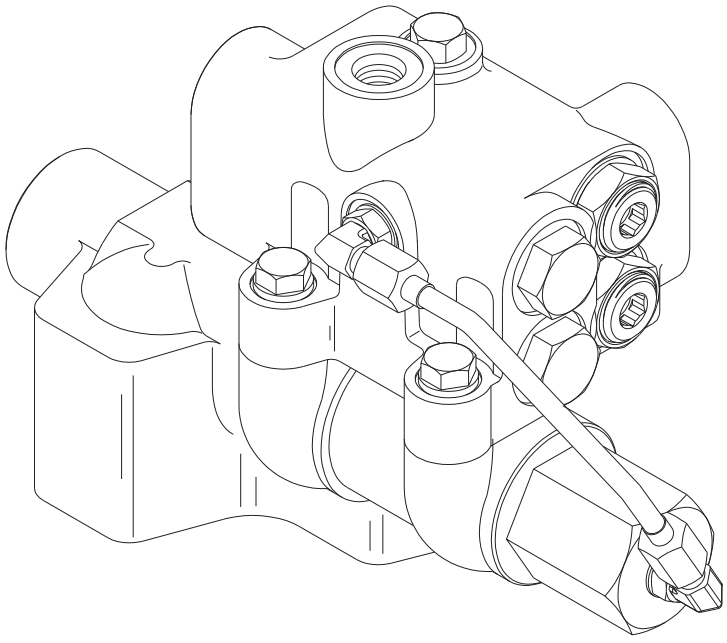
Dual ACCUMULATOR CHARGING VALVE

Service Instructions

TABLE 1 (Specifications)

Model Number	Repair Kit Number	Accumulator High Limit (cut out)		Accumulator Low Limit (cut in)	
		bar	(PSI)	bar	(PSI)
06-460-216	06-400-086	69.0 ± 1.7	(1000 ± 25)	48.3 ± 3.5	(700 ± 50)
06-460-218	06-400-086	124.1 ± 1.7	(1800 ± 25)	96.6 ± 3.5	(1400 ± 50)
06-460-222	06-400-086	158.6 ± 1.7	(2300 ± 25)	131.0 ± 3.5	(1900 ± 50)
06-460-252	06-400-086	124.1 ± 1.7	(1800 ± 25)	96.6 ± 3.5	(1400 ± 50)
06-460-264	06-400-086	153.4 ± 1.7	(2225 ± 25)	125.8 ± 3.5	(1825 ± 50)
06-460-266	06-400-086	89.6 ± 1.7	(1300 ± 25)	41.4 ± 3.5	(600 ± 50)
06-460-284	06-400-086	124.1 ± 1.7	(1800 ± 25)	96.6 ± 3.5	(1400 ± 50)
06-460-290	06-400-086	124.1 ± 1.7	(1800 ± 25)	96.6 ± 3.5	(1400 ± 50)
06-460-292	06-400-086	158.6 ± 1.7	(2300 ± 25)	131.0 ± 3.5	(1900 ± 50)

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



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⚠ WARNING

Be sure system energy is relieved from accumulator charging valve before removing from machine. See machine operating instructions for procedures to relieve system energy.

REFER TO MACHINE MANUFACTURE PROCEDURES AND RECOMMENDATIONS BEFORE REMOVING VALVE FROM MACHINE. PREVENT CONTAMINATION TO THE HYDRAULIC SYSTEM AND VALVE BY THOROUGHLY CLEANING THE VALVE AND SURROUNDING AREA OF ALL DIRT, GREASE, OIL, ETC. BEFORE REMOVING VALVE FROM THE MACHINE. AFTER REMOVAL, CAP HOSE AND LINE ENDS TO PREVENT ENTRY OF DIRT INTO THE HYDRAULIC SYSTEM.

