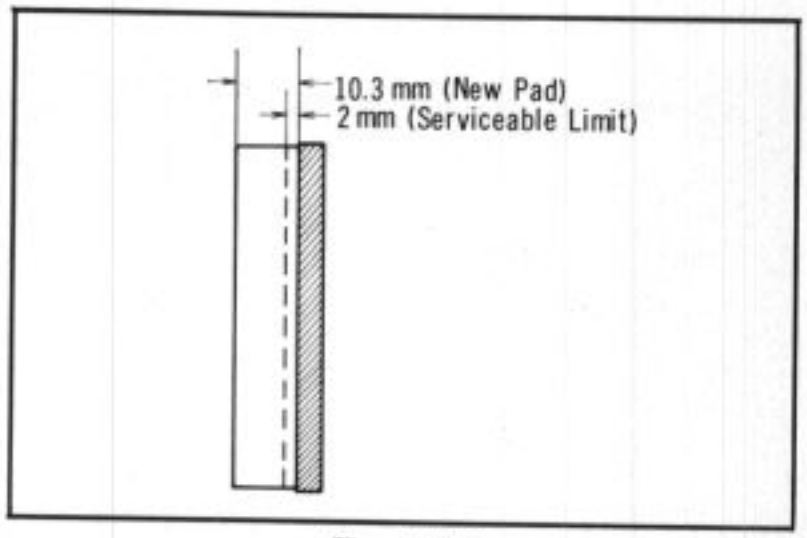


Fig. 11E-1b

A slightly tapered wear condition of the lining is normal and does not require replacement unless there is less than the minimum thickness.

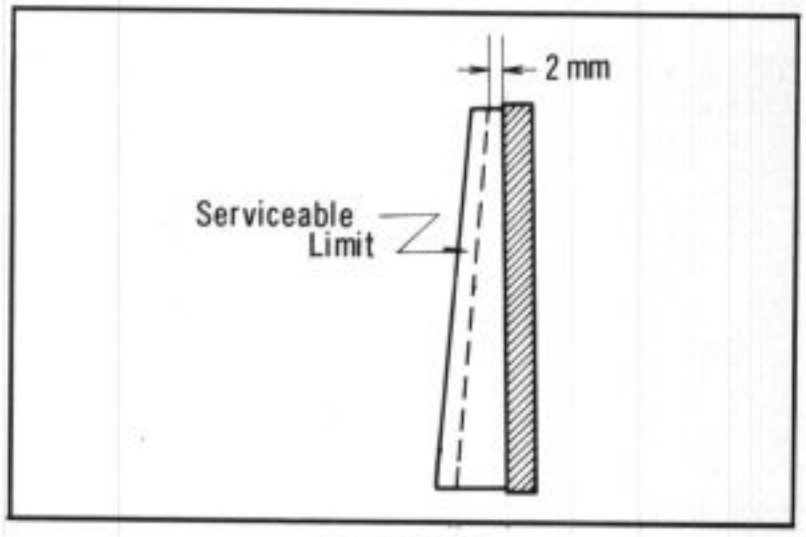


Fig. 11E-1c

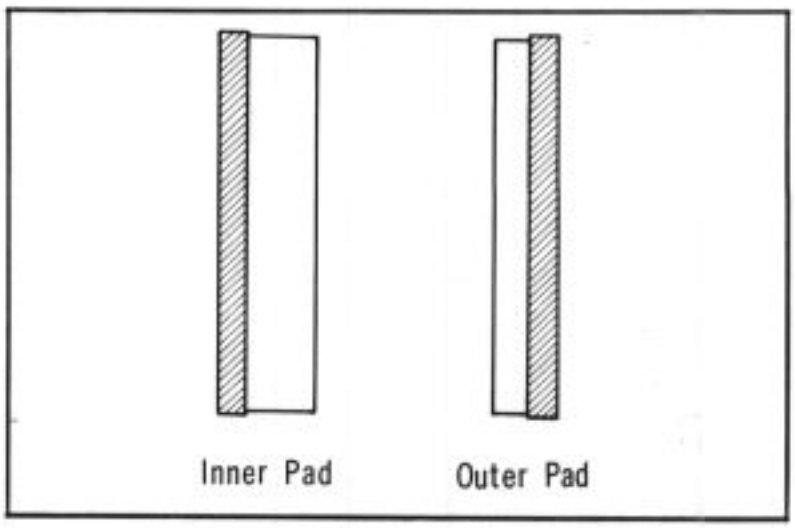


Fig. 11E-1d

If lining wear differs extremely between inner and outer pad, check the operation of the caliper. (Fig. 11E-30).

Replacement of Brake Pad

(Removal)

1. Raised the front wheels off the ground, and remove the wheels.

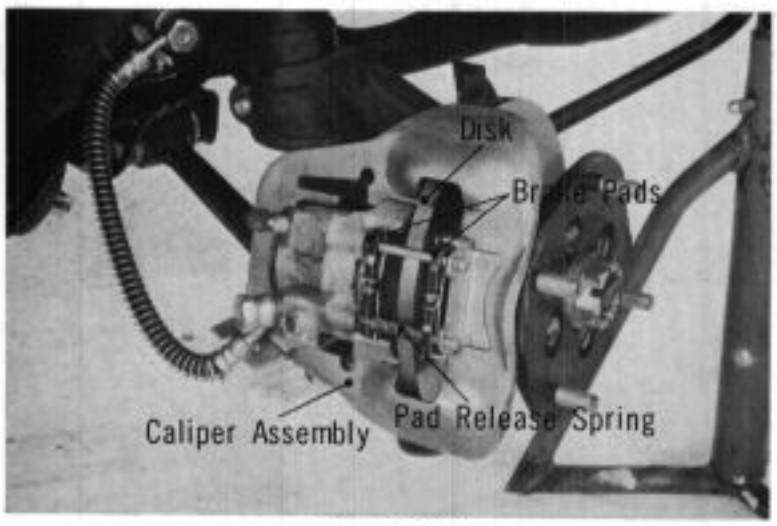


Fig. 11E-2

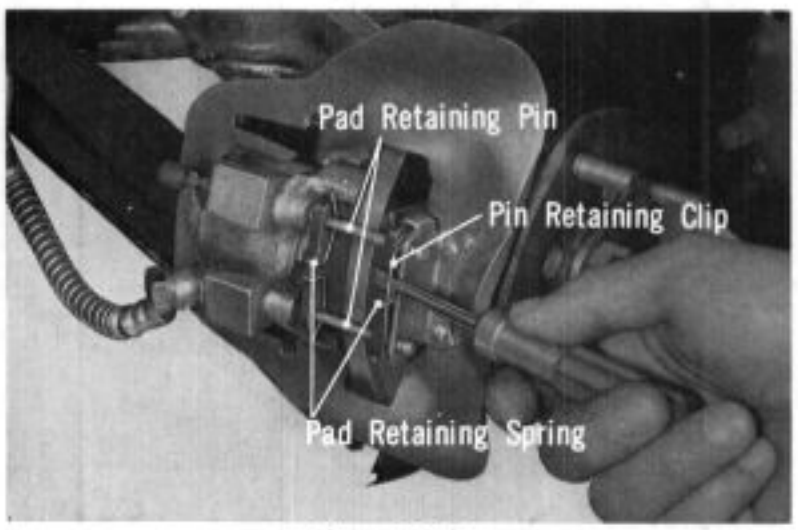


Fig. 11E-3

2. Remove the pin retaining clip which is fitted into the hole in the pad retaining pin.

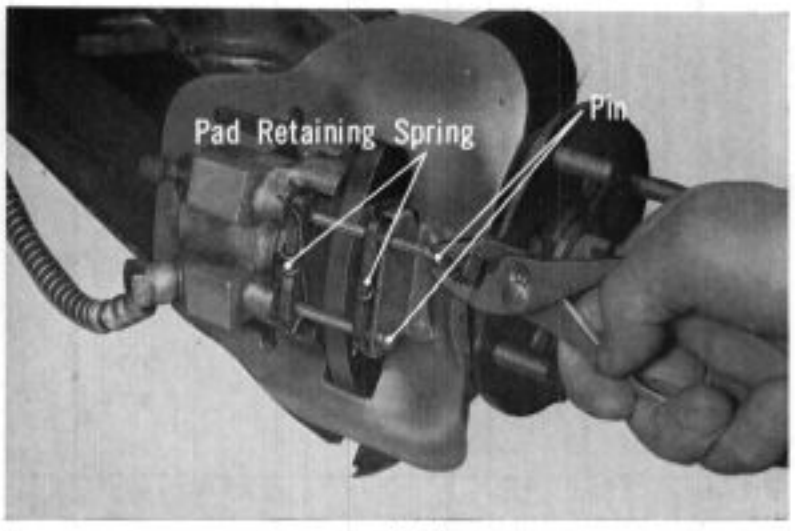


Fig. 11E-4

3. Remove the two pad retaining pins and the two pad retaining springs with a plier as shown in Fig. 11 E-4.
   In removing them, care must be taken to prevent springs from flying apart.

4. The pad can be removed together with the shim after removing the springs and pins. If the pads are difficult to remove, open the bleeder valve and move the yoke in the direction of the piston. The pads will become loose and can be easily removed.

   Note:
   After the pad is removed, the brake pedal must not be touched.

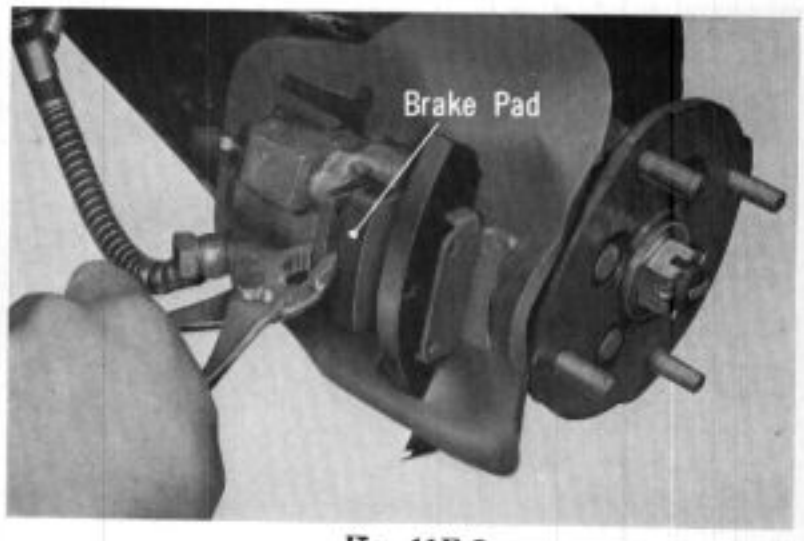


Fig. 11E-5

(Reinstalling New Pad)

5. Before starting to reassemble, the exposed areas such as the guide grooves, piston head and yoke sliding surface should be cleaned, preferably with a solvent such as alcohol.
6. Loosen the bleeder valve and push the inner piston back into the cylinder so that the piston is butted against the boot retaining ring.
7. Also push back the outer piston by applying pressure on the yoke so that the piston butts against the retaining ring.
8. After providing space to install the new pads on both sides of the disc, close the bleeder valve and insert the pad. Insert a shim behind each pad and in the direction so that the arrow on the shim is pointing up. (Fig. 11E-7)

   Note: When installing new pads without bleeding, do not overflow the brake fluid reservoir.

The shims to be installed behind the four pads on both front wheels are interchangeable with one another.

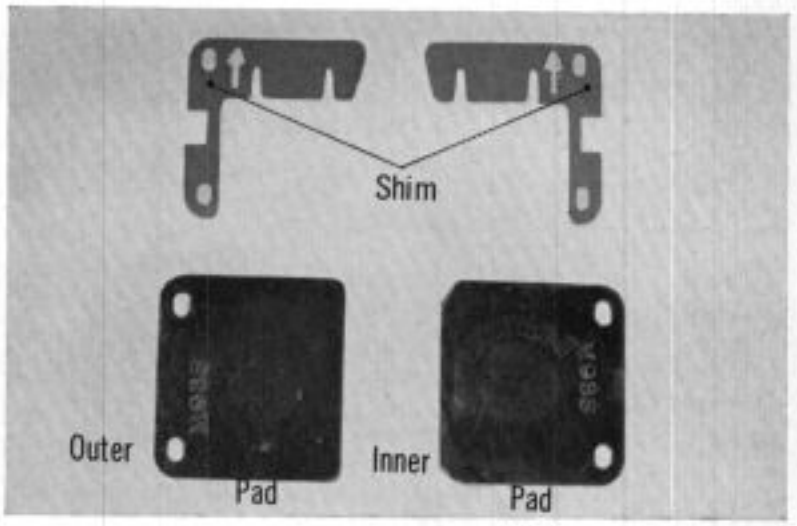


Fig. 11E-6

9. Incorrect installation of shims may cause squeaking brakes.

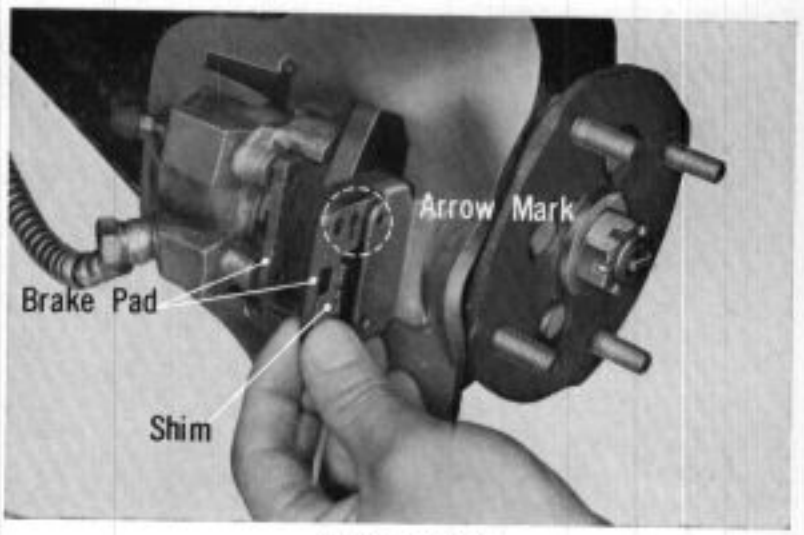


Fig. 11E-7

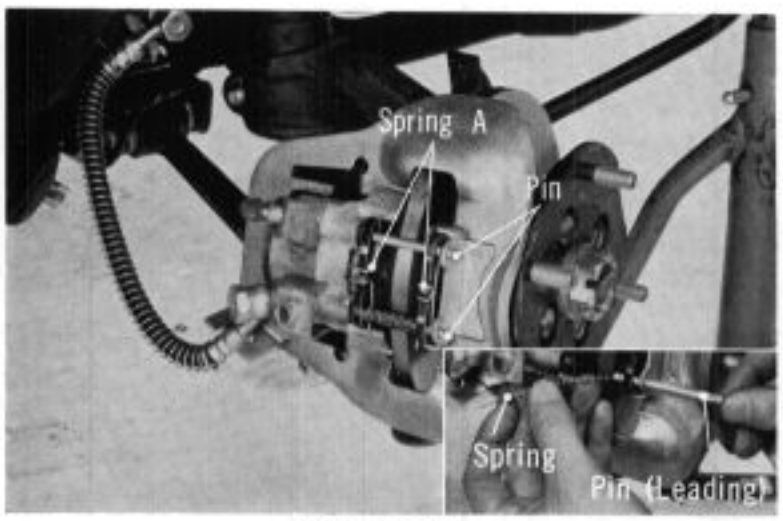


Fig. 11E-8

10. First install one of the pins and then hook one end of the pad retaining spring on this pin, clip the center loop over top of the pad and hold down the opposite end of the spring while pushing the pin through to align with the inside pad and mounting hole. Insert the pin retaining clip into the hole under the head of the pin.
    A coil spring is provided (should be installed only to the leading pin) to help the pads release fully.

11. Apply the brake pedal so that the pad will position itself against the disc, and then check for proper pedal travel. If the travel is excessively large, air bleeding of the brake system is necessary.

12. Reinstall the tire and then spin the wheel by hand with the brake released. For normal condition, it should require 2—3 kg (4.4 lb) force at the outer circumference of the tire to spin the wheel. If greater force is required, the wheel bearing may be excessively worn or the disc is out of alignment and causing the wheel to bind. Under such a condition, the tire should be removed and the runout of the disc be checked, to see if it is within the 0.10 mm (0.004 inch) tolerance.

Note:

1) The superior braking performance of the disc brake, though small in braking surface, is the result of the pads being manufactured of special compounded material and molded under closely controlled prosesses.

   The imitation brake pads which may be available in certain areas will not give the braking performance or the service life of the genuine brake pad recommended by Honda.

   Always insist on the genuine part which is stamped "TOKIKO" on back of the pad.

2) Even the slightest oil, grease, or thumbmark on the frictional surface of the pad may affect the braking performance as it is so small in size.

   When replacing the brake pad or performing air bleeding, exercise care not to contaminate the friction surface.

3) When replacing brake pads, they should be replaced in pairs and also on both sides to assure balanced braking performance.

   Replacement of brake pads only on one side may result in uneven braking which will cause the vehicle to pull to one side.

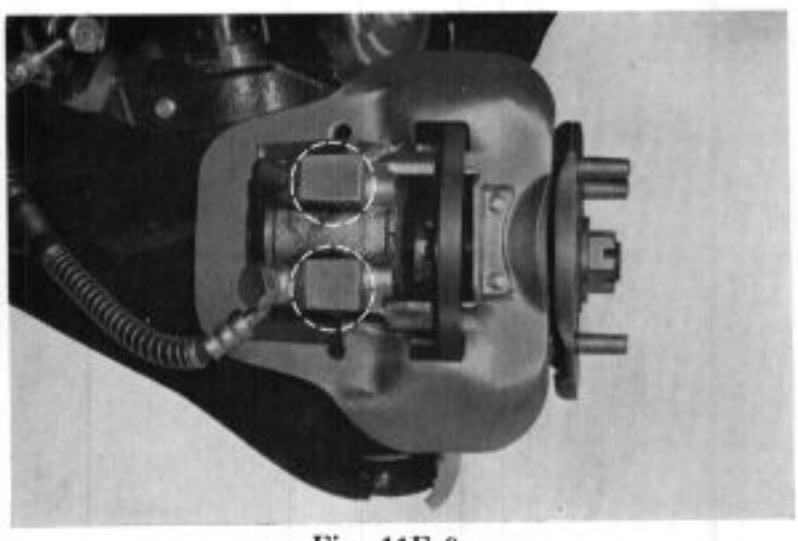


Fig. 11E-9

Removal and Disassembly

1. Unscrew the hub nuts and remove the wheel.
2. The caliper housing is mounted to the knuckle with 10mm bolts. Remove these bolts from the bottom side using a universal socket wrench. The hydraulic system (brake hose) need not be removed this time. Between the caliper and the knuckle at the fastening points are installed two adjusting shims.

   Care must be taken not to lose them.
   (The two 10mm bolts are located behind the cylinder. These locations are indicated with dotted round marks).

3. Remove the spindle nut, and extract the hub using a wheel puller.

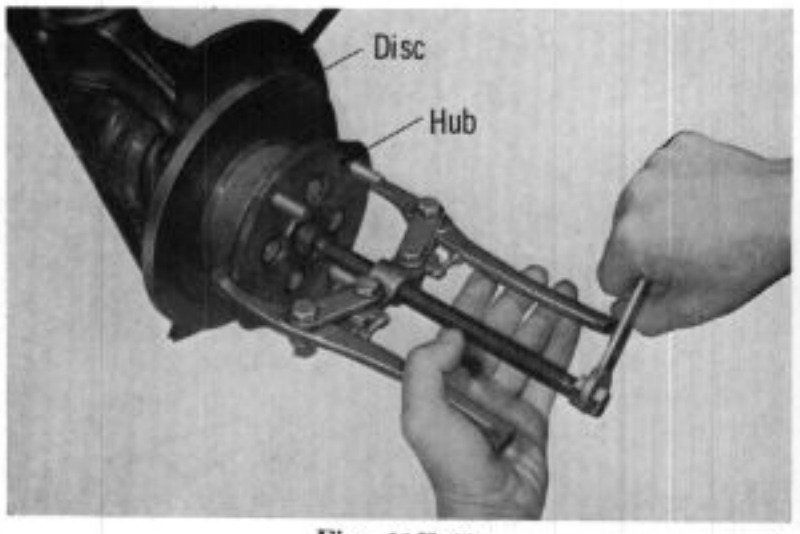


Fig. 11E-10

4. That splash shield plate is attached to the knuckle with three 8 mm bolts.

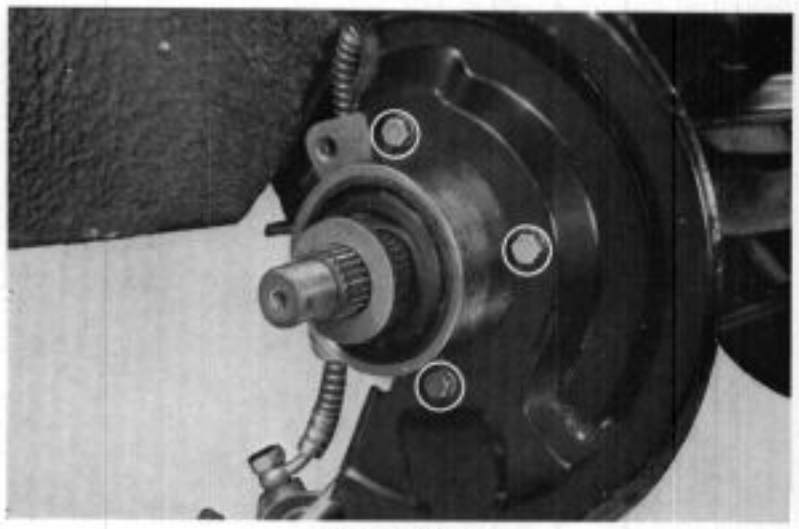


Fig. 11E-11

5. Remove the disc brake pads from the caliper assembly in accordance with the description in section "Removal of Brake Pad".

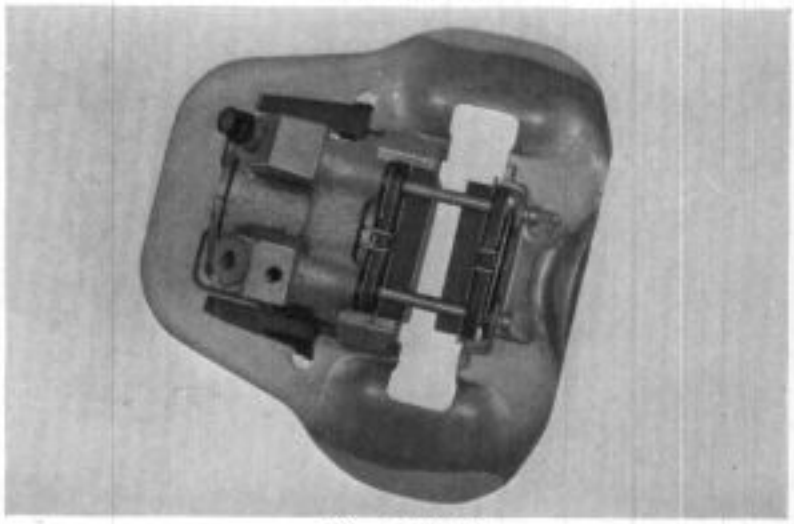


Fig. 11E-12

6. Tap the cylinder body lightly with a plastic hammer at the points shown in Fig. 11 E-13 to lightly remove the cylinder body.
remove the cylinder body from the caliper assembly. Exercise extreme care to avoid damage to the cylinder body.

   At this time, if only the cylinder body moved while the outer piston is held stationary on the caliper, a gentle tap on the piston should loosen the piston. Refrain from hitting the rubber boot to prevent its damage.

   The round marks in the Figure show the position to be tapped with the hammer.

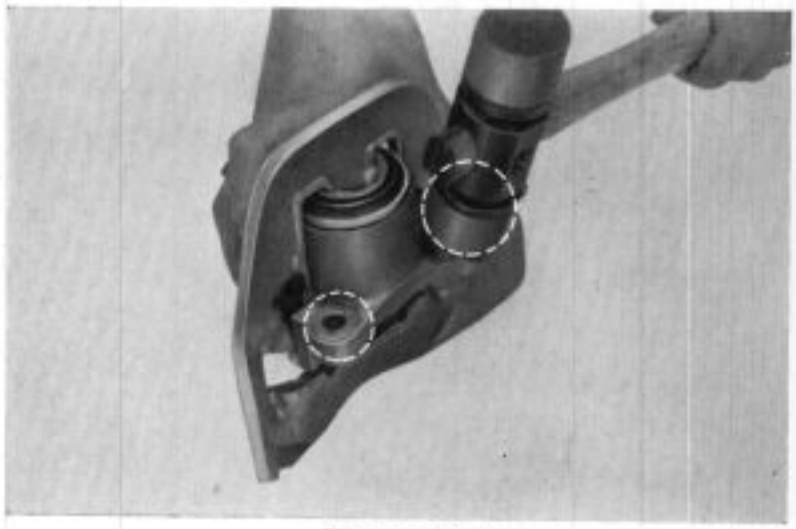


Fig. 11E-13

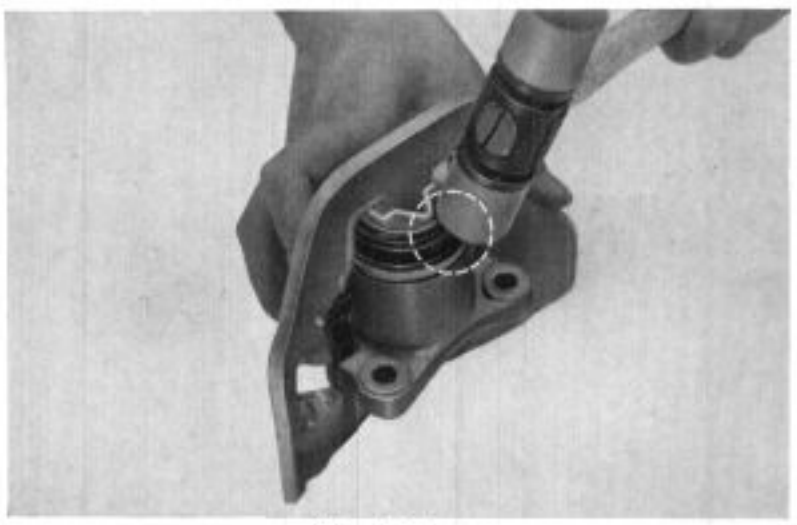


Fig. 11E-14

7. Fig. 11 E-14 shows the tapping point to loosen the piston.

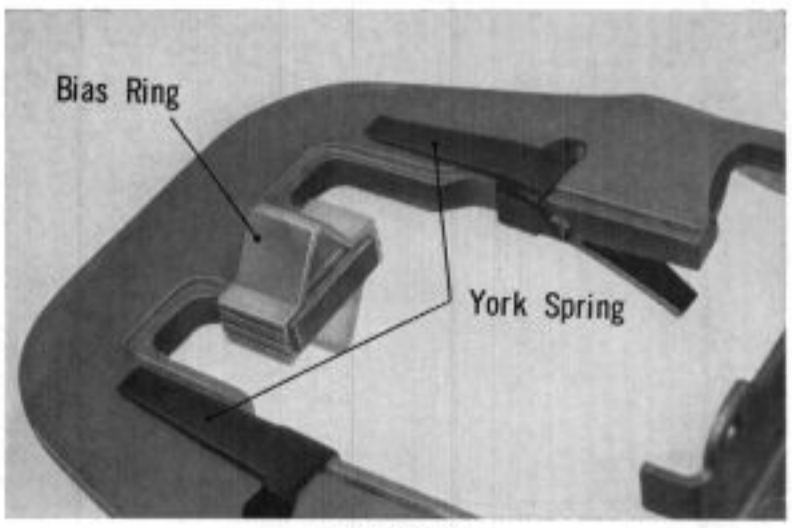


Fig. 11E-15

8. Remove the bias ring and also the two yoke spring from the caliper.

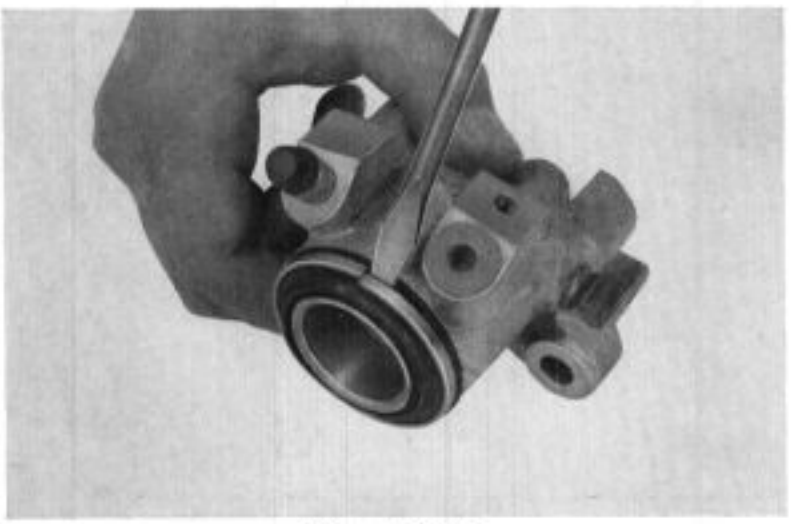


Fig. 11E-16

9. Remove the piston boot retainer rings at the both ends of the cylinder, using a driver and exercising care not to damage the rubber boots.

