

Group 5

SERVICE BRAKES

CONTENTS

	Par.	Page
Adjusting the Brakes	18	14
Front Brake Adjustment		
Rear Brake Adjustment		
Bleeding the Brake System	16	13
Brake Hose and Lines	20	15
Cyclebond Brake Lining	21	15
Grinding Recommendations	12	9
Inspecting the Brake Shoes	11	9
Installing the Brake Shoes	13	9
Installing the Front Brake Shoes		
Installing the Rear Brake Shoes		
Installing the Front and Rear Support Plates and Wheel Cylinders	15	12
Installation—Front Support Plates and Wheel Cylinders		
Installation—Rear Support Plates and Wheel Cylinders		
Removing the Brake Shoes	10	7
Removing the Front Brake Shoes		
Removing the Rear Brake Shoes		
Removing the Front and Rear Support Plates and Wheel Cylinders	14	11
Removal—Front Support Plates and Wheel Cylinders		
Removal—Rear Support Plates and Wheel Cylinders		
Cleaning and Inspection—Support Plates		
Cleaning and Inspection—Wheel Cylinders		
Service Diagnosis	1	4
Servicing the Master Cylinder	19	15
Removal		
Cleaning and Inspection		
Assembly		
Servicing the Service Brakes	9	7
Tests for Fluid Contamination	17	13

POWER BRAKES

(Bellows Type)

CONTENTS

	Par.	Page
Lubrication	31	24
Master Cylinder	33	25
Power Brake Unit	29	18
Removal		
Disassembly		
Cleaning and Inspection		
Assembly		
Installation		
Pedal Free Play Adjustment	32	24
Measuring Pedal Free Play (Alternate Method)		
Pedal Linkage Adjustment (On Vehicle)	30	24
Pedal Linkage Assembly		
Service Diagnosis	22	17
Testing the Brake System	34	25

POWER BRAKES (Oval Metal Type)

Master Cylinder	50	36
Operation	43	26
Pedal Linkage Adjustment	49	36
Removal		
Installation		
Pedal Trigger Adjustment		
Power Brake Adjustment	48	36
Pedal Free Play Adjustment		
Alternate Method of Measuring Pedal Free Play		
Power Brake Installation	47	34
Power Brake Removal	45	29
Disassembly		
Cleaning and Inspection		
Assembly		
Power Brake Testing	46	27
Operational Test		
Leakage Test		
Service Diagnosis	35	25
Testing the Power Brakes	44	27

Group 5

SERVICE BRAKES

DATA AND SPECIFICATIONS

ALL MODELS

Type	Hydraulic Total Contact Internal Expanding
Drum Diameter (Front-Rear)	
Windsor and De Soto..... (122" Wheelbase).....	11"
Windsor and De Soto (Equipped with Ram Manifold)..... (122" Wheelbase).....	12"
Town and Country..... (122" Wheelbase).....	12"
Saratoga and New Yorker..... (126" Wheelbase).....	12"
Imperial..... (129" Wheelbase).....	12"
Lining Type	Molded Asbestos Cyclebond
Attached to Shoes by.....	Front 2½" Rear 2½"
Width—All Models170"
Thickness	
Brake Shoe Return Spring-Tension—	
Pounds—Front	45 to 55
Pounds—Rear	45 to 55
Per Cent of Braking Torque—Rear Wheels	40
Diameter of Wheel Cylinder Bore	1½"
Diameter of Master Cylinder Bore	1½"
Piston Cylinder Clearance (All Bores)003" to .0065"
Brake Pedal Free Play (Power Brakes)	¼" to ⅛"

SPECIAL TOOLS

Tool Name	Tool Number	Tool Name	Tool Number
Hose—Bleeder	C-650	Tank—Bleeder	C-3496
Protector—Seal	C-745	Gauge—Power Brake	C-3508
Filler—Wheel	C-837B	Wrench	C-3512
Puller—Wheel	C-845	Ring—Power Brakes	C-3578
Wrench—Parking Brake	C-3014	Pilot—Power Brakes	C-3579
Hone—Wheel Cylinder	C-3080	Gauge—Brake Shoe	DD-1168
Pliers—Power Brake	C-3229	Gauge—Brake Shoe	MT-19-J
Adapter—Bleeder	C-349A		

TIGHTENING REFERENCE

	Foot Pounds	Inch Pounds
Rear Wheel Brake Support to Axle Housing	35	
Front Wheel Brake Mounting Bolt	55	
Wheel Cylinder Mounting Bolt		200
Master Cylinder Cover Bolt		50
Pedal Bracket Nut	20	
Pedal Shaft Nut	20	
Transmission Shaft Flange Bolt Nut		
$\frac{5}{16}$ "		95
$\frac{3}{8}$ "	35	
$\frac{7}{16}$ "	50	

SERVICE DIAGNOSIS (Service Brakes)

1. PEDAL GOES TO FLOOR

- a. Fluid in master cylinder, refill with MoPar Super Brake Fluid
- b. Wear on brake lining, adjust or replace as necessary.
- c. Master cylinder, repair or replace as necessary.
- d. Wheel cylinders, replace swollen or otherwise damaged cups.
- e. Loosen connections or broken lines, repair or replace as necessary.
- f. Air in brake system, bleed brakes using air-less bleeder tank unit, Tool C-837.
- g. If, after bringing car to a stop, the brake pedal slowly goes to the floor, there is evidence of the master cylinder by-passing fluid internally. Recondition the master cylinder.

2. SPONGY PEDAL

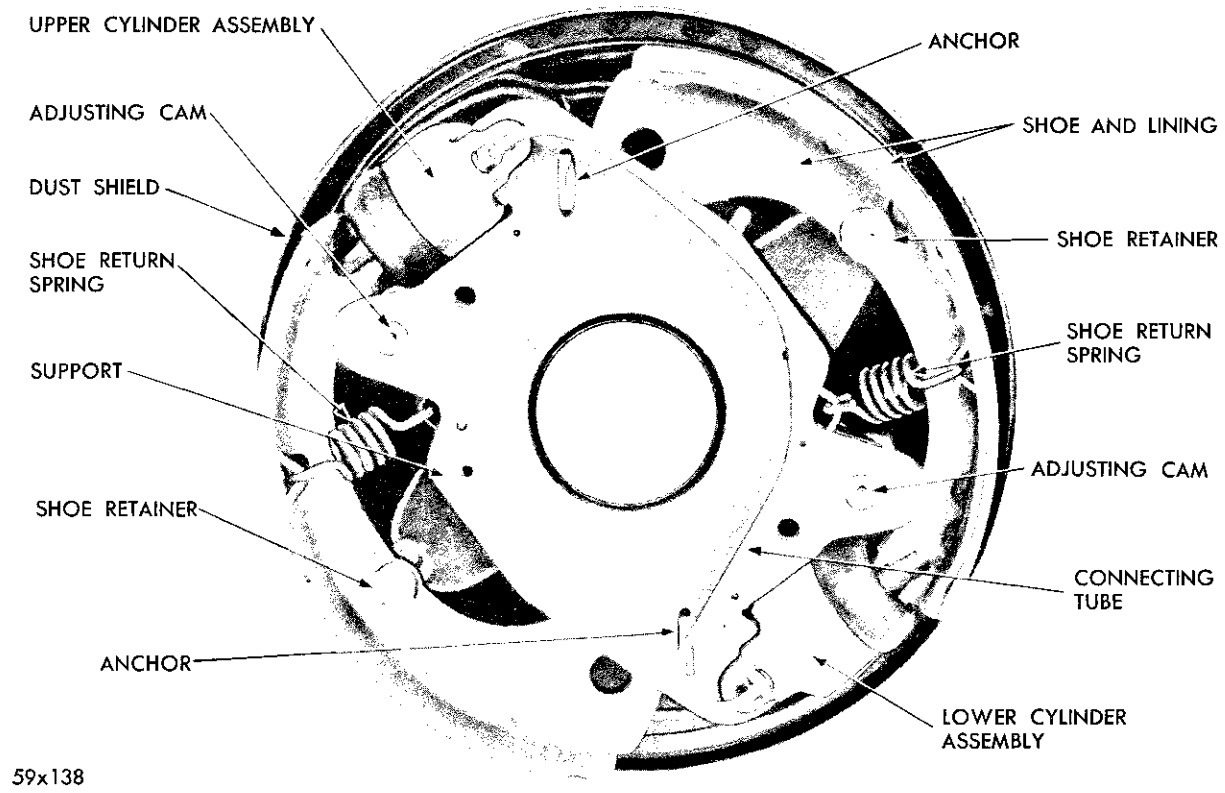
- a. Air in system, bleed brakes.
- b. Brake fluid contamination (Paragraph 17), replace with Super Brake Fluid.
- c. Brake drums, replace excessively refaced or broken drums.

3. BRAKES PULLING TO ONE SIDE

- a. Tires, inflate to proper pressure.
- b. Brake adjustment for proper clearance.
- c. Drums out-of-round — machine drum and replace with brake shoes to fit drum.
- d. Brake shoes — inspect for twist, straight, re-line, or regrind to fit drum (see Paragraph 11).
- e. Oil, grease or brake fluid on shoes—clean with alcohol. Badly saturated linings may require replacement.
- f. Brake lining — replace with matched lining.
- g. Restricted hose or fluid lines, check for restrictions.
- h. Front end alignment.

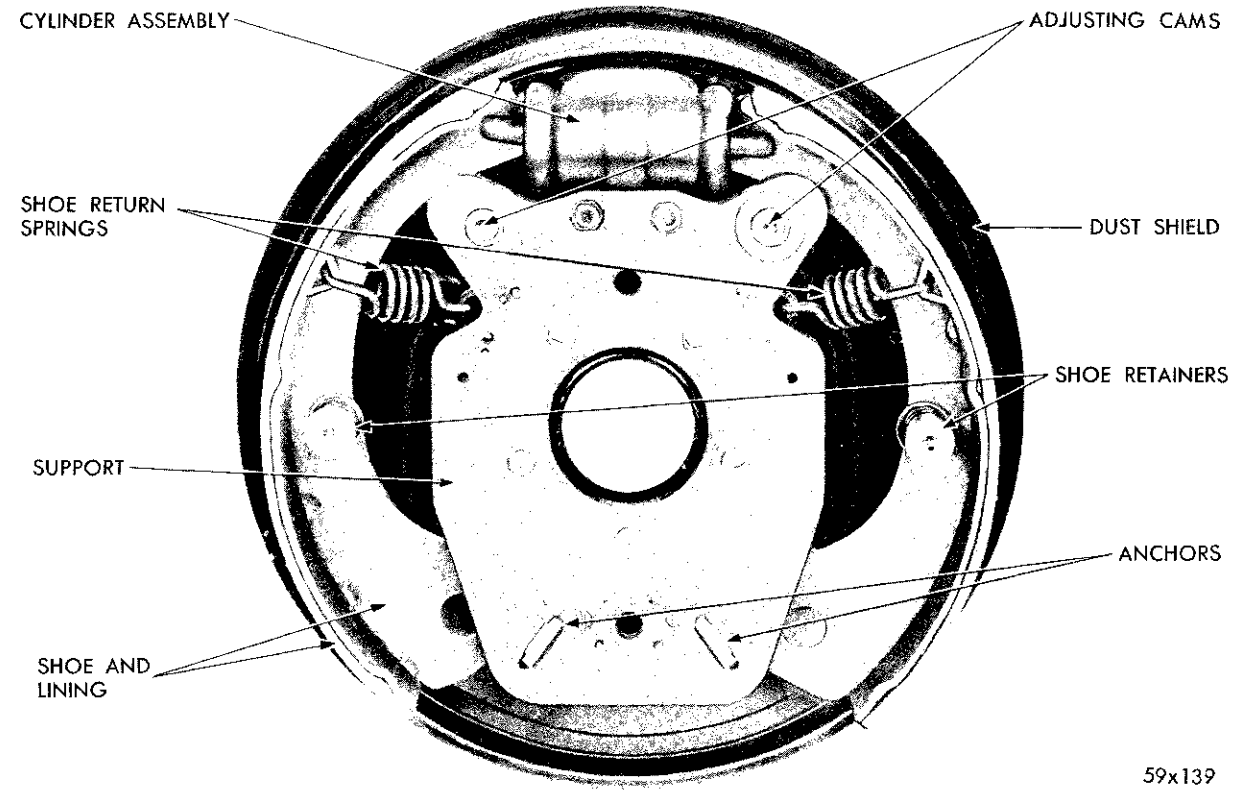
4. SQUEALING BRAKES

- a. Lining — replace with proper lining.
- b. Brake drum — clean or reface as necessary.
- c. Brake shoes — straighten or replace as necessary.
- d. Brake support plate — straighten or replace as necessary.



59x138

Fig. 1—Total Contact Brakes (Front) (Assembled View)



59x139

Fig. 2—Total Contact Brakes (Rear) (Assembled View)

6 — SERVICE BRAKES

e. Brake shoe return spring — replace as necessary.

f. Glazed lining — remove glaze by sanding.

5. DRAGGING BRAKE

a. Brake adjustment—adjust to proper clearance.

b. Parking brake, for being fully released.

c. Wheel cylinders, repair or replace as necessary.

d. Brake shoe return spring, replace worn or broken springs.

e. Brake pedal binding, loosen pedal across shaft.

f. Master cylinder — repair or replace, check for swollen cup.

g. Lack of pedal free play—adjust if power operated. Replace master cylinder, if manually operated.

h. Brake shoe squareness (see Paragraph 11).

i. Compensating port in master cylinder, repair or replace master cylinder as necessary.

6. HARD PEDAL

a. Brake shoe lining—replace with proper lining.

b. Brake shoe push rods — make proper adjustments.

c. Master cylinder compensating port plugged.

7. WHEEL LOCKS

a. Brake lining—replace torn or loose lining.

b. Wheel bearings—adjust to proper specifications.

c. Contaminated brake lining — correct leak and replace lining.

d. Wheel cylinders—repair or replace as necessary.

e. Oil seal leaks — replace if necessary.

f. Master cylinder push rod adjust, compensating port plugged.

8. BRAKE PEDAL FAILS TO RETURN

a. Pedal return spring—adjust or replace as necessary.

b. Master cylinder—tighten loose mounting bolts.

c. Brake pedal mounting bracket—adjust bracket and tighten bolts.

Group 5 SERVICE BRAKES

The service brakes used on the new 1960 models are known as the three-platform type Total Contact Brakes (Figs. 1 and 2).

The new brakes (Figs. 3 and 4) are comprised of newly developed dust shields, brake shoes, return

springs and wheel cylinders.

Brake shoe support is obtained by locating the brake shoes on three raised platforms pressed into the dust shield. With the new design each brake shoe is located on three platforms of the dust shield and guided by the three companion contact loops on the brake shoe (Fig. 5).

The four shoes in the front wheel brakes and the

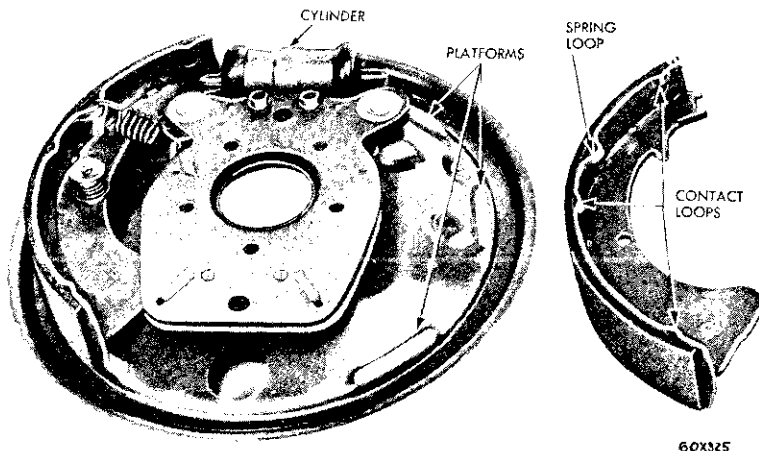


Fig. 3—Raised Platform and Shoe Contact Loops

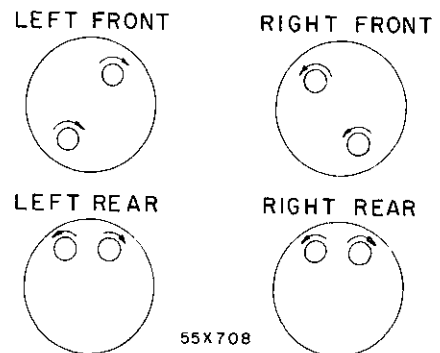


Fig. 4—Brake Adjusting Diaphragms

two forward shoes in the rear wheel brakes are self-energized when the car is moving forward. These shoes are adjusted in the same direction while the remaining rear shoes in the rear wheels are adjusted in the opposite direction, as shown in Figure 6. The slots in the front wheel cylinders have been widened to accept the wider support plate. A newly designed wheel cylinder boot is also being used.

9. SERVICING THE SERVICE BRAKES

When servicing the hydraulic brake system, there are three important rules to remember:

- (1) Vital parts of the system must be kept **CLEAN**, free from dirt, grease and oil.
- (2) The system must be free from entrapped air and all connections must be tight upon completion of any service job.
- (3) Use only factory recommended type high boiling point MoPar Super Brake Fluid.

