

## SECTION 9-D

## POWER BRAKES

| Paragraph | Subject   | Page | Paragraph | Subject  | Page |
|-----------|---|------|-----------|--|------|
| 9-15      | Description of Power Brake Mechanism.....                           | 9-23 | 9-17      | Moraine Power Brake Unit....                                       | 9-25 |
| 9-16      | Removal, Installation, Adjusting, Testing of Power Brake Units..... | 9-23 | 9-18      | Disassembly, Inspection, Assembly of Moraine Power Brake Unit..... | 9-28 |

## 9-15 DESCRIPTION OF POWER BRAKE MECHANISM

Wheel brake assemblies used in a power brake system are identical with those used in a regular brake system. The power brake unit provides lighter pedal pressures due to vacuum assist. These lighter pedal pressures are obtained with reduced pedal travel making it possible to have the brake pedal height more nearly the same as the accelerator pedal height.

The brake pedal is suspended from a bolt between two mounting brackets. As the brake is applied, a pedal lever extending upward operates a link rearward. This link in turn transmits motion to a lever on an idler, causing the idler to rotate. This rotation causes a second idler lever to push forward on the brake cylinder push rod clevis and push rod. The overall mechanical advantage in the power brake linkage is approximately  $1\frac{1}{2}$  to 1. See Figure 9-12.

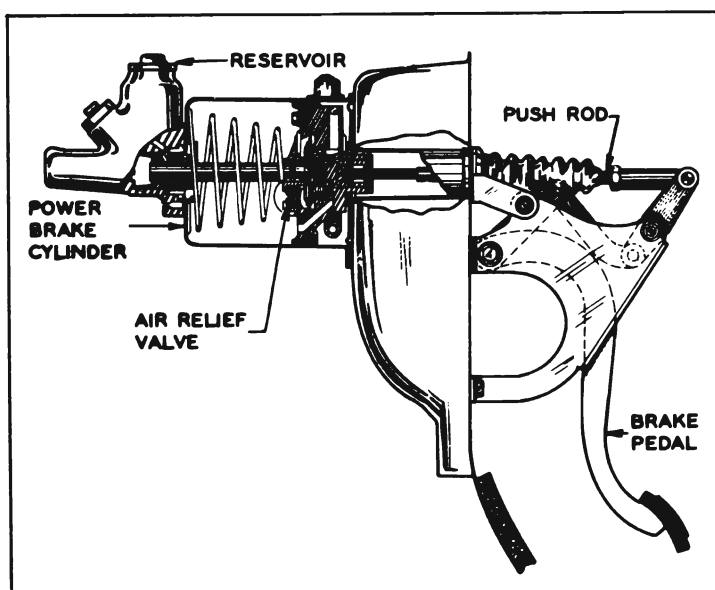


Figure 9-12—Power Brake Installation

All pivot points in the brake linkage have nylon bearings which are lubricated when installed but do not require periodic lubrication. Because there is no pedal stop, the pedal will be stopped in the "off" position by contact of the push rod with the stop plate in the power cylinder.

der. The only linkage adjustment possible is the pedal height adjustment (par. 9-16).

The power brake assembly is a self-contained vacuum and hydraulic unit which utilizes the difference between intake manifold vacuum and atmospheric pressure to reduce brake pedal effort. Both Bendix and Moraine power brake units are used on an optional basis. Internally, the Bendix and Moraine units differ in construction, but both units have the same external dimensions and may be used interchangeably. Both units have an air suspended power cylinder and a displacement type hydraulic cylinder.

The power brake cylinder is connected to the intake manifold through pipes and flexible connections. A vacuum reserve tank of approximately 360 cubic inches capacity is connected into the vacuum line near the power brake cylinder to insure quick and smooth response of the brake cylinder on all power brake applications. A check valve installed in the vacuum line closes to maintain existing vacuum at the power cylinder and in the reserve tank whenever manifold vacuum falls below that in the brake system.

When the engine is stopped and check valve is closed, the tank provides sufficient reserve vacuum for four to seven normal power brake applications. When reserve vacuum does not exist, the brakes can be applied manually in the same manner as the regular brakes, except that somewhat more effort is required.

## 9-16 REMOVAL, INSTALLATION, ADJUSTING, TESTING OF POWER BRAKE UNITS

The same procedure is used for removing, installing, adjusting, or testing either the Moraine or the Bendix power brake unit. Operation, disassembly and assembly are different, however, and are covered in separate paragraphs as shown in the index for section 9-D.

**a. Removal of Power Brake Unit**

1. Disconnect battery ground strap.
2. Remove clevis pin from push rod clevis. See figure 9-13.
3. Lift brake pedal to pull linkage out of the way, then remove large nut holding brake unit to cowl using Wrench 6618.
4. Disconnect stop light wire connector from switch.
5. Disconnect brake pipe from hydraulic cylinder and tape end of pipe to prevent entrance of dirt. Disconnect vacuum hoses from vacuum tee.
6. Remove bolts holding unit to ventilation air duct and remove power brake unit from car.
7. Remove filler cap and turn unit so that any brake fluid will drain out. Pump push rod by hand for full interior drainage. Discard old fluid. Install filler cap and cover hydraulic cylinder outlet with tape to exclude dirt. Clean all loose dirt from outside of unit before disassembling.

**b. Installation of Power Brake Unit**

1. Position power brake unit in ventilation air duct and install bolts to hold unit to air duct.
2. Connect brake pipe to hydraulic cylinder. Connect vacuum hoses to vacuum tee.
3. Connect stop light wire connector to switch.
4. Loosen brake reinforcing bracket bolt and nut. Lift brake pedal to pull linkage out of the way, then install and tighten large nut using Wrench 6618. After large nut is tight, tighten reinforcing bracket bolt and nut.
5. Install spring washer, clevis pin, and cotter key in push rod clevis.
6. Check brake pedal for correct height as described below (subpar. c). Adjust pedal height if necessary.
7. Reconnect battery ground strap.
8. Bleed hydraulic system in same manner as standard brake system. After bleeding bring fluid level to  $\frac{1}{4}$  inch below lowest point of bottom thread in filler opening. **NOTE:** *When pressure bleeding equipment is not available, do not use any vacuum assist. The engine should not be running and the vacuum reserve should be used up by repeatedly applying the brake before starting the bleeding procedure.*

**c. Checking and Adjusting Brake Pedal Height**

Correct pedal height is important to insure adequate pedal travel and to make sure that the pedal is in the proper position to get the best linkage action.

1. Make certain that brake pedal returns completely when released slowly. If pedal does not return freely, check linkage for binding and check condition of pedal return spring.
2. Measure from left top side of pedal pad perpendicular to toe pan using a foot ruler. Pedal height with ruler pressed firmly against floor mat should be  $5\frac{1}{2}$  inches plus or minus  $\frac{1}{4}$  inch. See figure 9-7.
3. If pedal height is incorrect, loosen push rod lock nut.
4. Turn push rod as necessary to adjust pedal height to  $5\frac{1}{2}$  inches.
5. Hold push rod and tighten lock nut. Re-check pedal height.
6. Start engine and depress brake pedal firmly. If pedal travels to within 1 inch of toeboard and has a hard feel, brake shoes require adjustment or relining. However, if pedal has a spongy feel, brake system needs bleeding.

**d. Testing Power Brake Unit**

1. **Vacuum Assist.** With engine stopped, apply brakes several times until all vacuum reserve in system is used up. Then depress brake pedal and start engine while holding a light pedal pressure. If vacuum system is operating properly, pedal will tend to fall away from under the foot, and less foot pressure will be required to hold pedal in same position. If no action is felt, vacuum system is not functioning.
2. **Hydraulic Leak.** Apply a heavy foot pressure on brake pedal with engine running. Hold this pressure at least 15 seconds and observe brake pedal. If pedal goes down gradually, check first for a leak in system outside of power brake unit. When possibility of an external leak is eliminated, leak is in hydraulic cylinder of power brake unit.
3. **Vacuum Leak.** Allow engine to idle a minute to build-up vacuum reserve. Shut off engine and wait several minutes at least (system should hold vacuum for 12 hours) before trying brake action. If brake is not vacuum assisted for at least 5 slow applications there

is a leak in the vacuum system. Always check for an external leak before blaming leak on power brake unit.

