

Service Instructions

HYDRAULIC BRAKE VALVE

Master Cylinder Section



Service Instructions

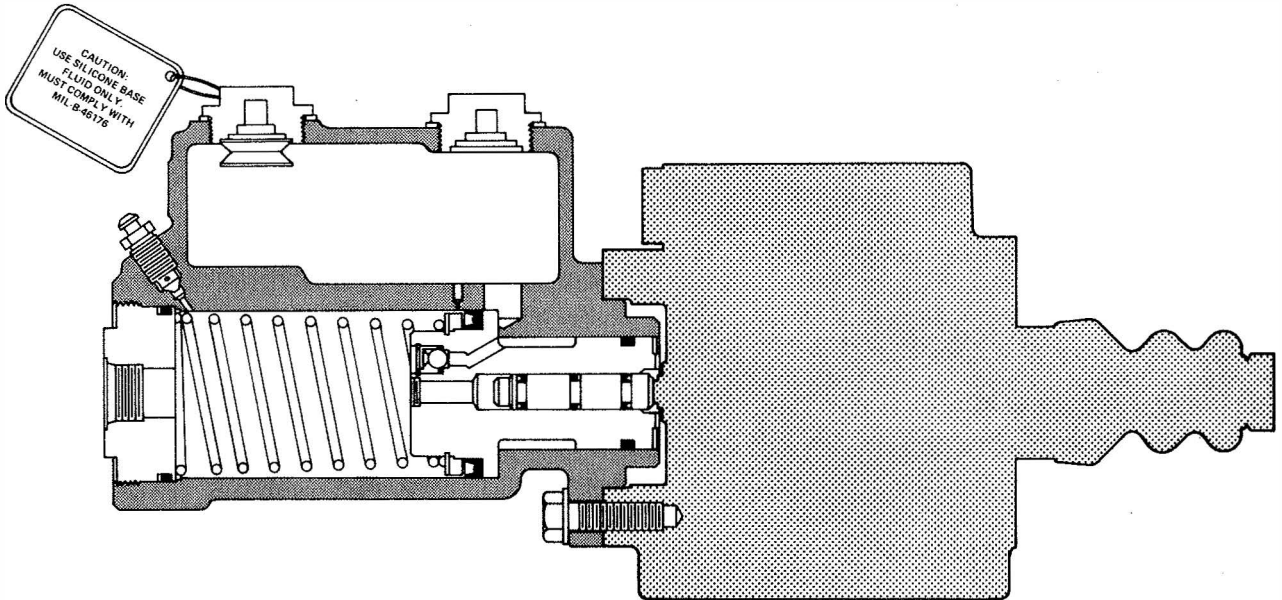


FIGURE 1

This instruction sheet services the Master Cylinder Sections for these model numbers:

02-460-344

TYPICAL SYSTEM SCHEMATIC

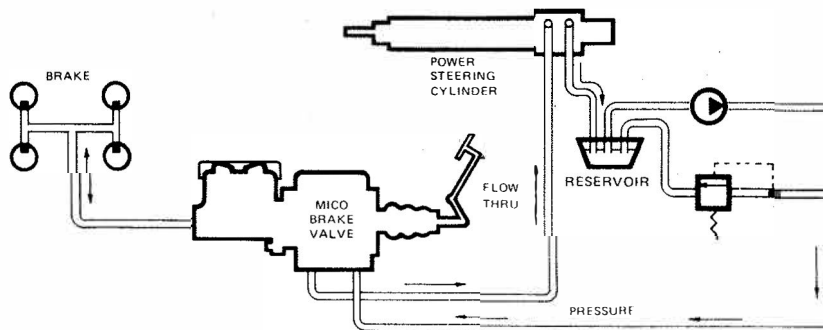


FIGURE 2

(This circuit may not apply to your installation)

REMOVING BRAKE VALVE FROM VEHICLE AND SEPARATING SECTIONS

(Refer to Figures 1 and 3)

1. Remove Brake Valve from vehicle by disconnecting necessary fluid lines, disconnecting push rod, and removing mounting bolts. Drain fluid from assembly.
2. Separate Master Cylinder Section from Power Assist Section by removing three cap screws and three washers.

