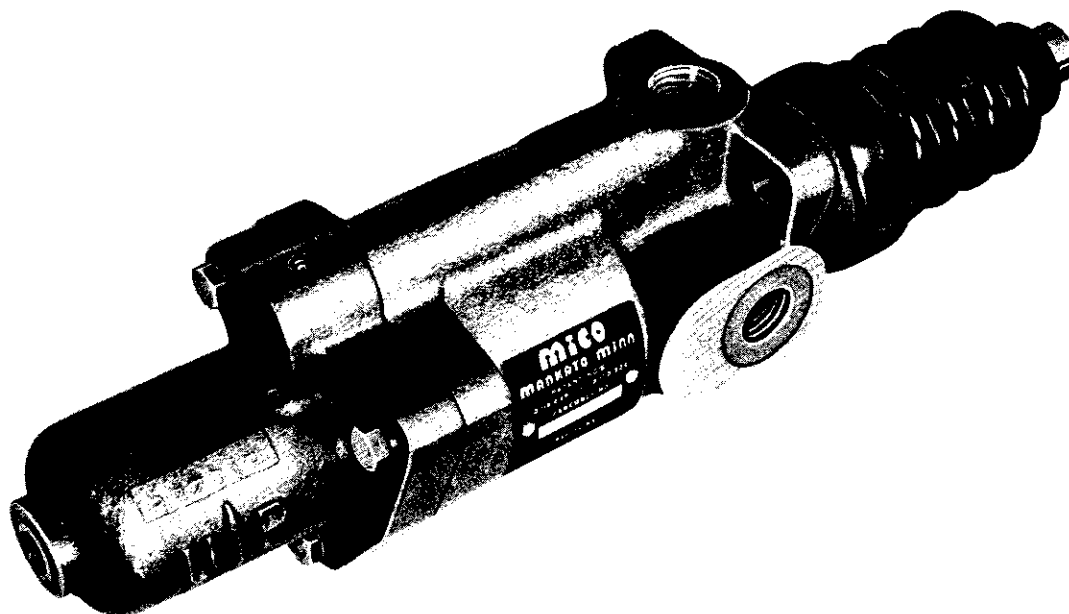


Service

Open Center HYDRAULIC POWER BRAKE VALVE

SERVICE MANUAL

ALMICO



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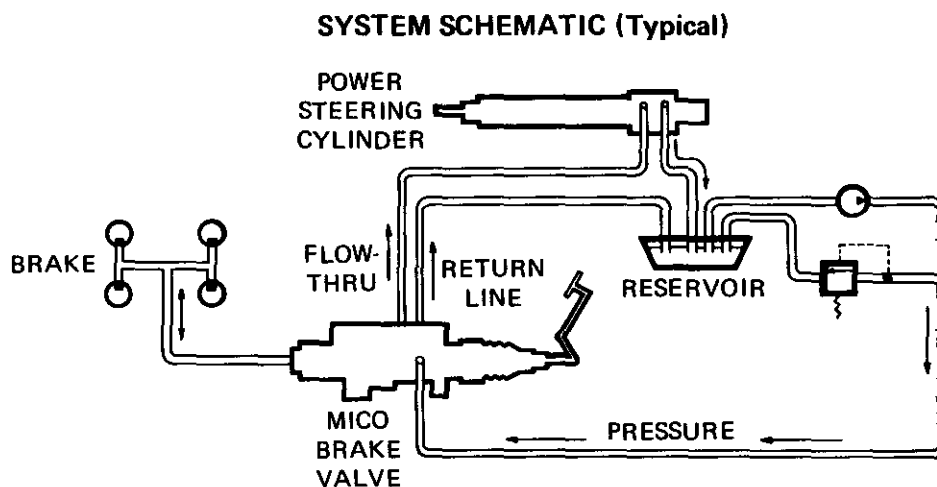


FIGURE 1

REPRESENTATIVE PERFORMANCE DATA

Flow capacity	3-24 gpm
System pressure	0-2000 psi
Brake line pressure.	See Specification Chart below
Master cylinder, bore & stroke	1 5/8" x 1 1/2"
Master cylinder, capacity	3.1 cubic inches
Pedal travel with power†	1.20"
Pedal force with power†	56.6 lbs. at 1500 psi brake line pressure
Pedal travel without power†	10.2" - 11" maximum
Brake line pressure without power*†725 psi
*250 lbs. pedal force †6 to 1 pedal ratio	

NOTE: Brake system rubber parts (Buna - N) must be compatible with mineral based hydraulic oil.

DESCRIPTION AND OPERATION OF THE MICO OPEN CENTER HYDRAULIC POWER BRAKE VALVE

The MICO Open Center Brake Valve will provide hydraulic power braking when installed in an open center hydraulic circuit. It can be used in conjunction with other hydraulic devices such as power steering, also installed in the same circuit. Using a single pump to provide flow and pressure, the brake valve should be installed in the system circuitry, in series, between the pump relief valve and the other hydraulic devices. The entire pump flow is directed thru the brake valve and is available to actuate the downstream devices. The brake valve requires a very small volume of oil for its operation; therefore, it does not interfere with the rest of the circuit, nor does usual actuation of the downstream hydraulic devices affect

operation of the brake valve. Full system pressure is always available for operating the rest of the system.

The MICO Brake Valve provides a single-fluid system using the systems hydraulic oil to operate the brakes. Synthetic rubber wheel-cylinder cups must be used to prevent swelling.

This valve reduces the braking effort to any required degree depending on pedal ratio. Brake pedal force is directly proportional to brake line pressure, thus giving a sense of feel in the operation of the brakes. Manual braking is always available whenever the hydraulic power system is not functioning. This is accomplished by a mechanical follow through within the brake valve. A longer pedal stroke,




usually with increased pedal effort, will be expected when braking in this condition.

The manner in which the hydraulic power brake valve functions will be discussed in the following paragraphs.

Oil from the pump flows through the brake valve and on to the downstream hydraulic unit as indicated (Figure 3). Sections of the valve which are communicated to the return port and the tank when the valve is not operating are shown (Figure 2). The compensating port (Figure 2) provides for thermal expansion of the oil in the brake lines and the master cylinder.

The residual valve (Fig. 2), if used, maintains pressure of 12-20 PSI in the brake lines when the pedal is released.

