BOOSTED MASTER CYLINDER
(Master Cylinder Section)

Service Instructions

MASTER CYLINDER SECTION - **Automotive Brake Fluid** POWER ASSIST SECTION - **Mineral Base Hydraulic Oil**

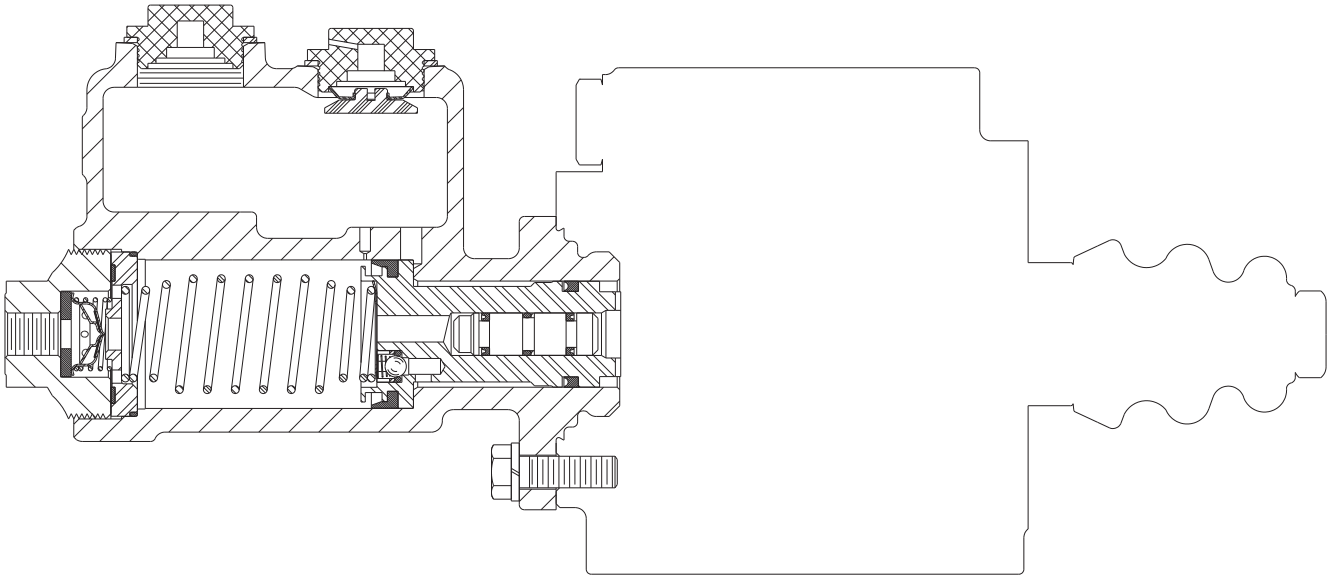

FIGURE 1

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

02-460-266

02-460-268*

* Does not use a residual check valve

NOTE: If your product number is not listed, contact ZF Off-Highway Solutions Minnesota Inc. for information.

TYPICAL SYSTEM SCHEMATIC (This circuit may not apply to your installation)