4. *Road Test.* Apply brakes several times at about 20 m.p.h. to determine if a light pedal pressure stops the car evenly and quickly. Notice pedal feel as compared to other cars of the same model.

## 9-17 MORaine POWER BRAKE UNIT

### a. Construction of Moraine Power Brake Unit

The power brake cylinder is the "air suspended" type, meaning that atmospheric pressure is present on both sides of the power piston in the unapplied stage.

As shown in figure 9-13, a cover closes the forward end of the cylinder housing to form a large chamber in which the power piston and related parts operate. The section on the cover side of the piston is called the *air* chamber since it is open to atmospheric pressure at all times. The section on the opposite side of the piston is called the *vacuum* chamber since it is subjected to manifold vacuum during power application of brakes. All air entering the cylinder housing passes through an air filter.

The rim of the power piston carries a spring expanded leather cup and a felt lubricating wick to seal against passage of air. A flexible rubber hose connecting the piston with a vacuum tee on the side of cylinder housing permits the piston to move back and forth while connected to manifold vacuum. Air is exhausted out of the *vacuum* chamber through passages in

the piston and the vacuum hose when the control valve is set for power application.

The related parts which operate in the cylinder housing with the power piston form an assembly composed of the air valve, floating control valve, hydraulic piston, and the reaction mechanism. Pedal pressure through a push rod starts the power piston assembly moving when applying the brakes; a single heavy return spring returns the power piston when releasing the brakes.

The hydraulic piston is a solid steel plunger which extends into the hydraulic cylinder through a rubber vacuum cup and rubber secondary and primary cups. To prevent vacuum from drawing brake fluid out of hydraulic cylinder in case of cup leakage, the space between the vacuum cup and the secondary cup is vented to atmosphere through two openings in the master cylinder to power cylinder gasket.

Movement of the piston into the fluid filled cylinder displaces a corresponding volume of the fluid, which is forced out into the brake pipes and wheel cylinders. Compensating ports in the counterbored end of the piston permit return of surplus fluid to reservoir when brakes are released. The check valve and spring in the hydraulic cylinder maintains a static residual pressure in brake pipes and wheel cylinders.

### b. Operation of Moraine Power Brake Unit

Description of power brake cylinder operation will cover (1) Released Position (2) Apply-

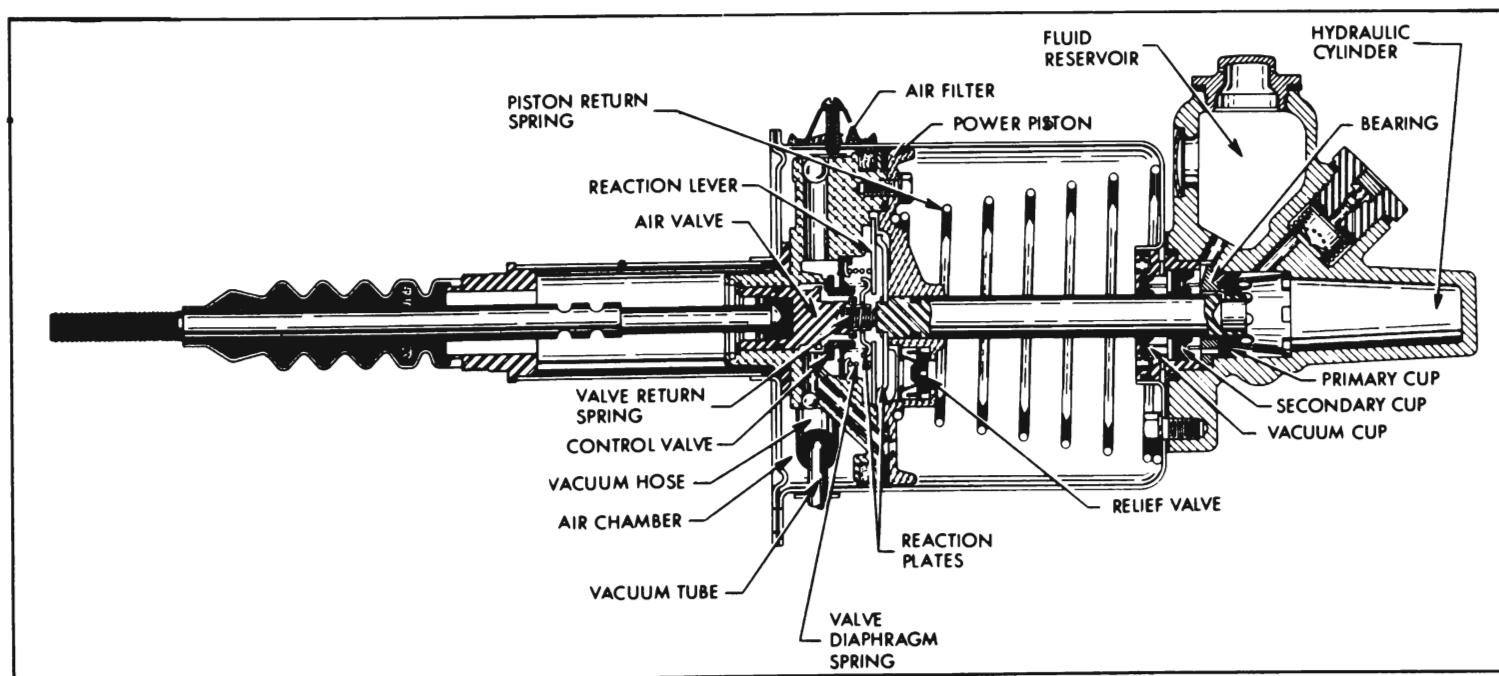


Figure 9-13—Moraine Power Brake Unit—Released Position

ing (3) Reaction Pressure (4) Holding (5) Releasing (6) Manual Applying.

(1) *Released Position.* See figure 9-13. The pedal return spring and the valve return spring hold the push rod and attached air valve so that the air valve is held clear of the floating control valve. At the same time, the valve diaphragm spring holds the floating control valve against its annular seat on the power piston, thereby closing the passage connected to manifold vacuum.

Atmospheric pressure enters through the air filter into the *air* chamber, flows through the space between the air valve and the floating control valve, then flows through a passage in the power piston into the *vacuum* chamber. With the vacuum passage closed and the *vacuum* chamber open to outside air, the power piston is balanced by atmospheric pressure on both sides and is held against the housing cover by the return spring.

The compensating ports in counterbored end of hydraulic piston are open to the area between the primary and secondary cups, permitting flow of brake fluid between the reservoir and hydraulic cylinder as required. The

check valve is seated to maintain static pressure in the brake pipes and wheel cylinders.

(2) *Applying.* See figure 9-14. As the brake pedal is depressed the push rod moves the air valve until its annular seat contacts the floating control valve, at which point atmospheric pressure is sealed off from the *vacuum* chamber. Further movement of the air valve pushes the floating control valve away from its annular seat on the power piston, thus connecting the vacuum chamber to manifold *vacuum* through a passage in power piston and the attached vacuum hose. As air is exhausted out of the *vacuum* chamber, atmospheric pressure in the *air* chamber moves the power piston forward toward the hydraulic cylinder. The valve and hydraulic piston move forward as a unit with the power piston.

