BOOSTED MASTER CYLINDER
(Master Cylinder Section)

Service Instructions

TABLE 1

Model Number	Master Cylinder Repair Kit Number	Uses Seat (6) and Check Valve (7)
02-460-390	02-400-176	No
02-460-428	02-400-195	Yes
02-460-606	02-400-253	Yes
* 02-460-626	02-400-253	Yes

***** Uses filler cap designed for use with remote reservoir.
NOTE: If your product number is not listed, contact ZF Off-Highway Solutions Minnesota Inc. for information.

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

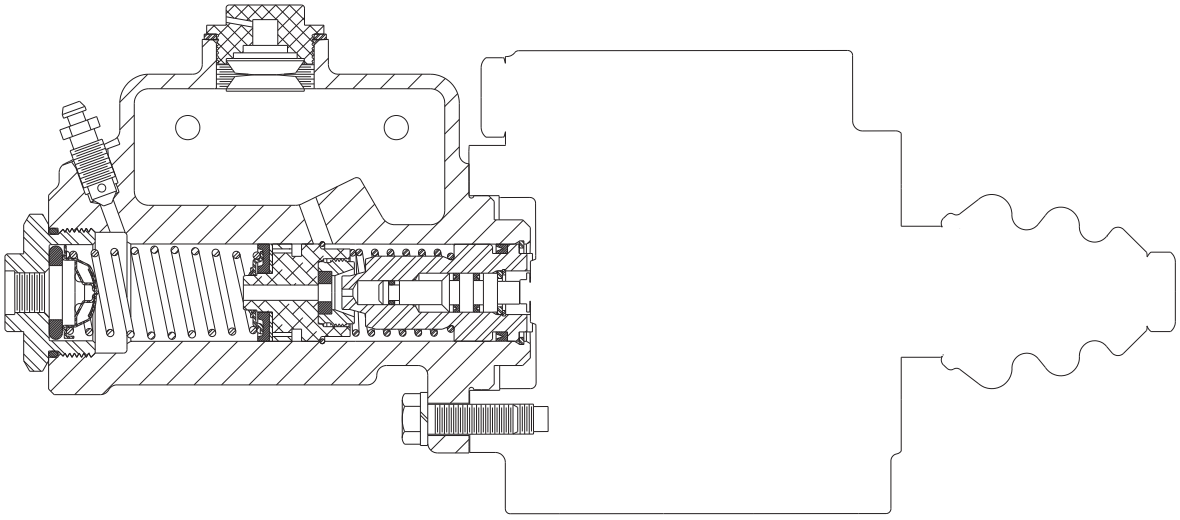

FIGURE 1
(02-460-428 shown)

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

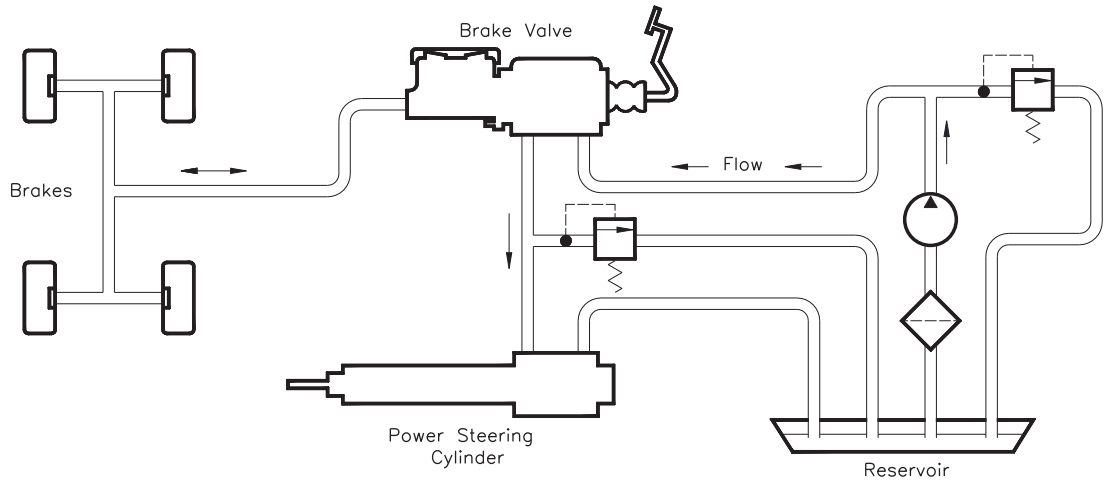

FIGURE 2

REMOVING BRAKE VALVE 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 mounting bolts. Drain 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 THE SECTIONS AND MOUNTING MASTER CYLINDER ON MACHINE

(Refer to Figures 1 and 3)