Schematic of Brake Valve in Neutral

-  RETURN LINE PRESSURE
-  BRAKE LINE PRESSURE
-  FLOW THRU PRESSURE

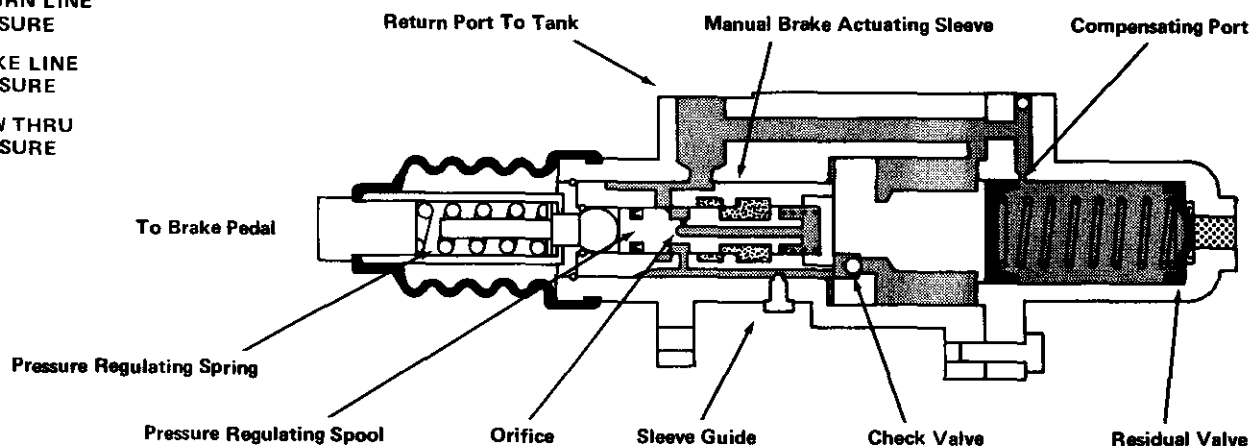






FIGURE 2

Brake Valve Actuated — Power Steering in Neutral

-  RETURN LINE PRESSURE
-  BRAKE LINE PRESSURE
-  FLOW THRU PRESSURE
-  CONTROLLED PRESSURE

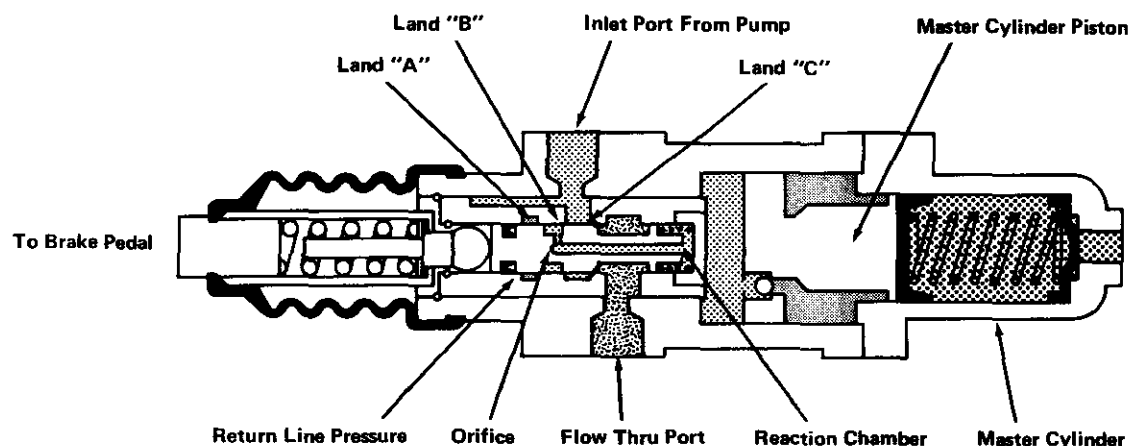
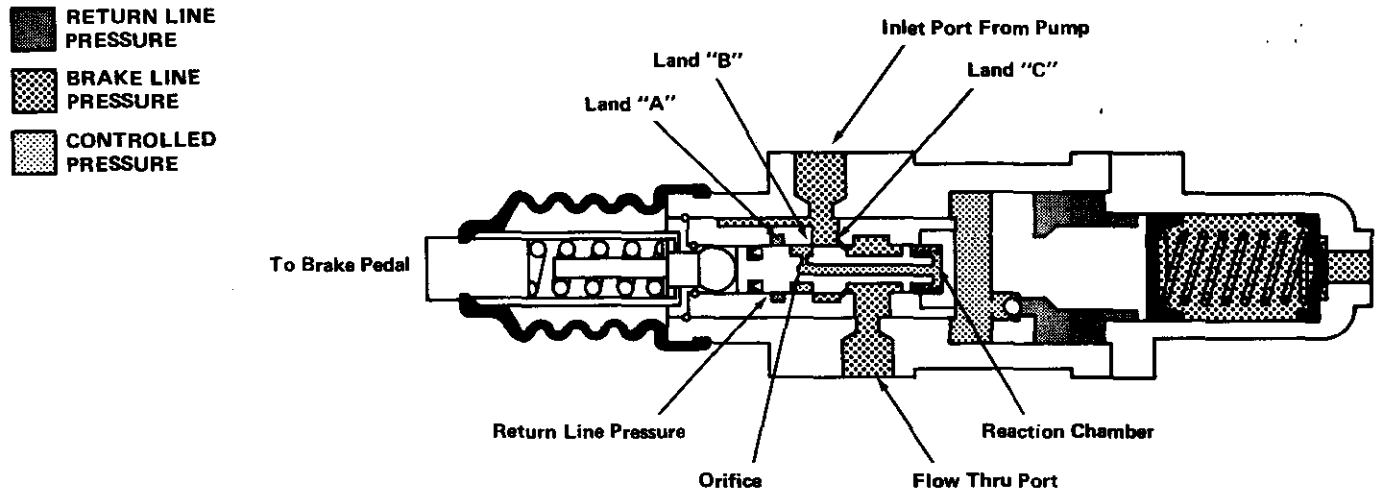


FIGURE 3

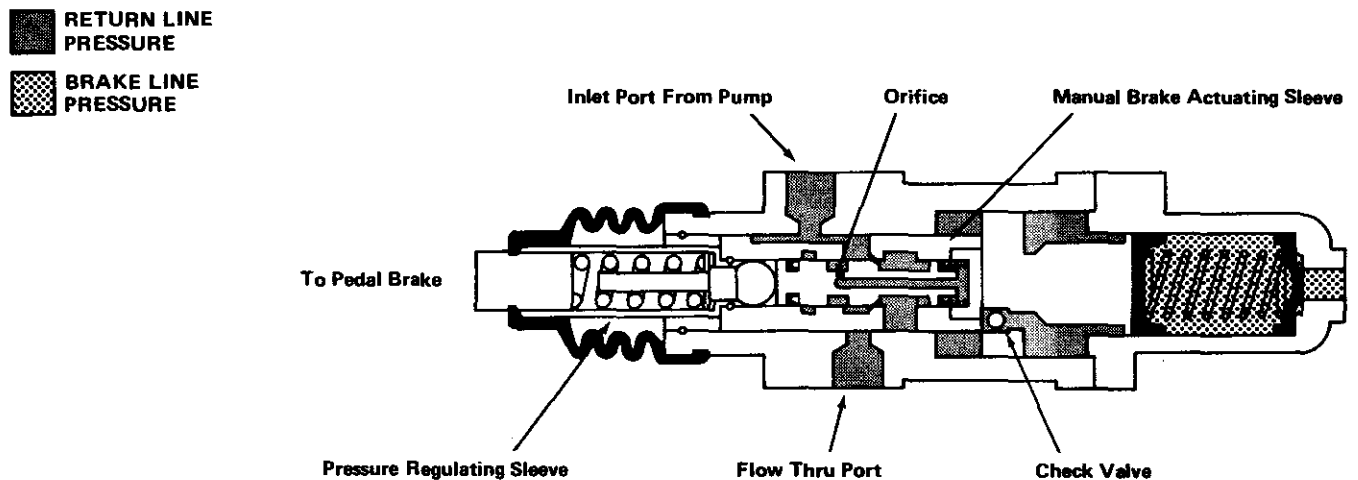
Hydraulic System Pressure Equal to Brake Line Pressure

FIGURE 4



Schematic of Brake Valve in Manual Operation

FIGURE 5



In drum brake systems this low pressure aids in preventing air from entering the brakes when the vehicle is at rest. The residual valve is removed from models designed for disc brake systems because of the drag which would develop in this type of brake, even at these relatively low pressures.