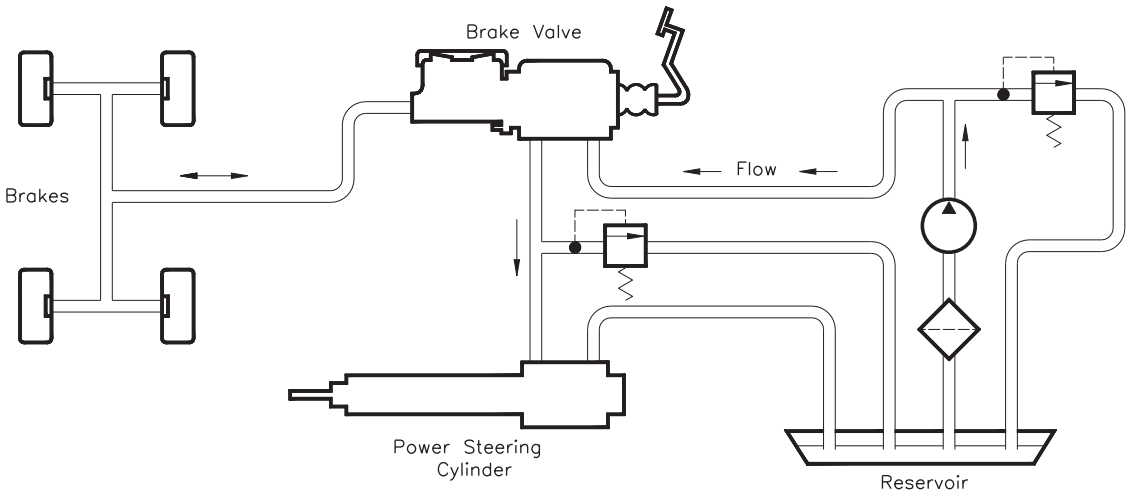

FIGURE 2

REMOVING MASTER CYLINDER FROM THE MACHINE AND SEPARATING SECTIONS

(Refer to Figures 1 and 3)

1. Remove the master cylinder assembly from the machine by disconnecting the necessary fluid lines, disconnecting the push rod, and removing the mounting bolts. Drain the fluid from the assembly.
2. Separate the master cylinder section from the power assist section by removing three cap screws and three lock washers.

CONNECTING SECTIONS AND MOUNTING MASTER CYLINDER ON THE MACHINE

(Refer to Figures 1 and 3)

1. Attach the master cylinder section to the power assist section with three cap screws and three lock washers. Torque cap screws 29.8-36.6 N·m (22-27 lb·ft).
2. Install the master cylinder assembly on the machine. Connect the push rod. Connect the fluid lines. Fill the reservoir and bleed the system of air. Tighten fittings if leaks occur. Make several applications to be sure the master cylinder is working properly. **NOTE: All fittings must be inspected for leaks and tightened if leaks occur.**

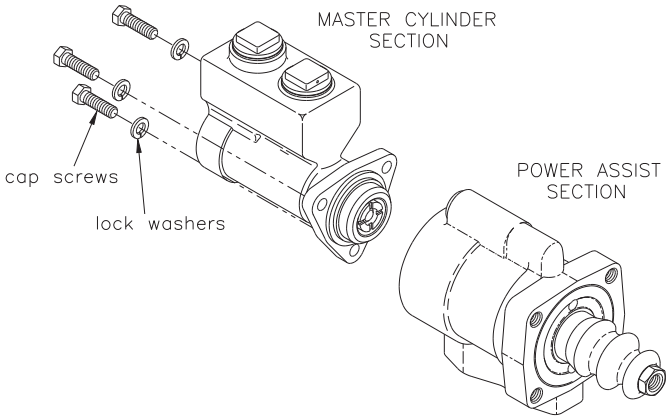

FIGURE 3

DISASSEMBLY

(Refer to Figures 1 and 4)

1. Drain fluid from unit before disassembling.
2. Remove end plug (1) with a large box end wrench.

⚠ CAUTION

End plug (1) is under tension of spring (9).

3. Remove spring (4), check valve (3), and seat (2) from end plug (1). **NOTE: Not all models use spring (4), check valve (3), or seat (2).**
4. Retainer assembly (5) should follow end plug (1) as it is removed. Remove o-ring (8) and seal (6) from retainer (7).
5. Remove spring (9) from housing (20).
6. Remove piston assembly (10) from housing (20) by pushing on piston assembly (10) with a wooden dowel from the small diameter end of housing.
7. Remove cups (16 & 18) from piston (17).
8. Remove piston assembly (19) from piston (17) by pushing on piston assembly (19) with a wooden dowel from the small diameter end of piston (17). Note direction of piston assembly (19).
9. Remove retainer (11), spring (12), ball (13), cage (14), and o-ring (15) from piston (17). Note direction of cage (14) and spring (12).
10. Remove filler plugs (22 & 23) and gaskets (21 & 24) from housing (20).