NOTE: Earlier models have a spacer between sections.

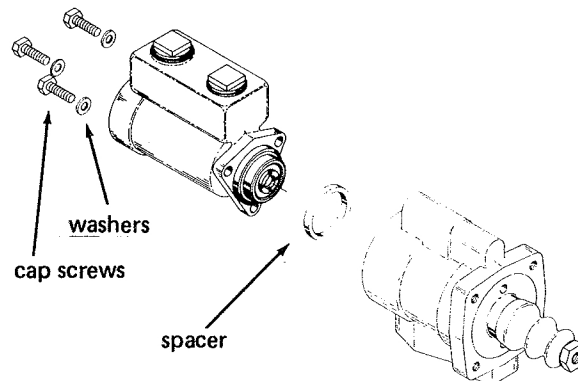


FIGURE 3

MASTER CYLINDER DISASSEMBLY

(Refer to Figure 1 and 4)

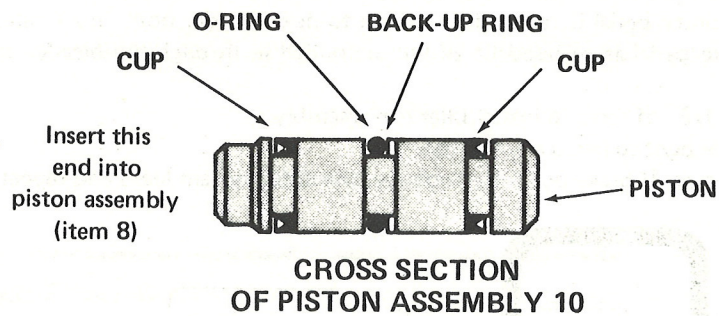
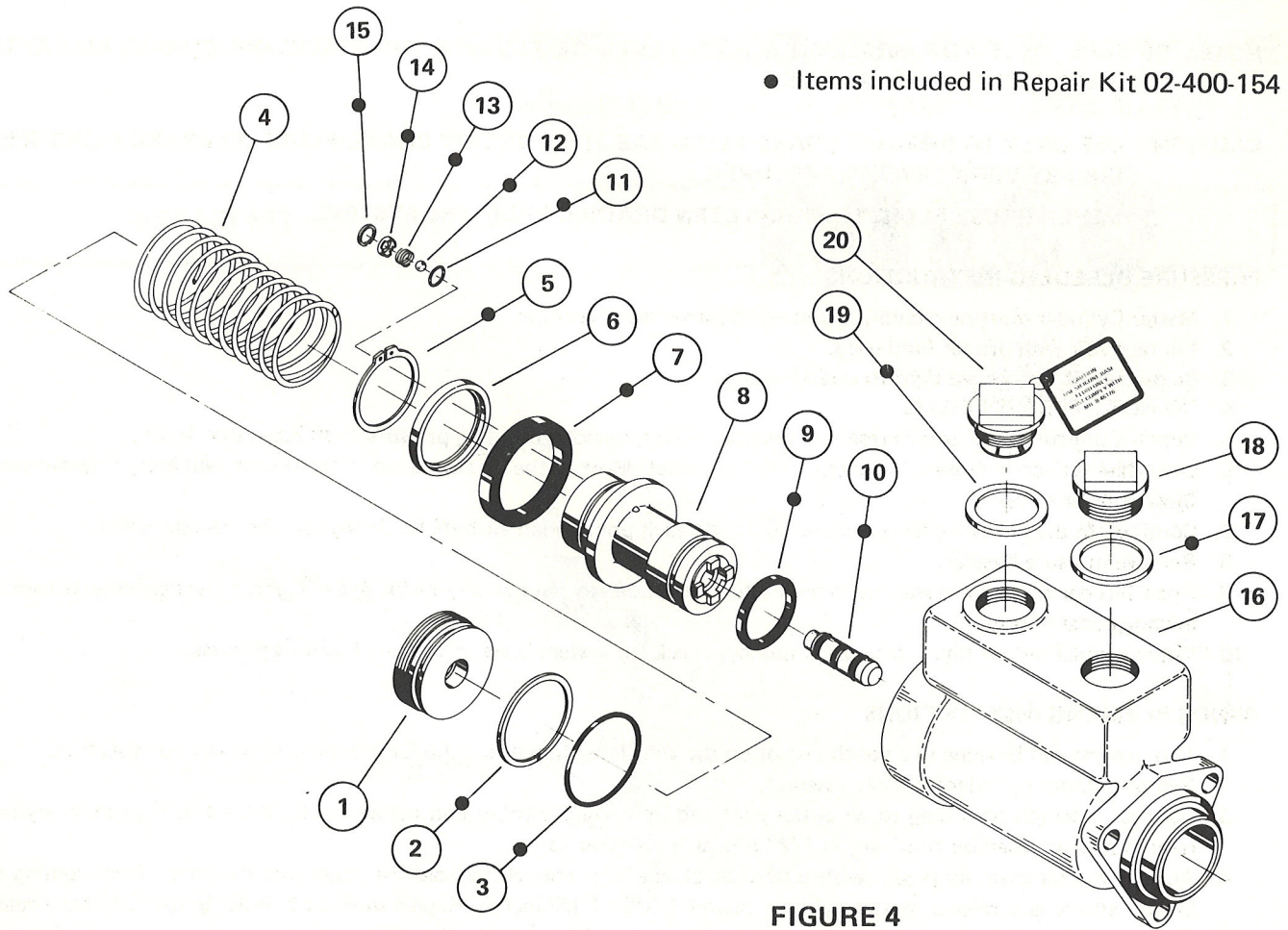
1. Drain fluid from unit before disassembling.
2. Remove end plug (item 1) with large box end wrench. **NOTE:** End plug is under tension of spring (item 4).
3. Remove back-up ring (item 2) and o-ring (item 3) from end plug (item 1).
4. Remove spring (item 4) from housing (item 16).
5. Remove piston (item 8) from housing (item 16). Then remove piston assembly (item 10) from piston (item 8).
6. Remove retaining ring (item 5) and retainer (item 6) from piston (item 8).
7. Remove cups (items 7 and 9) from piston (item 8).
8. Remove retaining ring (item 15) from inside of piston (item 8). Now remove check valve parts: cage (item 14), tapered spring (item 13), ball (item 12) and o-ring (item 11).
9. Remove filler plugs (items 18 and 20) and gaskets (items 17 and 19) from housing (item 16).