When force is applied to the brake pedal, this force acts through the PRESSURE REGULATING SPRING to shift the PRESSURE REGULATING SPOOL restricting the flow of oil at LAND "C" to build up pressure when there is no requirement for pressure to the power steering or other hydraulic device (Figure 3). As the pressure builds up, a small amount of oil flows through the ORIFICE and down through the passage inside the spool to the REACTION CHAMBER

(Figure 3). At the same time, oil flows along a groove in the outside diameter of the MANUAL BRAKE ACTUATING SLEEVE into the chamber ahead of the MANUAL BRAKE ACTUATING SLEEVE (Figure 2). Flow to the area ahead of the MANUAL BRAKE ACTUATING SLEEVE moves the MASTER CYLINDER PISTON, building up pressure in the MASTER CYLINDER which, in turn, builds pressure in the brake lines. Pressure in the REACTION CHAMBER moves the SPOOL back a small amount against the PRESSURE REGULATING SPRING, and when the hydraulic pressure balances against the PRESSURE REGULATING SPRING the pressure is controlled to the MASTER CYLINDER. The ORIFICE controls the rate of flow to the REAC-

TION CHAMBER; hence, the rate of pressure increase and stability of the pressure regulating spool is controlled. Therefore, system efficiency is maintained since the power brake valve does not momentarily take all of the fluid from the pump. When the pedal effort is released, the spring in the REACTION CHAMBER returns the pressure regulating spool to neutral. This closes LAND "B" to pressure and opens LAND "A" which allows the oil ahead of the spool in the REACTION CHAMBER to flow to the return port as well as the oil ahead of the MANUAL BRAKE ACTUATING SLEEVE. The spring in the MASTER CYLINDER returns the MASTER CYLINDER PISTON.

In case the downstream power hydraulic system requires a pressure that

is equal to or greater than one-half the brake line pressure, the **PRESSURE REGULATING SPOOL** shifts a minute amount and the pressure is regulated across **LAND "A"** and **LAND "B"** (Figure 4).

If the pressure required by the brake valve is lower than that required by the power steering, the power steering will not normally interfere with the operation of the brake (Figure 4).

NOTE: Brake line pressure can exceed preset specifications in the unusual condition of a simultaneous brake application and sudden elevation of the steering pressure above that value.

In the standard MICO Open Center Valve, the pressure in the **REACTION CHAMBER** and ahead of the **MAS-**

TER CYLINDER PISTON is equal to one-half of the brake line pressure. To accomplish this, the area of the **MASTER CYLINDER PISTON** is twice the area of the **MASTER CYLINDER**. Therefore, any pressure that is applied to the **MASTER CYLINDER PISTON** will be multiplied by two to determine the master cylinder pressure. The pressure regulating spring can be factory set to normally limit brake line pressure regardless of system pressure.

This valve will act as a manual brake master cylinder, in the event of failure in the hydraulic circuit supplying power to it. The **PRESSURE REGULATING SLEEVE** contacts the **MANUAL BRAKE ACTUATING SLEEVE** which, in turn, pushes directly on the master cylinder piston, thereby building pressure in the **MASTER CYLINDER** (Figure 5).

This requires a longer stroke in the pedal. The amount of pressure that can be generated in the brake lines in manual operation is proportional to the pedal ratio and the effort which the operator is able to exert on the pedal. In most cases, the operator is not able to build as much pressure in the brake line as can be done in power operations. The ports from the pump are restricted when the valve is actuated manually; however, as soon as the engine is started, hydraulic pressure will push the **MANUAL BRAKE ACTUATING SLEEVE** back against the retaining ring which contains it and the valve again functions with power. This is rather an abrupt action when the engine is started, causing the brake pedal to return to its power mode position, and it is suggested that the brakes not be applied manually when starting the engine.

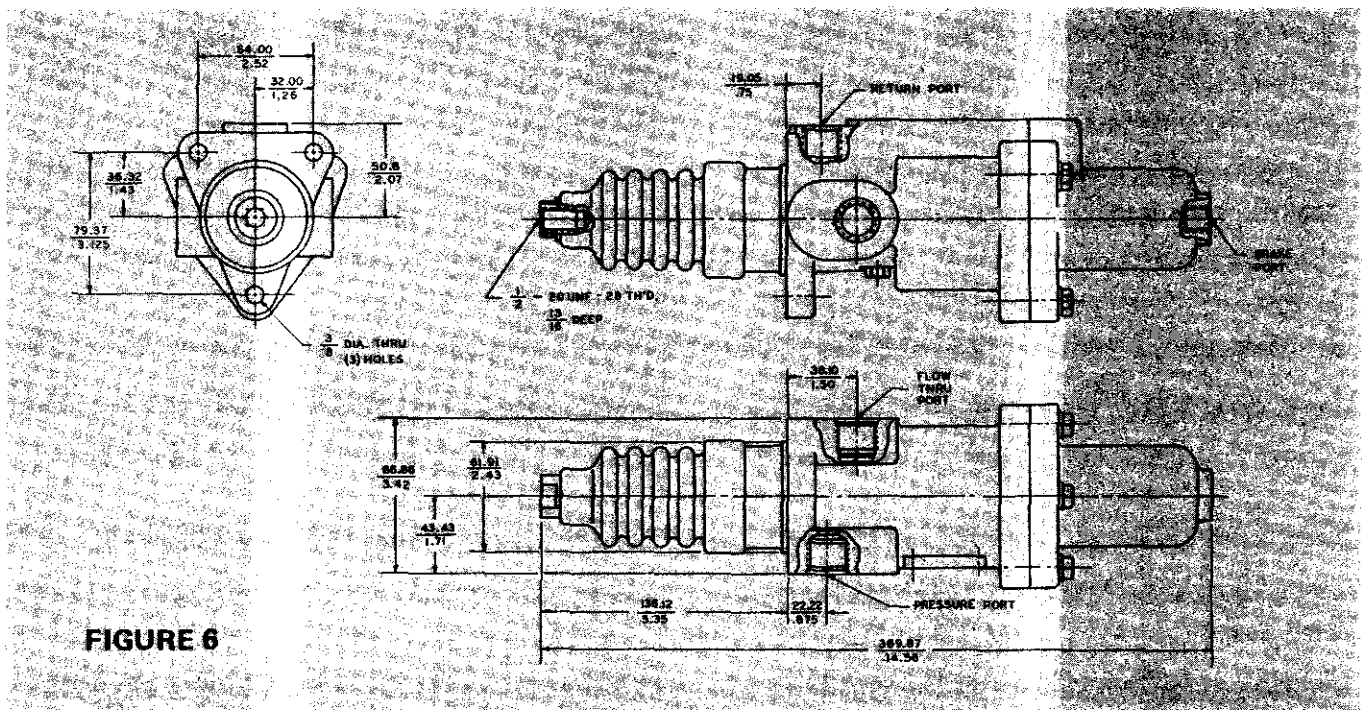


FIGURE 6

INSTALLATION INSTRUCTIONS

1. Mount MICO Open Center Power Brake Valve on vehicle and complete push rod and pedal hook-up. **NOTE:** It is important that the system reservoir be mounted above the brake valve, or that the return line have a vertical section of one foot directly above the valve.
2. The pedal assembly must have its own return spring. **DO NOT** rely on the internal spring in the valve for this function.
3. Pedal should be adjusted to allow 1/32" clearance between pressure regulating rod and actuator.
4. Bleed system (see bleeding instructions on page 14).
5. Be sure all hydraulic fittings are tight and visually check system for leaks with power applied.

THREE OPEN CENTER HYDRAULIC POWER BRAKE VALVE DESIGNS

PRIMARY CUP DESIGN

The Primary Cup Design uses a residual valve. This valve will maintain a pressure of 12 - 20 PSI in the brake lines when the pedal is released. When used in drum brake systems this low pressure aids in preventing air from entering the brakes when the vehicle is at rest.

