

NOTE

This literature services various models in this valve series. The components shown in Figures 1 through 6 may appear different than what is found in your valve.

MODULATING VALVE and RELAY VALVE Service Instructions

TABLE 1 (Specifications)

Caterpillar Part Number	Brake Pressure Setting	
	bar	(PSI)
129-2359	43.1 ± 3.4	(625 ± 50)
194-7658	69.8 ± 4.3	(1012 ± 63)
288-1165	60.7 ± 3.4	(880 ± 50)
325-3360	49.0 ± 2.8	(710 ± 40)
459-9298	92.3 ± 2.8	(1338 ± 40)

DISASSEMBLY

(Refer to Figure 1)

NOTE

Housing (9) and spool (8) are manufactured as a matched set. This set (housing and spool) should not be intermixed with other parts.

1. Remove boot (22) from retainer (20) and piston (17).
2. Remove retainer (20), piston (17), springs (16, 15, & 14), shim(s) (13), and retainer assembly (12) from housing (9).
NOTE: Be aware of the number of shim(s) being removed from housing (9). Retaining ring (11) and spacer (10) need not be removed from housing (9). Not all models use spring (16).
3. Carefully remove cup (21), quad ring (18), and o-ring (19) from retainer (20). Note direction and order of cup (21) and quad ring (18). **NOTE: Be careful not to scratch or mar retainer bore.**
4. Separate housing (9) and end cap (3) by removing cap screws (1) and washers (2). Remove o-rings (6 & 7) from housing (9) or end cap (3).
5. Remove retainer (5) and spring (4) from end cap (3).
6. Carefully remove spool (8) from housing (9). **NOTE: Be careful not to damage spool or housing bore.**

CAUTION

Do not intermix spool and housing. Spool (8) and housing (9) are a matched set.

ASSEMBLY

(Refer to Figure 1)

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 o-rings (6 & 7) in the proper o-ring pockets on housing (9).
3. Lubricate spool (8) with clean system fluid and carefully slide into bottom end of housing (9) bore. Note direction of spool (8). **NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.**
4. Place spring (4) and retainer (5) in end cap (3) and reassemble housing (9) and end cap (3) using cap screws (1) and washers (2). Use Loctite 242 on cap screws and torque 24.4-29.8 N·m (18-22 lb·ft). **NOTE: Make sure housing and end cap line up correctly and that o-rings (6 & 7) remain in the pockets during assembly.**

5. Carefully install new cup (21), new quad ring (18), and new o-ring (19) on retainer (20). Note direction and order of cup (21) and quad ring (18). **NOTE: Be careful not to scratch or mar retainer bore.**
6. Assemble springs (14, 15, & 16), shim(s) (13) and retainer assembly (12) in piston (17). **NOTE: Not all models use spring (16).**
7. Carefully install retainer (20) over piston (17) and install retainer (20) assembly into housing (9). Torque retainer (20) 81.4-94.9 N·m (60-70 lb·ft).
8. Install new boot (22) on retainer (20) and piston (17).

NOTE

After service, the valve must develop the pressure indicated in the specifications, Table 1. Shim(s) (13) are used to obtain the correct pressure setting. Contact machine manufacture if brake pressure setting is not able to be obtained.

