REVERSE MODULATING VALVE (poppet design)

Service Instructions

TABLE 1 (Specifications)

Model Number	***Valve Assembly Number	Repair Kit Number	Brake Pressure Setting		Model Number	***Valve Assembly Number	Repair Kit Number	Brake Pressure Setting	
			bar	(PSI)				bar	(PSI)
03-460-300	20-100-127	02-400-118	103.4 ± 1.7	(1500 ± 25)	**06-460-420	20-100-692	02-400-118	87.9 ± 3.5	(1275 ± 50)
03-460-302	20-100-127	02-400-118	103.4 ± 3.5	(1500 ± 50)	**06-460-426	20-100-738	02-400-118	120.7 ± 1.7	(1750 ± 25)
03-460-304	20-100-705	02-400-118	117.2 ± 3.5	(1700 ± 50)	**06-460-464	20-200-033	02-400-259	134.5 ± 6.9	(1950 ± 100)
03-460-308	20-100-705	02-400-118	117.2 ± 3.5	(1700 ± 50)	* 20-100-320	20-100-341	02-400-118	65.5 ± 3.5	(950 ± 50)
03-460-316	20-100-411	02-400-118	124.1 ± 3.5	(1800 ± 50)	* 20-100-424	20-100-127	02-400-118	103.4 ± 1.7	(1500 ± 25)
03-460-324	n/a	02-400-118	106.9 ± 3.5	(1550 ± 50)	* 20-100-545	20-100-547	06-400-161	55.2 ± 3.5	(800 ± 50)
03-460-326	20-100-127	02-400-118	103.4 ± 3.5	(1500 ± 50)	* 20-100-546	20-100-548	06-400-161	81.1 ± 5.2	(1175 ± 75)
03-460-328	n/a	02-400-118	106.9 ± 3.5	(1550 ± 50)	* 20-100-578	20-100-411	02-400-118	124.1 ± 3.5	(1800 ± 50)
03-460-357	20-100-863	02-400-118	103.4 ± 3.5	(1500 ± 50)	* 20-100-645	20-100-705	02-400-118	117.2 ± 3.5	(1700 ± 50)
03-460-362	20-100-889	02-400-118	124.1 ± 3.5	(1800 ± 50)	* 20-100-858	20-100-738	02-400-118	120.7 ± 1.7	(1750 ± 25)
03-460-364	20-100-921	02-400-118	110.3 ± 3.5	(1600 ± 50)	* 20-100-879	20-100-881	02-400-259	86.2 ± 5.2	(1250 ± 75)
03-460-366	20-100-929	02-400-118	131.0 ± 6.9	(1900 ± 100)	* 20-100-906	20-100-908	02-400-118	103.4 ± 1.7	(1500 ± 25)
03-460-368	20-100-956	02-400-263	110.3 ± 3.5	(1600 ± 50)	* 20-100-997	20-100-998	02-400-259	150.0 ± 6.9	(2175 ± 100)
03-460-472	20-100-998	02-400-259	150.0 ± 6.9	(2175 ± 100)	* 20-200-007	20-200-008	02-400-259	139.0 ± 6.9	(2000 ± 100)
**06-460-418	20-100-127	02-400-118	103.4 ± 3.5	(1500 ± 50)					

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

* No pedal and base assembly.