ASSEMBLY

(Refer to Figures 1 and 4)

Use only automotive brake 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 piston assembly (19) in piston (17). Note direction of piston assembly (19).
3. Install new o-ring (15), new cage (14), new ball (13), new spring (12), and new retainer (11) in piston (17). Note, the small end of spring (12) faces ball (13).
4. Install new cups (16 & 18) on piston (17).
5. Install new o-ring (8) and new seal (6) on retainer (7).
6. Install piston assembly (10), spring (9), and retainer assembly (5) in housing (20). Note the direction of retainer assembly (5).
7. Install new seat (2), new check valve (3), and new spring (4) in end plug (1). **NOTE: Not all models use spring (4), check valve (3), or seat (2).**
8. Lubricate the threads on end plug (1) and install end plug (1) in housing (20). Torque end plug (1) 67.8-108.5 N·m (50-80 lb·ft).
9. **NOTE: Before installing filler cap (22) be sure the filler cap breather hole is free of all contaminants. Use air pressure to clean and dry this hole.** Install new gaskets (21 & 24) and filler caps (22 & 23) on housing (20).

● Items included in Repair Kit

✻ Not used in all models

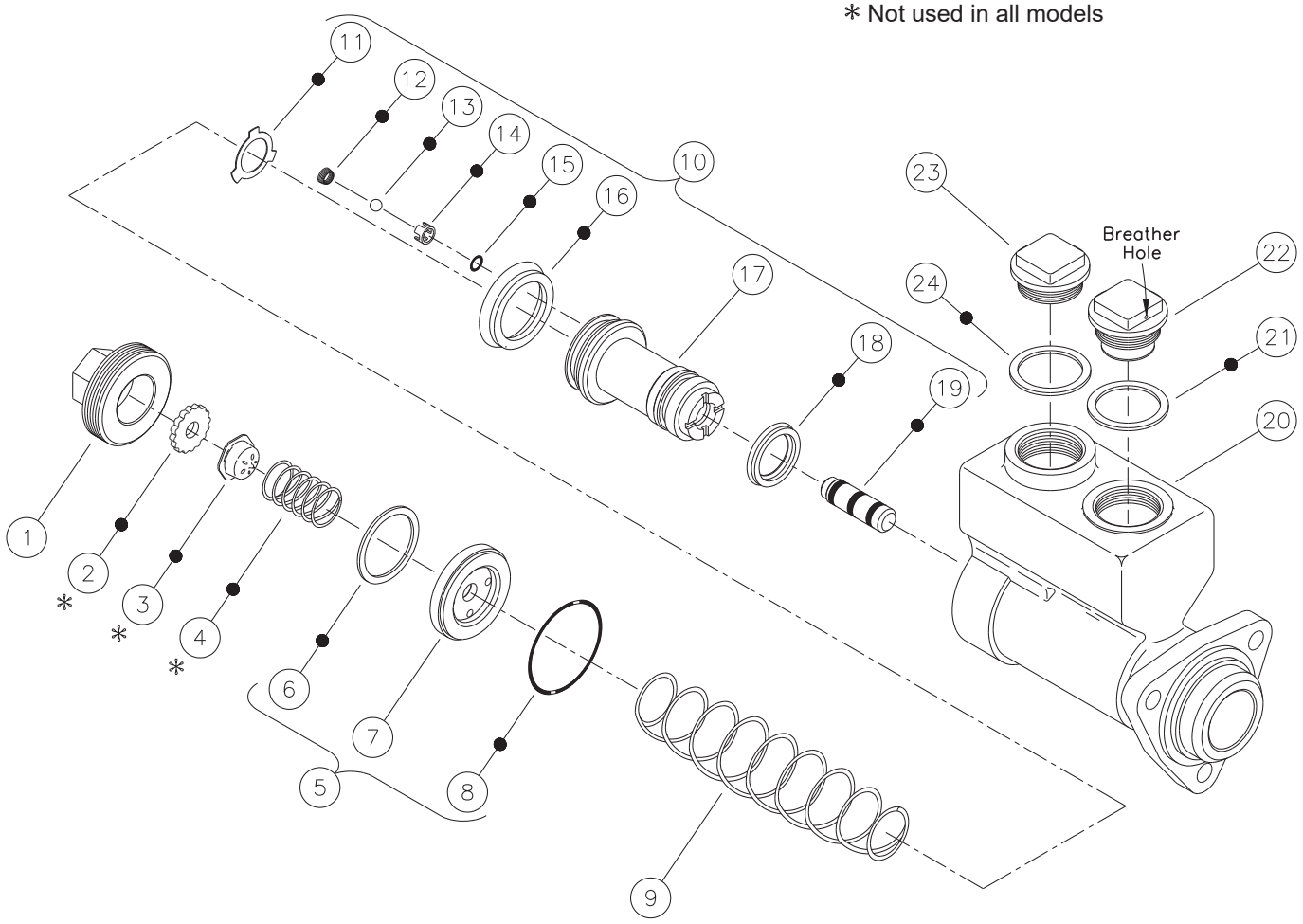

FIGURE 4

BLEEDING PROCEDURES

NOTE

Use only proper fluid specified by the machine manufacture. Never reuse fluid that has been drained from the system. Be sure that you maintain a high level of fluid in the reservoir during and after the entire bleeding process.

PRESSURE BLEEDING INSTRUCTIONS

1. Master cylinder must be mounted to power assist section.
2. Fill the reservoir with proper fluid.
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 2.07 bar (30 PSI) maximum. **NOTE: Make sure to use correct pressure bleeder for type fluid used in system.**
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 the bleeder screw.
8. Remove the pressure bleeder.
