

BOOSTED MASTER CYLINDER (Master Cylinder Section)



Service Instructions

MASTER CYLINDER SECTION - Mineral Base Hydraulic Oil

POWER ASSIST SECTION - Mineral Base Hydraulic Oil

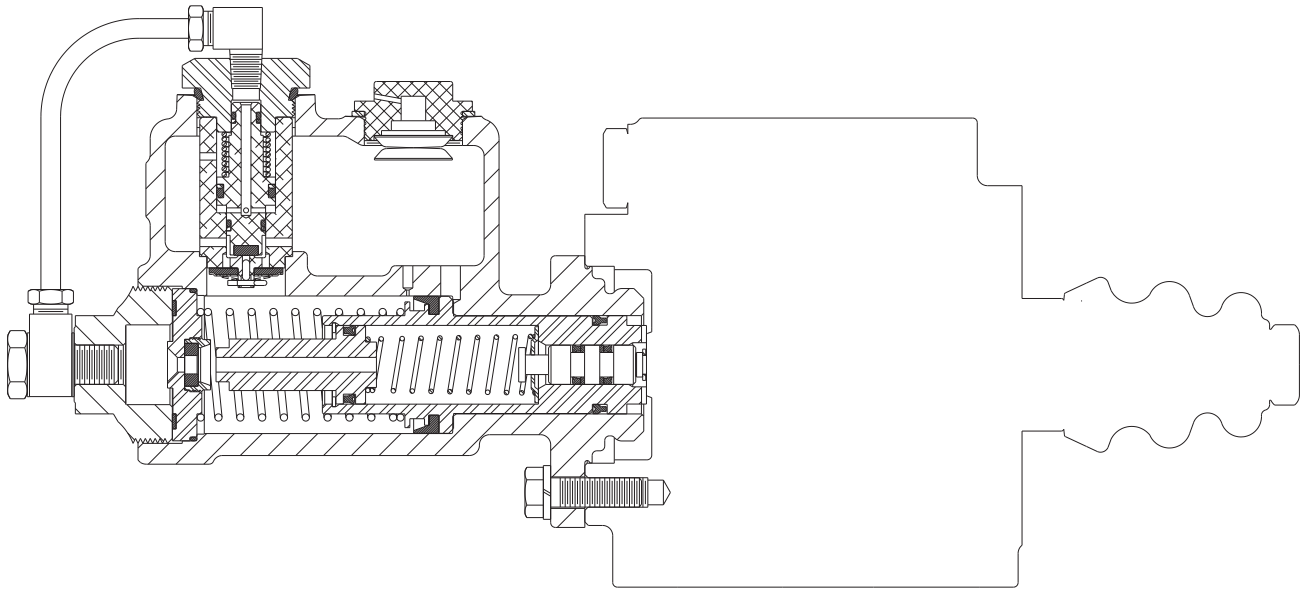


FIGURE 1

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

- 02-460-254
- 02-460-338
- 02-460-400

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

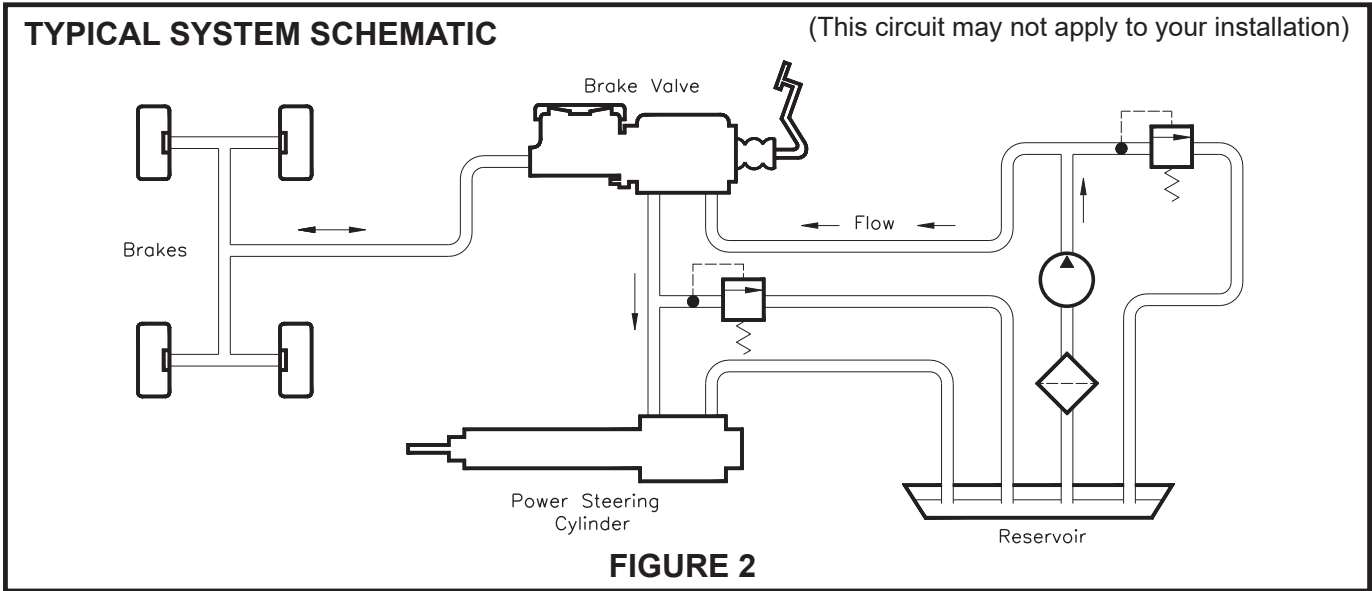


FIGURE 2

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 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. **NOTE: Later models do not have a spacer.**

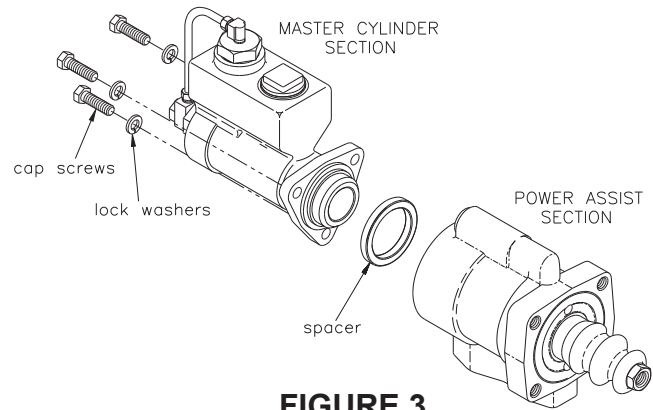


FIGURE 3

CONNECTING SECTIONS AND MOUNTING MASTER CYLINDER ON THE MACHINE

(Refer to Figures 1 and 3)

1. Install the spacer between the two sections (only if used on original model).
2. Attach the master cylinder section to the power assist section with three cap screws and three lock washers. Torque cap screws 29.83-36.61 N·m (22-27 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.**

DISASSEMBLY

(Refer to Figures 1 and 4)

1. Drain fluid from unit before disassembling.
2. Remove the upper tube nut on tubing assembly (24) from elbow fitting (23).
3. Remove line bolt (1), gaskets (2 & 4), and fitting block (3). Tubing assembly (24) need not be removed from fitting block (3).
4. Remove end plug (5) with a large box end wrench.

⚠ CAUTION

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

5. Retainer assembly (7) should follow end plug (5) as it is removed. Remove o-ring (8) from housing (20).
6. Remove spring (9) from housing (20).
7. Remove piston assembly (19) from housing (20) by pushing on piston assembly with a wooden dowel from the small diameter end of housing.
8. Remove cups (16 & 18) from piston (17).
9. Depress piston (11) and remove retaining ring (10). Hold firmly, spring (13) will force piston (11) out of piston (17) bore. Remove cup (12) from piston.