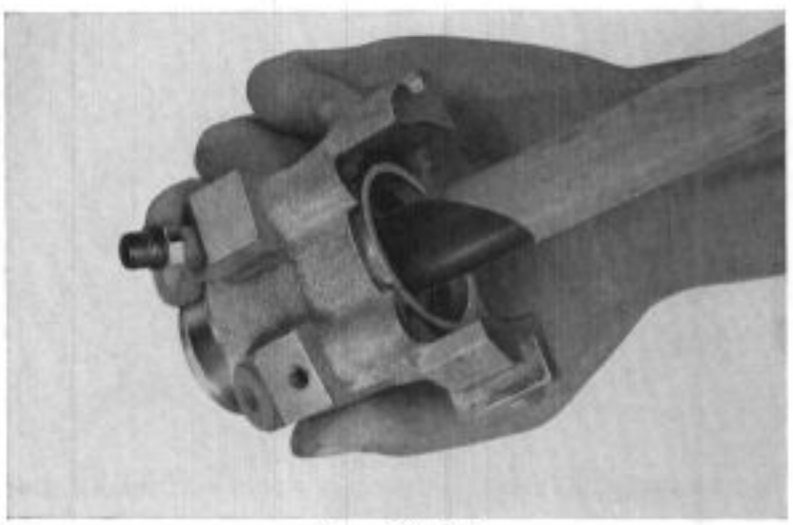


Fig. 11E-17

10. Both pistons (inner and outer) can be removed from the cylinder body by pushing through from one end, using a wooden rod as shown in Fig. 11 E-17.

11. Remove the piston seals installed on the inside of the cylinder at the both ends using a screw driver.

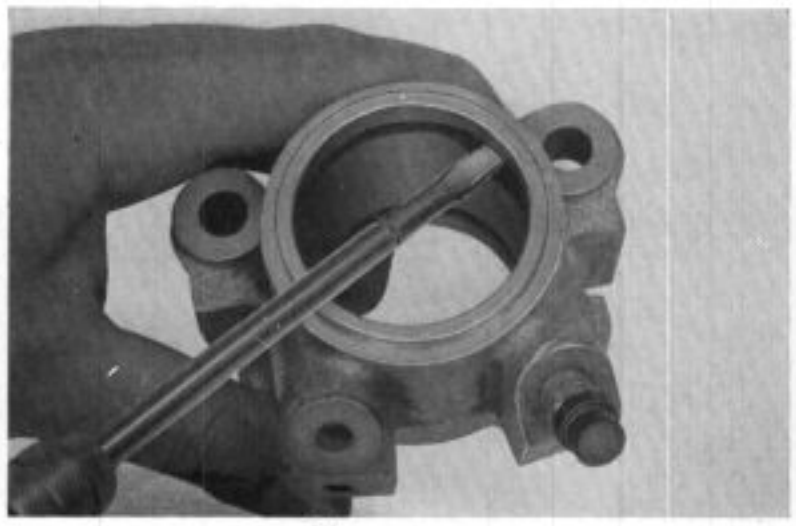


Fig. 11E-18

Assembly

12. Clean all the parts in solvent and dry thoroughly with compressed air.

13. Apply brake grease on the grooves and sliding surfaces and install the yoke springs with the tongue positioned toward the disc as shown in Fig. 11 H-19.

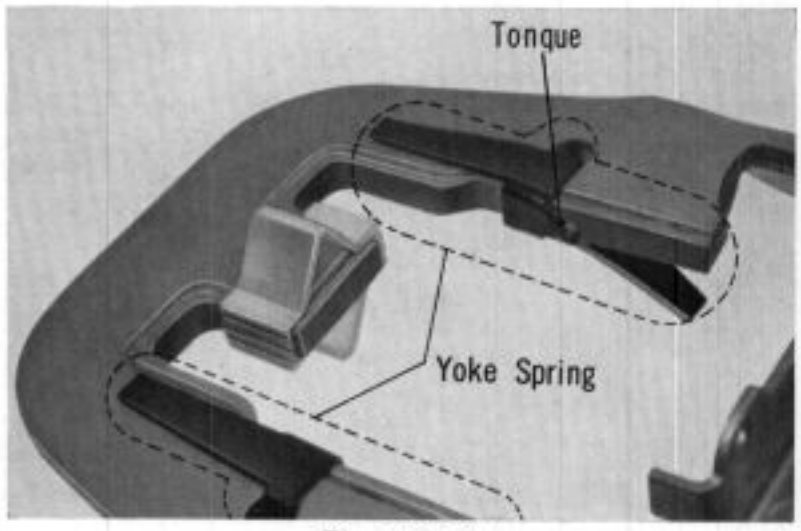


Fig. 11E-19

14. Apply rubber grease to the new piston seals as well as in the seal grooves and install the seal as shown in the detail in Fig. 11 E-20 bottom right. A piston seal installed in the incorrect way will result in oil leaks. Install the seals in the correct position without fail.

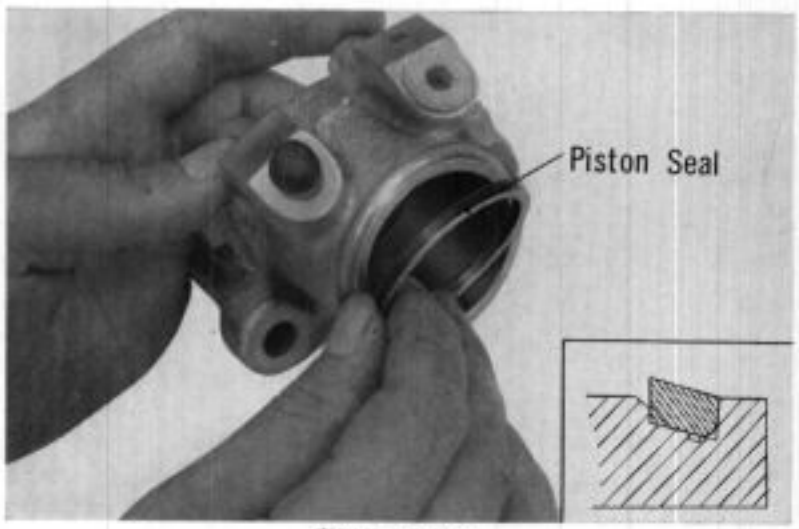


Fig. 11E-20

15. Apply rubber grease sparingly on the inside surface of the cylinder and insert the pistons into the cylinder untill the end of the piston skirt is even with the end of the cylinder. The outer piston and inner piston are not interchangeable, therefore, care should be taken so that the pistons are located correctly.

16. Insert a new bias ring into the outer piston which has been cleaned and dried. The bias ring must be installed to the full depth with the round brim toward the bottom. Whenever the cylinder is removed from the yoke, the bias ring should be replaced with a new one.

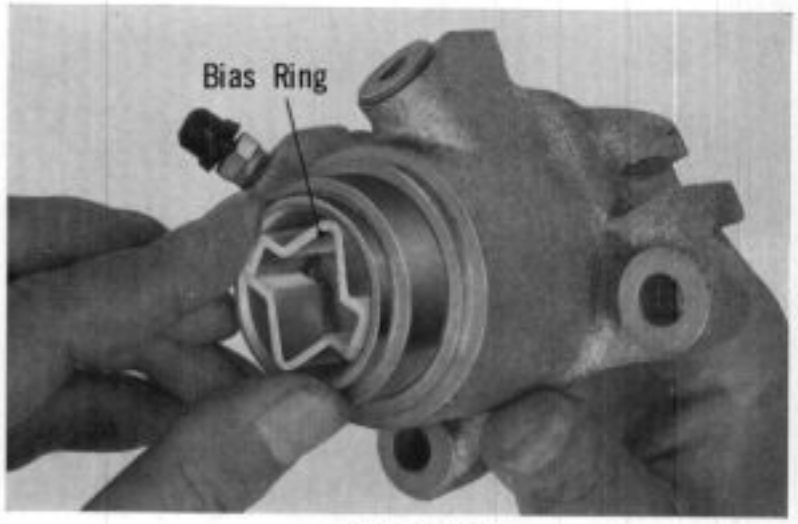


Fig.11E-21

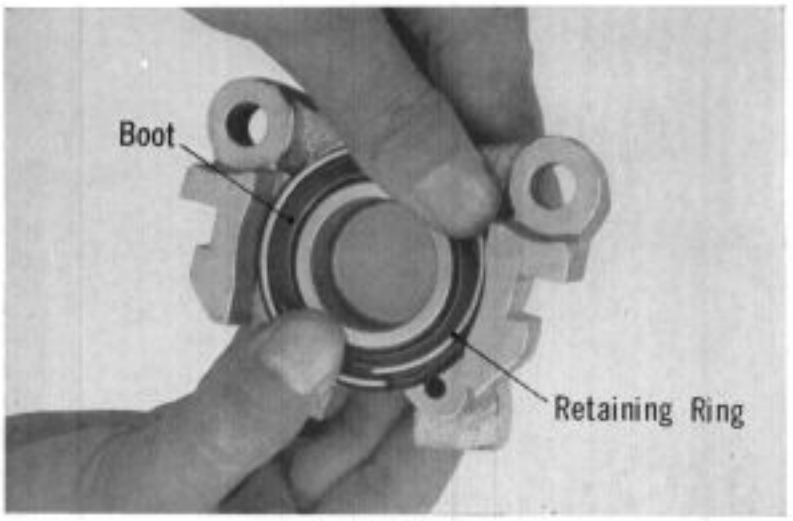


Fig. 11E-22

17. Install boots over both pistons and fix with retaining rings as shown in Fig. 11 E-22. Care should be taken so as not to damage the boots when installing the retaining rings.

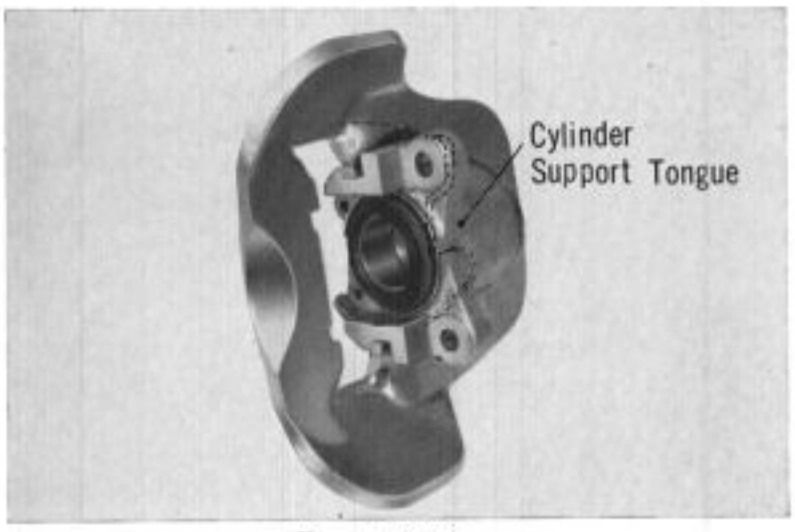


Fig. 11E-23

18. Apply grease on the sliding surfaces of the caliper and cylinder body.
Align the bias ring which is assembled in the outer piston so that the slot in the ring will fit on the cylinder support tongue of the caliper. Use extreme care not to damage the rubber part.

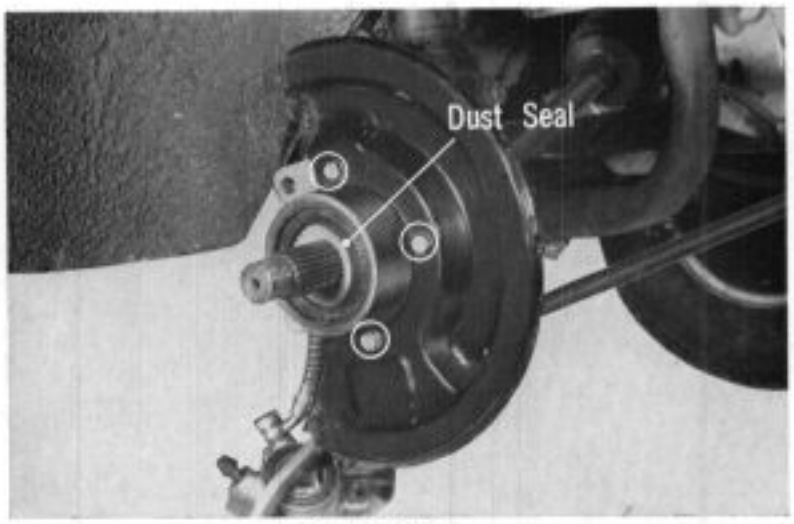


Fig. 11E-24

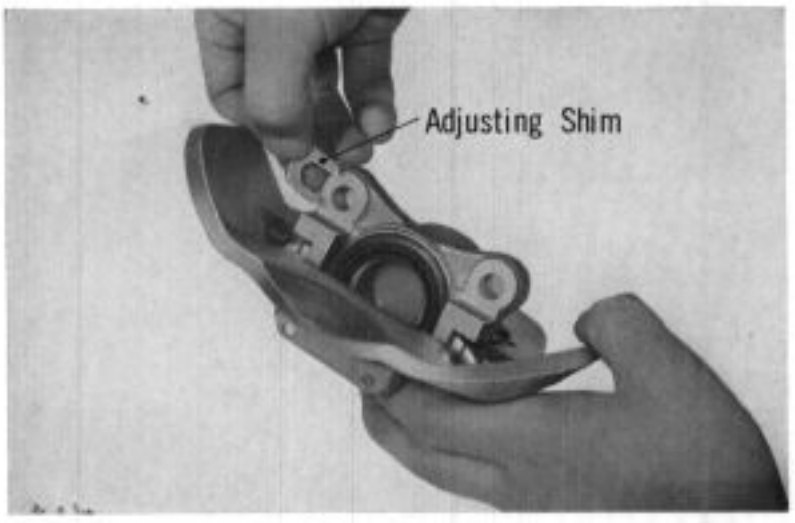


Fig. 11E-25

Installation and Inspection

19. Install the splash shield plate on the knuckle, and install the dust seal to both the wheel bearing and the thrust plate.

20. Install the disc together with the hub on the spindle with the hub nut. Torque the nut to specifications.
Note:
Use new cotter pin.

21. Check the perpendicularity (runout) of the disc with respect to the spindle. Runout greater than 0.10mm (0.004 in.) at point near the disc circumference should be corrected or the disc should be replaced.

22. Adjusting shims should be installed between the knuckle and the cylinder body on those vehicles whose brake pads are difficult to fit when newly replaced.

Thickness are as follows:
(1) 0.4 mm (0.016 in.)
(2) 0.6 mm (0.024 in.)

Note:
Never replace them with those of different thickness. The proper shim has been selected in the factory.

23. Tighten the two bolts which fasten the caliper on the knuckle to a torque value of 5.0 kg-m~6.0 kg-m (37~44 lb-ft).

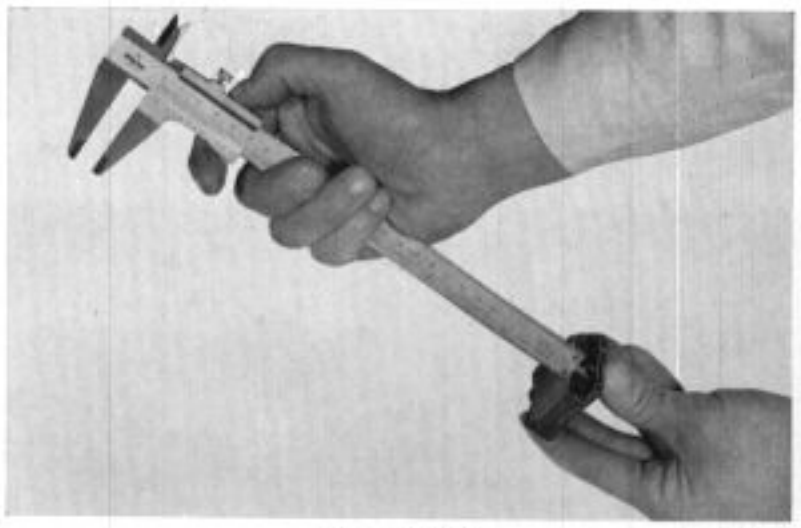


Fig. 11E-26

24. New brake pad lining has a thickness of 10.3mm (0.406 in.).
They should be replaced when worn to 2.00mm (0.08 in). Refer to the instruction in "Replacement of Brake pad".

25. The brake disc will develop circular scores as shown in Fig. 11 E-27 after long or even short usage when brake is applied frequently. Excessive scoring not only causes a squealing brake but also shortens the service life of the brake pads.

However, light scoring of the rubbing surface not exceeding 0.4mm (0.015 in) in depth, may result from normal use and is not detrimental to brake operation.

Worn Disc

Fig. 11E-27

26. Machining of the disc having an initial thickness of 9.6 mm (0.378 in.) will result in a reduced thickness. The disc must not be ground beyond the serviceable limit of 7.6 mm (0.299in).

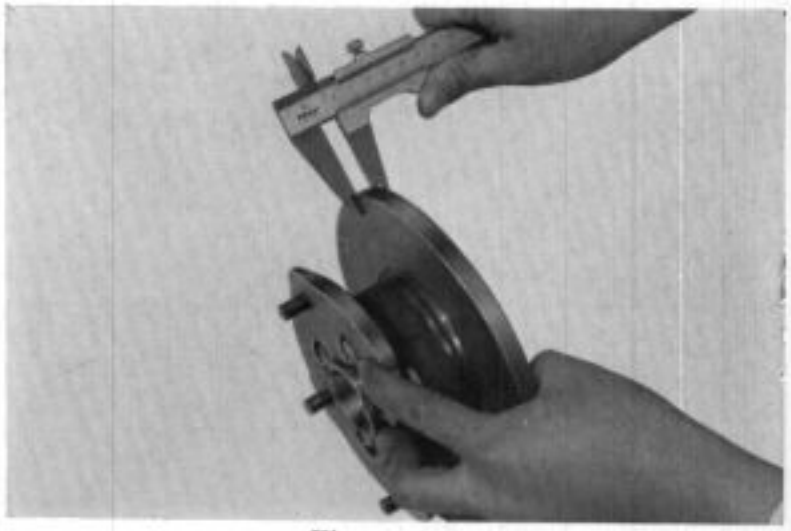


Fig. 11E-28

Check the wheel bearings for excessive play and replace if necessary. Measure the total lateral runout of the disk by turning slowly. Do not push the disk in the axial direction as this will give a false reading. The maximum permissible runout is 0.10mm (0.004 in).

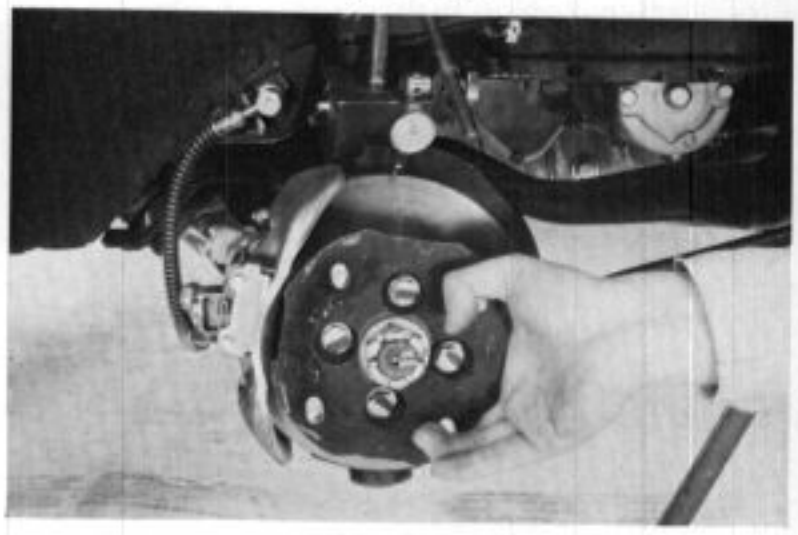


Fig. 11E-29

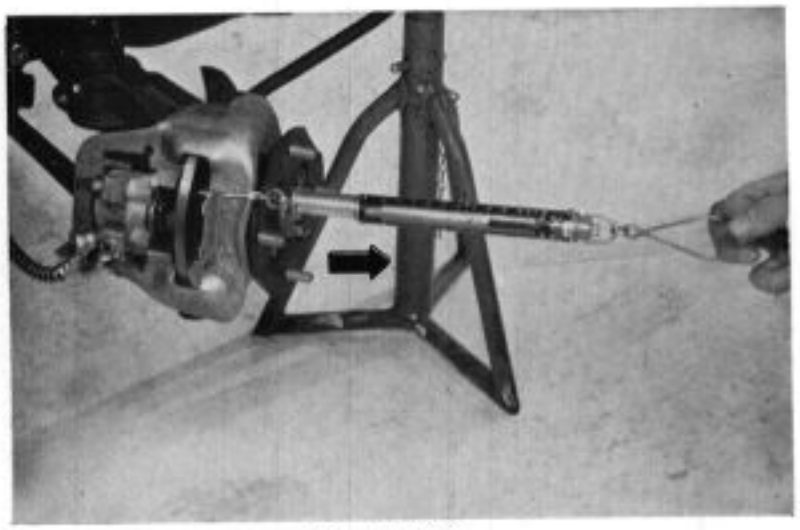


Fig. 11E-30

Inspect the caliper operation. If lining wear differs extremely between inner and outer pads, the caliper may be unable to move peoperly due to rust and dust at the sliding surfaces.
Clean the sliding part of the caliper and apply brake grease. Measure the amount of force required for sliding the caliper from the neutral position with a spring scale.

Standard reading; 25 kg (55 lbs)

Disk Brake Trouble Diagnosis

Trouble	Cause of Trouble	Corrective Action
Excessive vibration or large pedal stroke	1. Air present in fluid pressure system	Bleed air
	2. Oil leakage from fluid pressure system	Repair
	3. Faulty master cylinder piston, cup and seal	Replace
	4. Insufficient brake oil	Replenish and bleed air
	5. Worn front brake pad	Replace
	6. Unevenly worn front brake pad	Repair or replace
	7. Malfunction of pedal link system	Adjust
	8. Excessive runout of brake disc	Adjust
Squealing noise	1. Dragging of brake	Refer to the section on dragging
	2. Worn brake pad	Replace
	3. Deteriorated brake lining surface	Replace
	4. Improperly installed shim	Correct
	5. Foreign particle deposited on the friction area of disc.	Clean
	6. Runout or damaged disc	Correct by machining
	7. Disc surfaces not parallel	Correct by machining or replace

Trouble	Cause of Trouble	Corrective Action
Uneven braking	1. Improper inflation of tire	Inflate properly
	2. Water or oil deposited on the brake pad surface or disc	Clean or replace
	3. Worn or damaged (strain, rust) disc and drum	Correct by machining or replace
	4. Poor contact of pad surface	Correct or replace
	5. Carbonized or faulty pad	Replace
	6. Loose caliper mounting bolt	Retighten
	7. Malfunction of brake cylinder	Check and replace, if necessary
	8. Improper tightening of wheel bearing	Retighten
	9. Different pad material used on the left and right wheels	Replace
	10. Improperly aligned front wheel	Realign
	11. Clogged fluid pressure system	Clean
	12. Improper action of caliper yoke	Clean and apply brake grease
Dragging of one or both wheels	1. No pedal play	Adjust
	2. Weak or broken brake pedal return spring	Replace
	3. Malfunction of pedal link system	Adjust
	4. Clogged master cylinder return port	Repair
	5. Poor action of caliper yoke	Clean and apply brake grease
	6. Loose wheel bearing	Retighten
	7. Clogged fluid pressure system	Clean

Trouble	Cause of Trouble	Corrective Action
Insufficient braking force	1. Worn brake pad	Replace
	2. Water and oil on the brake pad contact area	Clean or replace
	3. Insufficient brake fluid	Replenish
	4. Air mixed into brake fluid	Bleed air
	5. Oil leakage from the fluid pressure system	Check and repair
	6. Oil leakage from master cylinder and caliper body seal	Check and replace
	7. Use of imitation or inferior pad	Replace with genuine part (brand name "TOKICO" marked on the back surface)
	8. Deteriorated pad and poor contact	Repair or replace
	9. Improper action of caliper yoke	Clean and apply brake grease
	10. Clogged fluid pressure system	Check and clean

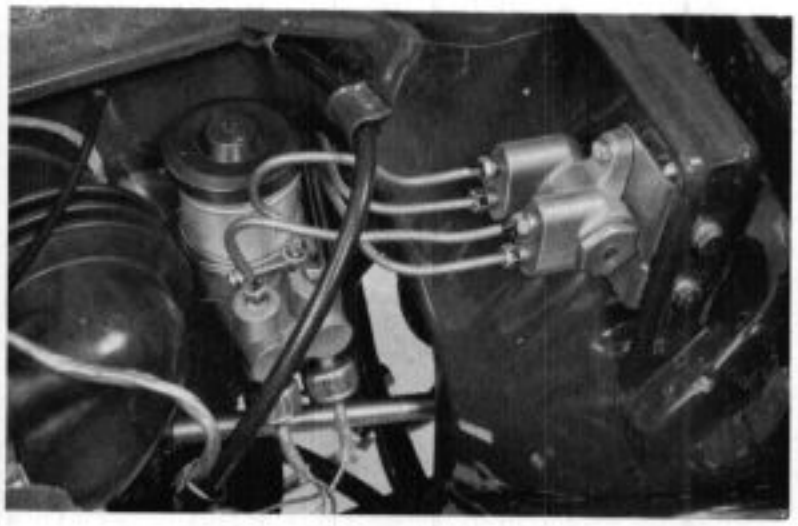


Fig. 11F-1

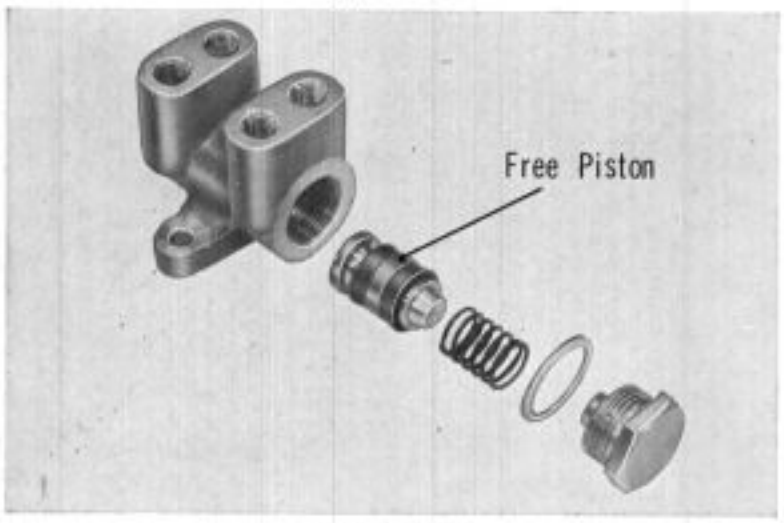


Fig. 11F-2

F. Bypass Valve

The bypass vlave is provided for all N600 Model vehicles equipped with a dual brake system and parallel master cylinder. Since the N600 is the front wheel drive car, its weight districution favors front wheels to provide greater vehicle tracking force. This also means the braking force is greater on the front wheels than on the rear. Thus, wear of the front wheel shoes occurs quicker than that of rear wheel shoes. For the parallel master cylinder, the equalizer, a link functions to balance the hydraulic pressure between the front and rear brake system (refer to Section C "Master Cylinder" for details).