** No pedal.

*** Assembly of items 1 through 28 on page 3.

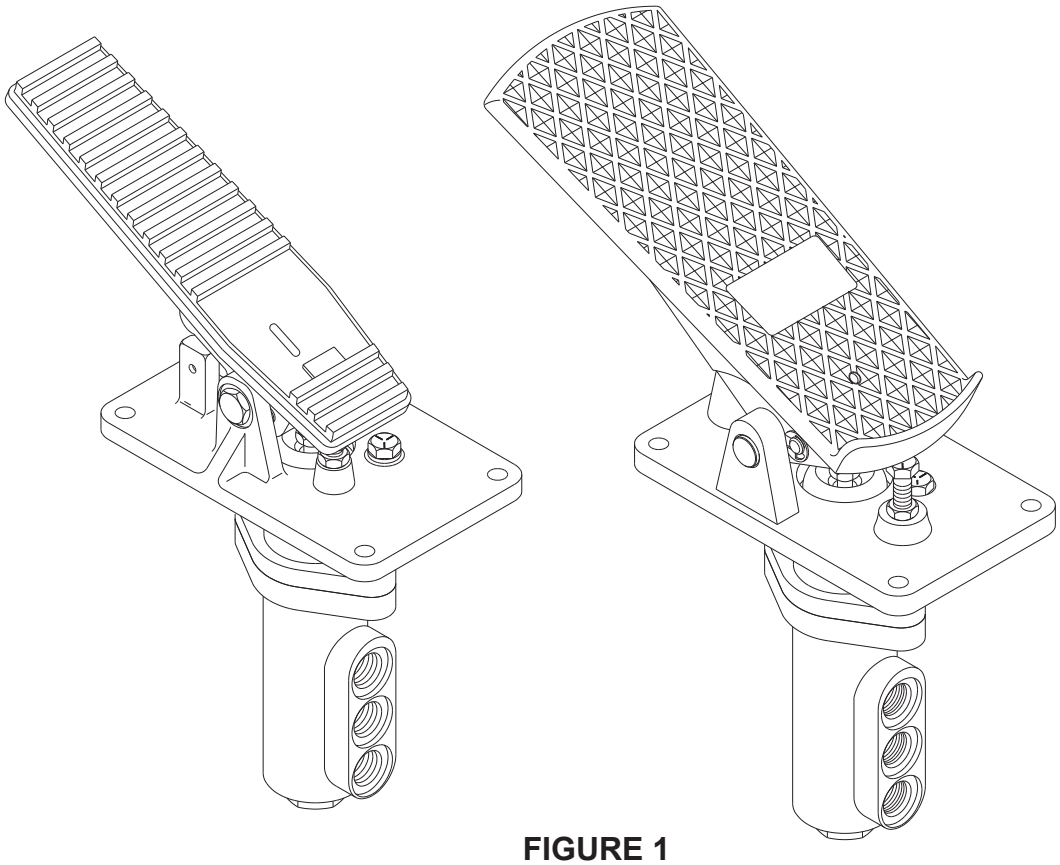

FIGURE 1

DISASSEMBLY

(Refer to Figures 2 and 3)

1. Depress pedal (50) and remove pedal stop screw (40) and jam nut (39) from base (43). Also loosen jam nut (38) for later removal of clevis (46).
2. Remove cap screws (45) and lock washers (44) from base (43).
3. Remove e-rings (42) from ends of pins (41). Remove pins (41). **NOTE: Some models use threaded studs (41), Figure 3, in place of pins (41) and e-rings (42).**
4. Remove set screw (49) from pedal (50). Remove e-rings (47) from both ends of pin (48). **NOTE: Not all models use e-rings (47).**
5. Separate pedal and base by removing pin (48) through clearance hole in pedal (50). Remove pedal (50) and base (43).
6. Temporarily insert pin (48) into clevis (46) and record distance from top of pin (48) to mounting flange of housing (34). This measurement will be necessary for reassembly purposes. **NOTE: Apply slight downward force on clevis (46) while taking measurement to assure that rod (29) is in contact with piston (28).**
7. Remove clevis (46) and jam nut (38) from rod (29).
8. Separate housings (14 & 34) by removing cap screws (36) and lock washers (35).
9. Remove rod (29), piston (30), spring (31), spring (32), and washer (33) from housing (34). Remove boot (37) from housing (34). **NOTE: Not all models use spring (32) or washer (33).**
10. Remove piston (28), shim(s) (27) and spring (26) from housing (14) bore. Note the number of shims being removed for reassembly purposes.
11. Remove o-ring (25) from housing (14) bore. **NOTE: Be careful not to scratch or mar housing bore.**
12. Remove retaining ring (24) from housing (14) bore. **NOTE: Be careful not to scratch or mar housing bore.**
13. Remove retainer (23) from housing (14) bore.
14. Remove retaining ring (22) from housing (14) bore.
15. Remove piston and sleeve assembly (16 & 21) from housing (14) bore. Separate piston (16) from sleeve (21).
16. Remove o-ring (19) and back-up ring (20) from sleeve (21).
17. Remove spring (15) from housing (14) bore.
18. Remove cup (17) and back-up ring (18) from piston (16). **NOTE: A check ball is located inside piston (16). Make sure ball is clean and moves freely. Some models use an o-ring in place of cup (17) and back-up ring (18).**
19. Remove plug (1) from housing (14).
20. Remove o-ring (2), cup (4), back-up ring (3), washer (5), spring (6), and guide (7) from plug (1). **NOTE: Some models use an o-ring in place of cup (4).**
21. Remove cage (8) from housing (14) bore.
22. Remove valve assembly (9) from housing (14) bore.
23. Remove o-ring (10) from valve assembly (9).
24. Remove plug (11) and ball (13) from housing (14). Remove o-ring (12) from plug (11).