10. REMOVING THE BRAKE SHOES (Figs. 3 and 4)

a. Removing the Front Brake Shoes

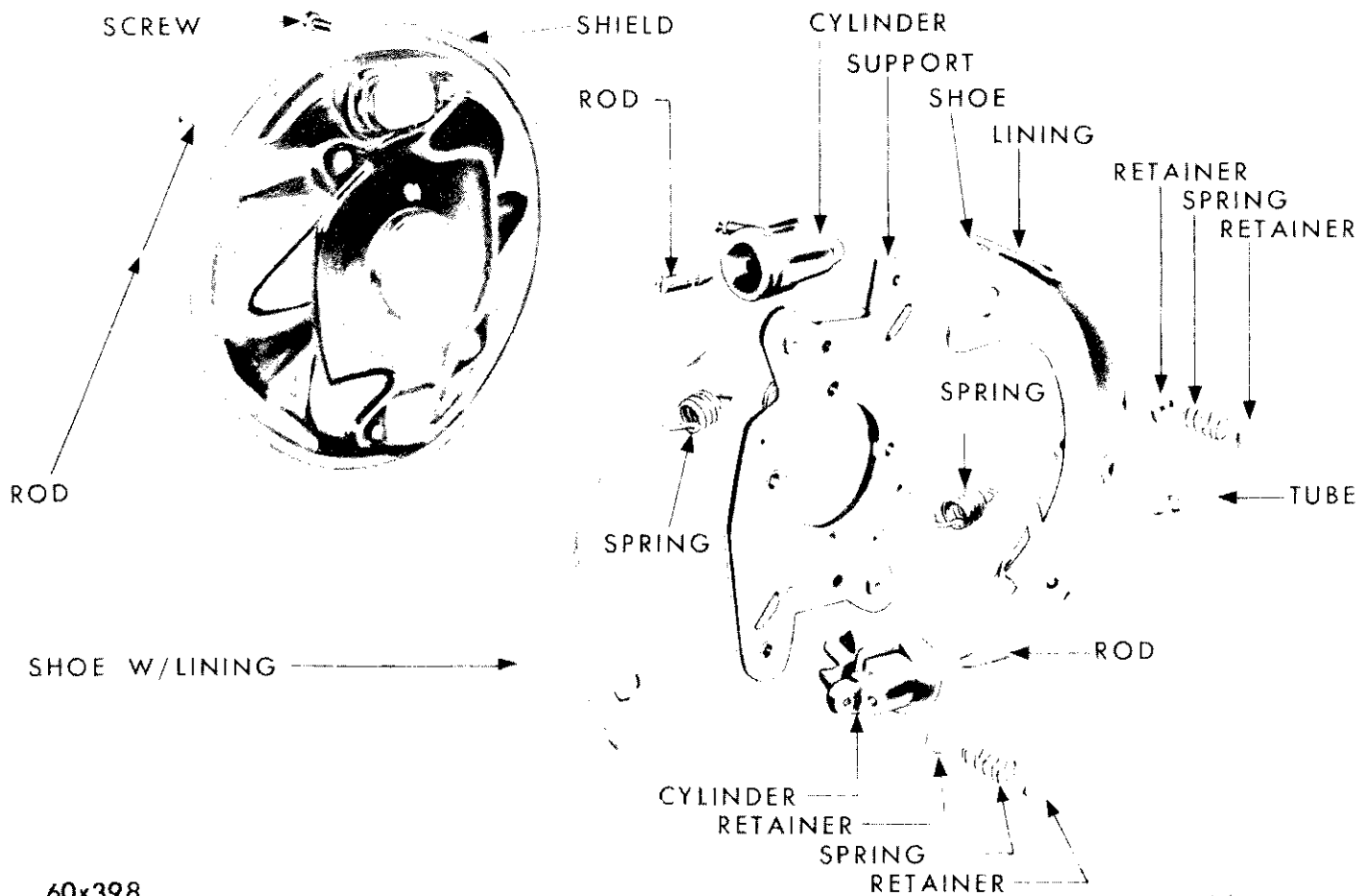
- (1) Block the brake pedal to prevent any downward movement of the pedal.
- (2) Remove the front wheel and drum as an assembly, after backing off the adjusting cams.
- (3) Use a suitable tool to remove the shoe return springs, as shown in Figure 7. The end of the tool should be inserted between the spring and the brake shoe web (Fig. 7) to remove the shoe return spring.

CAUTION

Do not use brake spring pliers or damage to the lining will result.

- (4) Turn the brake shoe guide retainer $\frac{1}{4}$ turn, then the retainer guide spring and rod, as shown in Figure 8.

NOTE: The lip on the end of guide rod is used for



60x398

Fig. 5—Total Contact Brakes (Front) (Exploded View)

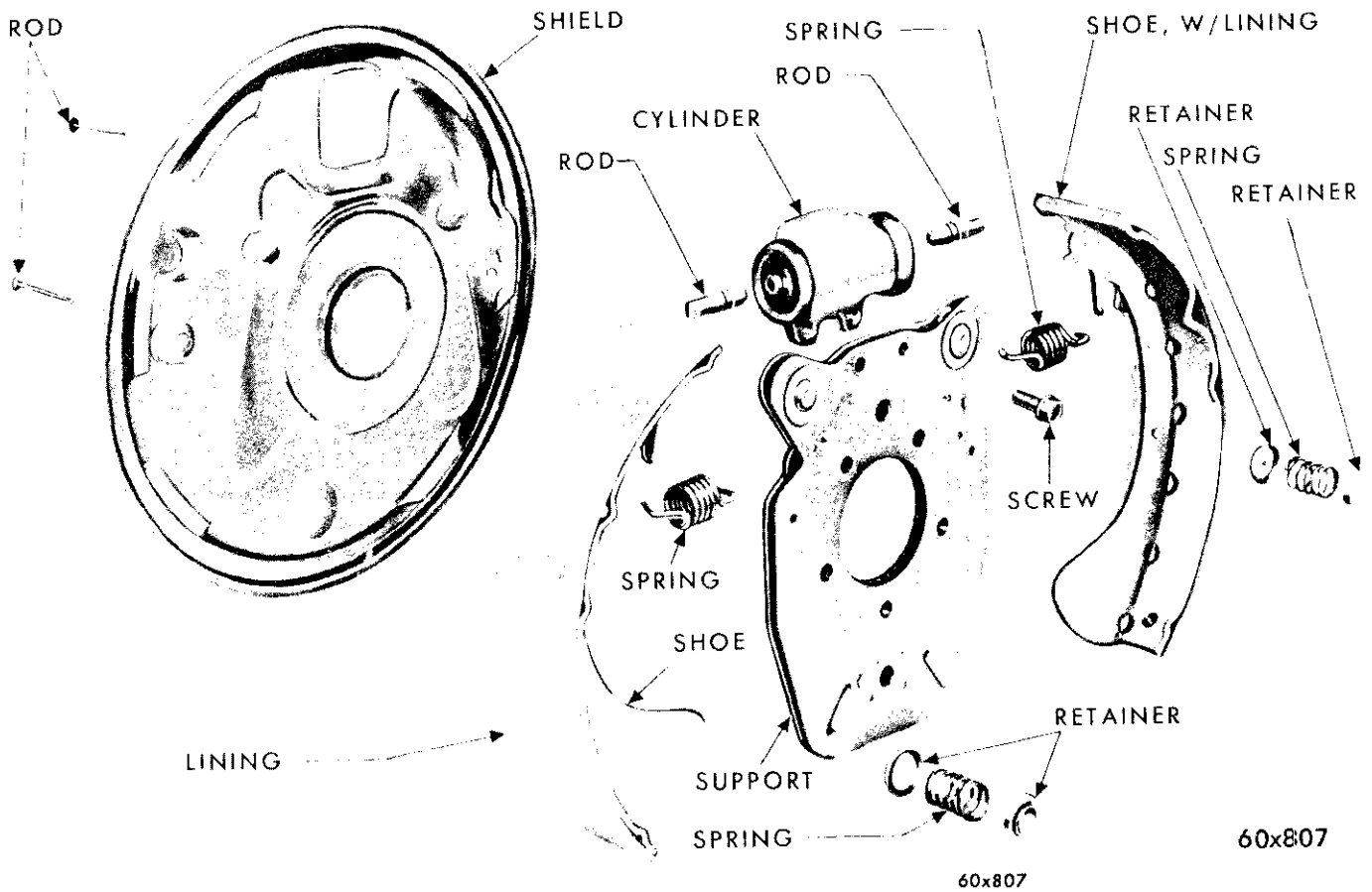


Fig. 6—Total Contact Brakes (Rear) (Exploded View)

positioning the guide rod into the slot of the spring retainer.

(5) Slide the shoes from between the support plates, as shown in Figure 9.

b. Removing the Rear Brake Shoes

(1) With the brake pedal blocked to prevent any

downward movement back off the adjusting cams. The shoes and support plates may become bent if the cams are not backed off.

(2) Remove the rear wheel. Use puller, Tool C-845, to remove the rear wheel drum.

CAUTION

Do not use a “knock off” type wheel puller.

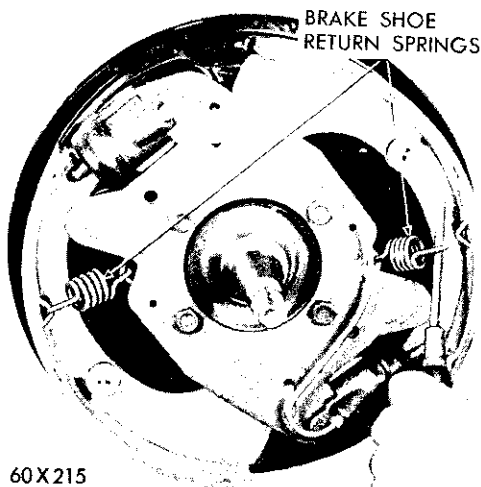


Fig. 7—Removing and Installing Brake Shoe Return Spring (Front)

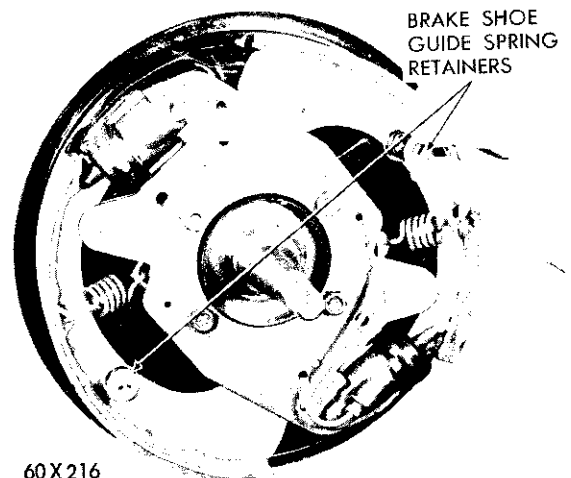


Fig. 8—Removing or Installing Brake Shoe Guide Spring Rod and Retainer

(3) Use a suitable tool to remove the shoe return springs, as shown in Figure 7. The end of the tool should be inserted between the spring and the web of the brake shoe (Fig. 7) to remove the shoe return spring.

CAUTION

Do not use brake spring pliers, or damage to the lining will result.

(4) Turn the brake shoe guide retainer $\frac{1}{4}$ turn, then remove the retainer and guide rod (refer to Fig. 8).

NOTE: The lip on the end of guide rod is used for positioning the guide rod into the slot of the spring retainer.

(5) Slide the shoes from between the support plates (Fig. 10).

11. INSPECTING THE BRAKE SHOES

Wipe or dry brush clean the metal portions of the brake shoes. Examine the lining contact pattern to determine if the shoes are true, and shoe tables square with the web. The lining should show contact across the entire width, extending from heel to toe. Shoes showing contact on only one side should be examined and the cause determined. Shoes should be checked for squareness. If the web is bent, discard the shoe. Shoes having sufficient lining but lack of contact at toe and heel, should be checked for proper grind. The shoe should be checked for lining overhang, burrs at the anchor and loops. Inspect the raised platforms on the brake shield for height and flatness. Nicks and burrs should be removed.

12. GRINDING RECOMMENDATIONS

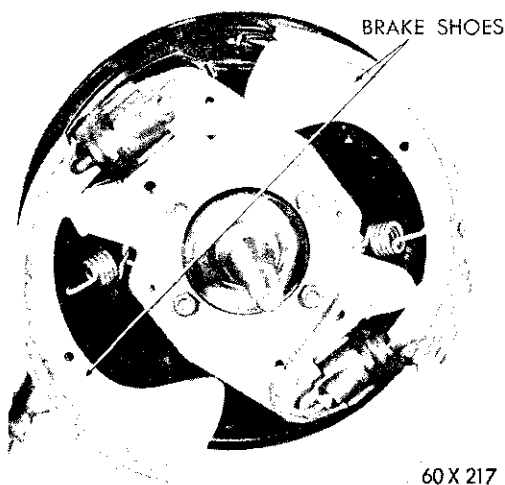


Fig. 9—Removing or Installing Brake Shoe (Front)

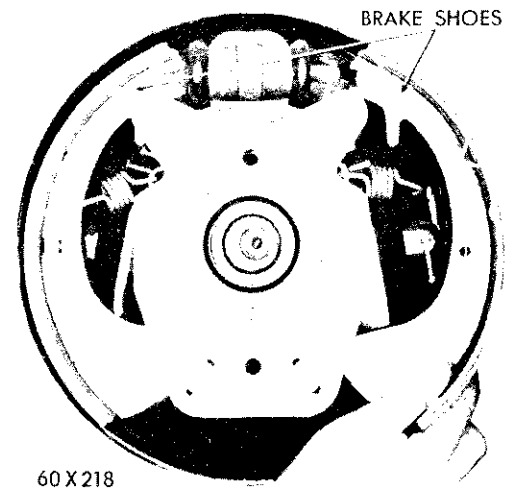


Fig. 10—Removing or Installing Brake Shoe (Rear)

a. Brake Shoe Lining

New lining if not pre-ground should be checked and ground .010 to .024 inch under the drum diameter on a machine having a cylindrical grinding wheel.

b. Drum Refacing

Measure the drum runout with an accurate gauge. Drum runout should not exceed .004 inch out of round. If the drum runout is in excess of .004 inch, the drum should be refaced. Remove only as much material as is necessary to clean up the drum.

NOTE: Do not remove more than .030 inch of metal during the refacing operation.

If the drum has hard spots, it must be ground or replaced by a new drum.

Knowing the drum diameter, the proper measurement is then placed on the grinder, and the lining ground to the required clearance of .010 to .024 inch, under drum diameter.

The grinding of brake linings need only be done if the cyclebond process is done in the dealership or the drum is refaced.

13. INSTALLING THE BRAKE SHOES

CAUTION

Whenever the brake shoes are removed from dust shield on a noise complaint, the brake shield platforms should be checked for flatness and height. Measure platform height as shown in Figures 11 and 12 with Tool MT-19-J or Tool DD-1168 with the shoes in place and a feeler gauge. Platforms should be in the same plane within .010 inch.

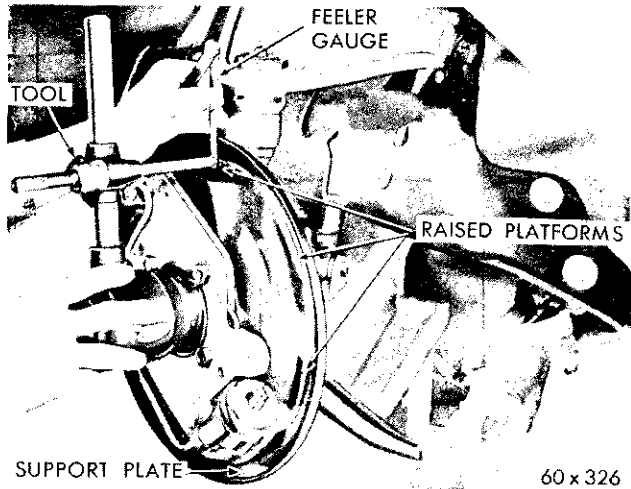


Fig. 11—Checking Platform Height (Tool MT-19-J)

a. Installing the Front Brake Shoes

Before installing the front brake shoes, apply a light coat of stick lubriplate on the raised platforms of the dust shield and on the shoe at the anchor reaction area end at the cam finger.

(1) Slide the brake shoes into position between the support plates. Be sure the ends of the cylinder push rods engage the toe end of the shoes properly.

(2) Insert brake shoe return springs in the link of the support plate.

(3) Use a suitable tool, as shown in Figure 7, to attach the return springs to the loop of the brake shoe table.

NOTE: Be sure that the end of the spring is hooked into the loop of the shoes properly to prevent the coil of the spring contacting the shoe.

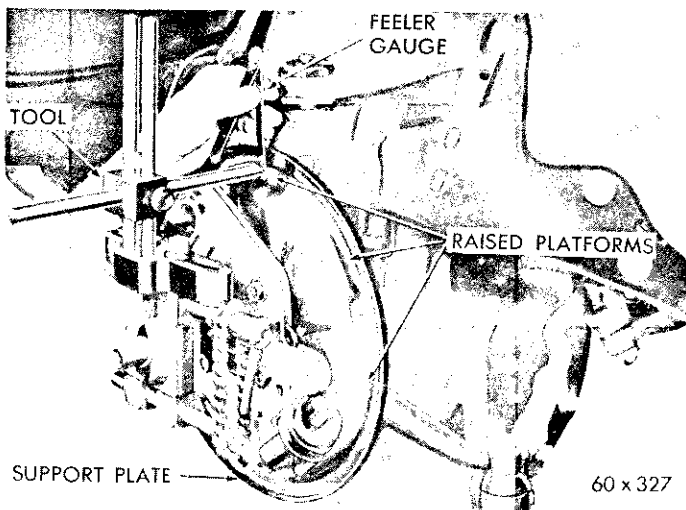


Fig. 12—Checking Platform Height (Tool DD-1168)

(4) Check the tension of the brake shoe return springs. The spring tension can be checked by hooking a scale at the toe of the shoe and pulling in the direction of piston movement. The scale should read 45 to 55 foot pounds at the instant the toe of the brake shoe moves. A dial indicator may be used to indicate shoe movement.

(5) Install guide rod and retainers (Fig. 8). Be sure the positioning lip of the guide rod is positioned properly in the spring retainer.

(6) Install the drum wheel and tire assembly after backing off the adjusting cams. Adjust the front wheel bearings as described in the Front Suspension, Group 2.

(7) Adjust the brakes.

b. Installing the Rear Brake Shoes

Before installing the rear brake shoes, apply a light coat of stick lubriplate on the raised platforms of the dust shield and on the shoe anchor where it contacts the support plate.

(1) Slide the brake shoes into position between the support plates. Be sure the ends of the cylinder push rods engage the toe end of the shoes properly (Fig. 10).

(2) Insert the brake shoe return springs in the link of the support plate (Fig. 10).

(3) Use a suitable tool, as shown in Figure 7, to attach the springs to loop of the shoe table.

(4) Install the guide rod and retainers (Fig. 8). Be sure the positioning lip of the guide rod slides into the slot of the spring retainer.

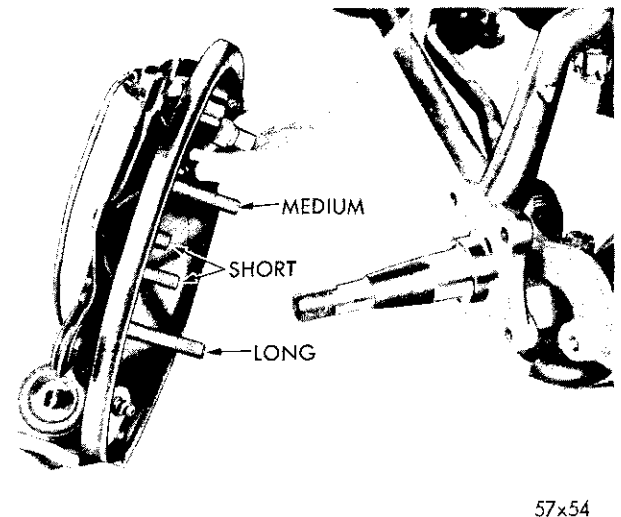


Fig. 13—Removing Brake Support Plate and Brake Assembly (Front)

(5) Check the tension of the brake shoe return springs. The spring tension can be checked by hooking a scale at the toe of the shoe and pulling in the direction of piston movement. The scale should read 45 to 44 foot pounds at the instant the toe of the shoe moves. A dial indicator may be used to indicate the shoe movement.

(6) Install the drum, wheel and tire assembly, after backing off the adjusting cams.

(7) Adjust the brakes.