However, this balancing can exceed control of the equalizer when wear of the front wheel shoes becomes excessive, resulting in greater oil pressure on the rear wheels than the front wheels; at worst, rear brake locks before front wheels. The bypass valve on the stay of the spare tire is provided to prevent this trouble. (Fig. 11F-1)

As shown in the Fig. 11F-2, the bypass valve contains a free piston, which functions during braking to maintain equal oil pressure in the front and rear brake system.

G. Proportioning Valve

Description

With the front engine and front wheels drive vehicles (Model FF), the front wheels (driving axles) are designed to receive greater body weight than the rear wheels to insure greater driving performance. However, since there is greater weight on the front wheels and further increases during sudden braking, the weight on the rear wheels decreases in turn. In this state, as the rear wheels have a smaller body weight load, they brake easier, causing locking at the time of sudden brake, if equal oil pressure were applied at both the front and rear.

The proportioning valve prevents this trouble. It is located under the floor of the rear compartment, and functions to reduce the amount of oil pressure on the rear wheels and to balance the braking effect between the front and rear wheels.

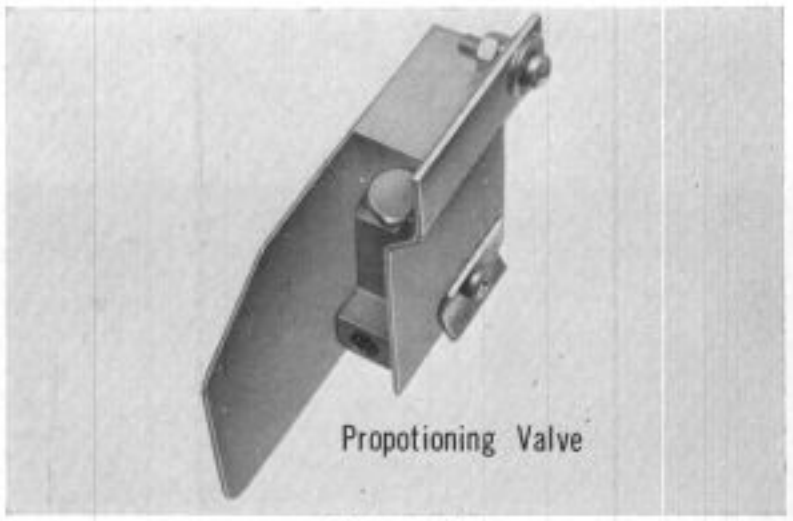


Fig. 11G-1

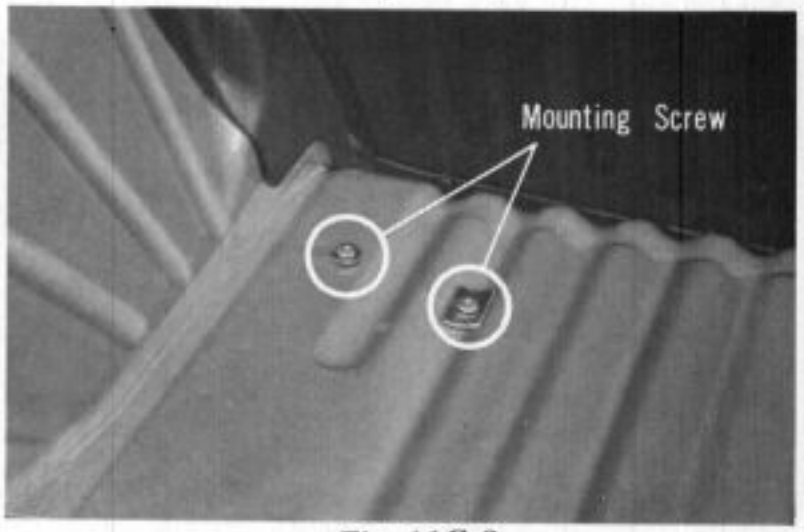


Fig. 11G-2

Remove the two nuts from the bolts which secure the proportioning valve and the protection cover.

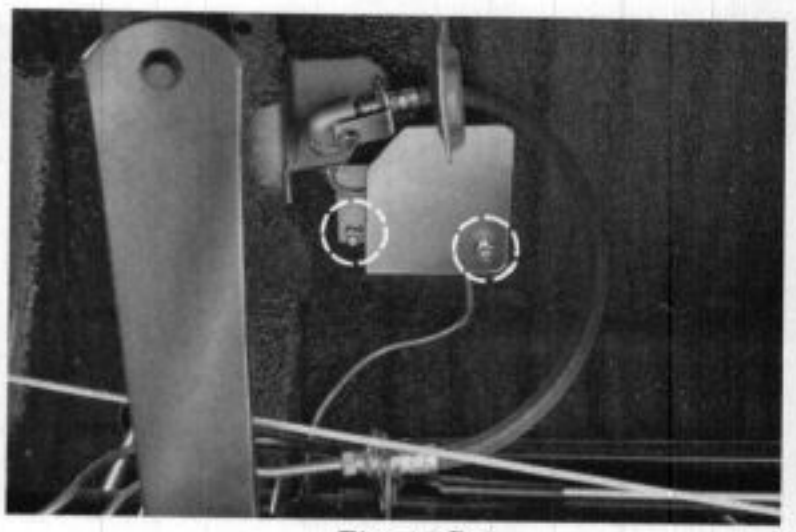


Fig. 11G-3

Remove the brake pipe from the proportioning valve.

Fig. 11G-4

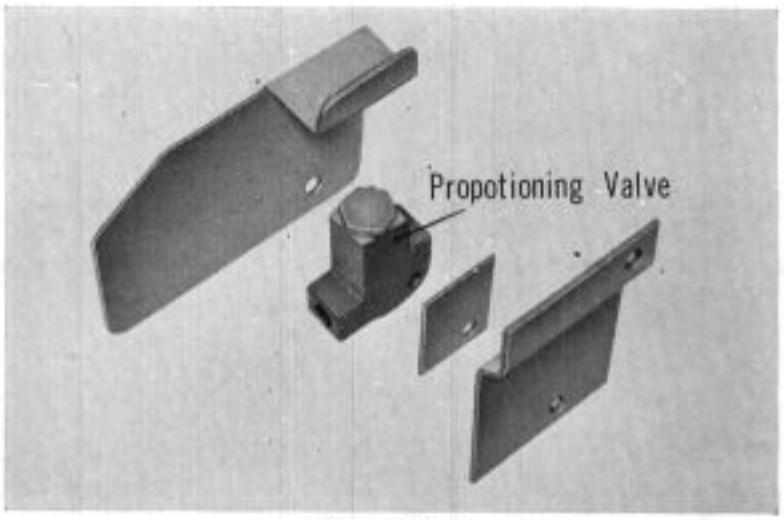


Fig. 11G-5

Avoid disassembling of the proportioning valve if possible. Make replacement as an assembly when found defective.

H. Vacuum Booster

Description

Major components of the diaphragm type vacuum booster are the relay valve, the power cylinder and the hydraulic cylinder.

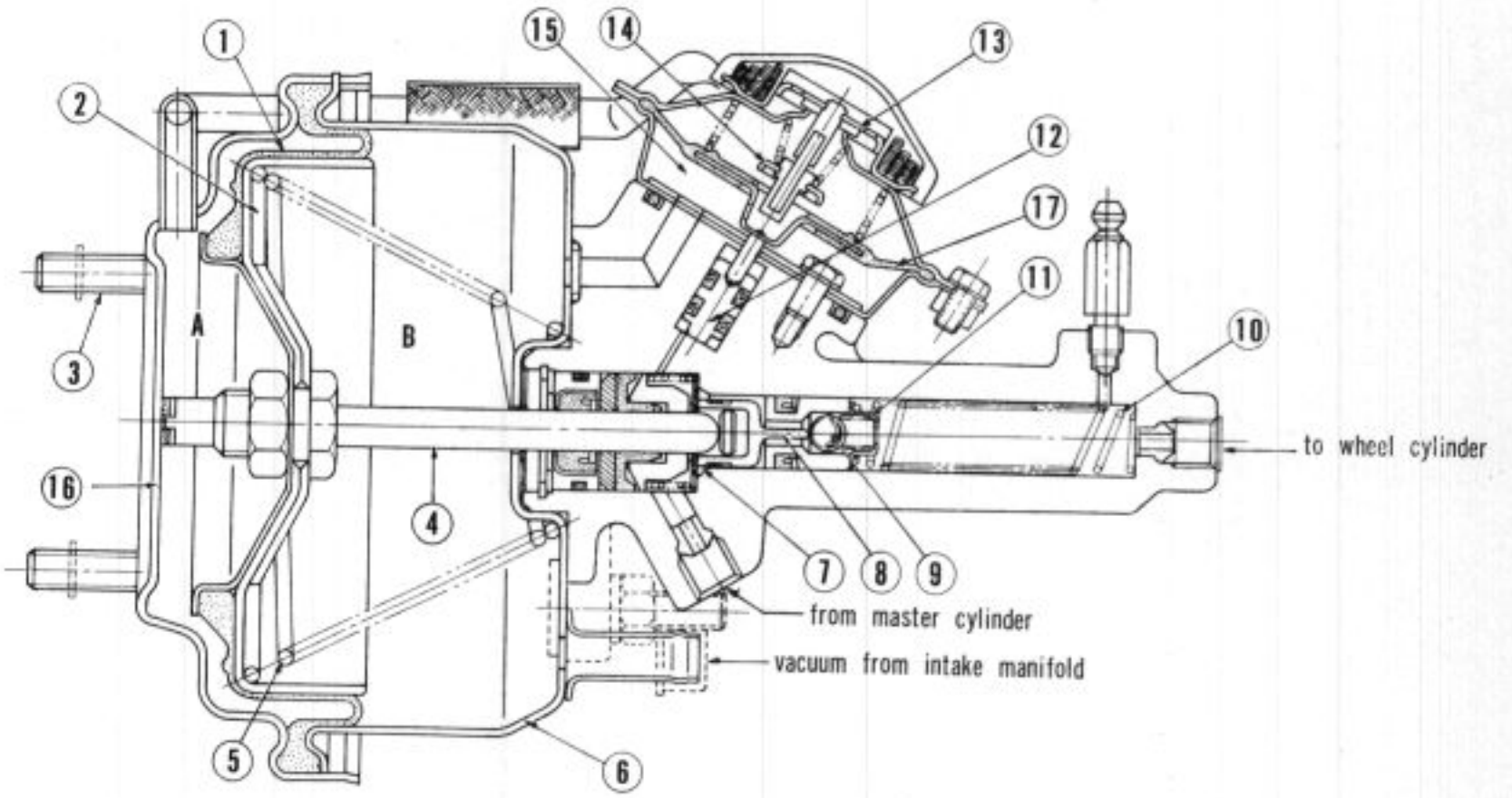


Fig. 11H-1

(1) Diaphragm
(2) Diaphragm plate
(3) Cylinder stud
(4) Push rod
(5) Power piston return spring
(6) Power cylinder front housing
(7) Piston stopper washer
(8) Yoke
(9) Ball check valve
(10) Piston return spring
(11) Hydraulic piston
(12) Relay valve piston
(13) Air valve
(14) Vacuum valve
(15) Relay valve
(16) Power cylinder rear housing
(17) Relay valve diaphragm

1) Vacuum booster in static condition

Fig. 11 H-1 shows the condition where the brake system is not in operation.

In this state, the vacuum from the engine intake manifold is admitted to compartment "B" of the power cylinder through the check valve and also enters compartment "A" through the relay valve.
Since both compartments "A" and "B" are in a state of vacuum, the power piston is forced toward the left (compartment A) by the return spring. The hydraulic piston is also at the left within the hydraulic cylinder against the piston stopper washer by the force of the piston return spring. The yoke is now bottomed, holding the ball check valve in the open position, allowing the hydraulic fluid from the master cylinder to pass through the center hole in the hydraulic piston and to the wheel cylinders. Further, even through the vacuum booster is not in operation, the brake system will still function in the conventional manner.

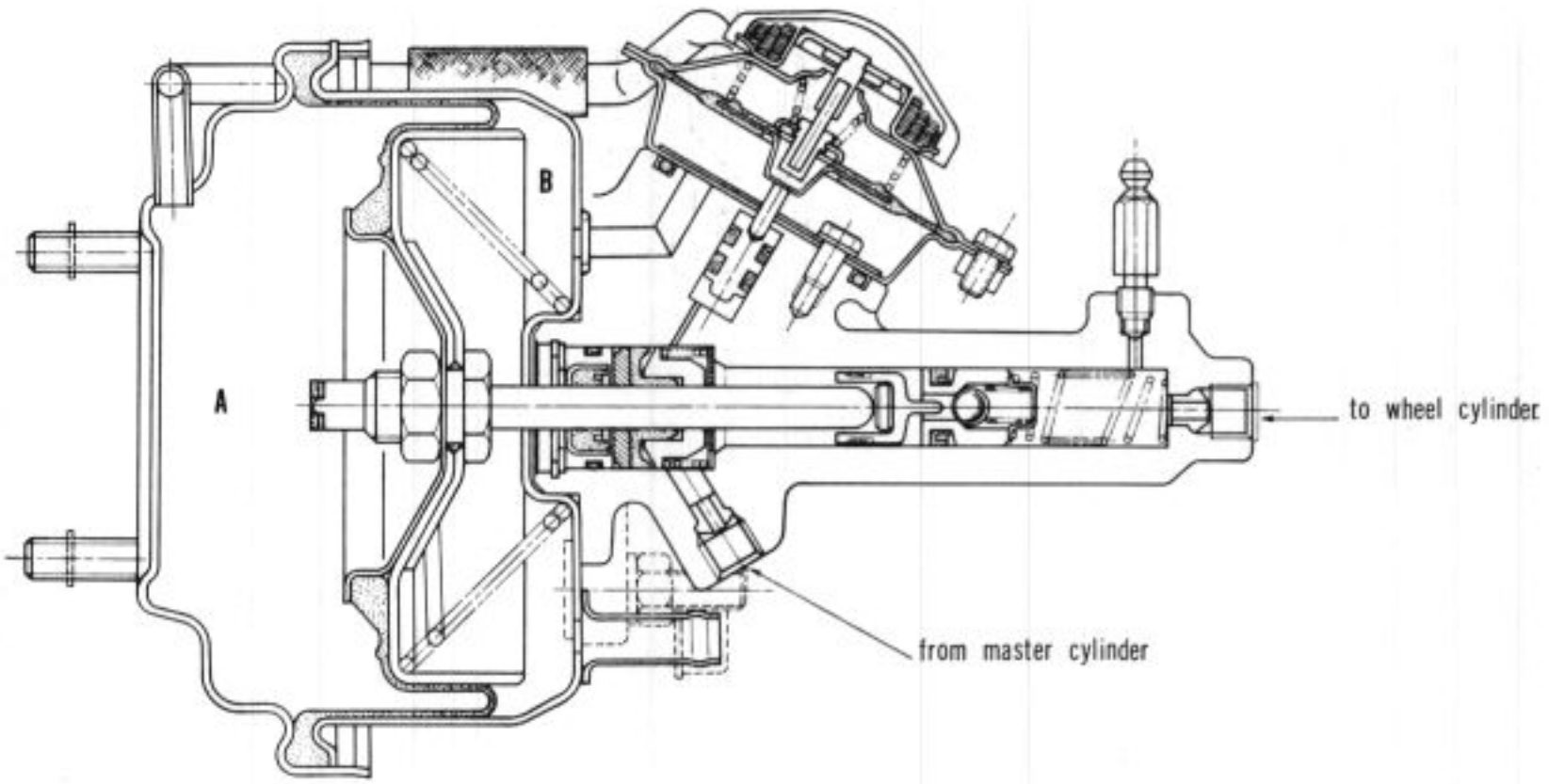


Fig. 11H-2

2) Vacuum booster in operating condition

Fig. 11H-2 shows the vacuum booster in operation. As pressure is applied to the brake pedal, the hydraulic pressure produced within the master cylinder is transmitted to the relay valve piston and the hydraulic cylinder. This causes the relay valve piston to be shifted upward, flexing the diaphragm and closing off the vacuum valve. As the pressure rises in the cylinder, the air valve is lifted off its seat and permits the filtered air to enter compartment A of the power cylinder.

At this time, since a differential in the piston moves toward the right as there is lower pressure in compartment B. The push rod attached to the power piston applies the booster force produced by the power piston directly against the hydraulic piston to start it moving, and the yoke which was in contact with the piston stopper washer becomes separated and blocks the ball check valve. This shuts off the flow of hydraulic fluid between the master cylinder and wheel cylinder and prevents the reverse flow of the high pressure fluid from the wheel cylinders. In this case, the total pressure applied to the wheel cylinders is the sum of the force applied to the push rod by the power piston and the force from the master cylinder applied directly to the hydraulic piston.

3) Released condition

When the brake pedal is released, the pressure applied to the relay valve piston drops, the air valve seals the inlet port and closes off the atmospheric pressure. The diaphragm separates from the vacuum valve and allows the vacuum to enter both chambers "A" and "B" of the power cylinder through the interconnecting passage. The air in the power cylinder is drawn into the intake manifold to recreate a state of vacuum within the vacuum booster.

Further, the power piston returns toward the left by the force of the power piston return spring; at the same time, the hydraulic piston also returns to its former position by the force of the hydraulic piston return spring. The yoke comes in contact with the piston stopper washer and opens the ball check valve.

Specification

Type	Power cylinder		Hydraulic cylinder		Relay valve	Color of label
	Effective dia.	Stroke	Diameter	Stroke	piston	
DHM 4500/1Z	114.3 mm dia.	35.0 mm	14.3 mm dia.	35.0 mm	12.7 mm dia.	blue
DHM 4500/1Z	same as above	same as above	17.5 mm dia.	35.0 mm	same as above	red

Note:
A vacuum booster with a blue label fixed on the power cylinder has a hydraulic cylinder of 14.3 mm dia., while the one with a red label has the cylinder of 17.5 mm dia. Accordingly, the component parts should be selected by the color of the label.

Removal and Disassembly

1. The vacuum booster is mounted on the upper dash board adjacent to the air cleaner housing and also the check valve which prevents the pressure from being transmitted reversely is installed in the intake manifold at the end of the connecting hose.

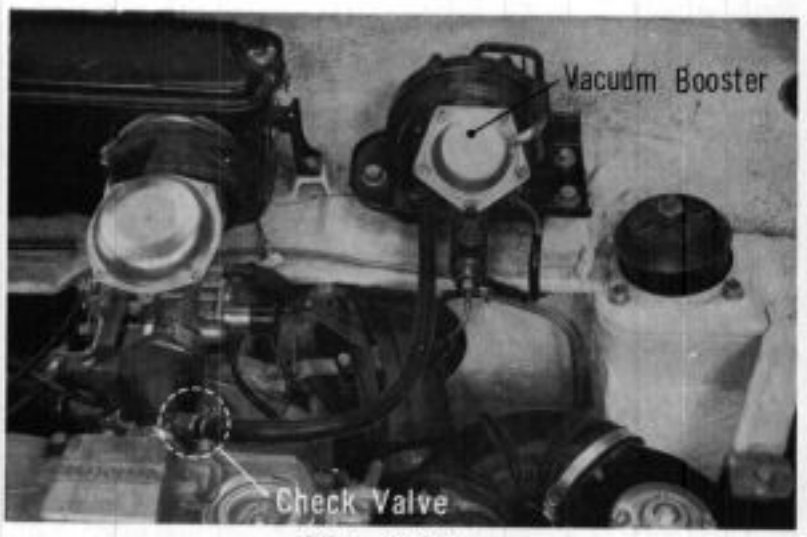


Fig. 11H-3

2. Disconnect the vacuum tube which connects the vacuum booster and the intake manifold, at the vacuum booster fitting.

3. Disconnect the master cylinder brake pipe and the wheel cylinder brake hose at the vacuum booster.

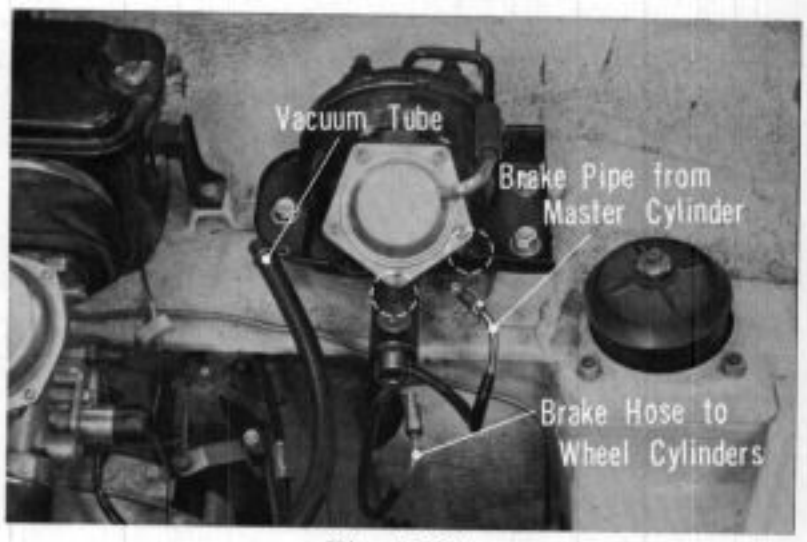


Fig. 11H-4

9. To disassembly the power cylinder, clamp the base of the special tool in the vise as shown in Fig. 11 H-9 and place the power cylinder on the base so that the three stud bolts on the front housing fit into the matching holes in the base.

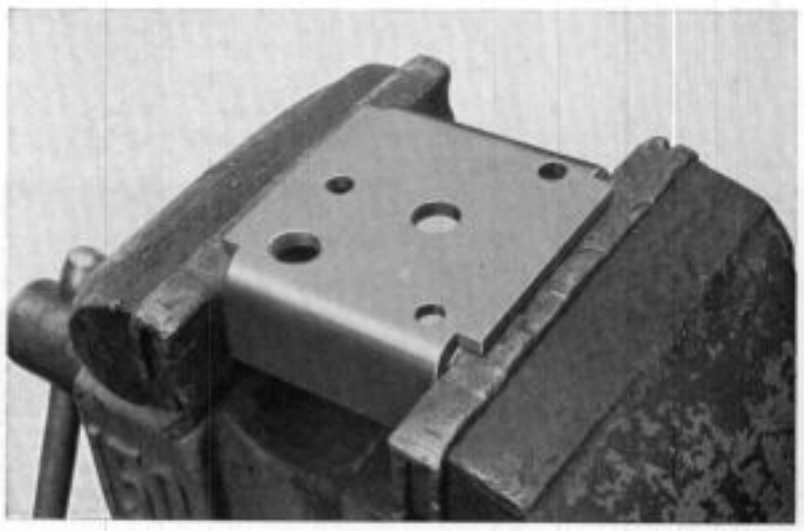


Fig. 11H-9

10. Mount the driver fitted with handles on the four stud bolts on the rear housing. The front and rear housings of the power cylinder can be separated by applying firm pressure on the driver handles in the counter clockwise direction.

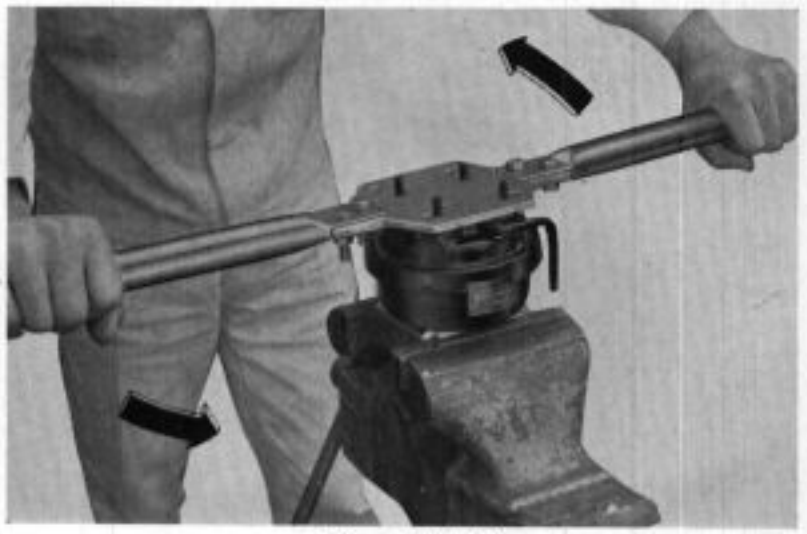


Fig. 11H-10

11. Fig. 11 H-11 shows the component parts of the power cylinder (the relay valve is mounted to show the relative positions of the air vent pipes.