As the hydraulic piston is forced into the hydraulic cylinder, escape of fluid into the reservoir is cut off when the piston compensating ports pass through the primary cup, and the fluid displaced by the piston is then forced out into the brake pipes and wheel cylinders to apply the brake shoes. At the same time, a *reaction pressure* is transmitted back to the

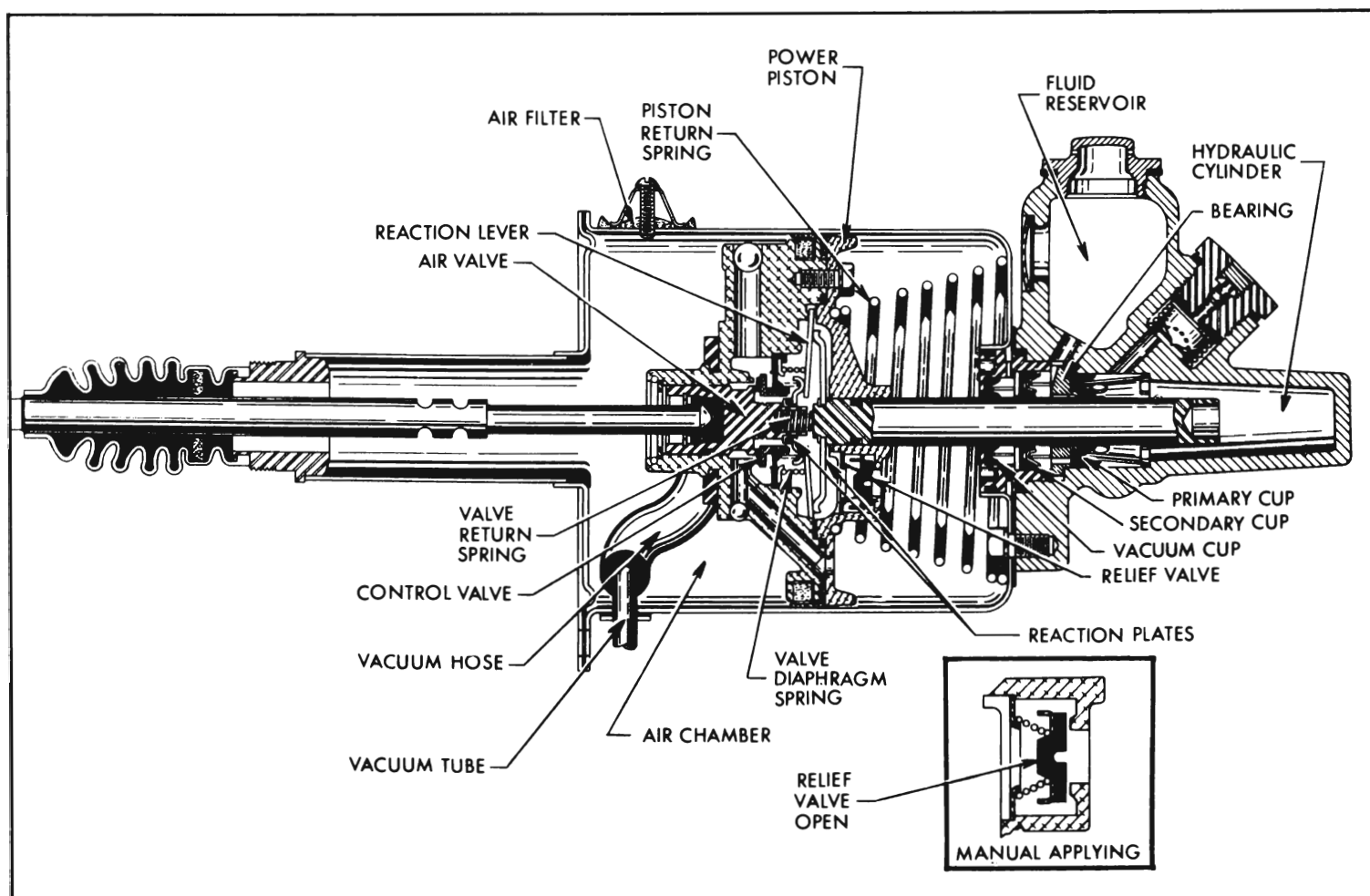


Figure 9-14—Applying

brake pedal to give the driver an indication or "feel" of the pressure being applied to the brake shoes.

(3) *Reaction Pressure.* As pressure is built up in the brake pipes and wheel cylinders during brake application, the hydraulic piston is subjected to the same pressure. Since the hydraulic piston is free to move rearward in the power piston, the pressure on the piston is transmitted through the attached reaction plate to the six reaction levers. The outer ends of the levers press against pivot points in the power piston and the inner ends press against the valve reaction plate which now bears against a shoulder of the air valve. See figure 9-14.

In this manner approximately 40% of the load on the hydraulic piston is transferred through the air valve and push rod to the brake pedal to oppose the foot pressure applied by the driver. This *reaction* pressure gives the driver a definite indication of "feel" of the pressure being applied to the brake shoes so that he has positive control over the braking operation at all stages.

(4) *Holding.* When the desired brake apply pressure is reached and brake pedal is held

poised, the power piston continues forward momentarily until the annular seat contacts the floating control valve. See figure 9-15. At this point, the air valve is also in contact with the control valve so that the passages to the *vacuum* chamber are closed to atmospheric pressure as well as vacuum; therefore, the power piston is held stationary or poised, ready to move in either direction as dictated by brake pedal movement.

(5) *Releasing.* When foot pressure on brake pedal is released, the pedal return spring pulls the push rod rearward to relieve pressure on the air valve. The valve return spring forces the air valve away from the floating control valve, which is seated against the power piston to close the vacuum passage. Since both sides of the power piston are now open to atmospheric pressure, the piston return spring forces the power piston and related parts rearward to the unapplied position (fig. 9-13).

As the hydraulic piston moves out of the hydraulic cylinder the fluid from the wheel cylinders flows back into the hydraulic cylinder through the check valve. When the compensating ports in the piston pass forward through