14. REMOVING THE FRONT AND REAR SUPPORT PLATES AND WHEEL CYLINDERS

a. Removal—Front Support Plates and Wheel Cylinders

(1) Remove the wheel, tire, and brake drum assembly.

(2) Remove the four retaining nuts attaching the support plates and dust shield to the steering knuckle.

(3) Disconnect the flexible brake hose from the frame bracket.

(4) Remove the four bolts that attach the brake assembly to the steering knuckle. (Refer to Figure 13 and note the location of bolts and the size. Three different lengths are used.)

(5) Remove the brake assembly, as shown in Figure 14.

CAUTION

Do not allow the dust shield to strike the bearing surface of knuckle as damage may result.

(6) Remove the brake shoes as described in Paragraph 10.

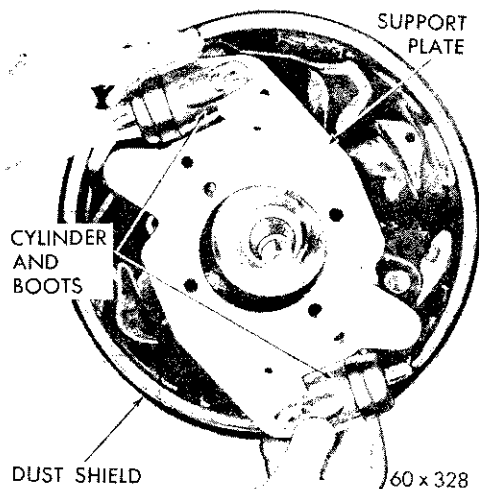


Fig. 14—Removing or Installing Support Plate (Front)

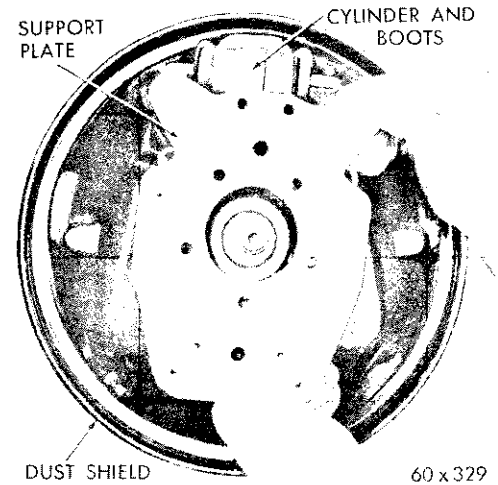


Fig. 15—Removing or Installing Support Plate (Rear)

(7) Remove the connecting tube between the wheel cylinders.

NOTE: Do not distort the tube.

(8) Remove each wheel cylinder mounting bolt after removing the sealer. Remove the support plate assembly, from the dust shield, as shown in Figure 15.

(9) Remove the wheel cylinders. If it is necessary to service the wheel cylinders, refer to Paragraph 14, Servicing the Wheel Cylinders.

b. Removal—Rear Support Plates and Wheel Cylinders

(1) Remove the rear brake shoes, as described in Paragraph 10.

(2) Disconnect the brake tube at the wheel cylinder. Remove the nuts and lockwashers that attach the support plates and wheel cylinders to the dust shield and axle housing flange (Fig. 14).

(3) Slide the support plates out and away from the axle, as shown in Figure 15. When removing the dust shield, it is advisable to install the seal protector, Tool C-745, then slide the dust shield and seal off axle.

(4) Remove the bolts that attach the wheel cylinder to the support plate. Lift the wheel cylinder away from the plate. Inspect and clean the support plate as described in Paragraph 14 (c). If reconditioning the wheel cylinders, refer to Paragraph 14 (d), Wheel Cylinders.

c. Cleaning and Inspection (Support Plates)

Clean the support plates in a suitable solvent, blow dry with compressed air, and inspect as follows: Check the freeness of the adjusting cams and return

spring links. The adjusting cams should turn without binding (7-10 foot pounds). Do not turn the adjusting cams unnecessarily. A small amount of rotation will tell if cam torque is correct.

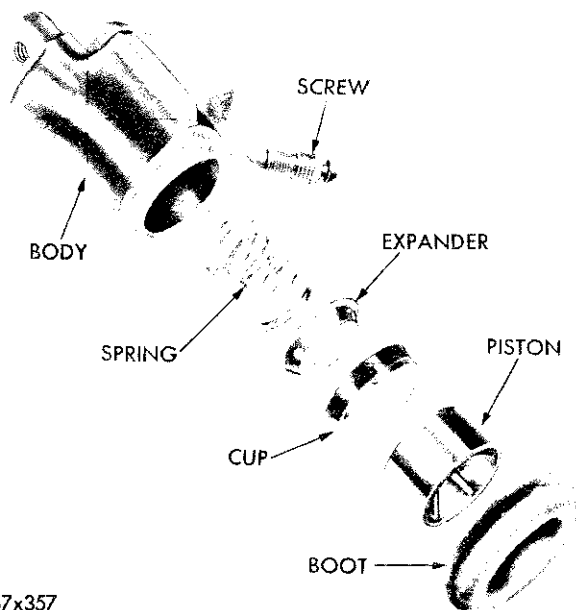
Inspect the condition of the adjusting cam dust shield washers. If the washers are cracked or deteriorated, new ones should be installed during assembly. If any visual distortion of the support plates is apparent, new plates should be installed. The support plates must be flat.

d. Cleaning and Inspection (Wheel Cylinders)

Wheel cylinder pistons that are badly scored or corroded should be replaced. The old piston cups should be discarded when reconditioning the hydraulic system.

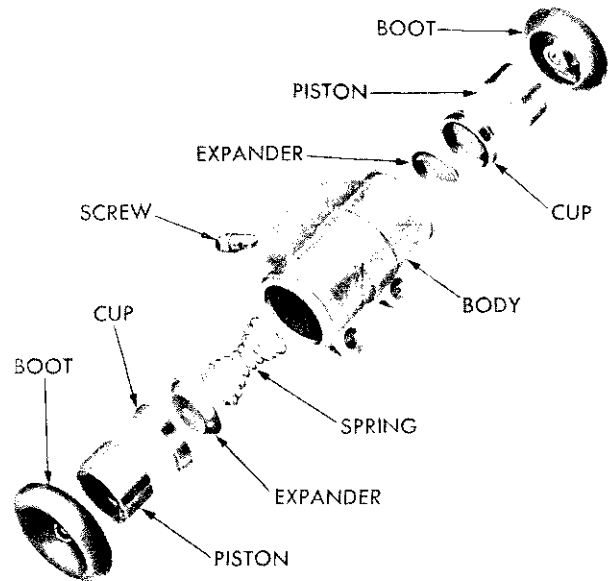
Cylinder walls that have very light scratches, or show signs of corrosion, can usually be cleaned up with crocus cloth, using a circular motion. However, cylinders that have scratches or scoring may be honed, using Tool C-3080, providing the diameter of the cylinder bore is not increased by more than .002 inch. Any cylinder bore increased by more than .002 inch should be discarded and a new cylinder installed. (Black stains on the cylinder walls are caused by the piston cups and do not cause any damage.)

Before assembling the pistons and new cups in the wheel cylinder, dip them in Super Brake Fluid. Refer to Figures 16 and 17, then assemble the brake cylinders. If the boots are deteriorated, or do not fit tightly on the brake shoe push rod or on the wheel



57x357

Fig. 16—Wheel Cylinder (Front)



57x358 A

Fig. 17—Wheel Cylinder (Rear)

cylinder casting, new boots should be installed.

15. INSTALLING THE FRONT AND REAR SUPPORT PLATES AND WHEEL CYLINDERS

a. Installation (Front Support Plates and Wheel Cylinders)

(1) Install the brake cylinders on the support plates, position the support plates on the dust shield. (Be sure the dust washers are in place, see Figure 9.)

Install the wheel cylinder attaching bolts and tighten 15 to 20 foot pounds torque.

(2) Slide the brake assemblies over the steering knuckles. Install the bolts, nuts and tighten to 55 foot pounds torque.

Measure dust shield for platform height as indicated in Paragraph 13.

(3) Lubricate the adjusting cams of the support plate assembly lightly with stick lubriplate, then slide brake shoes into position between the support plates.

(4) Install brake shoe return springs through link of the support plate and use a suitable tool to attach spring to the brake shoe, as shown in Figure 7.

(5) Install the brake shoe guide rod, spring and retainers.

(6) Install the wheel cylinder connecting tube, being careful not to bend or distort the tube.

(7) Turn the brake adjusting cams to the fully

released position. Attach the brake hose to the frame bracket. Connect the brake tube.

(8) Install the drum and wheel assembly. Adjust the front wheel bearing, as described in Front Suspension, Group 2.

(9) Bleed and adjust the brakes as outlined in Paragraph 18 and 20 of this Group.

b. Installation (Rear Support Plates and Wheel Cylinders)

(1) Place the wheel cylinder on the support plate, and install the attaching bolts. Tighten the bolts 5 to 20 foot pounds torque.

(2) Install a new seal in the dust shield (if needed), and install seal protector C-745 into seal. Install the dust shield and seal over axle shaft and down against flange.

(3) Slide the support plate assembly over axle shaft.

(4) Install the lockwashers and nuts. Tighten the nuts to 35 foot pounds torque. Measure the dust shield platform height as indicated in Paragraph 13.

(5) Slide the brake shoes into position between the support plates, after lubricating the cam finger and anchor reaction area with stick lubricate.

(6) Install the brake shoe return springs through the link of the support plate and use a suitable tool to attach the spring to the loop of the brake shoe, as shown in Figure 5.

(7) Install the brake shoe guide rod and retainers. **Be sure the positioning lip of the guide rod is positioned into the slot of the retainers.**

(8) Turn the brake adjusting cams to the fully released position, and attach the brake line to the wheel cylinder. Remove Tool C-745 seal protector.

(9) Insert key on slot in axle shaft, chalk axle shaft, and install the drum. Install the wheel and tire. Bleed and adjust the brakes, as described in Paragraph 18 and 20 of this Group.

16. BLEEDING THE BRAKE SYSTEM

NOTE: During the following operations, use MoPar Super Brake Fluid.

(1) Clean off all the dirt from around the master cylinder reservoir cover. Clean the dirt from the bottom of the power brake cylinder (if so equipped), so that the dirt or grit will not drop into the reservoir when the cover is removed. Automatic refiller, Tool C-837B or Bleeder Tank, Tool C-3496, are con-

venient to use for the following operations (use with adaptor Tool C-349A).

(2) Back off the adjusting cams to the fully released position. This allows the pistons in the wheel cylinders to move back, trapping all the air near the bleeder screw hole.

(3) Starting with the right rear wheel cylinder, wipe the dirt off the bleeder valve and attach bleeder hose, Tool C-650 to the valve. Place the other end of the hose in a jar half full of brake fluid. This is to prevent air from being drawn into the system when the brake pedal is released.

(4) Pump the brake fluid by pushing the brake pedal down and let it return slowly, to avoid air being drawn into the system. Bleed intermittently, opening and closing the valve about every four seconds. This causes a whirling action in the cylinder which helps expel the air. Continue this operation until the brake fluid runs out of the bleeder hose in a solid stream, without any air bubbles.

(5) Continue bleeding by repeating this operation on the left rear wheel, the right front wheel and finally the left front wheel.

NOTE: When bleeding the front wheel cylinders, bleed and lower cylinder first so as to force all air out of the connecting line.

(6) If necessary, repeat the bleeding operation if there is an indication of air remaining in the system. **Be sure to readjust the cams after the bleeding operation.** Check and refill the master cylinder with Super Brake Fluid.

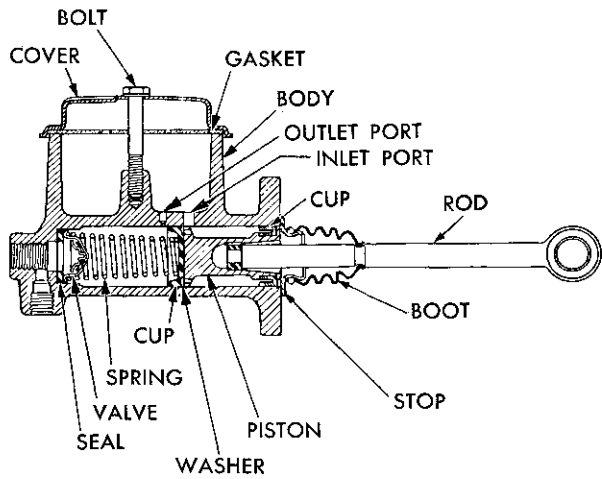
17. TEST FOR FLUID CONTAMINATION

In order to determine if contamination exists in the brake fluid, which may be indicated by swollen, deteriorated rubber cups, the following simple tests can be made.

(1) Place a small amount of drained brake fluid in a small clean clear glass bottle. Separation of the fluid into two distinct layers may indicate mineral oil contamination.

(2) Add 1 part water to two parts of the drained brake fluid and shake. If the contents become milky, mineral oil may be present. If the contents remain clear, it is not contaminated with mineral oil. Be safe and discard old brake fluid that has been bled from the system.

NOTE: Fluid drained from the bleeding operation may contain dirt particles or other contamination and should not be reused.



57x145 B

**Fig. 18—Master Cylinder (Manual Brake)
(Cross Section View)**

18. ADJUSTING THE BRAKES

All cams ($\frac{7}{16}$ inch hex head) operate against the toe end of the shoe web and extend through the brake dust shield.

The four shoes in the front wheel brakes and the two forward shoes in the rear wheel brakes are self-energized when the car is moving forward; these shoes are adjusted in the same direction while the

rear shoes in the rear wheels are adjusted in the opposite direction, as shown in Figure 6.

NOTE: Whenever the brakes have been relined or new shoes have been installed, always apply pedal prior to adjusting the brakes. This causes the brake shoes to center themselves to assist in the adjustment.

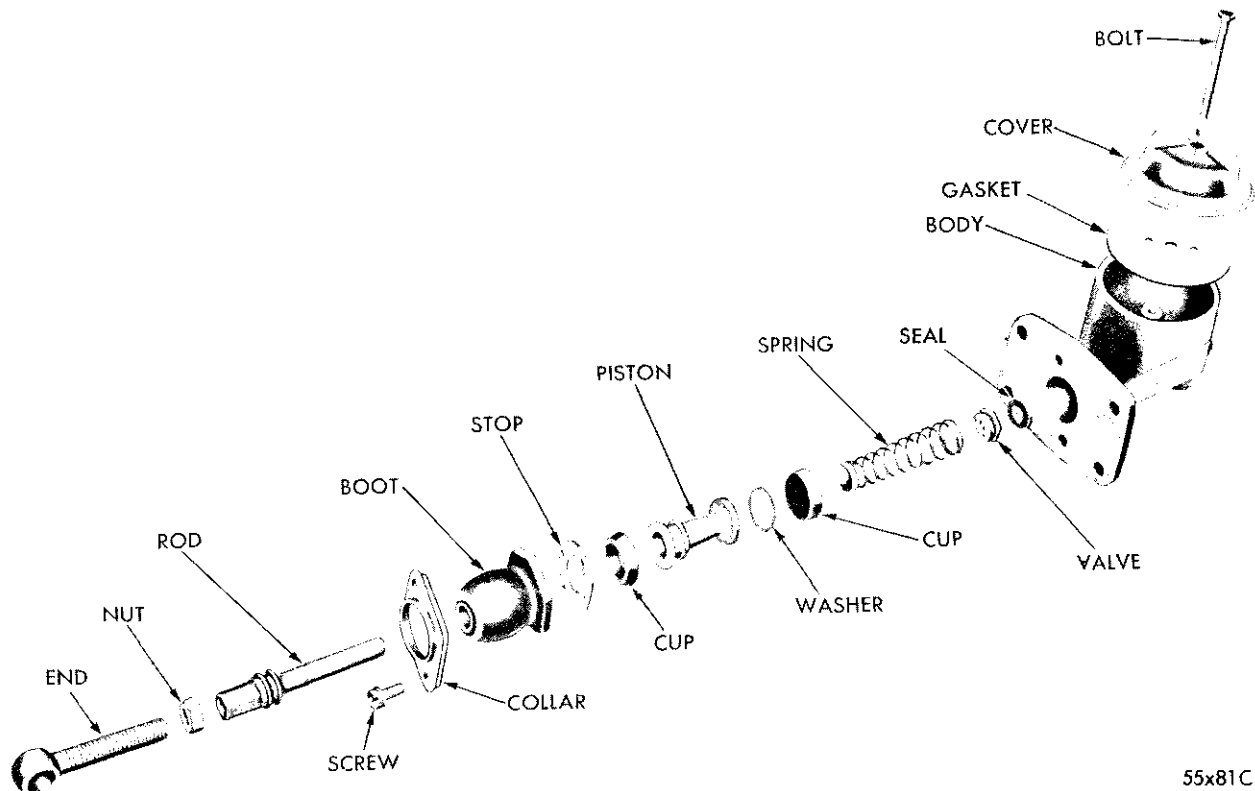
a. Front Brake Adjustment

(1) Perform the following operations on one cam at a time on both front wheels: Turn the adjusting cam in the direction of wheel forward rotation until the shoe lining is solidly against the drum, as shown in Figure 6, and the wheel is locked.

(2) Turn the adjusting cam slowly in the opposite direction until no drag is felt. Repeat the operation on the other cam.

b. Rear Brake Adjustment

The rear wheel forward brake shoe adjusting cam is rotated in the direction of forward wheel rotation to bring the shoe lining nearer to the drum. The rear brake shoe adjusting cam is rotated in the direction of wheel reverse rotation, as shown in Figure 6. Repeat the adjustment procedure on rear wheels as outlined in the Front Brake Adjustment, Paragraph 18 "A".



55x81C

Fig. 19—Master Cylinder (Power Brake) (Exploded View)

19. SERVICING THE MASTER CYLINDER

(Figs. 18 and 19)

NOTE: The master cylinder on cars without power brakes, has a fluted dust boot and retainer. This retainer acts as a master cylinder piston stop. The pedal return spring and pedal stop have been eliminated.

a. Removal

- (1) Remove the master cylinder push rod clevis pin.
- (2) Disconnect the push rod.
- (3) Disconnect the brake tube at the master cylinder.
- (4) Disconnect the stop light switch leads.
- (5) Remove the nuts that attach the master cylinder to the dash panel. Slide the master cylinder straight out and away from dash panel.

b. Cleaning and Inspection

Clean the outside of the master cylinder thoroughly, remove the cover and drain all brake fluid. Refer to Figure 18, and disassemble the master cylinder for inspection.

If master cylinder piston is badly scored or corroded, replace it with a new one. Piston cups and valve assembly should be replaced when reconditioning the master cylinder.