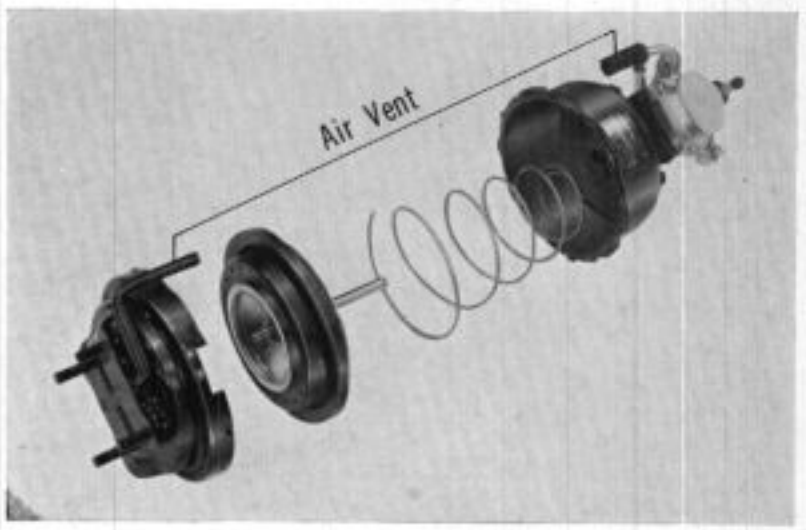


Fig. 11H-11

12. The rubber diaphragm can be removed from the diaphragm plate by slightly stretching it by hands as shown in Fig. 11 H-12.

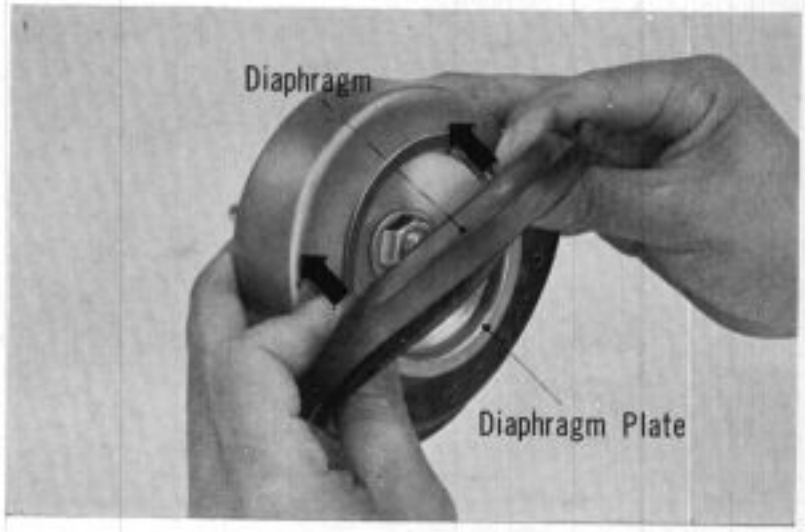


Fig. 11H-12

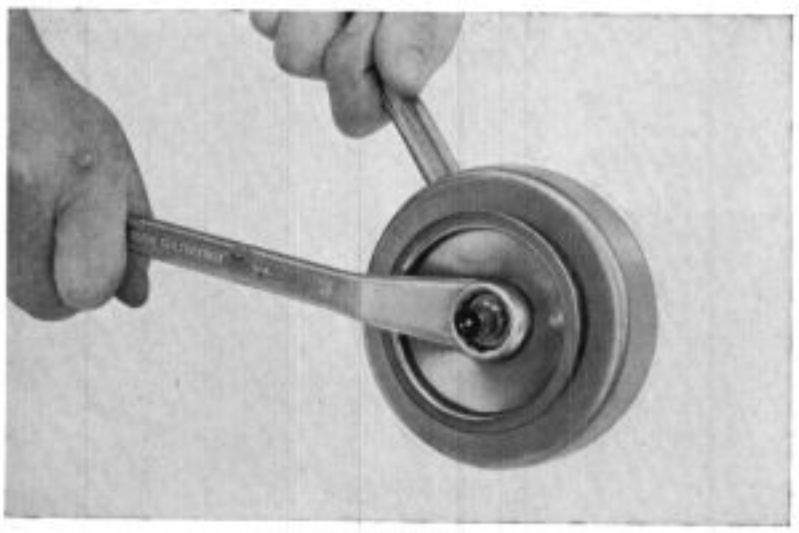


Fig. 11H-13

13. Separate the diaphragm retainer from the diaphragm plate by loosening the assembly bolt using two 16mm box wrenches (one should be a 15° offset head).

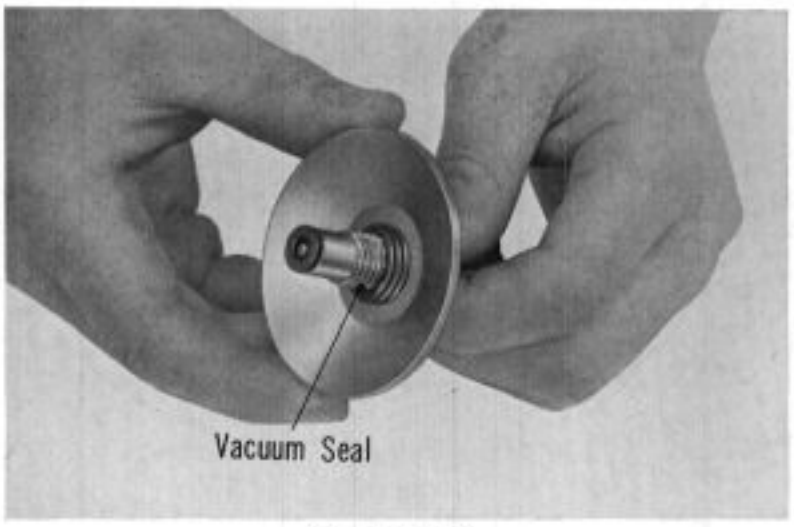


Fig. 11H-14

14. As shown in Fig. 11 H-14, a rubber vacuum seal is installed between the diaphragm plate and the diaphragm retainer. The seal must be replaced with a new item whenever the diaphragm plate is disassembled.

Fig. 11H-15

15. (Disassembly of Hydraulic Cylinder)
Remove the hydraulic cylinder from the power cylinder housing in accordance with the description in paragragh 8. (Fig. 11 H-8 and Fig. 11 H-15).

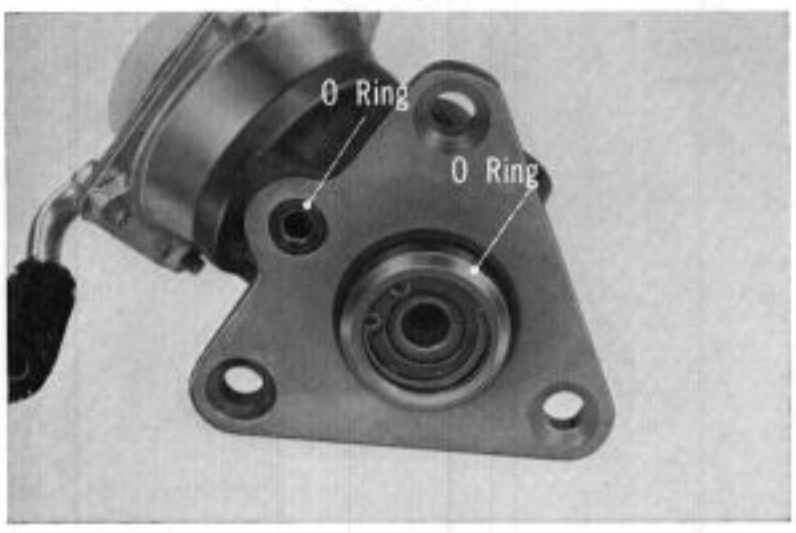


Fig. 11H-16

16. Remove the two 0 rings which are installed between the hydraulic cylinder and the power cylinder housing. Make sure that new 0 rings are installed during reassembly, regardless how the old ones appear. (Both of them are included in the repair kit).

17. Remove the circlip with a plier holding the other end with a finger as shown in Fig. 11 H-17. Extreme care should be taken as the valve on the inside is under pressure of the inner spring and will pop out.

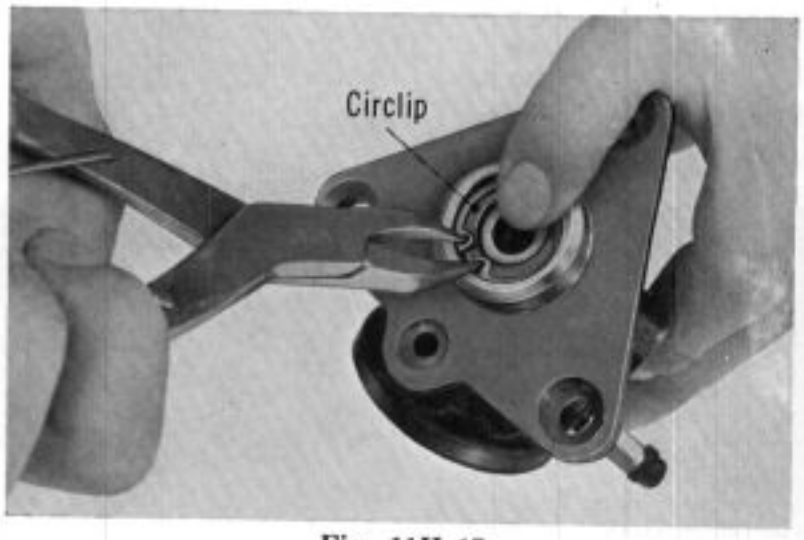


Fig. 11H-17

18. To keep the relative position of all the components within the cylinder in order, insert a screwdriver or a similar rod into the cylinder as shown when removing (Fig. 11 H-8 and Fig. 11 H-19).

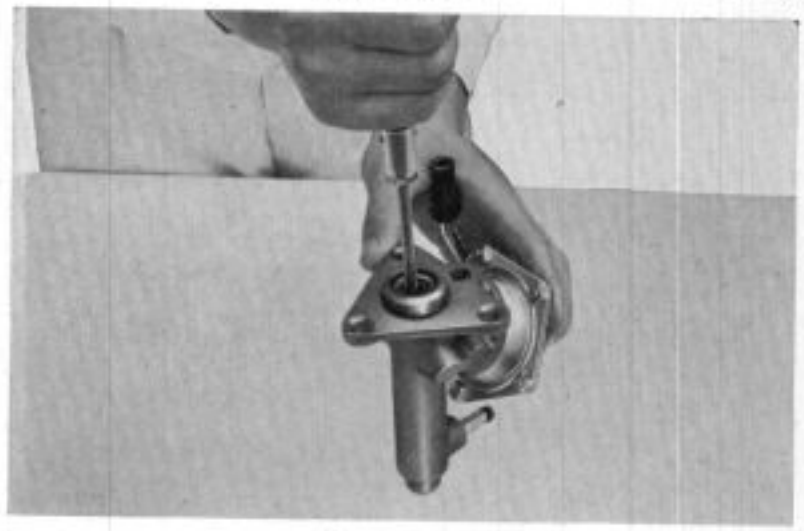


Fig. 11H-18

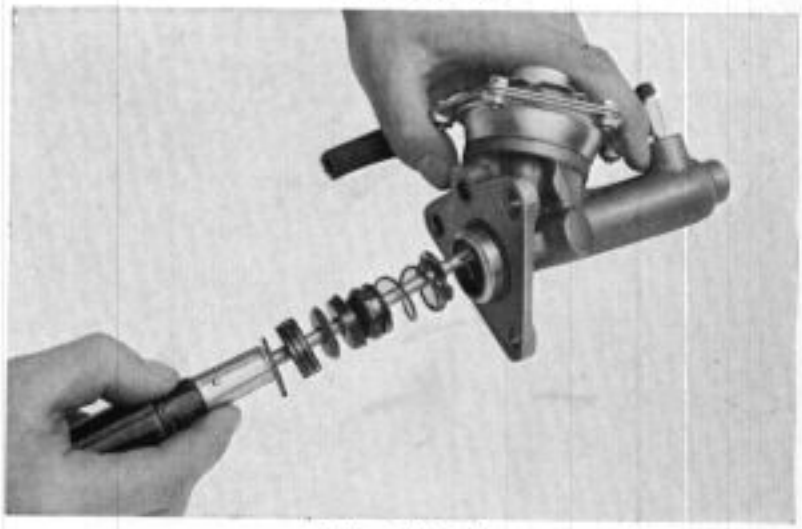


Fig. 11H-19

19. Remove the valve body cap with a screwdriver as shown in Fig. 11 H-20. Exercise care as the cap is easily broken.

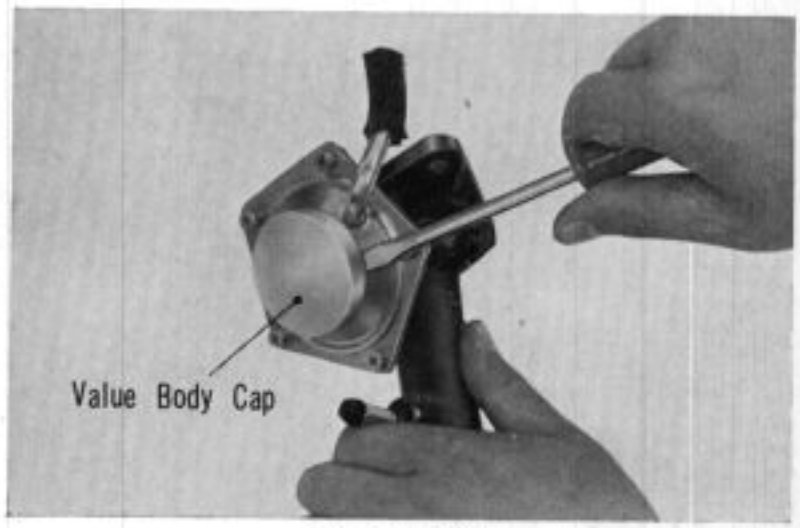


Fig. 11H-20

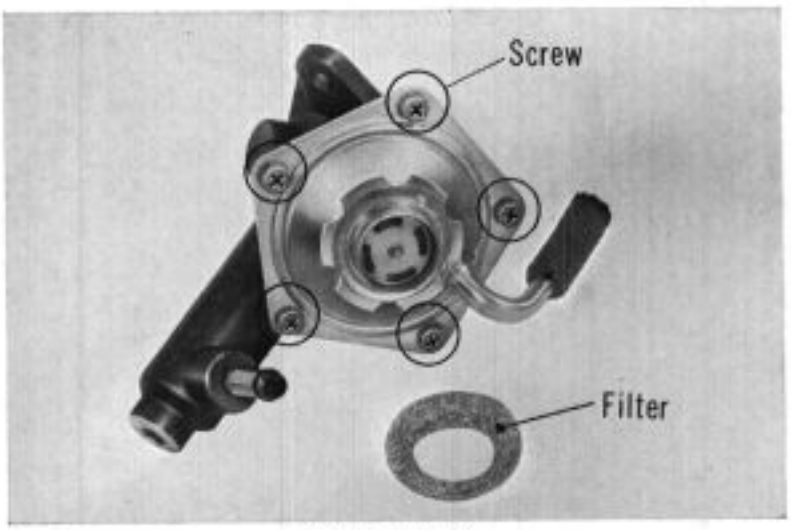


Fig. 11H-21

20. The steel wool filter ring contained within the valve body cap should be washed in gasoline and dried with compressed air whenever the cap is removed (Fig. 11 H-21).
    Perform this operation at every periods maintenances.

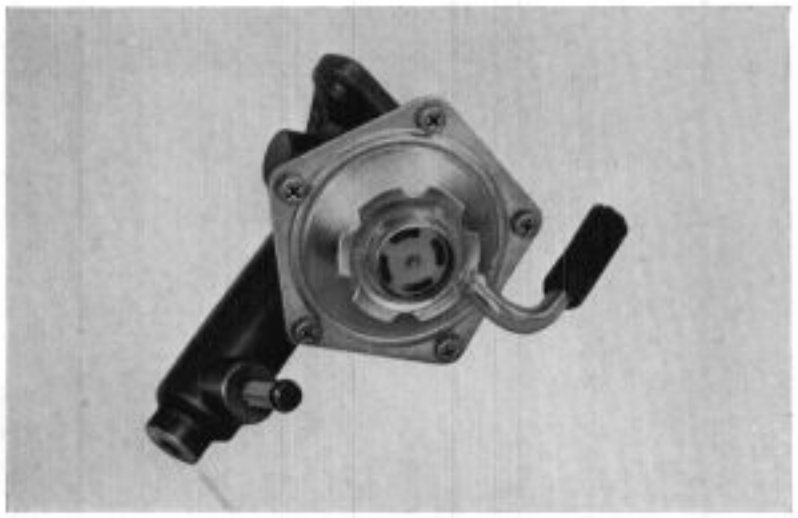


Fig. 11H-22

21. Remove five screws to disassemble the relay valve assembly from the diaphragm housing.

Fig. 11H-23

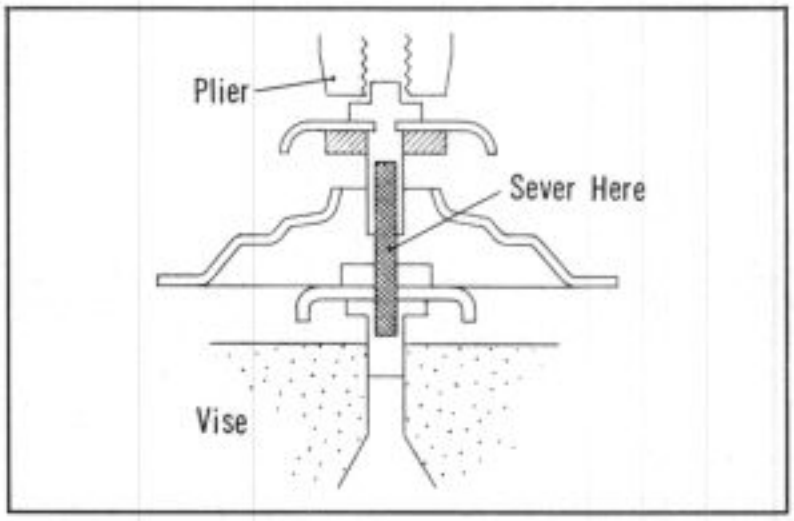


Fig. 11H-24

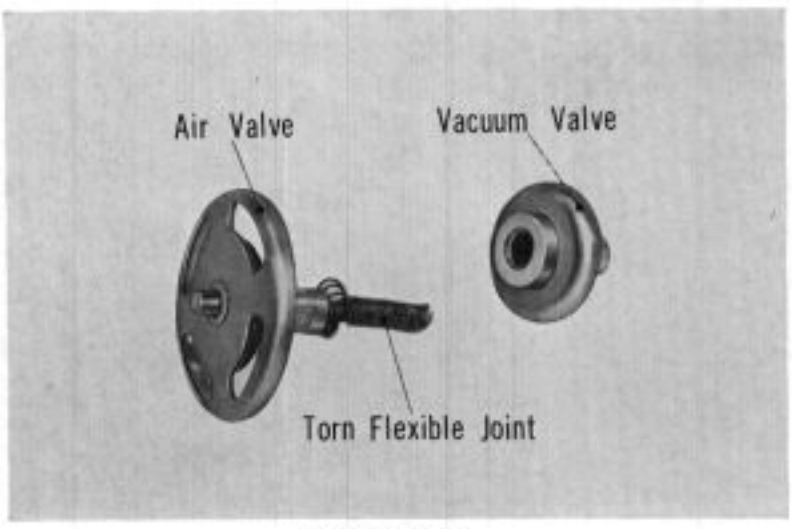


Fig. 11H-25

22. The factory assembled relay valve can not be disassembled without severing the stem as it is assembled by swaging.
    Firmly clamp the lower end of the valve assembly in a vise and pull the top of the valve with a plier (Fig. 11 H-23 and Fig. 11 H-24) to sever the flexible stem.

23. Fig. 11 H-25 shows the relay valve disassembled by severing the flexble stem.

24. The replacement relay valve is assembled by screw assemblying the vacuum valve and air valve. This permits easier servicing and future replacement.
Fig. 11 H-26 shows the disassembled relay valve for replacement.

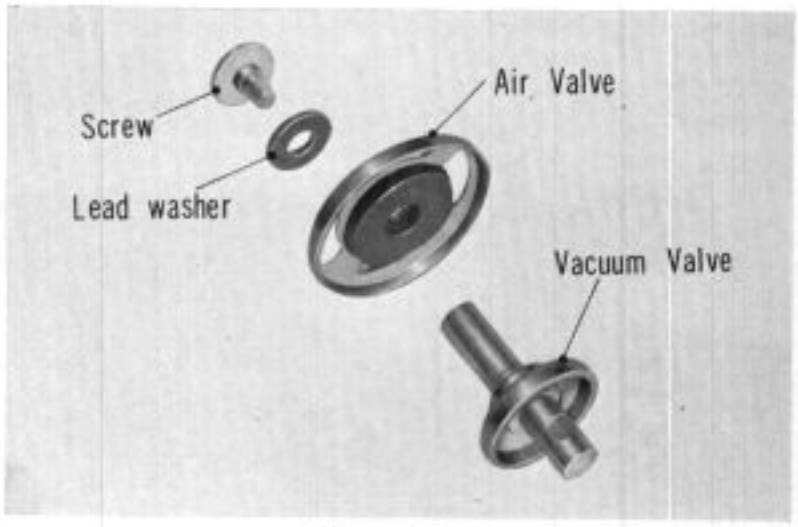


Fig. 11H-26

25. The relay valve housing can be disassembled as sohwn in Fig. 11 H-27.

26. If the relay valve diaphragm is not easily removable, apply compressed air through the bleeder hole.

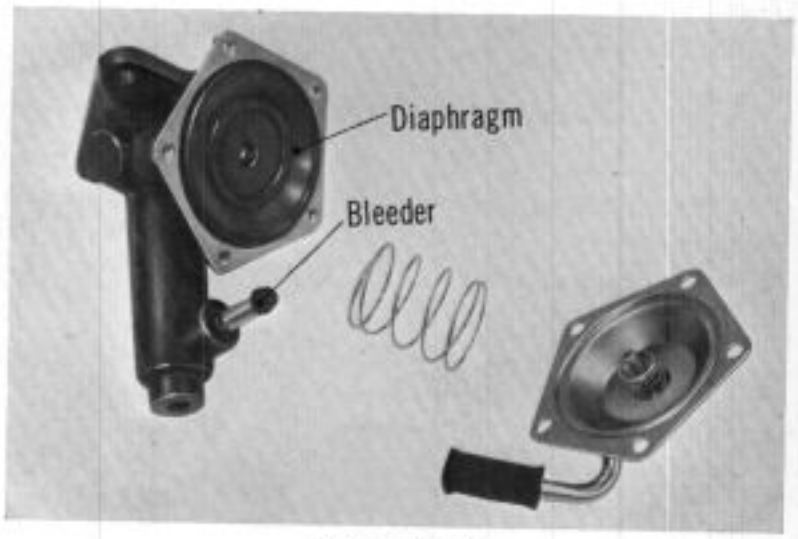


Fig. 11H-27

27. Remove the rubber diaphragm from the diaphragm retainer by stretching the inner diameter of the diaphragm by hand. Whenever the relay valve housing has been disassembled, always replace the rubber diaphragm with a new item regardless of the condition of the old one.

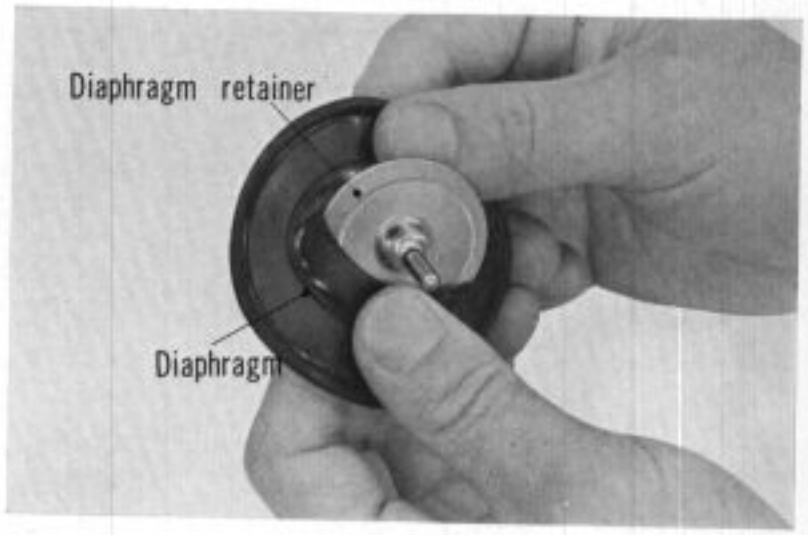


Fig. 11H-28

28. Remove the three screws which mounts the relay valve housing to the cylinder body. (Fig. 11 H-29 and Fig. 11 H-30).

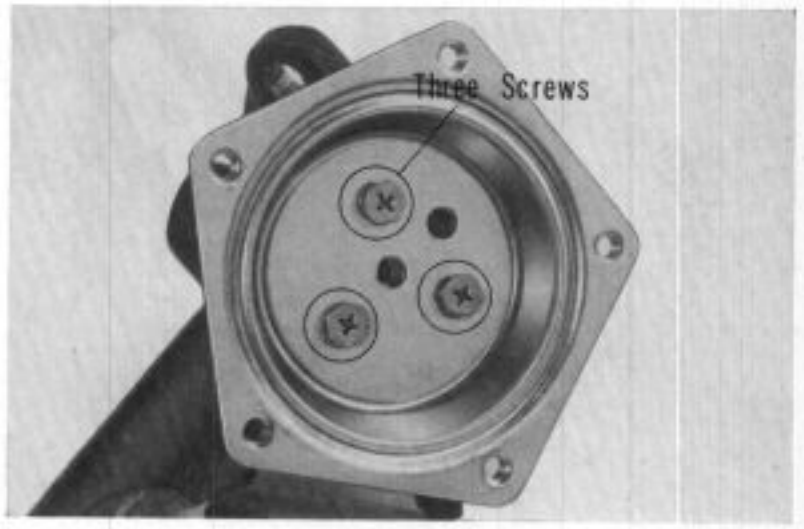


Fig. 11H-29

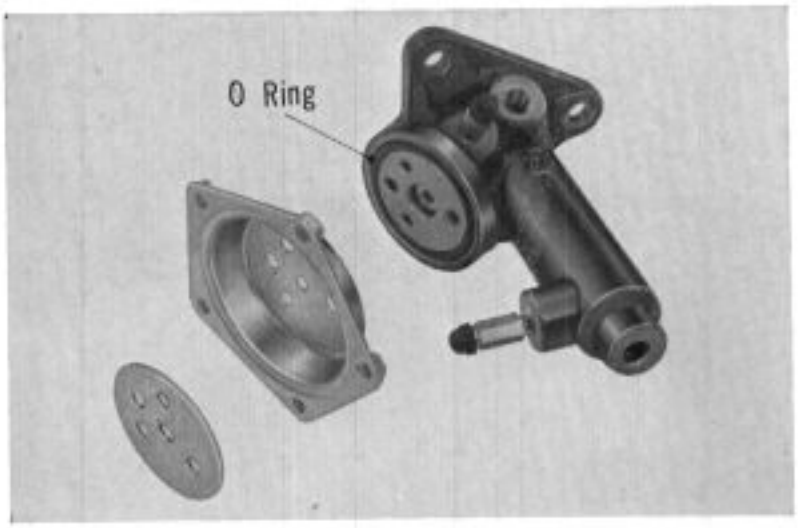


Fig. 11H-30

Assembly and Servicing

Rubber parts play vital roles in the function of the vacuum booster used in the N600. Any deformation or the slightest scratch to these rubber parts will affect the braking performance. For servicing the vacuum booster, a repair kit (Fig. 11H-31) is available, which contains the 12 rubber component parts, relay valve assembly and a tube of silicon grease. All parts of the kit must be replaced with a new items whenever the vacuum booster is disassembled, regardless of their condition. Further, the above parts must be replaced every two years.