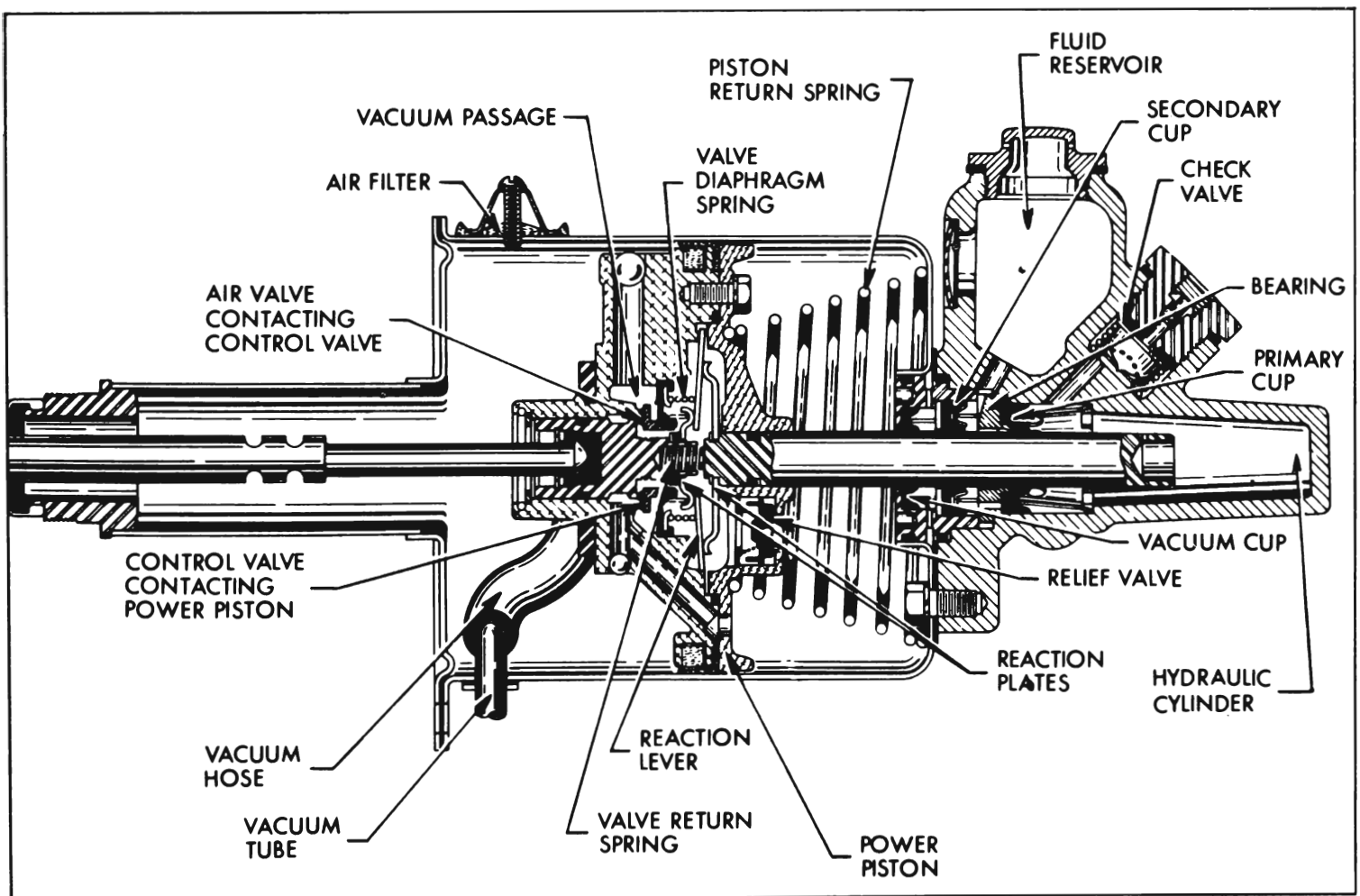


Figure 9-15—Holding



the primary cup, any surplus fluid in the hydraulic system can return to the reservoir. The check valve spring presses the check valve against its seat with sufficient pressure to maintain static pressure in the brake pipes and wheel cylinders.

(6) *Manual Applying.* When the engine is not running and all reserve vacuum is exhausted, the brakes are applied entirely by foot pressure on the brake pedal. As the pedal is depressed, the air valve and control valve move first. A shoulder on the air valve then contacts the end of the hydraulic piston. The hydraulic piston moves into the hydraulic cylinder, causing the brakes to be applied in the usual way. However, the pedal pressure for a given brake application is considerably greater. See figure 9-14.

As the hydraulic piston moves it carries the complete power piston assembly along with it. Under a sudden manual brake application, the rapid movement of the power piston tends to compress air ahead of it, resulting in a "dash-pot" effect. To eliminate this possibility, a spring-loaded relief valve in the power piston allows air to flow very easily from the vacuum

chamber side of the power piston to the air chamber side.

If the engine is started while the brakes are being manually applied, manifold vacuum will exhaust air from the *vacuum* chamber through the wide open vacuum port at the control valve, and the power piston will move forward. This will make the pedal "fall-away" slightly from under the foot and less foot pressure will be required to hold the pedal in the applied position.

## 9-18 DISASSEMBLY, INSPECTION, ASSEMBLY OF MORaine POWER BRAKE UNIT

NOTE: Refer to figures 9-13 thru 9-16 for identification of parts not shown in figures next to overhaul steps.

### a. Disassembly of Power Unit

1. Measure distance push rod projects through clevis. Record this dimension so that clevis can be reinstalled in same position. Then remove clevis.
2. Mount power brake unit in vise with hydraulic cylinder down. Tighten vise only enough to hold cylinder firmly; excessive tightening will distort or crack cylinder.

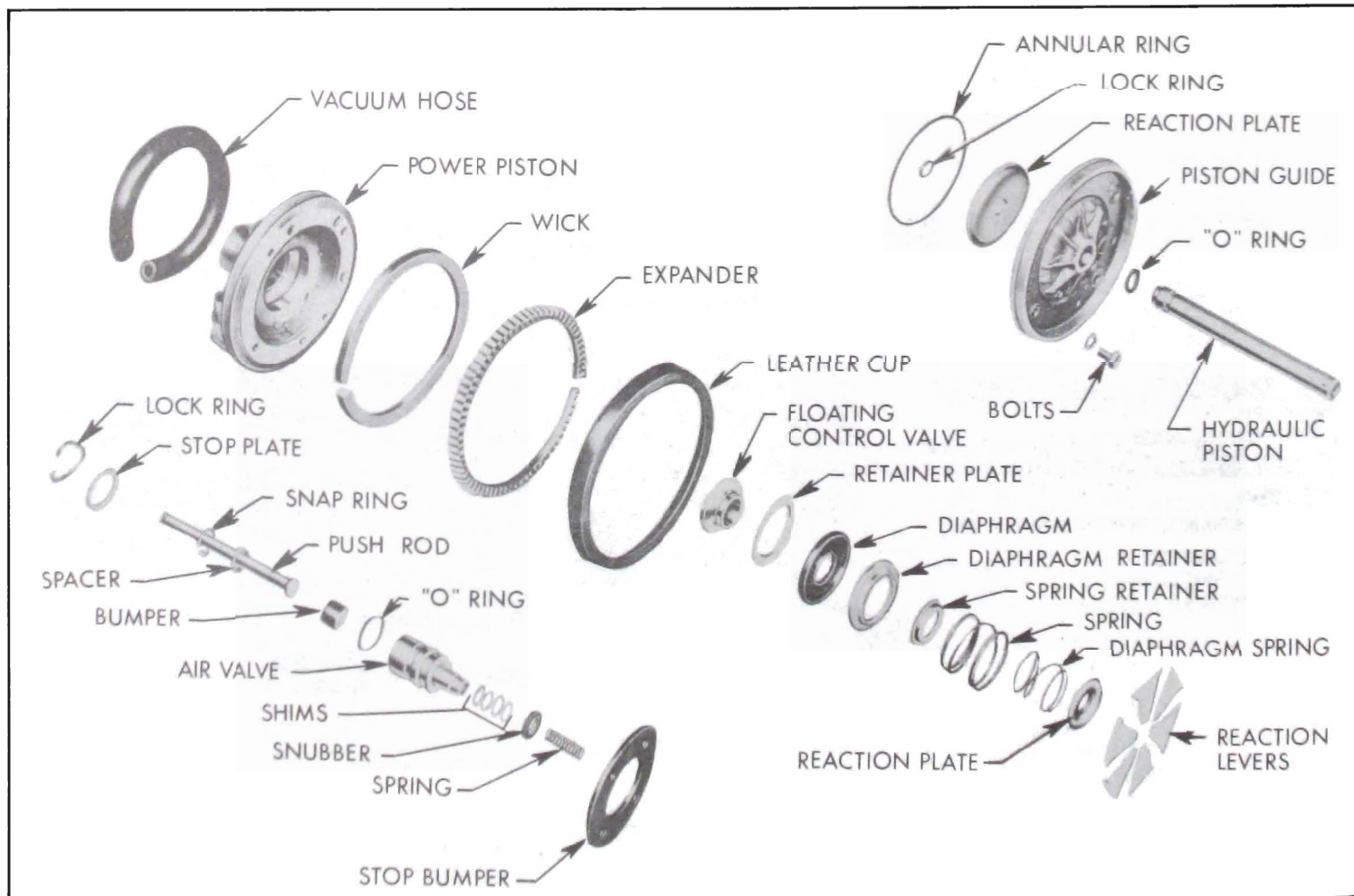


Figure 9-16—Power Piston Assembly—Exploded

3. Remove push rod boot from housing cover tube and from push rod. Remove felt air silencer from push rod boot. Take out air cleaner screw and remove air cleaner cover and filter.

4. Take out vacuum tube screws. Remove housing end cover screws, cover and gasket. While holding power piston down, disconnect vacuum hose from vacuum tube and remove tube and gasket from housing. *Slowly* release power piston to control pressure of piston return spring as piston and attached parts emerge from housing. Make sure that lip of leather piston cup does not catch in holes in housing.

5. Pull vacuum hose off power piston, if hose is defective.

6. On push rod side of power piston, remove wire lock ring and stop plate.

7. Hold power piston assembly with push rod down and pull out push rod and air valve. See figure 9-17. Lift off the spring, snubber, and spacers (note number of spacers). Remove O-ring from air valve.