Master cylinder walls that have very light scratches or show signs of corrosion, can usually be cleaned up with crocus cloth. Cylinders that have scratches or scoring may be honed, providing the diameter of the cylinder bore is not increased by more than .002 inch should be discarded and a new master cylinder used. (Black stains on the cylinder wall are caused by the piston cups and will do no harm.) Use extreme care in cleaning master cylinder after reconditioning. Remove all dust or grit by

flushing the cylinder with alcohol; wipe dry with a clean lintless cloth, and clean the second time with alcohol. Dry the master cylinder with air pressure, then flush with clean, heavy duty brake fluid. (Be sure the compensating port in the master cylinder is open.)

c. Assembly

Before assembling, the piston, cups and valve assembly should be dipped in new brake fluid. (Refer to Figure 19 for master cylinder assembled.)

20. BRAKE HOSE AND LINES

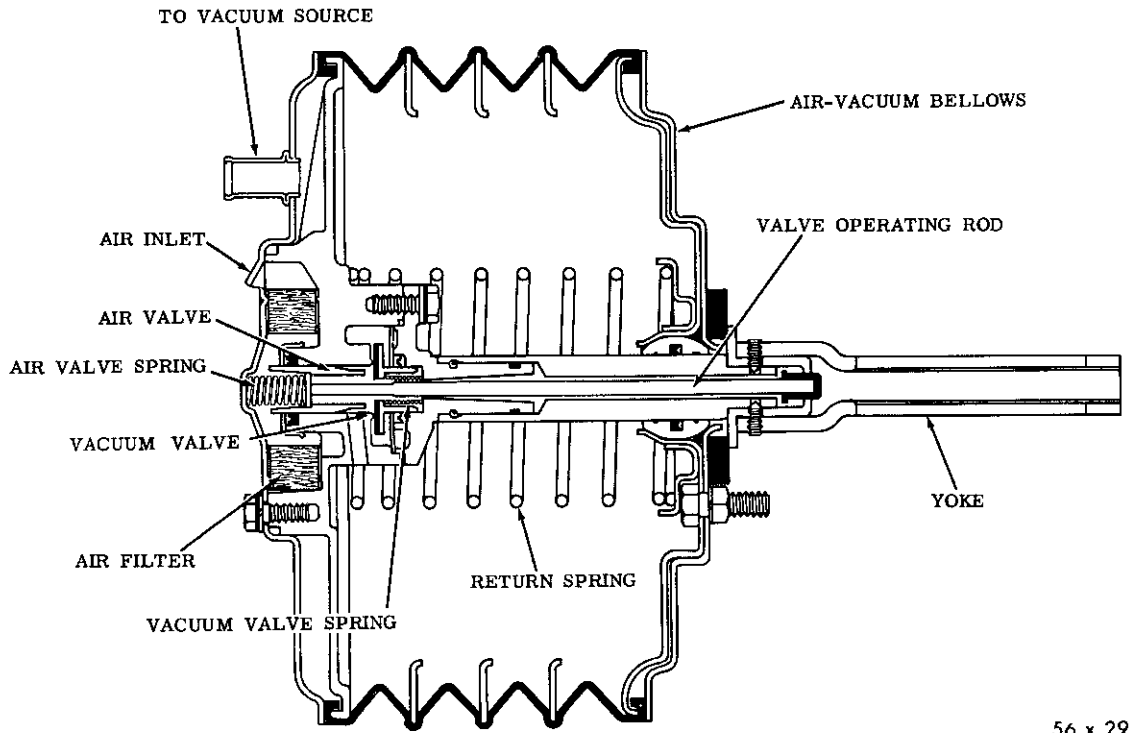
Inspection of brake hose should be included in all brake service operations. The hoses should be checked for:

- (1) Correct length, severe surface cracks, pulling, scuffing or worn spots.
- (2) Faulty installation causing twisted hose and wheel, tire or chassis interference.
- (3) Always use factory recommended hose to insure quality, length and long service life. Care should be taken to make sure seating surfaces are clean and free from nicks and burrs. Copper washers are to be used, and the tube nuts and connections properly made and tightened.

(4) Double tubing should always be used to insure long life and corrosion resistance. Flares and acute angles should always be accomplished with the proper tools to guard against leaks and restriction from reduced tube cross section.

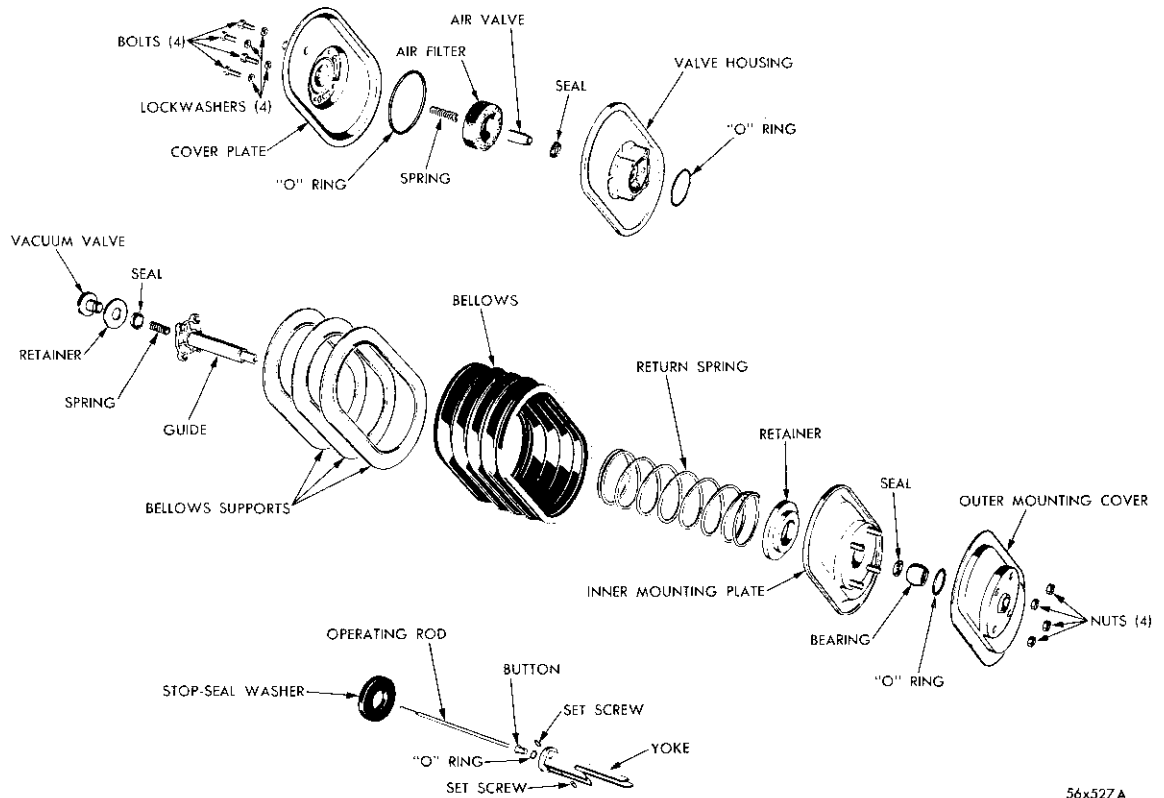
21. CYCLEBOND BRAKE LINING

Pre-cemented cyclebond brake lining can be successfully bonded to either new or used shoes, providing certain proven steps are followed. See instructions and model applications contained in shop replacement packages.



56 x 29

Fig. 20—Bellows Type Power Brake (Sectional View)



56x527 A

Fig. 21—Bellows Type Power Brake (Disassembled View)

POWER BRAKE UNIT

(Bellows Type)

SERVICE DIAGNOSIS

22. BRAKES DO NOT RELEASE PROPERLY

Possible Causes:

- a. Failure of brake pedal to return properly.
- b. Plugged compensating holes near end of sleeve of power piston assembly.
- c. Broken, damaged, or weakened power piston return spring, control spring, or reaction spring.
- d. Excessively dry air valve "O" ring.
- e. Brakes improperly adjusted.
- f. Inspection screw and gasket loose or missing.
- g. Cylinder misalignment on unit after installation of a repair kit.

23. POWER UNIT DOES NOT BOOST

Test to determine if unit is operating. With the engine stopped, depress brake pedal several times to eliminate all vacuum from the system. Apply the brakes, and while holding foot pressure on the brake pedal, start the engine. If the unit is operating, the brake pedal will move forward when engine vacuum power is added to the pedal pressure.

24. POWER UNIT DOES NOT OPERATE AFTER PERFORMING TEST

Possible Causes:

- a. Bent, broken or obstructed vacuum source line

from engine manifold to check valve or a faulty check valve.

- b. Blocked air passage in power piston guide sleeve assembly or in air cleaner element.

25. LOSS OF PEDAL

Possible Causes:

- a. Foreign material lodged between the reaction piston and the reaction piston insert, under the reaction piston dome cup, resulting in excessive friction between the ports. Grease, fluid, or moisture on brake linings. Brakes improperly adjusted.

26. SPONGY PEDAL

Possible Causes:

- a. Air in brake lines or in hydraulic cylinder of power unit.

27. PEDAL TRAVEL TOO GREAT

Possible Causes:

- a. Improperly adjusted brakes.
- b. Air in brake system.

28. PEDAL CHATTER

Possible Causes:

- a. Air in brake lines or in hydraulic cylinder of power unit.

POWER BRAKE UNIT

(Bellows Type)

The Bellows Type Booster Unit is an oval-shaped, air-vacuum bellows mounted on the engine side of dash panel, and is connected mechanically to brake pedal linkage through the power unit push rod (Figs. 20 and 21). The unit is an air suspended unit and, therefore, requires a vacuum reserve tank. Brake

linkage exists only when the unit is assisting in a brake application. With a loss of engine vacuum, the brake pedal is free to move completely independently of the Power Unit, to apply the brakes in the conventional manner (Fig. 20).

SERVICE PROCEDURES

29. POWER BRAKE UNIT

a. Removal

(1) Using pedal depressor, depress the pedal to prevent the trigger arm from extending beyond extremities of the bracket.

NOTE: If the pedal linkage is allowed to extend through the hole in the dash panel, the trigger arm may be damaged.

(2) Disconnect the vacuum hose at the power vent.

(3) Remove the master cylinder power unit and the bracket assembly hex nuts and lockwashers.

(4) Carefully withdraw the unit from the dash panel (Fig. 22).

NOTE: Use care to prevent loss of the nylon bush-

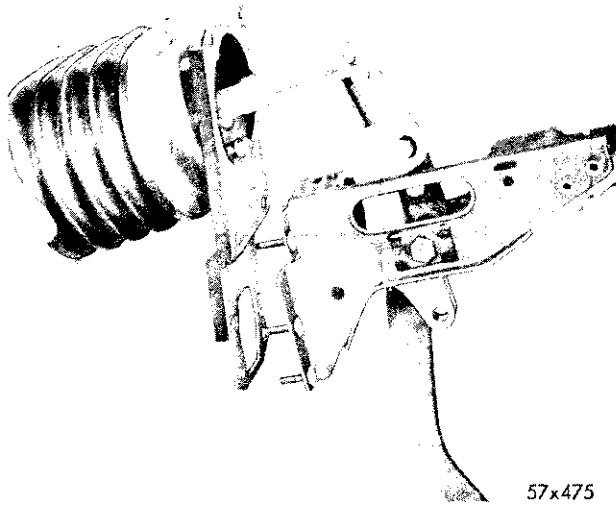


Fig. 22—Removing or Installing the Power Brake Unit (Bellows Type)

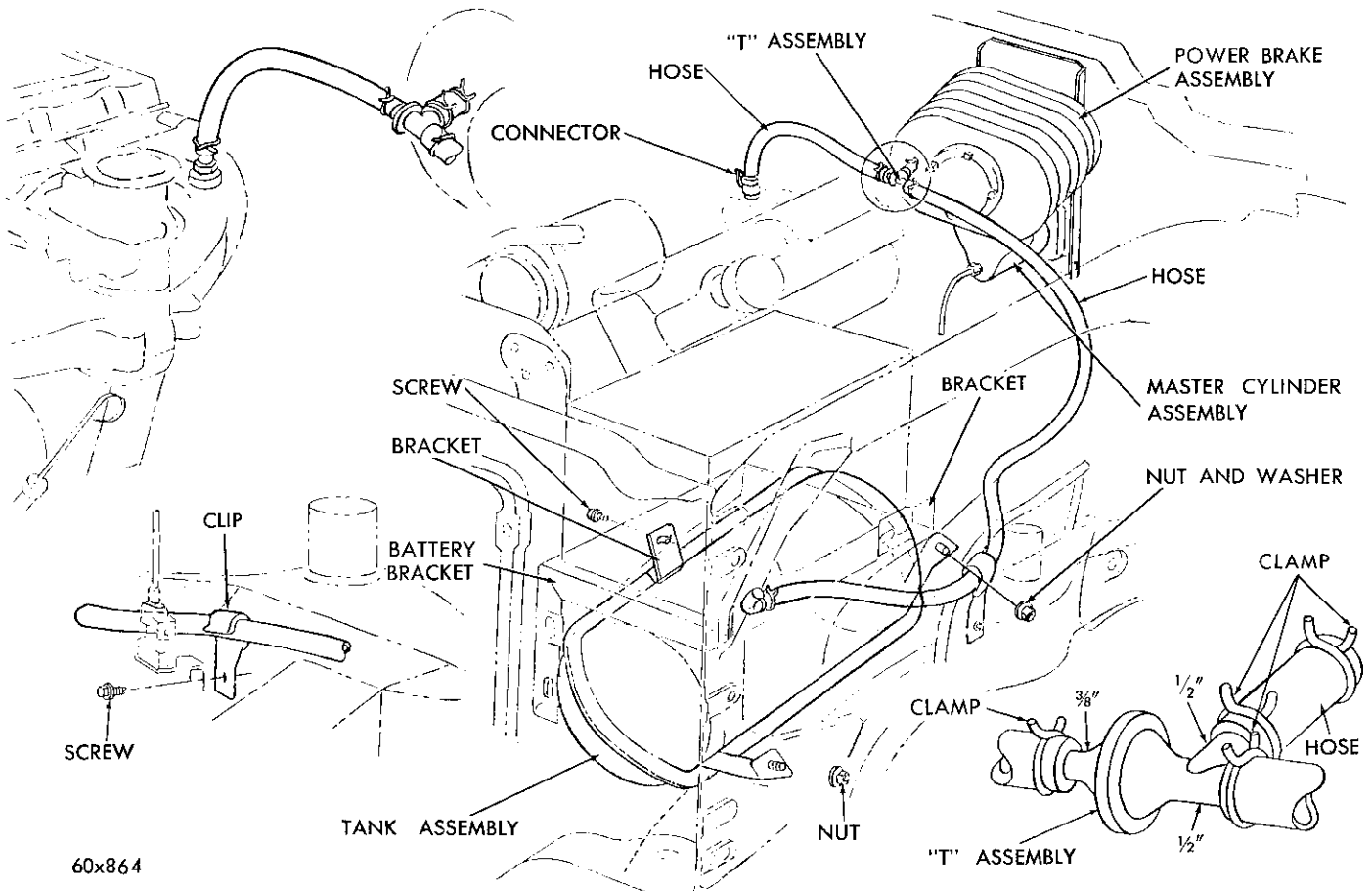
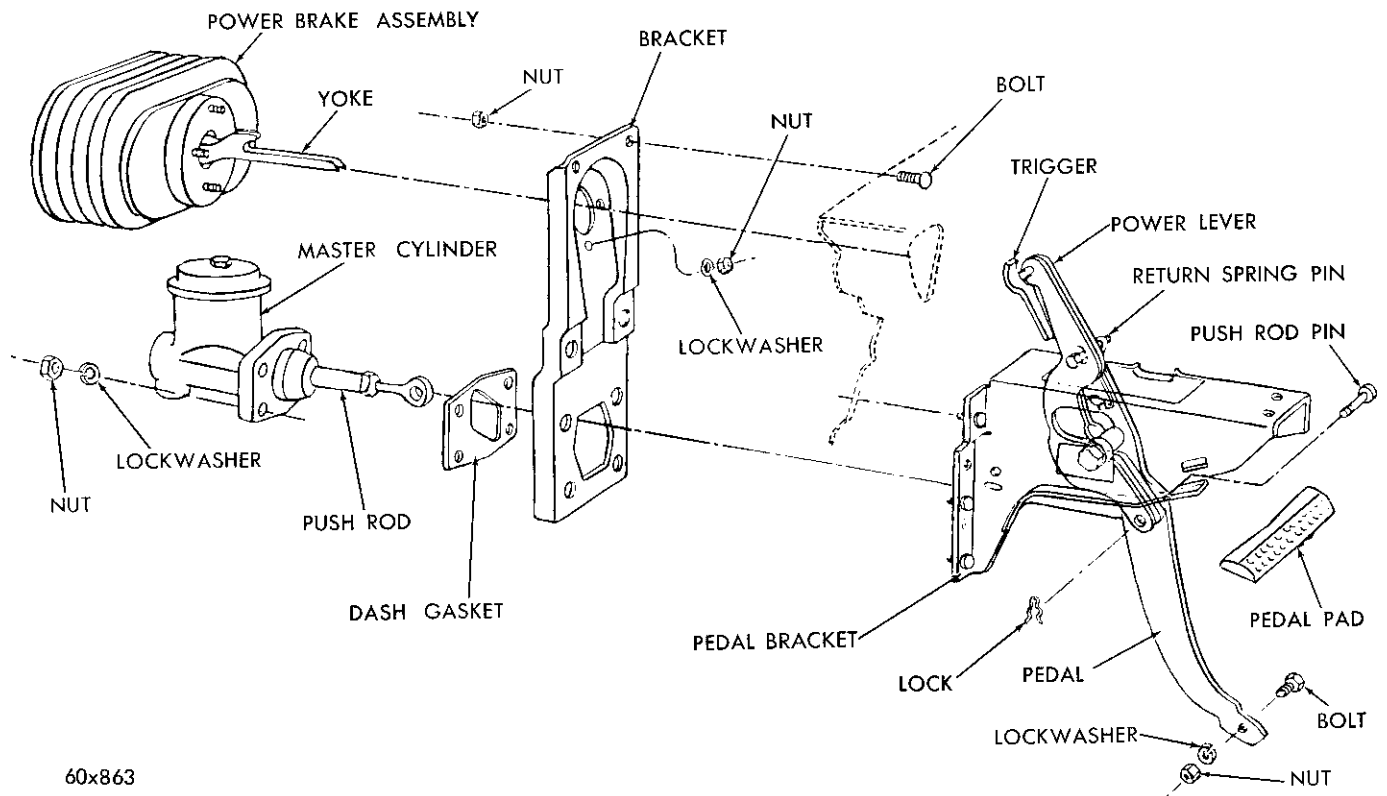


Fig. 23—Power Brake and Booster Installed



60x863

Fig. 24—Pedal Bracket and Power Brake Assembly

ing on the pedal linkage cross pin.

b. Disassembling Power Brake

- (1) Remove the nuts that attach the mounting plate to the unit.
- (2) Slide the plate off and away from the unit (Figs. 23 and 24).
- (3) Remove and discard the mounting plate "O" ring.

- (4) Using an Allen wrench, back out two set screws sufficiently to allow the removal of the yoke (Fig. 25).