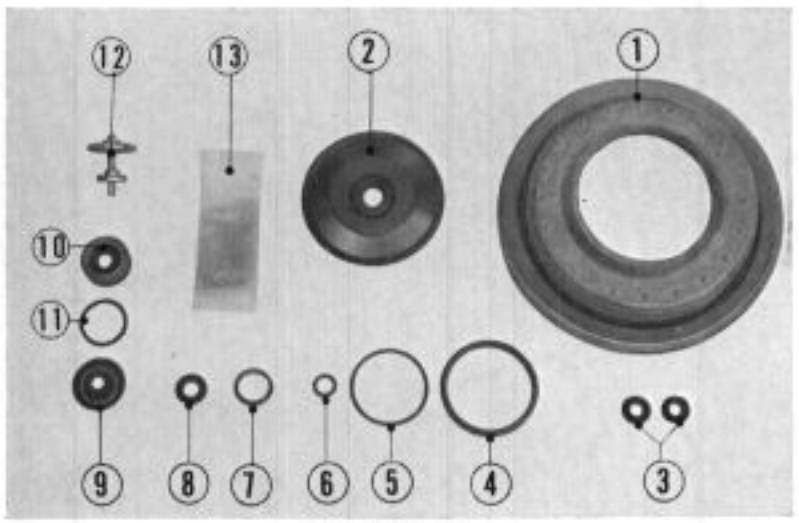


Fig. 11H-31

A set of repair kit for servicing N600 vacuum booster is shown in Fig. 11 H-31.
All the component parts included in the repair kit should replace the old ones whenever the vacuum booster is disassembled for servicing.

Repair Kit Parts List

1) Diaphragm
2) Relay valve diaphragm
3) Relay valve piston cup (2 pieces)
4) Relay valve unit 0 ring
5) Front housing 0 ring
6) Vacuum vent 0 ring
7) Vacuum seal
8) piston cup
9) Spring retainer cup
10) Push rod oil seal
11) Oil seal 0 ring
12) Relay valve assy.
13) Silicon grease

1. Replace the new relay valve with a new item. Insert the vacuum valve part from the bottom of the upper relay valve housing after removing the top screw along with a lead washer and the vacuum valve. Fix the air valve through the relay housing and fasten it with a screw and washer.

   Note that the top screw has LH threads.

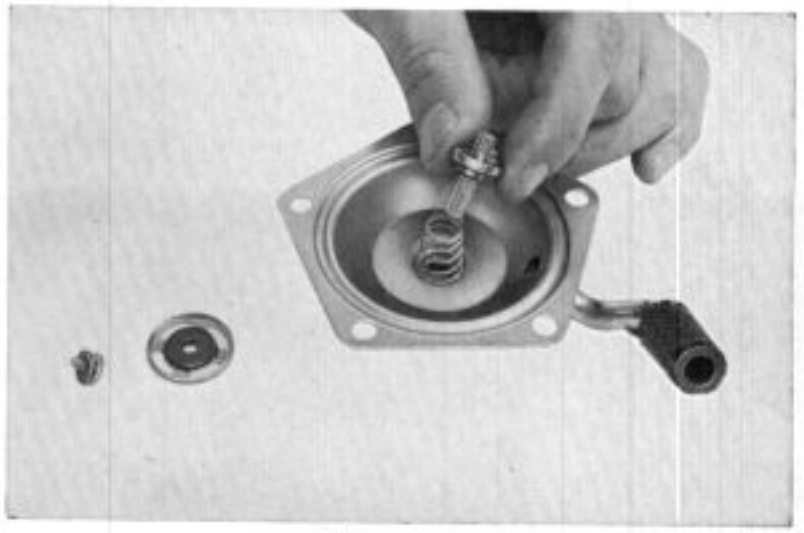


Fig. 11H-32

2. Assemble the new relay valve diaphragm on the relay valve retainer, exercising care not to damage the diaphragm when installing it.

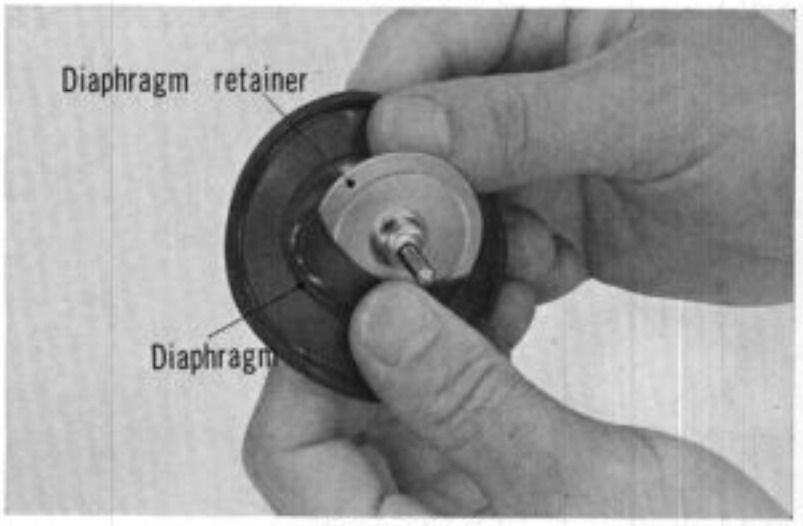


Fig. 11H-33

3. Fig. 11 H-34 shows the relay valve viewed from the top being installed into the relay valve housing.

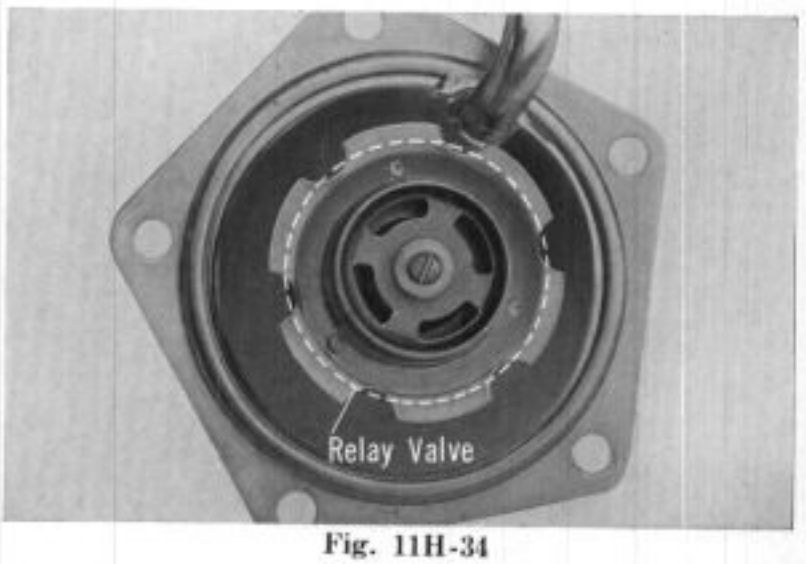


Fig. 11H-34

4. (Installation of diaphragm plate)
   Install the new vacuum seal between the diaphragm plate and the diaphragm retainer.

Fig. 11H-35

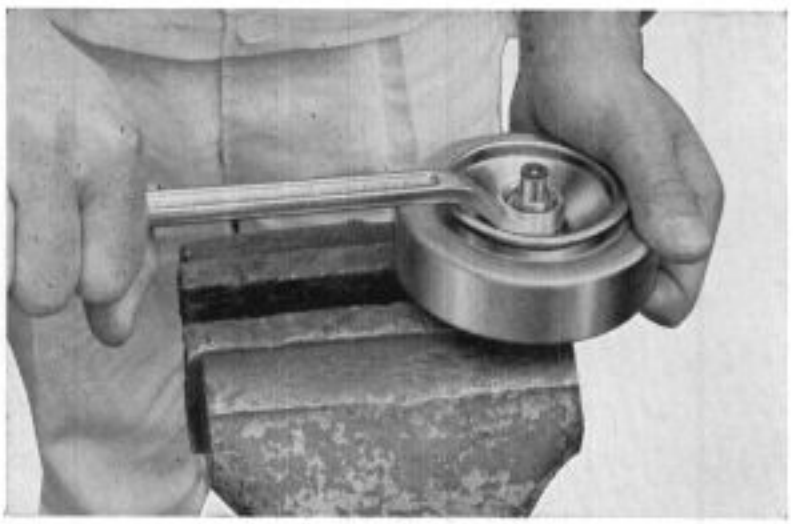


Fig. 11H-36

5. Hold the machined hex of the push rod in the box wrench clamped in the vise, assemble the diaphragm plate and retainer, and torque the retaining nut to 2—3 kg-m (14.5—21.7 ft-lbs). To prevent the vacuum seal from damage or shifting, hold both the diaphragm plate and retainer firmly by a hand while torquing the nut.

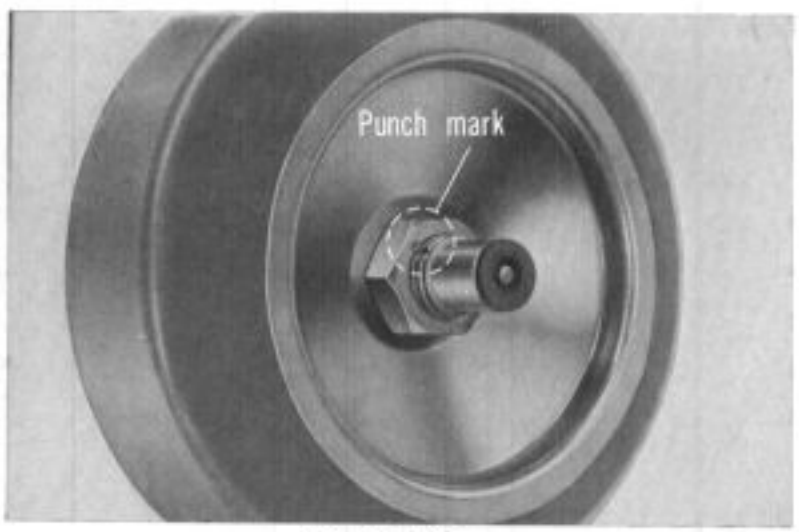


Fig. 11H-37

6. After assemblying the diaphragm plate, stake the nut adjacent to the thread using a center punch to prevent loosening (Fig. 11 H-37).

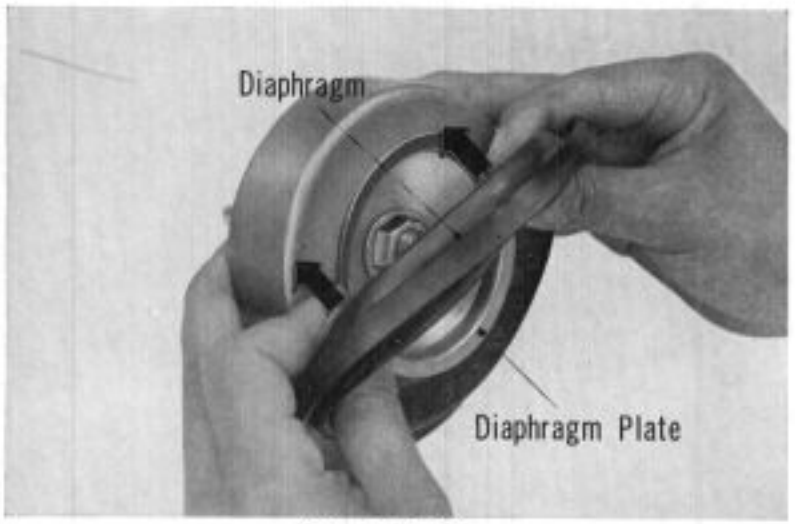


Fig. 11H-38

7. Carefully install the new power cylinder diaphragm on the diaphragm plate (Fig. 11 H-38).

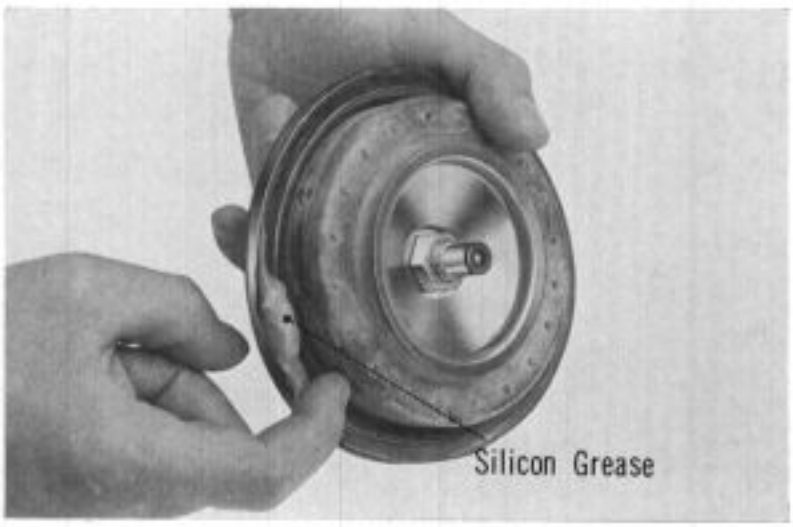


Fig. 11H-39

8. Apply a light coating of silicon grease around the surface of the diaphragm lip to prevent it from deformation when assemblying it into the vacuum cylinder.

9. Assemble the two new rubber cups on the relay valve, making sure that they are positioned in the proper direction. Apply brake fluid on the cups to facilitate its installation and to prevent damage.

10. Carefully insert the piston into the hydraulic cylinder body, rotating slowly to prevent the lips of the cups from curling.

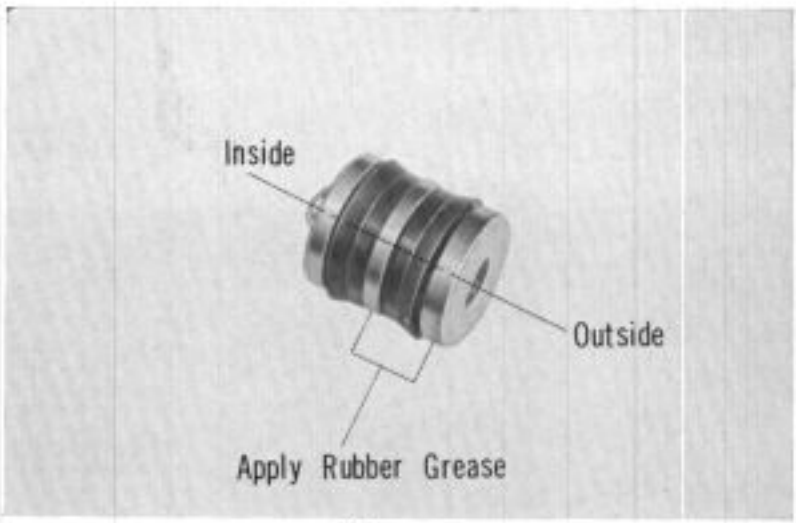


Fig. 11H-40

11. Install the new 0 ring into the groove of the hydraulic cylinder as shown in Fig. 11 H-41.

12. Assemble the relay valve housing and plate on the hydraulic cylinder as shown in the figure and install the three flat head screws.

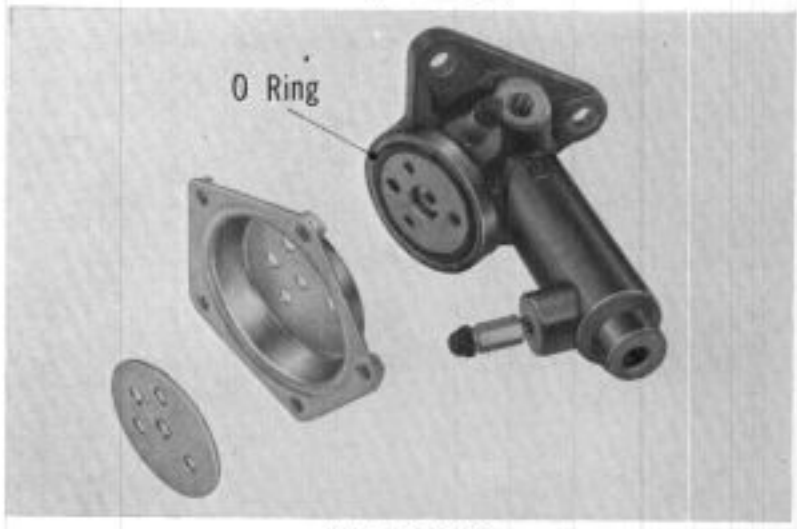


Fig. 11H-41

13. Install the new relay valve diagram and return spring on the valve housing. Fasten the upper relay valve housing with five mounting bolt. The air vent pipe must be parallel with the hydraulic cylinder.

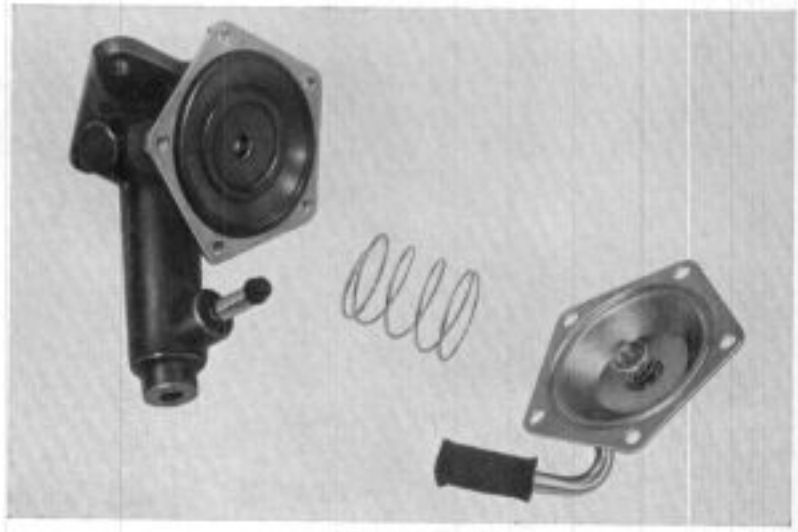


Fig. 11H-42

14. The relative positions of the hydraulic cylinder internal components are shown in Fig. 11 H-43.

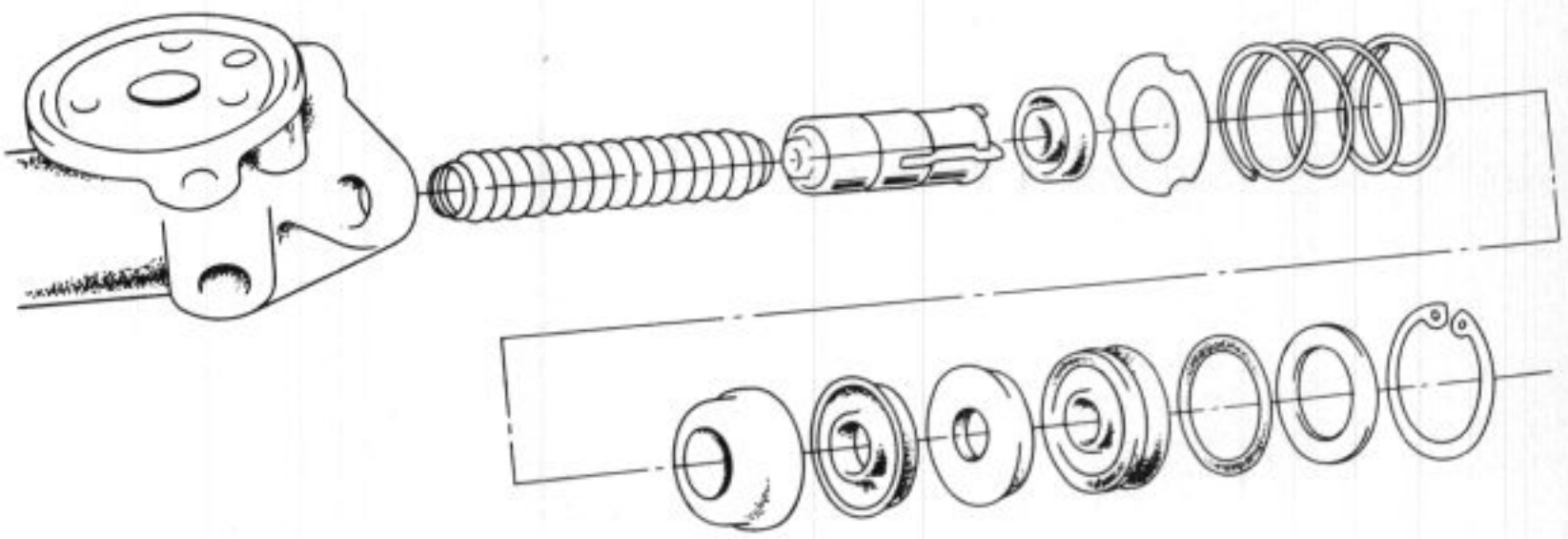


Fig. 11H-43

Fig. 11H-44

15. Before assemblying the hydraulic cylinder, replace the piston cup with a new item included in the repair kit and apply brake fluid on the piston to facilitate its installation. Exercise care not to score the piston or cup.

    Fig. 11 H-44 shows the relative positions of the piston and piston cup upon which it is to be installed.

    Note that the piston cup be installed in the correct direction.

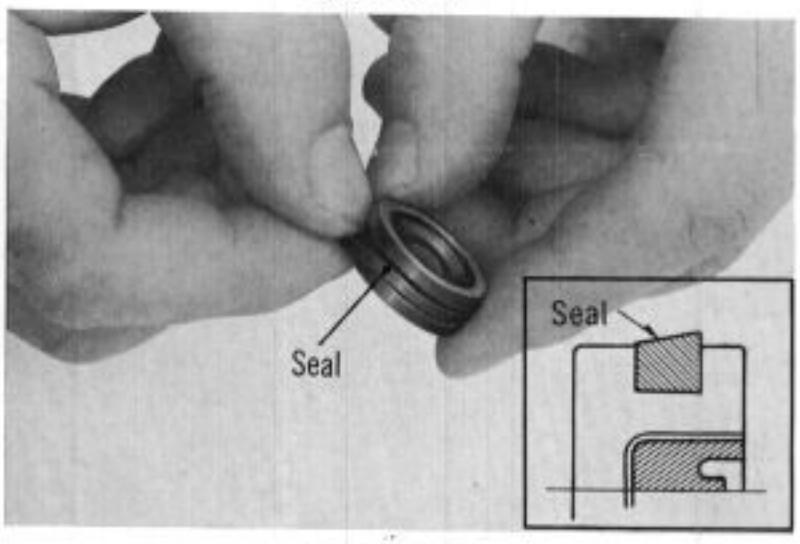


Fig. 11H-45

16. Replace the oil seal with a new item together with the new 0 ring. Dip the seal in brake fluid before installing. This seal must be replaced whenever any part of the booster hydraulic component is disassembled. Make sure that the seal is installed in the proper direction. (Fig. 11 H-2 and Fig. 11 H-43).

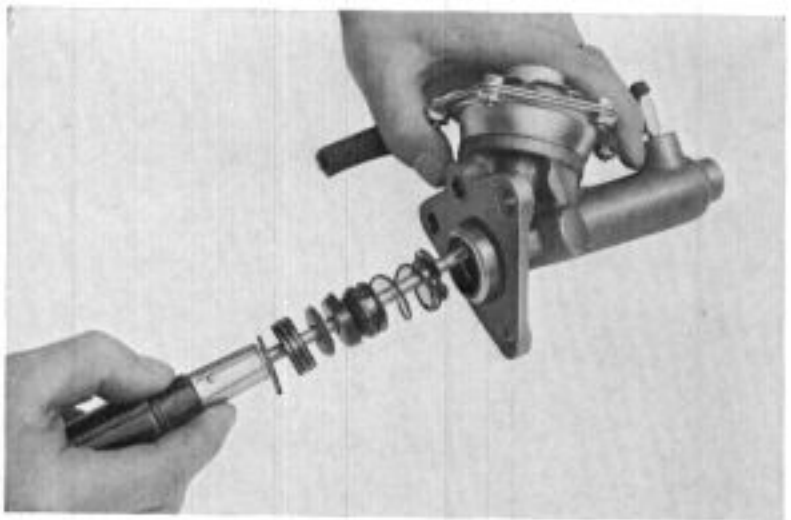


Fig. 11H-46

17. Carefully assemble the components into the cylinder in their proper order. Close fitting parts should be dipped in brake fluid and rotated while inserting to prevent the lip of the cups from turning up.

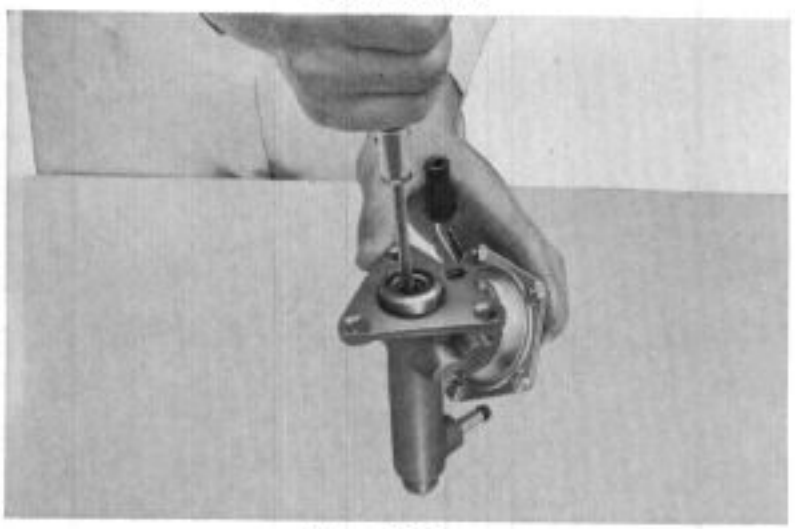


Fig. 11H-47

18. Force all the components in place against the force of the spring using a screwdriver or a similar rod (Fig. 11 H-1, Fig. 11 H-43 and Fig. 11 H-47).

19. Finally, install the circlip into the groove of the cylinder. Rotate the circlip with the circlip pliers to assure that it is properly seated. Incorrectly installed circlip may cause serious damage to the vacuum booster.

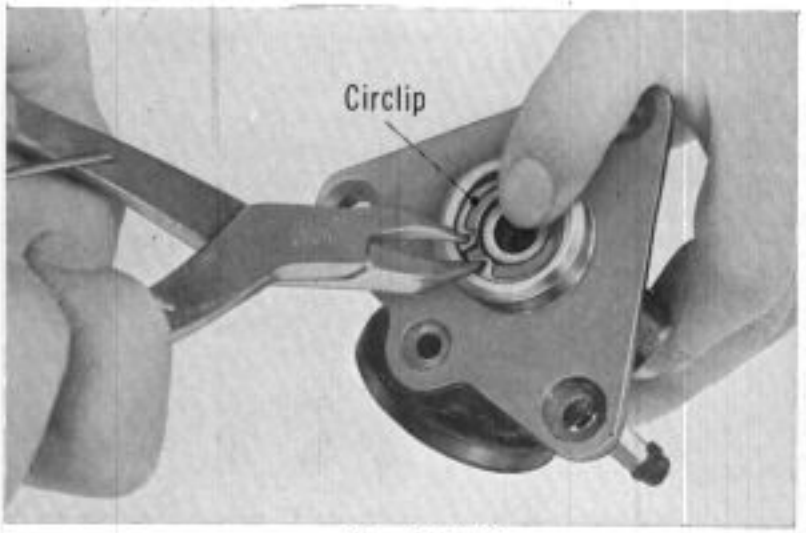


Fig. 11H-48

20. Assemble the components of the power cylinder in the order shown in the figure and position the housings so that air vent pipes of both the front and rear housings are aligned.