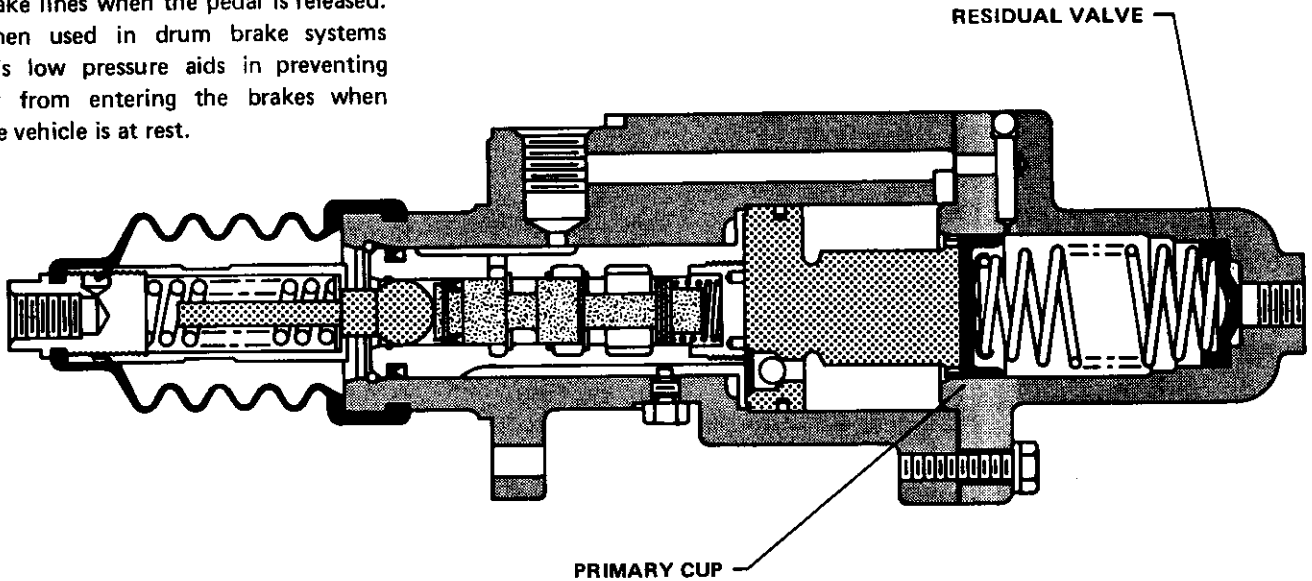


FIGURE 7

RING SEAL DESIGN

The Ring Seal Design is used mainly in disc brake systems. The residual valve is removed from models designed for disc brake systems because of the pressure they maintain in the brake lines when the pedal is released. Even these relatively low pressures (12 - 20 PSI) would develop drag in this type of brake.

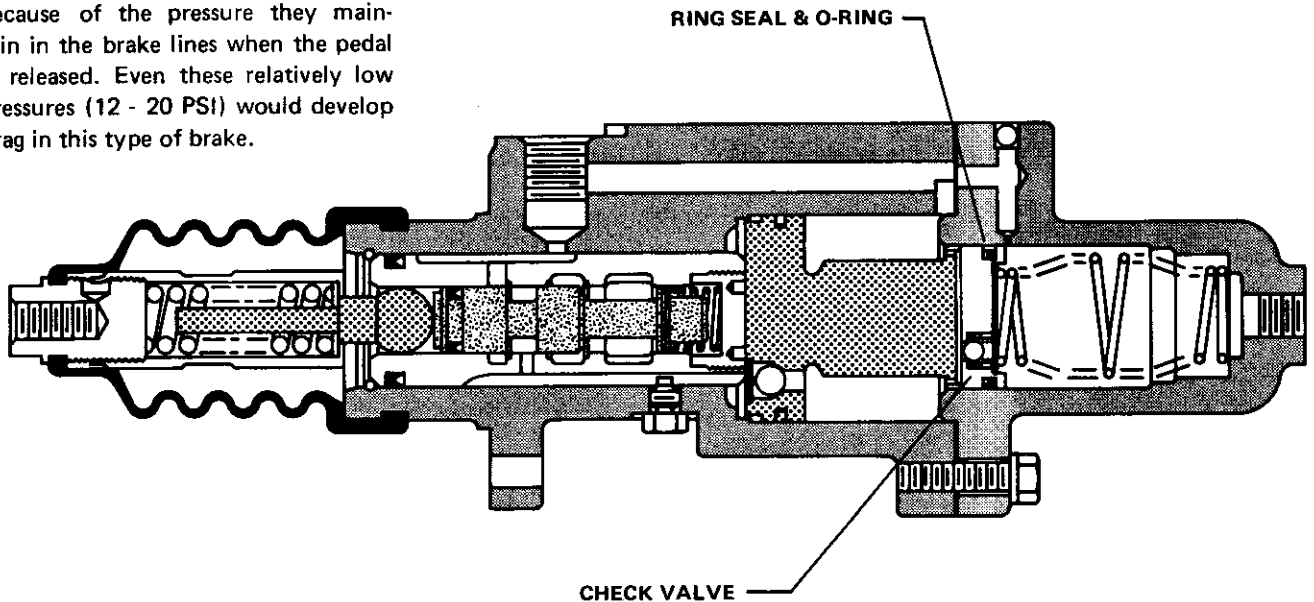
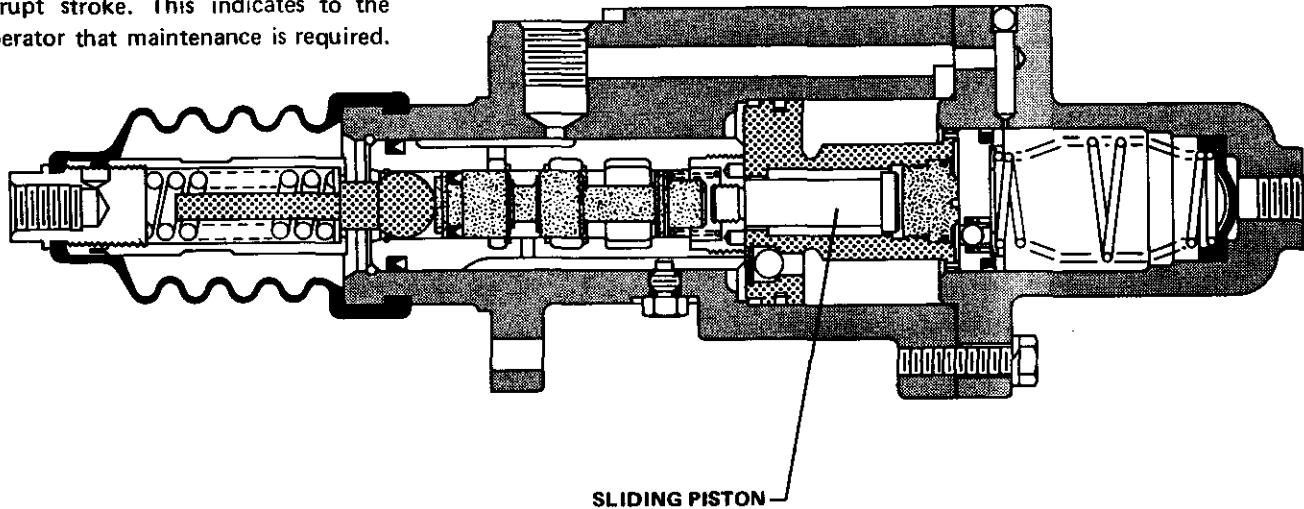


FIGURE 8

SLIDING PISTON DESIGN

FIGURE 9

The Sliding Piston Design was created with a specific function in mind. A specially designed piston slides inside the primary piston when the brake pedal is actuated. If primary piston strokes too far, the brake pedal will be pulled down with a short abrupt stroke. This indicates to the operator that maintenance is required.