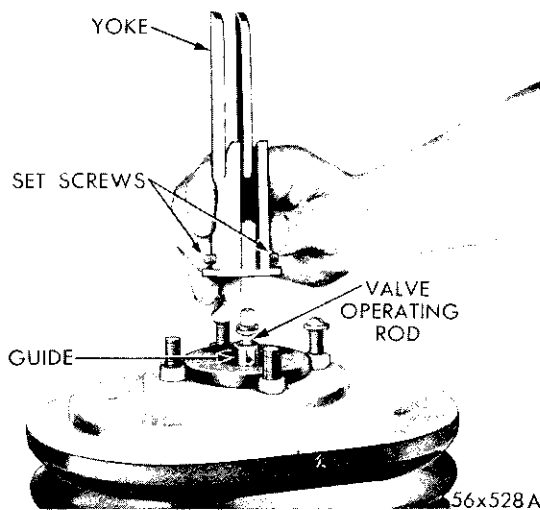


Fig. 25—Removing or Installing the Yoke

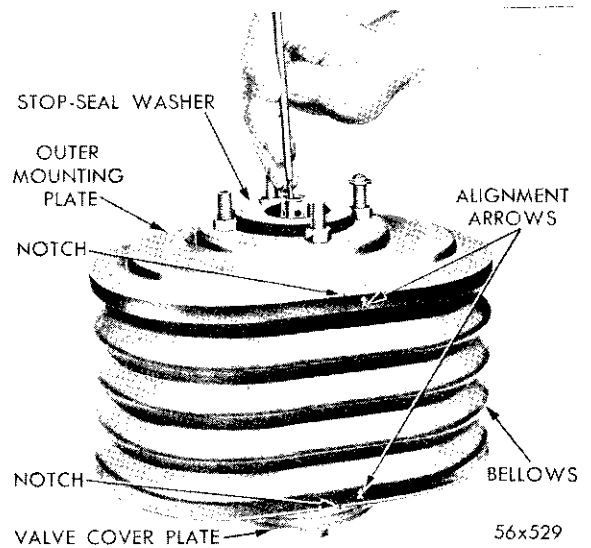


Fig. 26—Removing or Installing the Operating Rod

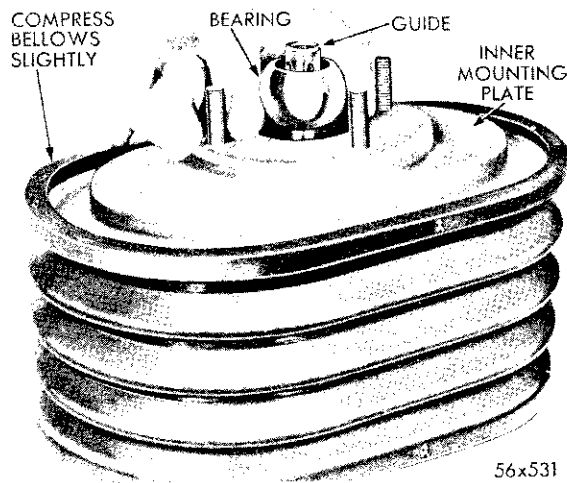


Fig. 27—Removing the Guide Bearing

(5) Slide the yoke off the end of the guide and away from the unit. (Slightly compress bellows by hand for clearance when loosening the set screw.)

(6) Remove the rubber stop seal washer.

(7) Lift the valve operating rod out of the unit, remove, and discard the valve operation rod button seal (Fig. 26).

(8) Remove the nuts that attach the outer mounting plate.

(9) Using a screwdriver, pry up gently on the plate to loosen. Lift the plate straight up and away from the unit. Discard the "O" ring.

(10) Compress the bellows by hand sufficiently to expose the guide bearing. Slide the bearing off the end of the guide (Fig. 27).

(11) Remove and discard the bearing seal from inside the bearing.

(12) Peel back the outer lip of the bellows com-

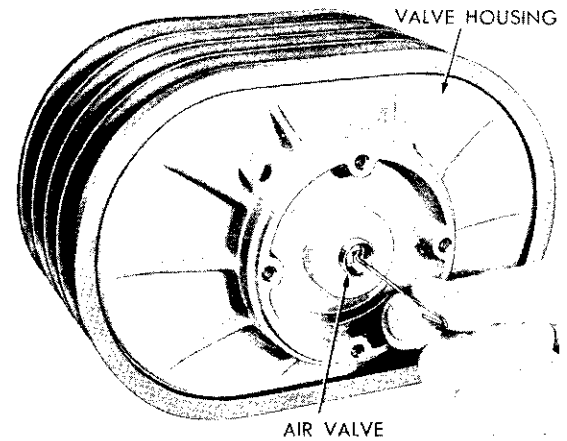


Fig. 29—Removing the Air Valve

pletely around the inner mounting plate. (Keep one hand on the inner mounting plate to prevent it from snapping up.)

(13) Remove the plate and lift out the return spring and the return spring retainer.

(14) Place the unit on its side and remove the bolts and lockwashers that attach the valve cover to the valve. Lift off the cover (Fig. 28). (If it is necessary, use a flat blade to separate the cover plate from the bellows flange.)

NOTE: Extreme care should be taken to avoid marking or scratching the inner face of the plate where it clamps to the bellows flange. A scratch on this surface could cause a leak.

(15) Remove the "O" ring from the valve cover and discard.

(16) Remove the air valve spring from the center of the valve.

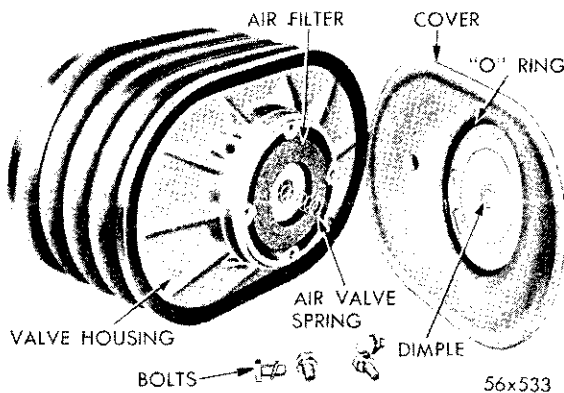


Fig. 28—Removing the Valve Housing Cover

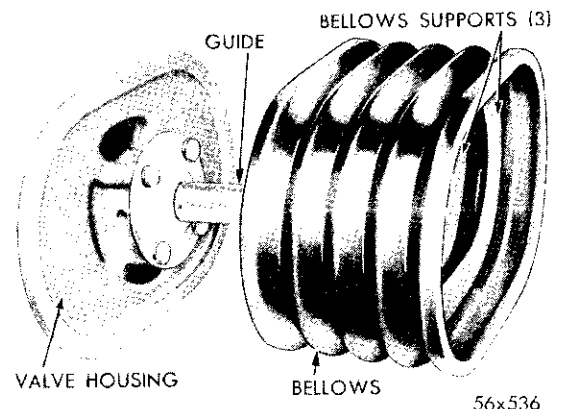


Fig. 30—Removing the Bellows

(17) Remove the air filter and slide air valve out of the housing (Fig. 29). To remove the valve, it may be necessary to use a hook formed from a paper clip.

(18) Place the valve housing end down on the bench. Remove the bellows from the valve by peeling back the outer lip of the bellows (Fig. 30).

(19) Lift the bellows up and away from the valve. If a new bellows is to be installed, remove the three bellows supports.

(20) Remove bolts and lockwashers that attach the guide to the valve body. Lift off the guide to expose the vacuum valve, valve spring and seats (Fig. 31).

(21) Remove the seals and discard them. Lift out the vacuum valve and retainer (Fig. 32).

(22) Remove and discard the valve housing to the guide seal.

(23) Invert the valve housing and remove the air valve seal from its groove in the valve body (Fig. 33).

CAUTION

Work carefully to avoid marking or scratching the inside diameter bore of the valve housing.

c. Cleaning and Inspection

The bellows type power brake now has been disassembled as much as necessary for cleaning and inspection.

(1) Clean all parts (except the bellows, bearing and air filter) in solvent and blow dry with compressed air.

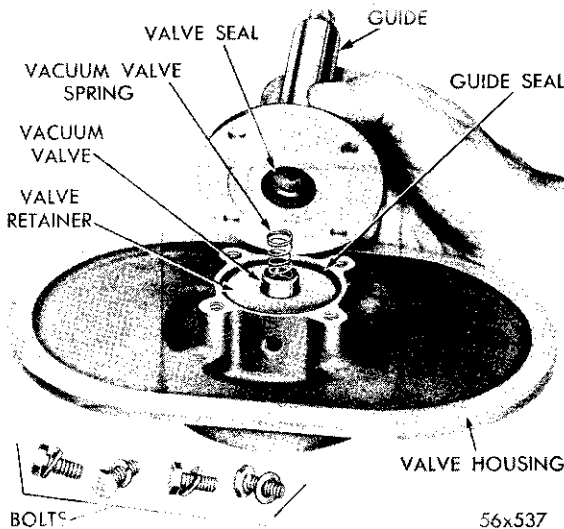


Fig. 31—Removing or Installing the Guide

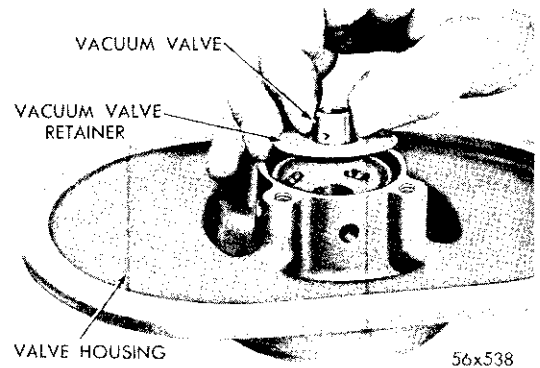


Fig. 32—Removing the Vacuum and Retainer

(2) Place cleaned parts on clean paper for re-assembly.

(3) If necessary, the bellows may be washed with water and mild soap.

(4) Inspect all parts for wear or damage and check the air valve for signs of scoring or wear.

(5) If the valve body or the valve is scored or worn, install new parts as required. Always use new "O" and seal rings.

d. Assembling the Power Brake

Be sure all seals and "O" rings are suitably coated with silicone grease (rings and seals pre-coated in Parts Kits).

(1) Insert a new air valve seal into the bore of the valve housing (lips of seal facing out when installed). (Refer to Fig. 33.)

(2) Carefully position the new vacuum valve in the retainer.

(3) Invert the valve housing and install the vacuum valve and the retainer in the housing.

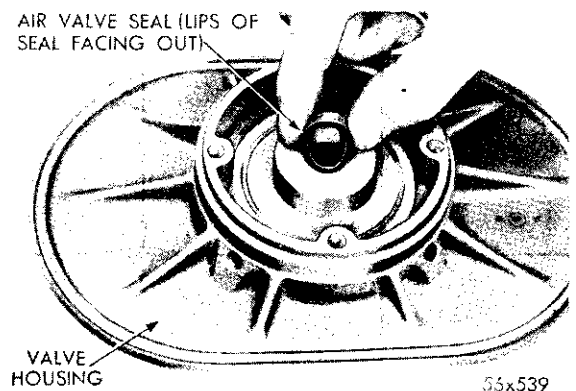


Fig. 33—Removing or Installing the Air Valve Seal

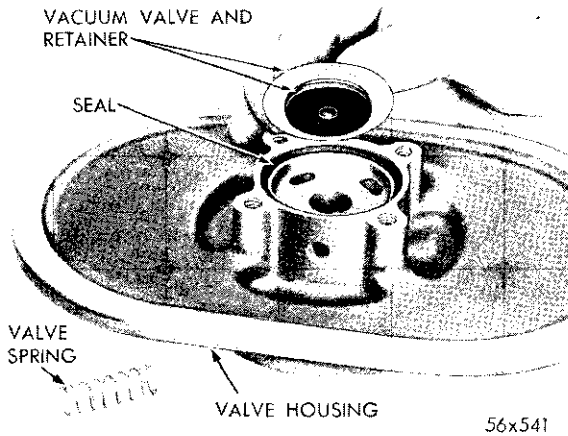


Fig. 34—Installing the Vacuum Valve and Retainers

(4) Press down firmly on the retainer to snap it in place (Fig. 34).

(5) Position the new valve housing to guide the seal in the groove provided.

(6) Install a new vacuum seal in the bore guide, with the lip of the seal toward the bottom of bore (Fig. 35).

(7) Install the vacuum valve spring in the center of the valve.

(8) Position the guide over the vacuum valve, lining up the bolt in the guide with bolt holes in the valve body.

(9) Carefully lower the guide down against the valve body, making certain the tapered portion of the vacuum valve enters the seal evenly.

(10) Press down on the guide to seat and install bolts and lockwashers. Tighten the bolts evenly and securely.

CAUTION

Be sure the countersunk holes at the end of the guide line up with the long centerline of the valve housing.

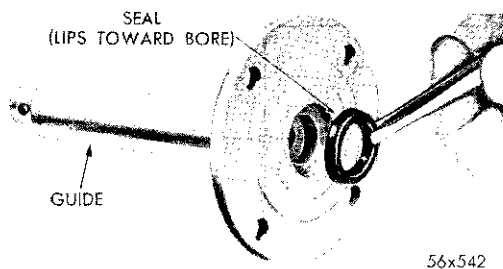


Fig. 35—Installing the Vacuum Seal

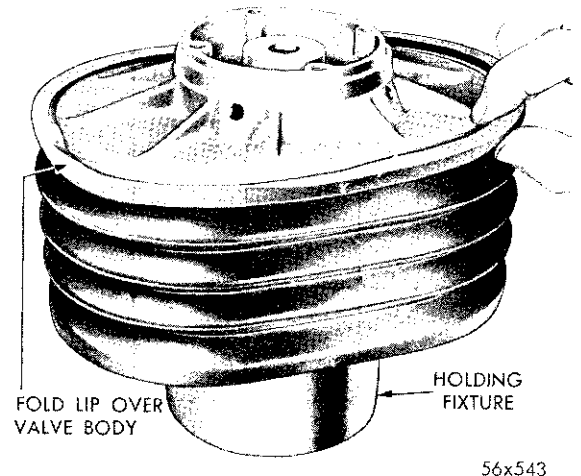


Fig. 36—Installing the Bellows

(11) If new bellows are being installed, position the supports in the bellows. (The supports must be centered in three center accordion folds and aligned with the bellows and each other.)

(12) Using holding fixtures (made from a piece of 4-inch pipe) to support the guide and valve assembly, install the bellows (Fig. 36). **Be sure the arrows on the edge of the bellows and housing are aligned.**

(13) With the assembly in the holding fixture, lightly coat the outer surface of the air valve with silicone grease (do not use any other kind of grease), and insert (small end first) into the bore of housing (Fig. 37).

(14) Use finger pressure to test for free move-

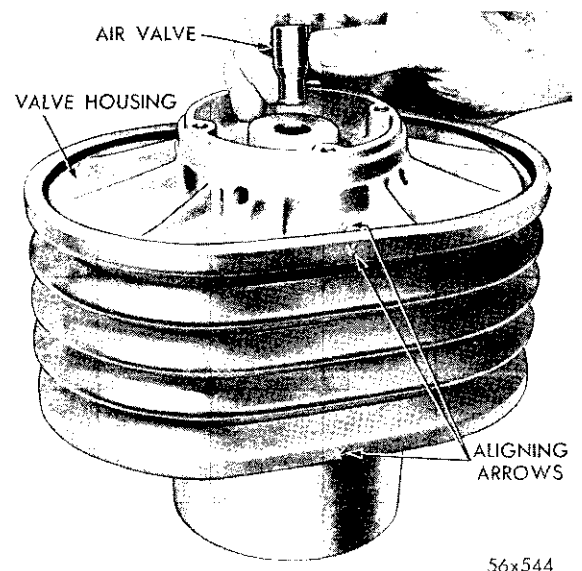


Fig. 37—Installing the Air Valve

ment of the valve against the vacuum valve spring.

(15) Install the air valve spring in the recess in the air valve and air filter.

(16) Install the new valve housing cover "O" ring on the shoulder provided on the valve body hub.

(17) Position the valve body cover over the valve housing, with the notch in the edge of the cover matching the arrow on the bellows (Fig. 38). Be sure the air valve spring nestles on the dimple in the center of the cover.

(18) Press the cover down evenly over the valve housing to seat the cover "O" ring, install the bolts, and tighten securely.

(19) Remove the assembly from the holding fixture and invert the unit.

(20) Coat the guide lightly with silicone grease and install the return spring.

(21) Position the spring evenly around the hub of the valve housing and guide (Fig. 39).

(22) Place the spring retainer and inner mounting plate over the spring, being sure the arrow stamped on the plate is in line with the arrow on the edge of the bellows.

(23) Compress the return spring and fold the bellows lip over the edge of the plate. Be sure the bellows fit evenly all around the plate.

(24) Install the new guide bearing seal in the groove inside the bearing bore.

(25) The seal must rest snugly in the bearing.

(26) Using silicone grease, lubricate the inside of the bearing and slide it over the guide, while

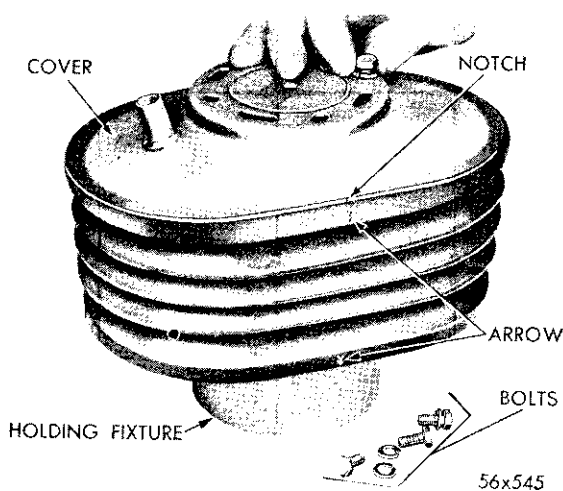


Fig. 38—Installing the Valve Housing Cover

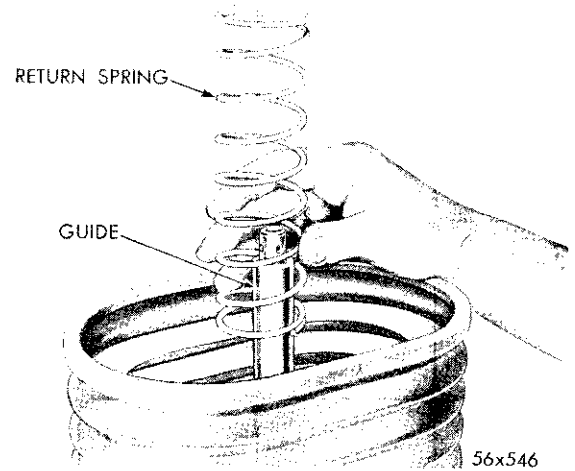


Fig. 39—Installing the Return Spring

compressing the bellows (Fig. 40).