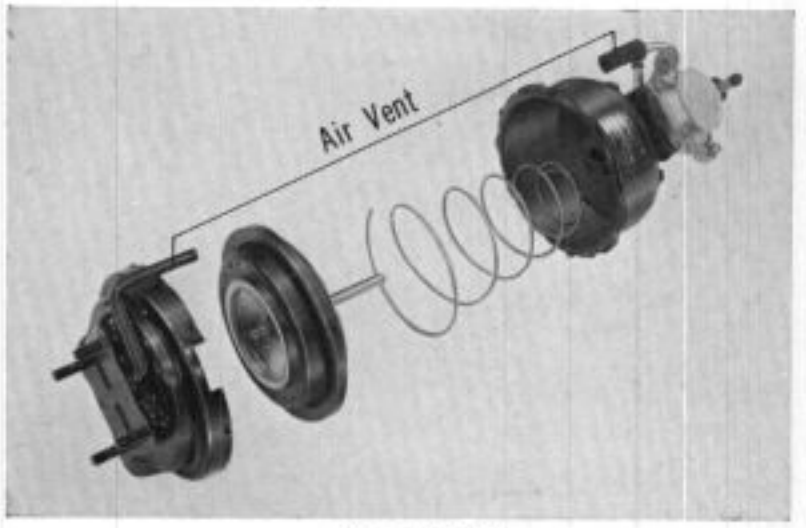


Fig. 11H-49

21. Set up the special tool (07145—57950) for reassembly in the same manner as was set for disassembly of the power cylinder assembly. Perform the reasembly of the power cylinder in the reverse order of disassembly. Make sure that the front and rear housings are properly assembled by checking to the that the tongues of the front housing are oligned to the cutout sections of the rear housing.

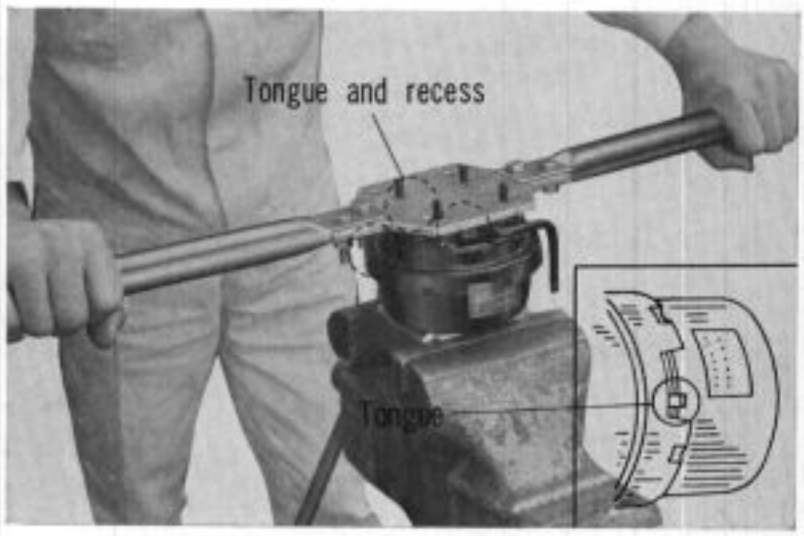


Fig. 11H-50

22. Complete the vacuum booster assembly by mounting the hydraulic cylinder on the power cylinder housing with three bolts.

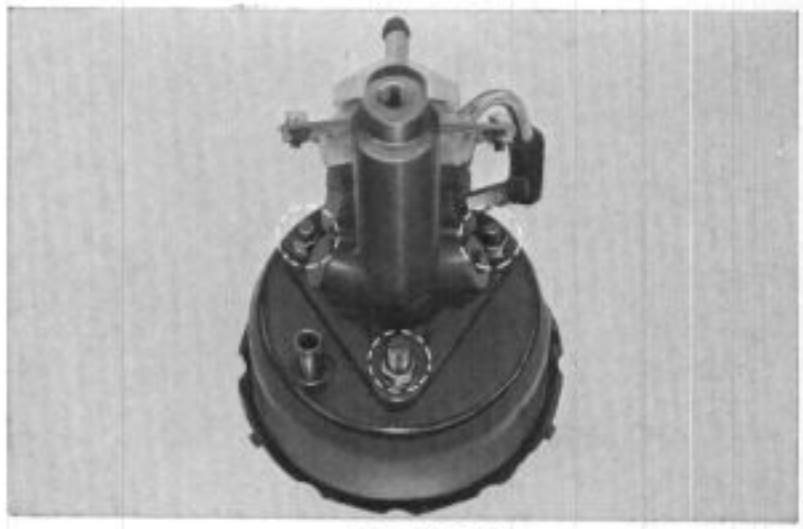


Fig. 11H-51

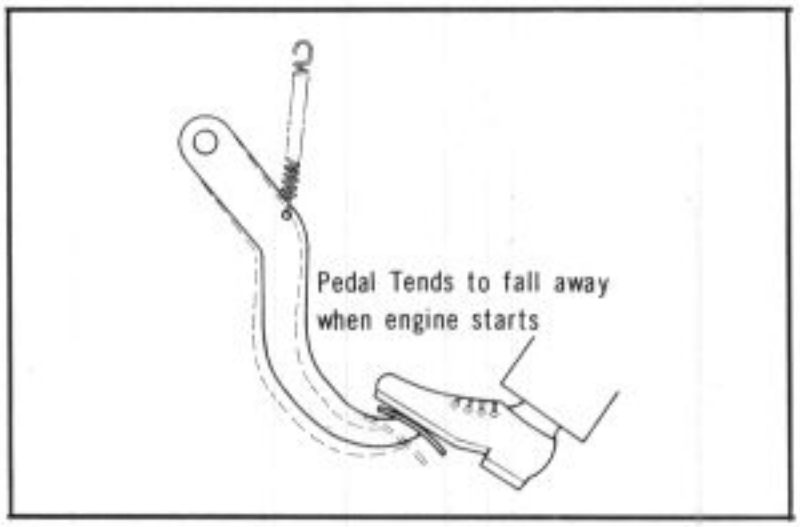


Fig. 11H-52a

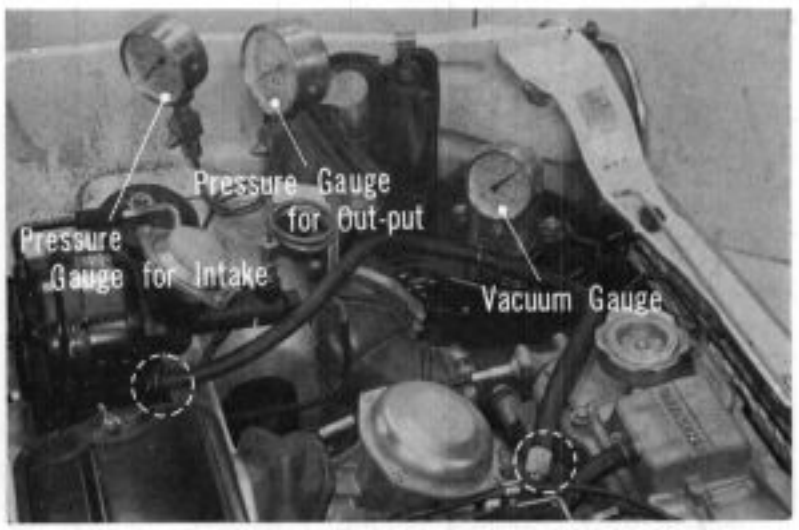


Fig. 11H-52b

Performance Test

A. Preliminary Test

Stop the engine and depress the brake pedal several times to exhaust all vacuum in the system. Then, depress the pedal and hold it in the applied position. Start the engine. At this moment, if one can feel brake pedal fall away under foot pressure, the vacuum booster is functioning. If the vacuum booster seems to be inoperative, proceed to a more accurate test described below

B. Precise Test

To test the vaccum booster system, connect two pressure gauges and one vacuum gauge as shown in Fig. 11 H-52. These gauge can be seen by the person in the driver's seat who depresses the acceler-ator pedal. A gauge of minimum reading 100 kg/cm^2 shall be installed on the intake side and a gauge of minimum reading 160 kg/cm^2 on the output side.

then stop the engine. The reading should drop approximately 20 mmHg in 15 seconds. If the drop in reading is greater than 20 mmHg in 15 seconds, the check valve and the vacuum hose should be checked for defect.

1. After maintaining the reading on the vacuum gauge to 500mmHg by controlling the accelerator pedal, stop the engine. The reading should drop approximately 25 mm Hg in 15 seconds.

   If the drop in reading is greater than the above value for the 15 second period, it is an indication that a vacuum leak exists somewhere in the vacuum system including the vacuum booster check valve and a vacuum passage (hose and connector).

2. Disconnect the vacuum hose which connects the intake manifold and vacuum booster at the side of the vacuum booster, then close the end of the hose with the thumb as shown in Fig. 11 H-53.
   Start the engine and adjust the accelerator pedal until the indication of the gauge reaches 500mmHg, then stop the engine. The reading should drop approximately 20 mmHg in 15 seconds. If the drop in reading is greater than 20 mmHg in 15 seconds, the check valve and the vacuum hose should be checked for defect.

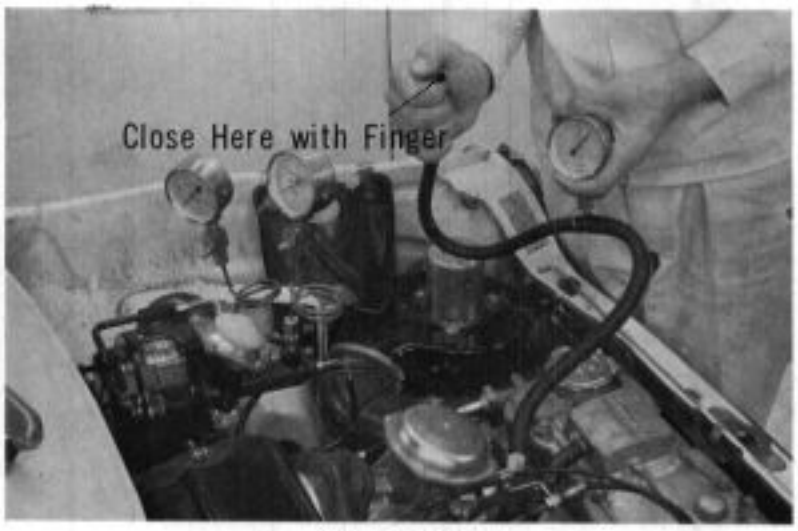


Fig. 11H-53

3. After making sure that the check valve and vacuum hose are both vacuum-proof by performing the test descr bed in item 2, repeat the test described in item if the drop in reading exceeds the serviceable value. The vacuum booster should be inspected in such a case, as it indicates vacuum leakage from the vacuum booster.

4. (Inspection of Pressure Gauge)
Inspect the operation and oil leakage of the brake system, refering to Section 11 BRAKE AND WHEEL, followed by, returning the reading of the vacuum gauge to 0. Depress the accelerator pedal so that the reading of the pressure gauge or the intake side reaches 20 kg/cm^2 if any difference exists between the pressure readings of the intake and output sides, the pressure gauges should be checked because there is a possibility that one of them is malfunctioning.

5. (Inspection of Vacuum Booster Performance)
For inspection of the vacuum booster performance, sit on the driver's seat and maintain the reading of the intake pressure gauge to 15 kg/cm^2 by controlling the pedal and using accelerator pedal. (In order to properly check the performance of the vacuum booster, the reading of the vacuum gauge must be at 500 mmHg. In case the vacuum fails to maintain reading of 500 mmHg, release the accelerator pedal to decrease the vacuum and try again to create 500 mmHg constant vacuum pressure.
After making sure that the reading of the vacuum gauge is 500 mmHg and that of the intake pressure gauge is 15kg/cm^2, check to see if the reading of the output pressure gauge is within the serviceable limits indicated below. If the reading exceeds the serviceable limits the vacuum booster should be checked and readjusted.
The reading should be: 43 kg/cm^2—53kg/cm^2 for the vacuum booster with blue label and 31 kg/cm^2—41kg/cm^2 for the vacuum booster with red label. (Refer to Fig. 11H-55)

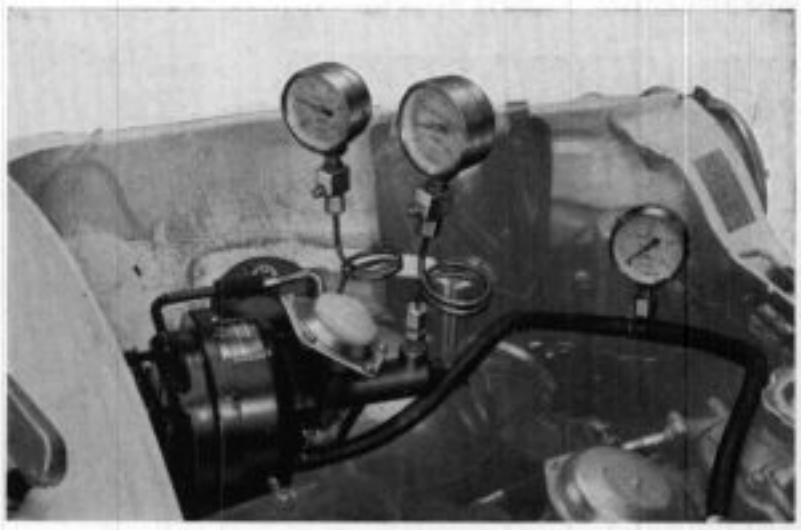


Fig. 11H-54

6. After completing the test, air bleeding should be performed as shown in Fig. 11 H-54 before the pressure gauges are removed. The air bleeding should be made on the pressure gauge of output side and then on the one of intake side.

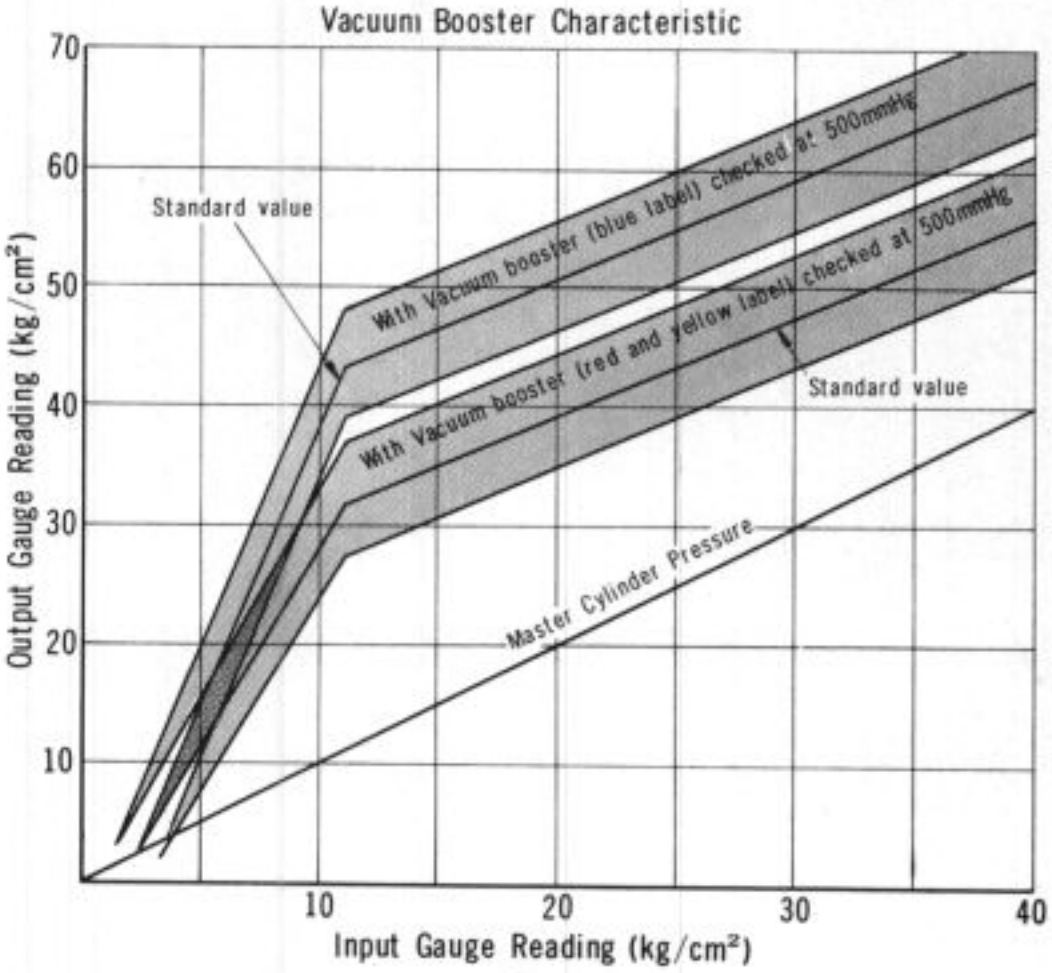


Fig. 11H-55

Fig. 11 H-55 shows the performance curve of the N600 vacuum booster with yellow, red and blue labels. If the output reading corresponding to any given input reading beyond 11 kg/cm^2 is within the dotted zone in the above diagram, the vacuum booster is satisfactory.

I. Brake Lines and Connection

In addition to periodical check every 3000 miles, brake line, hoses, and cable should be inspected for brake fluid leak, chafing, corrosion, deterioration, or other damages whenever the car is raised on a lift for any reason.

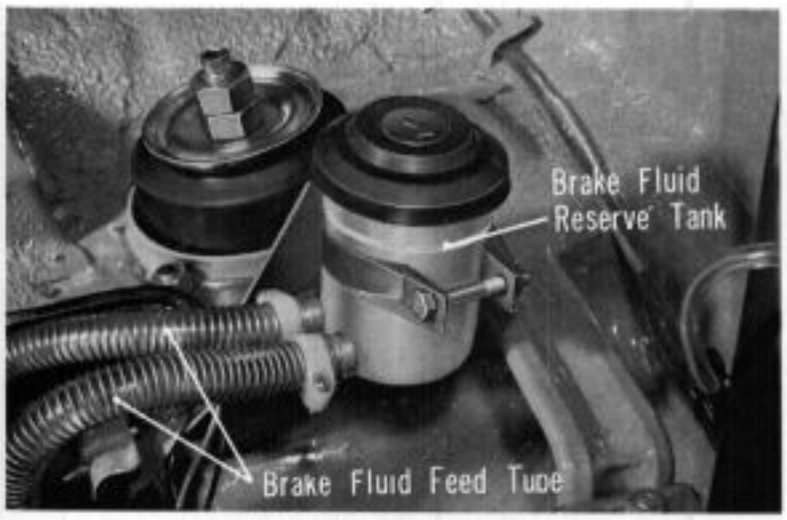


Fig. 11I-1

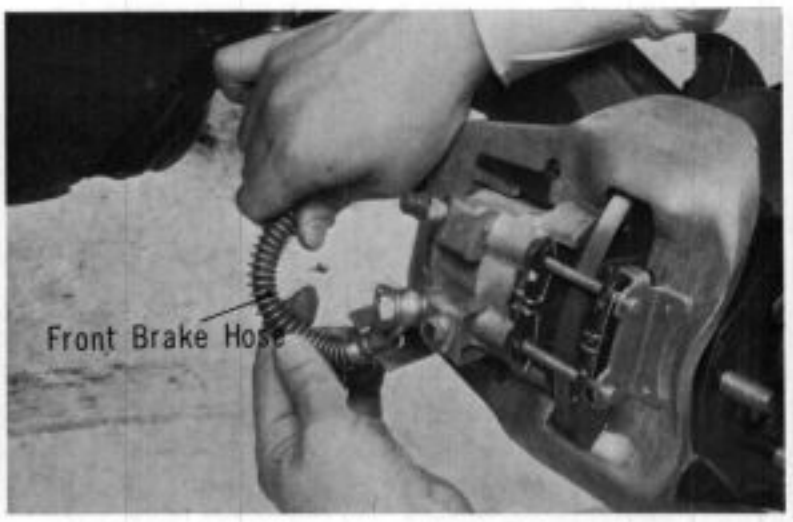


Fig. 11I-2

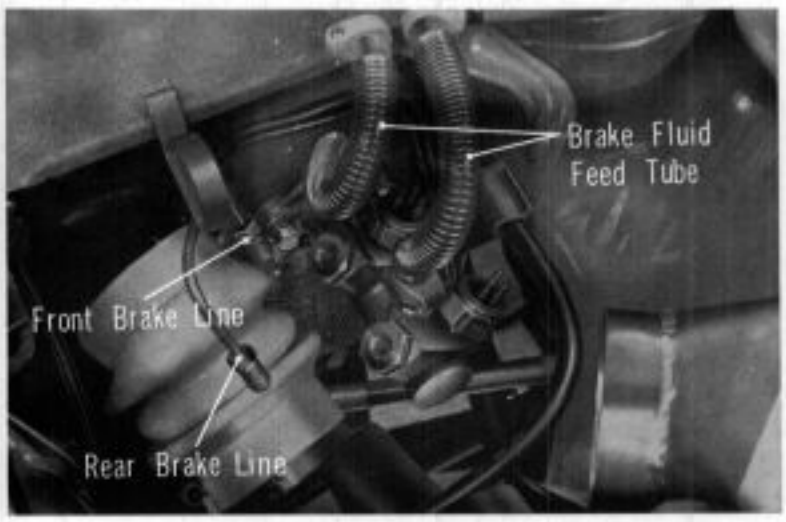


Fig. 11I-3

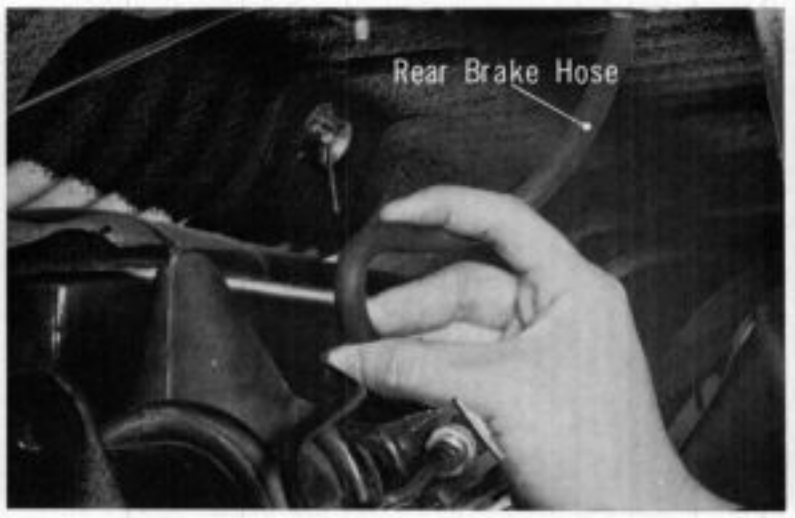


Fig. 11I-4

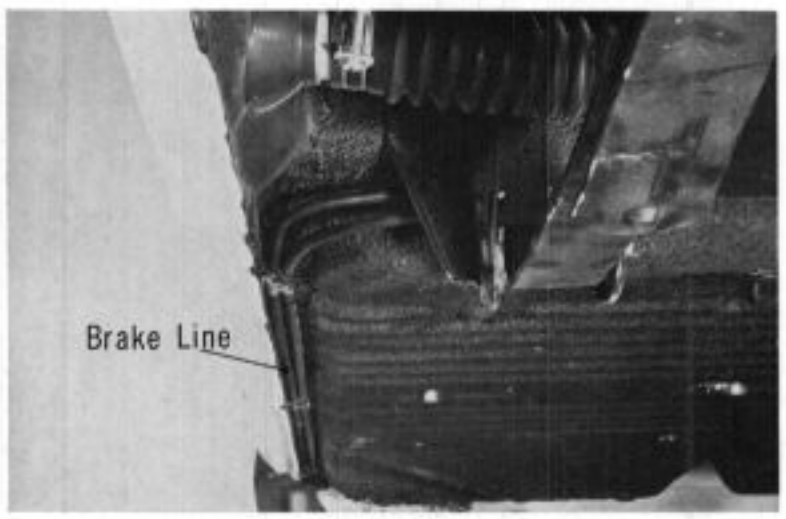


Fig. 11I-5

J. Parking Brake

Description

The parking brake is of mechanical type which applies braking force to the rear wheels. The parking brake lever is located between the front seats. The cable which is attached to the tail end of the parking brake lever extends to the equalizer and to the right and left rear wheel brakes. (See the figure on page 11-1)

When the lever is pulled, the cable becomes taut (pulling both right and left parking brake arms, after being equalized) to actuate the rear brake shoes.

The lever is fitted with a parking brake indicator light switch

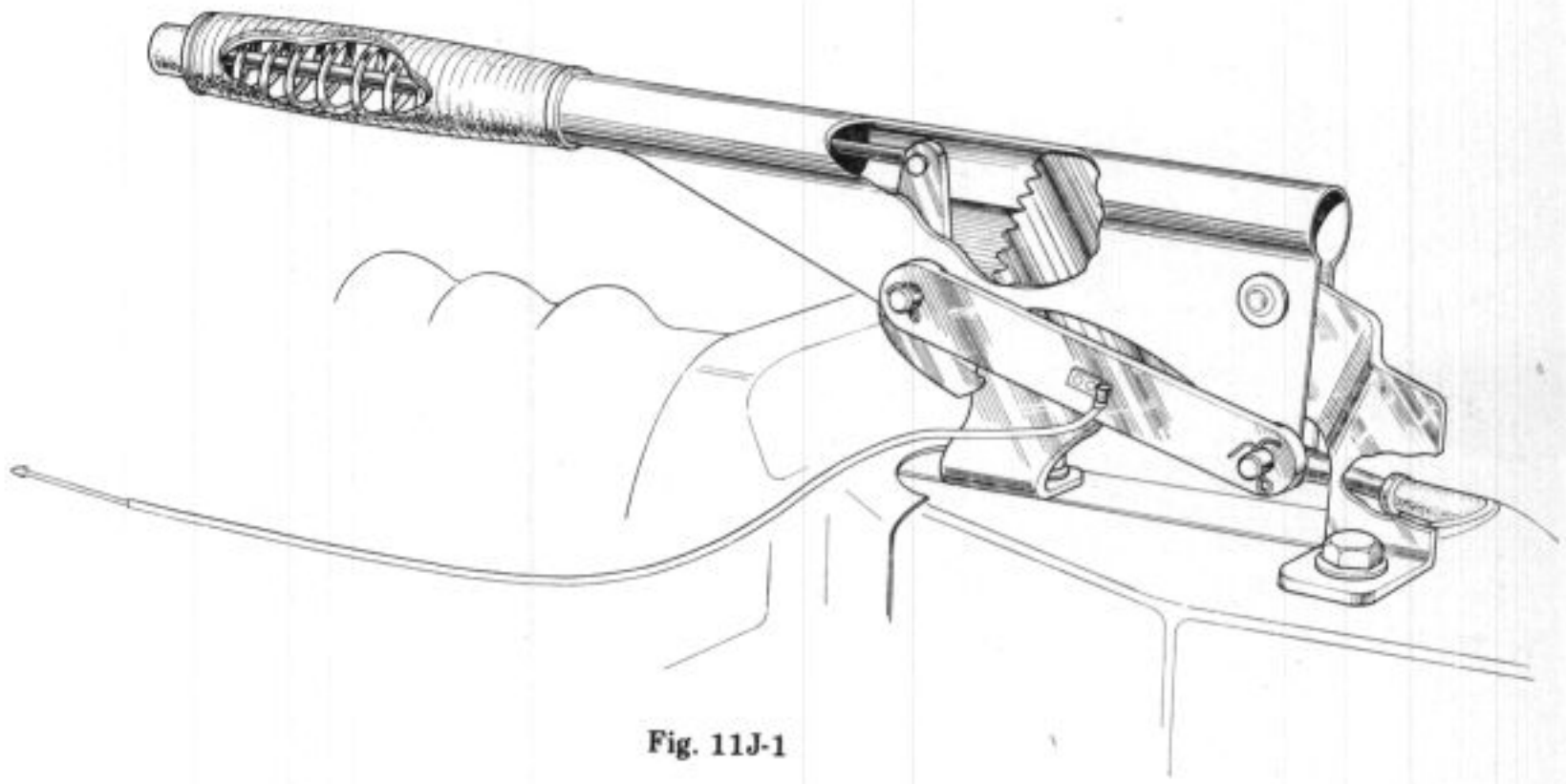


Fig. 11J-1

Removal

1. Remove the primary cable adjusting nut from the equalizer mounted on the rear axle, and separate the primary cable from the equalizer.