- Items included in Repair Kit
- * Not used in all models

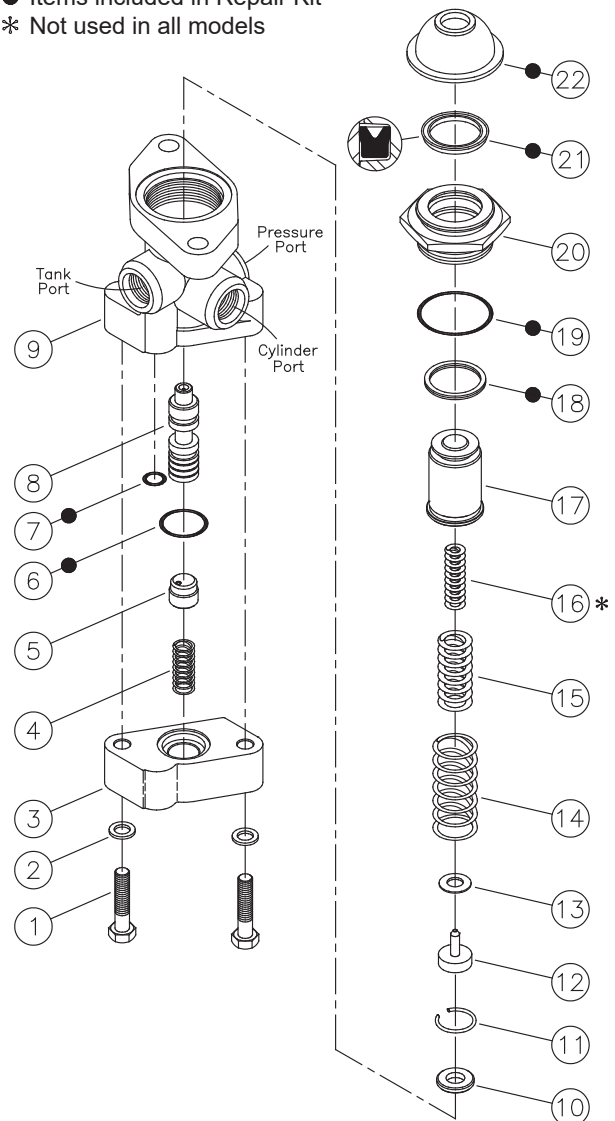


FIGURE 1

TABLE 2 (Specifications)

Caterpillar Part Number	Brake Pressure Setting	
	bar	(PSI)
123-9849	69.8 ± 4.3	(1012 ± 63)
128-2993	43.1 ± 3.5	(625 ± 50)
149-3424	55.2 ± 3.5	(800 ± 50)
169-3504	47.6 ± 0.69	(690 ± 10)
201-3199	46.5 ± 1.7	(675 ± 25)
201-3200	43.1 ± 3.5	(625 ± 50)
210-3142	43.1 ± 3.5	(625 ± 50)
210-5587	46.5 ± 1.7	(675 ± 25)
236-8832	65.5 ± 3.5	(950 ± 50)
260-9632	43.1 ± 3.5	(625 ± 50)
264-5727	50.0 ± 3.5	(725 ± 50)
294-0978	46.9 ± 2.4	(680 ± 35)
308-9523	58.6 ± 3.5	(850 ± 50)
385-9335	48.3 ± 3.5	(700 ± 50)
437-2852	55.2 ± 3.5	(800 ± 50)
584-3413	35.0 ± 1.4	(508 ± 20)

DISASSEMBLY

(Refer to Figure 2)

NOTE

Housings (6 & 11) and spools (7 & 10) are manufactured as matched sets. These sets (housing & spool) should not be intermixed with other parts. Some valves have a plug in one of the tank ports, this plug need not be removed.

1. Remove boot (24) from retainer (22) and piston (19).
2. Remove retainer (22), piston (19), springs (18, 17, & 16), shim(s) (15) and retainer assembly (14) from housing (11).
NOTE: Be aware of the number of shim(s) being removed from housing (11). Retaining ring (13) and spacer (12) need not be removed from housing (11).
3. Carefully remove cup (23), quad ring (20), and o-ring (21) from retainer (22). Note direction and order of cup (23) and quad ring (20). **NOTE: Be careful not to scratch or mar retainer bore.**
4. Remove end plug (1) and spring (3) from housing (6). Remove o-ring (2) from end plug (1).
5. Separate housings (6 & 11) by removing cap screws (4) and washers (5). Remove o-rings (8 & 9) from housings (6 & 11).
6. Carefully remove spools (7 & 10) from housings (6 & 11).
NOTE: Be careful not to damage spools or housing bores.