ASSEMBLY

(Refer to Figures 2 and 3)

CLEAN AND INSPECT ALL PARTS FOR WEAR. LUBRICATE ALL RUBBER COMPONENTS FROM REPAIR KIT WITH CLEAN SYSTEM FLUID.

1. Install new o-ring (12) on plug (11). Install new ball (13) and plug (11) in housing (14). Torque plug (11) 88.1-101.7 N·m (65-75 lb·in).
2. Install new o-ring (10) on valve assembly (9) and insert into housing (14) bore. Note direction of valve assembly. **NOTE: Be sure valve assembly seat is fully seated into housing (14).**
3. Install new cage (8) into housing (14) bore.
4. Install new o-ring (2) on plug (1).
5. Insert new back-up ring (3) and new cup (4) inside end of plug (1). Note order of back-up ring and cup. **NOTE: Some models use an o-ring in place of cup (4).**
6. Install guide (7), spring (6), and washer (5) in plug (1). Install plug (1) in housing (14) and torque 54.3-67.8 N·m (40-50 lb·ft).
7. Install new cup (17) and new back-up ring (18) on piston (16) and insert piston into sleeve (21). Note direction of piston and sleeve. **NOTE: Some models use an o-ring in place of cup (17) and back-up ring (18).**
8. Install new back-up ring (20) and new o-ring (19) on sleeve (21).
9. Install spring (15) on piston (16).
10. Install piston and sleeve assembly (16 & 21) in housing (14) bore. Note direction of assembly.
11. Install new retaining ring (22) in housing (14) bore.
12. Install retainer (23) and retaining ring (24) in housing (14) bore. **NOTE: Be careful not to scratch or mar housing bore.**
13. Install new o-ring (25) in housing (14) bore.
14. Install spring (26), shim(s) (27), and piston (28) in housing (14) bore. Be sure to install the same number of shim(s) as were removed during disassembly.
15. Lightly coat inside bore of housing (34) with graphite based grease and install new boot (37) on housing (34).
16. Apply graphite based grease sparingly to piston (30) in the chamfered area where rod (29) makes contact.
17. Insert rod (29), piston (30), spring (31), spring (32) and washer (33) into housing (34). **NOTE: Not all models use spring (32) or washer (33).**
18. Attach housings (14 & 34) using cap screws (36) and lock washers (35). Torque 29.8-36.6 N·m (22-27 lb·ft).
19. Install jam nut (38) and clevis (46) on end of rod (29). Adjust the clevis to the distance recorded during disassembly.

LUBRICATE ALL BUSHINGS AND PINS WITH GRAPHITE BASED GREASE BEFORE ASSEMBLING THE PEDAL AND BASE.

20. Place base (43) on housing (34) mounting flange. Position pedal (50) and insert pin (48) through clearance hole in pedal and into clevis (46). **NOTE: Position pin so the flat area is aligned with set screw hole in pedal.**
21. Install set screw (49) in pedal (50) and torque 8.5-9.6 N·m (75-85 lb·in). Install new e-rings (47) on each end of pin (48). **NOTE: Not all models use e-rings (47).**
22. Insert pins (41) through base (43) and into pedal (50). Install new e-rings (42) on pins (41). **NOTE: Some models use threaded studs (41), Figure 3, in place of pins (41) and e-rings (42). Threaded studs to be torqued 47.5-54.3 N·m (35-40 lb·ft).**
23. Attach base (43) to valve assembly using cap screws (45) and lock washers (44). Torque cap screws (45) 29.8-36.6 N·m (22-27 lb·ft).
24. Fully depress pedal (50) and torque jam nut (38) 27.1-32.5 N·m (20-24 lb·ft) against clevis (46).
25. Install pedal stop screw (40) and jam nut (39). **NOTE: With pedal in the release position, adjust pedal stop screw and jam nut so there is 0.38 to 0.76 mm (0.015-0.030 in) of clearance between the pedal and top of pedal stop screw. Torque jam nut (38) 27.1-32.5 N·m (20-24 lb·ft).**

NOTE

After service, the valve must develop the pressure indicated in the specifications, TABLE 1. Shim(s) (27) may be added or removed to obtain the correct pressure setting.