DISASSEMBLY

(Refer to Figure 1)

1. Loosen tube nuts on tubing (1) and remove tubing (1).
2. Remove elbows (2 & 45). Remove o-rings (3) from elbows (2 & 45).
3. Separate housings (11 & 41) by removing three cap screws (43 & 46) and lock washers (44). Remove o-rings (12 & 13).
4. Remove end cap (4), piston (7), retainer (8) and spring (9) from housing (11). Remove o-ring (6) from piston (7). Remove o-ring (5) from end plug (4).
5. Remove retaining ring (16) from housing (11). Use a pull hammer threaded into plug (15) and remove plug (15) from housing (11). Remove o-ring (14) from plug (15).
6. Using a 6.35-7.87 mm (0.25-0.31 in) diameter wood or plastic dowel, carefully remove spool (10) out plug (4) side of housing (11). Remove o-ring (6) from spool (10). **NOTE: Be careful not to scratch or mar spool (10) or housing bore.**
7. Remove potting compound covering plug (30) with a chisel and hammer. A small pick can be used to remove potting compound from threads of housing (41) and screwdriver slot of plug (30). **NOTE: Be careful not to damage threads of housing (41).**
8. Before removing plug (30) from housing (41) accurately measure its depth from end of housing and record the distance for reassembly purposes.
9. Remove plug (30) from housing (41). Remove o-ring (29) from plug (30).
10. Remove nylon pin (31) from plug (30) using a drive pin punch. Be careful not to damage threads.
11. Remove spring (28), guide (27), and ball (26) from housing (41). **NOTE: Balls (26 & 21) are different diameters in some models. For reassembly purposes, do not intermix balls (26 & 21).**
12. Remove plug (17) from housing (41). Remove o-ring (18) from plug (17).
13. Remove spring (19), guide (20), and ball (21) from housing (41). Do not intermix balls (26 & 21).
14. Using a 6.35 mm (0.25 in) diameter wooden or plastic dowel, carefully push insert (23) and spool (22) from housing (41). **NOTE: Be careful not to scratch or mar valve seats on insert (23).**
15. Remove spool (22) from insert (23). Remove o-rings (24 & 25) from insert (23).
16. Repeat steps 7 through 15 for cavity B.
17. **Earlier Models:** Loosen nut (32) on screw assembly (33) and remove screw assembly (33) from housing (41). Remove o-ring (34) from screw assembly (33). Remove spring (35), poppet/ball (36), seat (37), o-ring (18) and washer (38) from housing (41).
    Later Models: Some later models use a directional spring (35). Directional spring (35) is attached to screw assembly (33) by means of the small diameter end of spring (35) being snapped into a groove on the nose end of screw assembly (33). See Figure 1a. Remove nut (32) and remove screw assembly (33) from housing (41). Remove o-ring (34) from screw assembly (33) from nut (32) side of screw assembly. Remove shim (47), spring (35), steel ball (36), seat (37), o-ring (18) and orifice (38) from housing (41).
18. Remove filter (39) and washer (40) from housing (41). **NOTE: Not all models use filter (39), these models use two washers (40). Some models use a steel ball in place of plastic poppet (36).**
19. Repeat steps 17 and 18 for cavity A.
20. Remove plug (42) from housing (41). Remove o-ring (3) from plug (42).

ASSEMBLY

(Refer to Figure 1)

CLEAN ALL PARTS THOROUGHLY WITH CLEAN SOLVENT AND LET DRY. LUBRICATE ALL RUBBER PARTS WITH CLEAN SYSTEM FLUID PRIOR TO ASSEMBLING. BE SURE ENTIRE ASSEMBLY PROCEDURE IS DONE WITH CONTAMINATION FREE METHODS.