NOTE: The bearing must be installed with the lip of the seal facing out.

(27) Push the bearing down over the guide and into the pocket of the plate.

(28) Release the bellows and the bearing will ride up the guide with the plate into position.

(29) Install the bearing to the mounting plate "O" ring and lower the outer mounting plate down on the assembly.

NOTE: The notch on the edge of the plate must be in line with the arrow on the bellows.

(30) Install the nuts and draw down finger tight.

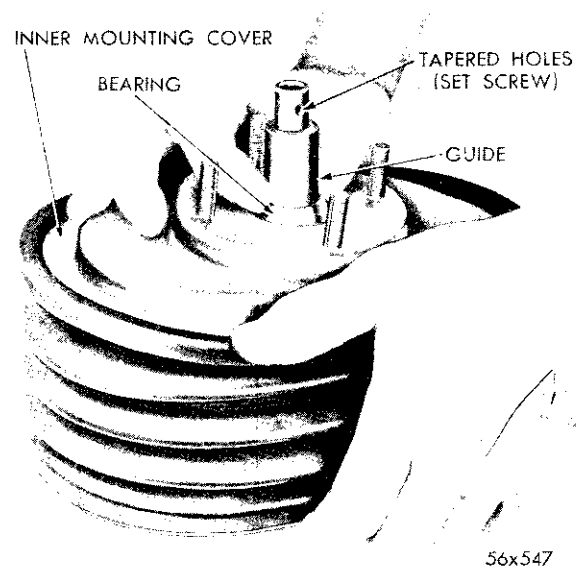


Fig. 40—Installing the Guide Bearing

(31) Slide the new valve operating rod seal ring over the nylon bumper on the end of the rod and into the groove.

(32) Install the rod in the center of the guide.

(33) Press on the end of the rod to test for free operation or movement of the air and vacuum valves. A "Two Step" movement should be felt when the rod is depressed and fully released.

(34) Place a new stop-seal washer in position and install the yoke on the end of the guide.

(35) Compress the bellows slightly and alternately tighten the set screws.

NOTE: The hub of the yoke must be down firmly against the shoulder of the guide, with the set screws aligned with tapered holes in the guide.

(36) Tighten the mounting plate nuts securely.

(37) Place the mounting bracket in position, with the long centerline of the bracket at right angles to the long centerline of the unit section.

(38) Install the nuts and lockwashers and tighten securely.

e. Installation on Vehicle

(1) Position the power brake unit on the dash panel of the vehicle so that its axis inclines down toward the front of the car.

NOTE: As the yoke passes through the dash panel, be sure that it engages the pedal linkage correctly by sliding over the nylon bushings on the power brake lever cross pin. Connect master cylinder push rod.

(2) Replace four hex nuts and lockwashers, tighten the nuts securely, and release the pedal.

30. PEDAL LINKAGE ADJUSTMENTS (On Vehicle)

It should seldom be necessary to adjust the brake pedal trigger arm. Adjustment, however, may be necessary, occasionally, to eliminate the following conditions:

(1) If the pedal pressure releases slowly, adjust by rotating the adjustment screw in a **counter-clockwise direction**.

(2) A time delay (noted during a fast brake application) can be corrected by making a clockwise adjustment on the adjusting screw.

(3) Should the pedal vibrate (booster chatter), turn the adjusting screw in a counter-clockwise direction. A more likely cause of chatter is an empty

master cylinder, or an improperly bled brake system. Refill or bleed.

NOTE: Rotation of the adjustment screw should be limited to plus or minus 90 degrees about the original setting.

α. Assembly of the Pedal Linkage in the Pedal Bracket

CAUTION

Use extreme care during assembly or handling of the linkage as the power brake pedal trigger arm is easily damaged.

31. LUBRICATION

Except for an occasional few drops of SAE 10-W Engine Oil on the power brake lever pin bushings, the brake pedal linkage requires no further lubrication. The power unit will require no lubrication under normal usage.

32. PEDAL FREE PLAY ADJUSTMENT

After the master cylinder, booster, and pedal linkages are completely installed, a free play adjustment check should be made at **no vacuum** as follows:

NOTE: Removing the vacuum hose to the engine and pressing the brake pedal several times will obtain a no vacuum condition in the booster.

(1) Insert the blade of a screwdriver between the rubber collar of the power brake trigger pivot and the rear side of the elongated hole in the power brake lever, forcing them apart.

NOTE: If the brake pedal and power brake lever are not wedged apart, a false free play setting (which includes the booster valve travel) will be measured at the pad end of the pedal.

(2) Check the free play with the linkage in this position by pushing lightly at the pad end of the brake pedal.

(3) The pedal free play travel should be between $\frac{1}{16}$ and $\frac{1}{8}$ inch. If the pedal free play movement does not come within the required limits, adjustment is made by lengthening or shortening the push rod as required.

α. Alternate Method of Measuring the Pedal Free Play

(1) Remove the master cylinder push rod end pin.

(2) Using **light** finger pressure, move the push rod forward until contact is made with the master cylinder piston.

(3) Attempt to insert the push rod end pin through the power lever and push rod end hole.

(4) If the push rod must be pulled back to allow the passage of the push rod end pin, free play is present.

(5) If the push rod must be pushed further into the master cylinder to allow passage of the push rod end pin, no free play is present and an adjustment must be made at the push rod.

33. SERVICING THE MASTER CYLINDER

The distance from the push rod end hole to the master cylinder face is 4.7 inches. The service procedures covering the master cylinder are the same as on the standard master cylinder.

34. TESTING THE BRAKE SYSTEM

With the power brake unit completely assembled and installed on the vehicle, make the following vacuum and hydraulic leakage test. An operational test should also be made to determine that the brake power unit and the hydraulic brake system are operating up to standard.

(1) Road test the car and make brake applications at about 20 m.p.h. If the brake pedal has a spongy feel when the brakes are applied, air is present in the hydraulic system and the lines must be bled. Bleed

the brake system at each wheel cylinder.

(2) With the engine not running, apply the brakes several times to exhaust all the vacuum in the system.

(3) Depress the brake pedal, hold the foot pressure on the pedal and start the engine. As soon as the engine begins to operate, the brake pedal will tend to fall away under foot pressure and less pressure will be required to hold the pedal in the applied position.

(4) If there is NO noticeable difference in the pedal effort with or without the engine running, the vacuum system is not functioning.

(5) Check for restriction in the vacuum supply line, restriction on the air cleaner, faulty pedal adjustments, or faulty power unit operation. Stop the engine and again exhaust all the vacuum in the system.

(6) Depress the brake pedal and hold foot pressure on the pedal. If the pedal gradually falls away under foot pressure, the hydraulic system is leaking. If the brake pedal travels to within one inch of the toe board, the brake shoes require readjustment or relining.

POWER BRAKE UNIT (Oval Type)

SERVICE DIAGNOSIS

35. PEDAL RELEASES SLOWLY AFTER APPLICATION OR BRAKE PEDAL VIBRATES (Booster Chatter)

- a. Pedal trigger arm improperly adjusted.

36. DELAY IN APPLICATION (Noted During Fast Brake Application)

- a. Pedal trigger arm improperly adjusted.

37. VACUUM LEAK (Unit Released)

- a. Leakage in internal hose connection to end plate or piston tube.
- b. Leakage at balancing diaphragm.
- c. Leakage at poppet diaphragm.
- d. Leakage at rubber seat of poppet assembly.

38. VACUUM LEAK (Unit Applied)

- a. Leakage in internal hose connection to end plate or piston tube.
- b. Leakage at balancing diaphragm.
- c. Leakage at poppet diaphragm.
- d. Leakage at rubber seat of poppet assembly.
- e. Scored atmospheric seat at center of piston plate.
- f. Leakage at valve rod seal.
- g. Leak at piston packing.
- h. Leak at mounting ring or at piston rod seal.

39. ROUGH IDLING

- a. Vacuum leaks at reserve tank hose connections.

40. DELAY IN POWER

- a. Weak or broken valve actuating spring.
- b. Weak or broken pedal return spring.

41. LACK OF POWER ASSISTANCE (When Cold)

NOTE: This condition only occurs when the car has

been setting for a long period of time (storage). Unit must be disassembled, cleaned of all old lubricants, seals and diaphragm must be softened with silicone grease before unit will function properly.

42. LEAKS IN BOOSTER

(Whistle When Brake Is Applied)

- a. Air leaks in vacuum lines.
- b. Leaks in power cylinder. Recondition complete power cylinder assembly.

POWER BRAKE—OVAL METAL TYPE

The power brake unit shown in Figures 41 and 42, is a vacuum power brake, designed for use with a master cylinder and pedal linkage of the reactionary type. A tube extending from the air cleaner at the rear is connected to the intake manifold through a hose, a vacuum reservoir and a check valve (see Figure 43).

The power brake consists of three basic components, namely an elliptical shaped power cylinder, a vacuum piston and rod assembly and an internal poppet type control valve, as shown in Figure 44.

43. OPERATION

As the brake pedal (Fig. 44) is depressed, the trigger

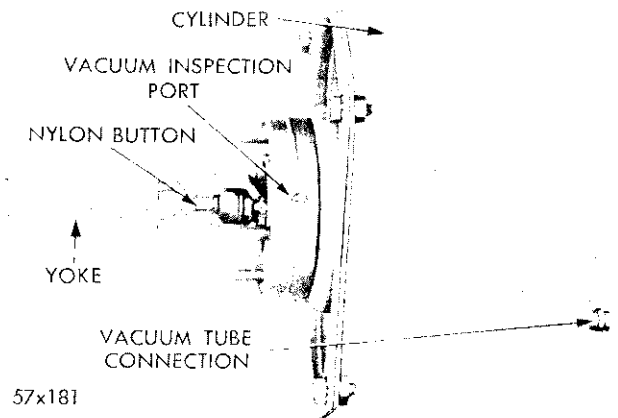


Fig. 41—Power Brake Assembly

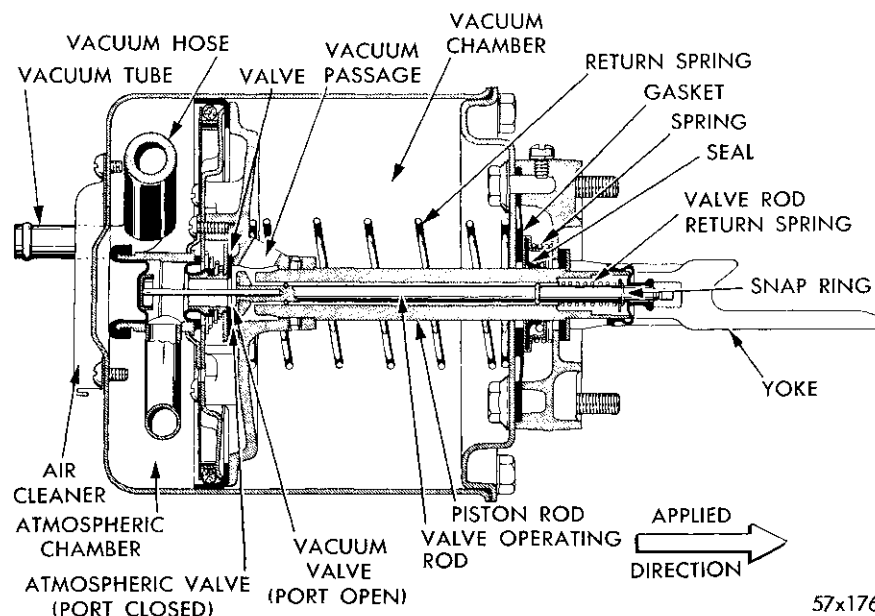


Fig. 42—Power Brake Unit (Sectional View)

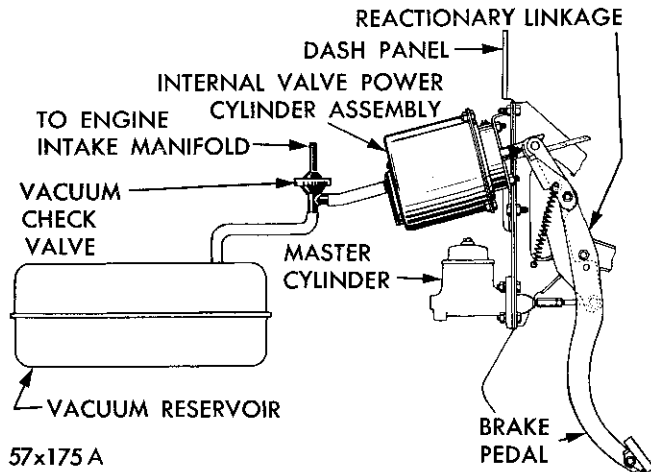


Fig. 43—Power Brake System (Typical)

arm moves back, releasing sufficient pressure against the valve operating rod, to permit the valve return spring to close the atmospheric port, and open the vacuum port of the control valve. As the front chamber of the unit assumes a state of vacuum, the piston moves forward and applies power to the upper end of the power lever. Power is then transmitted to the master cylinder through the reactionary linkage and the master cylinder push rod, as shown in Figure 43.

The oval-shaped air-vacuum unit (Fig. 43) mounted on the engine side of the dash panel is connected mechanically to the brake pedal linkage through the power unit push rod.

A yoke at the end of the piston rod is in contact with the power lever pin of the reactionary linkage.

The valve operating rod is located at the center of the piston rod and is always in contact with a ramp at the upper end of the valve trigger arm of pedal linkage. A control valve operating rod (Fig. 42) moves within the piston rod to actuate the vacuum valve and poppet.

The mechanical contact between the power unit and the brake linkage exists only when the power unit is assisting in a brake application. In the event there is a loss of engine vacuum, the brake pedal is free to function independent of the power unit to apply the brakes in the conventional manner.

44. TESTING THE POWER BRAKE (On the Vehicle)

(1) Remove the screw plug from the mounting ring and connect the test fitting, hose and vacuum gauge at the port.

(2) With the brakes in the released position, start the engine and allow to idle, while observing the vacuum gauge. (A zero reading indicates that the power unit is fully released.) A vacuum gauge reading of one to 16 inches or more indicates that the power unit is not releasing properly which may be due to faulty pedal adjustment or faulty power unit operation.

(3) Depress the brake pedal slowly and observe the vacuum gauge reading. (A vacuum gauge reading of one to 16 inches or more, depending upon pressure applied to the pedal indicates that the power unit is operating.)

A zero reading on the gauge indicates faulty power unit operation, restriction in the vacuum supply line,

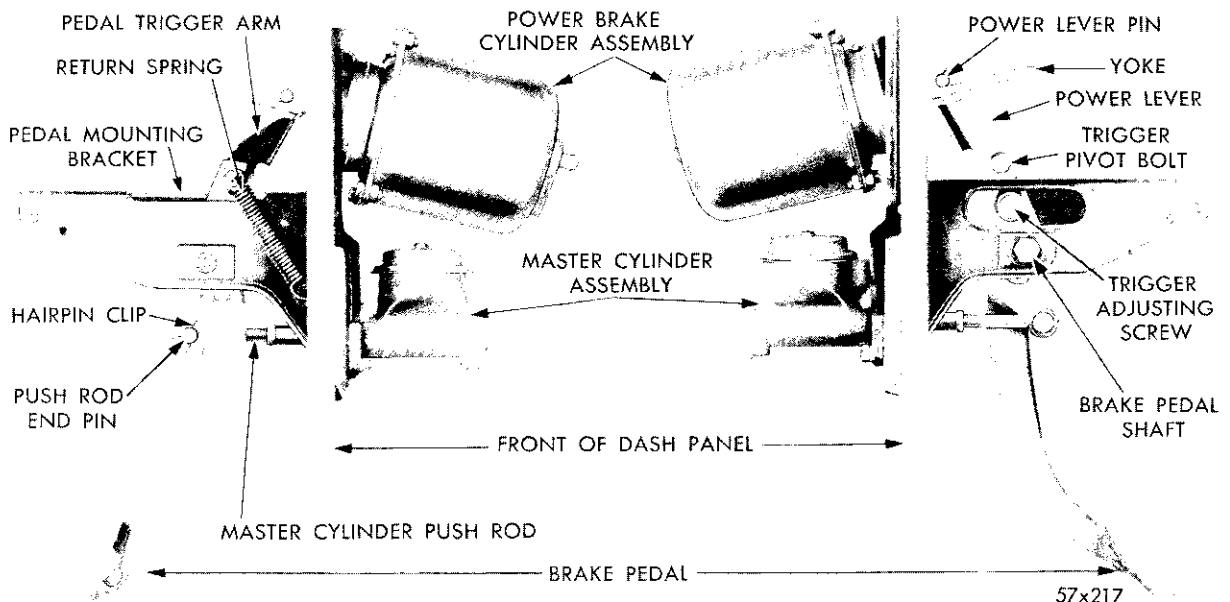


Fig. 44—Power Brake Pedal Assembly

or the brake pedal requires corrective service.

(4) Failure of the power unit to function properly indicates the need for corrective service.

NOTE: Before proceeding with any corrective measures, determine if the source of vacuum is satisfactory.

If a vacuum gauge is not available, depress the brake pedal several times to deplete any vacuum in the system and reservoir.

(5) Hold the pedal partially depressed while starting the engine. As soon as the engine starts, the pedal will fall away under the pressure applied.

(6) **Shut off engine**, depress the pedal six to ten times. There should be a noticeable increase in the effort required to depress the pedal to the same point the last time compared to the first, as the vacuum in the system is depleted.

(7) If there is no noticeable difference in the pedal effort with or without the engine running, check for a restriction in the vacuum supply hose B, air cleaner, incorrect pedal adjustment or faulty power unit operation.

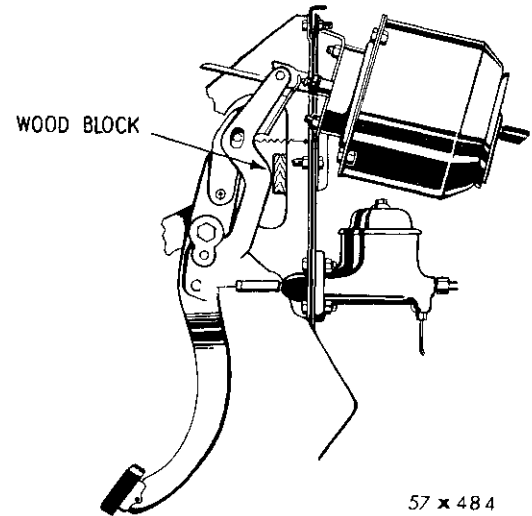


Fig. 45—Removal of Power Brake Unit

(8) Disconnect the vacuum hose from the power unit and place a finger over end of hose. A high vacuum indicates that vacuum is being applied to the unit. If no vacuum is present at the end of the vacuum hose when the engine is running, a restriction in the vacuum supply is apparent and should be corrected.