2. Attach the master cylinder section to the power assist section with three cap screws and three lock washers. Torque cap screws 47.5-61.0 N·m (35-45 lb·ft)
3. Install the unit on the machine. Connect the push rod. Connect the fluid lines. 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.**

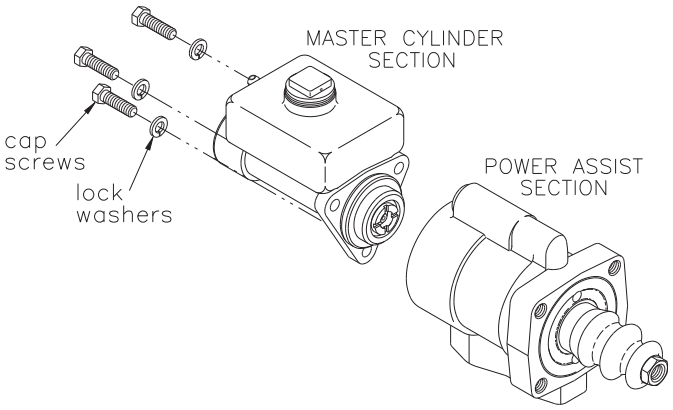

FIGURE 3

NOTE

This literature services several master cylinder models. The components shown in Figures 1-4 may appear different than what is found in your master cylinder.

DISASSEMBLY

(Refer to Figures 1 and 4)

1. Drain fluid from the unit before disassembling.
2. Depress piston assembly (11) and remove retaining ring (12) from housing (13).
3. Remove piston assembly (11) from housing (13). **NOTE: Be careful not to damage housing bore.**
4. Place the master cylinder in a soft jawed vise with end plug (5) facing up.
5. Remove line bolt (1), washer (2), fitting block (3), and washer (4) from end plug (5). **NOTE: Not all models use line bolt (1), washer (2), fitting block (3), or washer (4).**
6. Remove end plug (5) from housing (13).

⚠ CAUTION

End plug (5) is under tension of spring (9).

7. Remove o-ring (8) from end plug (5).
8. Remove seat (6), check valve (7), and spring (9) from housing (13). **NOTE: Not all models use seat (6) or check valve (7). See Table 1.**
9. Use a wooden dowel to push piston assembly (10) out of end plug (5) side of housing. **NOTE: Do not remove round ring from inside of housing bore.**
10. Remove filler cap (15) and gasket (14) from housing (13).

ASSEMBLY

(Refer to Figures 1 and 4)

Use only automotive brake fluid in the master cylinder section.

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

1. Clean all parts thoroughly before assembling.
2. Carefully install new piston assembly (10) in housing (13). Note direction of piston assembly (10). **NOTE: Be careful not to damage housing bore.**
3. Install spring (9) in housing (13).
4. Install new seat (6), new check valve (7), and new o-ring (8) on end plug (5). **NOTE: Not all models use seat (6) or check valve (7). See Table 1.**
5. Install end plug (5) in housing (13) and torque 67.8-108.5 N·m (50-80 lb·ft).
6. Install new washer (4), fitting block (3), new washer (2), and line bolt (1) in end plug (5). Finger tighten line bolt (1). **NOTE Not all models use washer (4), fitting block (3), washer (2), or line bolt (1).**
7. Remove the master cylinder from the soft jawed vise.
8. Install new piston assembly (11) and retaining ring (12) in housing (13). Note direction of piston assembly (11).
9. **NOTE: Before installing filler plug (15) be sure the filler plug breather hole is free of all contaminants. Use air pressure to clean and dry this hole.** Install new gasket (14) and filler cap (15) on housing (13). Finger tighten filler cap (15).