1. Install new o-rings (24 & 25) on insert (23).
2. Insert spool (22) into insert (23). Note direction of insert (23) and spool (22). Carefully install insert (23) in housing (41).
3. Install ball (21) in housing (41).
4. Put a small amount of grease on the end of spring (19) to hold stop (20) in place. Install stop (20) and spring (19) in housing (41). Note direction of stop (20) and spring (19).
5. Install new o-ring (18) on plug (17) and install plug (17) in housing (41). Torque plug 54.2-61.0 N·m (40-45 lb·ft).
6. Position housing (41) so plug (30) housing bore faces up. Install ball (26), retainer (27), and spring (28) into housing (41).
7. Insert new nylon pin (31) into plug (30). Be sure nylon plug is properly aligned and evenly driven into plug (30). Do not damage threads.
8. Install new o-ring (29) on plug (30) and install plug (30) in housing (41) to the depth recorded during disassembly.
9. Repeat steps 1 through 8 for cavity B.
10. Install washer (40) and new filter (39) in housing (41). **NOTE: Not all models use filter (39), these models use two washers (40).**
11. **Earlier Models:** Install new o-ring (34) on screw assembly (33). Install washer (38), new o-ring (18), seat (37), new poppet (36) or ball (36), spring (35) and screw assembly (33) into housing (41). Torque screw assembly (33) 24.4-29.8 N·m (18-22 lb·ft). Then install nut (32) on screw assembly (33) and torque nut 43.4-51.5 N·m (32-38 lb·ft). **NOTE: If the valve uses a steel ball in place of plastic poppet (36), reinstall steel ball.**
    Later models: Some later models use a directional spring (35). Directional spring (35) is attached to screw assembly (33) by means of the small diameter end of spring (35) being snapped into groove on the nose end of screw assembly (33). If necessary, reattach the small diameter of spring (35) into the groove on the nose end of screw assembly (33) using a slight twisting motion. See Figure 1a. Install new o-ring (34) on screw assembly (33) from nut (32) side of screw assembly. Install orifice (38), new o-ring (18), seat (37), steel ball (36) and spring (35) in housing (41). Fully lubricate shim (47) with clean system fluid and install in housing (41) on end of seat (37). Install screw assembly (33) in housing (41). Torque screw assembly (33) 24.4-29.8 N·m (18-22 lb·ft). Then install nut (32) on screw assembly (33) and torque nut 43.4-51.5 N·m (32-38 lb·ft).
12. Repeat steps 10 and 11 for cavity A.
13. Install new o-ring (3) on plug (42). Install plug (42) in housing (41) and torque 24.4-29.8 N·m (18-22 lb·ft).
14. Install new o-ring (14) on plug (15). Install plug (15) and retaining ring (16) in housing (11).
15. Install new o-ring (6) on spool (10). Insert spool (10) in housing (11) through plug (4) side of housing. Be sure spool is all the way into bore so the spool contacts plug (15). Note direction of spool.
16. Install new o-rings (3) on elbows (2 & 45).
17. Install new o-ring (5) on end plug (4). Install elbow (2) in end plug (4).
18. Install new o-ring (6) on piston (7). Install piston (7), retainer (8) and spring (9) into end plug (4).