SPECIFICATIONS CHART

Part Number	Brake Port	Pressure Port	Flow Thru Port	Return Port	Brake Line Pressure
06-460-520	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1/2-14 N.P.T.F.	1850 PSI \pm 50 PSI
06-460-524	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1850 PSI \pm 50 PSI
06-460-550	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1/2-14 N.P.T.F.	1500 PSI \pm 50 PSI
06-460-560	1/2-20 UNF-2B	3/4-16 UNF-2B SAE No. 8	3/4-16 UNF-2B SAE No. 8	7/8-14 UNF-2B SAE No. 10	1550 PSI \pm 50 PSI
06-460-566	1/2-20 UNF-2B	3/4-16 UNF-2B SAE No. 8	3/4-16 UNF-2B SAE No. 8	7/8-14 UNF-2B SAE No. 10	1150 PSI \pm 50 PSI
06-460-570	9/16-18 UNF-2B	3/4-16 UNF-2B SAE No. 8	3/4-16 UNF-2B SAE No. 8	7/8-14 UNF-2B SAE No. 10	1550 PSI \pm 50 PSI
06-460-580	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1500 PSI \pm 50 PSI
06-460-588	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1550 PSI \pm 50 PSI
06-460-600	9/16-18 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1/2-14 N.P.T.F.	1500 PSI \pm 50 PSI
06-460-610	9/16-18 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1/2-14 N.P.T.F.	950 PSI \pm 50 PSI
06-460-620	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1500 PSI \pm 50 PSI
06-460-636	1/2-20 UNF-2B	7/8-14 UNF-2B JIC No. 10	7/8-14 UNF-2B JIC No. 10	1/2-14 N.P.T.F.	1850 PSI \pm 50 PSI
06-460-638	1/2-20 UNF-2B	3/4-16 UNF-2B SAE No. 8	3/4-16 UNF-2B SAE No. 8	7/8-14 UNF-2B SAE No. 10	1000 PSI \pm 50 PSI
06-460-640	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1550 PSI \pm 50 PSI
06-460-642	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1550 PSI \pm 50 PSI
06-460-644	1/2-20 UNF-2B	3/4-16 UNF-2B SAE No. 8	3/4-16 UNF-2B SAE No. 8	7/8-14 UNF-2B SAE No. 10	1150 PSI \pm 50 PSI
06-460-646	1/2-20 UNF-2B	3/4-16 UNF-2B SAE No. 8	3/4-16 UNF-2B SAE No. 8	7/8-14 UNF-2B SAE No. 10	1500 PSI \pm 50 PSI
06-460-648	1/2-20 UNF-2B	3/4-16 UNF-2B SAE No. 8	3/4-16 UNF-2B SAE No. 8	7/8-14 UNF-2B SAE No. 10	1500 PSI \pm 50 PSI
06-460-650	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	1/2-14 N.P.T.F.	1500 PSI \pm 50 PSI
06-460-652	1/2-20 UNF-2B	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	7/8-14 UNF-2B SAE No. 10	250 PSI \pm 25 PSI
06-460-680	1/2-20 UNF-2B	3/4-16 UNF-2B SAE No. 8	3/4-16 UNF-2B SAE No. 8	7/8-14 UNF-2B SAE No. 10	1550 PSI \pm 50 PSI
06-460-684	1/2-20 UNF-2B	7/8-14 UNF-2B JIC No. 10	7/8-14 UNF-2B JIC No. 10	7/8-14 UNF-2B JIC No. 10	1100 PSI \pm 25 PSI

OPEN CENTER HYDRAULIC BRAKE VALVE PRIMARY CUP DESIGN (Refer to Figure 10)

Disassembly

1. Remove boot (item 1) and pressure regulating spring assembly (item 2).

CAUTION: Pressure regulating spring assembly has been set at the factory and should never be disassembled, re-adjusted or interchanged with another valve.

2. Separate end cap (item 21) from housing (item 11).

CAUTION: Care must be taken as end cap is under tension of spring (item 19).

Remove gasket (item 14).

3. Remove primary cup (item 17), retainer (item 18), spring (item 19) and residual valve (item 20) from end cap (item 21).
4. Remove cap screw (item 13) from under side of housing (item 11). Remove o-ring (item 12) from cap screw.
5. Remove retaining ring (item 8) from housing (item 11).
6. Remove sleeve (item 10) by pulling on push rod (item 4). Remove cup (item 9) from sleeve.
7. Remove piston (item 16) from housing (item 11). Remove piston ring (item 15) from piston.
8. Remove retaining ring (item 3) carefully with a small flat tool. Do not scratch bore of sleeve (item 10).
9. Remove push rod (item 4), spool (item 6) and spring (item 7) from sleeve (item 10). Remove cup (item 5) from spool (item 6).

Inspection

Clean and inspect all component parts for scratches, cracks or wear. Replace any parts that are excessively worn or damaged.

CAUTION: If spool (item 6), sleeve (8)

(item 10) or bore of housing (item 11) are in any way damaged, scratched or broken, the entire assembly must be replaced. These parts are select-fitted and are not interchangeable or replaceable with service items.

Assembly

1. Install new cup (item 9) on sleeve (item 10) and new cup (item 5) on spool (item 6).

CAUTION: Lips on cups (items 5 & 9) should be away from ends of spool (item 6) and sleeve (item 10).

2. Place spring (item 7) in sleeve (item 10).
3. Install spool (item 6) in sleeve (item 10). Note direction of spool.
4. Install push rod (item 4) in sleeve (item 10) and secure it with new retaining ring (item 3).
5. Install new o-ring (item 12) on cap screw (item 13) and install in housing (item 11).
6. Carefully install sleeve (item 10) into housing (item 11).

CAUTION: Make sure that groove on sleeve will engage cap screw (item 13).

Install retaining ring (item 8).

7. Install new piston ring (item 15) on piston (item 16) and install in housing (item 11).
8. Place new residual valve (item 20), spring (item 19) and retainer (item 18) in end cap (item 21).

CAUTION: Residual valve must be checked for proper seating in end cap.

9. Place new gasket (item 14) on mounting face of end cap (item 21) and new primary cup (item

- 17) on end of spring (item 19).
10. Assemble end cap (item 21) with its components to housing (item 11) making sure lip on primary cup (item 17) has properly engaged bore of housing.
11. Install lock washers (items 22) and bolts (items 23). Torque 16 to 18 ft. lbs.
12. Install pressure regulating spring assembly (item 2) on push rod (item 4). Install new boot (item 1).

SEE BLEEDING SECTION FOR COMPLETE BLEEDING INSTRUCTIONS

PARTS LIST

ITEM	DESCRIPTION
1	● BOOT
2	● PRESSURE REGULATING SPRING ASSEMBLY
3	● RETAINING RING
4	● PUSH ROD
5	● CUP
6	● SPOOL
7	● SPRING
8	● RETAINING RING
9	● CUP
10	● SLEEVE
11	● HOUSING
12	● O-RING
13	● CAP SCREW
14	● GASKET
15	● PISTON RING
16	● PISTON
17	● PRIMARY CUP
18	● RETAINER
19	● SPRING
20	● RESIDUAL VALVE
21	● END CAP
22	● LOCK WASHERS
23	● BOLTS