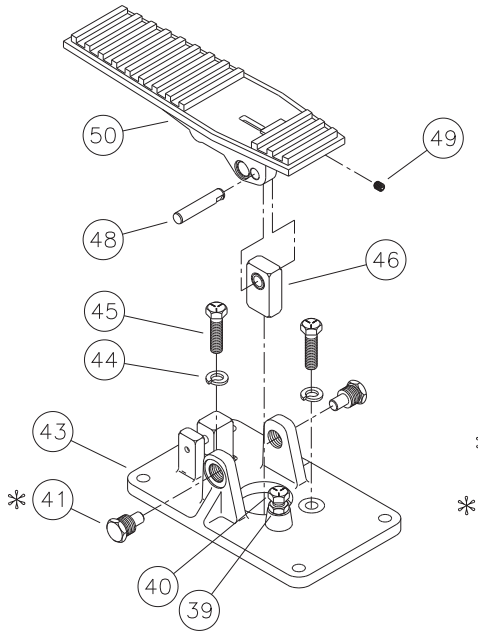

FIGURE 3

- ● Items included in Repair Kits
- ✻ Not used in all models

NOTE: Not all models include pedal and base assembly.

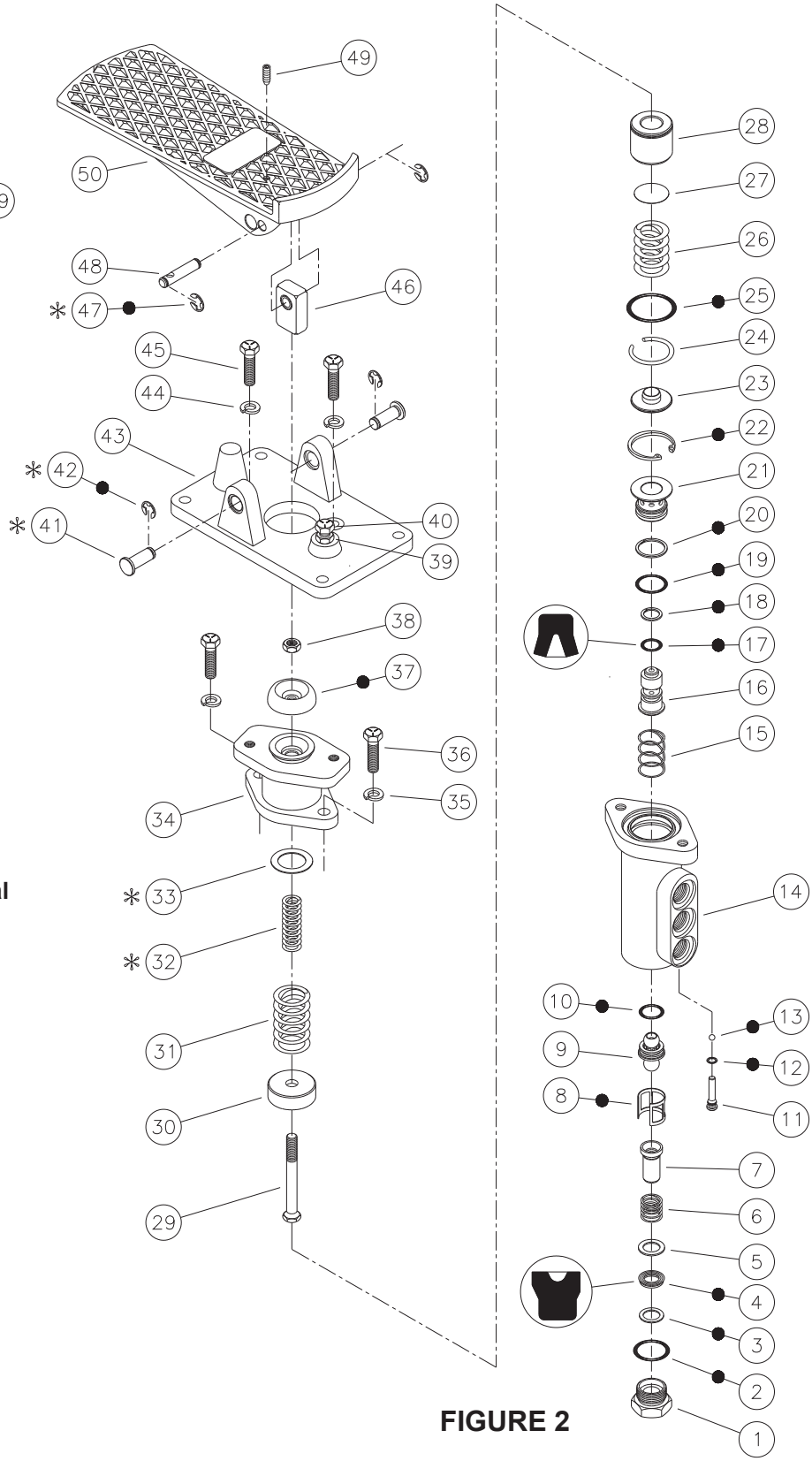

FIGURE 2

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