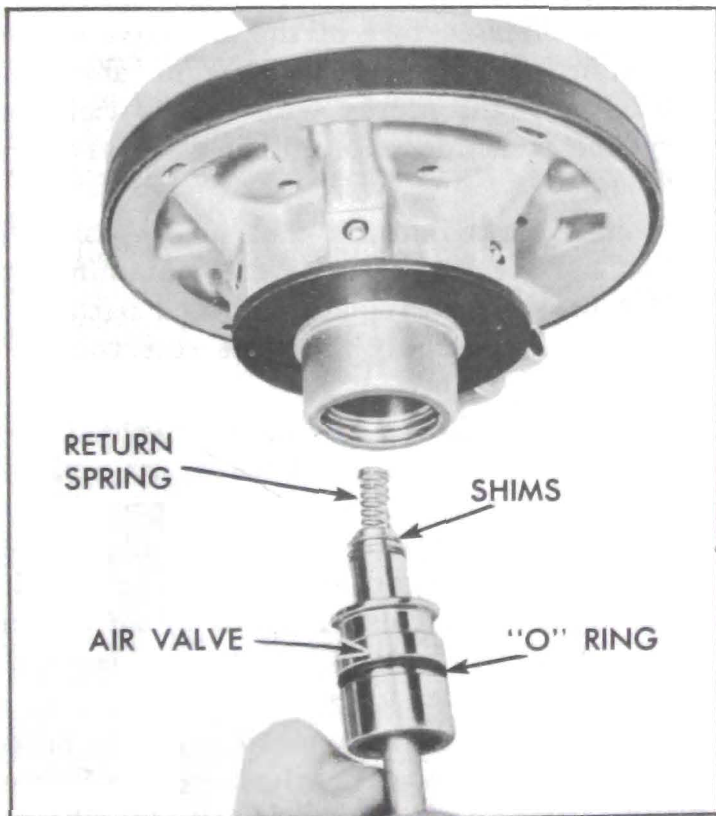


Figure 9-17—Removing or Installing Air Valve Assembly

8. Unless push rod is noisy or noticeably loose in air valve it need not be disconnected from air valve. If it must be disconnected, use No. 1 Truarc Pliers J-5403 to disengage snap ring. Then pull out push rod, bumper and washer.

9. Remove sponge rubber piston stop bumper.

10. Remove four cap screws holding piston guide to power piston while holding assembly together against inner spring load. With piston flat, carefully lift piston guide and hydraulic piston straight up to avoid disturbing loose parts under piston guide. Lift off loose annular ring.

11. Push hydraulic piston out through piston guide and remove O-ring from hydraulic piston.

12. If reaction plate or hydraulic piston is defective, separate them using No. 2 Truarc Pliers J-4880 to remove snap ring.

13. Inspect relief valve which is staked in place in piston guide. Remove relief valve if it is defective.

14. From power piston assembly, remove reaction levers, reaction spring, small reaction plate, and diaphragm spring. See figure 9-18.

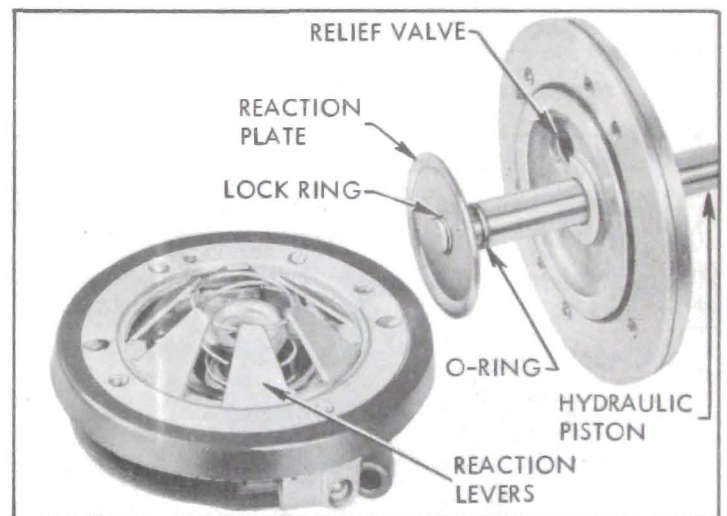


Figure 9-18—Reaction Levers and Related Parts

15. Remove leather cup, cup expander and felt wick.

16. Remove floating control valve assembly from power piston and disassemble as follows: With small screwdriver, pry retainer off diaphragm, then push floating control valve through diaphragm. See figure 9-19. This frees retainer plate in the process. Pull diaphragm from diaphragm retainer. This completes disassembly of the power piston assembly.

17. With hydraulic master cylinder still clamped vertically in a vise, remove power piston return spring. Remove three bolts and pull power cylinder straight up. Remove gasket. Unscrew master cylinder plug, using Wrench J-5794. Remove two annular rings. See figure 9-20.



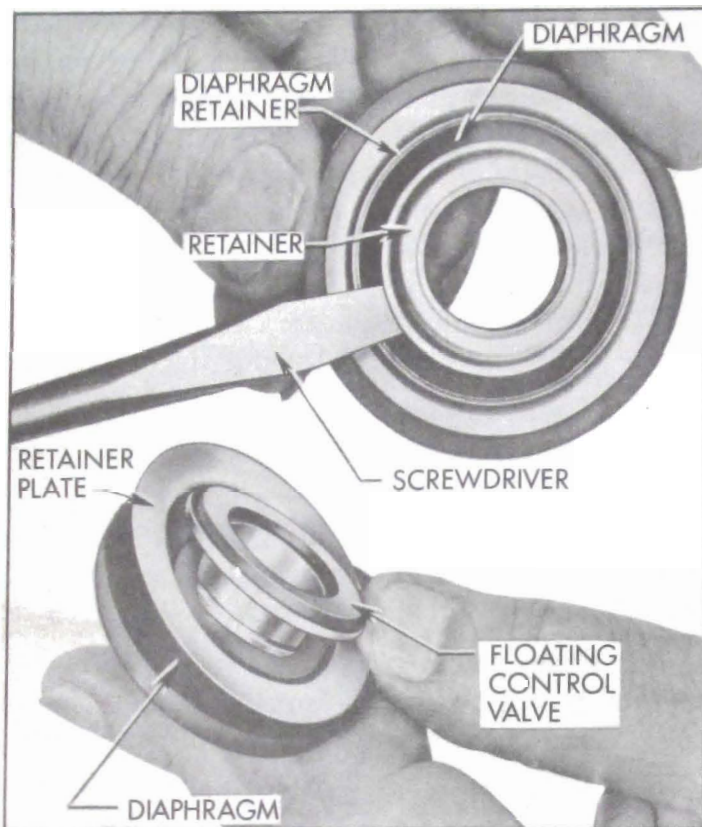


Figure 9-19—Floating Control Valve and Diaphragm Assembly

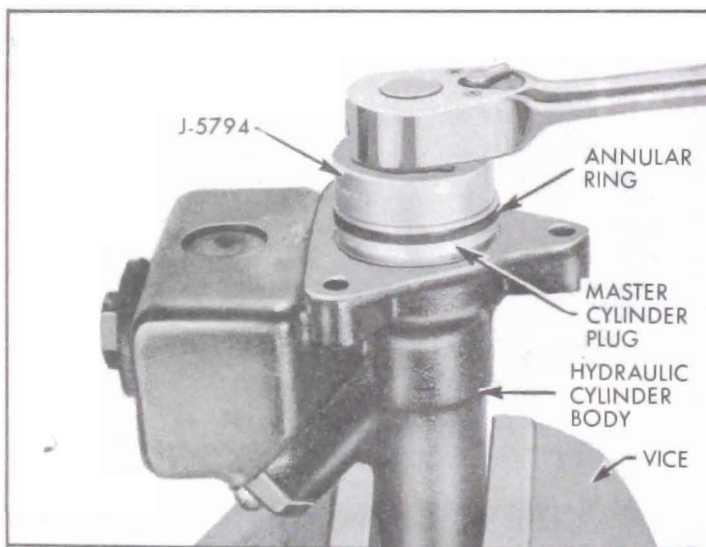


Figure 9-20—Removing Cylinder Plug

18. From inside plug, remove secondary cup expander, secondary cup, flat support, vacuum seal retainer and vacuum seal.

19. From bore of master cylinder body, pull out cup retainer, piston bearing, flat primary cup ring, primary cup and conical cup retainer. See figure 9-21.

20. Reclamp hydraulic cylinder in vise so that head nut is straight up. Unscrew head nut, guarding against escape of check valve and spring as nut leaves threads of body. Remove check valve and spring from body. Remove gasket and check valve seat washer from head nut.