CAUTION

Do not intermix spools and housings. Spool (7) and housing (6) are a matched set as are spool (10) and housing (11).

ASSEMBLY

(Refer to Figure 2)

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 o-rings (8 & 9) in the proper o-ring pockets on housings (6 & 11).
3. Lubricate spool (10) with clean system fluid and carefully slide into bottom end of housing (11) bore. Note direction of spool (10). **NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.**

4. Reassemble housings (6 & 11) using cap screws (4) and washers (5). Use Loctite 242 on cap screws and torque 29.8-33.9 N·m (22-25 lb·ft). **NOTE: Make sure housings line up correctly and that o-rings (8 & 9) remain in the pockets during assembly.**
5. Lubricate spool (7) with clean system fluid and carefully slide into housing (6) bore. Note direction of spool (7).
NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.
6. Install new o-ring (2) on end plug (1).
7. Install spring (3) and end plug (1) into housing (6). Torque end plug (1) 47.5-54.2 N·m (35-40 lb·ft).
8. Carefully install new cup (23), new quad ring (20), and new o-ring (21) on retainer (22). Note direction and order of cup (23) and quad ring (20). **NOTE: Be careful not to scratch or mar retainer bore.**
9. Assemble springs (16, 17, & 18), shim(s) (15), and retainer assembly (14) in piston (19).
10. Carefully install retainer (22) over piston (19) and install retainer (22) assembly into housing (11). Torque retainer (22) 81.4-94.9 N·m (60-70 lb·ft).
11. Install new boot (24) on retainer (22) and piston (19).

NOTE

After service, the valve must develop the pressure indicated in the specifications, Table 2. Shim(s) (15) are used to obtain the correct pressure setting. Contact machine manufacture if brake pressure setting is not able to be obtained.

● Items included in Repair Kit

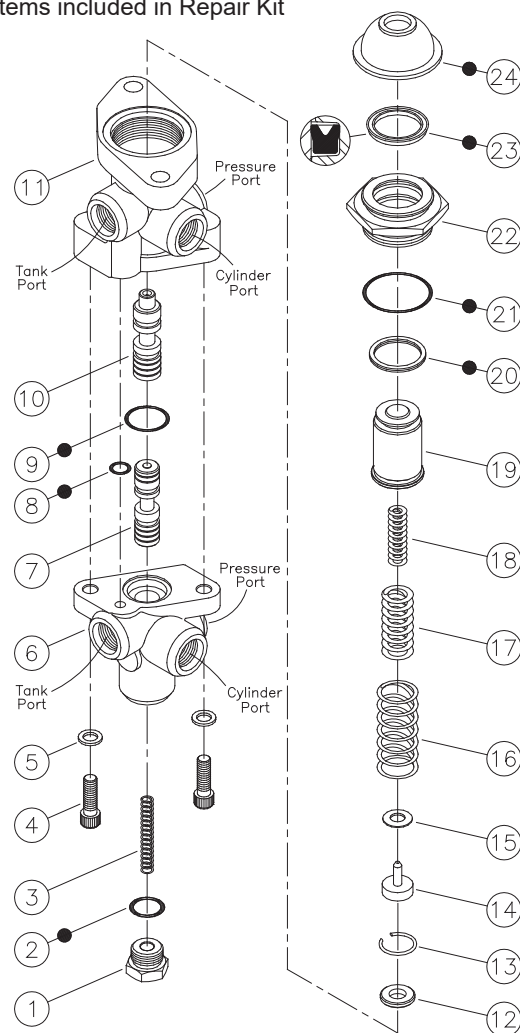
**FIGURE 2**

TABLE 3 (Specifications)