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

Figure 1a

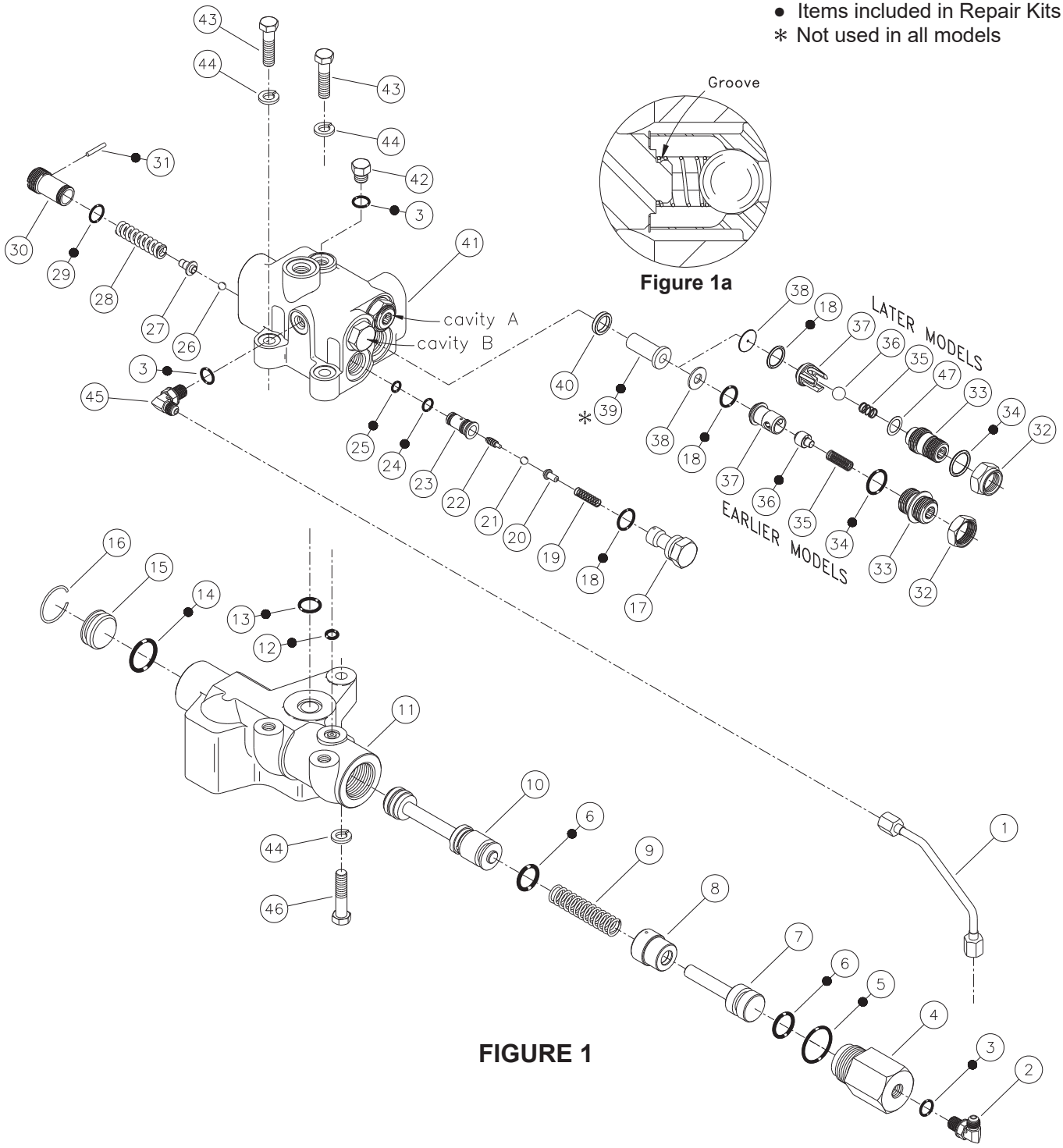

FIGURE 1

19. Install end plug (4) in housing (11) and torque 54.2-67.8 N·m (40-50 lb·ft).
20. Place new o-rings (12 & 13) in the proper grooves on housing (11).
21. Attach housing (11) to housing (41) using three cap screws (43 & 46) and lock washers (44). Torque cap screws 29.8-36.6 N·m (22-27 lb·ft).
22. Install elbow (45) into housing (41). Connect tubing (1) to elbows (2 & 45). Torque nut on elbows (2 & 45) 2.2-20.3 N·m (9-15 lb·ft). Torque tube nuts on tubing (1)12.2-20.3 N·m (9-15 lb·ft).

VALVE ADJUSTMENT

1. Properly reinstall valve. Tee an accurate pressure gauge into each accumulator line.
2. Start the pump and allow approximately one minute for charging to start (pressure in gauges will read accumulator precharge plus). If valve does not begin to charge, turn plug (30) in, stopping when gauge shows an increase in pressure. Check the high limit specifications (see TABLE 1) and adjust plug (30) until the high limit setting is achieved. This pressure can be checked correctly only if after each adjustment of plug (30) the accumulator pressure is reduced below the low limit setting and the system recharges the accumulator pressure to its high limit. **NOTE: Both gauges should rise to the highest setting.**
3. Repeat step 2 for cavity B.