● Items included in Repair
Kit 06-459-002

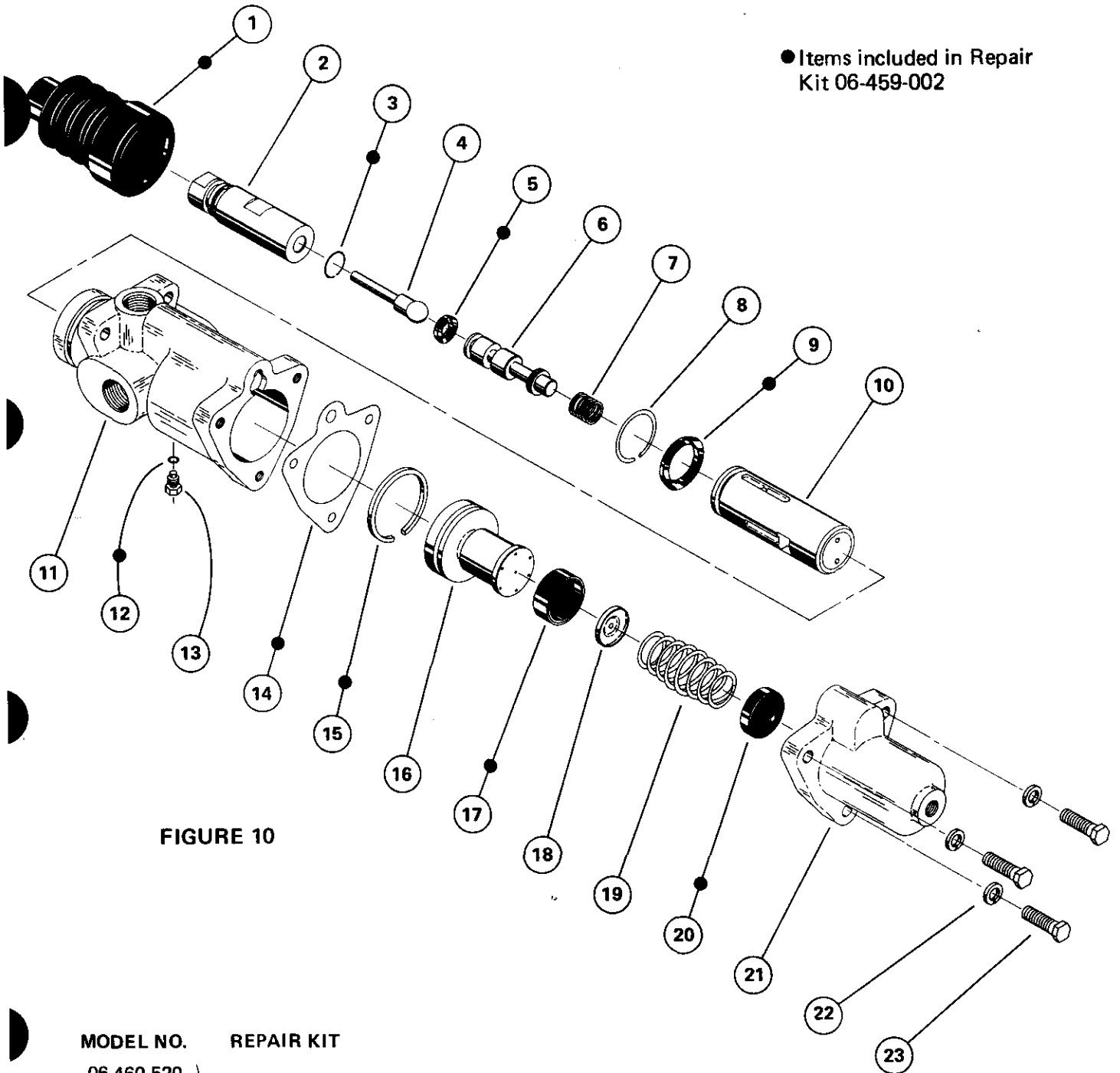


FIGURE 10

MODEL NO.	REPAIR KIT
06-460-520	06-459-002
06-460-524	
06-460-550	
06-460-560	
06-460-570	
06-460-580	
06-460-588	
06-460-600	
06-460-610	
06-460-620	
06-460-650	
06-460-680	

OPEN CENTER HYDRAULIC BRAKE VALVE RING SEAL DESIGN

(Refer to Figure 11)

Disassembly

1. Remove boot (item 1) and pressure regulating spring assembly (item 2).

CAUTION: Pressure regulating spring assembly has been set at the factory and should never be disassembled.

2. Separate end cap (item 21) from housing (item 11).

CAUTION: Care must be taken as end cap is under tension of spring (item 20).

Remove gasket (item 14).

3. Remove piston & poppet assembly (item 17) and spring (item 20) from end cap (item 22).

CAUTION: If you have model 06-460-566, you will also have to remove residual valve (item 21).

4. Remove cap screw (item 13) from under side of housing (item 11). Remove o-ring (item 12) from cap screw.
5. Remove retaining ring (item 8) from housing (item 11).
6. Remove sleeve (item 10) by pulling on push rod (item 4). Remove cup (item 9) from sleeve.
7. Remove piston (item 16) from housing (item 11). Remove piston ring (item 15) from piston.
8. Remove retaining ring (item 3) carefully with a small flat tool. Do not scratch bore of sleeve (item 10).
9. Remove push rod (item 4), spool (item 6) and spring (item 7) from sleeve (item 10). Remove cup (item 5) from spool (item 6).

Inspection

Clean and inspect all component parts for scratches, cracks or wear. Replace (10)

any parts that are excessively worn or damaged.

CAUTION: If spool (item 6), sleeve (item 10) or bore of housing (item 11) are in any way damaged, scratched or broken, the entire assembly must be replaced. These parts are select-fitted and are not interchangeable or replaceable with service items.

Assembly

1. Install new cup (item 9) on sleeve (item 10) and new cup (item 5) on spool (item 6).

CAUTION: Lips on cups (items 5 & 9) should be away from ends of spool (item 6) and sleeve (item 10).

2. Place spring (item 7) in sleeve (item 10).
3. Install spool (item 6) in sleeve (item 10). Note direction of spool.
4. Install push rod (item 4) in sleeve (item 10) and secure it with new retaining ring (item 3).
5. Install new o-ring (item 12) on cap screw (item 13) and install in housing (item 11).
6. Carefully install sleeve (item 10) into housing (item 11).

CAUTION: Make sure that groove on sleeve will engage cap screw (item 13).

Install retaining ring (item 8).

7. Install new piston ring (item 15) on piston (item 16) and install in housing (item 11).
8. Install new o-ring (item 18) and new ring seal (item 19) on new piston & poppet assembly (item 17).
9. Install spring (item 20) and piston & poppet assembly (item 17) in end cap (item 22).

NOTE: If you have model 06-460-566, you will

have to install new residual valve (item 21). You must also check residual valve for proper seating in end cap.

CAUTION: Extreme care must be taken so as not to scratch teflon seal (item 19) when installing piston & poppet assembly (item 17) in end cap (item 22).

10. Place new gasket (item 14) on mounting face of end cap (item 22) and assemble, with its components, to housing (item 11).
11. Install lock washers (items 23) and bolts (items 24). Torque 16 to 18 ft. lbs.
12. Install pressure regulating spring assembly (item 2) on push rod (item 4). Install new boot (item 1).

SEE BLEEDING SECTION FOR COMPLETE BLEEDING INSTRUCTIONS

PARTS LIST

ITEM	DESCRIPTION
1*	BOOT
2	PRESSURE REGULATING SPRING ASSEMBLY
3*	RETAINING RING
4	PUSH ROD
5*	CUP
6	SPOOL
7	SPRING
8	RETAINING RING
9*	CUP
10	SLEEVE
11	HOUSING
12*	O-RING
13	CAP SCREW
14*	GASKET
15*	PISTON RING
16	PISTON
17*	PISTON & POPPET ASSEMBLY
18*	O-RING
19*	RING SEAL
20	SPRING
21*	RESIDUAL VALVE
22	END CAP
23	LOCK WASHERS
24	BOLTS