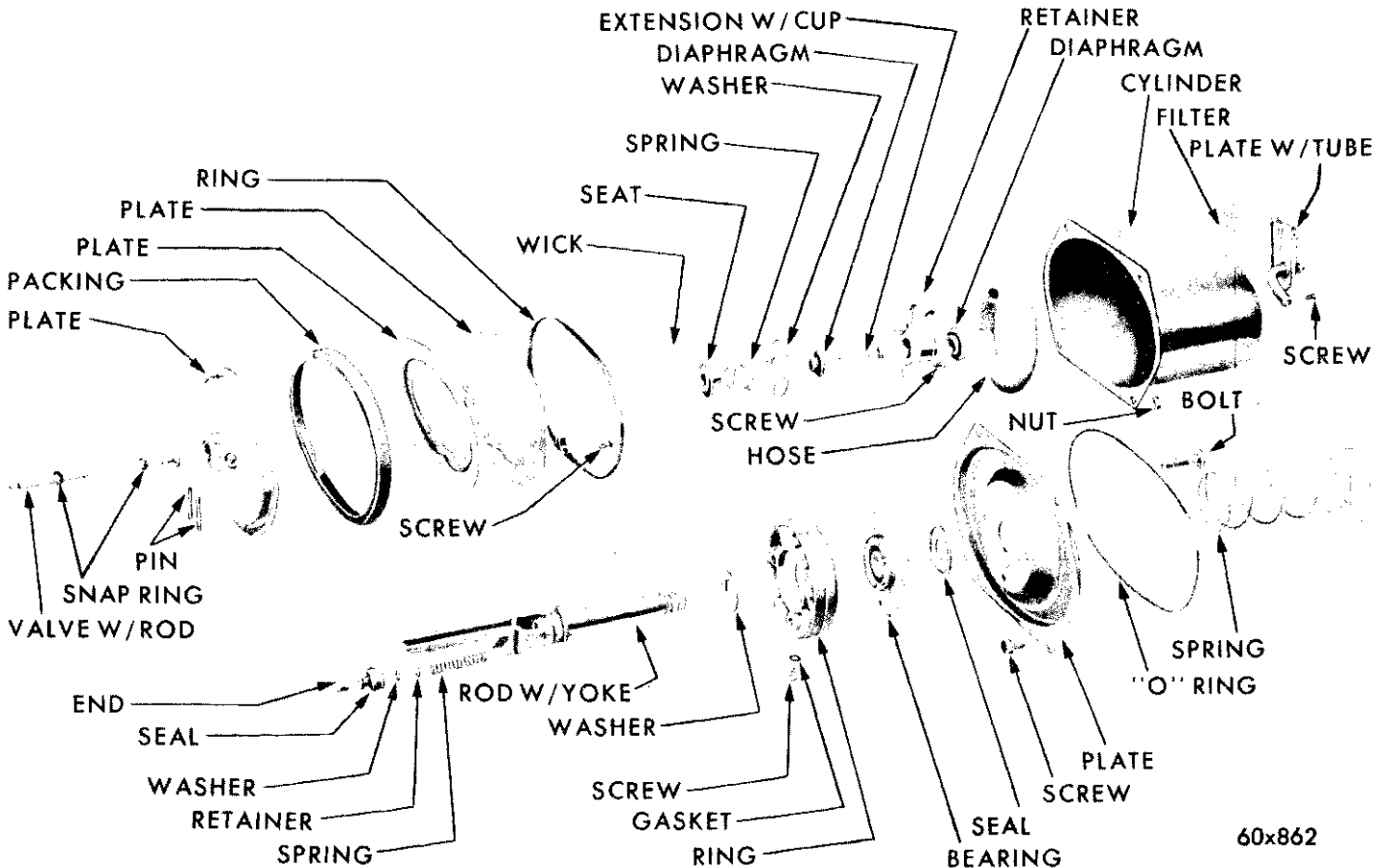


Fig. 46—Power Brake Assembly (Exploded View)

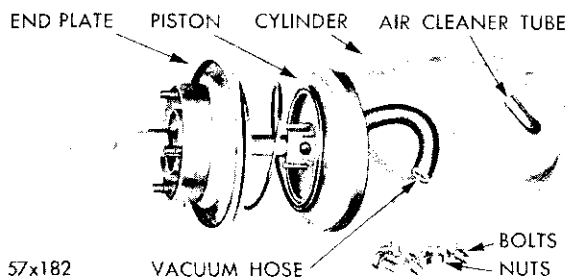


Fig. 47—Removing or Installing the Vacuum Hose

(9) If vacuum is being supplied to the unit, check the pedal linkage adjustment as described in Paragraphs 9 and 10. If all adjustments are made according to the recommended procedure and the unit fails to function properly, remove the unit from the vehicle for complete overhaul.

45. REMOVAL—POWER BRAKE

(1) Insert a wooden block or wedge between the power lever and the bracket (Fig. 45). (The use of a wedge or block will prevent damage to the ramp of the trigger arm.)

(2) Scratch alignment marks across the power unit adjacent to the vacuum test port, and across the mounting bracket and between the mounting bracket and the fire wall.

(3) Disconnect the vacuum hose from the end of the power unit.

(4) Remove the master cylinder push rod eye bolt from the pedal.

(5) Remove the stop light switch wires and master cylinder brake tube from the master cylinder.

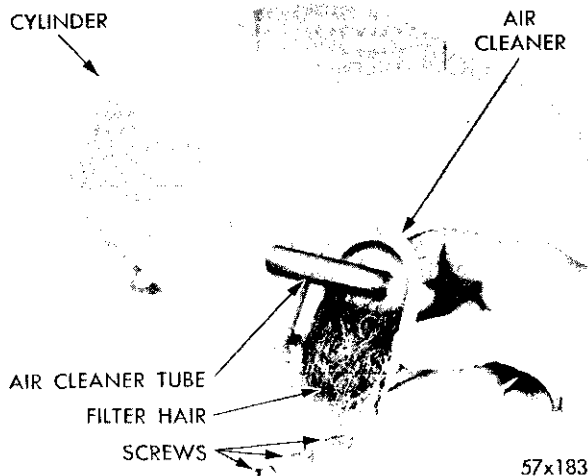


Fig. 48—Removing the Air Cleaner and Filter

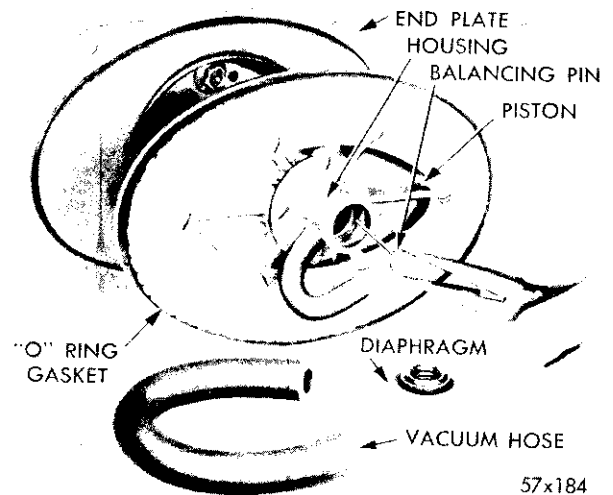


Fig. 49—Removing or Installing the Balancing Pin

(6) Remove the master cylinder.

(7) Remove the bolts that attach the power unit mounting bracket to the fire wall. Slide the unit and the bracket straight out from the fire wall and out of the engine compartment. Remove the power unit from the mounting bracket.

a. Power Brake Disassembly (Fig. 46)

NOTE: Do not clamp the yoke of the unit in a vise or allow the piston cylinder to become dented during the disassembly operation.

(1) Place a scribe mark across the flange of cylinder and end plate, and remove the attaching nuts and bolts. Slide the vacuum piston out of the cylinder. Reach inside and slide the vacuum hose off the air cleaner tube, as shown in Figure 47. Remove the cylinder to end plate "O" ring.

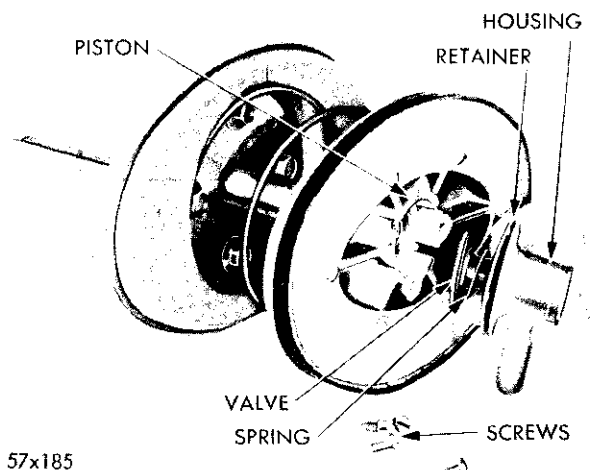


Fig. 50—Removing the Valve Housing from the Piston

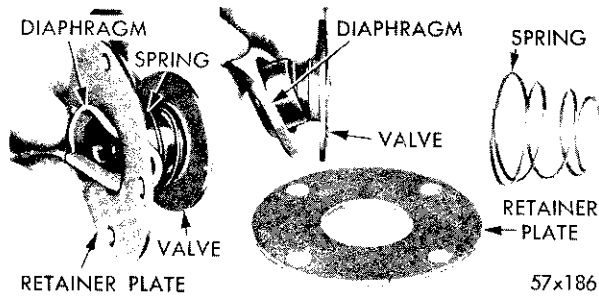


Fig. 51—Disassembling the Valve

(2) Remove the air cleaner attaching screws, disengage air cleaner and filter from the cylinder, as shown in Figure 48.

(3) Remove the hose from the vacuum tube. Remove the balancing pin diaphragm from the end of pin housing. Using long nose pliers, remove the balancing pin, as shown in Figure 49.

(4) Remove the tube and housing attaching screws and separate the valve housing from the piston, as shown in Figure 50.

(5) Remove the valve retaining plate from the diaphragm by compressing diaphragm, as shown in Figure 51. Remove the spring, then peel the diaphragm from the valve.

(6) Using a thin blade screwdriver and a 1 inch square block, pry the nylon button from the end of the valve shaft, as shown in Figure 52. Slide the valve rod seal from the end of the rod.

(7) Using pliers, Tool C-3229, remove the snap ring that retains the valve rod in the piston, as shown in Figure 53.

(8) Slide the valve rod washer and spring off end of rod, as shown in Figure 54. Slide the valve rod out of the piston, as shown in Figure 55.

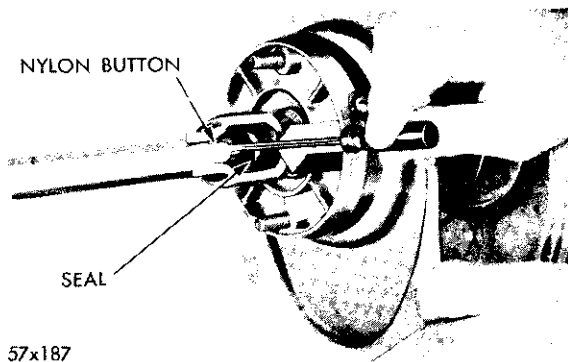


Fig. 52—Removing the Nylon Button from the Rod

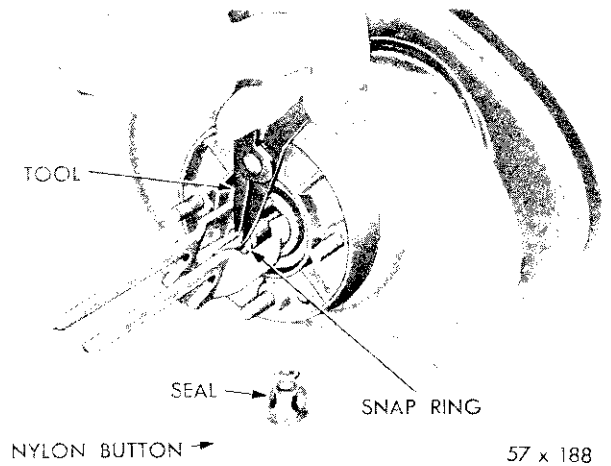


Fig. 53—Removing or Installing the Snap Ring

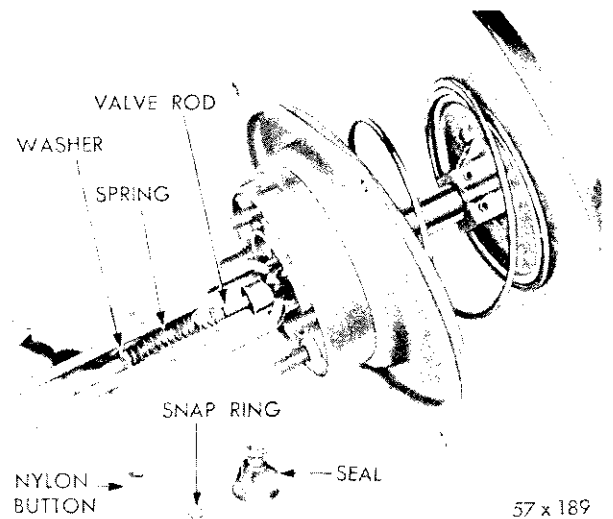


Fig. 54—Removing or Installing the Spring and Washer

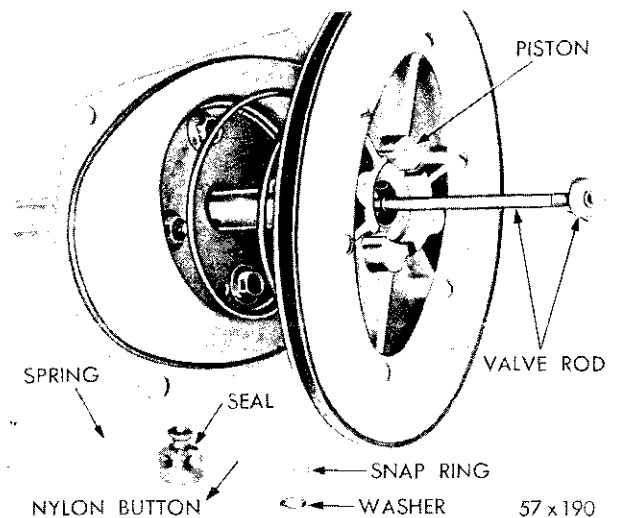


Fig. 55—Removing the Valve Rod from the Piston

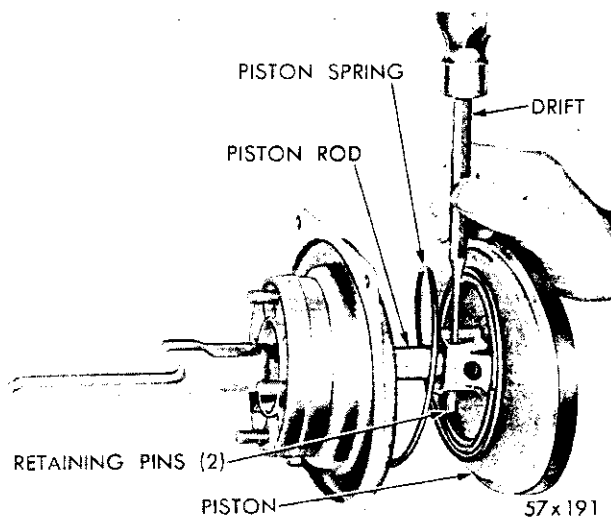


Fig. 56—Driving out Retaining Pins

(9) Drive out the piston rod retaining pins, using a $\frac{3}{16}$ inch drift, as shown in Figure 56. Remove the piston from the rod.

NOTE: Use care when driving out the pins, as the return spring is under pressure, and may cause the piston to snap off the rod end.

(10) Remove the return spring, slide the piston rod out from the end plate, as shown in Figure 57. Remove the rubber stop washer.

(11) Remove the bolts that attach the mounting ring to the end plate. Separate the end plate from the mounting ring, and remove the seal retainer spring, piston and rod leather seal and mounting ring gasket, as shown in Figure 58. Remove the vacuum inspection port screw and gasket from the mounting ring.

(12) Remove the screws that hold the retainer plate to the piston plate. Separate the retainer and the piston plate, remove the expander spring, wick,

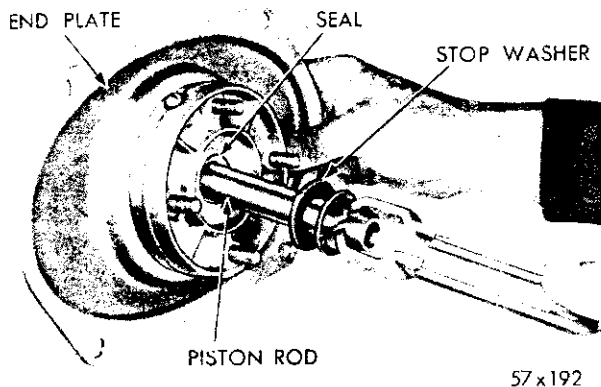


Fig. 57—Removing the Piston Rod from the End Plate

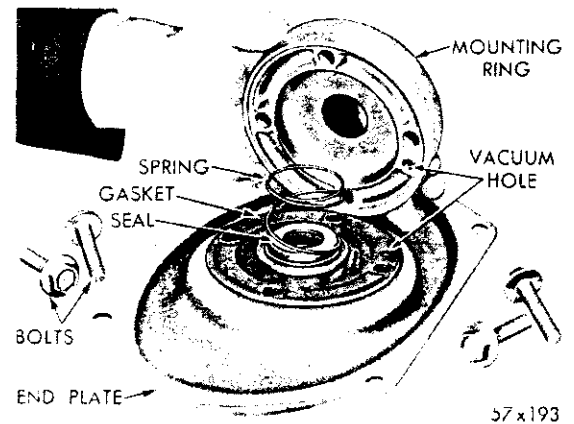


Fig. 58—Removing the Mounting Ring

packing plate, and leather packing, as shown in Figure 59.

b. Cleaning and Inspection

(1) Clean all metal parts in a suitable solvent then blow dry with compressed air (including recesses and internal passages).

(2) Wash rubber parts in clean alcohol. After parts are cleaned, place on clean paper or cloth and inspect all the parts for wear or damage. Replace worn or damaged parts with new parts.

(3) Check the inside of the vacuum cylinder. If the cylinder is rusted or corroded, polish with fine steel wool or crocus cloth.

(4) If inspection reveals nicks or scratches on the piston rod, valve seat (on end of valve rod) or valve seat (at center of piston plate) install new parts at assembly.

(5) Check the leather packing and piston rod leather seal. If worn excessively, install new parts.