MASTER CYLINDER ASSEMBLY

(Refer to Figure 1 and 4) Use only silicone fluid in Master Cylinder Section.

LUBRICATE ALL RUBBER COMPONENTS FROM REPAIR KIT WITH CLEAN TYPE FLUID USED IN THE SYSTEM.

1. Clean all parts thoroughly before assembling.
2. Install new o-ring (item 11), new ball (item 12), new tapered spring (item 13) — small end towards ball, new cage (item 14) and new retaining ring (item 15) in piston (item 8).
3. Install new cups (items 7 and 9) on piston (item 8).
4. Install retainer (item 6) and retaining ring (item 5) on piston (item 8).
5. Gently insert new piston assembly (item 10) into slotted end of piston (item 8). Push lead cup, only, on piston assembly (item 10) all the way through piston (item 8). Now gently push lead cup back into piston (item 8). If you caused the lead cup to invert, this will correct the error.
6. Insert piston (item 8) into housing (item 16). Note direction of piston.
7. Install spring (item 4), into housing (item 16).
8. Install new back-up ring (item 2) and new o-ring (item 3) on end plug (item 1).
9. Install end plug (item 1) in housing using a large box end wrench.
10. Install new gaskets (items 17 and 19) and filler plugs (items 18 and 20) on housing (item 16).



CONNECTING SECTIONS AND MOUNTING BRAKE VALVE ON VEHICLE

(Refer to Figures 1 and 3)

1. Install spacer between the two sections (only if your model has one).
2. Attach Master Cylinder Section to Power Assist Section with three cap screws and three washers. Torque 35 - 40 ft. lbs.
3. Install unit on vehicle. Connect push rod. Connect fluid lines. Bleed system of air. Tighten fittings if leaks should occur. Make several applications to be sure Brake Valve is working properly.