Caterpillar Part Number	Brake Pressure Setting	
	bar	(PSI)
130-4917	69.0 ± 5.2	(1000 ± 75)
143-5605	58.6 ± 3.5	(850 ± 50)
144-8521	56.0 ± 4.3	(812 ± 63)
201-3198	69.8 ± 4.3	(1012 ± 63)
215-3687	86.2 ± 3.5	(1250 ± 50)
345-2103	56.9 ± 3.5/-1.7	(825 ± 50/-25)
456-1803	165.5 ± 10.3	(2400 ± 150)

DISASSEMBLY

(Refer to Figure 3)

NOTE

Housings (7 & 12) and spools (8 & 11) are manufactured as matched sets. These sets (housing and spool) should not be intermixed with other parts. Some valves have a plug in one of the tank ports, this plug need not be removed.

1. Remove boot (24) from retainer (22) and piston (19).
2. Remove retainer (22), piston (19), springs (17 & 18), shim(s) (16), and retainer assembly (15) from housing (12).
NOTE: Be aware of the number of shim(s) being removed from housing (12). Retaining ring (14) and spacer (13) need not be removed from housing (12).
3. Carefully remove cup (23), quad ring (20), and o-ring (21) from retainer (22). Note direction and order of cup and quad ring. **NOTE: Be careful not to scratch or mar retainer bore.**
4. Remove end plug (1), retainer (2), and spring (4) from housing (7). Remove o-ring (3) from end plug (1).
NOTE: Not all models use retainer (2).
5. Separate housings (7 & 12) by removing cap screws (5) and washers (6). Remove o-rings (9 & 10) from housings (7 & 12).
6. Carefully remove spools (8 & 11) from housings (7 & 12).
NOTE: Be careful not to damage spools or housing bores.

CAUTION

Do not intermix spools and housings. Spool (8) and housing (7) are a matched set as are spool (11) and housing (12).

ASSEMBLY

(Refer to Figure 3)

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 o-rings (9 & 10) in proper o-ring pockets on housings (7 & 12).
3. Lubricate spool (11) with clean system fluid and carefully slide into bottom end of housing (12) bore. Note direction of spool (11). **NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.**
4. Reassemble housings (7 & 12) using cap screws (5) and washers (6). Use Loctite 242 on cap screws and torque 29.8-33.9 N·m (22-25 lb·ft). **NOTE: Make sure housings line up correctly and that o-rings (9 & 10) remain in the pockets during assembly.**
5. Lubricate spool (8) with clean system fluid and carefully slide into housing (7) bore. Note direction of spool (8).
NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.
6. Install new o-ring (3) on end plug (1).

7. Install spring (4), retainer (2), and end plug (1) into housing (9). Torque end plug (1) 47.5-54.2 N·m (35-40 lb·ft).
NOTE: Not all models use retainer (2).
8. Carefully install new cup (23), new quad ring (20), and new o-ring (21) on retainer (22). Note direction and order of cup (23) and quad ring (20). **NOTE: Be careful not to scratch or mar retainer bore.**
9. Assemble springs (17 & 18), shim(s) (16), and retainer assembly (15) in piston (19).
10. Carefully install retainer (22) over piston (19) and install retainer (22) assembly into housing (12). Torque retainer 81.4-94.9 N·m (60-70 lb·ft).
11. Install new boot (24) on retainer (22) and piston (19).

NOTE

After service, the valve must develop the pressure indicated in the specifications, Table 3. Shim(s) (16) are used to obtain the correct pressure setting. Contact machine manufacture if brake pressure setting is not able to be obtained.