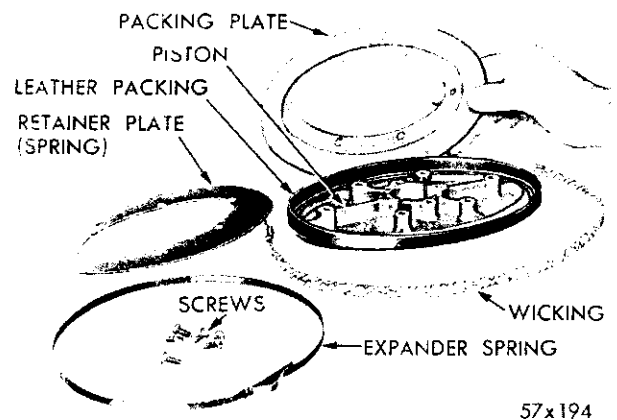


Fig. 59—Disassembling the Piston

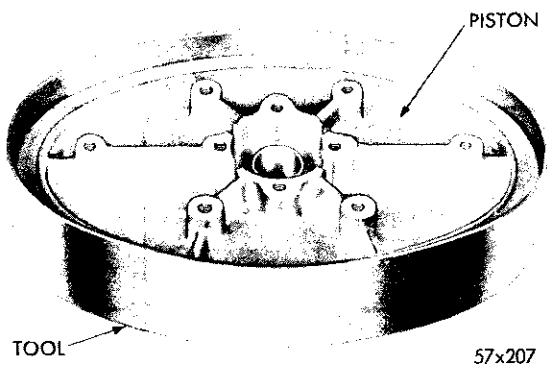


Fig. 60—Piston Installed in the Assembly Tool

c. Power Brake Assembly (Fig. 46)

When reassembling the Power Brake, use new gaskets and apply silicone grease to those parts requiring lubrication.

(1) Place the vacuum piston in assembly Tool C-3578, with the threaded holes in the piston facing up, as shown in Figure 60.

(2) Place the leather packing on the piston with the lip side up. Place the packing retainer plate on the packing, with the raised portion side up and the holes in the plate aligned with those in the piston, as shown in Figure 61.

(3) Coil the cotton wick inside the packing lip and cut to the required length, as shown in Figure 62. Remove the wick and dip in vacuum cylinder oil. Let excess oil drip off then install in packing.

(4) Install the expander spring inside the wicking, with the gripper points next to the wicking, as shown in Figure 63. Engage the notch at the loop end of spring with the hook at the opposite end.

(5) Install the expander spring retainer plate,

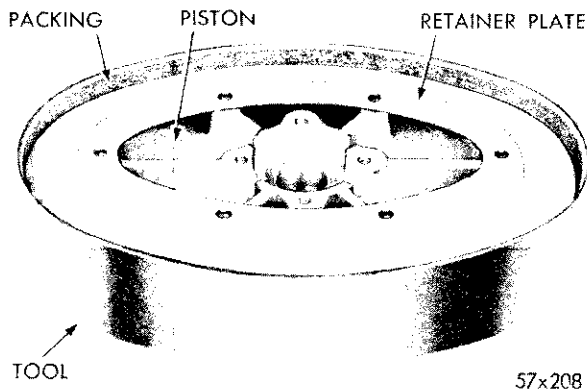


Fig. 61—Packing and Retainer Plate Installed

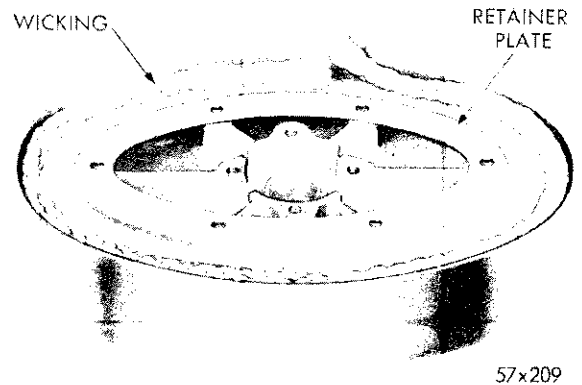


Fig. 62—Installing the Wicking

and align the holes in the plate with the threaded holes in the piston plate. Install screw and tighten securely.

NOTE: Do not remove the tool from the piston until ready to install in the vacuum cylinder.

(6) Insert the vacuum inspection port screw and gasket into the mounting ring. Insert the ring retaining bolts through the holes in the end plate. Apply silicone grease to the outer face of the gasket around the center hole. Slide gasket down over bolts. (Be sure the vacuum port opening in the gasket is aligned with opening in the end plate.) (See Fig. 64.)

(7) Place a new piston rod leather seal on the gasket, with the raised shoulder up. Slide spring over shoulder and seat against seal, as shown in Figure 64. Center the seal and spring.

(8) Coat the bearing surface of the mounting ring with silicone grease, and slide mounting ring down over bolts (with recessed side next to gasket and the vacuum port holes aligned) until threads are contacted, as shown in Figure 65. Tighten bolts

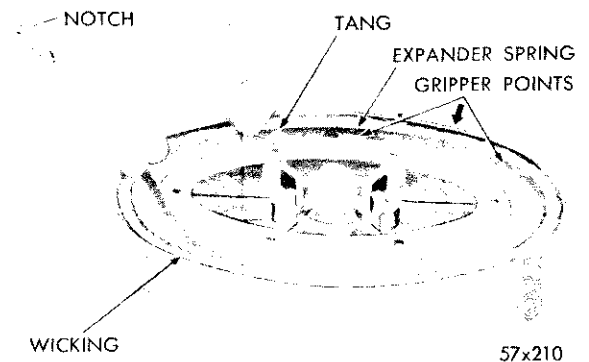


Fig. 63—Installing the Expander Spring

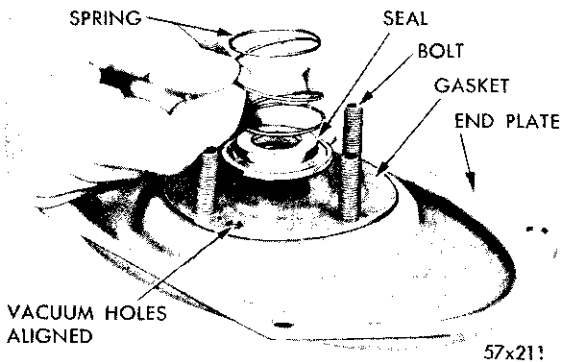


Fig. 64—Installing the Gasket, Seal and Spring

securely. When properly assembled, the outer rim of the mounting ring should contact the end plate.

(9) Slide the rubber stop washer over the piston rod and up against the steel washer. Place pilot, Tool C-3579, on end of the piston rod, and insert through the leather seal in the end plate, as shown in Figure 66. Remove the tool. Install the piston spring over the piston rod and down against the end plate.

(10) Slide the vacuum piston on the piston rod and up against the shoulder. Install the retaining pins, as shown in Figure 67.

NOTE: Hold the rod seated during the operation.

(11) Slide the valve rod through the center of the piston and piston rod until the end of rod protrudes, as shown in Figure 68. Slide the valve rod spring and retainer washer over the end of the rod.

(12) Compress the spring, then install the snap ring in the groove of the valve rod, using pliers, Tool C-3229, as shown in Figure 53.

(13) Install the valve rod seal over the end of

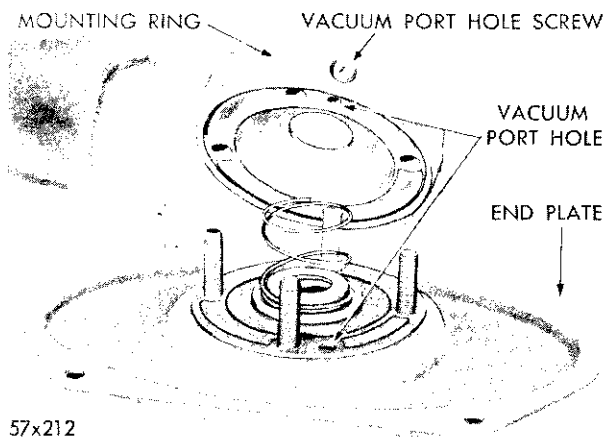


Fig. 65—Installing the Mounting Ring

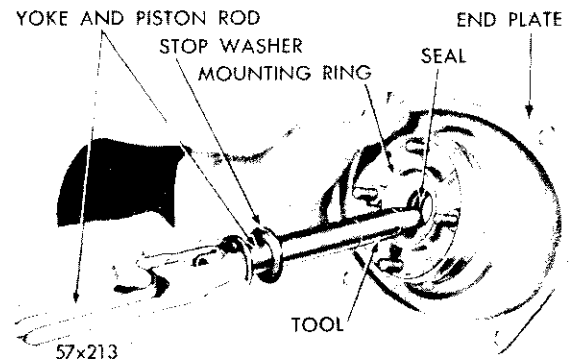


Fig. 66—Installing the Piston Rod through the Seal

the valve rod and piston rod.

NOTE: To aid in the seal assembly, turn the seal partially inside out and slide the small diameter end of the seal over the valve rod first, then slide the large diameter over the end of the piston rod. Slide the nylon button over the end of the valve rod and press until seated.

(14) Slide the small diameter of the valve diaphragm over the small shoulder on the valve, as shown in Figure 51.

(15) Compress the diaphragm enough to allow the valve spring to be installed (small diameter first) down against the valve plate. Holding the diaphragm compressed, install the retainer plate. Seat the plate evenly on diaphragm.

(16) Center the valve and retainer plate on the piston. Place the vacuum tube and pin housing on the retainer plate, making certain that the bead of the diaphragm is in the annular groove of the housing and that the screw holes are aligned.

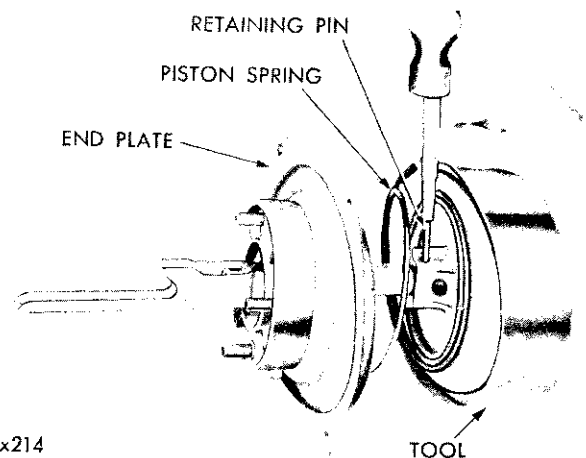


Fig. 67—Installing the Piston Retaining Pins

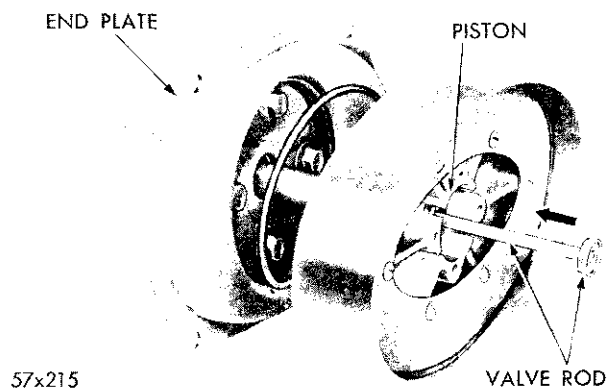


Fig. 68—Installing the Valve Rod

(17) With the scribe marks in alignment, install the attaching screws and tighten securely. Install the balancing pin and diaphragm, and slide the vacuum hose over the tube of the housing.

(18) Slide a new "O" ring gasket over the piston and down on the shoulder of the end plate. Insert the air cleaner tube of the filter housing through hole in the vacuum cylinder. Place air cleaner housing against the cylinder, align holes, install the attaching screws and tighten securely.

(19) Remove Tool C-3578 from the piston assembly, and place in position in front of cylinder. Reach inside and connect the vacuum hose to the cleaner tube. Slide the piston into the cylinder. Install the end plate to the cylinder bolts and nuts. Tighten securely. Using a thin blade screwdriver, or a 6 inch scale ruler, press the air cleaner filter hair into the housing, as shown in Figure 69.

46. POWER BRAKE TESTING (On the Bench)

Testing of the unit consists of making operational and leakage tests.

NOTE: When vacuum is applied to the power cylinder without a force being applied to the end of the valve operating rod, the vacuum piston can move out to the end of the stroke unrestricted.

a. Operational Test

(1) Apply 15 to 20 inches of vacuum to the vacuum tube at the air cleaner end of the power cylinder. If the valve is not depressed, the piston and yoke will move to the fully extended (or applied) position when the vacuum is applied to the unit.

NOTE: During the operation tests, the power cylinder piston should move throughout its full stroke without hesitation.

b. Leakage Test

To make a leakage test, a vacuum source, vacuum gauge and a shut off valve are necessary. The gauge should be close to the power unit and the shut off valve so arranged that the volume of the test line should not exceed 6 cubic inches in volume.

(1) Press in on the valve operating rod sufficiently to compress the valve rod spring. Apply 15 to 20 inches of vacuum to the power cylinder, and close the vacuum shut off valve. The amount of vacuum leakage should not exceed $\frac{1}{2}$ inch in 60 seconds.

(2) Open the vacuum shut off valve, release the valve operating rod and allow the piston to travel to the end of its stroke. Close the shut off valve and note the leakage. Vacuum should not exceed 1 inch in ten seconds.

47. POWER BRAKE INSTALLATION (In Vehicle)

When installing the power brake in the vehicle, be sure to align the scribe marks made at the start of disassembly.

(1) Place the mounting bracket on the power unit, with the vacuum test port and the mark on the mounting bracket in alignment.

(2) Align the scribe marks on the fire wall with the mounting bracket, then guide the yoke end of the piston rod through the hole in the fire wall so that the slot in the yoke at the end of the piston rod slides over the power lever pin.

(3) Install the bolts and nuts that attach the mounting bracket to the fire wall. Remove the wooden block (or wedge) from between the power lever and the pedal linkage mounting bracket. Tighten the attaching bolts securely.

(4) Slide vacuum hose over the vacuum tube at

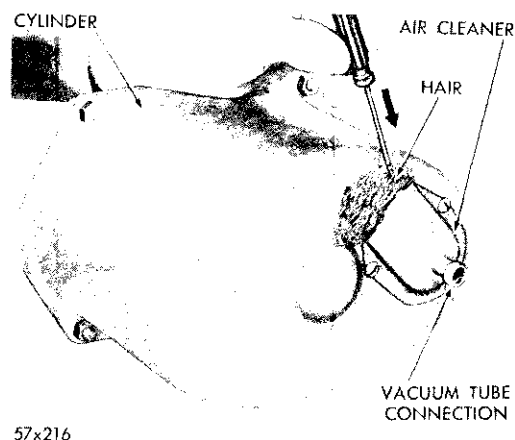


Fig. 69—Installing the Filter Hair

the end of the power brake unit. Install the clamp.

48. POWER BRAKE ADJUSTMENT

Normally no adjustments are required, as the valve lever ramp and reactionary pedal linkage are adjusted at the factory. If the performance, however, of the power brake is unsatisfactory, a slight adjustment of the linkage may be necessary. The following checks will indicate the need for further adjustment:

(1) Start the engine and allow to warm up, and apply the brake several times. If there is a noticeable drag in the release of the brake pedal, rotate the adjusting screw (see Fig. 44) slightly in a counter-clockwise direction. If there is a time lag or delay in making a fast brake application, rotate the adjusting screw slightly in a clockwise direction. In either case, recheck brake operation after making the adjustment and increase or decrease as required to provide no lag in the brake release or application.

NOTE: The rotation of the adjusting screw should be limited to 90 degrees from the vertical position (arrow up).

a. Pedal Free Play Adjustment

(1) Remove the vacuum hose and press the brake pedal several times to aid in obtaining a no vacuum condition.

(2) Insert the blade of a screwdriver between the rubber collar of the trigger pivot and the rear side of the elongated hole in the power brake lever, forcing them apart.

NOTE: If the brake pedal and the power brake lever are not wedged apart, a false free play setting will be measured at the pad end of the pedal.

(3) Check the free play with the linkage in this position, by pushing lightly at the pad end of the brake pedal. The pedal free play travel should be between $\frac{1}{32}$ and $\frac{1}{8}$ inch. If the pedal free play movement does not come within the required limits, make the adjustment by lengthening or shortening the push rods as required.

b. Alternate Method of Measuring Pedal Free Play

(1) Remove the master cylinder push rod end pin. Using a light finger pressure, move the push rod forward until contact is made with the master cylinder piston.

(2) Try to insert the push rod end pin through the power lever and push rod end hole. If the push rod must be pulled back, to allow passage of the push rod pin, free play is present.

(3) If the push rod must be pushed further into the master cylinder to allow passage of the push rod end pin, no free play is present, and an adjustment must be made on the push rod.

49. PEDAL LINKAGE ADJUSTMENT (On the Bench)

If the power brake pedal linkage has been removed for service, the following check and adjustment must be made on the bench, before reinstalling the linkage on the vehicle.

a. Removing the Pedal from Bracket

To remove the pedal from the mounting bracket for replacement of nylon bushings, or trigger arm, refer to Figure 44.

(1) Remove the pedal return spring.

(2) Remove the master cylinder push rod retaining pin.

(3) Remove the pivot bolt that attaches the pedal to the bracket.

(4) Slide the pedal assembly out of the mounting bracket being careful not to damage or bend the trigger arm.

b. Installing the Brake Pedal in the Bracket

CAUTION:

Extreme care must be taken when reassembling and handling the pedal assembly to prevent the trigger arm from being damaged or bent.

(1) When installing the pedal in the bracket, (power unit removed), insert wooden wedge between the brake lever and the forward edge of the slot in the pedal bracket. This will prevent the trigger arm from extending beyond the edge of the bracket. Install the pedal, in reverse of the removal procedure described above.

(2) The wedge can also serve to correctly position the pedal linkage, when the power brake and upper reinforcement plate are attached to the dash panel. If the pedal linkage is allowed to extend through the hole in the dash panel, the trigger arm may be damaged or bent. This would require a complete readjustment of the pedal linkage.

c. Pedal Trigger Adjustment

(1) With the adjusting screw in the position, clamp or wedge the brake pedal pivot to the rear side of the hole in the power lever until the adjusting screw collar is compressed and metal to metal contact is made. (A screwdriver can be used.)

(2) Install gauge Tool C-3508, over the brake lever pin. Align the scribed centerline of the gauge with the centerline of the pedal. Turn the adjusting screw until the outer curved surface of the trigger arm rests exactly even with the inner scribed circle and within the scribed arc lines on the gauge. This dimension must be .640 inch plus or minus .005 inch.

(3) To check the .730 inch measurement, (the outer scribed circle) remove the wedge and lightly press on the pedal to bring the outer curved surface of the trigger arm exactly even with the outer scribed circle on the gauge, and within the scribed arc lines on the gauge.

(4) If the curvature of the trigger arm does not fall within the scribed lines and the concentricity of the .640 inch and the .730 inch circles, it can usually

be brought within the desired radius by carefully bending the trigger arm until conformation has been obtained. If the trigger, however, is out an excessive amount, install a new pedal and trigger, adjust as described, to conform to the gauge. It will be necessary to recheck the .640 inch measurement described above.

50. SERVICING THE MASTER CYLINDER

The master cylinder can be bled and the push rod end assembled to the proper length, as described in the Service Brake Section of this Manual. (The service procedures covering the power brake master cylinder are the same as on the conventional master cylinder, except that cars without power brakes have no pedal spring or adjustable pedal push rod.)