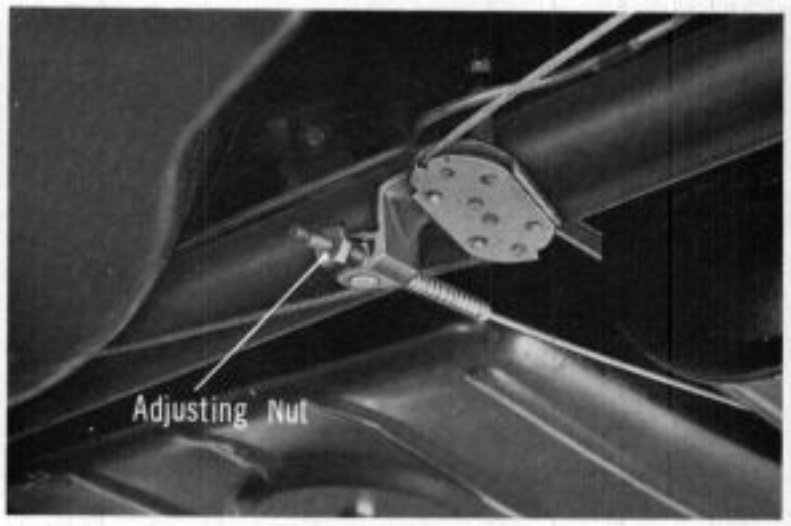


Fig. 11J-2

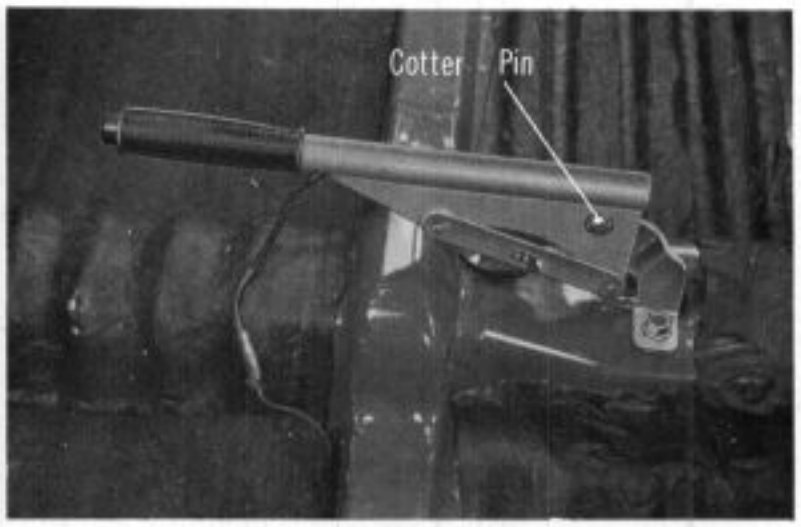


Fig. 11J-3

2. Set the parking brake lever to the fully released position.
Remove the cotter pin from the pin connecting the cable end and lever, and draw out the pin using pliers.

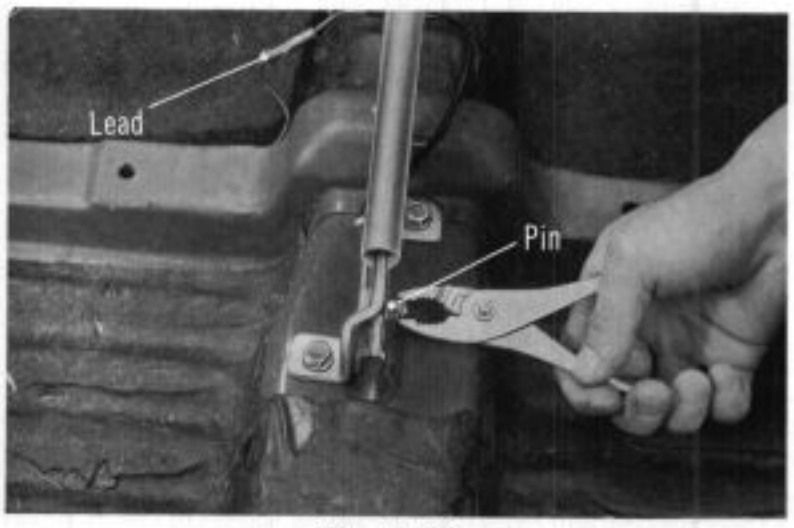


Fig. 11J-4

3. Separate the wiring (lead) of the parking brake indicator light switch at the connector.

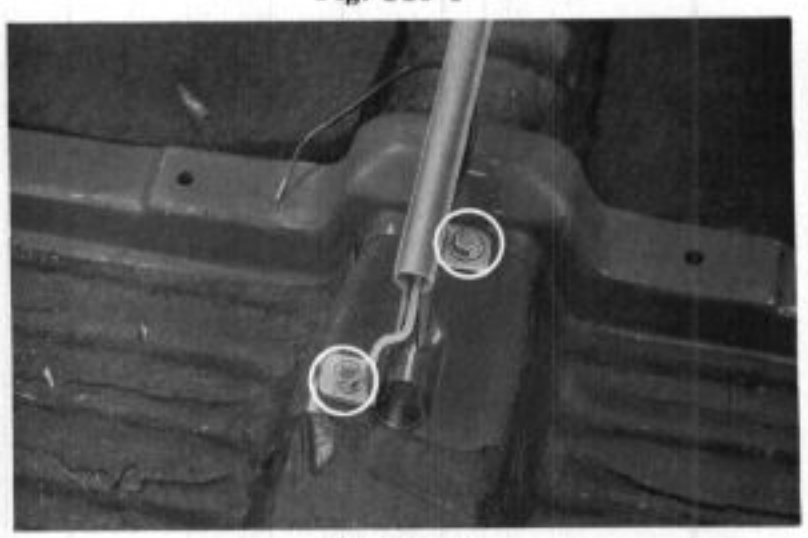


Fig. 11J-5

4. Remove the brake lever from the floor by removing the two mounting bolts.

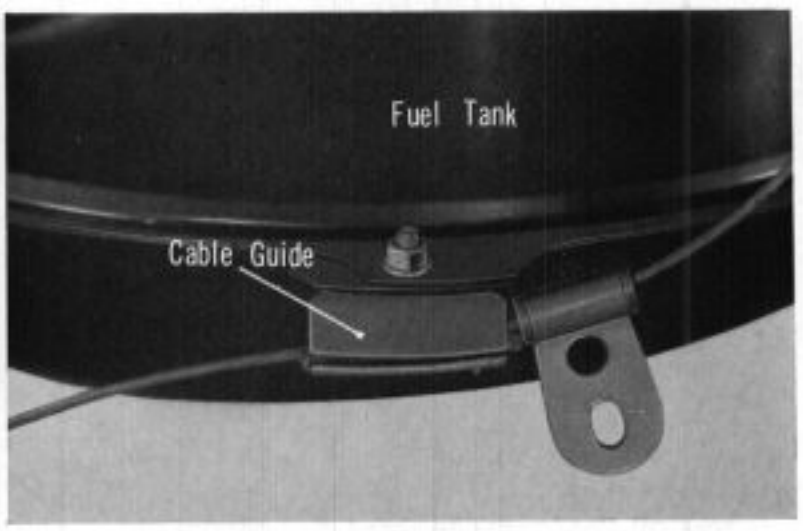


Fig. 11J-6

5. Detach the cable from the guides at the front and right side of the fuel tank. The guide in place at the front of the fuel tank is held by a mounting bolt.

Inspection and Adjustment

Check the condition of the indicator light switch mounted on the parking brake lever.

Check the rachet and pawl of the lever for wear and other damage; replace if necessary.

Adjust the lever travel to 30~50% (2~3 notches) of the full stroke by turning the equalizer adjusting nut. (Refer to Fig. 11J-7)

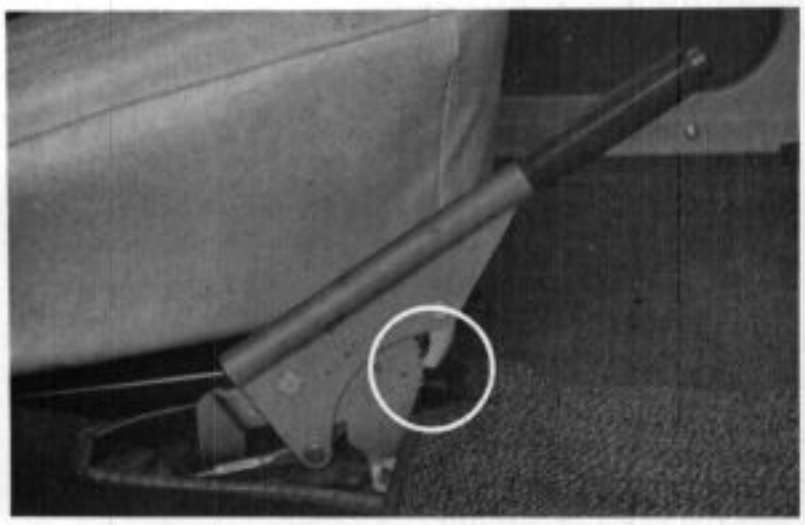


Fig. 11J-7

If cable guide is excessively worn or cracked, replace it.

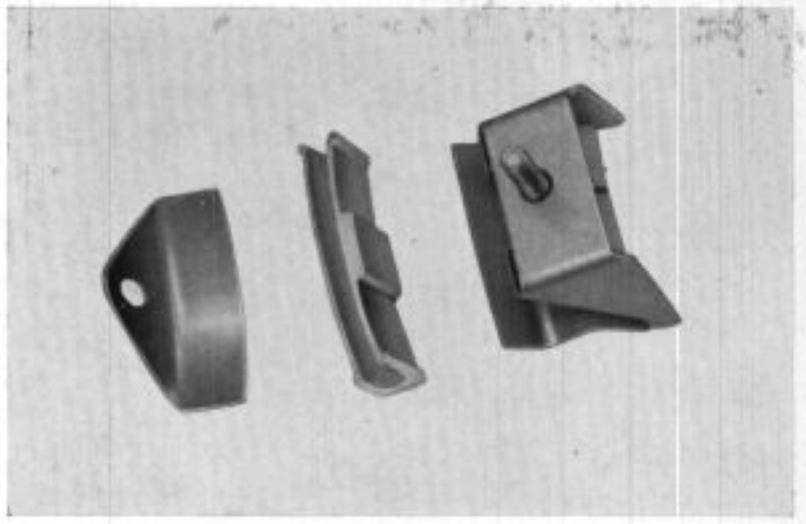


Fig. 11J-8

Apply grease to the cable and the guide.

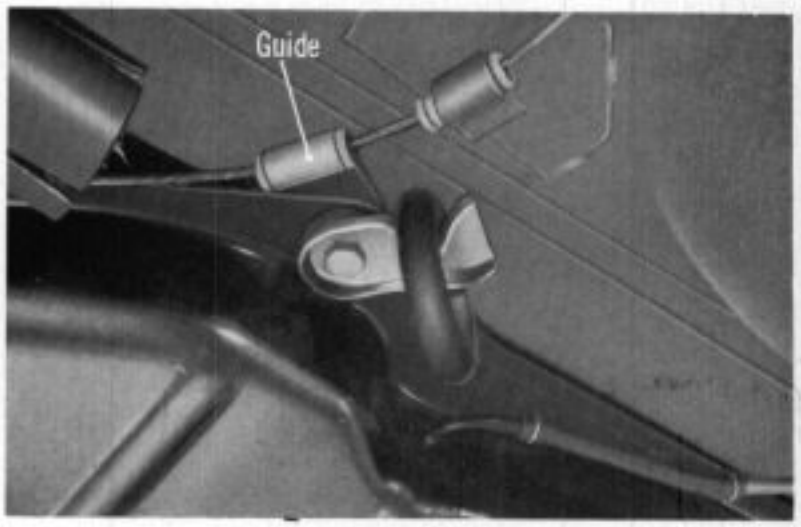


Fig. 11J-9

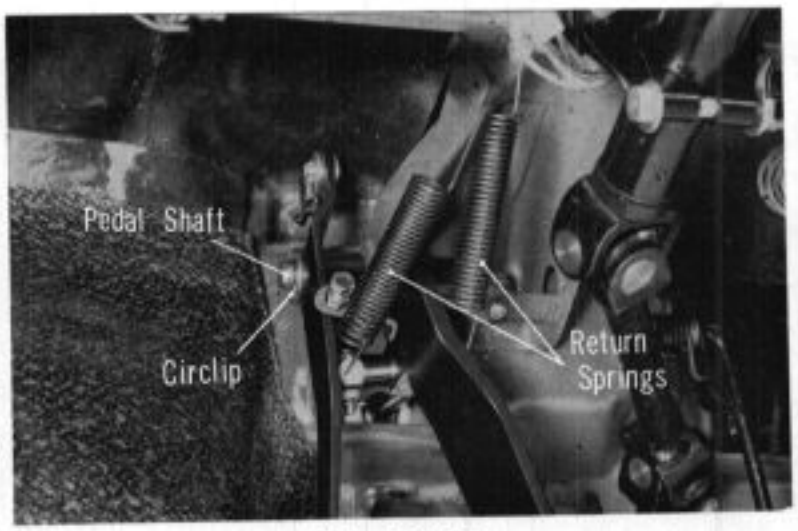


Fig. 11K-1

K. Pedals and Pedal Linkages

Removal

1. Unlock the pedal return springs from the clutch and brake pedal.
2. Remove the circlip and washer from the pedal shaft.

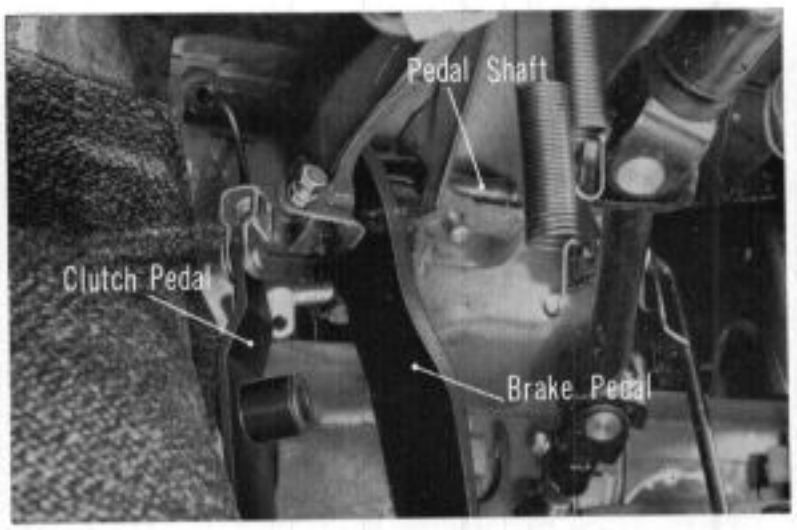


Fig. 11K-2

3. Push the pedal shaft to the interior and separate the clutch pedal from the shaft.
4. Remove the lock pin and clevis pin of the brake push rod, and disconnect the brake pedal from the brake master cylinder. (Refer to C. Master Cylinder.)

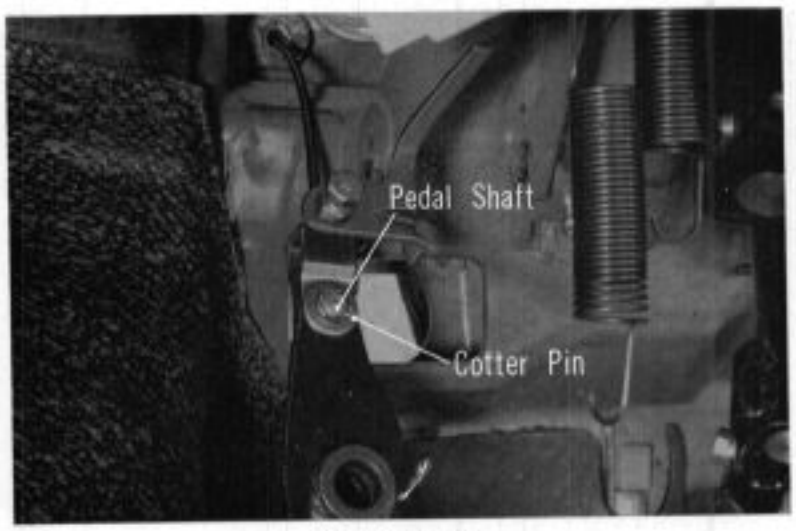


Fig. 11K-3

5. Draw out the pedal shaft from the pedal bracket and remove the brake pedal.
6. Disconnect the clutch pedal from the clutch cable by removing cotter pin and pedal pin.

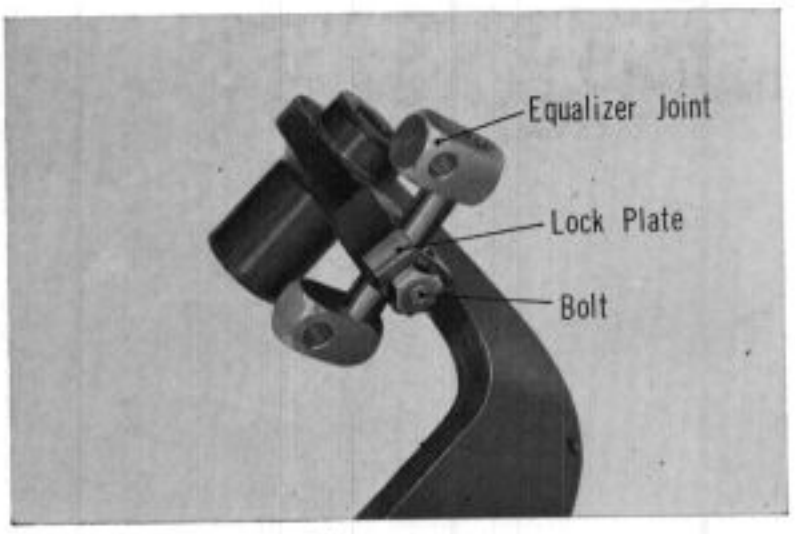


Fig. 11K-4

7. (Parallel Master Cylinder)
   Remove the equalizer joints and the lock plate and bolt.

8. (Removal of the accelerator pedal.)
   Remove the two bolts mounting the accelerator pedal bracket, and disconnect the throttle cable from the accelerator pedal.

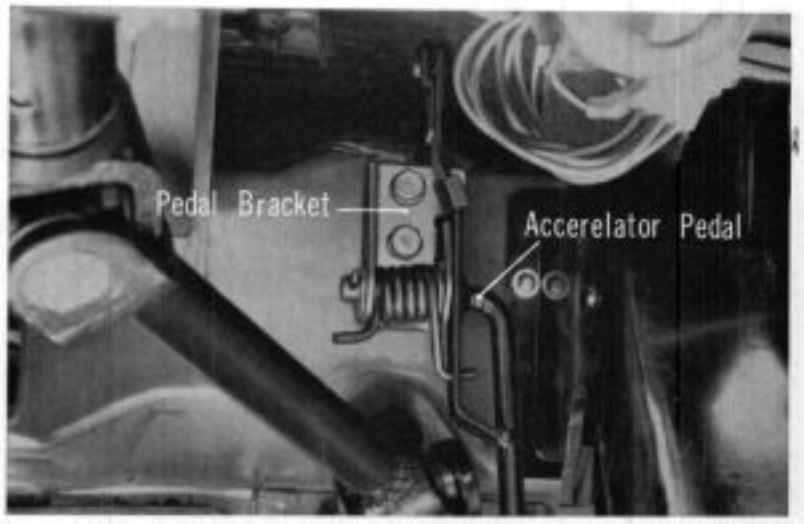


Fig. 11K-5

9. Unlock the return spring from the pedal, remove the cotter pin, then separate the pedal from the bracket.

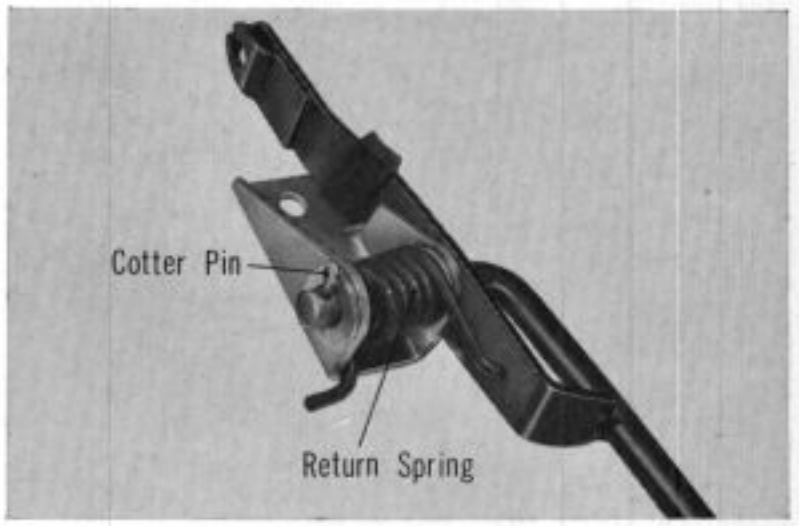


Fig. 11K-6

Inspection

1. Clean all parts with a good cleaning solvent.
2. Inspect all pedal bushings and the pedal shaft for wear and damage. Replace any part if necessary.

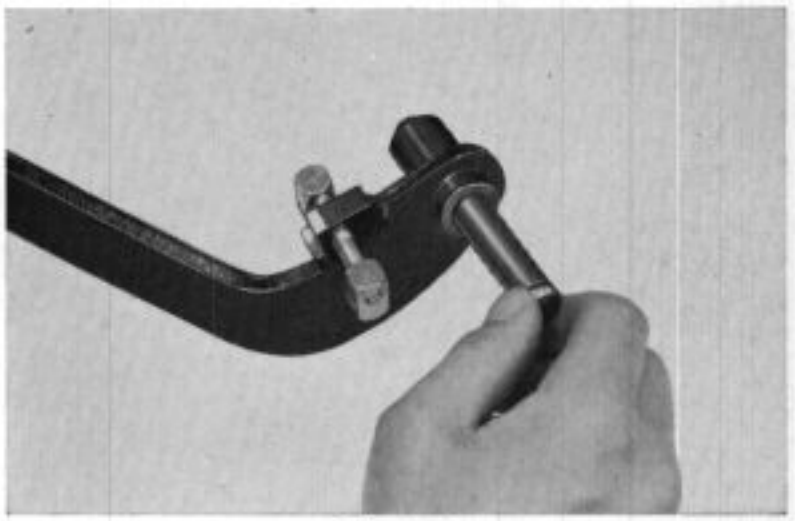


Fig. 11K-7

3. Removing the pedal bushing.
   Apply a screwdriver or appropriate tool on the inside of the bushing and tap the screwdriver with a hammer.

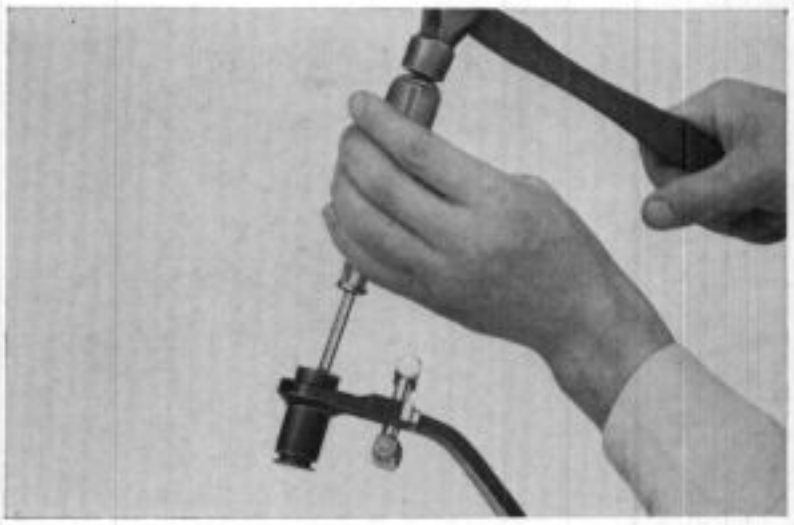


Fig. 11K-8

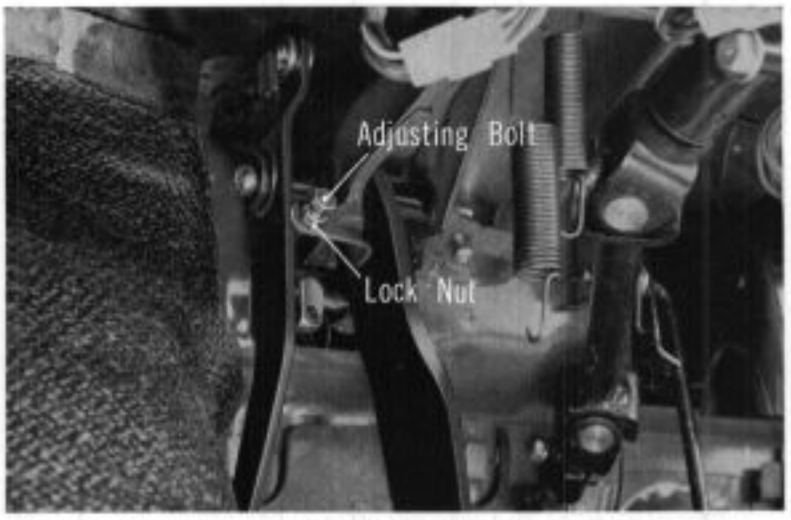


Fig. 11K-9

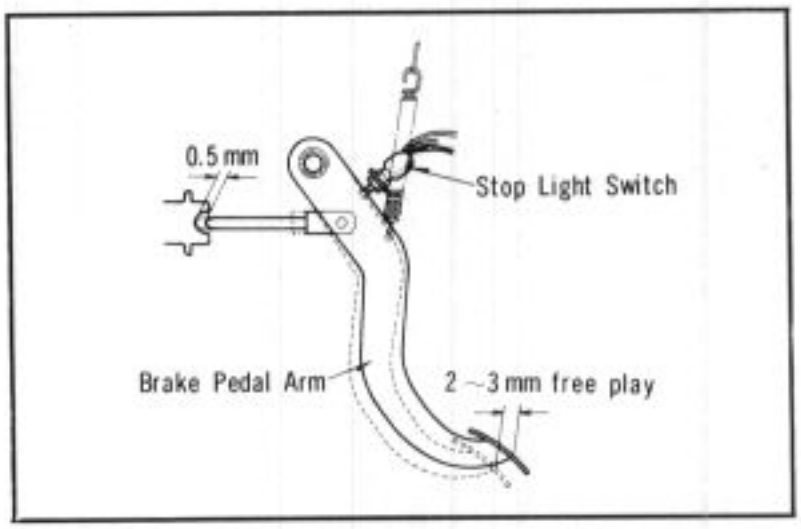


Fig. 11K-10

Fig. 11K-11

Installation

Install in reverse of removal.