### b. Cleaning, Inspection, Replacement of Parts

As an aid in determining the cause of improper power brake operation, wipe fluid from all rubber parts, then carefully examine these parts for nicks, cuts or other damage. After examination discard all these parts.

Thoroughly clean the remaining parts in diacetone alcohol or clean brake fluid.

**CAUTION:** Do not use anti-freeze alcohol, gasoline, kerosene, or any other cleaning fluid that might contain even a trace of mineral oil, as this could cause serious damage to all rubber parts in the brake system.

Carefully examine the cleaned parts for nicks, burrs, stripped threads, damage or excessive wear. Replace damaged or excessively worn parts or housings. If inside of vacuum power cylinder is rusted or corroded, polish with steel wool or fine emery cloth. Replace when scored.

Make certain that the small compensating ports in end of hydraulic piston are clear. If these ports are plugged, clean them thoroughly and flush the hydraulic system to remove all dirt.

If the outer surface of the air valve or the hydraulic piston show evidence of abrasion, polish out light scores with crocus cloth or very fine polishing paper, then wash and dry thoroughly.

If any parts indicate that heavy abrasive action has resulted from severe contamination of the brake fluid, replace damaged parts and be sure to thoroughly flush the reservoir and wheel cylinder lines.

The Power Brake Cylinder Overhaul Kit (Group 4.898) contains all necessary replacement parts for the power brake cylinder. When reassembling the brake cylinder use all the new parts in the kit regardless of whether the old parts appear fit for use. *Discard all old rubber parts.* In addition, replace any other parts which inspection indicates to be unfit for use.

Lubricate all hydraulic master cylinder parts with clean brake fluid. Lubricate vacuum power piston parts with Dynaflo oil or silicone grease as specified. Silicone grease is supplied in the power brake cylinder overhaul kit. *Do not lubricate parts until just before installation.*

### c. Assembly of Moraine Power Brake Unit

1. Clamp hydraulic master cylinder body in vise with threaded outlet hole straight up. Into



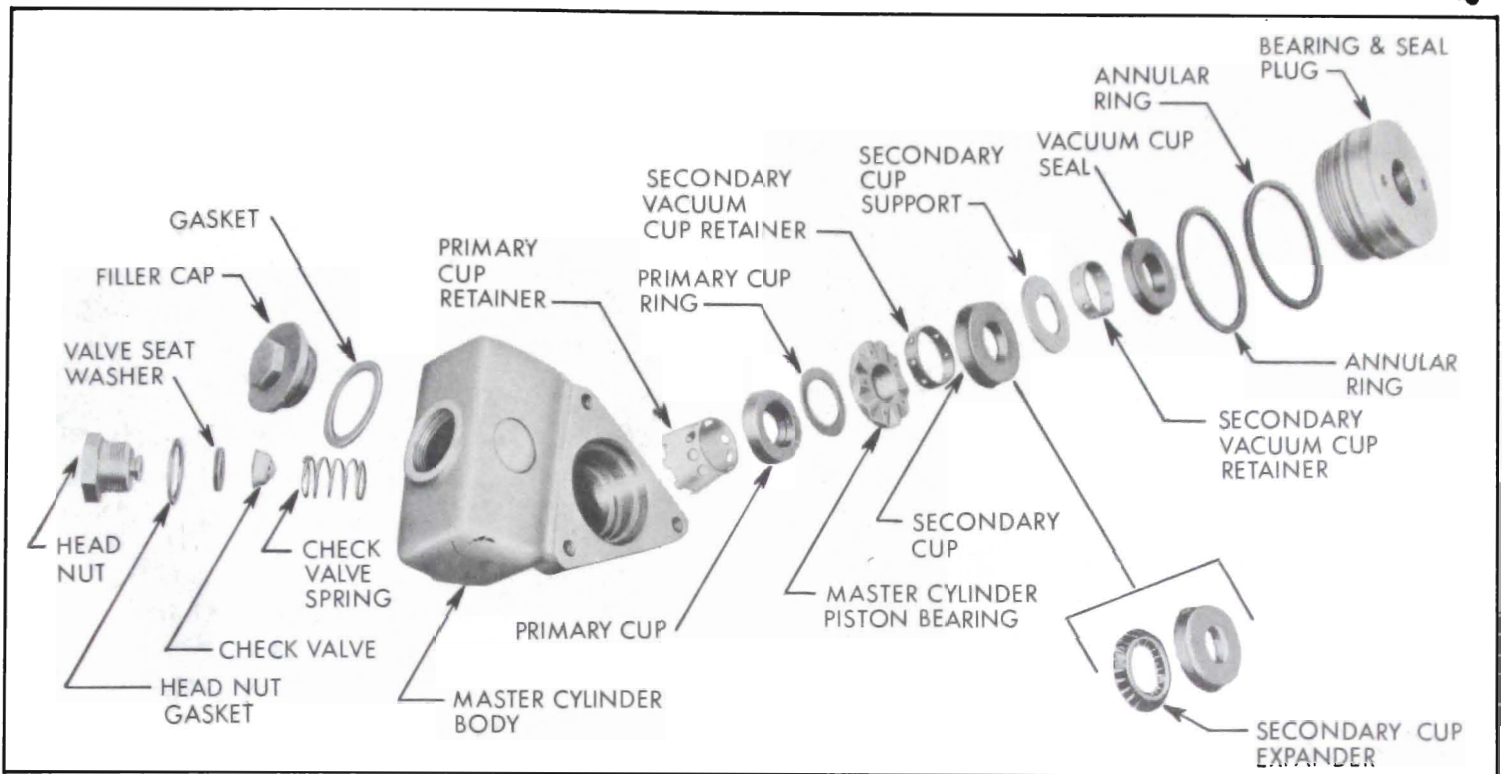


Figure 9-21—Hydraulic Cylinder Assembly—Exploded

this hole, place check valve spring. Place new check valve, concave side out, on spring. Place new gasket and stretch new seat washer onto head nut. Set head nut squarely against check valve and press against spring to hold check valve in position while head nut is started in threads. Run down finger tight, back off one or two turns to allow check valve to center, then torque to 85-90 ft. lbs.

2. Reposition hydraulic cylinder in vise with large bore straight up. Wipe bore and threads with a thin coat of clean brake fluid.

3. Into bore, set conical primary cup retainer with notched end in first. Dip primary cup in clean brake fluid and install lip side first over retainer. Center lip of cup must fit in hole. Set primary cup ring of thin blued steel on flat of primary cup. With notched face out, place piston bearing on primary cup ring with hub of bearing fitting into opening in cup, then press home to solid seat. Now set dark secondary cup retainer to center on bearing and position expander on retainer with notched side in.

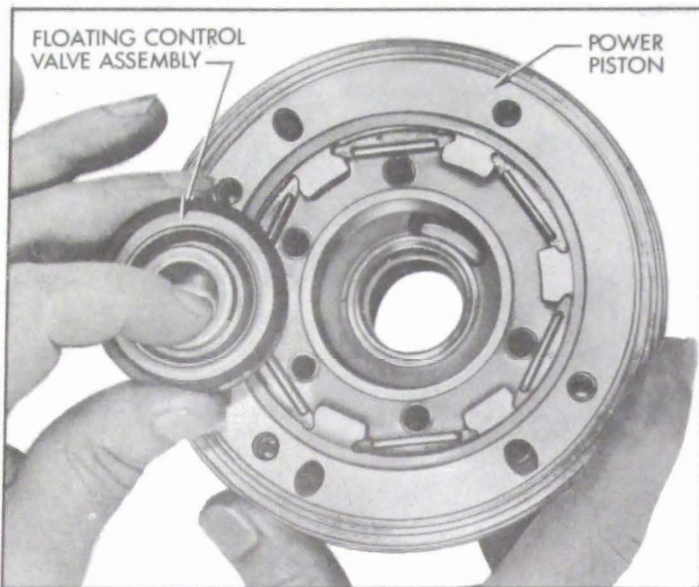
4. On master cylinder plug, install two annular rings as others on first and third grooves of plug. *Do not place an annular ring in center groove which has four small vent holes.* Install vacuum seal in bottom of bore in plug flat side down. Position light colored retainer on seal, then install flat support on shoulder in bore. Place secondary cup flat side down against support.