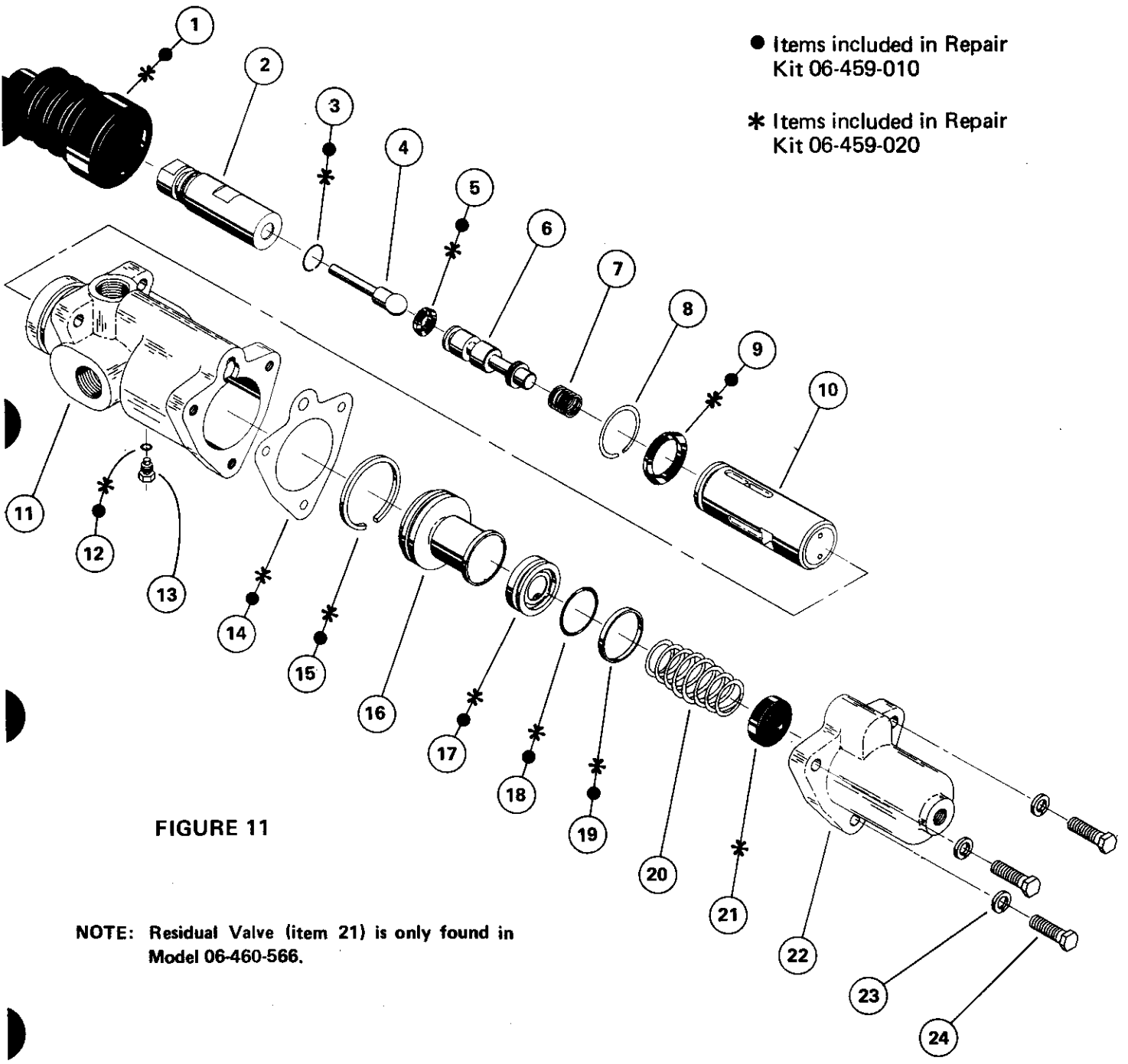


FIGURE 11

NOTE: Residual Valve (item 21) is only found in Model 06-460-566.

MODEL NO.	REPAIR KIT
06-460-566	06-459-020
06-460-636	06-459-010
06-460-638	
06-460-644	
06-460-646	
06-460-648	

OPEN CENTER HYDRAULIC BRAKE VALVE SLIDING PISTON DESIGN

(Refer to Figure 12)

Disassembly

1. Remove boot (item 1) and pressure regulating spring assembly (item 2).

CAUTION: Pressure regulating spring assembly has been set at the factory and should never be disassembled.

2. Separate end cap (item 20) from housing (item 3).

CAUTION: Care must be taken as end cap is under tension of spring (item 18).

Remove gasket (item 6).

3. Remove piston & poppet assembly (item 15), spring (item 18) and residual valve (item 19) from end cap (item 20).
4. Remove cap screw (item 5) from under side of housing (item 3). Remove o-ring (item 4) from cap screw.
5. Remove sleeve & piston assembly (item 14) from housing (item 3). Remove cup (item 12) and piston ring (item 13) from sleeve & piston assembly (item 14).
6. Remove retaining ring (item 7) carefully with a small flat tool. Do not scratch bore of sleeve & piston assembly (item 14).
7. Remove push rod (item 8), spool (item 10) and spring (item 11) from sleeve & piston assembly (item 14). Remove cup (item 9) from spool (item 10).

Inspection

Clean and inspect all component parts for scratches, cracks or wear. Replace any parts that are excessively worn or damaged.

CAUTION: If spool (item 10), sleeve (item 14) or bore of housing (item 3) are in any way damaged, scratched or broken, the

entire assembly must be replaced. These parts are select-fitted and are not interchangeable or replaceable with service items.

Assembly

1. Install new cup (item 12) and new piston ring (item 13) on sleeve & piston assembly (item 14).

CAUTION: Lip on cup (item 12) should be away from end of sleeve (item 14).

2. Install new cup (item 9) on spool (item 10).

CAUTION: Lip on cup (item 9) should be away from end of spool (item 10).

3. Insert spool (item 10) and push rod (item 8) into sleeve & piston assembly (item 14). Secure with new retaining ring (item 7).
4. Carefully install sleeve & piston assembly (item 14) into housing (item 3).

CAUTION: Make sure that groove on sleeve will engage screw (item 5).

5. Install new o-ring (item 4) on cap screw (item 5) and install in housing (item 3).
6. Install new o-ring (item 16) and new ring seal (item 17) on new piston & poppet assembly (item 15).
7. Place residual valve (item 19), spring (item 18) and piston & poppet assembly (item 15) in end cap (item 20).

NOTE: Residual valve must be checked for proper seating in end cap.

CAUTION: Extreme care must be taken so as not

to scratch ring seal (item 17) when installing piston & poppet assembly (item 15) in end cap (item 20).

8. Place new gasket (item 6) on mounting face of end cap (item 20) and assembly, with its components, to housing (item 3).
9. Install lock washers (items 21) and bolts (items 22). Torque 16 to 18 ft. lbs.
10. Install pressure regulating spring assembly (item 2) on push rod (item 8). Install new boot (item 1).

SEE BLEEDING SECTION FOR COMPLETE BLEEDING INSTRUCTIONS

PARTS LIST

ITEM	DESCRIPTION
1	• BOOT
2	• PRESSURE REGULATING SPRING ASSEMBLY
3	• RETAINING RING
4	• PUSH ROD
5	• CUP
6	• SPOOL
7	• SPRING
8	• HOUSING
9	• O-RING
10	• CAP SCREW
11	• GASKET
12	• CUP
13	• PISTON RING
14	• SLEEVE & PISTON ASSEMBLY
15	• PISTON & POPPET ASSEMBLY
16	• O-RING
17	• RING SEAL
18	• SPRING
19	• RESIDUAL VALVE
20	• END CAP
21	• LOCK WASHERS
22	• BOLTS