Note:

1. Lubricate the pedal shaft and bushing (both must operate freely) .
2. Refer to C. Master Cylinder for the equalizer of the brake pedal.
3. After installation, align the clutch pedal with the brake pedal using the adjusting bolt. (Fig. 11K-9)

(Brake pedal height adjustment)

For those vehicles equipped with the mechanical operating stop light switch above the brake pedal arm, brake pedal height and the stop light switch should be inspected periodically.

Check for air in the hydraulic system and correct brake adjustment before any attempt is made to adjust brake pedal height. Brake Pedal hight adjustment is made by means of the stop light switch adjustment. Screw in the stop light switch until the push rod free play is eliminated, and back off a half turn to allow the master cylinder push rod 0.5mm (0.02 in) free play. By this adjustment about 2—3 mm (0.08—0.12 in) proper free play is provided at the brake pedal pad.

Inspection of Mechanical Stop Light Switch

The brake pedal arm operates the switch. Check to see that the pedal is in the fully returned position by lifting slightly by hand.

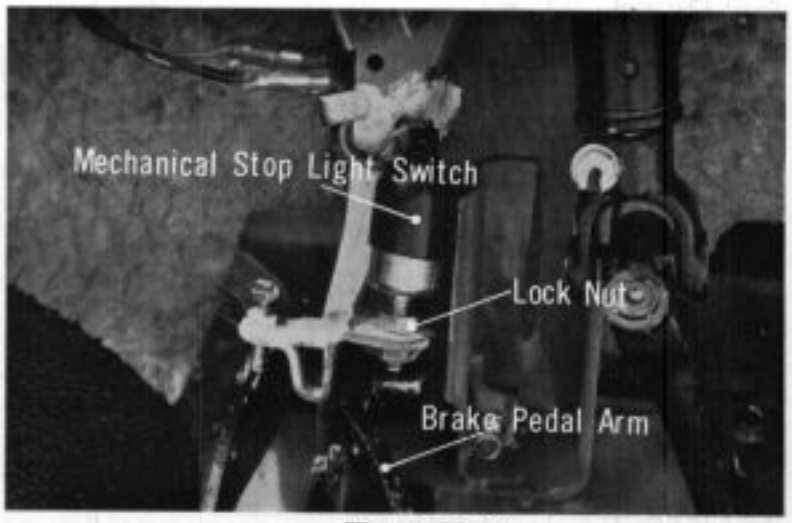


Fig. 11K-12

To check the operation of stop light switch, remove it from the bracket and check the continuity with a service tester while releasing the plunger from fully depressed position.

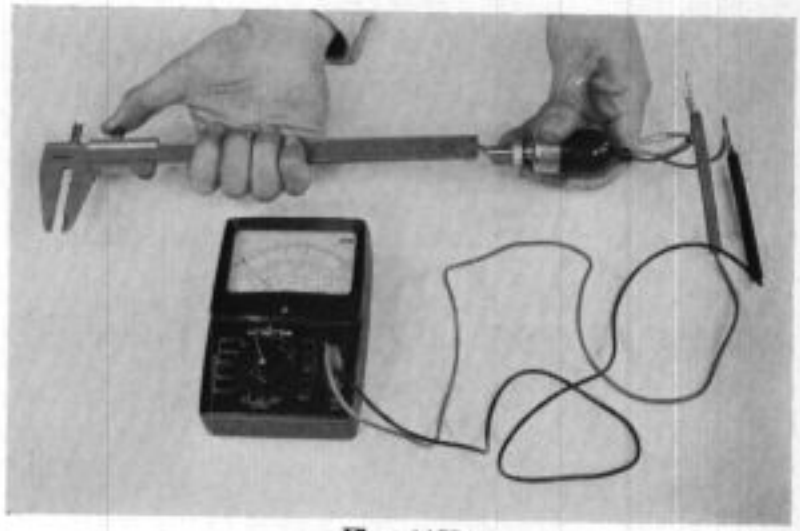


Fig. 11K-13

If there is complete continuity at the position shown in the picture, the stop light switch is serviceable. Upon completion of the check, apply a light coat of grease to the plunger

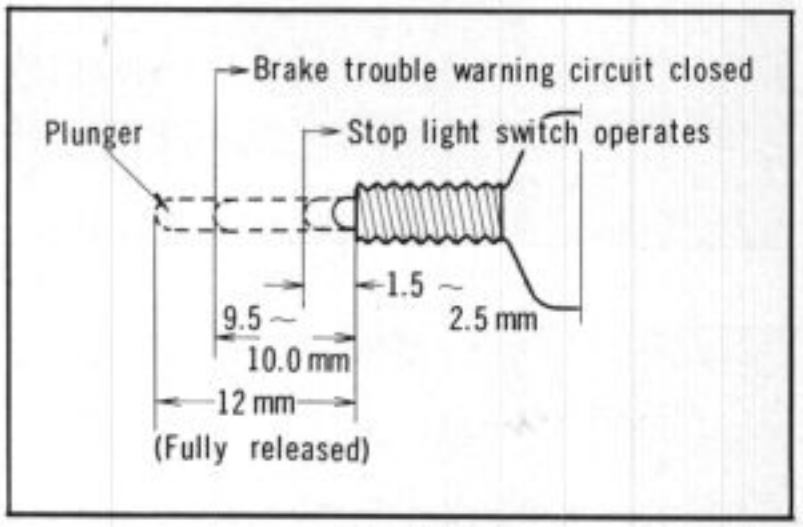


Fig. 11K-14

Inspection of Brake Trouble Warning Circuit (Verhicles for U.S.A.)

Periodical check every 24,000 miles or 24 months is required. However, inspection of brake trouble warning circuit should be made any time major brake work is done.

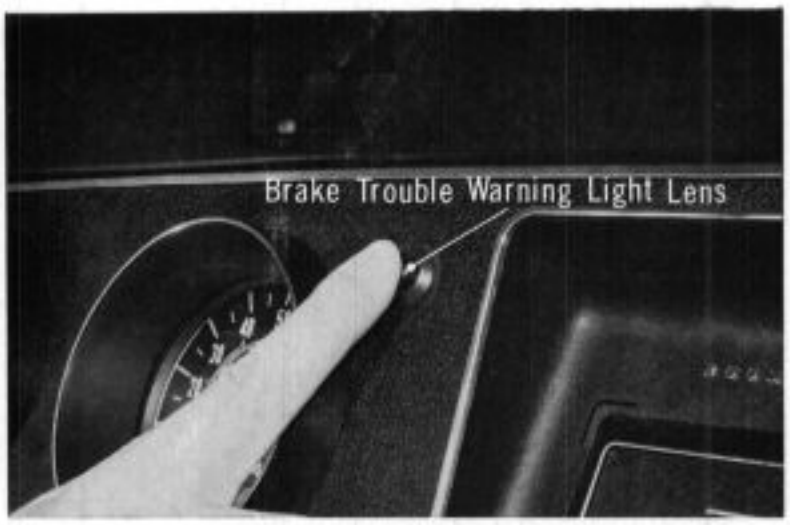


Fig. 11K-15

(Inspection Produre)

1. Make sure the bulb is functioning by depressing the brake trouble warning light.
2. Check the brake fluid level and add if necessary.

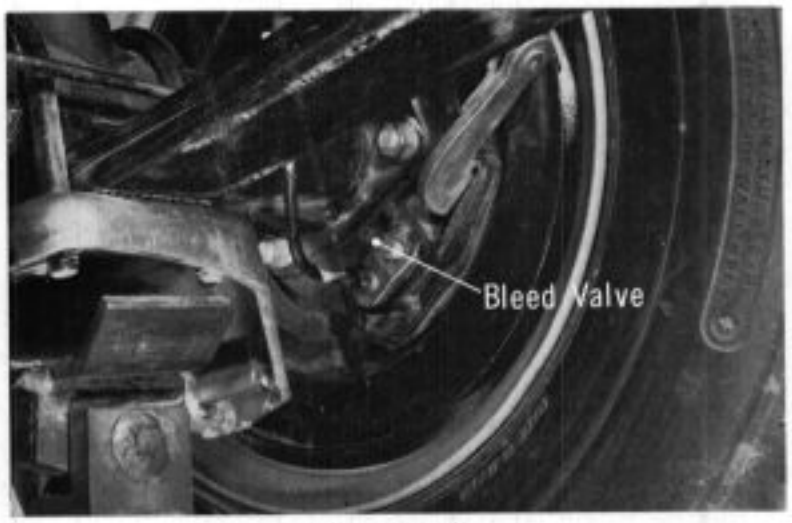


Fig. 11K-16

3. Open the wheel cylinder bleed screw in the rear wheel while depressing the brake pedal. The light should come on due to pressure difference.
   Note:
   Do not release the pedal while the bleed valve is open as air will enter the hydraulic system.

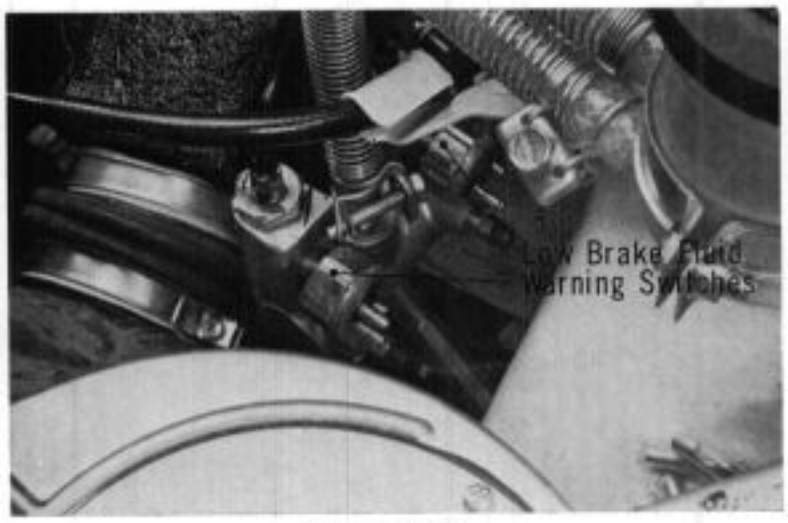


Fig. 11K-17

4. If the brake trouble warning circuit is inoperative, check the stop light switch and the low brake fluid warning switches for defect.

L. Wheels and Tires

Description

The wheels are mounted with right-hand-thread tapered nuts. The standard tire sizes are 5.20-10-2PR and 5.20-10-4PR.

(Tire inflation pressure under cold conditions)

Vehicle Model		Type of tire		Tire pressure	
				Front	Rear
Sedan	Manual transmission	2Ply Bias		1.4kg/cm² (20psi)	1.0kg/cm² (14psi)
		4Ply Bias		1.7kg/cm² (24psi)	1.5kg/cm² (22psi)
		4Ply Radial		1.8kg/cm² (26psi)	1.5kg/cm² (22psi)
		6Ply Bias		2.0kg/cm² (29psi)	1.7kg/cm² (24psi)
	Handamatic transmission	4Ply Bias		1.8kg/cm² (26psi)	1.5kg/cm² (22psi)
		4Ply Radial		1.8kg/cm² (26psi)	1.5kg/cm² (22psi)
		6Ply Bias		2.0kg/cm² (29psi)	1.7kg/cm² (24psi)
Van	LN360	4Ply	Unloaded	1.7kg/cm² (24psi)	1.5kg/cm² (22psi)
			Loaded	2.0kg/cm² (29psi)	2.4kg/cm² (34psi)

Both right and left wheels must be balanced uniformly.
Wheel balance, however, may change gradually due to the non-uniform wear of tires, tire repair work or replacement, or brake drum replacement. Unbalanced wheels may cause noise and vibration and eventually will shorten vehicle life. When noise and vibration occur, pay attention to the noisy or vibrating part as well as to the unbalanced wheel to determine the exact cause of the trouble.

Static Wheel Balancing

Static balancing shows that the weight distribution of the wheels and tires relative to the rotating axis is in balance. If the vehicle is operated in an unbalanced wheel condition, "bouncing" may occur and result in vibration, the generation of noise and, consequently shorten the life of the vehicle.

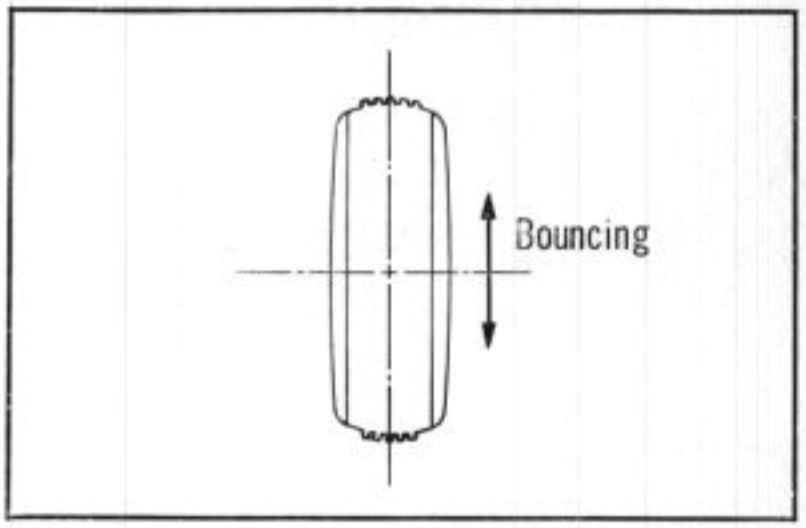


Fig. 11L-1

Dynamic Wheel Balancing

If the weight distribution of the wheels and tires relative to the rotational plane is not in balance even if static balancing is perfect, shimmy causes fairly strong vibration of the steering wheel. This vibration may become serious when attempting to manipulate the steering wheel.

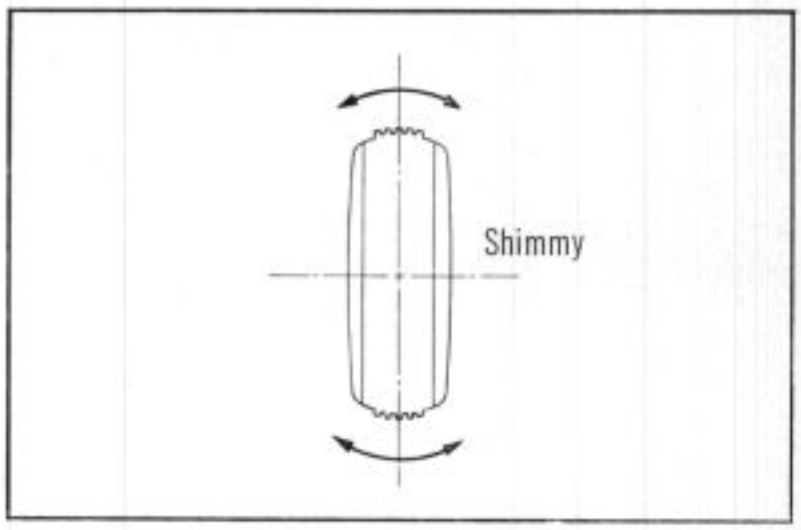


Fig. 11L-2

Fig. 11L-3

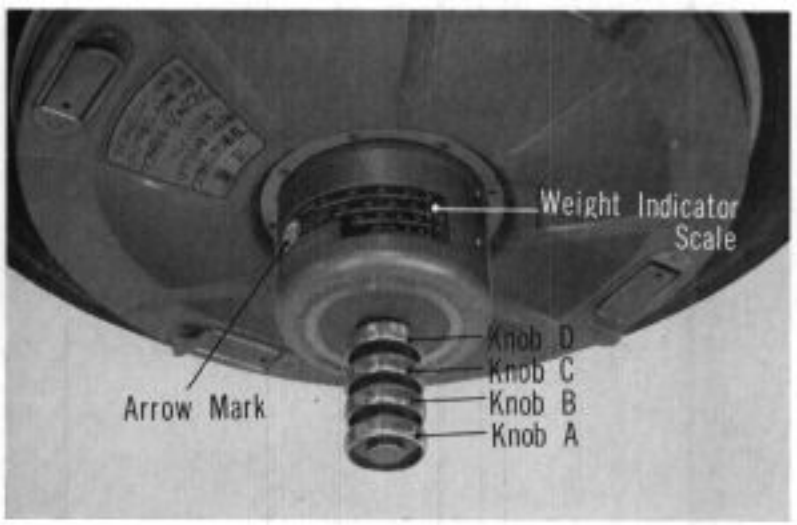


Fig. 11L-4

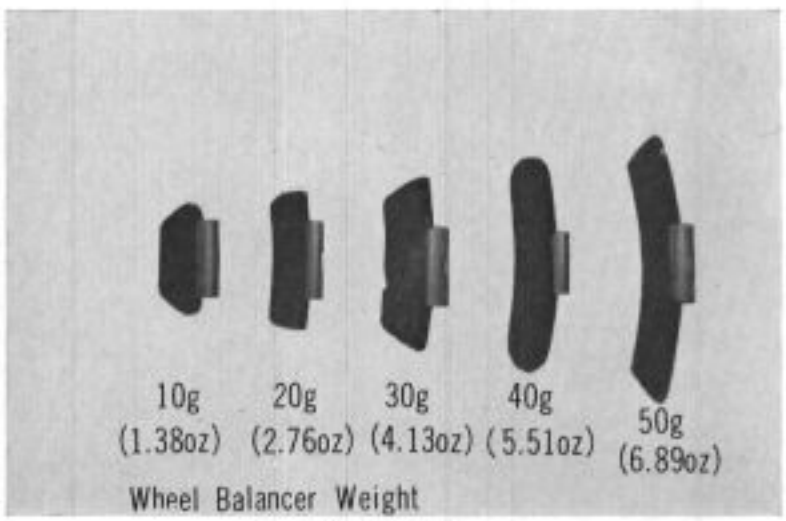


Fig. 11L-5

Inspection before Balancing Wheel and Tires

1. After jacking the vehicle up, spin the wheels by hand to check wheel bearing play.
2. Check the tire for roundness.
3. Check tire for wear and other damage; and also for stones, dirt, etc. between threads.
4. Make sure that the tire pressure is correct.

Balancing Procedure

There are a variety of balancing instruments and equipment and these can be divided generally into two types, those used with the wheels in place and those used with the wheels removed. The former type is used in the procedure outlined below. If a different type of instrument, is used, follow manufacturer's instruction.

1. Front Wheels
   * Jack the vehicle up at the front until the wheels clear the ground, and install the wheel balancer.
   * Start the engine and spin the front wheels at a speed equivalent to 60 km/hr. (approx. 38 mph).
   * Hold knob A which turns in unison with the wheels with the fingers. Release the finger grip a little after the position where vibration is minimum, is obtained.
   * Hold knob B and release the finger grip where vibration is minimum.
   * Hold knob C and release the finger grip a little beyond the point where vibration is minimum.
   * Hold knob D and release the finger grip where vibration is minimum.
   * If the above procedure stops the vibration, stop the engine and wait for the wheels to come to a stop on their own.
   * When the wheels have stopped, read the weight indicator scale of the wheel balancer, as shown ing Fig. 11L-3, and put the correct balancing weight on the outer edge of the rim in a straight line from the arrow on the wheel balancer.
   * Remove the balancer and start the engine to check whether or not wheel balancing is correct and vibration eliminated.

2. Rear Wheels
   * Jack the vehicle up at the rear until the wheels clear the ground and place the roller of the wheel spinner in contact with each wheel in turn.
   * Push the control lever to drive the wheel.
   * Repeat the procedure in the order given for the front wheels.

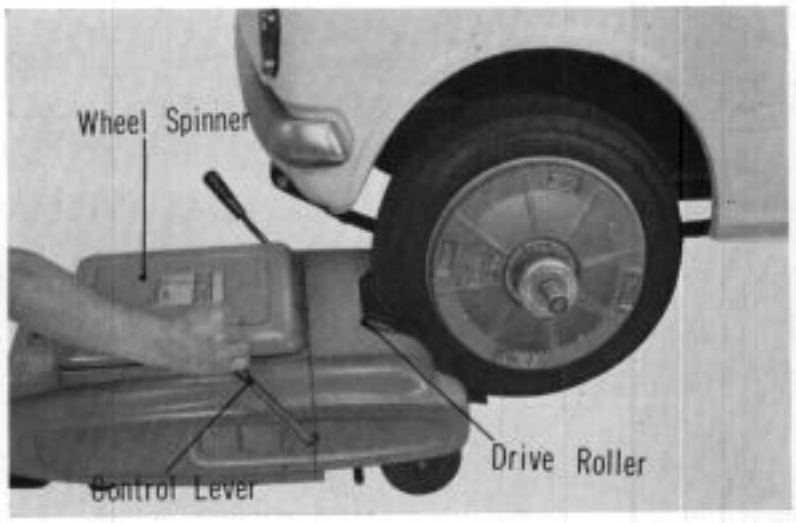
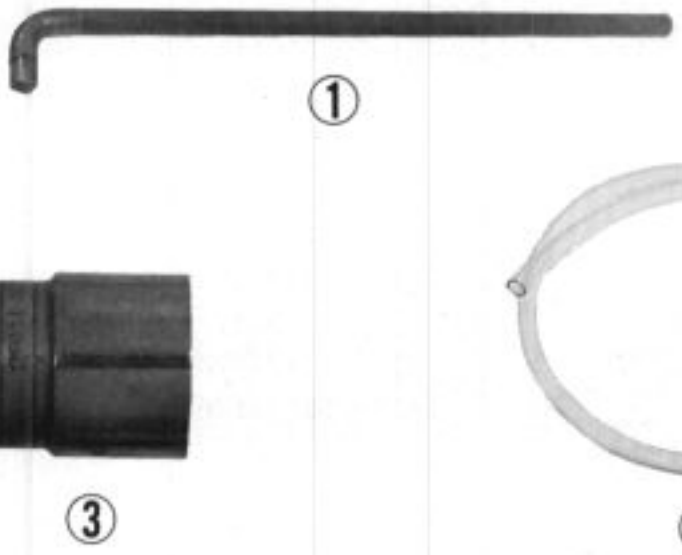


Fig. 11L-6

M. Special Tools



Ref.No.	Tool No.	Description
1.	07023-60106	Wrench Handle
2.	07083-60110	Socket (32 mm)
3.	07083-60115	Socket (27 mm)
4.	07059-55102	Air Bleeder Tube

N. Trouble Diagnosis

PHENOMENON	POSSIBLE CAUSES
a) Poor braking.	1. Brake adjustment incorrect. 2. Excessively worn brake lining. 3. Water or oil on brake lining surface. 4. Change in the brake lining surface; uneven shoe contact. 5. Air trapped in hydraulic system. 6. Fluid leakage in hydraulic system. 7. Compensating port clogged. 8. Rusted wheel cylinder. 9. Malfunctioning caliper yoke (Disk brake).
b) Vehicle pulls to one side.	1. Maladjustment of tire pressure. 2. Water or oil on the surface of the brake lining, the disc brake, or the drum. 3. Worn or damaged (warped, rusted, etc.) disc or drum. 4. Hardened brake lining. 5. Uneven brake lining surface contact. 6. Carbonized or damaged brake lining. 7. Malfunctioning of the brake cylinder. 8. Improper mounting of wheel bearing. 9. Use of pad lining of different material on the left and right wheels. 10. Improper alignment of the front wheels. 11. Clogged pressure system 12. Difference in the left and right sides of the road condition. 13. Loose caliper mounting bolts. 14. Malfunctioning caliper yoke. 15. Water, mud, etc., in brakes.

PHENOMENON	POSSIBLE CAUSES
c) Wheels drag.	1. Brake adjustment incorrect. 2. Oil, etc., in system. 3. Clogged compensating port. 4. Improper returning action of the parking brake. 5. Insufficient play of the brake pedal. 6. Broken or weakened brake pedal return spring. 7. Malfunctioning pedal linkage. 8. Malfunctioning rear brake and shoe, or weakened spring. 9. Loose wheel bearing. 10. Malfunctioning wheel cylinder. 11. Malfunctioning caliper yoke. (Disk brake) 12. Missing knuckle to caliper adjusting shim.
d) Pedal stroke changes or becomes larger.	1. Air bubbles in the brake fluid. 2. Fluid leakage in the fluid pressure system. 3. Worn or defective piston, cup and/or seal. 4. Insufficient amount of brake fluid. 5. Worn front and rear brake linings. 6. Unevenly worn front and rear brake lining. 7. Malfunctioning pedal linkage. 8. Excessive runout of the disc. (Disk brake) 9. Tilting of the rear brake shoe or incorrect return.
e) Brake squeaks.	1. Dragging of the brake shoe. 2. Worn brake lining. 3. Change in the surface of lining. 4. Lodging of foreign matter on the disc or drum. 5. Runout or damage on the sliding surface of the disc or drum. 6. Unevenly worn disc surface. (Disk brake) 7. Dirt or dust inside the brake. 8. New linings not yet fully burnished. 9. Rusty wheel cylinder. 10. Incorrect installation of brake pad shims (Disk brake)

PHENOMENON	POSSIBLE CAUSES
f) Pedal reaches floorboard when fully depressed.	1. Excessively worn brake lining. 2. Excessive clearance between brake drum and lining. 3. Insufficient fluid in master cylinder. 4. Leaking hydraulic lines or cylinders. 5. Air in brake line. 6. Damaged master cylinder rubber cap. 7. Worn master cylinder piston or piston cup. 8. Defective master cylinder check valve. 9. Defective wheel cylinder piston cup. 10. Clogged brake line.
g) Brakes lock, not released properly.	1. Clogged brake line. 2. Clogged master cylinder return port. 3. Malfunctioning master cylinder check valve. 4. Poor return action of wheel cylinder.
h) Parking brake action is poor.	1. Excessive brake lever stroke. 2. Excessive adjustment of brake cable or rod. 3. Incorrect clearance between brake shoe and drum. 4. Oil on brake shoe.