9. Open the bleeder screw at the master cylinder. Actuate cylinder to remove any residual air. Tighten the bleeder screw before permitting the pedal to return.
10. Depress pedal several times. If the pedal is spongy, check for system leaks and repeat bleeding process.
11. Fill the reservoir to within 12.7 mm (0.50 in) of top. Install filler cap and torque 33.9-40.7 N·m (25-30 lb·ft).

BENCH BLEEDING INSTRUCTIONS

(Refer to Figure 5)

1. This process can be done in a bench vise or on the machine with master cylinder mounted to power assist section.
2. Remove master cylinder filler cap.
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 12.7 mm (0.50 in) 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. **See CAUTION below.** Repeat until air bubbles in reservoir have ceased.
5. Remove tubing. This should be done quickly so the loss of fluid will be minimized.
6. If the cylinder was bench bled in a vise, it must now be attached securely to the power assist section and mounted on the machine. Complete all plumbing connections before continuing to step 7.
7. Bleed the remaining air from the system by depressing brake pedal and opening bleeder fitting closest to the master cylinder. Close the bleeder fitting before the brake brake pedal is released. Continue to the 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 into the system.
8. Fill the reservoir to within 12.7 mm (0.50 in) of top. Install the filler cap and and torque 33.9-40.7 N·m (25-30 lb·ft).
9. Be sure all fittings are tight to avoid any leaking.
10. Depress the pedal several times. If the brake pedal feels spongy, check for system leaks and repeat bleeding process.

⚠ CAUTION

Care must be taken so as not to over stroke this cylinder. The cylinder does not incorporate a piston stop. Over stroking this cylinder may cause it to leak from push rod end of cylinder. Maximum recommended stroke for this cylinder is 31.8 mm (1.25 in).

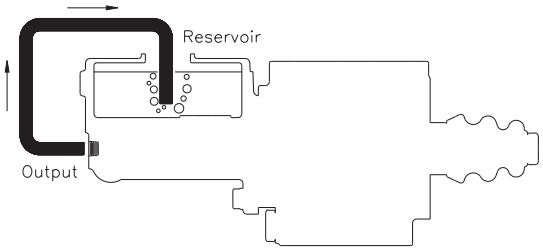

FIGURE 5

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