SERVICE CHECKS FOR HYDRAULIC SYSTEMS

ACCUMULATOR CHARGING CYCLE REPEATS FREQUENTLY WHEN ACCUMULATOR IS NOT NORMALLY BEING DISCHARGED IN SERVICE

1. Leaking accumulator lines or fittings
1. **Check lines and fittings for leaks and correct**
2. Accumulator gas charge too low
2. **Check accumulator gas charge**
3. Accumulator gas charge too high
3. **Check accumulator gas charge**
4. Line to accumulator plugged
4. **Replace line**
5. Inoperative charging valve
5. **Replace charging valve**

ACCUMULATOR STARTS TO CHARGE BUT DOES NOT REACH HIGH LIMIT

1. No oil or low oil level in tank
1. **Check oil level**
2. Inoperative or worn pump (pump does not deliver full flow or pressure)
2. **Check pump pressure and flow**
3. Inoperative system relief valve (valve leaking or has low setting so full flow and pressure are not available)
3. **Check relief valve**
4. Inoperative charging valve
4. **Replace charging valve**

ACCUMULATOR CHARGING TIME TOO LONG

1. No oil or low oil level in tank
1. **Check oil level**
2. Relief valve setting too low
2. **Check valve setting**
3. Pump worn or inoperative and not delivering full flow or pressure
3. **Check pump**
4. Inoperative charging valve
4. **Replace charging valve**

ACCUMULATOR FAILS TO START CHARGING

1. No oil or low oil level in tank
1. **Check oil level**
2. Worn or inoperative pump
2. **Check pump pressure and flow**
3. Inoperative relief valve
3. **Check relief valve setting**
4. Inoperative charging valve
4. **Replace charging valve**

VERY RAPID CYCLING OF CHARGING VALVE

1. Accumulator gas charge too low
1. **Check gas charge**
2. Accumulator gas charge too high
2. **Check gas charge**
3. No gas charge in accumulator
3. **Check gas charge**
4. Inoperative charging valve
4. **Replace charging valve**

LACK OF ADEQUATE FLOW THROUGH VALVE

1. Inoperative pump
1. **Check pump pressure and delivery**
2. Inoperative relief valve
2. **Check relief valve setting**
3. Blocked lines
3. **Replace lines**
4. Inoperative charging valve
4. **Replace charging valve**

CHARGING VALVE SERVICE DIAGNOSIS

(Refer to Figure 1)

ACCUMULATOR CHARGING CYCLE REPEATS FREQUENTLY WHEN THE ACCUMULATOR IS NOT NORMALLY BEING DISCHARGED IN SERVICE

1. One of poppets/balls (36) leaking
2. One of o-rings (18) next to seat (37) leaking
3. One of pilot valve balls (21) leaking
4. Damaged seat on one of inserts (23)

ACCUMULATORS START TO CHARGE BUT DOES NOT REACH HIGH LIMIT

1. O-rings (24 or 25) on one of the pilot valve bodies is damaged
2. O-ring (6) on charging valve spool (10) has been damaged or worn

ACCUMULATOR CHARGING TIME TOO LONG

1. Broken charging valve spring (9)
2. Charging valve spring (9) has taken a set
3. Dirt in filters (39)
4. One of poppets (36) stuck, partially closed

ACCUMULATORS FAIL TO START CHARGING

1. One of pilot valve springs (28) is broken
2. Broken charging valve spring (9)
3. O-ring (6) defective
4. Charging valve spool (10) stuck
5. Dirt in filters (39)

VERY RAPID CYCLING OF CHARGING VALVE

1. Spool (22)/insert (23) worn