BLEEDING PROCEDURES

NOTE: BE SURE THAT YOU MAINTAIN A HIGH LEVEL OF FLUID IN THE RESERVOIR DURING AND AFTER THE ENTIRE BLEEDING PROCESS.

CAUTION: USE ONLY HYDRAULIC BRAKE FLUID SAE J1703 OR DOT BRAKE FLUID OR BRAKE FLUID SPECIFIED BY VEHICLE MANUFACTURER.

NEVER REUSE FLUID THAT HAS BEEN DRAINED FROM THE SYSTEM.

PRESSURE BLEEDING INSTRUCTIONS

1. Master Cylinder must be securely mounted to power assist section.
2. Fill reservoir with proper fluid used.
3. Be certain all fittings are tight to avoid leaking.
4. **DO NOT DEPRESS PEDAL.**
5. Connect pressure bleeder into reservoir adapter. Recommended bleeding pressure is 30 P.S.I. maximum.
6. Open bleeder screw closest to master cylinder outlet. Most of the air contained in the system will escape by this route. Close bleeder screw.
7. Continue to the next bleeder screw and so on. At each point when air bubbles disappear close bleeder screw.
8. Remove pressure bleeder.
9. Open bleeder screw at master cylinder. Actuate cylinder to remove any residual air. Tighten bleeder screw before permitting pedal to return.
10. Actuate pedal several times. If pedal is spongy, check for system leaks and repeat bleeding process.

BENCH BLEEDING INSTRUCTIONS

1. This process can be done in a bench vise or on the vehicle with master cylinder mounted to power assist section.
2. Remove master cylinder filler cap assembly.
3. Connect a length of tubing to an outlet port and immerse the other end below the fluid level in the master cylinder reservoir. Keep reservoir fluid within 1/2" of inside reservoir top.
4. Actuate master cylinder piston with a smooth object large enough to hold the small internal piston from coming out. Slowly stroke and release master cylinder piston 1 3/8 - 1 1/2 inches. Repeat until air bubbles in reservoir have ceased.
5. Remove tubing. This should be done quickly so the loss of brake fluid will be minimized.
6. If cylinder was bench bled in a vise, it must now be attached securely to the power assist section and mounted on vehicle. Finish all plumbing connections before continuing to step 7.
7. Bleed remaining air from system by depressing brake pedal and opening bleeder fitting closest to master cylinder. Close bleeder fitting before brake pedal is released. Continue to next bleeder port. In all cases the bleeder fittings must be closed before the brake pedal is released or air will be pulled in through the bleeder and ingest unwanted air in the system.
8. Fill reservoir to within 1/2" of top and install filler cap assembly.
9. Be certain all fittings are tight to avoid any leaking.
10. Actuate pedal several times. If brake pedal feels spongy, check for system leaks and repeat bleeding process.

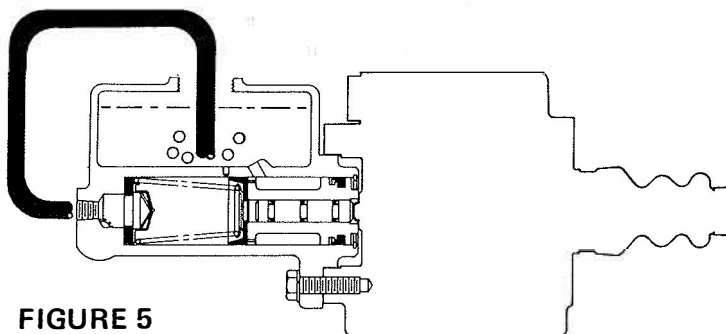


FIGURE 5

This publication is not subject to any update service. Information contained in this publication was in effect at the time the publication was approved for printing and is subject to change without notice or liability. ZF Off-Highway Solutions Minnesota Inc. reserves the right to revise the information presented or to discontinue the production of parts described at any time.



ZF Off-Highway Solutions Minnesota Inc.

1911 Lee Boulevard / North Mankato, MN U.S.A. 56003

Tel: +1 507 625 6426 **Fax:** +1 507 625 3212