● Items included in Repair Kit
* Not used on all models

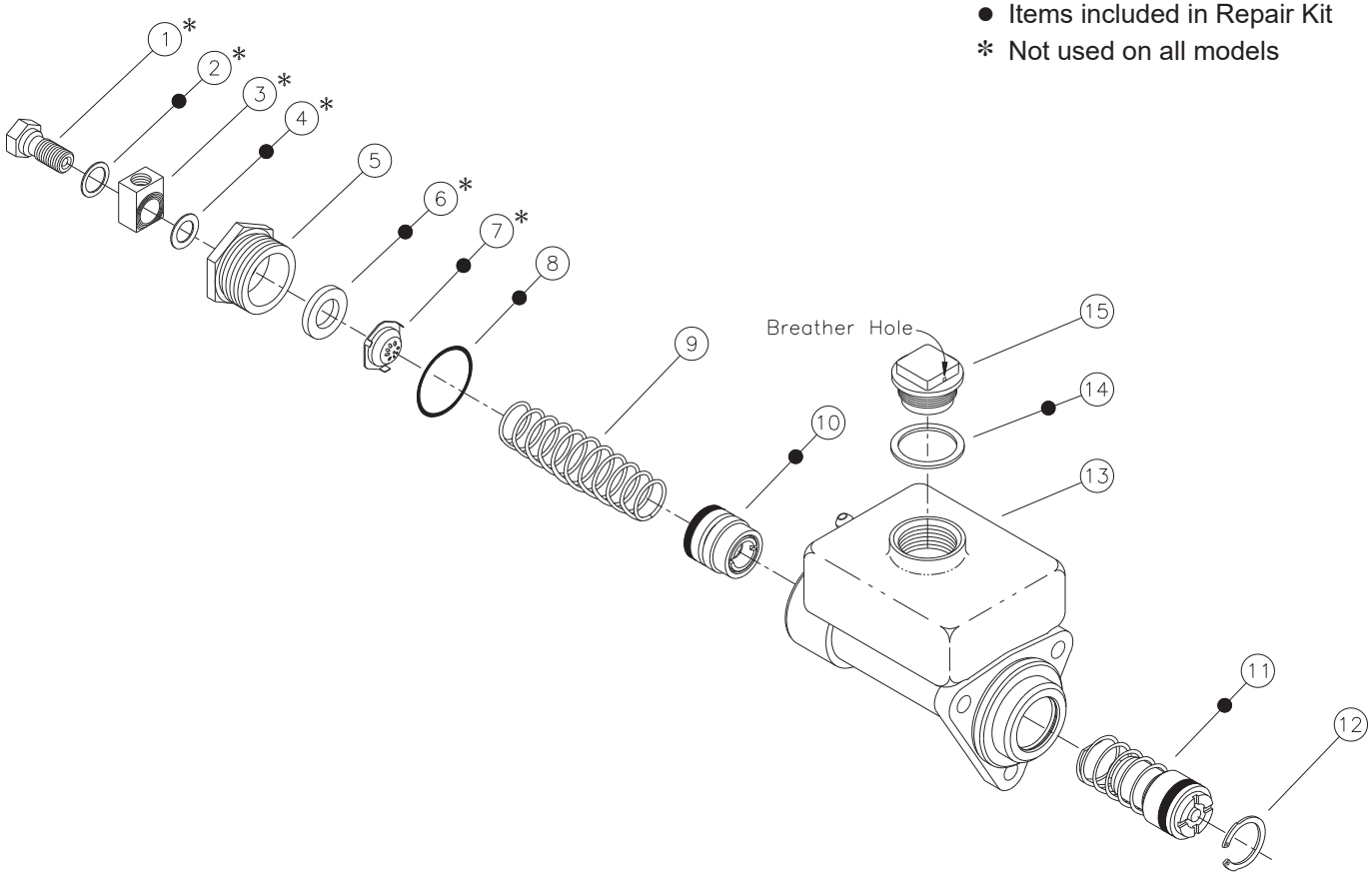

FIGURE 4

BLEEDING PROCEDURES

NOTE

Use only proper fluid specified by 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. The master cylinder must be mounted to the power assist section.
2. Fill reservoir with proper fluid.
3. Be sure all fittings are tight to avoid leaking.
4. DO NOT DEPRESS PEDAL.
5. Connect the pressure bleeder to the reservoir adapter. Recommended bleeding pressure is 2.07 bar (30 PSI) maximum. **NOTE: Be sure to use correct pressure bleeder for type of fluid used in system.**
6. Open the bleeder screw closest to the 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 the master cylinder to remove any residual air. Tighten bleeder screw before allowing the pedal to return.
10. Depress the 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 the top. Install filler cap and torque 33.9-47.5 N·m (25-35 lb·ft).

BENCH BLEEDING INSTRUCTIONS

(Refer to Figure 3)

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 the reservoir fluid filled to within 12.7 mm (0.50 in) of the 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 master 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 remaining air from system by depressing brake pedal and opening the bleeder screw closest to master cylinder. Close bleeder screw before brake pedal is released. Continue to next bleeder port. In all cases the bleeder screws 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 12.7 mm (0.50 in) of top. Install filler cap and torque 33.9-47.5 N·m (25-35 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 the bleeding process.

⚠ CAUTION

Be careful not to over stroke this cylinder. It does not incorporate a piston stop. Over stroking this cylinder may cause it to leak from the push rod end of the cylinder. Maximum recommended stroke for this cylinder is 31.8 mm (1.25 in).

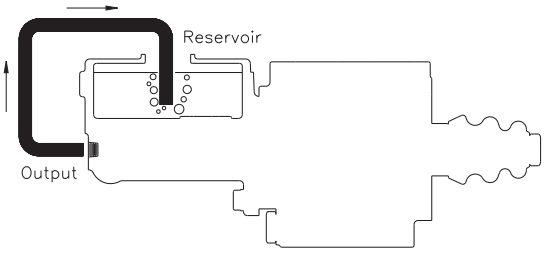

FIGURE 5

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