5. Moisten annular rings on plug with clean brake fluid and screw plug assembly into hydraulic body, checking that secondary cup retainer and expander are centered. Use Wrench J-5794 to tighten plug to 20-30 ft. lbs. Set assembled hydraulic cylinder aside to protect from dirt or damage.

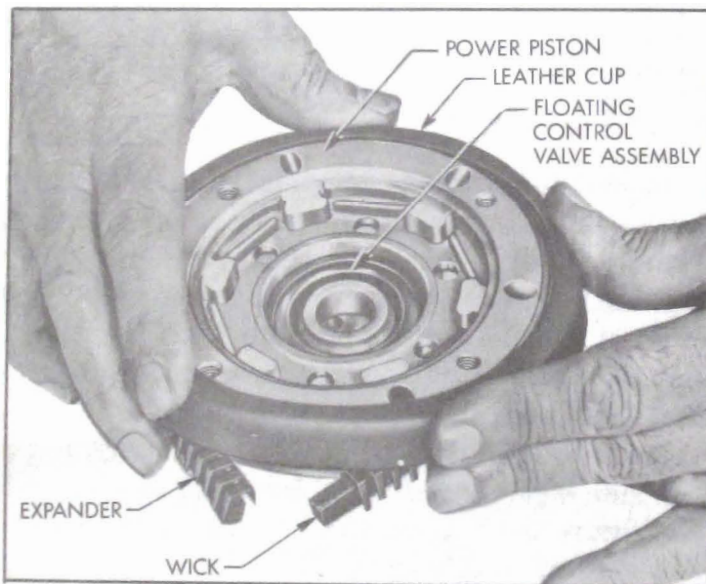
6. To assemble floating valve assembly, press flat side of diaphragm retainer into diaphragm. See figure 9-19. Hold flat side of plate against flat side of diaphragm while pressing floating control valve into center hole of diaphragm. Use thumbs to stretch diaphragm over hub of floating control valve, then press spring retainer over valve hub and diaphragm lip. Lubricate O.D. of floating valve with Dynaflo oil and press into place in power piston with rubber face of floating control valve facing in. See figure 9-22.

7. Soak felt wick in Dynaflo oil and allow excess to drain. Position wick in cup expander and install these parts in groove on O.D. of power piston with expander fingers pointing toward piston hub. Hold in groove while leather piston cup is slipped over expander with its lip pointing toward piston hub. See figure 9-23. If new leather cup is being installed, use cardboard cylindrical retainer to confine cup during installation.

8. Set piston on flat surface hub down. Install lighter diaphragm spring on spring retainer, then place smaller reaction plate on spring.

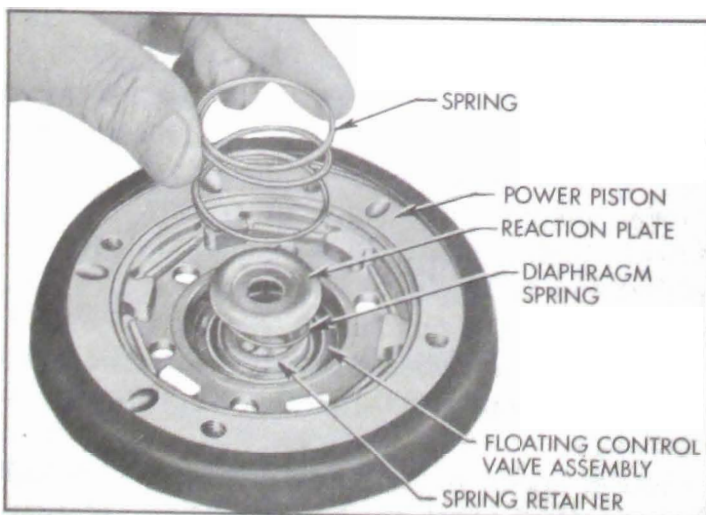


**Figure 9-22—Installing Floating Control Valve and Diaphragm Assembly**



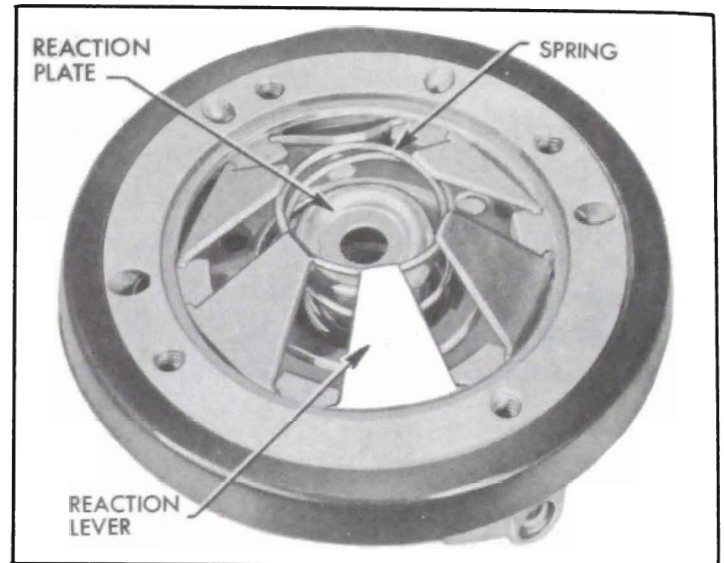
**Figure 9-23—Installing Leather Piston Cup**

Lower heavier reaction spring to seat around inner lip of diaphragm retainer. See figure 9-24.



**Figure 9-24—Installing Reaction Plate and Springs**

9. Set six reaction levers in place with small ends resting on reaction spring as shown in figure 9-25.



**Figure 9-25—Installing Reaction Levers**

10. If relief valve was removed from piston guide, install new relief valve and stake it securely being careful not to damage piston guide.

11. Lubricate a new O-ring with Dynaflow oil and install in groove on hydraulic piston. If reaction plate was removed from hydraulic piston, install it on piston with raised portion away from piston. Engage snap ring using No. 2 Truarc Pliers J-4880.

12. Lubricate a new annular ring with Dynaflow oil and install it on shoulder of piston guide.

13. Lubricate center hole of power piston guide with silicone grease. Holding hydraulic piston vertical with reaction plate down, start piston guide ribbed side up on piston. Set reaction plate square and centered over reaction levers, then lower quickly to hold levers in position while compressing springs. In this step, watch that wide end of a lever does not jump out of its seat. See figure 9-26. Hold pressure while sliding piston guide down over hydraulic piston for installation of screws. Note that reaction levers must hold position, piston guide must clamp leather cup while expander and wick hold position under cup, and all holes must align—all at the same time. When correct, install screws and torque to 5-6 ft. lbs. **NOTE:** *To assure that reaction levers are properly*



seated, check to see that master cylinder piston has a slight movement in power piston assembly.

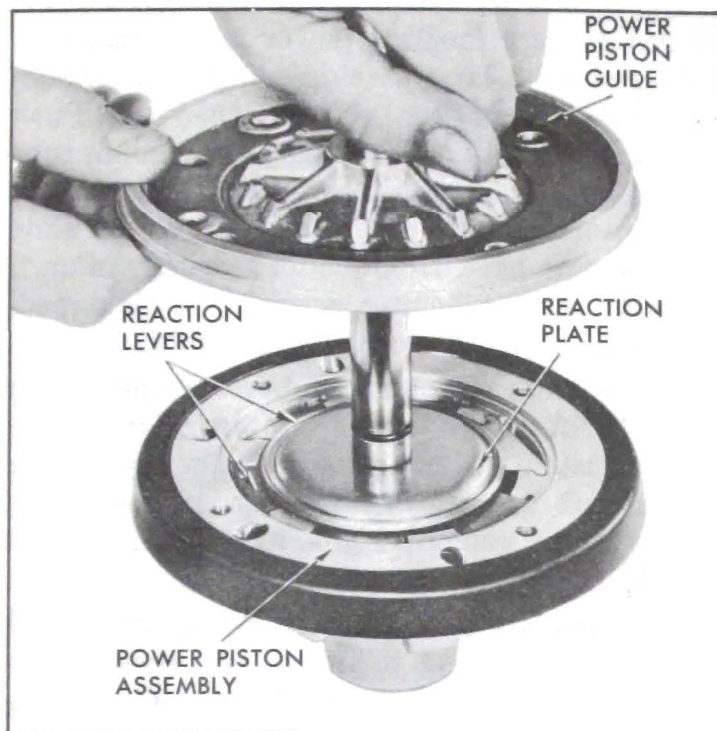


Figure 9-26—Installing Piston Guide

14. Coat one side of rubber piston stop bumper with weatherstrip adhesive and air dry for 30-60 seconds. Install bumper in groove on hub of power piston.

