MODEL V42 DIRECTIONAL CONTROL VALVE ASSEMBLY, TYPICAL MAIN ASSEMBLY (Continued)

Item No.	Part No.	Description	Quantity Per Assembly
13	K-28027	POSITIONER, Spool "IN" Detent Spring Return to Neutral "R" (See Figure 4-18)	A/R
14	K-28059	POSITIONER, Regenerative (See Figure 4-19)	A/R
15		POSITIONER, Hydraulic Remote (Refer to Catalog No. 1016)	A/R
16		POSITIONER, Hydraulic Remote (Refer to Catalog No. 1016)	A/R
17		POSITIONER, Solenoid Control (Refer to Catalog No. 1020)	A/R
18	K-28065	CHECK, Anti-Cavitation, Upper, (See Figure 4-28)	A/R
19	K-28064	CHECK, Anti-Cavitation, Lower, (See Figure 4-29)	A/R
20		RELIEF, RD50N, Non-Adjustable (See Figure 4-30)	A/R
21		RELIEF, RD50A, Adjustable (See Figure 4-31)	A/R
22		RELIEF, WH (Up to 3000 PSI [207 bar] only) (See Figure 4-32)	A/R
23		PLUG, Lower Anti-Cavitation (See Figure 4-33)	A/R
24		PLUG, Upper Anti-Cavitation (See Figure 4-34)	A/R
25	8090—	COVER, Top Outlet (See Page 3-3)	1
26	8091—	COVER, End Outlet (See Page 3-4)	1
27	1039-001	WASHER, Lock (for 1 or 2 work sections only)	4
28		BOLT, (See Table 3-1)	4
29		STUD and STUD NUT ASSEMBLY, (See Table 3-1)	4
30		BOOT ASSEMBLY (See Figure 4-24)	A/R
31		MID-INLET SECTION, Split Flow (See Figure 4-7)	A/R
32		MID-INLET SECTION, Combined Flow (See Figure 4-8)	A/R
33		MID-INLET SECTION, 2 Position (See Figure 4-9)	A/R
34		HANDLE ASSEMBLY, Vertical (See Figure 4-20)	A/R
35		HANDLE ASSEMBLY, Horizontal (See Figure 4-21)	A/R
36		RETAINER, Standard (See Figure 4-22)	A/R
37		BRACKET, Handle (See Figure 4-23)	A/R
38		WORK SECTION, 3-Way, 3-Position (See Figure 4-2)	A/R
39		WORK SECTION, 4-Way, 3-Position (See Figure 4-3)	A/R
40		WORK SECTION, 4-Way, 4-Position Float (See Figure 4-4)	A/R
41		WORK SECTION, 4-Way, 4-Position Regenerative (See Figure 4-5)	A/R
42		WORK SECTION, 4-Way, 3-Position With Pressure Detent Release (See Figure 4-6)	A/R

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

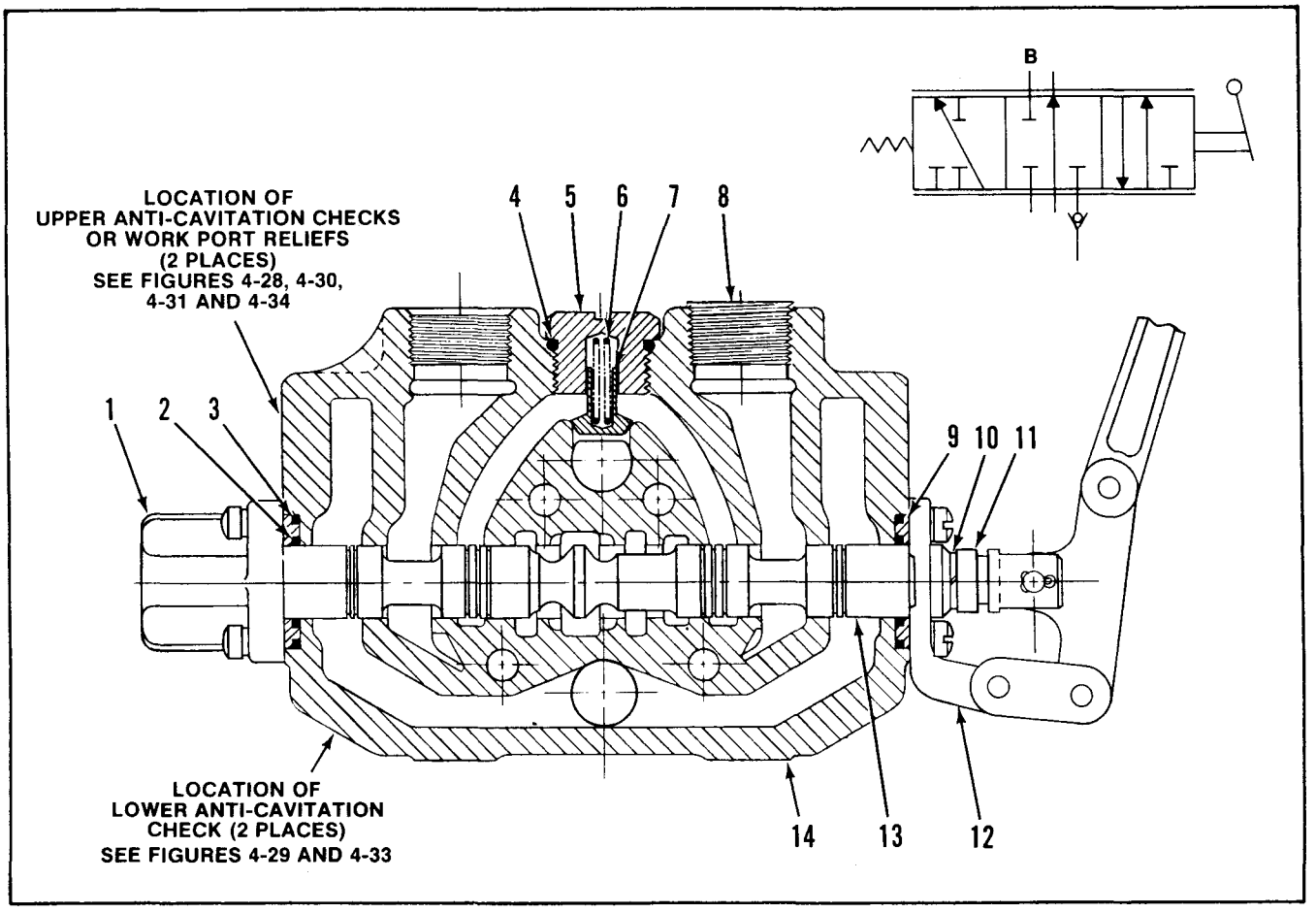

Figure 4-2. 3-Way, 3-Position Work Section

3-WAY, 3-POSITION WORK SECTION

Item No.	Part No.	Description	Quantity Per Section
	K-28029*	SEAL KIT (Contains items 2, 3 and 4 plus section seals)	
	K-7018*	SERVICE KIT (Contains items 4 thru 7)	
1	K-28060	POSITIONER, Standard (See Figure 4-12)	1
2	2931-001*	SEAL, Spool	2
3	3532-001*	SEAL, O-Ring } Not Sold Separately. Order K-28029	2
4	2709-001*	SEAL, O-Ring	1
5	7790-001	PLUG, Load Check	1
6	2796-001	SPRING } Not Sold Separately. Order K-7018	1
7	7791-001	POPPET	1
8		PLUG (See Table 4-3 for part number)	1
9	3531-001	PLATE, Seal	2
10	1039-001	WASHER, Lock	1
11	8351-001	ADAPTER, Clevis	1
12		HANDLE, BRACKET or RETAINER (See Figure 4-20 thru 4-24)	1
13	8059-001	SPOOL, 3-Way } See Note	1
14	8045-XXX	HOUSING, 3-Way	1

NOTE: These are matched parts and are not sold separately. See page 3-2 for ordering information.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

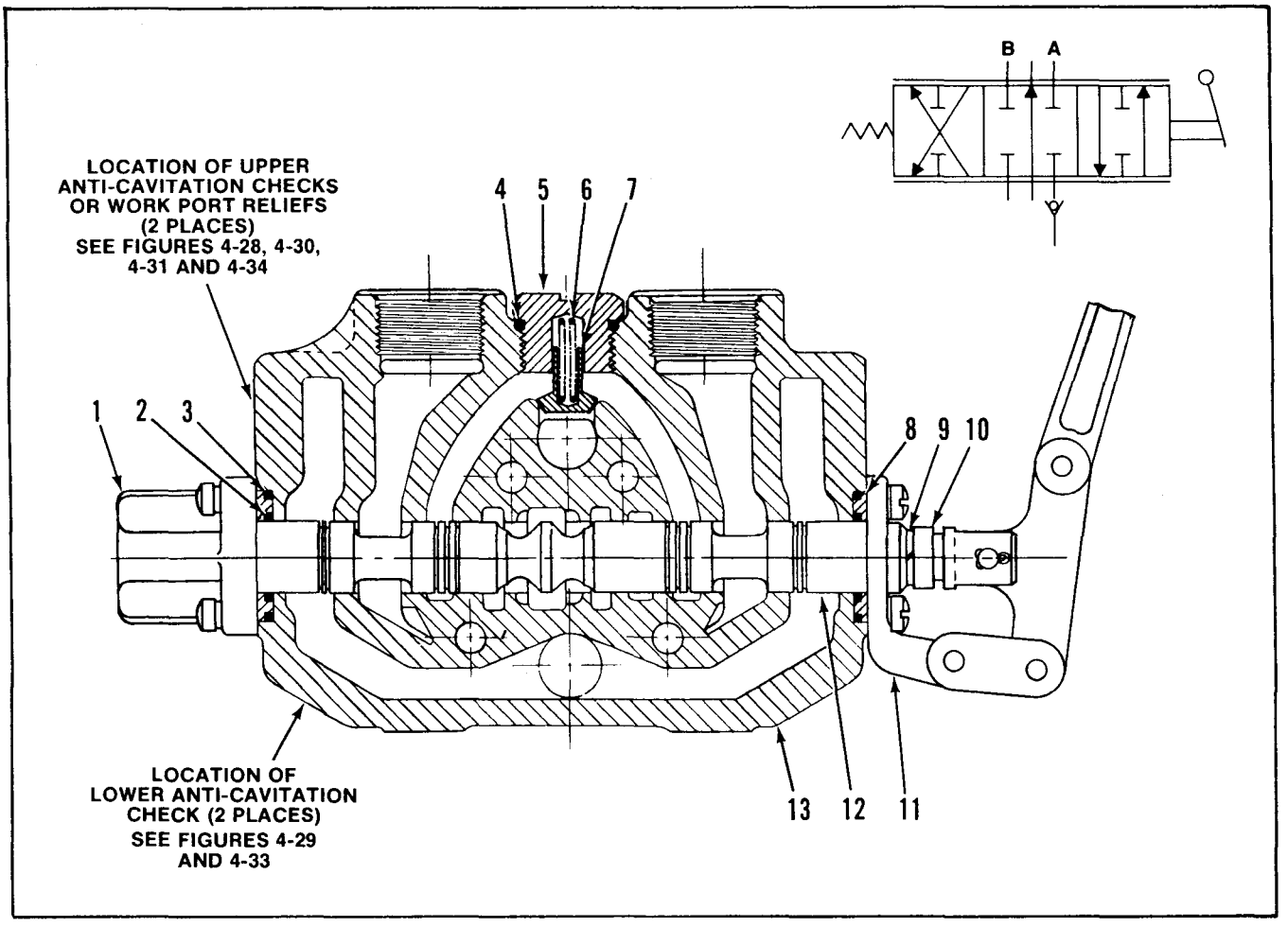

Figure 4-3. 4-Way, 3-Position Work Section

4-WAY, 3-POSITION WORK SECTION

Item No.	Part No.	Description	Quantity Per Section
	K-28029*	SEAL KIT (Contains items 2, 3 and 4 plus section seals)	
	K-7018*	SERVICE KIT (Contains items 4 thru 7)	
1	K-28060	POSITIONER, Standard (See Figure 4-12)	1
2	2931-001*	SEAL, Spool	2
3	3532-001*	SEAL, O-Ring — Not Sold Separately. Order K-28029	2
4	2709-001*	SEAL, O-Ring	1
5	7790-001	PLUG, Load Check	1
6	2796-001	SPRING — Not Sold Separately. Order K-7018	1
7	7791-001	POPPET	1
8	3531-001	PLATE, Seal	2
9	1039-001	WASHER, Lock	1
10	8351-001	ADAPTER, Clevis	1
11		HANDLE, BRACKET or RETAINER (See Figure 4-20 thru 4-24)	1
12	8060-001	SPOOL, 4-Way — See Note	1
13	8045-XXX	HOUSING, 4-Way — See Note	1

NOTE: These are matched parts and are not sold separately. See page 3-2 for ordering information.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

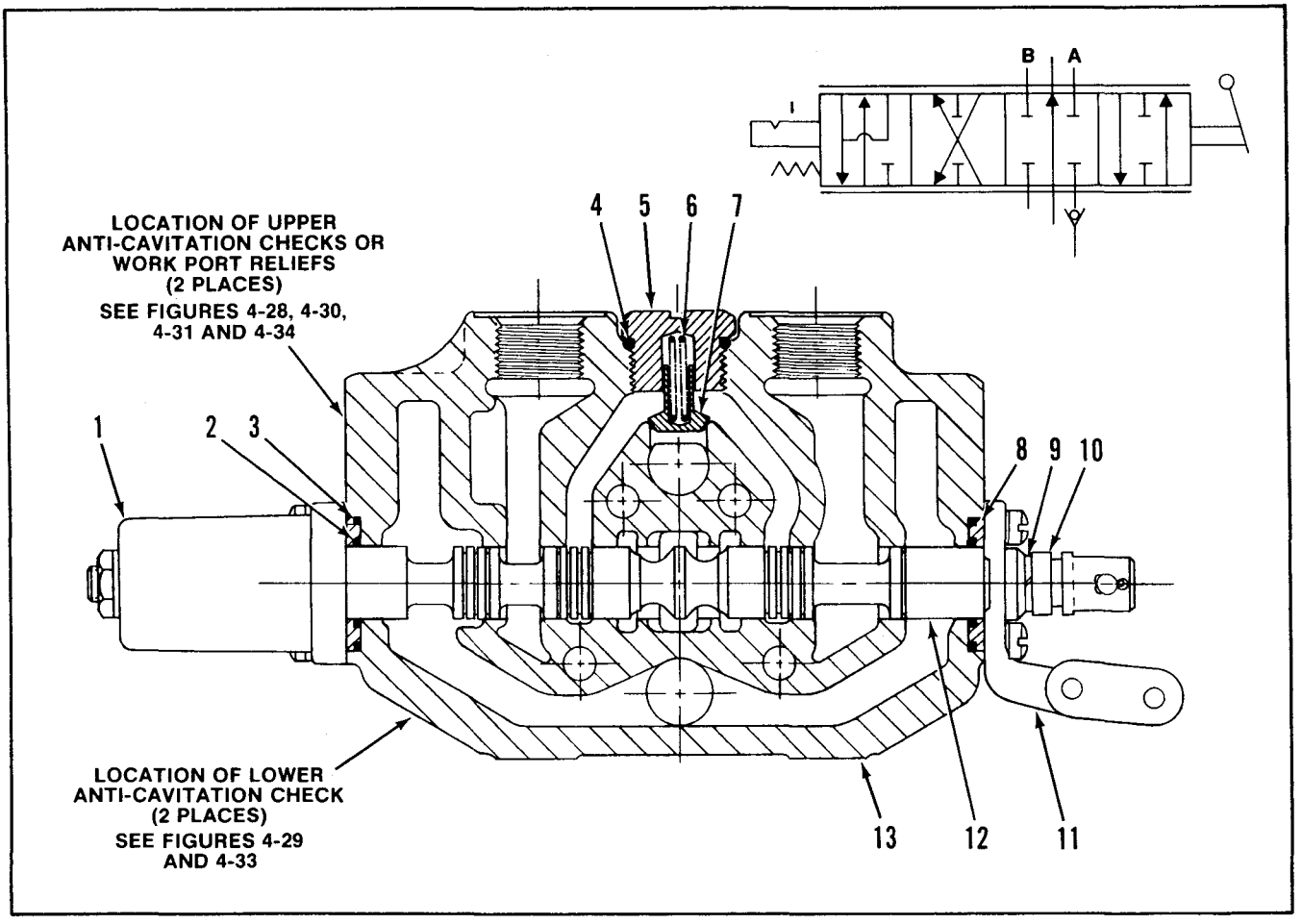

Figure 4-4. 4-Way, 4-Position Float Work Section.

4-WAY, 4-POSITION FLOAT WORK SECTION

Item No.	Part No.	Description	Quantity
	K-28029*	SEAL KIT (Contains items 2, 3 and 4 plus section seals)	
	K-7018*	SERVICE KIT (Contains items 4 thru 7)	
1	K-28061	POSITIONER, Float (See Figure 4-15)	1
2	2931-001*	SEAL, Spool } Not Sold Separately. Order K-28029	2
3	3532-001*	SEAL, O-Ring } Not Sold Separately. Order K-28029	2
4	2709-001*	SEAL, O-Ring } Not Sold Separately. Order K-28029	1
5	7790-001	PLUG, Load Check } Not Sold Separately. Order K-7018	1
6	2796-001	SPRING } Not Sold Separately. Order K-7018	1
7	7791-001	POPPET } Not Sold Separately. Order K-7018	1
8	3531-001	PLATE, Seal	2
9	1039-001	WASHER, Lock	1
10	8351-001	ADAPTER, Clevis	1
11		HANDLE, BRACKET or RETAINER (See Figure 4-20 thru 4-24)	1
12	8061-001	SPOOL, Float } See Note	1
13	8046-XXX	HOUSING, 4-Way Float } See Note	1

NOTE: These are matched parts and are not sold separately. See page 3-2 for ordering information.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

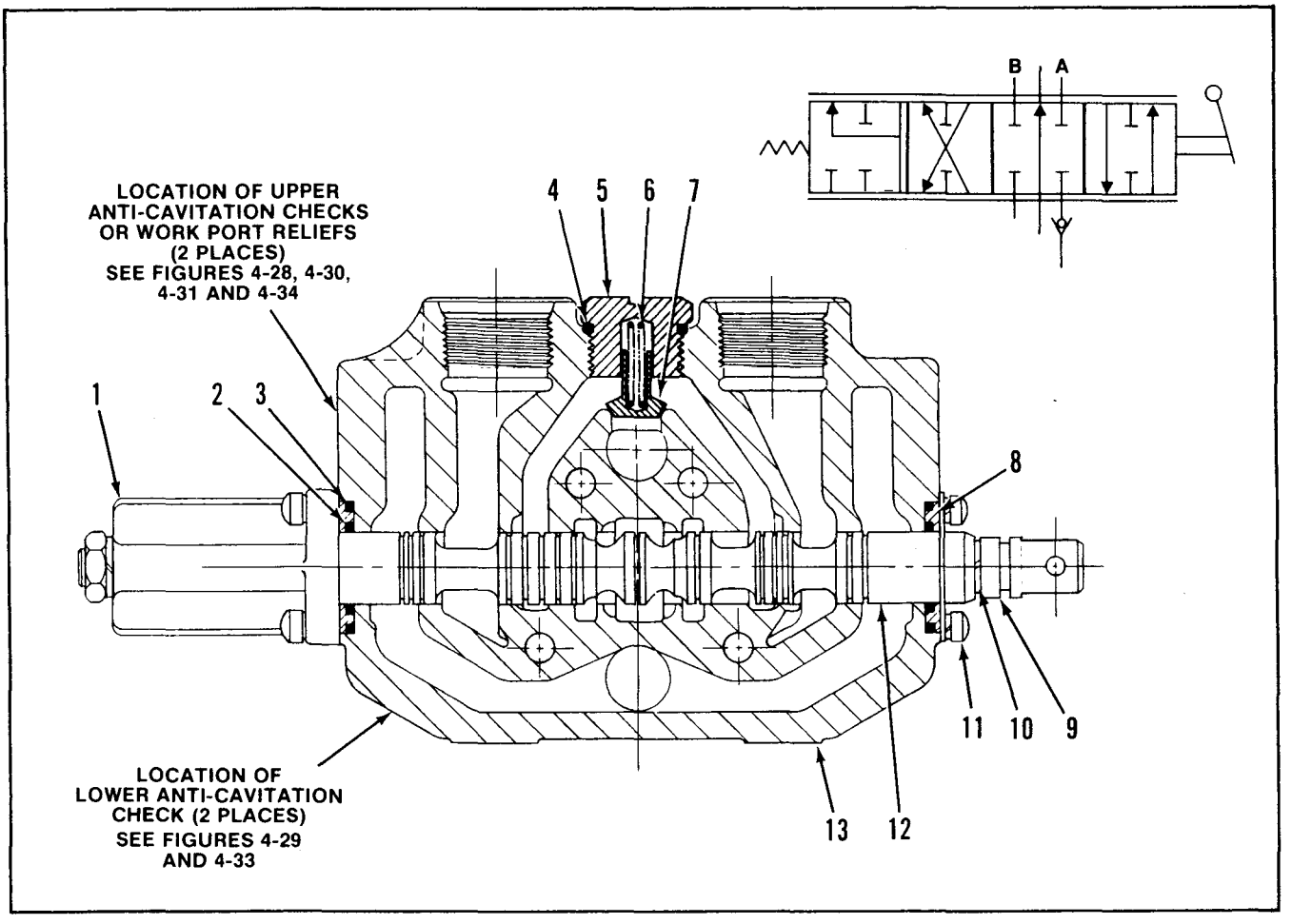

Figure 4-5. 4-Way, 4-Position Regenerative Work Section

4-WAY, 4-POSITION REGENERATIVE WORK SECTION

Item No.	Part No.	Description	Quantity
	K-28029*	SEAL KIT (Contains items 2, 3 and 4)	
	K-7018*	SERVICE KIT (Contains items 4 thru 7)	
1	K-28059	POSITIONER, Regenerative (See Figure 4-19)	1
2	2931-001*	SEAL, Spool } Not Sold Separately. Order K-28029	2
3	3532-001*	SEAL, O-Ring } Not Sold Separately. Order K-28029	2
4	2709-001*	SEAL, O-Ring } Not Sold Separately. Order K-28029	1
5	7790-001	PLUG, Load Check } Not Sold Separately. Order K-7018	1
6	2796-001	SPRING } Not Sold Separately. Order K-7018	1
7	7791-001	POPPET } Not Sold Separately. Order K-7018	1
8	3531-001	PLATE, Seal	2
9	8351-001	ADAPTER, Clevis	1
10	1039-001	WASHER, Lock	1
11		HANDLE, BRACKET or RETAINER (See Figure 4-20 thru 4-24)	1
12	8140-001	SPOOL, Regenerative } See Note	1
13	8138-XXX	HOUSING, 4-Way, Regenerative } See Note	1

NOTE: These are matched parts and are not sold separately. See page 3-2 for ordering information.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

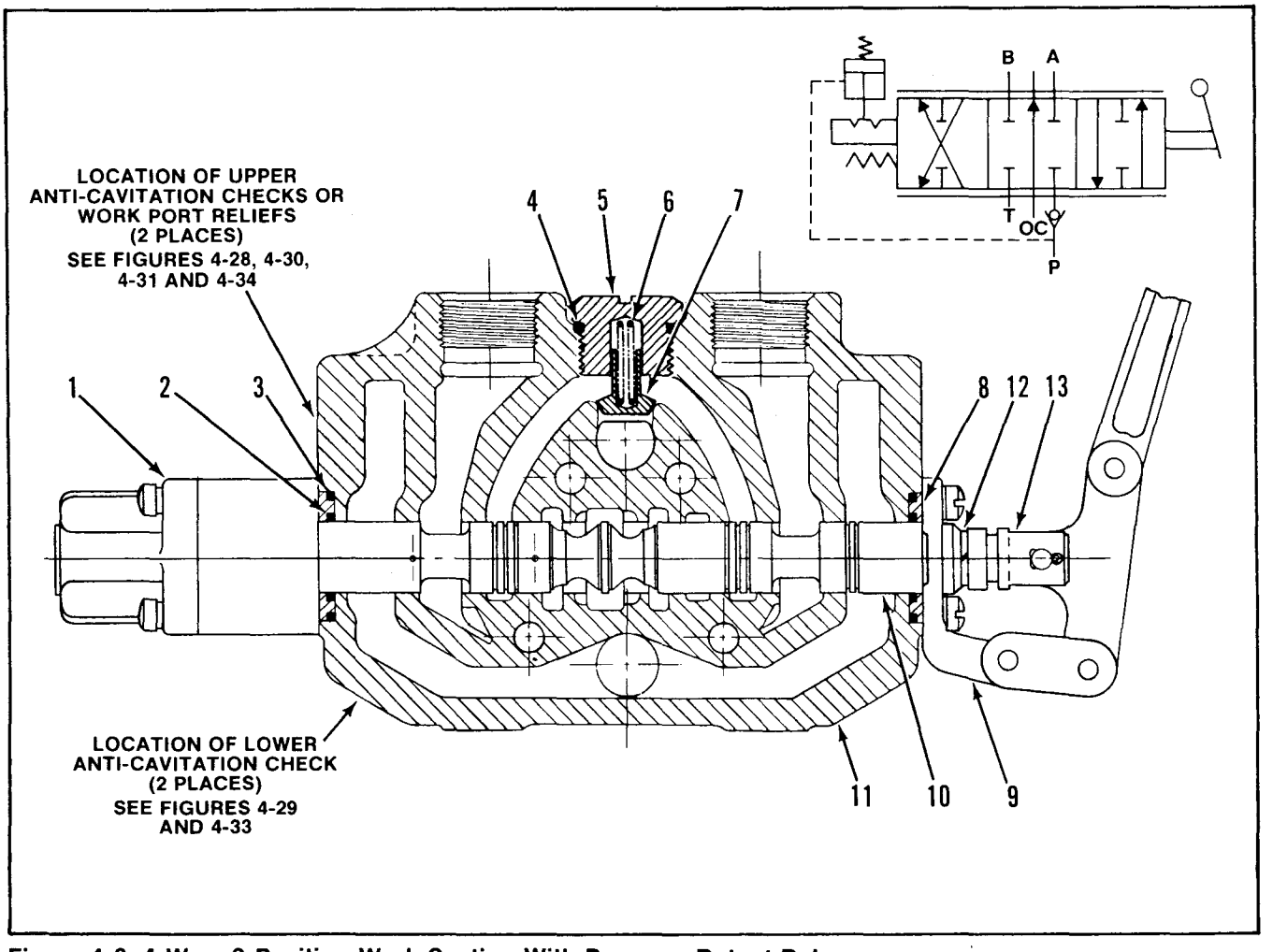

Figure 4-6. 4-Way, 3-Position Work Section With Pressure Detent Release.