● Items included in Repair Kit

* Not used in all models

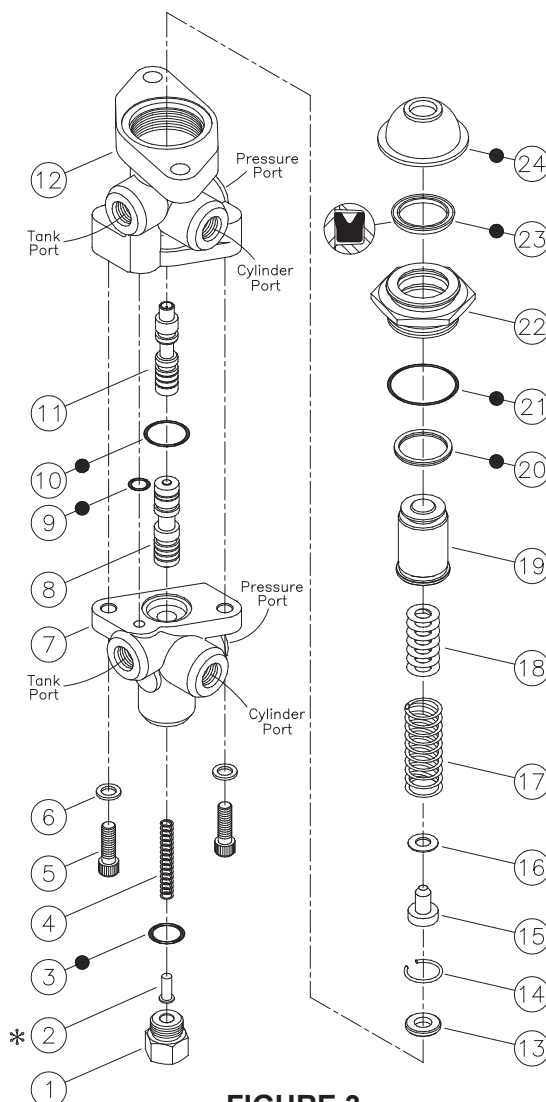
**FIGURE 3**

TABLE 4 (Specifications)

Caterpillar Part Number	Brake Pressure Setting	
	bar	(PSI)
200-0866	47.2 ± 2.8/-1.7	(685 ± 40/-25)
269-3289	43.1 ± 3.4	(625 ± 50)
306-9502	58.6 ± 1.7	(850 ± 25)
310-2729	33.1 ± 2.1	(480 ± 30)
607-9900	46.5 ± 3.4	(674 ± 50)

DISASSEMBLY

(Refer to Figure 4)

NOTE

Housings (6 & 10) and spools (7 & 9) are manufactured as matched sets. These sets (housing & spool) should not be intermixed with other parts.

1. Remove boot (23) from retainer (21) and piston (18).
2. Remove retainer (21), piston (18), springs (17, 16, & 15), shim(s) (14), and retainer assembly (13) from housing (10).
NOTE: Be aware of the number of shim(s) being removed from housing (10). Retaining ring (12) and spacer (11) need not be removed from housing (10).
3. Carefully remove cup (22), quad ring (19), and o-ring (20) from retainer (21). Note direction and order of cup (22) and quad ring (19). **NOTE: Be careful not to scratch or mar retainer bore.**
4. Remove end plug (1) and spring (3) from housing (6). Remove o-ring (2) from end plug (1).
5. Separate housings (6 & 10) by removing cap screws (4) and washers (5). Remove o-ring (8) from housings (6 & 10).
6. Carefully remove spools (7 & 9) from housings (6 & 10).
NOTE: Be careful not to damage spools or housing bores.

CAUTION

Do not intermix spools and housings. Spool (7) and housing (6) are a matched set as are spool (9) and housing (10).

ASSEMBLY

(Refer to Figure 4)

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 o-ring (8) in proper o-ring pocket on housings (6 & 10).
3. Lubricate spool (9) with clean system fluid and carefully slide into bottom end of housing (10) bore. Note direction of spool (9). **NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.**
4. Reassemble housings (6 & 10) using cap screws (4) and washers (5). Use Loctite 242 on cap screws and torque 47.5-61.0 N·m (35-45 lb·ft). **NOTE: Make sure housings line up correctly and that o-ring (8) remains in the pocket during assembly.**
5. Lubricate spool (7) with clean system fluid and carefully slide into housing (6) bore. Note direction of spool (7).
NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.
6. Install new o-ring (2) on end plug (1).
7. Install spring (3) and end plug (1) into housing (6). Torque end plug (1) 47.5-54.2 N·m (35-40 lb·ft).