10. Remove spring (13).
11. Remove piston assembly (15) from piston (17) by pushing on piston assembly (15) with a wooden dowel from the small diameter end of piston (17).
12. Remove relief valve assembly (29) from housing (20). With a box end wrench remove end cap (25). Remove o-ring (26) from end cap. **NOTE: End cap is under tension of spring (27).**
13. Remove spring (27).
14. Remove filler cap (22) and gasket (21) from housing (20).

ASSEMBLY

(Refer to Figures 1 and 4)

Use only mineral base hydraulic oil 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. Install new slotted retainer (14) on new piston assembly (15) and gently insert into piston (17). Note direction of retainer.
3. Install spring (13), large end first, into piston (17).
4. Install new cup (12) on piston (11).
5. Insert piston (11) into piston (17). Depress piston (11) and install new retaining ring (10).
6. Install new cup (16) and new cup (18) on piston (17). Note direction of cups (16 & 18).
7. Install piston assembly (19) into housing (20). Note direction of piston assembly.
8. Install spring (9) over piston assembly (19).
9. Install new o-ring (8) in housing (20) and new seal (6) on new retainer assembly (7). Install new retainer assembly into housing (20). Note direction of retainer assembly.
10. Install end plug (5) into housing (20) and tighten end plug (5) with a large box end wrench to approximately 67.8 N·m (50 lb·ft).
11. Insert new piston and body assembly (28) into housing (20).
12. Install new spring (27).
13. Install new o-ring (26) on end cap (25).
14. Install end cap (25) into housing (20) and torque end cap (25) 88.1-101.7 N·m (65-75 lb·ft).
15. Assemble new gaskets (2 & 4), fitting block (3), and line bolt (1) into end plug (5). Torque line bolt (1) 47.5-61.0 N·m (35-45 lb·ft). **NOTE: Hold fitting block (3) in upright fixed position while tightening line bolt.**