4-WAY, 3-POSITION WORK SECTION WITH PRESSURE DETENT RELEASE

Item No.	Part No.	Description	Quantity
	K-28029*	SEAL KIT (Contains items 2, 3 and 4)	
	K-7018*	SERVICE KIT (Contains items 4 thru 7)	
1		POSITIONER, Pressure Detent Release (See Figure 4-17)	1
2	2931-001*	SEAL, Spool — Not Sold Separately. Order K-7018	2
3	3532-001*	SEAL, O-Ring — Not Sold Separately. Order K-7018	2
4	2709-001*	SEAL, O-Ring — Not Sold Separately. Order K-7018	1
5	7790-001	PLUG, Load Check — Not Sold Separately. Order K-28029	1
6	2796-001	SPRING — Not Sold Separately. Order K-28029	1
7	7791-001	POPPET — Not Sold Separately. Order K-28029	1
8	3531-001	PLATE, Seal	2
9		HANDLE, BRACKET or RETAINER (See Figure 4-20 thru 4-24)	1
10	8264-001	SPOOL, Pressure Detent Release — See Note	1
11	8045-XXX	HOUSING, 4-Way — See Note	1
12	1039-001	WASHER, Lock	1
13	8351-001	ADAPTER, Clevis	1

NOTE: These are matched parts and are not sold separately. See page 3-2 for ordering information.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

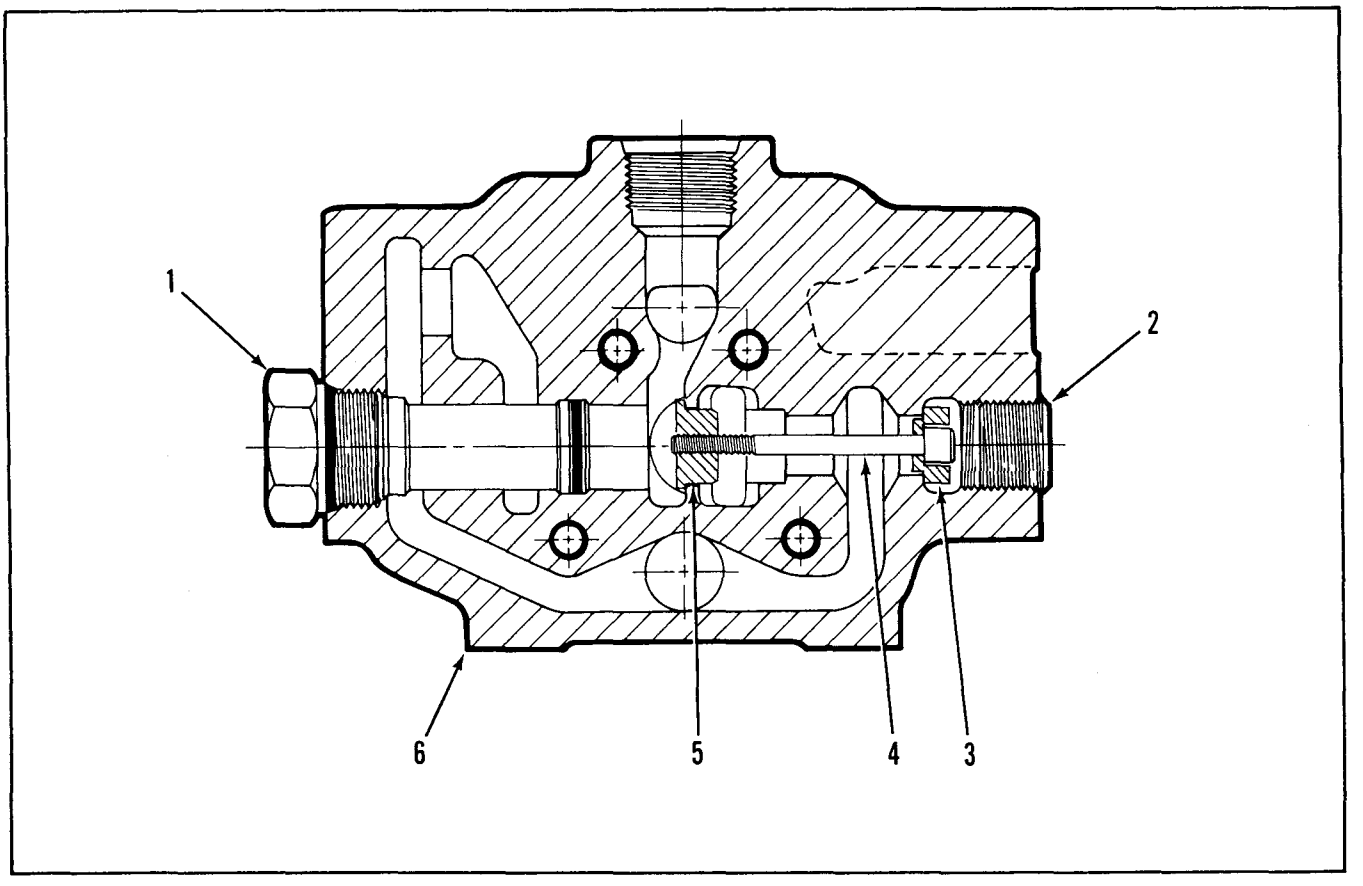

Figure 4-7. Split Flow Mid-Inlet Section

SPLIT FLOW MID-INLET SECTION

Item No.	Part No.	Description	Quantity
1		RELIEF VALVE (See Figures 4-25 thru 4-27)	1
2	0947-001	PLUG	1
3	8011-001	ADAPTER	1
4	3731-111	SCREW	1
5	8012-001	PLUG, Split Flow	1
6	3953-XXX	HOUSING	1

NOTE: Mid-Inlet Sections may be changed from split flow to combined flow in the field by replacing items 3, 4 and 5. Order:

K-7026 Split Flow Conversion Kit

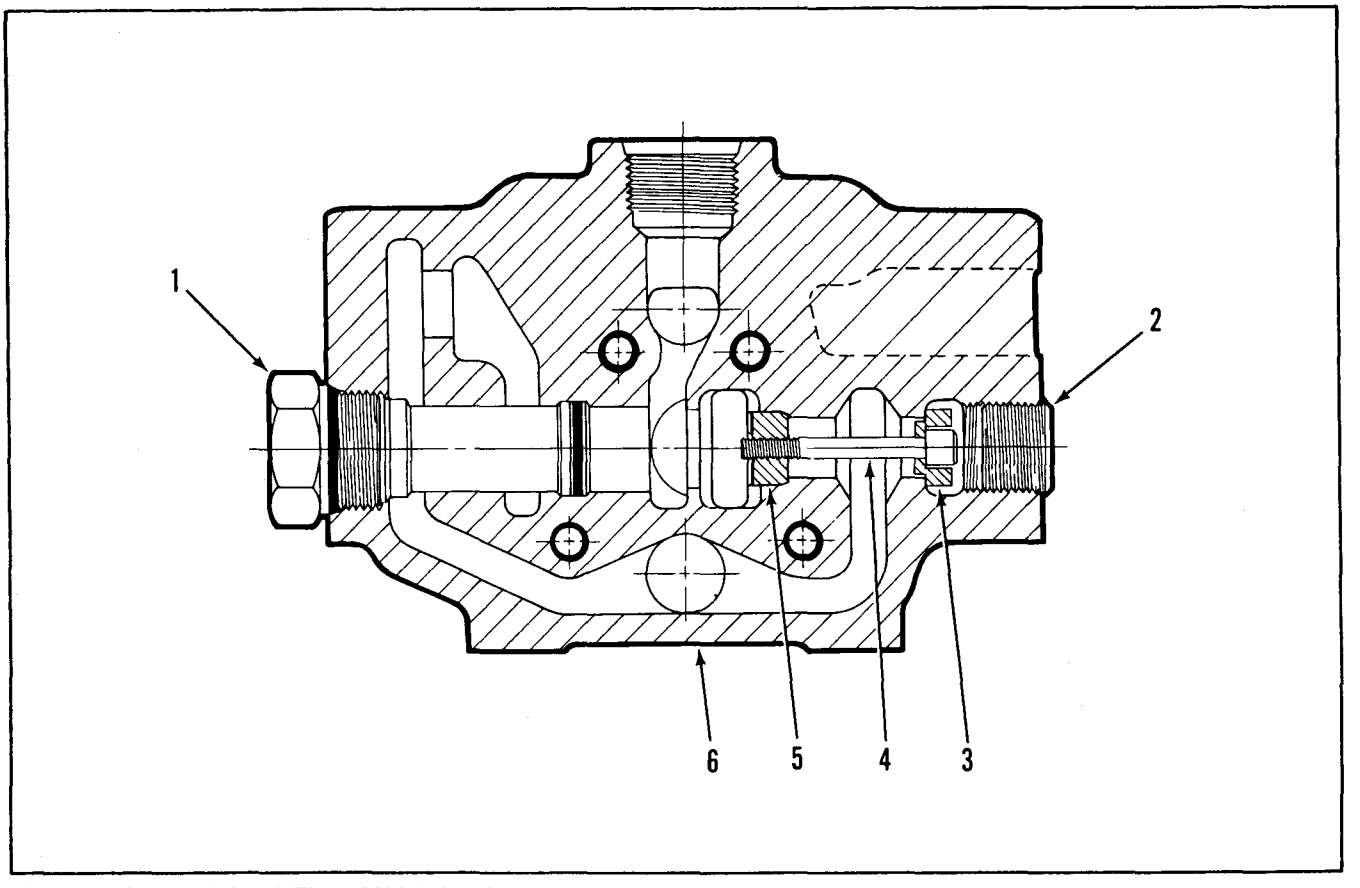

Figure 4-8. Combined Flow Mid-Inlet Section

COMBINED FLOW MID-INLET SECTION

Item No.	Part No.	Description	Quantity
1		RELIEF VALVE (See Figure 4-25 thru 4-27)	1
2	0947-001	PLUG	1
3	8011-001	ADAPTER	1
4	3731-108	SCREW	1
5	8013-001	PLUG, Combined Flow	1
6	3953-XXX	HOUSING	1

NOTE: Mid-Inlet Sections may be changed from combined flow to split flow in the field by replacing items 3, 4 and 5. Order:

K-7025 Combined Flow Conversion Kit.

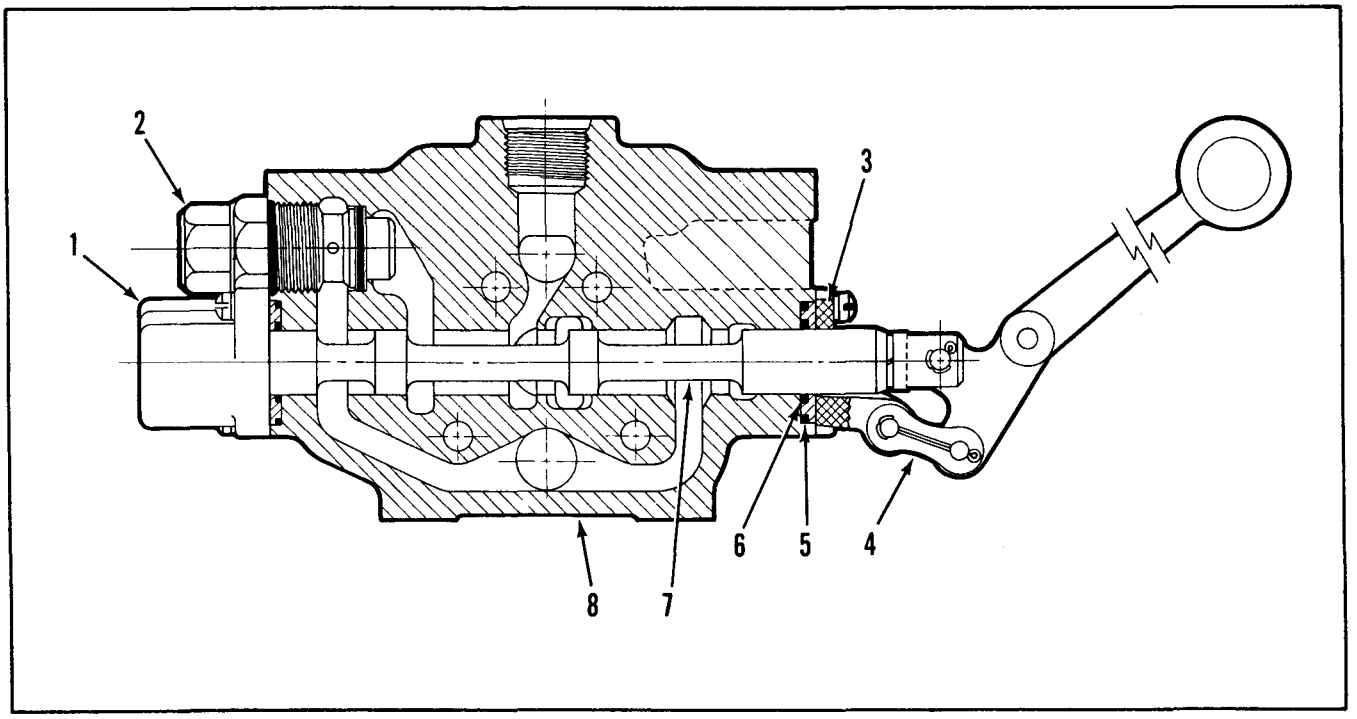

Figure 4-9. 2-Position Mid-Inlet Section

2-POSITION MID-INLET SECTION

Item No.	Part No.	Description	Quantity
	K-28029*	SEAL KIT (Contains items 5 and 6)	
1		POSITIONER, Load To Split Flow (See Figure 4-10)	1
		POSITIONER, Load To Combined Flow (See Figure 4-11)	1
2		RELIEF VALVE (See Figures 4-25 thru 4-27)	1
3	3531-001	PLATE, Seal	2
4		HANDLE ASSEMBLY (See Figures 4-20 thru 4-24)	1
5	3532-001*	SEAL, O-Ring } Not Sold Separately. Order K-28029	2
6	2931-001*	SEAL, Spool }	2
7	3968-001	SPOOL } See Note	
8	3953-XXX	HOUSING }	

NOTE: These are matched parts and are not sold separately.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

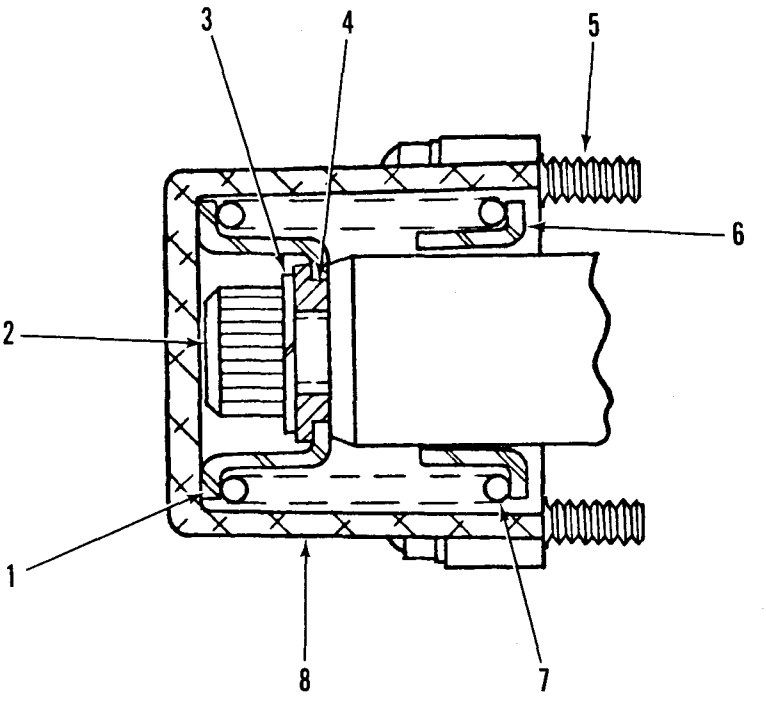

Figure 4-10. Spring Load To Split Flow Positioner

SPRING LOAD TO SPLIT FLOW POSITIONER

Item No.	Part No.	Description	Quantity
1	1609-001	COLLAR, Stop	1
2	3731-196	SCREW, Hex Soc Hd, 3/8—16 by 3/4 inch long	1
3	1039-001	WASHER, Lock	1
4	3967-001	SPACER, Spool	1
5	2673-001	SCREW, Fil. Hd, 1/4—20 by 1 inch long	4
6	3966-001	COLLAR, Stop	1
7	1625-001	SPRING, Centering	1
8	3481-001	BONNET	1

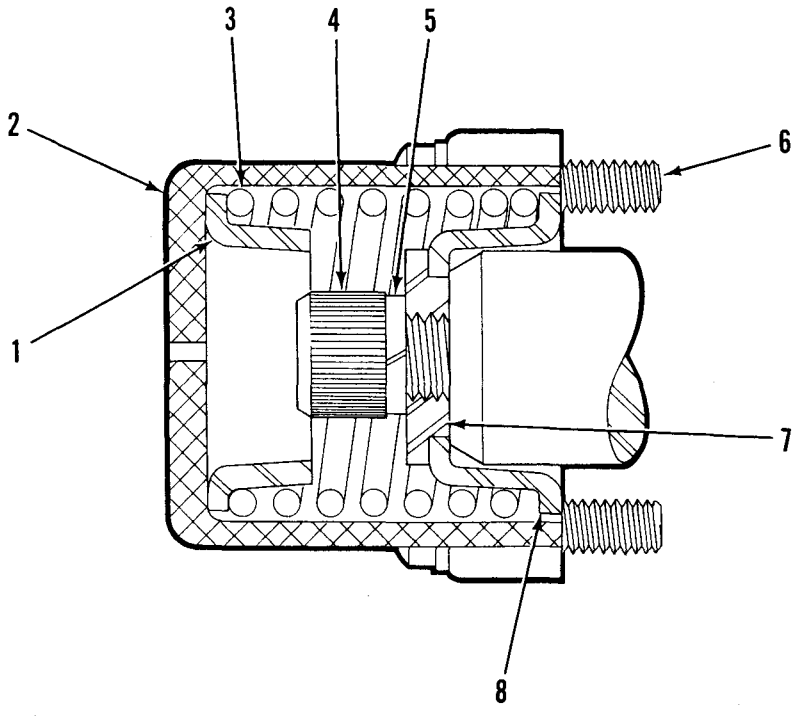

Figure 4-11. Spring Load To Combined Flow Positioner

SPRING LOAD TO COMBINED FLOW POSITIONER

Item No.	Part No.	Description	Quantity
1	3966-001	COLLAR, Stop	1
2	3481-001	BONNET	1
3	1625-001	SPRING	1
4	3731-196	SCREW, Hex Soc Hd, 3/8—16 by 3/4 inch long	1
5	1039-001	WASHER, Lock	1
6	2673-001	SCREW, Fil Hd, 1/4—20 by 1 inch long	4
7	3967-001	SPACER	1
8	1609-001	COLLAR, Spring	1

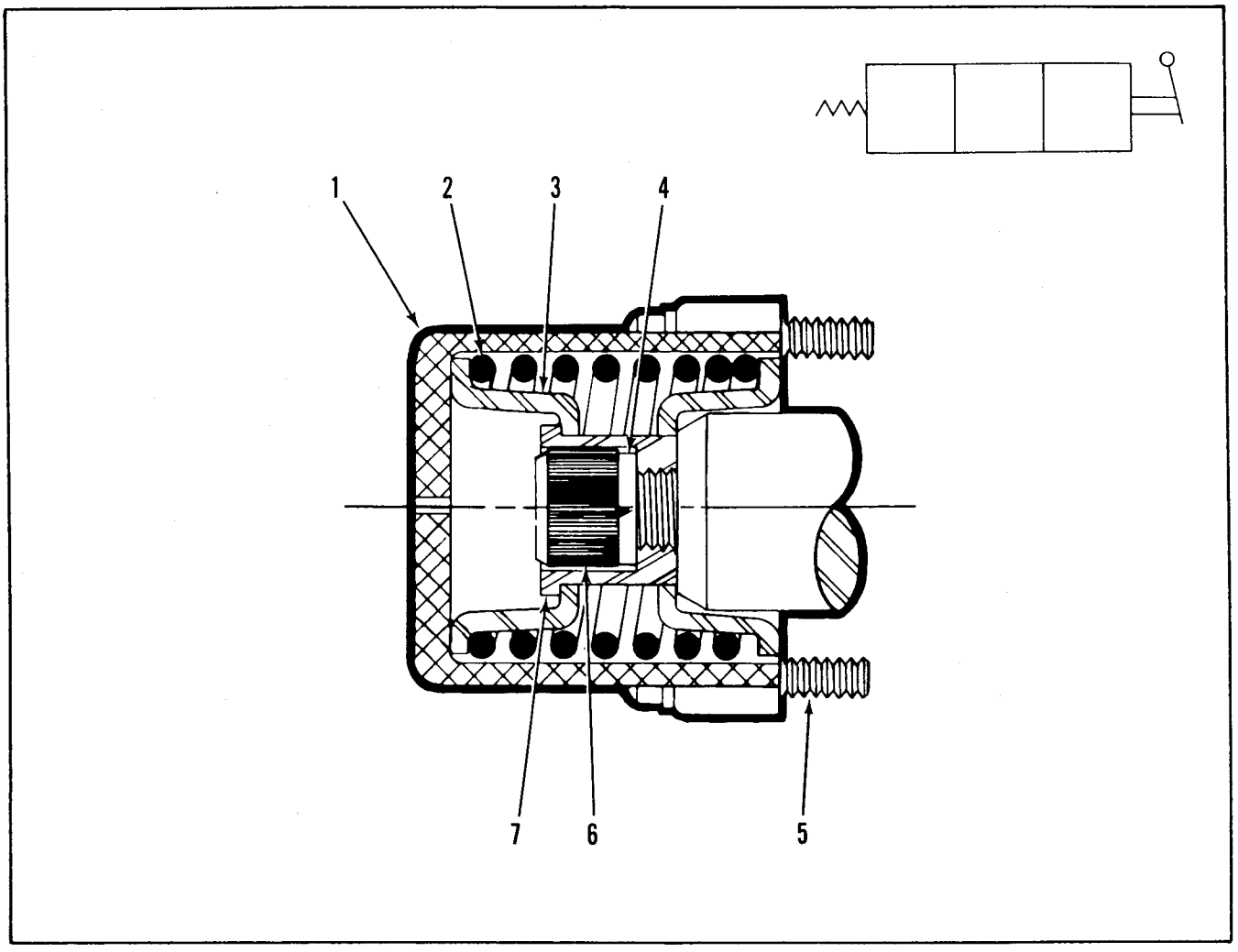

Figure 4-12. Spring Return to Neutral Positioner

SPRING RETURN TO NEUTRAL POSITIONER

Item No.	Part No.	Description	Quantity
	K-28060	REPLACEMENT KIT (Contains all items listed below)	
1	3481-001	BONNET	1
2	1608-001	SPRING	1
3	1609-001	COLLAR, Stop	2
4	1291-001	WASHER, Lock	1
5	2673-001	SCREW, Fil. Hd., 1/4—20 by 1 inch long	4
6	3731-196	SCREW, Hex. Soc. Hd., 3/8—16 by 3/4 inch long	1
7	3533-001	COLLAR, Spool	1

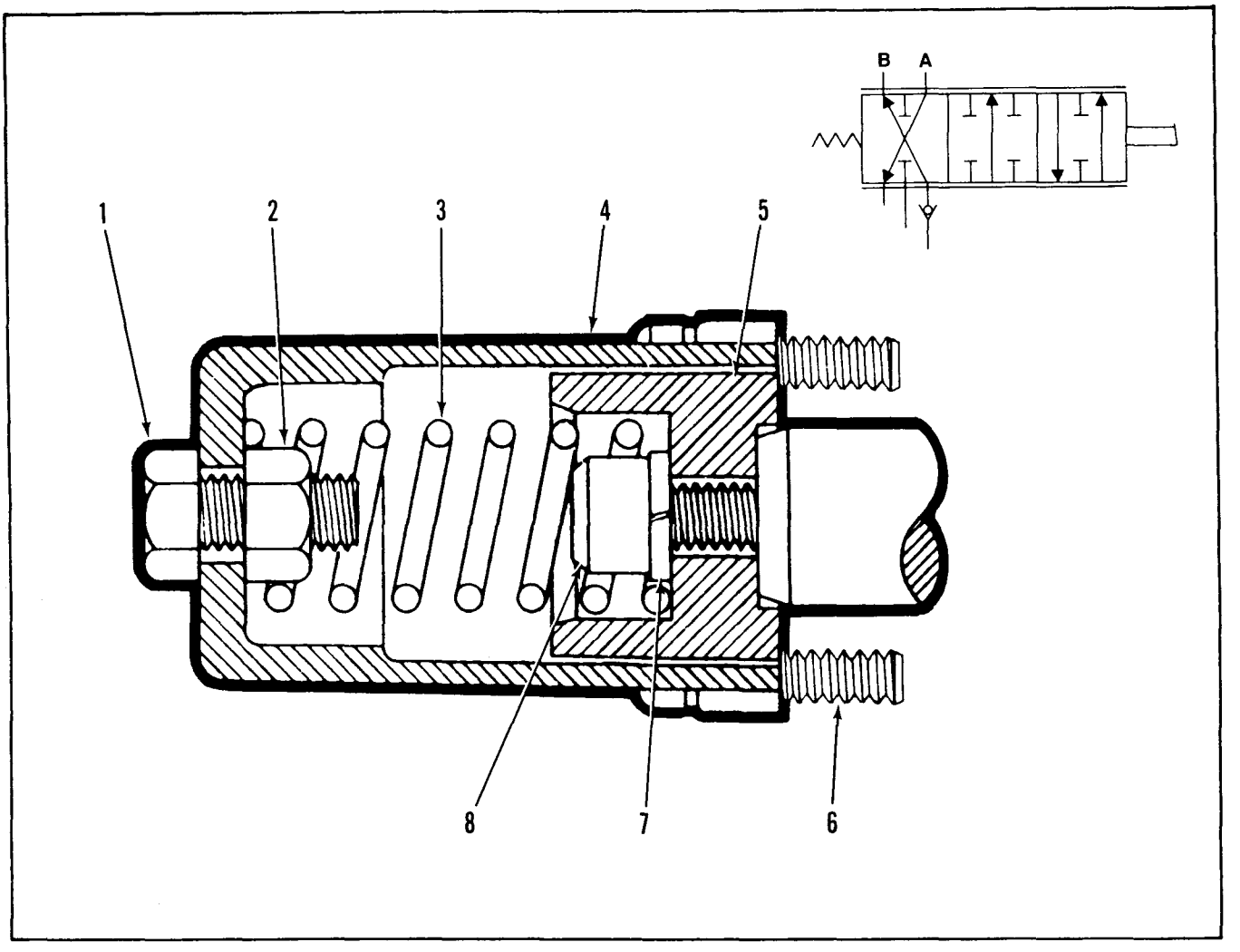

Figure 4-13. Spring Extended Spool Positioner

SPRING EXTENDED SPOOL POSITIONER

Item No.	Part No.	Description	Quantity
	K-28028	REPLACEMENT KIT (Contains all items listed below)	
1	3732-001	SCREW	1
2	1665-001	NUT Hex	1
3	1761-001	SPRING	1
4	3482-001	BONNET	1
5	3538-001	COLLAR, Stop	1
6	2673-001	SCREW, Fil. Hd., 1/4—20 by 1 inch long	4
7	1291-001	WASHER, Lock	1
8	3731-198	SCREW	1