8. Carefully install new cup (22), new quad ring (19), and new o-ring (20) on retainer (21). Note direction and order of cup (22) and quad ring (19). **NOTE: Be careful not to scratch or mar retainer bore.**
9. Assemble springs (15, 16, & 17), shim(s) (14), and retainer assembly (13) in piston (18).
10. Carefully install retainer (21) over piston (18) and install retainer (21) assembly into housing (10). Torque retainer (21) 81.4-94.9 N·m (60-70 lb·ft).
11. Install new boot (23) on retainer (21) and piston (18).

NOTE

After service, the valve must develop the pressure indicated in the specifications, Table 4. Shim(s) (14) are used to obtain the correct pressure setting. Contact machine manufacture if brake pressure setting is not able to be obtained.

● Items included in Repair Kit

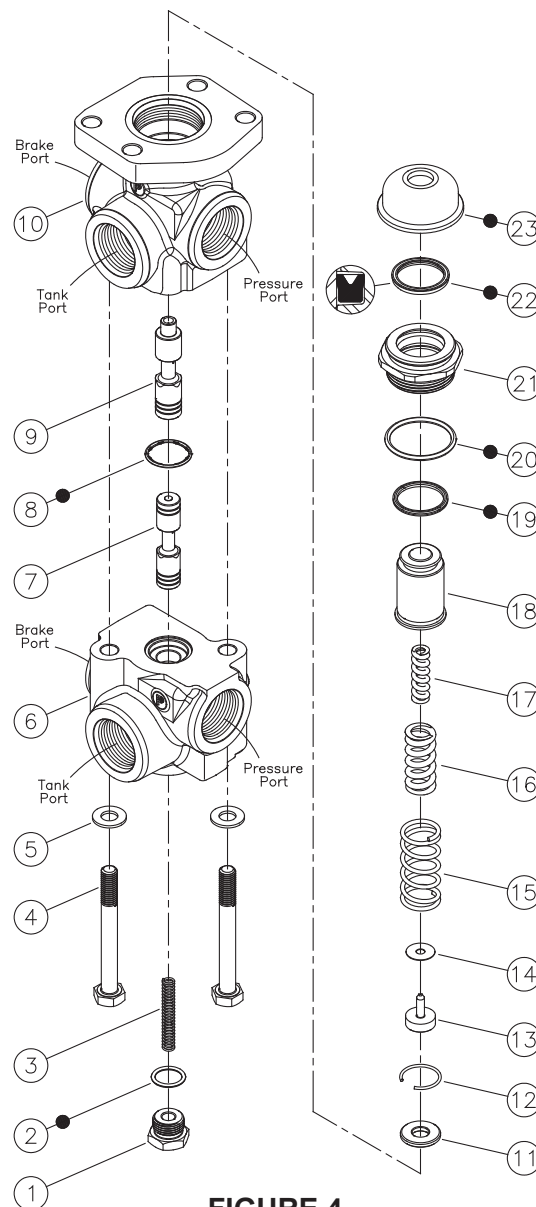
**FIGURE 4**

TABLE 5 (Specifications)

Caterpillar Part Number	Valve Assembly Part Number	Brake Pressure Setting	
		bar	(PSI)
519-8005	525-4824	30.3 ± 1.4	(440 ± 20)

DISASSEMBLY

(Refer to Figure 5)

NOTE

Housings (6 & 11) and spools (7 & 10) are manufactured as matched sets. These sets (housing & spool) should not be intermixed with other parts.