● Items included in Repair Kit

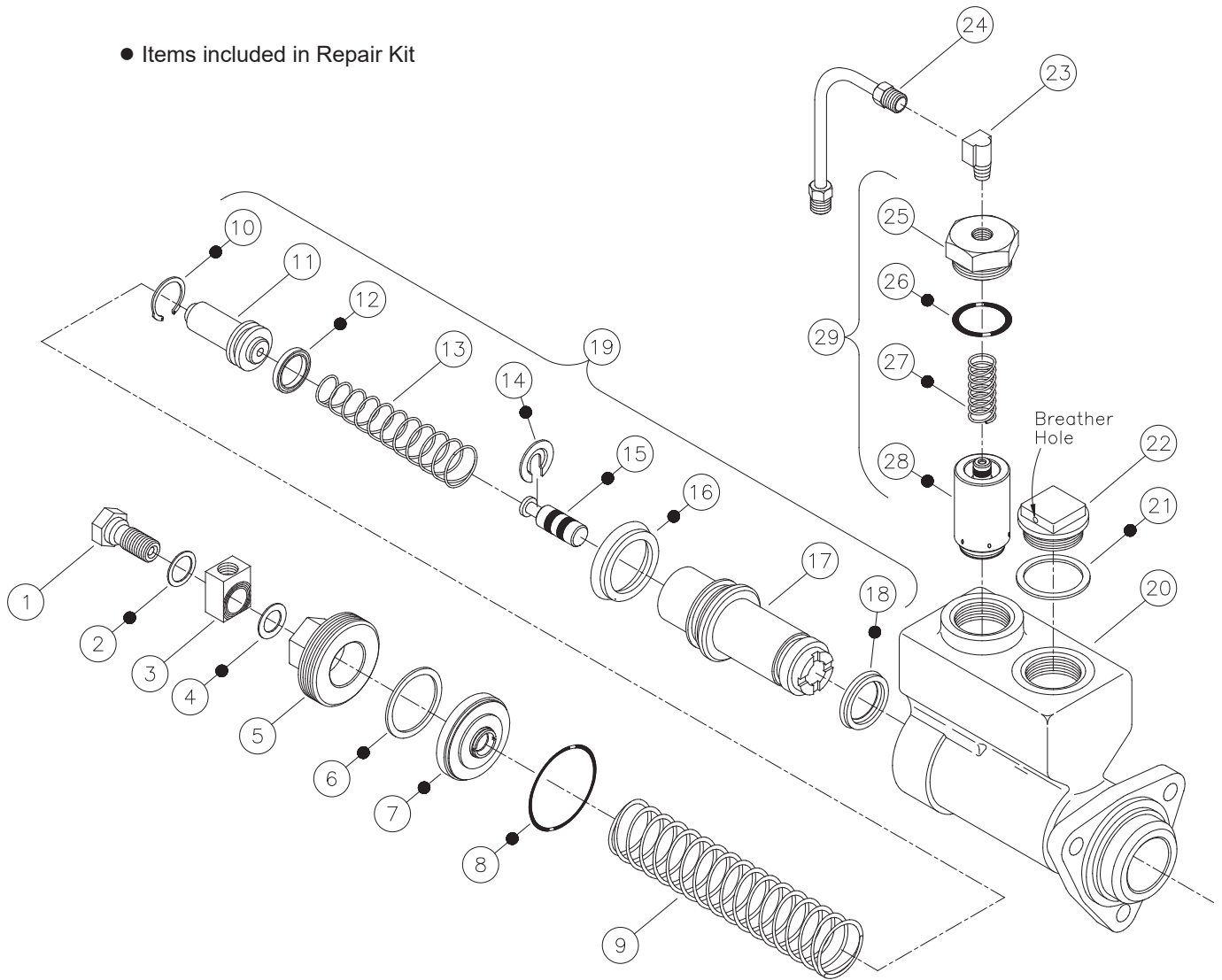


FIGURE 4

16. Install upper tube nut on tubing assembly (24) into elbow fitting (23) and torque 12.2-20.3 N·m (9-15 lb·ft). Tighten lower tube nut if necessary.
17. **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 gasket (21) and filler cap (22) on housing (20).

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 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).

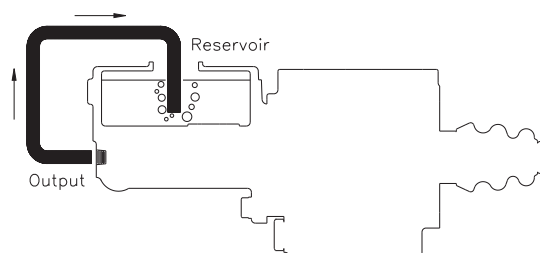


FIGURE 5

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