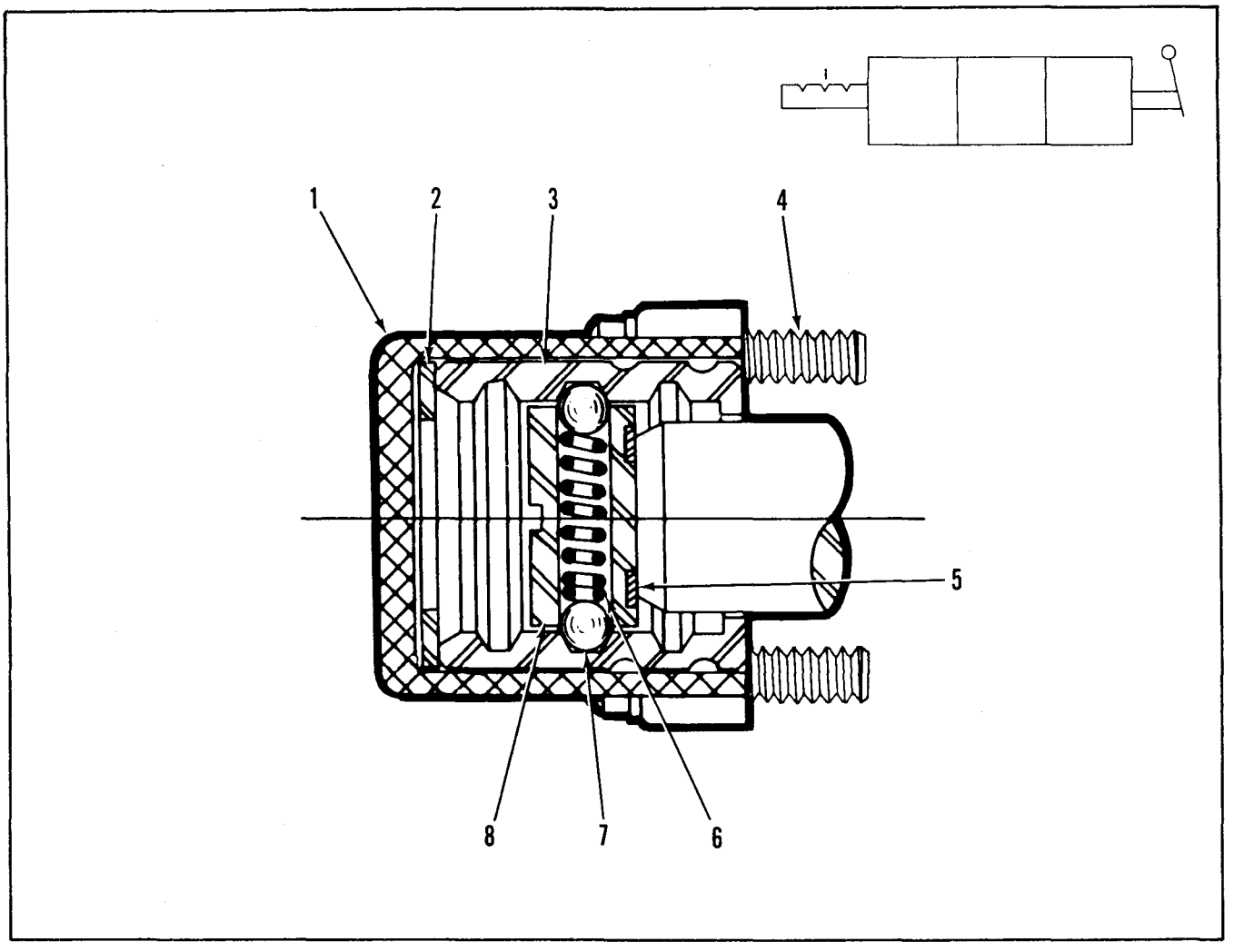

Figure 4-14. 3-Position Detent Positioner

3-POSITION DETENT POSITIONER

Item No.	Part No.	Description	Quantity
	K-28025	REPLACEMENT KIT (Contains all items listed below)	
1	3481-001	BONNET	1
2	3593-001	WASHER, Detent Stop	1
3	3583-001	SLEEVE, Detent	1
4	2673-001	SCREW, Fil. Hd., 1/4—20 by 1 inch long	4
5	1039-001	WASHER, Lock	1
6	1634-001	SPRING, Detent	1
7	0514-001	BALL	2
8	1627-001	HOLDER, Detent	1

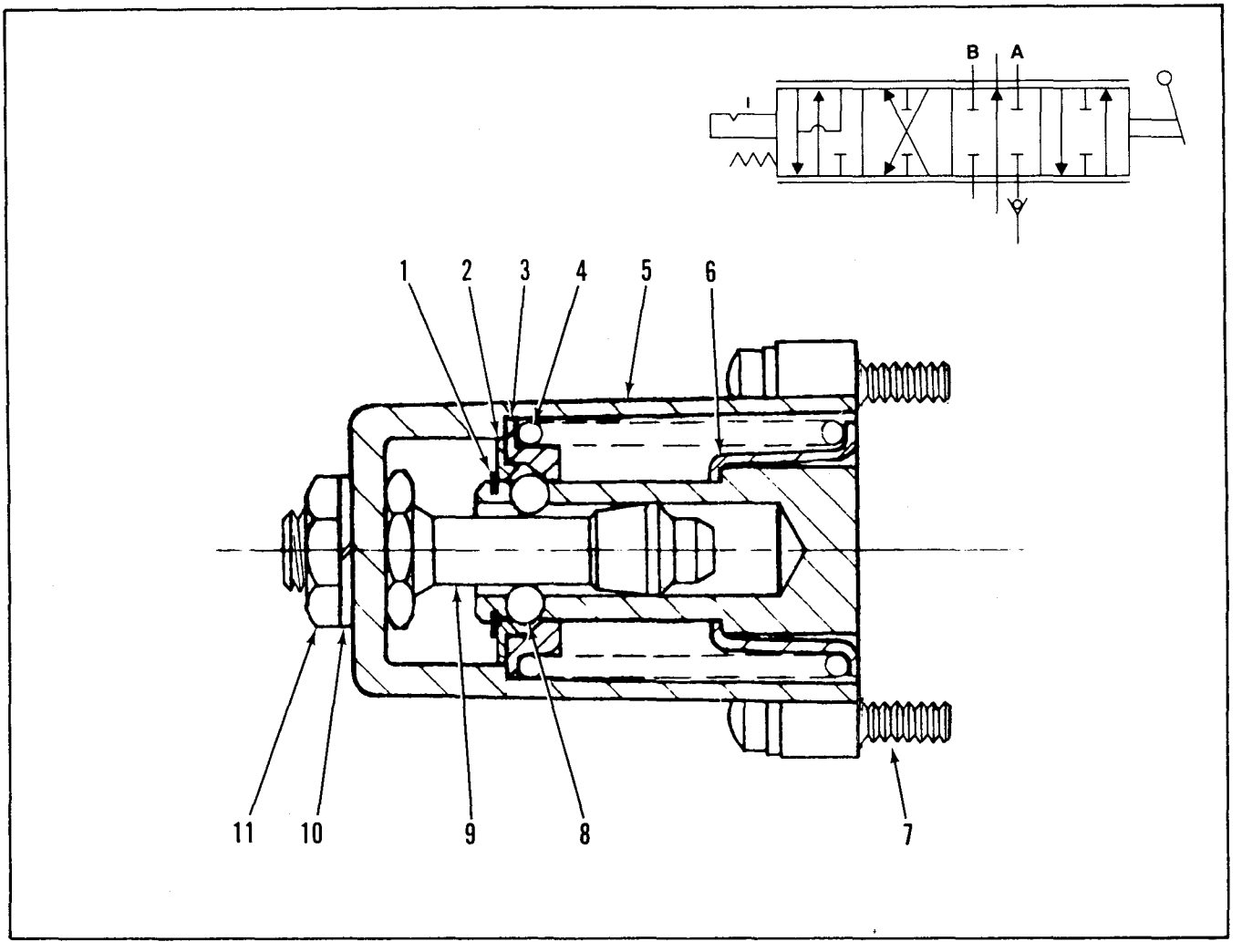

Figure 4-15. Float Positioner

FLOAT POSITIONER

Item No.	Part No.	Description	Quantity
	K-28061	REPLACEMENT KIT (Contains all items listed below)	
1	1741-001	RING, Retaining	1
2	1738-001	RETAINER, Detent Ball	1
3	1737-001	COLLAR, Spring	1
4	7711-001	SPRING	1
5	3482-001	BONNET	1
6	3535-001	COLLAR, Spring	1
7	2673-001	SCREW, Fil. Hd., 1/4—20 by 1 inch long	4
8	1700-001	BALL	4
9	3537-001	SPUD, Positioner	1
10	1732-001	WASHER, Lock	1
11	1731-001	NUT, Hex, 7/16" UNC 2A	

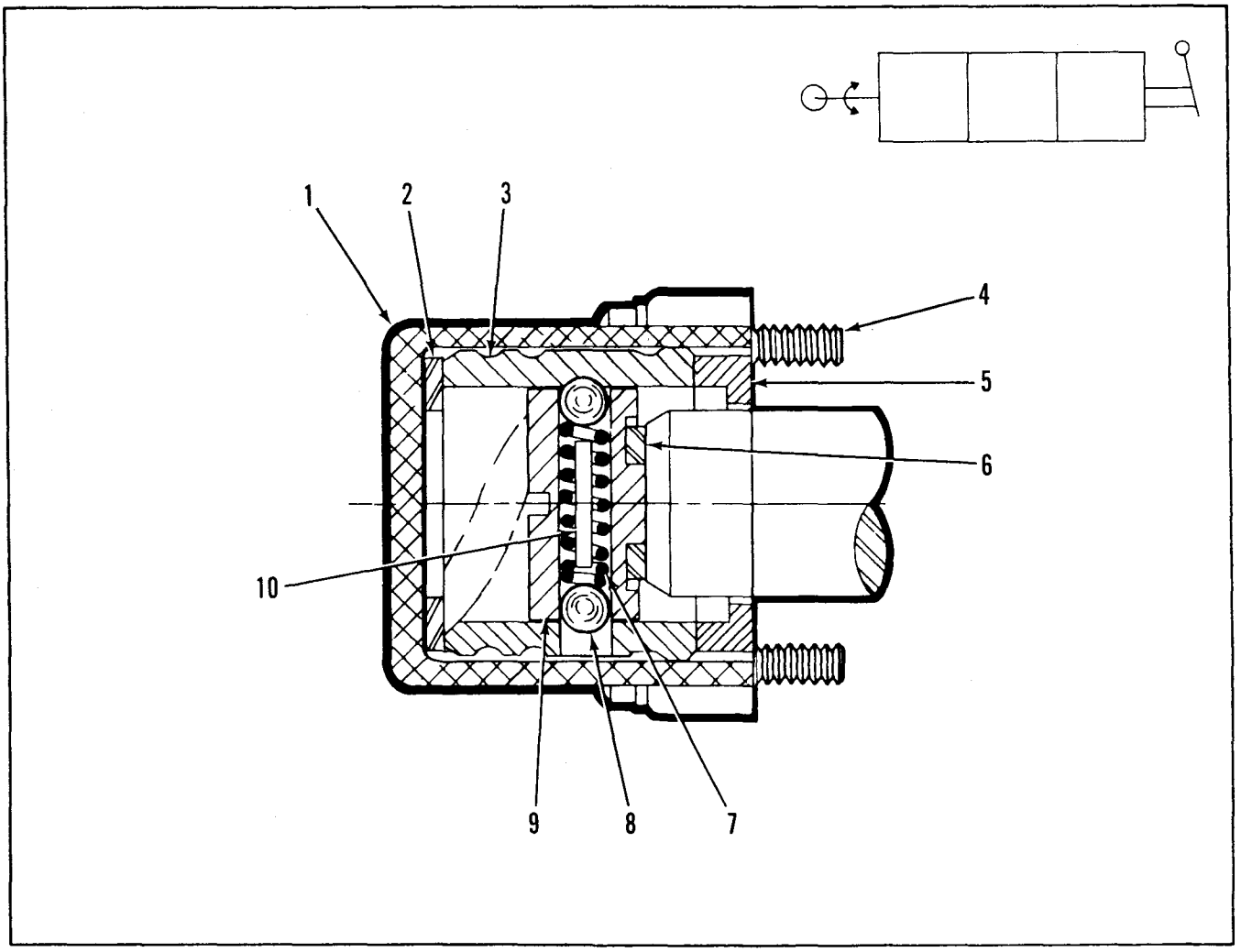

Figure 4-16. Rotary Positioner

ROTARY POSITIONER

Item No.	Part No.	Description	Quantity
	K-28026	REPLACEMENT KIT (Contains all items listed below)	
1	3481-001	BONNET	1
2	3593-001	WASHER, Detent Stop	1
3	3592-001	ACTUATOR, Rotary	1
4	2673-001	SCREW	4
5	3598-001	COLLAR, Stop	1
6	1039-001	WASHER, Lock	1
7	1634-001	SPRING, Detent	1
8	0514-001	BALL	2
9	1627-001	HOLDER, Detent	1
10	1768-001	PIN, Ball Stop	1

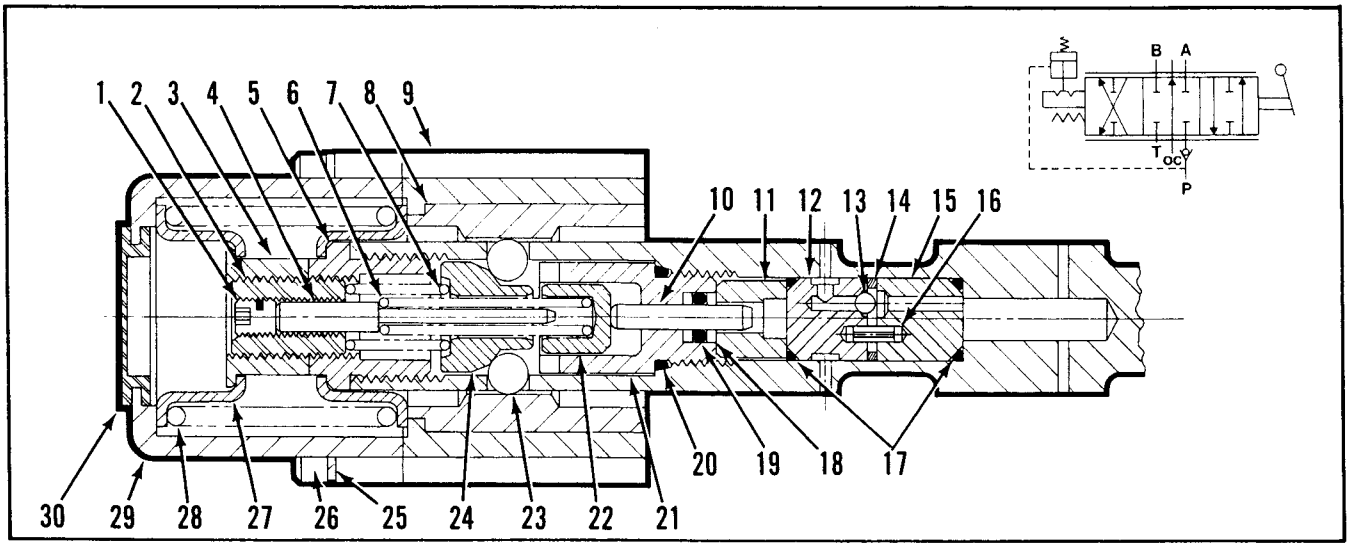

Figure 4-17. Internal Pressure Detent Release Positioner

INTERNAL PRESSURE DETENT RELEASE POSITIONER

Item No.	Part No.	Description	Quantity
	K-28088	SEAL KIT (Contains items 17 thru 20)	
1	7536-001	SETSCREW, Hex Soc, 1/4—28 by 1/4 inch long	1
2	7537-001	SLEEVE, Adjusting	1
3	7535-001	COLLAR, Spool	1
4	7939-001	GUIDE, Spring	1
5	7538-001	ADAPTER, Spool	1
6	7900-001	SPRING	1
7	1829-001	SPRING	1
8	7540-001	SLEEVE, Detent	1
9	7539-001	ADAPTER, Detent	1
10	7944-001	ROLLER, Needle	1
11	7945-001	RETAINER, Seal	1
12	7947-001	BODY, Check	1
13	7937-001	BALL	1
14	1883-001	SEAL	1
15	7948-001	BODY, Check	1
16	7940-001	PIN, Spring, .094 x .50 inch long	1
17	6884-001	SEAL, O-Ring	2
18	7907-001	WASHER, Backup	2
19	3328-001	SEAL, O-Ring	1
20	2705-001	SEAL, O-Ring	1
		Not Sold Separately. Order K-28088	
21	7943-001	PLUG, Seal Retainer	1
22	7942-001	PLUNGER	1
23	0023-001	BALL	4
24	7941-001	RAMP, Detent	1
25	0563-001	WASHER, Lock	4
26	3731-108	SCREW, Hex Soc. Hd., 1/4—20 by 2-1/2 inches long	4
27	1609-001	COLLAR, Spring	2
28	1625-001	SPRING	1
29	3481-002	BONNET	1
30	1612-001	DIAPHRAGM	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

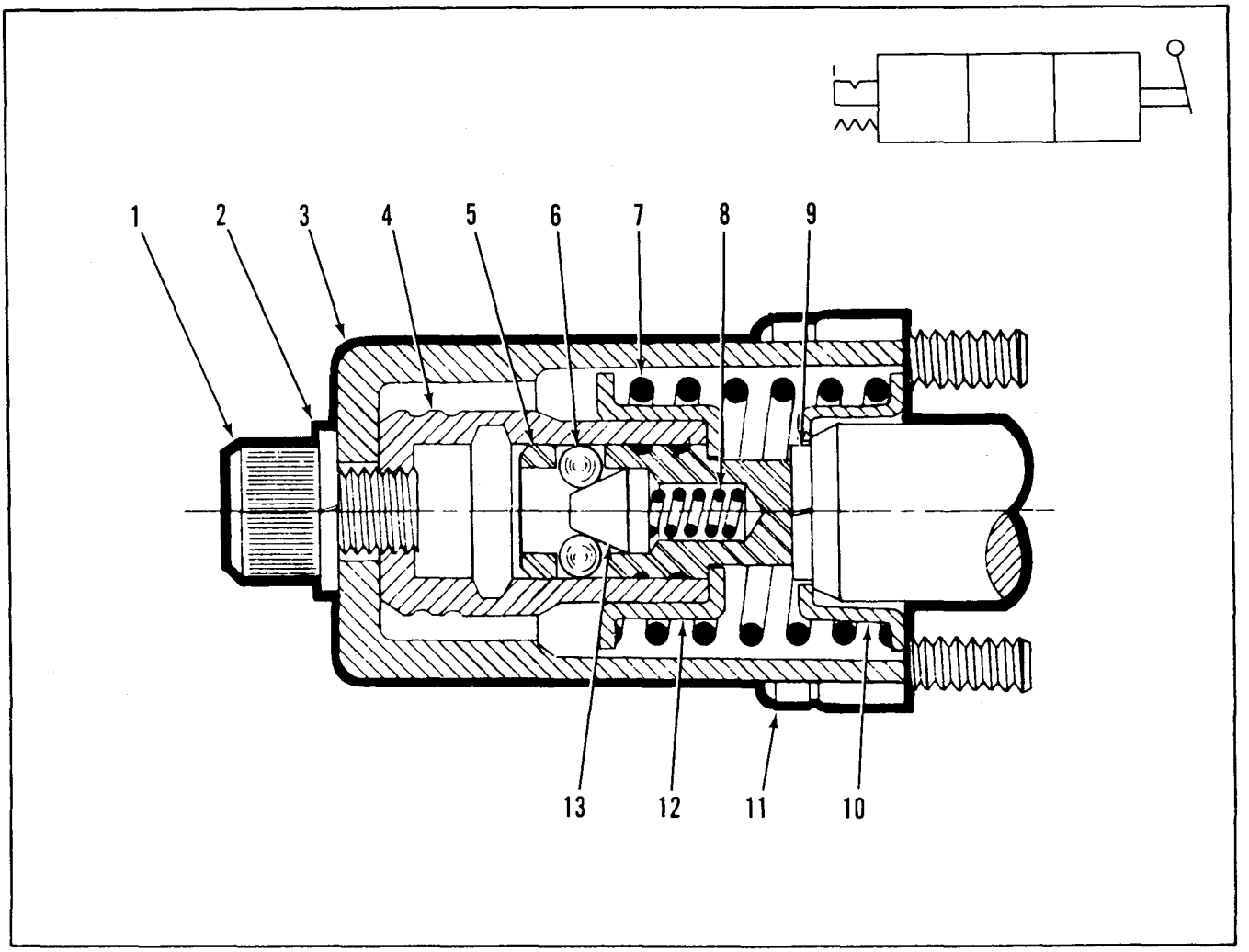

Figure 4-18. Spool "IN" Detent With Spring Return To Neutral Positioner

SPOOL "IN" DETENT WITH SPRING RETURN TO NEUTRAL POSITIONER

Item No.	Part No.	Description	Quantity
	K-28027	REPLACEMENT KIT (Contains all items listed below)	
1	1776-001	SCREW	1
2	1732-001	WASHER, Lock	1
3	3482-001	BONNET	1
4	3586-001	SLEEVE, Detent	1
5	3585-001	HOLDER, Detent	1
6	1700-001	BALL	4
7	1625-001	SPRING, Centering	1
8	1634-001	SPRING, Detent	1
9	1039-001	WASHER, Lock	1
10	1609-001	COLLAR, Stop	1
11	2673-001	SCREW, Fil. Hd., 1/4—20 by 1 inch long	4
12	1774-001	COLLAR, Detent	1
13	1773-001	FOLLOWER, Detent	1

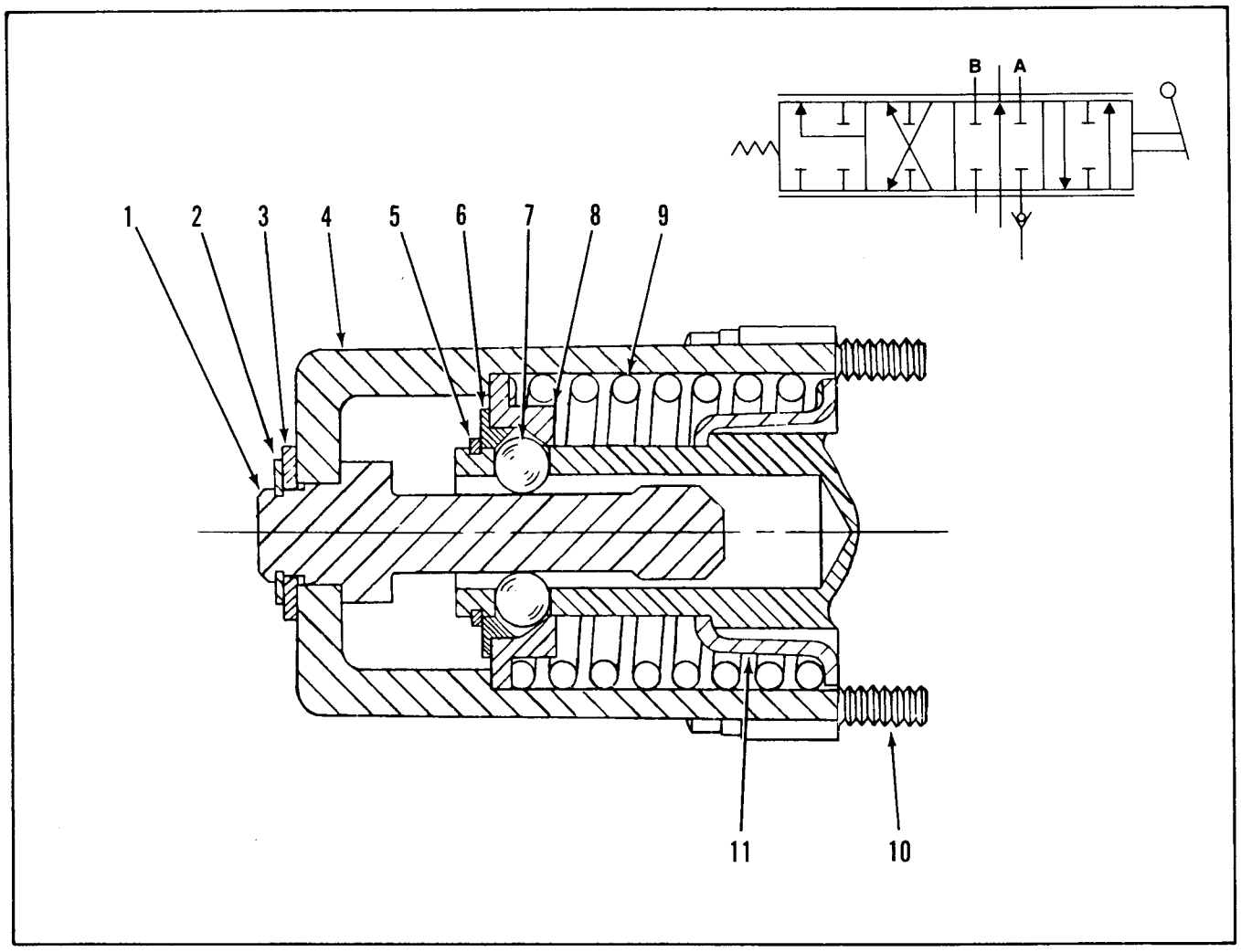

Figure 4-19. Regenerative Spool Positioner

REGENERATIVE SPOOL POSITIONER

Item No.	Part No.	Description	Quantity
	K-28059	REPLACEMENT KIT (Contains all items listed below)	
1	8554-001	POSITIONER	1
2	7442-001	RING, Retaining	1
3	0509-001	WASHER, Plain	1
4	3482-001	BONNET	1
5	1741-001	RING, Retaining	1
6	1738-001	ADAPTER	1
7	1700-001	BALL	4
8	3534-001	COLLAR, Detent	1
9	7170-001	SPRING	1
10	2673-001	SCREW, Fil. Hd., 1/4—20 by 1 inch long	4
11	3535-001	COLLAR, Stop	1