1. Remove boot (25) from retainer (23) and piston (20).
2. Remove retainer (23), piston (20), springs (19, 18, & 17), retainer (16), shim(s) (15), and retainer assembly (14) from housing (10). **NOTE: Be aware of the number of shim(s) being removed from housing (10). Retaining ring (13) and spacer (12) need not be removed from housing (10).**
3. Carefully remove cup (24), quad ring (21), and o-ring (22) from retainer (23). Note direction and order of cup (24) and quad ring (21). **NOTE: Be careful not to scratch or mar retainer bore.**
4. Remove end plug (1) and spring (3) from housing (6). Remove o-ring (2) from end plug (1).
5. Separate housings (6 & 11) by removing cap screws (4) and washers (5). Remove o-rings (8 & 9) from housings (6 & 11).
6. Carefully remove spools (7 & 10) from housings (6 & 11). **NOTE: Be careful not to damage spools or housing bores.**

CAUTION

Do not intermix spools and housings. Spool (7) and housing (6) are a matched set as are spool (10) and housing (11).

ASSEMBLY

(Refer to Figure 5)

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 o-rings (8 & 9) in proper o-ring pocket on housings (6 & 11).
3. Lubricate spool (10) with clean system fluid and carefully slide into bottom end of housing (11) bore. Note direction of spool (10). **NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.**
4. Reassemble housings (6 & 11) using cap screws (4) and washers (5). Use Loctite 242 on cap screws and torque 29.8-33.9 N·m (22-25 lb·ft). **NOTE: Make sure housings line up correctly and that o-rings (8 & 9) remains in the pocket during assembly.**
5. Lubricate spool (7) with clean system fluid and carefully slide into housing (6) bore. Note direction of spool (7). **NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.**
6. Install new o-ring (2) on end plug (1).
7. Install spring (3) and end plug (1) into housing (6). Torque end plug (1) 47.5-54.2 N·m (35-40 lb·ft).

8. Carefully install new cup (24), new quad ring (21), and new o-ring (22) on retainer (23). Note direction and order of cup (24) and quad ring (21). **NOTE: Be careful not to scratch or mar retainer bore.**
9. Assemble springs (17, 18 & 19), retainer (16), shim(s) (15), and retainer assembly (14) in piston (20).
10. Carefully install retainer (23) over piston (20) and install retainer (23) assembly into housing (11). Torque retainer (23) 81.4-94.9 N·m (60-70 lb·ft).
11. Install new boot (25) on retainer (21) and piston (20).

NOTE

After service, the valve must develop the pressure indicated in the specifications, Table 5. Shim(s) (15) are used to obtain the correct pressure setting. Contact machine manufacture if brake pressure setting is not able to be obtained.