15. If push rod was disconnected from air valve, install bumper, push rod and washer. Then install snap ring using No. 1 Truarc Pliers J-5403. Check for proper seating of snap ring with a hard pull on push rod.

16. Set spacers (shims) on Gauge J-5805. Hold power piston assembly with air valve bore down and insert gauge and spacers as shown in figure 9-27. (The body of the gauge sets against the smaller reaction plate while the pin of the gauge extends through to contact the master cylinder piston.) Now turn whole assembly over to bring gauge on top and observe gauge pin in gauge body as shown in figure 9-27. CAUTION: Hydraulic master cylinder piston must be at lowest limit for correct use of gauge. Do not hold assembly by hydraulic piston or allow hydraulic piston to contact bench.

17. If pin is flush with body or sticks out no more than .010 inch, spacers are correct. If pin is high or low, add or remove spacers respectively until within limits. When spacers are correct, pull out gauge and set spacers and snubber

(rubber face out) on air valve. Then set air valve return spring in end of air valve. Install new O-ring in narrow groove of air valve and lubricate O.D. of air valve and O-ring with Dynaflow oil. See figure 9-28.

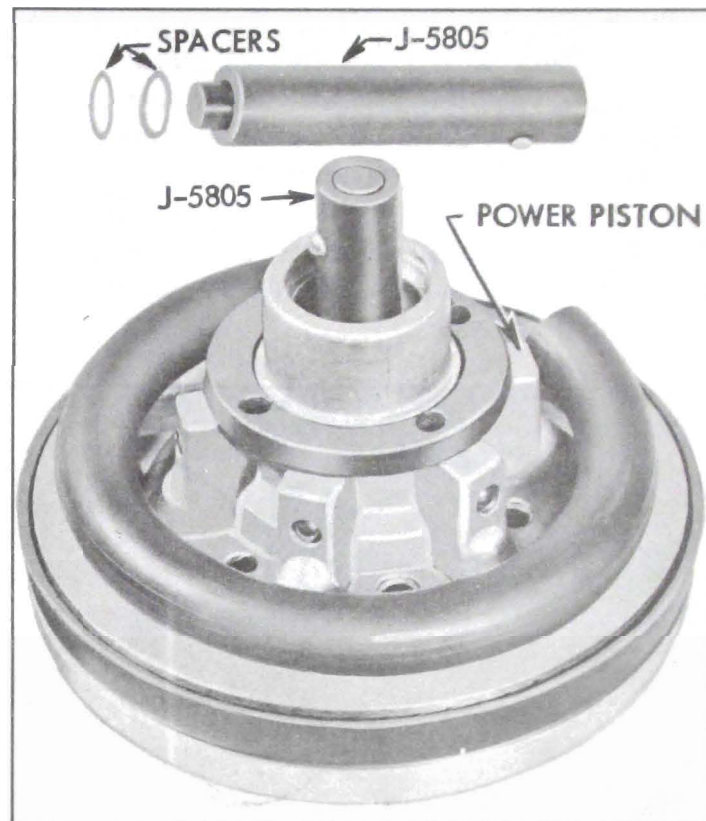


Figure 9-27—Checking Spacer Thickness

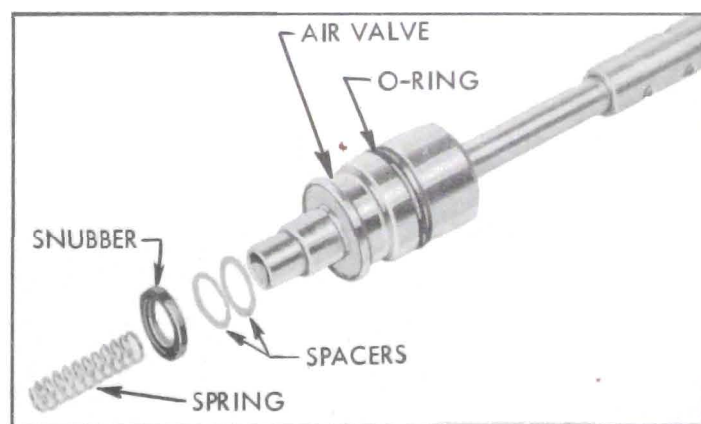


Figure 9-28—Air Valve and Related Parts

18. Hold power piston assembly with air valve bore down and install complete air valve assembly. Hold air valve in position and turn power piston over. Install stop plate and wire lock ring in hub of power piston. Check to see that air valve has about  $\frac{1}{32}$  inch movement before it picks up floating valve, then pull out hard on push rod to check seating of lock ring.



19. If vacuum hose was removed from power piston, coat O.D. of vacuum hose tube with adhesive, allow 30-60 seconds to air dry, then slip vacuum hose fully on tube so that it lays parallel to power piston.

20. Clamp assembled master cylinder vertically in vise. Lubricate O.D. of annular ring on cylinder plug with Dynaflow oil. Place master cylinder to vacuum cylinder gasket over master cylinder plug and install power cylinder housing so that the air cleaner holes are in the same direction as the master cylinder filler cap. Install three bolts and lock washers and torque to 12 ft. lbs. Wipe light coat of Dynaflow oil on inside of housing.

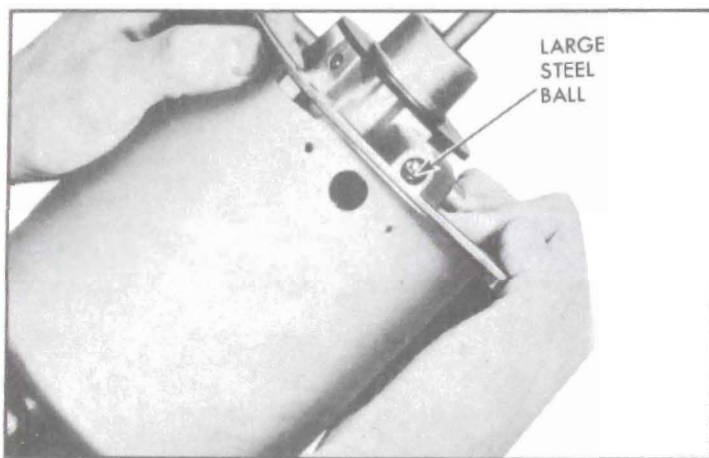


Figure 9-29—Positioning Piston in Housing

21. Set power piston return spring in housing with large end in position so that bent end fits between a bolt head and closest dimple.

22. Wipe a light coat of Dynaflow oil on O.D. of leather cup. Position power piston assembly on spring with large steel ball aligned with vacuum tube hole in housing. See figure 9-29. Push piston assembly into housing past vacuum tube hole. Place gasket against vacuum tube flange, then insert vacuum tube through hole and slide into vacuum hose. Hold piston assembly in until vacuum tube attaching screws are tightened, then release piston slowly against tube.

23. Operate power piston several times, then check vacuum hose to see that it lays flat against power piston without rubbing either on power piston hub or cylinder housing. If hose rubs, rotate power piston position in relation to small end of return spring to correct.

24. Install housing cover and gasket. Hold against spring load to install two screws.

25. Place felt silencer halfway up boot. Slide boot over push rod  $\frac{1}{2}$  inch past threads, then install in groove on cover tube.

26. Install air cleaner filter, cover and screw.

27. Install push rod clevis so that push rod projects through clevis the exact amount as measured before removing clevis. Tighten clevis lock nut.