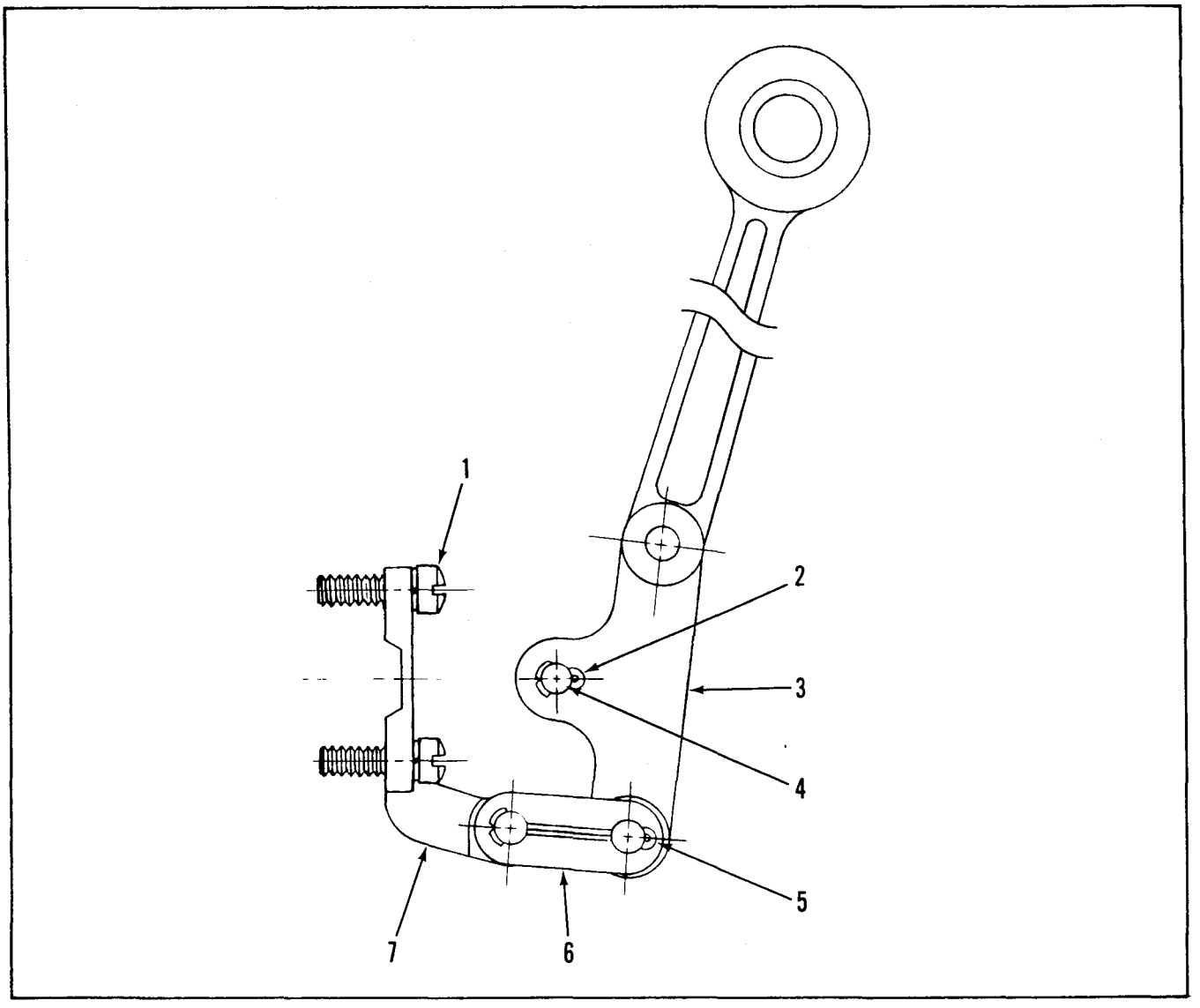

Figure 4-20. Vertical Handle

VERTICAL HANDLE

Item No.	Part No.	Description	Quantity
		REPLACEMENT KITS (Contains all items listed below)	
	K-28080	Replacement Kit With Black Plastic Coated Handle (Standard)	
	K-28081	Replacement Kit With Red Plastic Coated Handle	
	K-28082	Replacement Kit With Plain Handle	
1	1620-001	SCREW, Fil. Hd., 1/4—20 by 3/4 inch long	4
2	0086-001	PIN, Cotter, 0.078 by 0.50 inch long	1
3	8349-001	HANDLE, Vertical, Black Plastic Coated (Standard)	1
	8349-002	HANDLE, Vertical, Red Plastic Coated (Optional)	1
	8349-003	HANDLE, Vertical, Plain (Optional)	1
4	0085-001	PIN, Clevis	1
5	0929-00	PIN, Cotter, 0.062 by 1.50 inches long	1
6	3452-001	SIDE PLATE (Less pins)	1
	3453-001	SIDE PLATE (With pins)	1
7	8348-001	BRACKET, Handle	1

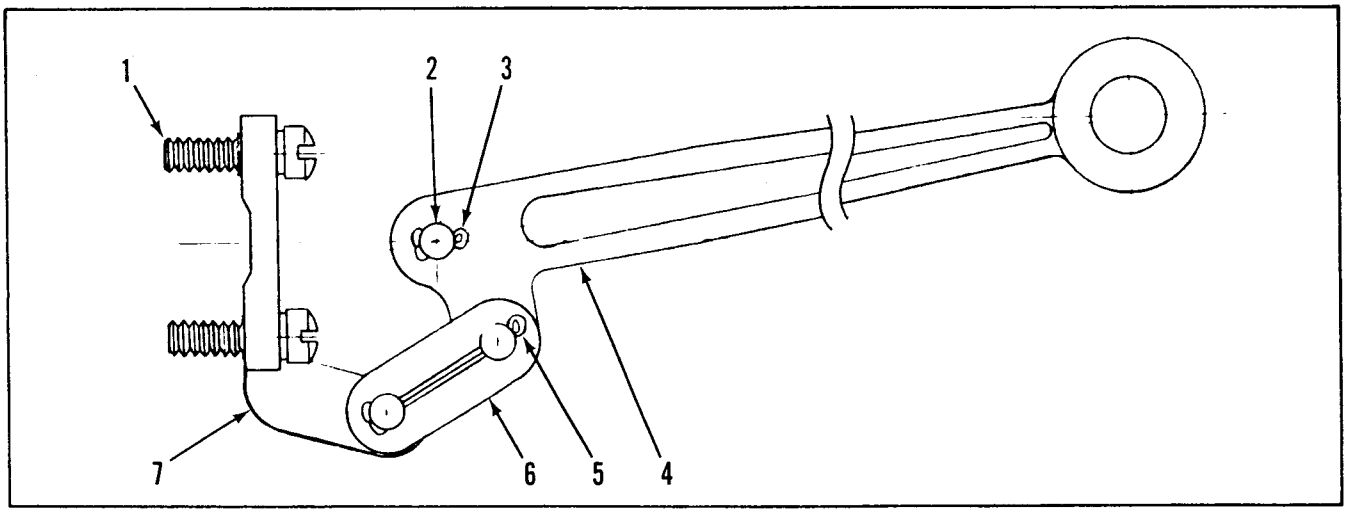

Figure 4-21. Horizontal Handle

HORIZONTAL HANDLE

Item No.	Part No.	Description	Quantity
		REPLACEMENT KITS (Contains all items listed below)	
	K-28083	Replacement Kit with Black Plastic Coated Handle (Standard)	
	K-28084	Replacement Kit with Red Plastic Coated Handle	
	K-28085	Replacement Kit with Plain Handle	
1	1620-001	SCREW, Fil. Hd., 1/4—20 by 3/4 inch long	4
2	0085-001	PIN, Clevis	1
3	0086-001	PIN, Cotter, 0.078 by 0.50 inch long	1
4	3249-001	HANDLE, Horizontal, Black Plastic Coated (Standard)	1
	3249-002	HANDLE, Horizontal, Red Plastic Coated (Optional)	1
	3249-003	HANDLE, Horizontal, Plain (Optional)	1
5	0929-001	PIN, Cotter, 0.062 by 1.50 inches long	1
6	3452-001	SIDE PLATE (Less pins)	1
	3453-001	SIDE PLATE (With pins)	1
7	8348-001	BRACKET, Handle	1

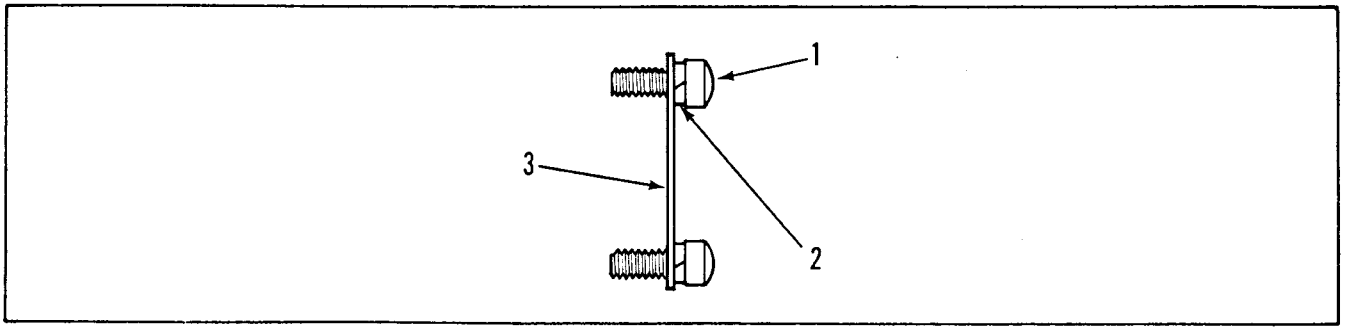

Figure 4-22. Standard Seal Retainer

STANDARD SEAL RETAINER

Item No.	Part No.	Description	Quantity
	K-28022	REPLACEMENT KIT (Contains items 1, 2 and 3)	
1	0510-001	SCREW, Button Hd., 1/4—20 UNC by 1/2 inch long	4
2	0563-001	WASHER, Lock	4
3	0725-001	PLATE, Retainer	1

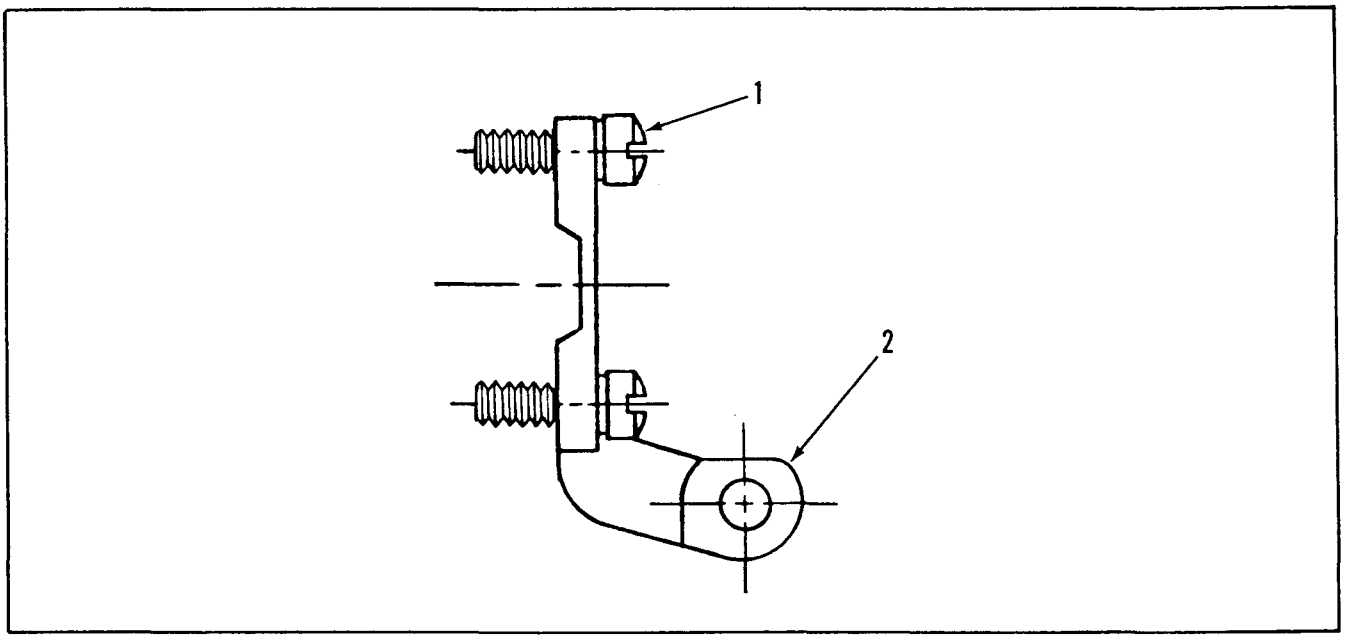

Figure 4-23. Handle Bracket

HANDLE BRACKET

Item No.	Part No.	Description	Quantity
	K-28086	REPLACEMENT KIT (Contains items 1 and 2)	
1	1620-001	SCREW, Fil. Hd., 1/4—20 by 3/4 inch long	4
2	8348-001	BRACKET, Handle	1

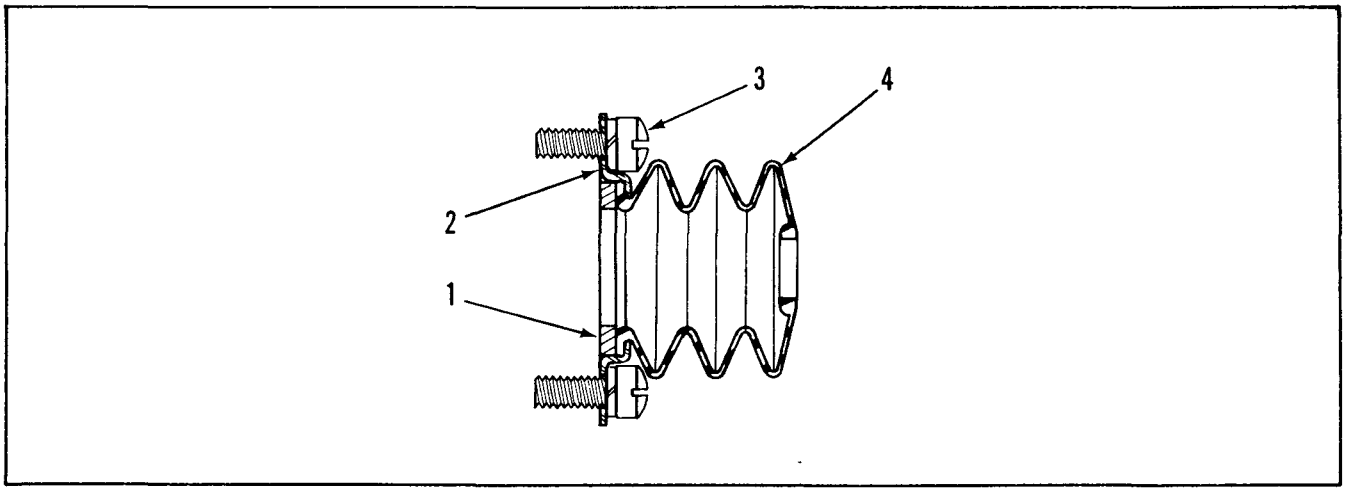

Figure 4-24. Spool Protective Boot

SPOOL PROTECTIVE BOOT

Item No.	Part No.	Description	Quantity
	K-7021	REPLACEMENT KIT (Contains all items listed below)	
1	7722-001	WASHER, Breather	1
2	7721-001	RETAINER, Boot	1
3	1620-001	SCREW and LOCK WASHER, Fil. Hd., 1/4—20 by 3/4 inch long	4
4	7723-001	BOOT, Dust	1

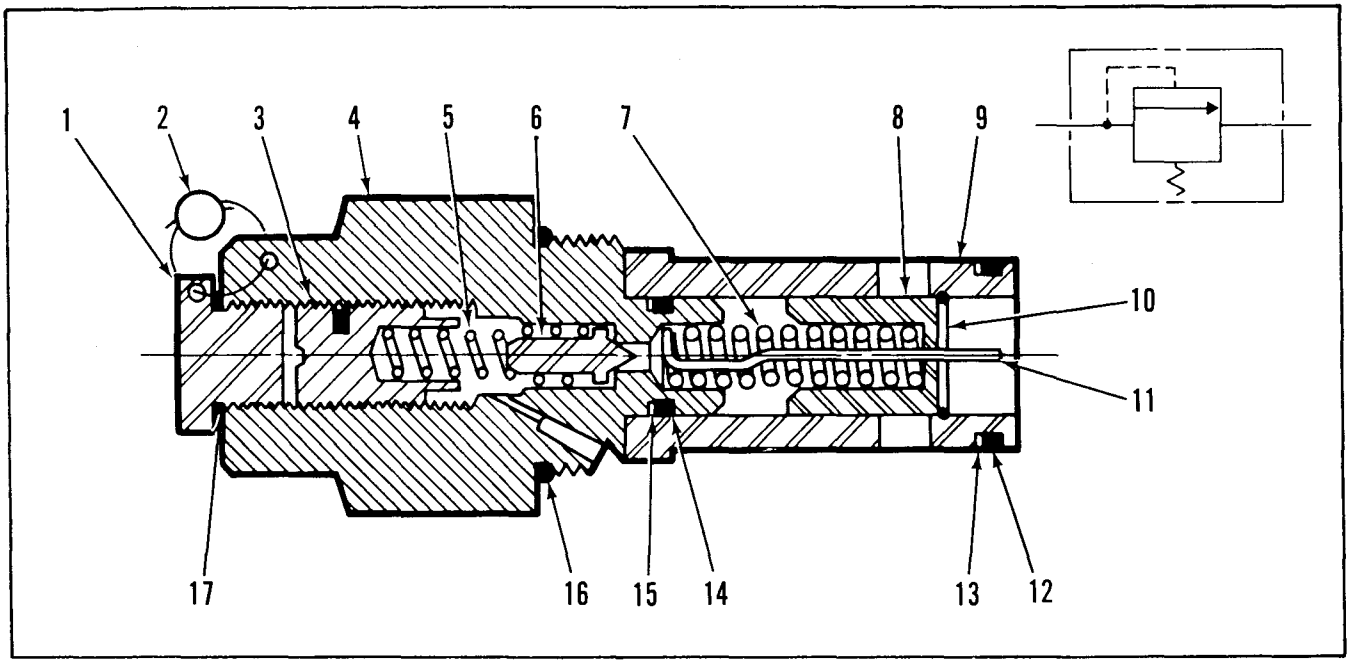

Figure 4-25. Model PK Relief Valve

MODEL PK RELIEF VALVE

Item No.	Part No.	Description	Quantity
	K-21003	SERVICE KIT, Rebuilding (Contains items 5 thru 9 and 11 thru 17)	
	K-21004	SERVICE KIT, Piston and Cylinder (Contains items 8 thru 11)	
	K-7005*	SEAL KIT (Contains items 12 thru 17)	
1	1687-001	CAP, Standard	1
	1687-002	CAP, Optional, Tamper Proof	1
2	1234-001	LOCKWIRE, Tamper Proof	1
3	1693-001	SCREW, Adjusting	1
4	1709-001	BODY, Relief, Standard	1
	1709-002	BODY, Relief, Optional, Tamper Proof	1
5	1695-001	SPRING, Pilot	1
6	2797-001	POPPET	1
7	1696-001	SPRING, Piston	1
8	1682-001	PISTON	1
9	1797-001	CYLINDER	1
10	1649-001	RING, Piston Retaining — See Note	1
11	3159-001	PIN, Piston	1
12	1698-001*	SEAL, O-Ring	1
13	1783-001	WASHER, Backup	1
14	0926-001*	SEAL, O-Ring	1
15	1785-001	WASHER, Backup — Not Sold Separately. Order K-7005	1
16	2709-001*	SEAL, O-Ring	1
17	1686-001	GASKET, Cap	1

NOTE: These are matched parts and are not sold separately. Order Service Kit K-21004.

Due to the close tolerances of the working parts in a pilot operated relief valve, it is important that the system be kept free of all foreign matter. A filter should be installed in any system incorporating pilot operated reliefs.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

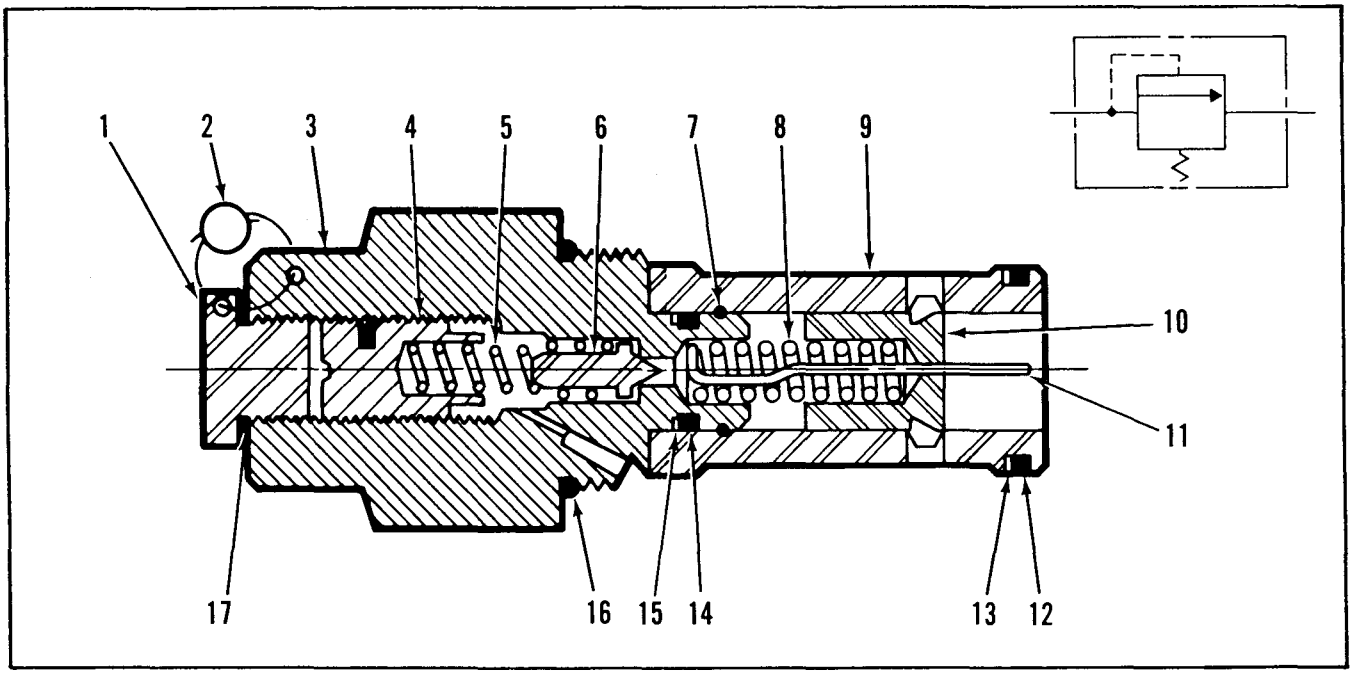

Figure 4-26. Model DPK Relief Valve

MODEL DPK RELIEF VALVE

Item No.	Part No.	Description	Quantity
	K-21006	SERVICE KIT, Rebuilding (Contains items 5, 6 and 8 thru 17)	
	K-21005	SERVICE KIT, Piston and Cylinder (Contains items 9 thru 11)	
	K-7005*	SEAL KIT (Contains items 12 thru 17)	
1	1687-001	CAP, Standard	1
	1687-002	CAP, Optional, Tamper Proof	1
2	1234-001	LOCKWIRE, Tamper Proof	1
3	1709-001	BODY, Relief, Standard	1
	1709-002	BODY, Relief, Optional, Tamper Proof	1
4	1693-001	SCREW, Adjusting	1
5	1799-001	SPRING, Pilot	1
6	2797-001	POPPET	1
7	1710-001	LOCKWIRE	1
8	1696-001	SPRING, Piston	1
9	1708-001	CYLINDER } See Note	1
10	1705-001	PISTON } See Note	1
11	3159-001	PIN, Piston } See Note	1
12	1698-001*	SEAL, O-Ring	1
13	1783-001	WASHER, Backup	1
14	0926-001*	SEAL, O-Ring	1
15	1785-001	WASHER, Backup } Not Sold Separately. Order K-7005	1
16	2709-001*	SEAL, O-Ring	1
17	1686-001	GASKET, Cap	1

Note: These are matched parts and are not sold separately. Order Service Kit K-21005.

Due to the close tolerances of the working parts in a pilot operated relief valve, it is important that the system be kept free of all foreign matter. A filter should be installed in any system incorporating pilot operated reliefs.