● Items included in Repair Kit

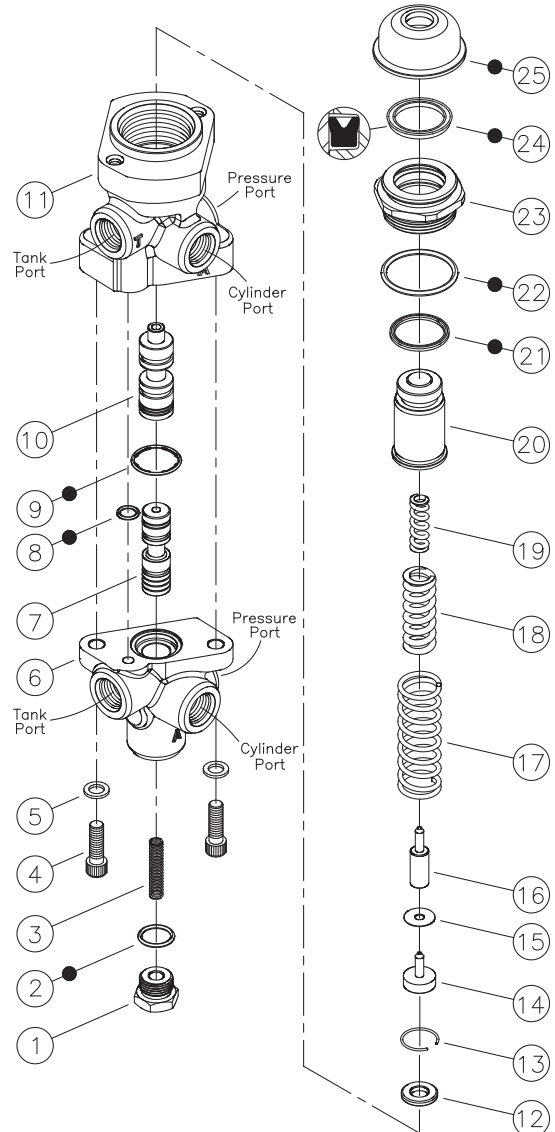
**FIGURE 5**

TABLE 6 (Specifications)

Caterpillar Part Number	Brake Pressure Setting	
	bar	(PSI)
319-5411	49.0 ± 2.8	(710 ± 40)

DISASSEMBLY

(Refer to Figure 6)

NOTE

Housings (8 & 11) and spools (5 & 10) are manufactured as matched sets. These sets (housing & spool) should not be intermixed with other parts.

1. Remove end plug (1), spring (3), and retainer (4) from housing (8). Remove o-ring (2) from end plug (1).
2. Separate housing (8), housing (11), and cap (12) by removing cap screws (6) and washers (7). Remove o-rings (9) from housings (8 & 11).
3. Carefully remove spools (5 & 10) from housings (9 & 11).

NOTE: Be careful not to damage spools or housing bores.

CAUTION

Do not intermix spools and housings. Spool (5) and housing (8) are a matched set as are spool (10) and housing (11).

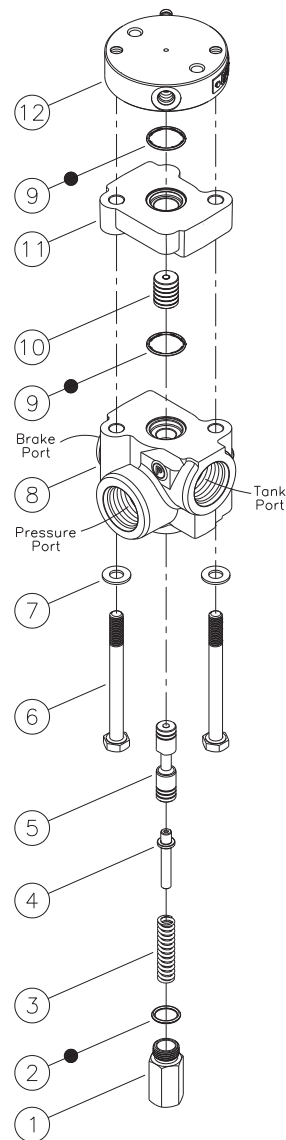
ASSEMBLY

(Refer to Figure 6)

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 o-rings (9) in proper o-ring pockets on housings (8 & 11).
3. Lubricate spool (10) with clean system fluid and carefully slide into bottom end of housing (11) bore. Note direction of spool (10). **NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.**
4. Reassemble housing (8), housing (11), and cap (12) using cap screws (6) and washers (7). Torque cap screws (6) 7.5-54.2 N·m (35-40 lb·ft). **NOTE: Make sure housings line up correctly and that o-rings (9) remain in the pockets during assembly.**
5. Lubricate spool (5) with clean system fluid and carefully slide into housing (8) bore. Note direction of spool (5). **NOTE: Spool must slide freely into bore. If either part is damaged, a new valve assembly may be required.**
6. Install new o-ring (2) on end plug (1).
7. Install spring (3), retainer (4), and end plug (1) into housing (8). Torque end plug (1) 47.5-61.0 N·m (35-45 lb·ft).

● Items included in Repair Kit

**FIGURE 6**