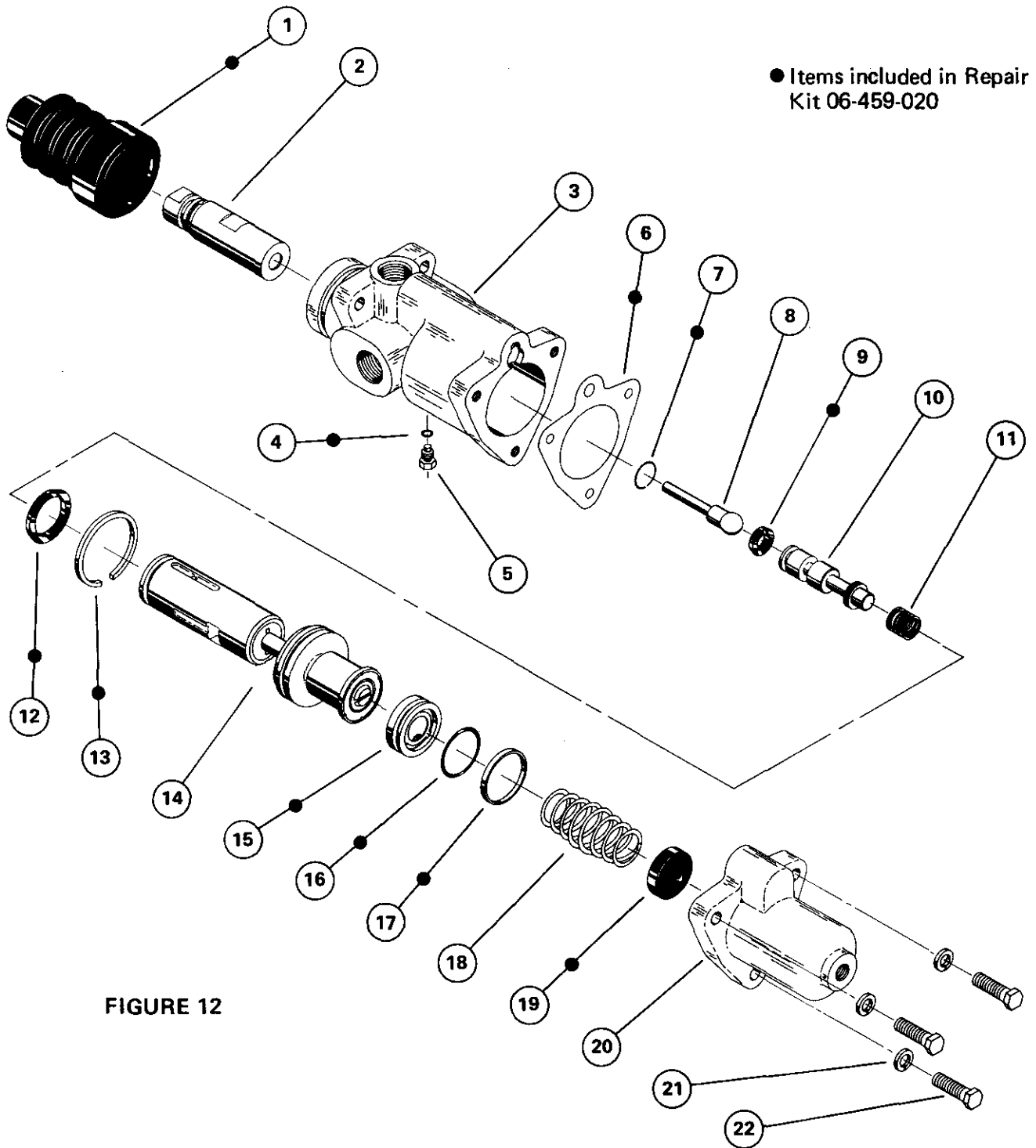


FIGURE 12

MODEL NO.	REPAIR KIT
06-460-640	06-459-020
06-460-642	
06-460-684	

GENERAL SERVICE DIAGNOSIS

With Engine Off —

PEDAL GOES TO FLOOR

1. Brake not adjusted
1. Check adjustment
2. Air in system
2. Bleed brakes
3. Defective brakes
3. Check brakes
4. Blown hydraulic line
4. Check brake line
5. Worn out primary cup
5. Check by making sure brakes are properly adjusted, in good operating condition, and system well bled. If pedal continues to go to the floor, service brake valve.

SPONGY PEDAL

1. Air in system
1. Bleed brakes

PEDAL IS FIRM BUT STOPS TOO NEAR FLOOR

1. Brakes out of adjustment
1. Adjust brakes

2. Defective brakes
2. Check for wear
3. Displacement problem
3. Wheel cylinders too large for valve to handle properly. Consider alternate braking valve.

PEDAL IS FIRM BUT BRAKING IS INADEQUATE TO STOP VEHICLE IN EVENT OF ENGINE FAILURE

1. Pedal ratio too small
1. Increase pedal ratio
2. Brakes defective
2. Check brakes for wear or oily brakes

With Engine Running —

PEDAL GOES DOWN PART WAY THEN BOUNCES BACK

1. Insufficient flow from pump
1. Check and fill reservoir
2. Small volume from pump at idle
2. Crack throttle and recheck

3. Brakes not adjusted
3. Check adjustment
4. Air in system
4. Bleed system

NO POWER STEERING OR OTHER DOWNSTREAM HYDRAULIC ACTION AT ANY TIME

1. Hydraulic lines crossed
1. Recheck circuit
2. No hydraulic action at any time
2. Check and fill reservoir. Check relief valve setting on pump. Check for proper rotation at pump, vee belt, sheared keys, etc.

NO OR SLOW POWER STEERING WITH BRAKES APPLIED

1. Recheck relief valve on pump for proper setting
2. Check and fill reservoir
3. Check and tighten pump belt if necessary

BLEEDING

The MICO Open Center Power Brake Valve and remaining brake system are sometimes difficult to bleed. The difficulty arises when the hydraulic oil used does not flow easily through lines and small holes by means of gravity. Generally, to effectively remove air, oil must be forced into the brake valve master cylinder cavity and the rest of the system.

CAUTION: Make sure the machine is in a safe and controlled state before attempting any servicing including bleeding the brake system.

Manual and pressure bleeding are two methods of bleeding a brake system.

MICO recommends using one of these two methods of bleeding the Open Center Power Brake Valve and the rest of the brake system.

CAUTION: Be sure brake valve is installed properly and brakes adjusted correctly before beginning bleeding procedures.

MANUAL BLEEDING PROCEDURES

1. Start engine and allow enough time to pass for the system to become filled and thoroughly flushed with oil.
2. With engine still running, one person can stroke the brake pedal while another person opens and closes the brake bleeder screws.
3. Only on the down stroke of the

- brake pedal, open bleeder screw on the brake closest to brake valve first. When all flow stops from bleeder, close it and allow pedal to return to rest.
4. Wait at least 30 seconds and repeat the process until all air has been expelled from that brake. Then go on to the next closest brake bleeder and repeat process

- until all brakes have been bled.
5. Stop engine and depress brake pedal. Pedal should be hard, not spongy, and fairly high. If pedal is too spongy and/or travels too far, repeat bleeding process.
6. It is a characteristic of the brake valve to kick the pedal back when actuated if system is not bled with engine running.

PRESSURE BLEEDING PROCEDURE

1. Refer to Figure 13. Install a small BLEEDER BY-PASS LINE as shown. A 1/4" size line or hose is sufficient.
2. Start engine and allow enough time to pass for the system to become filled and thoroughly flushed with oil.
3. It is necessary to develop between 50 - 200 PSI at the inlet to brake valve. A method to throttle the oil will be needed if the system does not already have a secondary hydraulic device downstream from the brake valve. **THIS PRESSURE SHOULD BE HELD THROUGHOUT THE BLEEDING PROCESS AND SHOULD NOT EXCEED 250 PSI.**
4. **DO NOT STEP ON THE BRAKE PEDAL DURING THIS BLEEDING PROCESS.**
5. Oil will now be forced directly into the brake line by the pump and fill the brake valve master cylinder cavity. This may take a minute or two.
6. Continue to hold the bleed pressure while bleeding each brake starting with the line and brake closest to the brake valve.
7. Allow a sufficient amount of fluid to pass at brake bleeder screw to insure all air is removed from each bleeder point.
8. Continue this method until all brakes and lines are bled.
9. When all brakes are bled and fittings tight, release the 50 - 200 PSI pressure and **SHUT OFF ENGINE.**
10. Remove the bleeder by-pass line and plug the connections. Be sure not to lose fluid or ingest air at the brake line connection when removing bleeder by-pass line.
11. With engine off, step on brake pedal. It should be fairly high and hard. If a spongy pedal is felt, the system still contains air. If pedal strokes downward too far, check and readjust brakes and repeat bleeding process.
12. When the pedal is satisfactory, restart engine and actuate brake pedal several times. Now check for leaks.