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

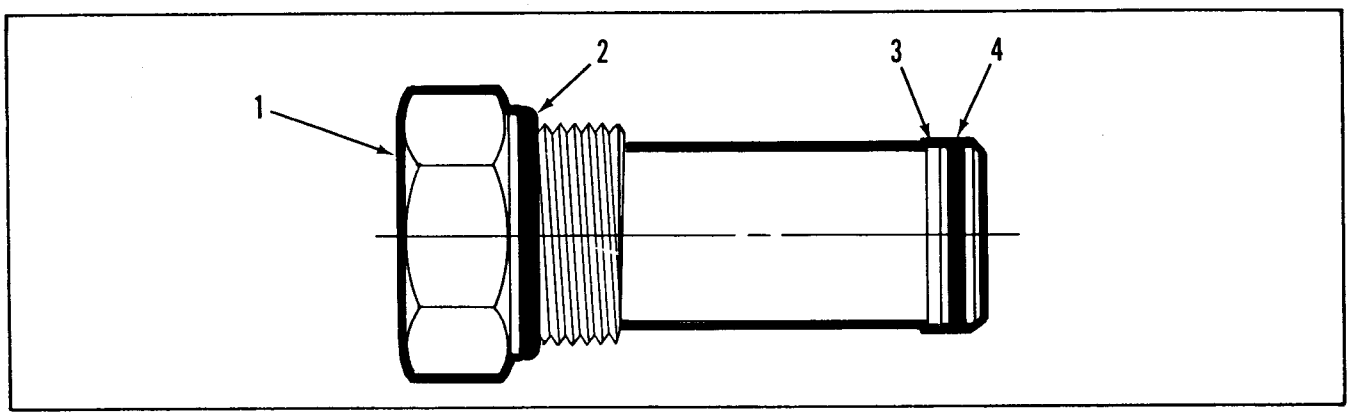

Figure 4-27. No Relief "NR" Plug (Main Relief)

NO RELIEF "NR" PLUG (MAIN RELIEF)

Item No.	Part No.	Description	Quantity
	K-7014	REPLACEMENT KIT (Contains all items listed below)	
1	2952-001	PLUG, Relief	1
2	2709-001*	SEAL, O-Ring	1
3	1783-001	WASHER, Backup	2
4	1698-001*	SEAL, O-Ring	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

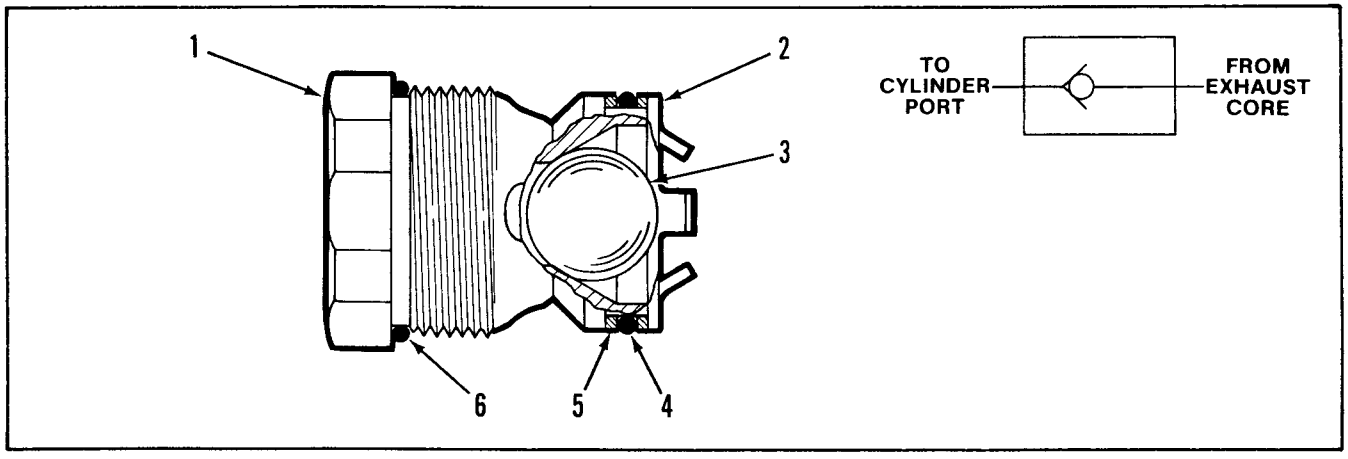

Figure 4-28. Upper Anti-Cavitation Check Valve

UPPER ANTI-CAVITATION CHECK VALVE

Item No.	Part No.	Description	Quantity
	K-28064	REPLACEMENT KIT (Contains all items listed below)	
	K-28062	SEAL KIT (Contains items 4, 5 and 6)	
1	6529-001	BODY	1
2	1661-001	RETAINER, Ball	1
3	2742-001	BALL	1
4	1718-001	SEAL, O-Ring	1
5	6530-001	WASHER, Backup } Not Sold Separately. Order K-28062	2
6	1615-001*	SEAL, O-Ring	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

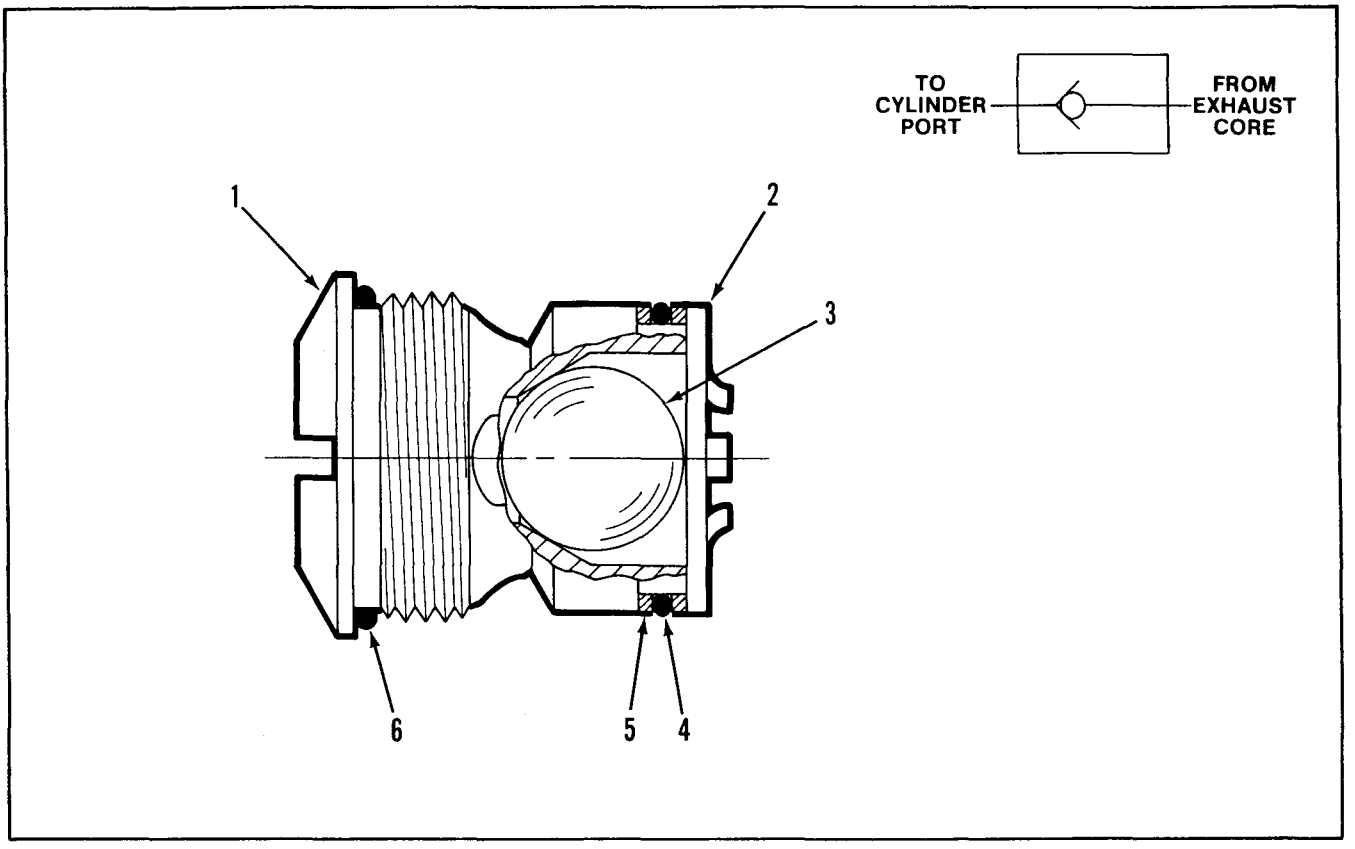

Figure 4-29. Lower Anti-Cavitation Check Valve

LOWER ANTI-CAVITATION CHECK VALVE

Item No.	Part No.	Description	Quantity
	K-28065	REPLACEMENT KIT (Contains all items listed below)	
	K-28063	SEAL KIT (Contains items 4, 5 and 6)	
1	6526-001	BODY	1
2	1659-001	RETAINER, Ball	1
3	1656-001	BALL	1
4	1660-001	SEAL, O-Ring Not	1
5	6527-001	WASHER, Backup } Sold Separately. Order K-28063	2
6	1698-001*	SEAL, O-Ring	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

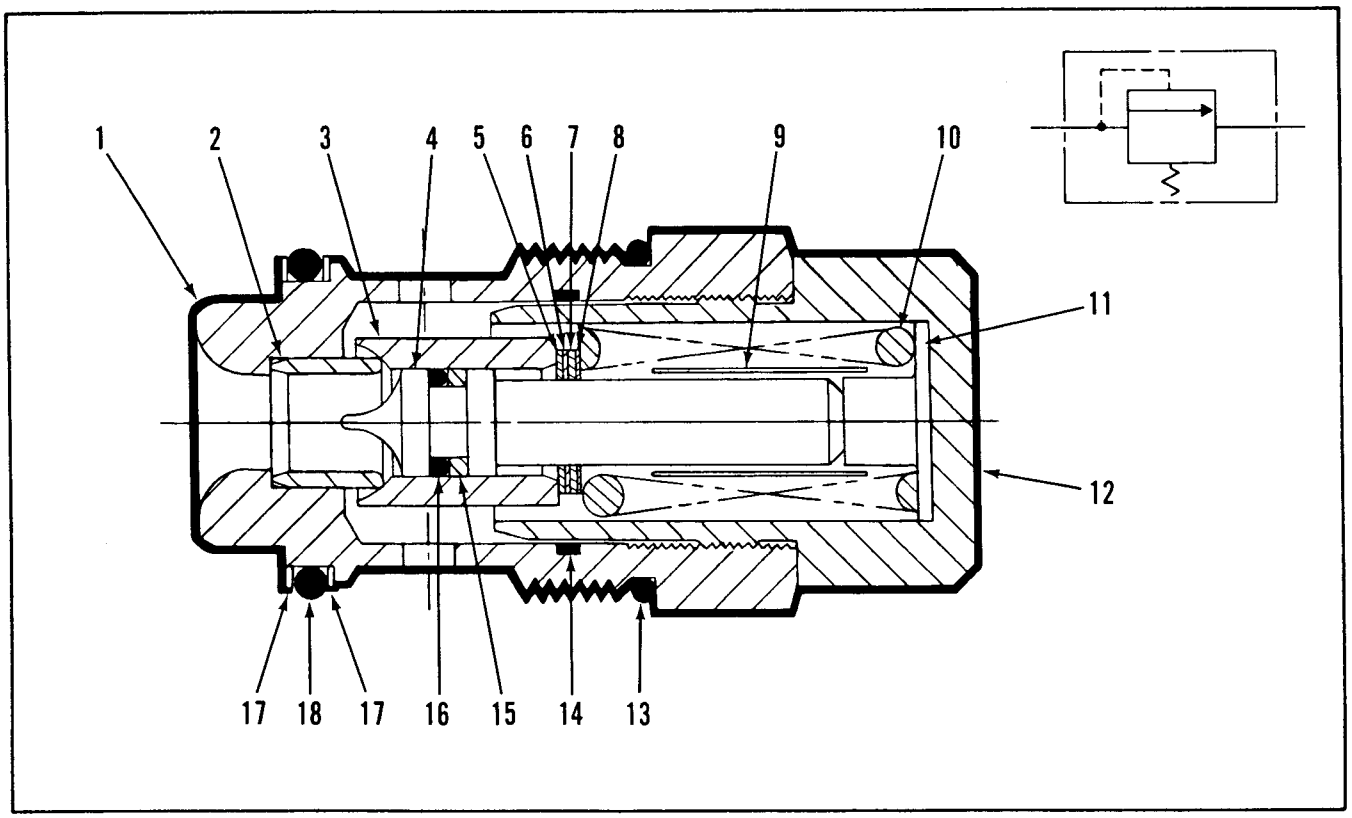

Figure 4-30. Model RD5ON Relief Valve (Non-adjustable)

MODEL RD50N MAIN RELIEF VALVE (Non-Adjustable Type)

Item No.	Part No.	Description	Quantity
		For complete Cartridge, order RD50N	
	K-6126	SEAL KIT (Contains items 13 thru 18)	
1	8114-001	BODY, Relief	1
2	8036-001	SEAT	1
3	8115-001	POPPET	1
4	8041-001	GUIDE, Poppet	1
5	0462-001	SHIM (.010)	A/R
6	0459-001	SHIM (.020)	A/R
7	0458-001	SHIM (.040)	A/R
8	8430-001	SHIM (.005)	A/R
9	7874-001	SLEEVE, Spring Dampening	1
10	8407-001	SPRING, (Standard, S.S., 500-1000 PSI Crack) [34-69 bar]	1
	1870-001	SPRING, (Standard, S.S., 1001-2500 PSI Crack) [70-173 bar]	1
	7497-001	SPRING, (Standard, S.S., 2501-4000 PSI Crack) [174-276 bar]	1
11	8436-001	SPACER, Poppet Guide	1
12	8437-001	CAP	1
13	1615-001*	SEAL, O-Ring	1
14	6814-001*	SEAL, O-Ring	1
15	7774-001	RING, Backup	1
16	8043-001	SEAL, O-Ring	1
17	6530-001	RING, Backup	2
18	1718-001	SEAL, O-Ring	1

Not Sold Separately. Order K-6126

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

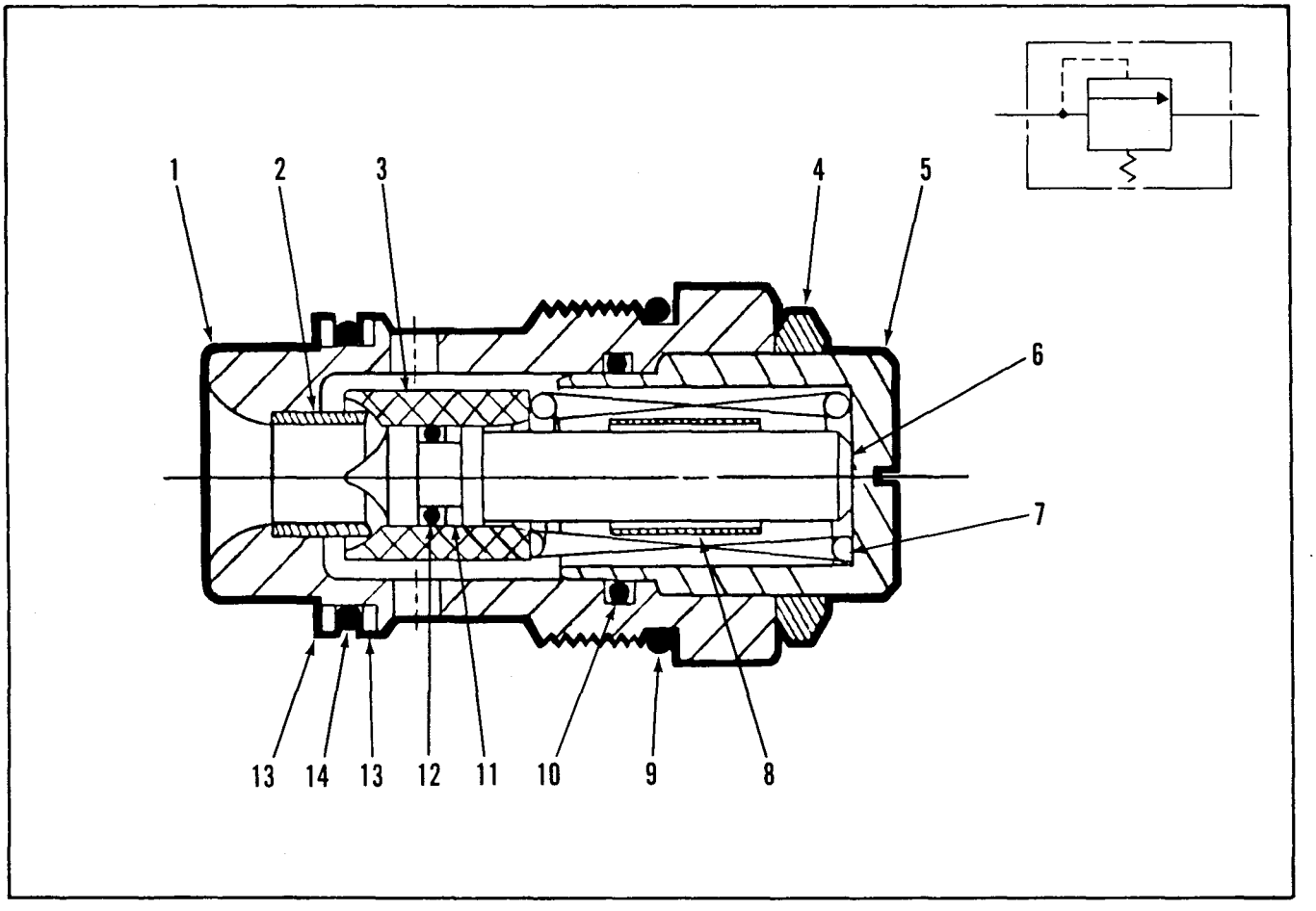

Figure 4-31. Model RD50A Relief Valve (Adjustable within the spring range.)

MODEL RD50A MAIN RELIEF VALVE (Adjustable within the spring range.)

Item No.	Part No.	Description	Quantity
		For complete Cartridge, order RD50A	
	K-6126	SEAL KIT (Contains items 9 thru 14)	
1	8114-001	BODY, Relief	1
2	8036-001	SEAT	1
3	8115-001	POPPET	1
4	8116-001	NUT, Jam	1
5	8117-001	CAP	1
6	8041-001	GUIDE, Poppet	1
7	1869-001	SPRING, (Standard, S.S., 500-1000 PSI Crack) [34-69 bar]	1
	1870-001	SPRING, (Standard, S.S., 1001-2500 PSI Crack) [70-173 bar]	1
	7497-001	SPRING, (Standard, S.S., 2501-4000 PSI Crack) [174-276 bar]	1
8	7874-001	SLEEVE, Dampening	1
9	1615-001*	SEAL, O-Ring	1
10	6814-001*	SEAL, O-Ring	1
11	7774-001	Ring, Backup	1
12	8043-001	SEAL, O-Ring	1
13	6530-001	RING, Backup	2
14	1718-001	SEAL, O-Ring	1

Not Sold Separately. Order K-6126

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

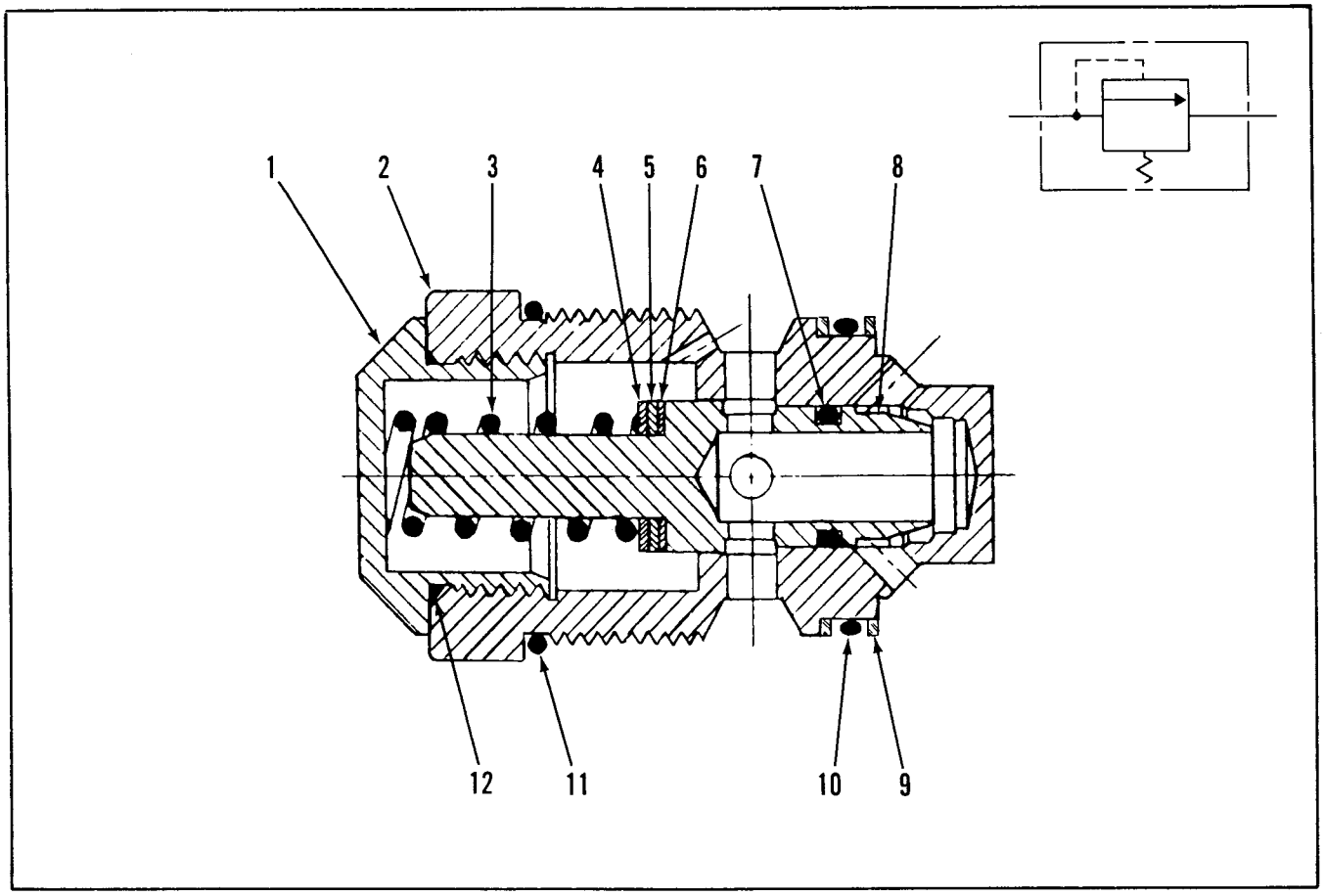

Figure 4-32. WH Relief Valve (For pressures up to 3000 PSI [207 bar] only.)

WH RELIEF VALVE

Item No.	Part No.	Description	Quantity
	K-19002	SERVICE KIT (Contains items 7 and 8)	
	K-19003	SEAL KIT (Contains items 9 thru 12)	
1	1880-001	CAP, Relief	1
2	6533-001	BODY	1
3	1450-001	SPRING, 500-1350 PSI [34-93 bar]	1
	1864-001	SPRING, 1351-1750 PSI [94-121 bar]	1
	1451-001	SPRING, 1751-2200 PSI [122-152 bar]	1
	1865-001	SPRING, 2201-3000 PSI [153-207 bar]	1
	1870-001	SPRING, S.S., 2201-2600 PSI [153-179 bar]	1
	7497-001	SPRING, S.S., 2601-3000 PSI [180-207 bar]	1
4	0458-001	SHIM, (.040 inch) [1,02mm]	A/R
5	0459-001	SHIM, (.020 inch) [0,51mm]	A/R
6	0462-001	SHIM, (.010 inch) [0,25mm]	A/R
7	1881-001	RING, Piston — Not Sold Separately. Order K-19002	1
8	1883-001	POPPET, Relief — Not Sold Separately. Order K-19002	1
9	6530-001	WASHER, Backup — Not Sold Separately. Order K-19003	2
10	1718-001	SEAL, O-Ring — Not Sold Separately. Order K-19003	1
11	1615-001*	SEAL, O-Ring — Not Sold Separately. Order K-19003	1
12	2707-001*	SEAL, O-Ring — Not Sold Separately. Order K-19003	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

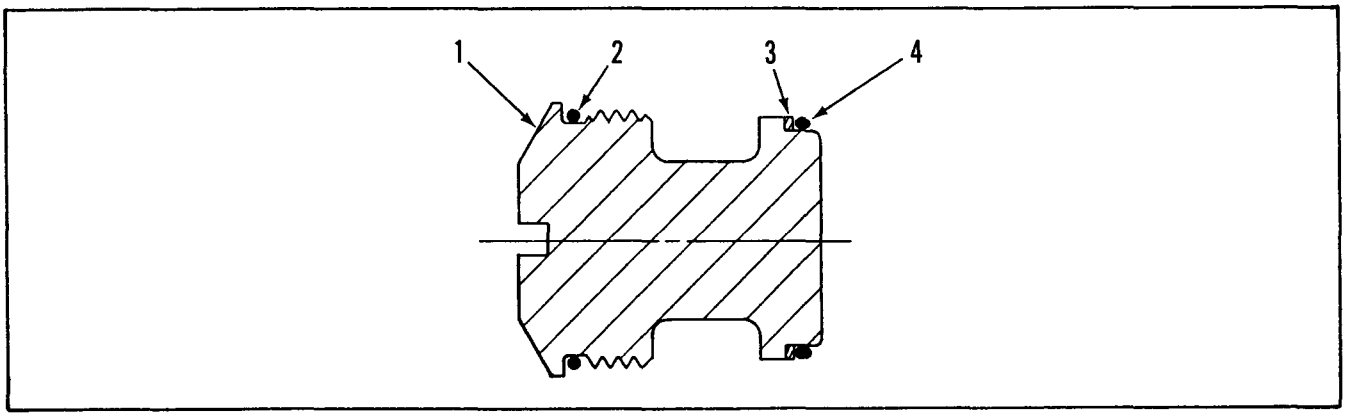

Figure 4-33. Lower Anti-Cavitation Plug

LOWER ANTI-CAVITATION PLUG

Item No.	Part No.	Description	Quantity
	K-28087	REPLACEMENT KIT (Contains all items listed below)	
	K-28063	SEAL KIT, (Contains items 2, 3 and 4)	
1	6759-001	PLUG	1
2	1698-001*	SEAL, O-Ring	1
3	6527-001	WASHER, Backup } Not Sold Separately. Order K-28063	2
4	1660-001	SEAL, O-Ring	1

*Buna-N seals are standard for all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

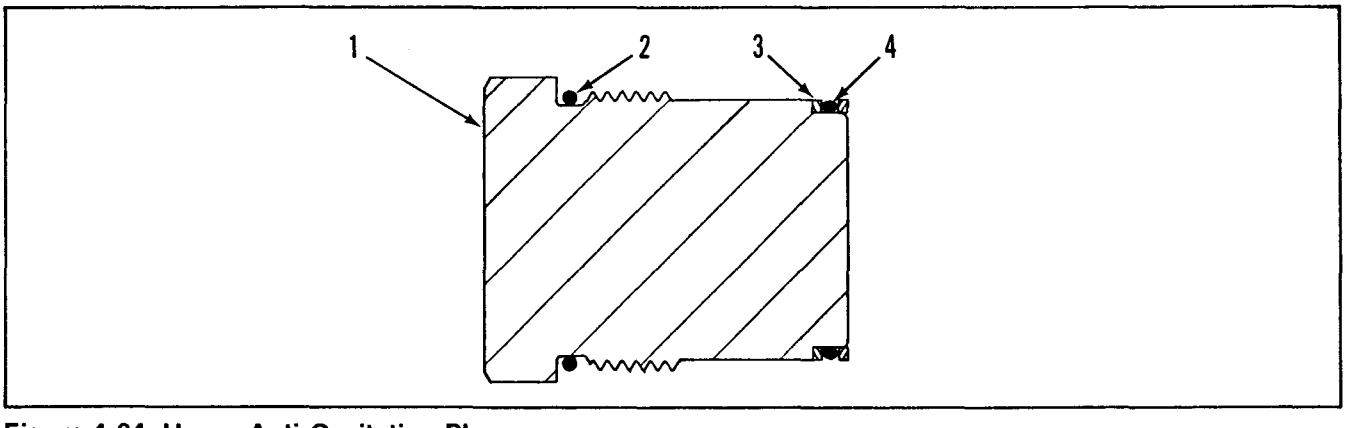

Figure 4-34. Upper Anti-Cavitation Plug

UPPER ANTI-CAVITATION PLUG

Item No.	Part No.	Description	Quantity
	K-6132	REPLACEMENT KIT (Contains all items listed below)	
	K-28062	SEAL KIT (Contains items 2, 3 and 4)	
1	6760-001	PLUG	1
2	1615-001*	SEAL, O-Ring	1
3	6530-001	WASHER, Backup } Not Sold Separately. Order K-28062	2
4	1718-001	SEAL, O-Ring	1

*Buna-N seals are standard on all Gresen valve assemblies. Optional Viton seals are available. See Cross Reference Tables on page 4-31.

Standard Buna-N Seals and O-Rings

All standard Gresen products utilize Buna-N seals which are compatible with petroleum base, water-in-oil emulsions, and water-glycol fluids. Phosphate ester type fire-resistant fluids will cause Buna-N seals to swell. This swelling is not normally detrimental to static seals, but will be a problem for dynamic seals such as valve spool seals. Swelling of these seals can result in binding. The temperature range of Buna-N seals is -40° F to +260° F [-40° C to +127° C].

Table 4-1. Cross Reference for Seals and O-Rings Buna-N to Viton

Buna-N Part No.	Viton Part No.	Application
0926-001	6273-001	Relief Seal
1615-001	7447-001	Relief and Check Seal
1621-001	6274-001	Large Section Seal
1622-001	6275-001	Small Section Seal
1660-001	None	Check Seal
1698-001	6276-001	Relief and Check Seal
1718-001	None	Relief and Check Seal
2707-001	7448-001	Relief Seal
2709-001	6277-001	Relief Plug Seal
2931-001	6278-001	Spool Seal
3532-001	6272-001	Spool Seal
6814-001	7450-001	Relief Seal
7877-001	None	Piston Seal
7951-001	None	Piston Seal

Optional Viton Seals and O-Rings

Viton seals are recommended for most applications that use phosphate-ester type fluids. Viton seals will not swell when in contact with phosphate-ester type fluids. The temperature range for Viton seals is -20° F to +400° F [-29° C to +260° C] in dynamic applications and -40° F to +400° F [-40° C to+250° C] in static applications Viton seals are available for Gresen Model V42 Valves.

Table 4-2 Cross Reference For Seal Kits. Buna-N to Viton

Buna-N Part No.	Viton Part No.	Application
K-7005	K-7019	PK and DPK Relief Valve Seals
K-7014	K-28033	No Relief "NR" Plug Kit
K-7018	K-7020	Check Plug Kit
K-28029	K-28032	Spool and Section Seals

Table 4-3. Cylinder Port Plugs and Seals for 3-Way Work Sections

Part No.	Description
1282-001	Cylinder Port Plug (3/4" NPTF)
1288-001	Cylinder Port Plug (1" NPTF)
1726-001	Cylinder Port Plug (SAE 12)
1629-001	Cylinder Port Plug (SAE 16)
2708-001	O-Ring for SAE 12 Plug
2710-001	O-Ring for SAE 16 Plug

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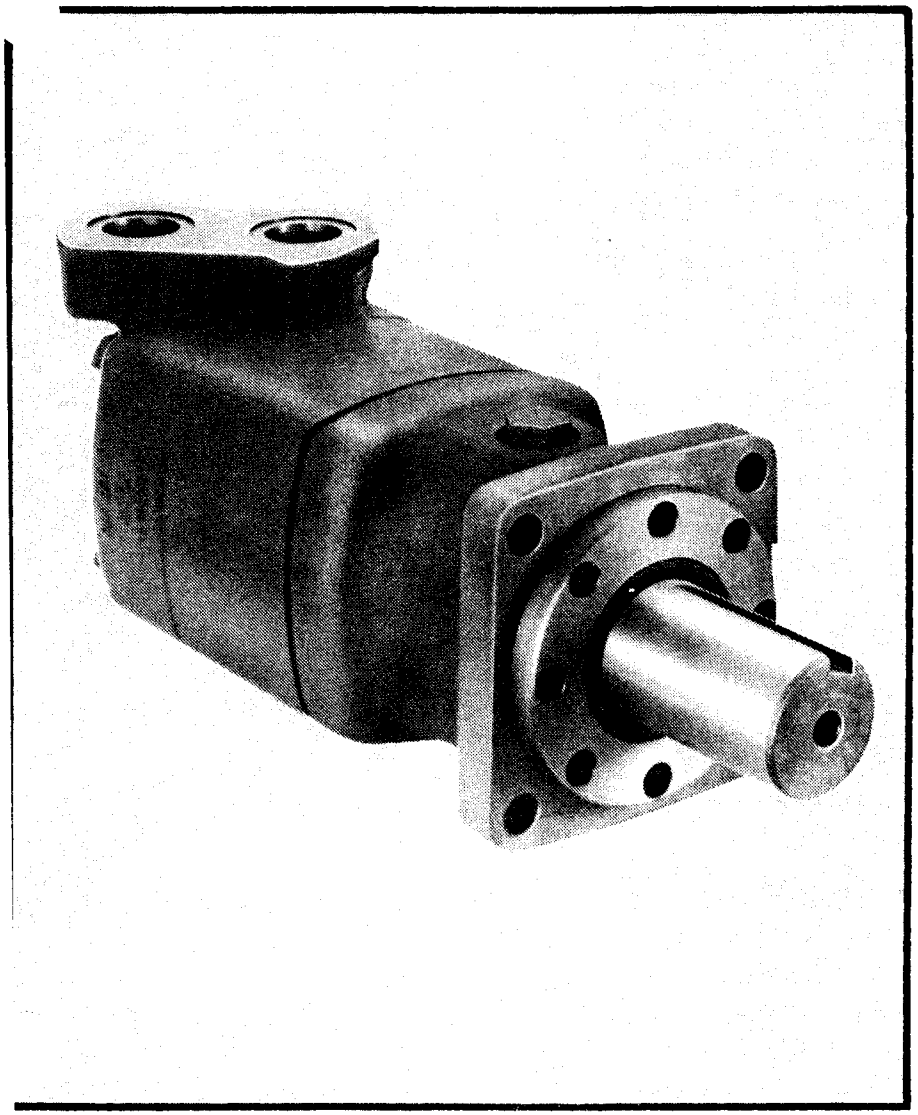

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DEALER'S NAME _____

TABLE OF CONTENTS

HYDRAULIC MOTORS

A hydraulic motor is a device that converts fluid energy into mechanical energy. A hydraulic pump, which is driven mechanically, draws in fluid from a reservoir and pumps it to a motor converting mechanical energy to fluid energy. The fluid from the pump causes the motor output shaft to rotate and so drives its load by a mechanical link. The speed of the motor shaft is determined by the amount of fluid flowing through the motor (gallons per minute—gpm). Output torque, is produced by fluid under pressure operating against the displacement element (Geroler).® Displacement is the volume of fluid required to produce one revolution of a pump or motor output shaft. It is usually measured in cubic inches per revolution (cu. in./rev.). Char-Lynn®motor displacement is determined by the width of the Geroler.

Pressure (PSI) produces torque (lb. in.).
Amount of Flow (GPM) determines Speed (RPM).

DISPLACEMENT — 1 Gallon= 231 cubic inches.

Formula for figuring theoretical torque—

$$T = \frac{\text{Pressure (psi) x Displacement (cu. in.)}}{2\pi}$$

EXAMPLE
How much torque will a 10,000 Series, 40 cubic inch displacement motor produce at 1500 psi?

$$T = \frac{1500 \times 40}{6.28} = \frac{60{,}000}{6.28} = 9554 \text{ lb. in.}$$

This torque is theoretical. For actual torque, multiply by a percentage factor based on the efficiency of the motor. 10,000 Series motors have mechanical efficiencies averaging 85%.

Actual torque = 9554 x 85% = 8121 lb. in.

4 Introduction

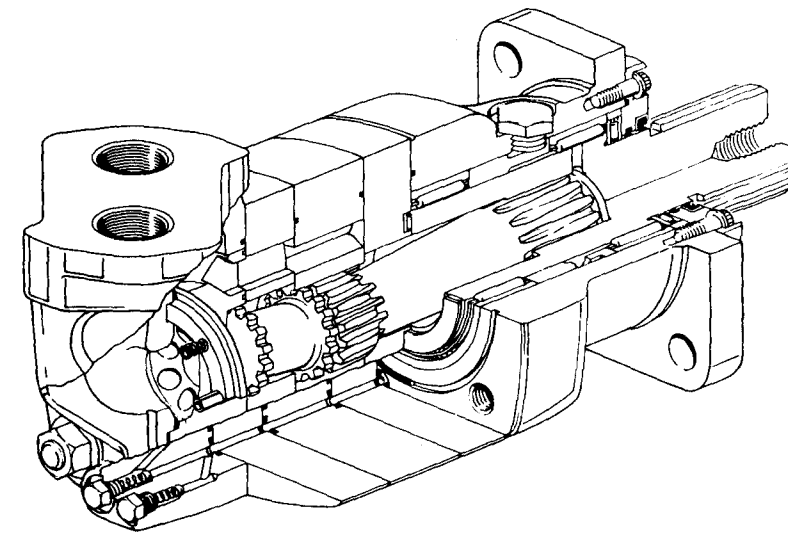
CHAR-LYNN® 10,000 SERIES MOTOR

The 10,000 Series Motors are simple in design, compact and powerful. Using the same basic principle as the other Char-Lynn hydraulic motors, they provide high torque and low speeds through an effective 8:1 internal reduction. Few moving parts, all self lubricated using the hydraulic system fluid, minimize friction and wear within the motor. All motors are individually tested to insure the highest possible quality.

This manual has been prepared to help install the motor in a manner that will help to obtain long and useful life. For more information concerning the servicing of the motor, a Repair Manual is available which gives complete disassembly and reassembly instructions plus other pertinent information about the repair of the motor.

If you have any questions which are not answered in these manuals, contact your local representative or the Eaton Corporation, Minneapolis Division.

CUTAWAY DIAGRAM



SPECIFICATIONS

Displacement (cu. in./rev.)		20.65	29.22	40.55	57.36
Speed (RPM)	Continuous Flow and Pressure	480	340	240	175
	Peak Flow and Continuous Pressure	650	460	330	235
Flow (GPM)	Continuous	45	45	45	45
	Peak	60	60	60	60
Torque (lb. in.)	Running @ Continuous Flow and Pressure	7400	10,500	10,200	10,000
	Running @ Continuous Flow and Peak Pressure	11,200	15,900	16,400	15,200
	Starting	90% of running at the same pressure			
Pressure (△ PSI)	Continuous	2500	2500	1750	1250
	Peak	3750	3750	2750	1850
	Peak Back Pressure without External Case Drain*	1000	1000	1000	1000

***For continuous back pressure over 300 PSI use an external case drain. Install case drain lines to provide a 100 to 150 PSI case pressure.**

Maximum inlet pressure 3750 PSI. Do not exceed △ PSI rating above

Maximum return pressure 3750 PSI. Do not exceed △ PSI rating above

Peak conditions assumed to be less than 10% of every minute

Recommended maximum system operating temperature 180° F

Recommended viscosity range 100 SSU to 200 SSU at operating temperature

Recommended filtration 10 micron

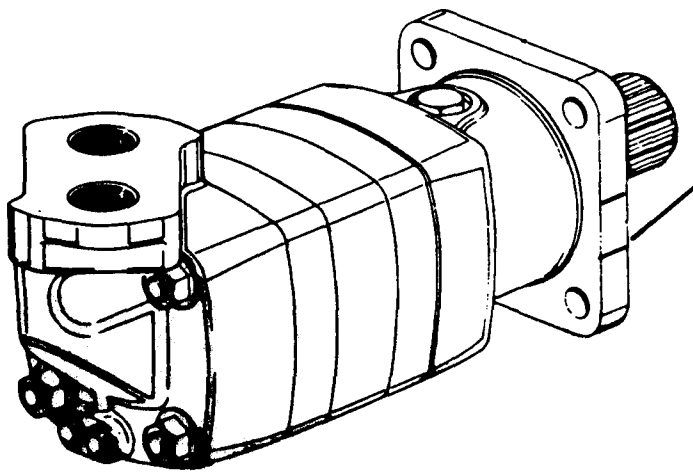
Always use external case drain in closed loop circuits

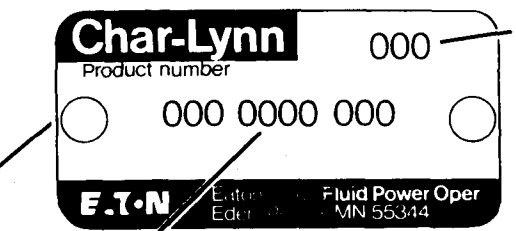
For performance beyond ratings above, contact Char-Lynn sales department

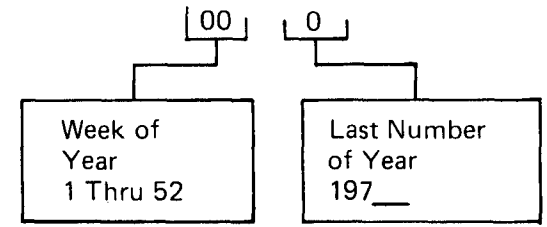
To assure optimum motor life, run motor for approximately one hour at 30% of rated pressure before application of full load. Be sure motor is properly filled with fluid prior to any load applications.

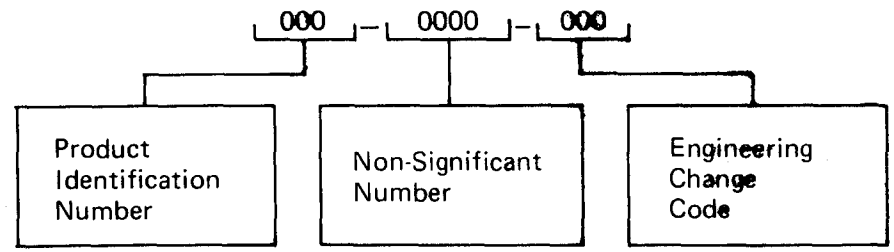
6 Introduction

MOTOR IDENTIFICATION









Standard Motor	119–
Wheel Motor	120–
Bearingless Motor	121–

MOTOR IDENTIFICATION

Type of Motor	Type of Shaft	Port Connectors	Displacement (cu. in./rev.) and Product Number			
			20.65	29.22	40.55	57.36
Standard	Straight	1⅝" Threaded	119-1028	119-1029	119-1030	119-1031
		1¼" Split Flange	119-1040	119-1041	119-1042	119-1043
	Splined	1⅝" Threaded	119-1032	119-1033	119-1034	119-1035
		1¼" Split Flange	119-1044	119-1045	119-1046	119-1047
	Tapered	1⅝" Threaded	119-1036	119-1037	119-1038	119-1039
		1¼" Split Flange	119-1048	119-1049	119-1050	119-1051
Wheel	Straight	1⅝" Threaded	120-1005	120-1006	120-1007	120-1008
		1¼" Split Flange	120-1017	120-1018	120-1019	120-1020
	Splined	1⅝" Threaded	120-1009	120-1010	120-1011	120-1012
		1¼" Split Flange	120-1021	120-1022	120-1023	120-1024
	Tapered	1⅝" Threaded	120-1013	120-1014	120-1015	120-1016
		1¼" Split Flange	120-1025	120-1026	120-1027	120-1028
Bearingless		1⅝" Threaded	121-1007	121-1008	121-1009	121-1010
		1¼" Split Flange	121-1011	121-1012	121-1013	121-1014

8 Introduction

HYDRAULIC CIRCUITS

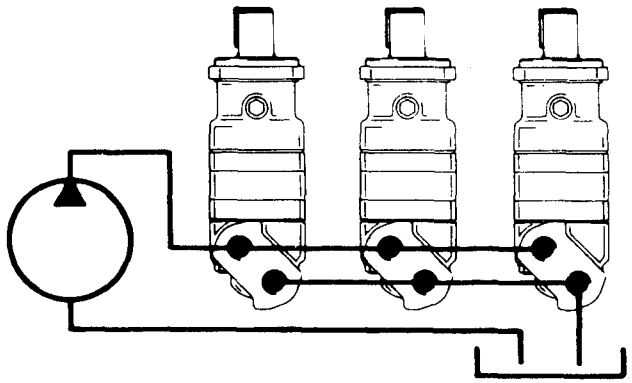
Hydraulic motor circuits can be reduced to 3 basic types. The single motor circuit, series circuit and parallel circuit (both of the later types incorporating 2 or more motors). The figures below illustrate these circuit.

SINGLE MOTOR CIRCUIT

A 3-way open center valve can be used to start and stop the motor. When the valve is moved to the stop position, the motor is allowed to "coast" to a stop. A 4-way valve can be used if the motor is to be reversed.

PARALLEL MOTOR CIRCUIT

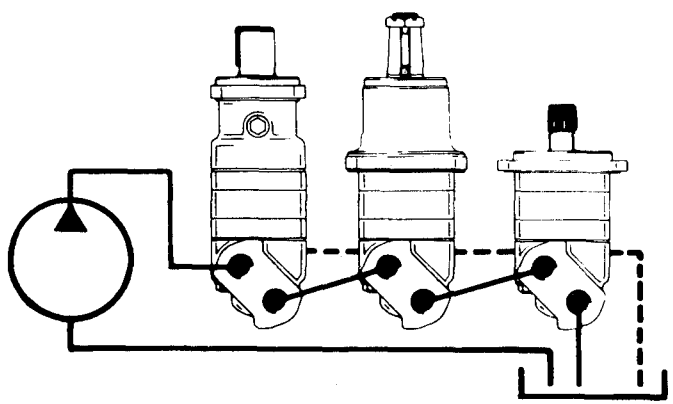
The 2 or more motors hooked in parallel share the same oil supply. With equal loads, two motors in parallel will operate at ½ the speed of a single motor at the same GPM. Torque will remain constant. 10,000 Series motors will operate satisfactorily in this type installation with no back pressure.



Parallel Connection

SERIES MOTOR CIRCUIT

The 2 or more motors in series will divide pump pressure according to the load on each, but will operate at approximately equal speed. An external case drain is required whenever 2 or more motors are used in series. See page 22.



Series Connection

THE RESERVOIR

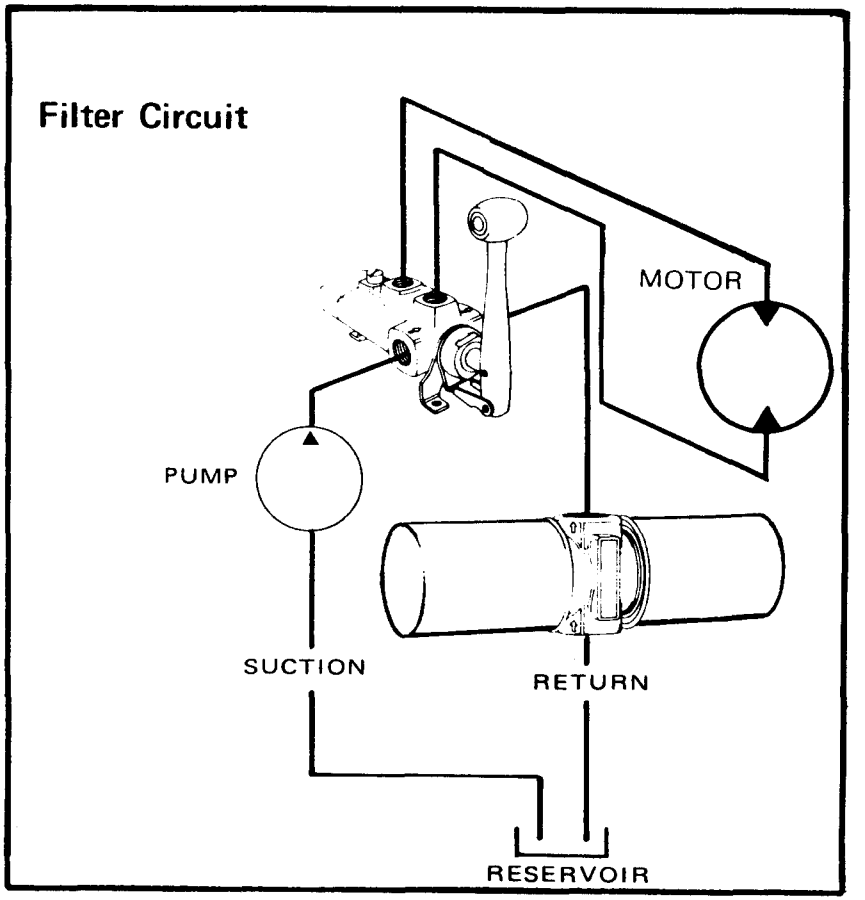
Reservoir size varies with the type of circuit and the application. A ratio of 1:1* is adequate to supply most systems and maintain the proper temperature. This temperature should be around 120° with 180° considered the absolute maximum!

If oil temperatures go beyond this range, a larger reservoi or heat exchanger should be added to the circuit. Black iron pipes can be used to replace hoses in some instances. These help keep the temperatures down and also give a more economical installation. The pipe should be in accordance with recognized pressure maximums i.e. STD., XH or XXH.

*1 GALLON OF RESERVOIR CAPACITY FOR EACH GPM PUMPED.

THE FILTER

This motor is sensitive to contamination because of close part tolerances. Therefore, it is very important that adequate filtration is included in the system. A 10 micron filter is recommended. It should be installed in the return line. Welding slag, dirt, or sand in a new reservoir can cause contamination throughout the system at start-up. Be sure to flush out the reservoir through the filtering system without the motor and other components.



10 Introduction

THE FLUID IN A HYDRAULIC MOTOR SYSTEM

The following are the recommended procedures for selecting the proper hydraulic fluid for use in Char-Lynn® Motors. Select a major brand industrial PREMIUM QUALITY (anti-wear type) hydraulic oil to provide viscosity between 100—200 SSU at operating temperature. Premium hydraulic oils with viscosity indexes of 95 or above will provide the following temperature ranges:

INDUSTRY IDENTIFICATION VISCOSITY GRADE	OPERATING TEMPERATURE	VISCOSITY
150 SSU	122° F	100 SSU
	84° F	200 SSU
225 SSU	140° F	100 SSU
	107° F	200 SSU
300 SSU	150° F	100 SSU
	116° F	200 SSU
450 SSU	165° F	100 SSU
	130° F	200 SSU
600 SSU	182° F	100 SSU
	145° F	200 SSU

THE FLUID IN A HYDRAULIC MOTOR SYSTEM

If, because of necessity or convenience it is desirable to use an automotive engine oil, multi-viscosity oils of SE rating which will provide viscosity between 100 and 200 SSU at operating temperature can be used. These will provide proper viscosity over a wide range. For example:

SAE VISCOSITY GRADE	OPERATING TEMPERATURE	VISCOSITY
10W–30	160° F	100 SSU
	120° F	200 SSU
10W–40	190° F	100 SSU
	140°	200 SSU

The above recommendations cover the normal system operating temperatures.

If in doubt as to proper grade and types of oils to use, Eaton distributors or representatives can supply pertinent information or contact Eaton Corporation, Fluid Power Operations, Minneapolis Division, 15151 Highway 5, Eden Prairie, Minnesota, 55344.

Synthetic fluids or other non-petroleum based fluids can be used. However where such fluids are required because of fire hazard or other specifications, the motor performance may have to be de-rated, the operating temperature and pressure limited or seals may require changing because of incompatability with the fluid. Consult Char-Lynn® product distributors.

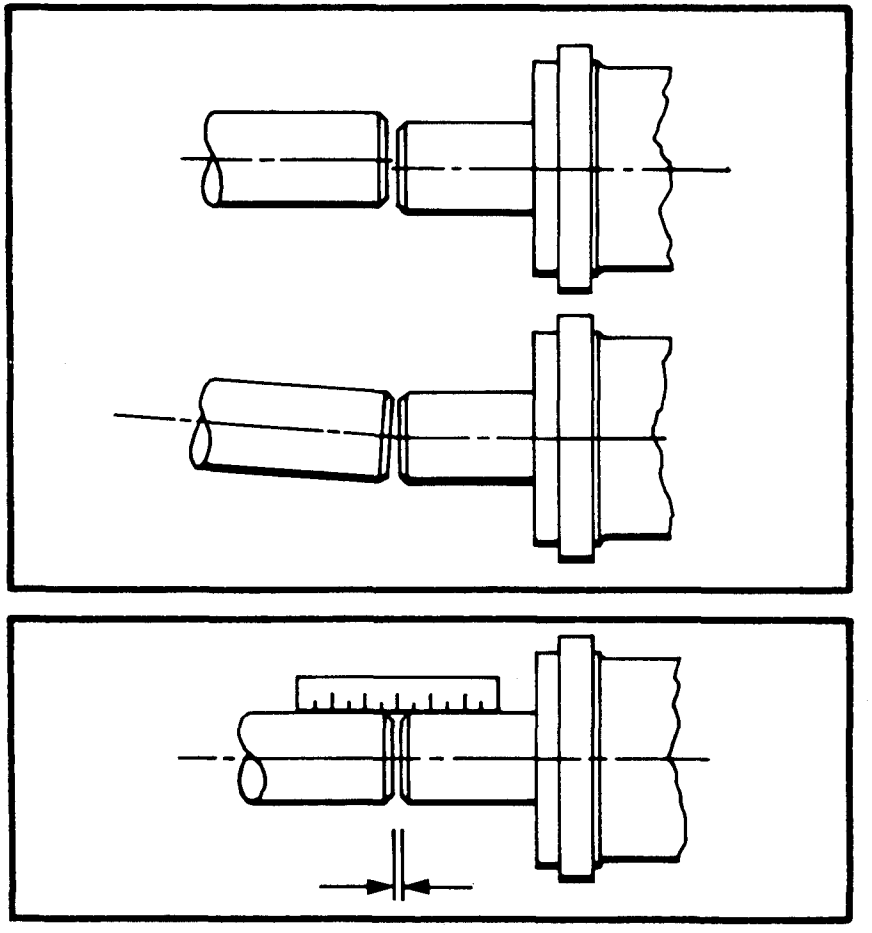
Do not use propriety additives such as viscosity increasers or friction eliminators.

12 Installation

SHAFT ALIGNMENT

Avoid poor installation practices which lead to shaft misalignment. The motors are adequately designed to withstand substantial side and thrust loads, but to impose an unnecessary continuous force on the motor shaft can accelerate wear and reduce the work life of the motor and coupling.

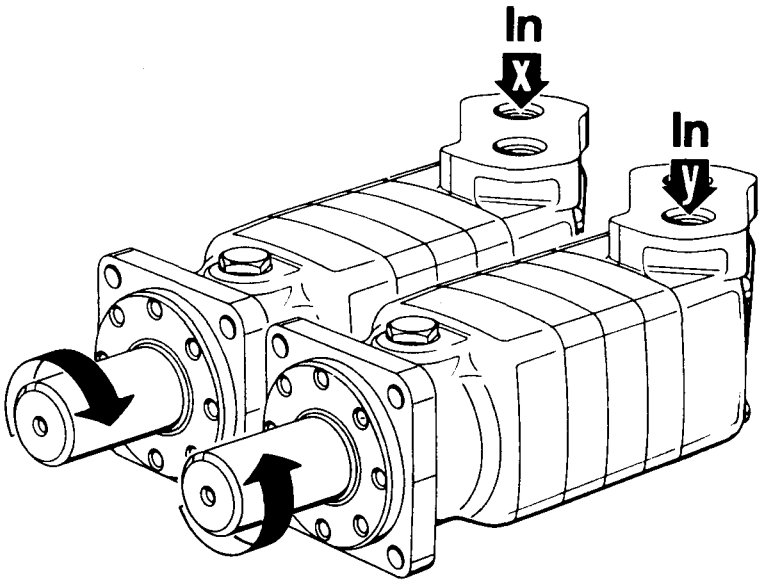
As shown here, there are two types of misalignment problems. For most applications, a 6" scale and visual inspection can determine the correct alignment. For example, place one half of the scale's edge up against the motor shaft. The other half of the scale on the output shaft. If the two shafts are aligned, the edge of the scale will be one continuous solid line between both shafts. If the shafts are not aligned, there will be a visible gap between the scale's edge and the output shaft. This visual method of checking alignment is shown in the bottom Figure.



SHAFT ROTATION

The ports in the 10,000 Series Motors are 1-5/16" –20 UN straight thread fittings, or 1-1/4" SAE split flange fittings.
The motors operate equally well in either direction, depending on which port is connected to pressure.

These motors are set at the factory to rotate in a clockwise direction when pressurized as shown. The direction of rotation can be reversed simply by reversing the oil lines. If for some reason this is impossible, the position and relation of the valve and Geroler must be changed to effect reversal. The procedure for this is outlined in the 10,000 Series Motor Repair Manual.



Rotation – Viewed from shaft end
Port X pressurized – Clockwise (CW)
Port Y pressurized – Counter clockwise (CCW)

14 Installation

RADIAL LOAD CHARACTERISTICS

These curves indicate the radial load capacity of the 10,000 Series Motors (Except the Bearingless Motors) depending on the location of the radial load.

The curves are based on 2000 hour B-10 bearing life at 100 RPM. To determine the allowable radial load for speeds other than 100 RPM multiply the load values given on the bearing curves by the following factors:

RPM	Multiplication Factor
50	1.23
100	1.00
200	0.81
300	0.72
400	0.66
500	0.62
600	0.58

Example: If the load is centered 2 inches from 0 (see example coordinate line on curve), the maximum load at 100 RPM would be 5400 lb. At the same location at 200 RPM maximum load would be 4374 lb.

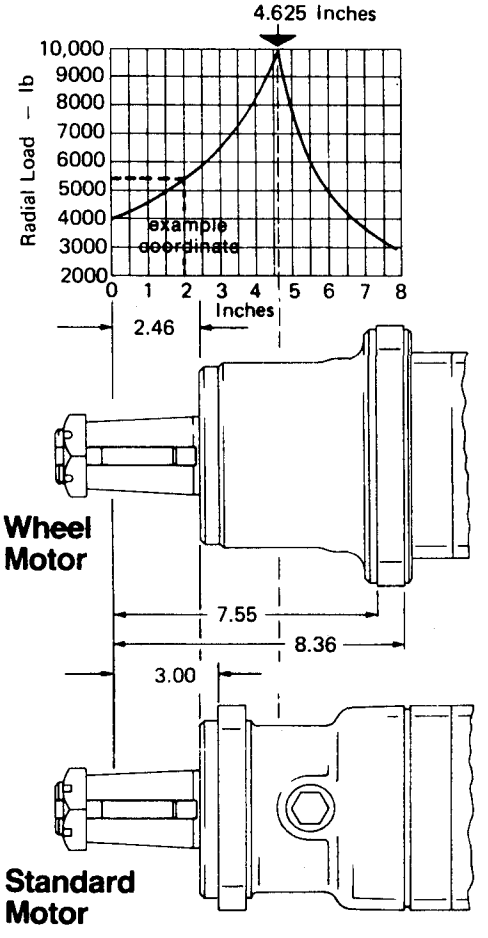
5400 lb x 0.81 = 4374 lb

Thrust Load Characteristics—Either direction

Standard Motor ..... 2000 lb

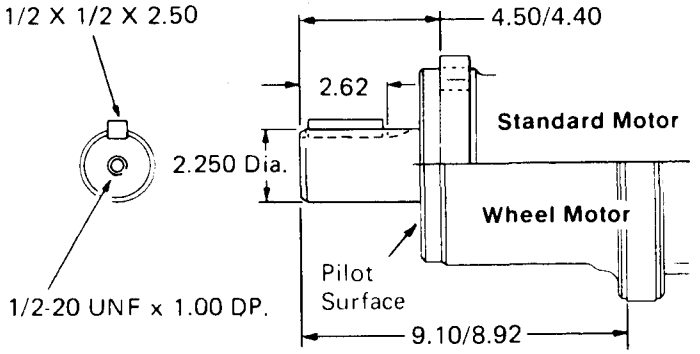
Wheel Motor ..... 2000 lb

The maximum radial load at 100 RPM is 9900 pounds applied 4.625 inches from 0.

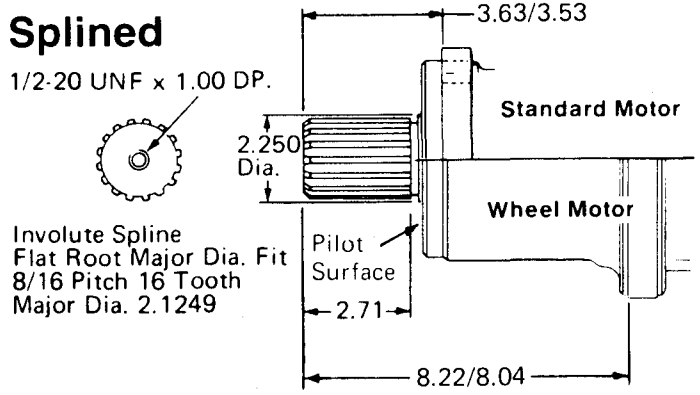


Dimension Data-Shafts

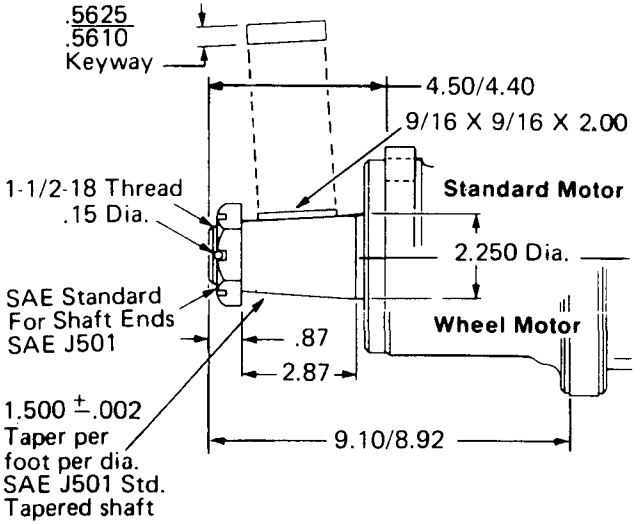
Straight



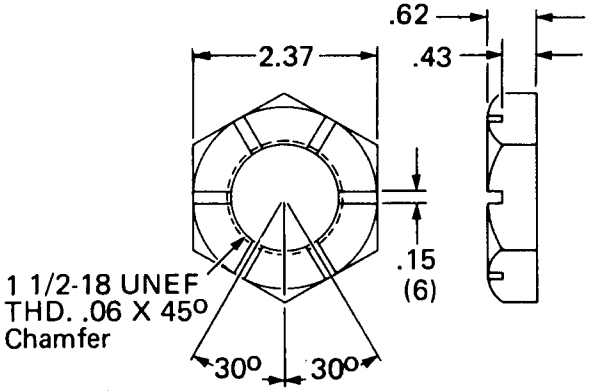
Splined



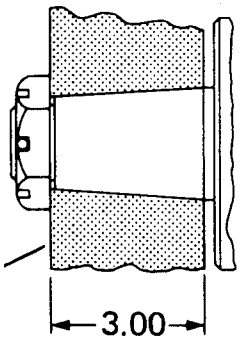
Tapered



Nut for Tapered Shaft



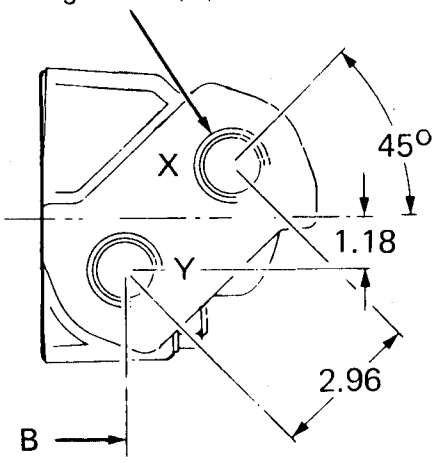
Installation Tapered Shaft



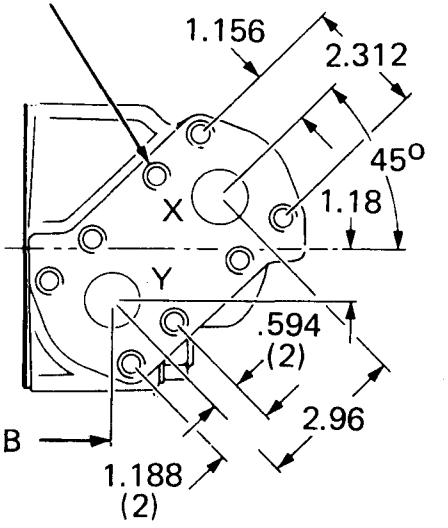
16 Installation

Dimension Data-Ports

SAE 1-5/16 – 12UN - 2B Straight Thread O-ring Ports (2)



7/16-14 UNC (8 Holes) For SAE 1-1/4" Split Flange Fittings

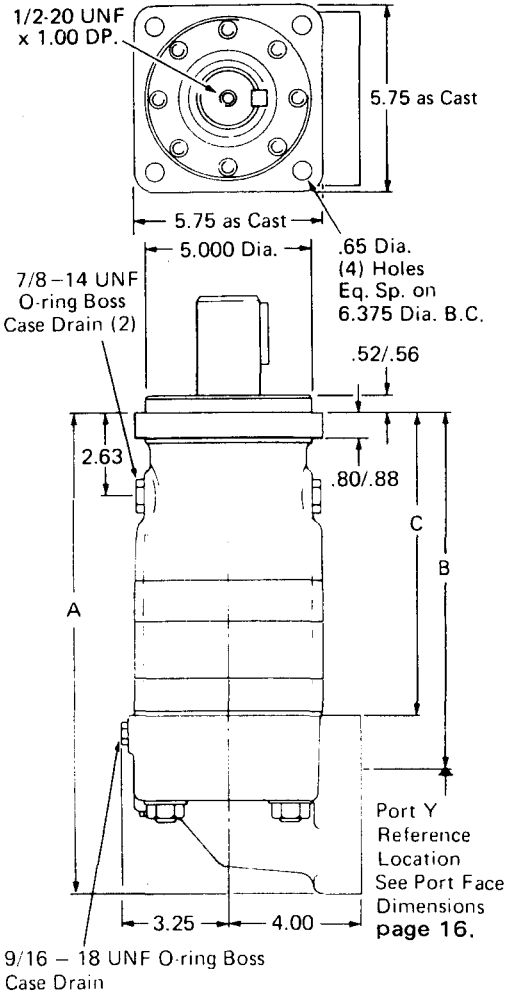


DIMENSIONS AND MOUNTING DATA

STANDARD MOTOR

Disp. cu. in. rev.	A	B	C±.12
20.65	14.92	11.10	9.43
29.22	15.44	11.62	9.95
40.55	15.44	11.62	9.95
57.36	16.17	12.35	10.68

See pages 15 and 16 for shaft and port dimensions.



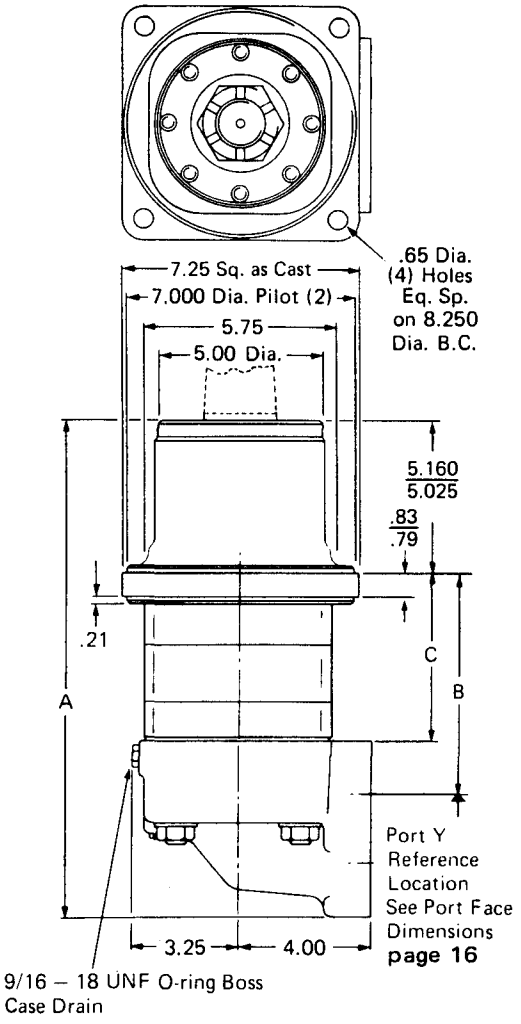
18 Installation

DIMENSIONS AND MOUNTING DATA

WHEEL MOTOR

Disp. cu. in. rev.	A	B	C±.12
20.65	15.50	6.56	4.85
29.22	16.00	7.06	5.37
40.55	16.00	7.06	5.37
57.36	16.75	7.81	6.10

See pages 15 and 16 for shaft and port dimensions.

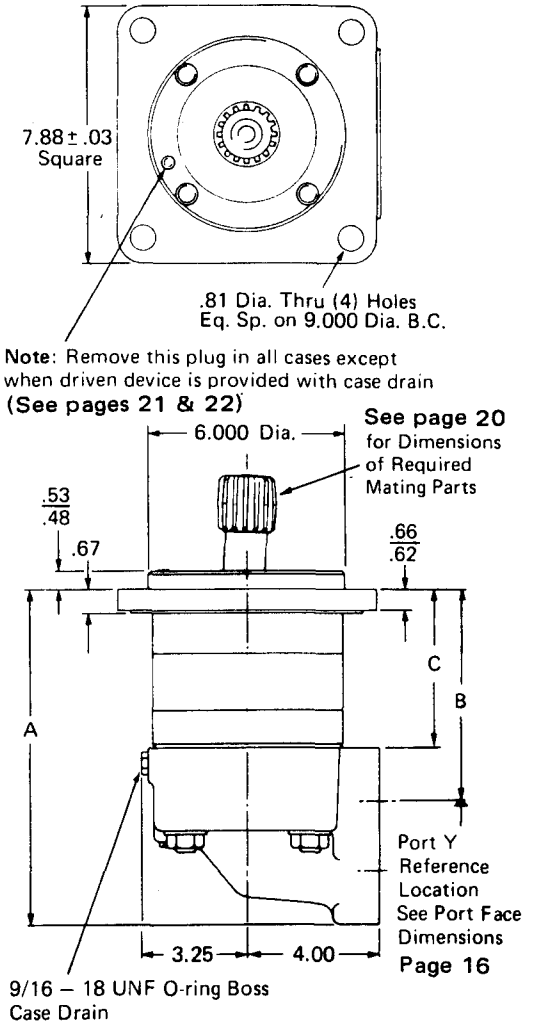


DIMENSIONS AND MOUNTING DATA

BEARINGLESS MOTOR

Disp. cu. in. / rev.	A	B	C±.12
20.65	10.02	6.20	4.53
29.22	10.54	6.72	5.05
40.55	10.54	6.72	5.05
57.36	11.27	7.45	5.78

See page 16 for port dimensions.
See page 20 and 21 for installation instructions.



20 Installation

DIMENSION AND MOUNTING DATA

BEARINGLESS MOTOR

Installation Information

1. Recommended pilot diameter 6.001/6.003 diameter.
2. Pitch diameter of spline in mating part 1.6000 to be concentric to 6.001 pilot diameter within .010 T.I.R.
3. Recommended material and heat treat for internal spline: 8620-H steel hardness at .004 to .020 below surface of spline to be RC-58-62 minimum. Hardness at .030 below surface of spline to be RC-50.
4. End of motor shaft must be retained by hardened mating part.
5. Mounting surface of mating assembly to be flat within .003 T.I.R. and perpendicular to internal spline pitch diameter within .003 T.I.R.

Internal Involute Spline Data
(American National Standards Institute ANSI B 92.1-1970)

Flat Root Side Fit

Number of Teeth	16
Spline Pitch	10/20
Pressure Angle	30°
Base Diameter	1.385641
Pitch Diameter	1.6000
Major Diameter	1.7390 Max.
Form Diameter	1.704
Minor Diameter	1.507/1.502

Circular Space Width

Max. Actual	.1612
Min. Effective	.1571
Max. Measurement Between Pins	1.3555
Pin Diameter	.1728

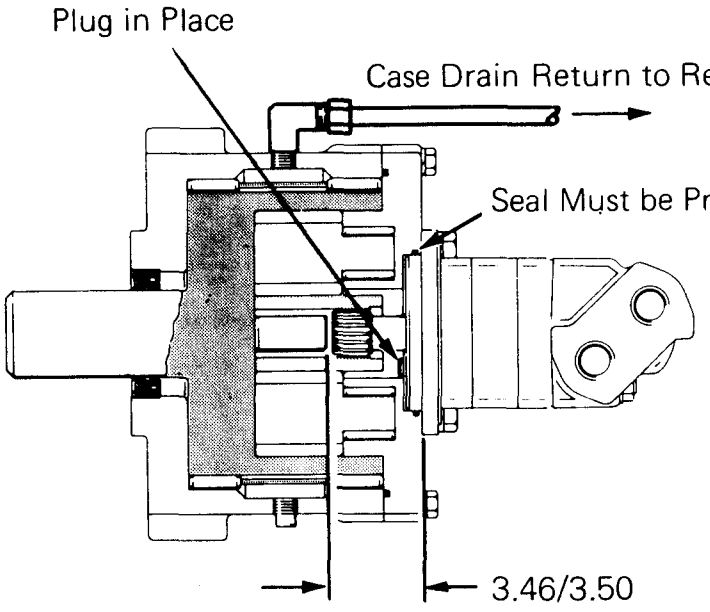
DIMENSIONS AND MOUNTING DATA

BEARINGLESS MOTOR

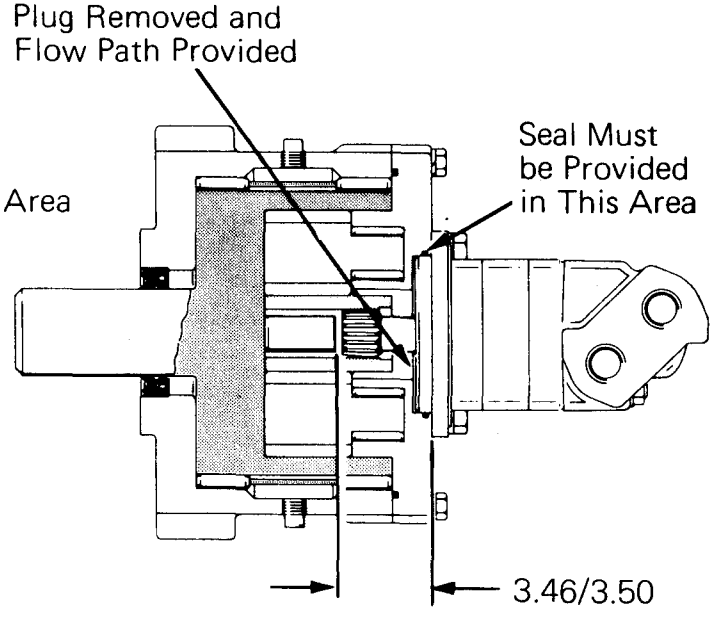
The bearingless motor features an internal check valve system (to regulate case pressure) and an external case drain connection. The drive mates with a standard SAE internal involute spline.

The driven mechanism must be capable of operating with the fluid of the hydraulic system. A case drain port is recommended on the driven mechanism.

Always use an external case drain when used in a closed loop system or when intermittent system back pressure exceeds 1000 PSI.



External Case Drain Line in Driven Mechanism



Internal Check Valve System in Motor

22 Installation

CASE DRAIN

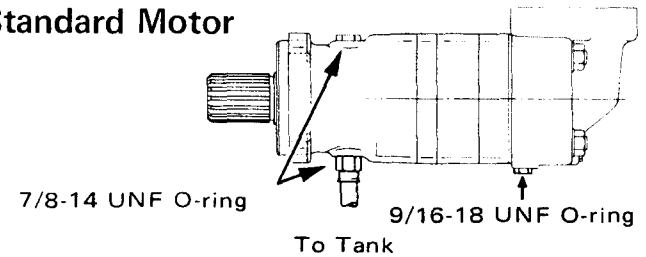
An external case drain is recommended when intermittent back pressure exceeds 300 PSI, and is required when intermittent back pressure exceeds 1000 PSI.

To install case drain on standard motor, remove one of the 7/8-14 boss plugs, or use 9/16-18 UNF o-ring port. Install case line as shown. You can use tubing, pipe, or hose for this line, providing they have at least 1/4" inside diameter.

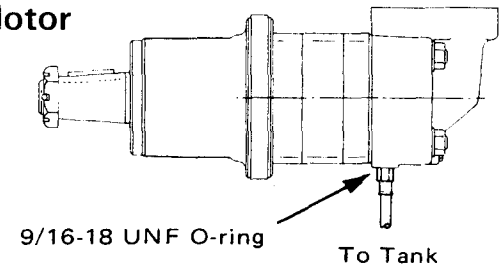
On the wheel motor the case drain is located in the valve housing opposite the shaft end and requires a 9/16-18 UNF o-ring fitting.

On the bearingless motor, we recommend a case drain be provided on the driven device. When this is not possible remove the plug from the mounting flange, and install a case drain in the motor housing as shown. This requires a 9/16-18 UNF o-ring fitting.

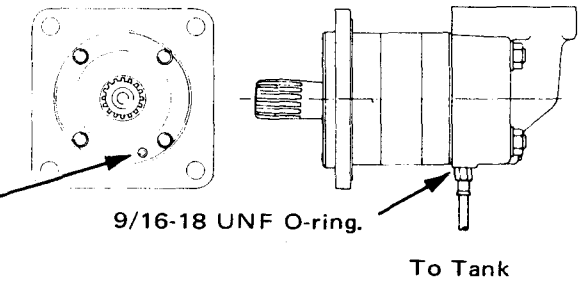
Standard Motor



Wheel Motor



Bearingless Motor



Motor Maintenance 23

A Char-Lynn® hydraulic motor is built to extremely high standards and should be treated as such. It should be returned to your nearest service center or to the factory if in need of repair. Trained personnel repair and test returned motors so that they meet the highest quality repair and test standards. Upon request, before repairs are made, the owner will be notified of the cost and probable cause of the failure.

INSURE TROUBLE–FREE SERVICE

The Char-Lynn hydraulic motor was designed and is manufactured to very strict tolerances and assembled under closely controlled conditions. If properly installed and with a minimum of attention it will give long trouble-free service.

****Avoid nuisance fluid-leaks. Typical causes are: dirty, scratched, bowed or inadequately bolted joints; vibrating, unsupported lengths of flexible and rigid piping. The cure: careful assembly, proper seals, periodic inspection. Only compatible seal materials (resistant to fluid and temperatures involved) should be used.

****Eliminate vacuum leaks in suction lines to pumps. Suction leaks lead to noisy pump operation, cavitation, and early pump failure.

****Avoid shock–limit the rate of pressure build-up. Be sure relief valves are adjusted properly. Avoid chatter, sudden pressure surges, and higher-than-needed working pressures. Pressure and flow are energy–use them efficiently.

****Be aware of temperatures. Use oils that will not be too heavy when cold or too light when hot. Either may affect operation and lubrication. (See pages 10 and 11).

****Include adequate filtration in the system (10 micron filter.)

CHAR-LYNN®
HYDRAULIC MOTOR
OPERATOR'S MOTOR
NO. 8-110

Eaton Corporation **Fluid Power Operations** Minneapolis Division 15151 Highway 5 Eden Prairie, MN. 55344 Telephone (612) 941-2800

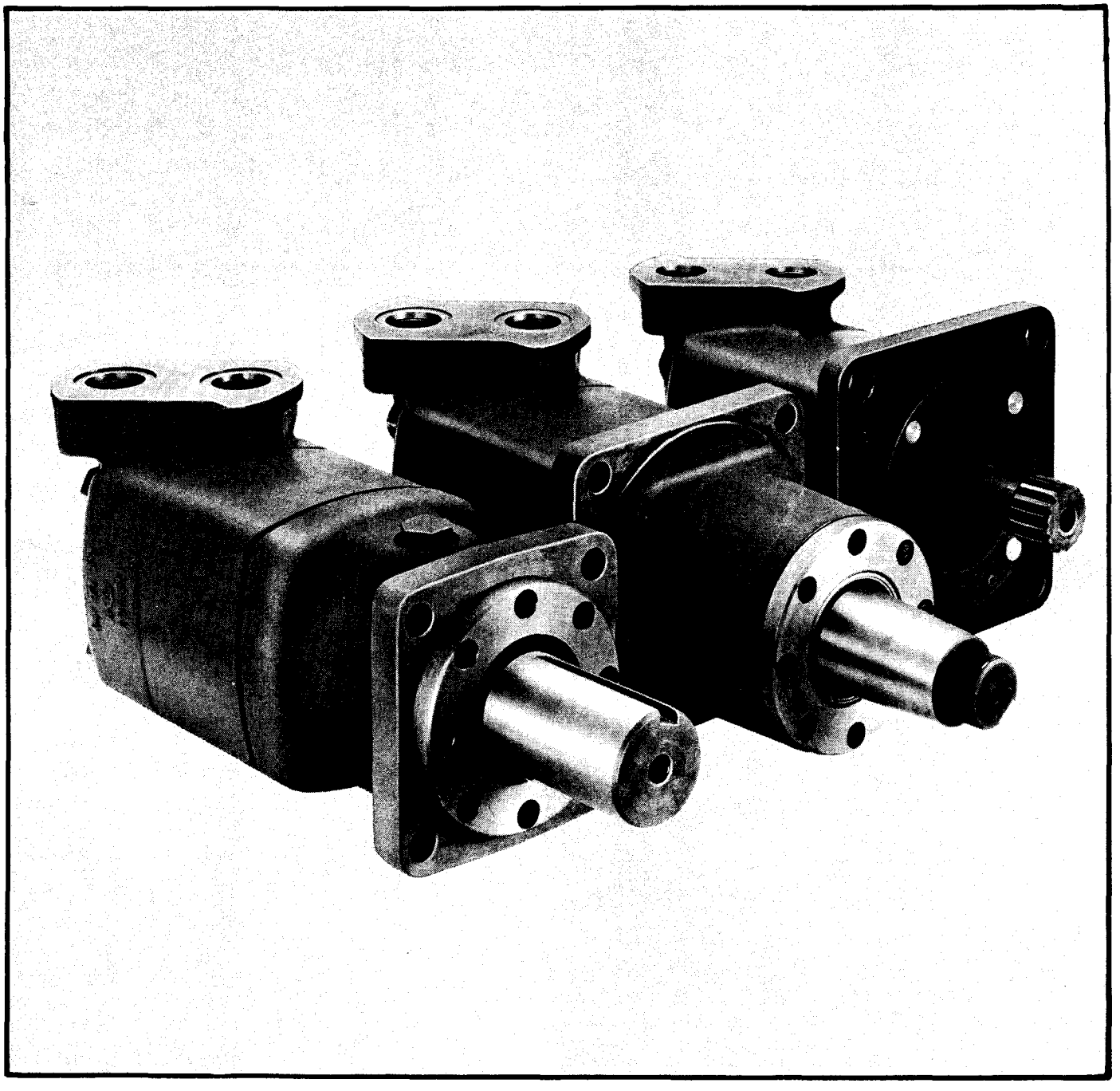
EATON Fluid Power Products

REVISED MARCH, 1978
FORM NO. 8-110

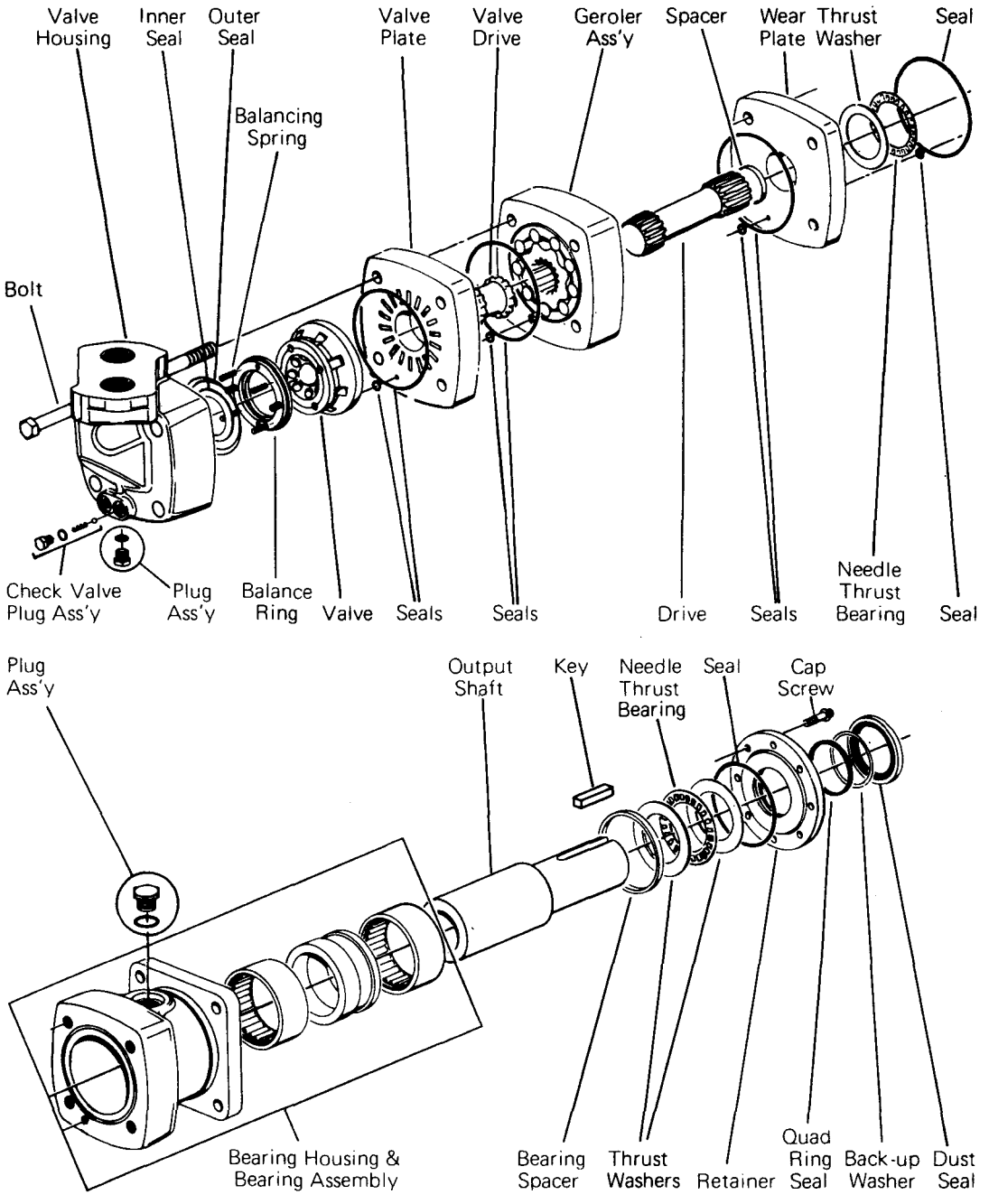
NO. 7-112

Char-Lynn®
Repair Manual
10,000 Series Motors

002
003



EATON Fluid Power Products



See pages 10 and 11 for wheel motor and bearingless motor repair information.

Tools required for disassembly and reassembly are

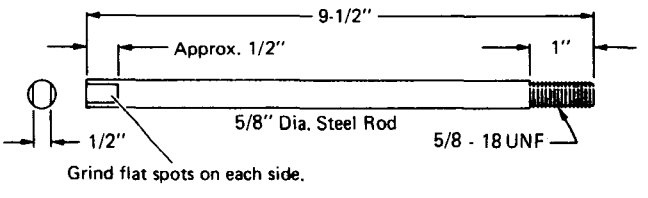
- Torque wrench (1200 in. lb. or 100 ft. lb. capacity)
- 1", 15/16", 1/2" and 5/16" sockets
- 12" - 16" breaker bar
- Small screwdriver (6" – 8" long, 1/4" blade)
- Plastic or rubber hammer

The following tools are not necessary for disassembly and reassembly, but are extremely helpful.

- Seal sleeve or bullet
- Alignment studs (2) if required*

* Motors with tie bolts and original studs not available.

Alignment studs (2)



Disassembly 4

Disassembly

Cleanliness is extremely important when repairing a hydraulic motor. Work in a clean area. Before disconnecting the lines, clean the port area of the motor thoroughly. Use a wire brush to remove foreign material and debris from the exterior joints of the motor. Check the shaft and keyway, remove all nicks, burrs, or sharp edges that might damage the shaft seals when installing the retainer over the shaft. Before starting the disassembly procedures, drain the oil from inside the motor.

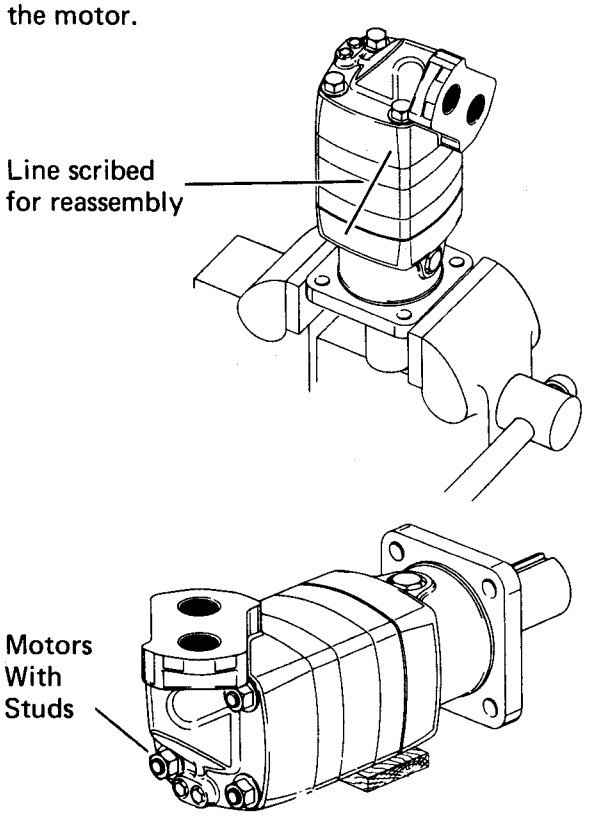


Figure 1

1 Place the motor in a vise with the output shaft down, or place the motor (earlier models with studs) on a smooth, clean, flat surface; use a piece of wood under the center section of the motor to raise the valve housing end of the motor off the surface of your work area, see Fig. 1, for these preparations.

Note: It may be helpful for reassembly to scribe a line across the length of the motor.

Although not all drawings show the motor in a vise, we recommend that you keep the motor in the vise during disassembly and reassembly. Follow the clamping procedures explained throughout the manual.

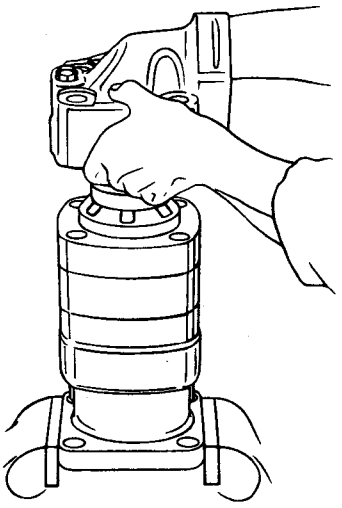


Figure 2

2 Remove 4 bolts (or nuts and washers for earlier models) from motor. Remove studs (earlier models) per step 17.

3 Carefully lift the valve housing straight off. If this is done carefully, the springs and balance ring assembly will remain on the valve for easy removal.

4 Remove 2 check valve plug assemblies (plugs, springs, and steel balls) from valve housing.

5 Place valve housing on bench with open end up, then carefully remove 4-1/4" I.D. seal, and 3/8" I.D. seal.

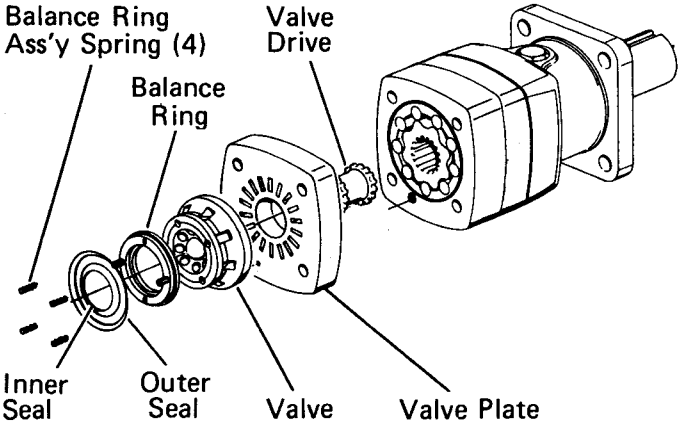


Figure 3

6 Remove 4 balance ring assembly springs.

7 Remove balance ring assembly.

8 Remove inner and outer seals from balance ring.

9 Remove valve.

10 Remove valve plate.

11 Remove valve drive.

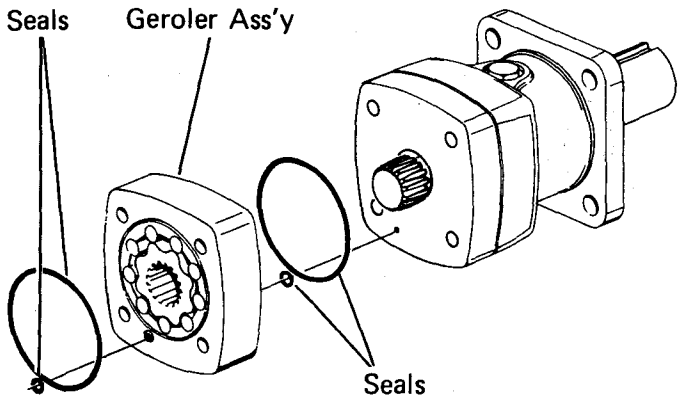


Figure 4

12 Remove Geroler. Retain rollers in Geroler assembly.

13 Remove 3/8" I.D. seals, and 4-1/4" I.D. seals from the Geroler, 2 seals on each side of the Geroler.

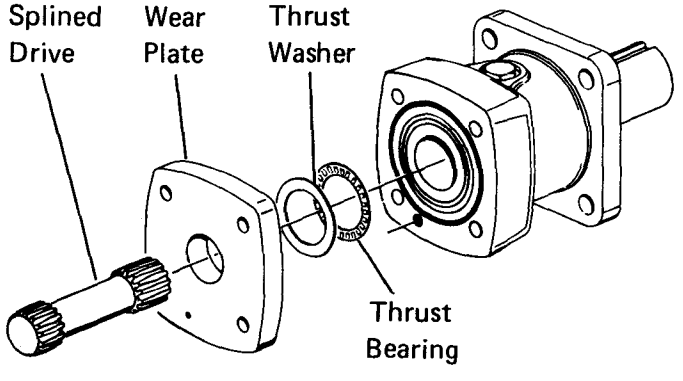


Figure 5

14 Remove splined drive from bearing housing.

15 Remove wear plate.

16 Remove thrust bearing and thrust washer from wear plate.

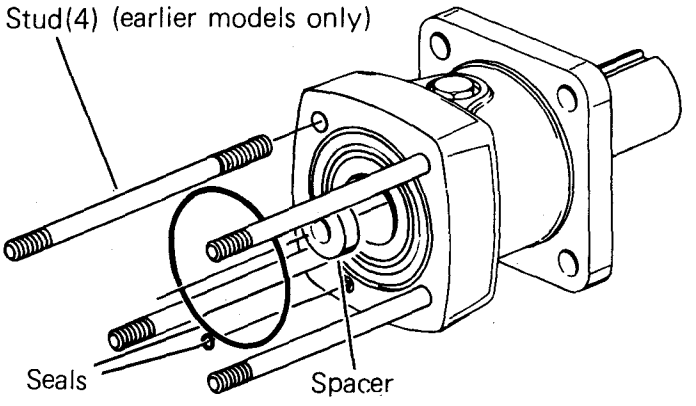


Figure 6

17 Use a stud remover or vise grips to remove studs (earlier models only) see Fig. 6.

18 Remove 3/8" I.D. seal, and 4-1/4" I.D. seal from bearing housing.

19 Remove spacer from inside output shaft.

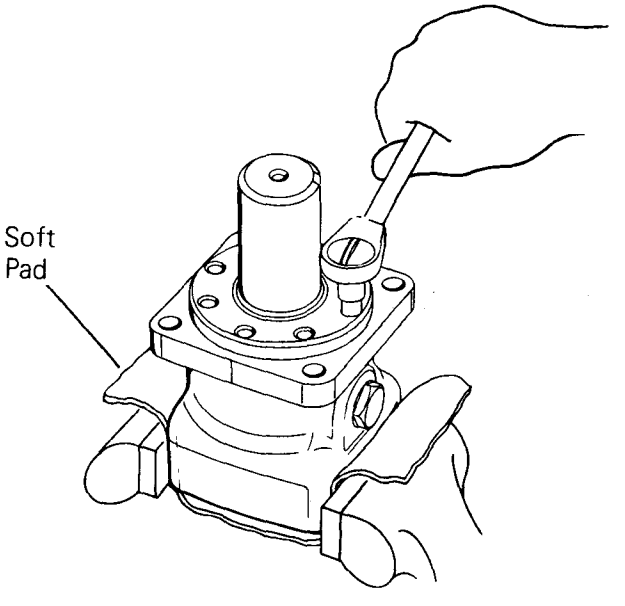


Figure 7

20 Place bearing housing in vise, as shown in Figure 7. Loosen 8 cap screws (5/16") in retainer.

Disassembly

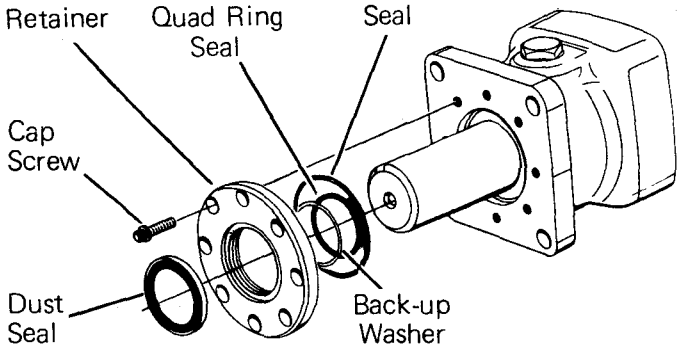


Figure 8

21 Place bearing housing on a clean, flat surface. Remove 8 cap screws and retainer.

22 Remove quad-ring seal, back-up washer, o-ring seal, and dust seal from retainer. Use a small screwdriver to remove the dust seal. Do not damage bore of retainer.

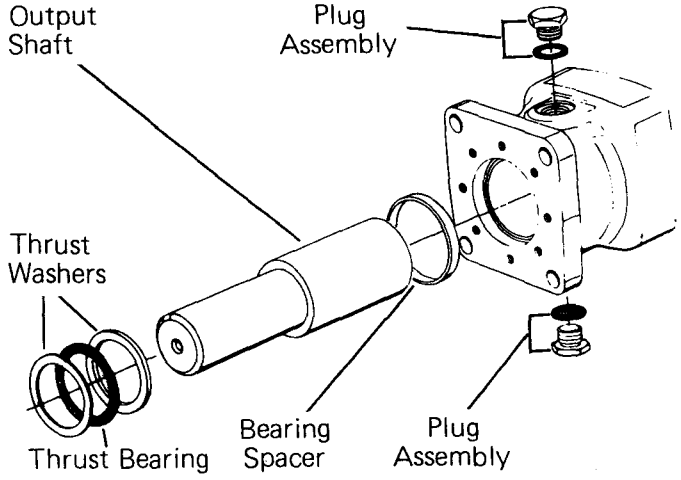


Figure 9

23 Remove output shaft.

24 Remove 2 thrust washers and thrust bearing from the output shaft.

25 Remove bearing spacer.

26 Remove 2 plug assemblies (1") from the bearing housing.

Note: The bearing housing and bearings inside the housing are not sold separately. These bearings are hydraulicly pressed into the bearing housing.

Reassembly

Reassembly

Check all mating surfaces. Replace any parts that have scratches or burrs that could cause leakage. Clean all metal parts in clean solvent. Blow dry with air. Do not wipe with a cloth or paper towel because lint or other matter can get into the hydraulic system and cause damage. Do not use coarse grit or try to file these parts. Check around the keyway and chamfered area of the shaft for burrs nicks or sharp edges that can damage the seals when reassembling the retainer.

Note: Lubricate all seals with petroleum jelly such as Vaseline. Refer to the parts list (6-119) for replacement parts and proper seal kit number.

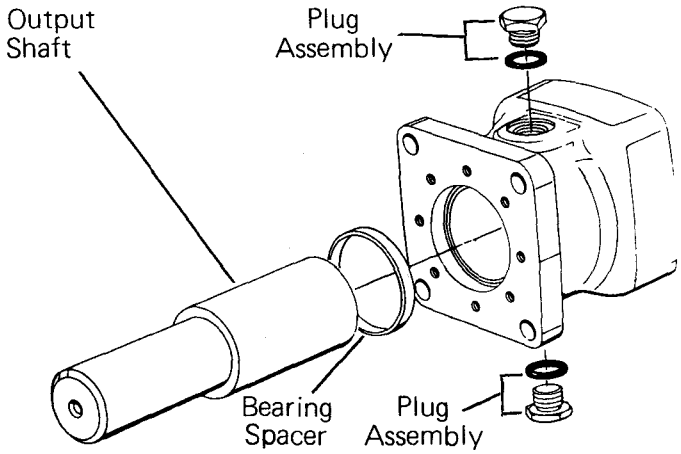


Figure 10

7 Reassembly

1 Place bearing housing on a smooth, flat surface. Install 2 plug assemblies, see Figure 10.

2 Install bearing spacer in bearing housing.

3 Install output shaft. Rotate shaft while installing in bearing housing.

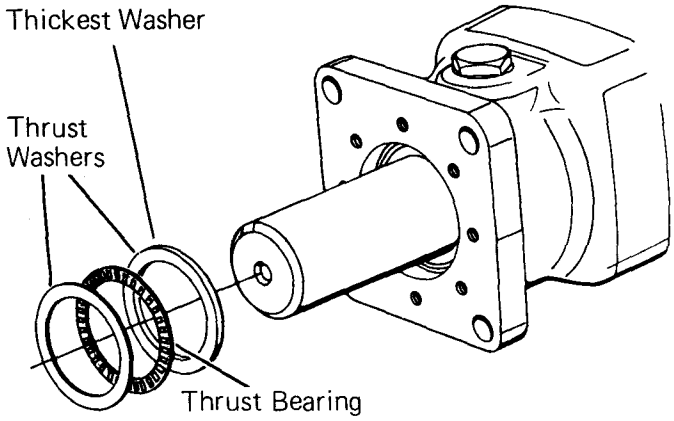
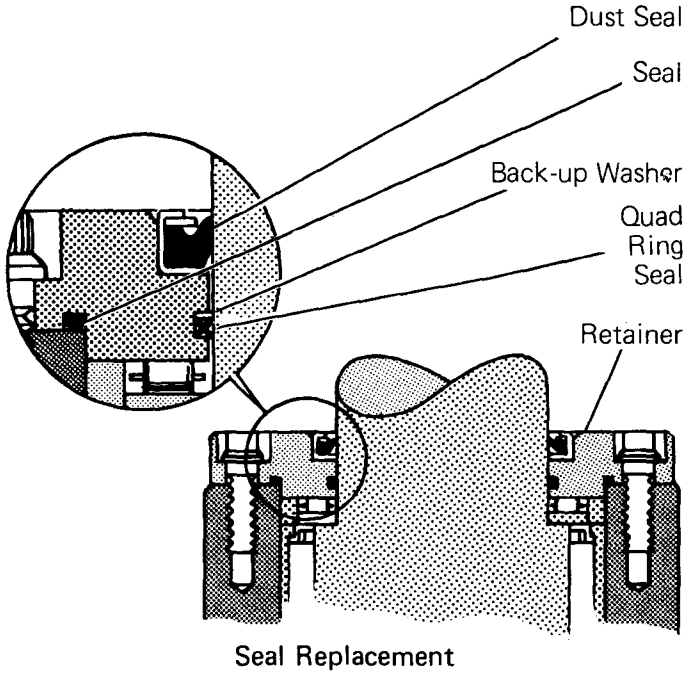


Figure 11

4 Install 2 thrust washers and thrust bearing. Install thrust bearing between the 2 thrust washers, thickest washer over shaft first, see Figure 11.



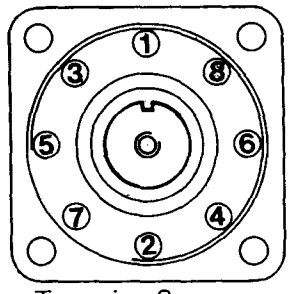
Seal Replacement

Figure 12

5 Use a small press, if available, to install dust seal in retainer. Metal side of dust seal must face toward retainer, as shown in Figure 12. If a press isn't available, use a plastic or rubber hammer to tap dust seal in place.

6 Install back-up washer, quad ring seal, and 3-1/2" I.D. seal in the retainer. Apply petroleum jelly to inside diameter of dust seal and quad ring seal.

7 Before installing retainer, place a protective sleeve or bullet, if available, over shaft. To prevent damage to seals, install retainer over shaft with a twisting motion. Do not cut or distort retainer seals. Damage to these seals will cause external leakage.



Torquing Sequence

Figure 13

8 Lubricate threads of 8 cap screws with a light film of oil. Install and finger tighten screws. Place unit in a vise, as shown in Figure 7. Tighten cap screws to 192 inch pounds of torque--in the sequence shown in Figure 13.

9 Install key (when used) in key slot of shaft.

10 Reposition motor in vise, clamp housing flange, as shown in Figure 1.

11 Pour a small amount of hydraulic oil inside output shaft.

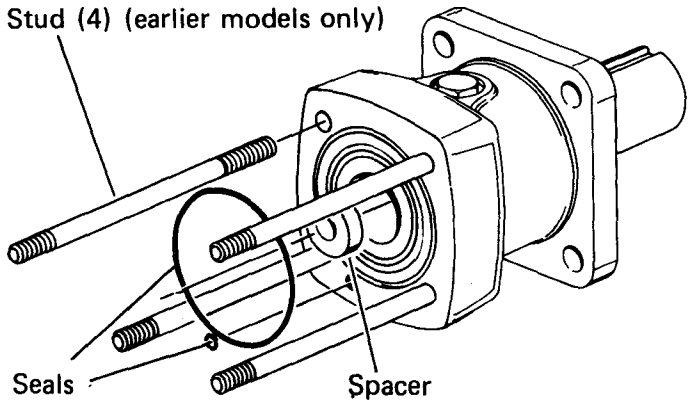


Figure 14

12 Install spacer in output shaft, guide spacer with a pencil.

Reassembly

13 Apply petroleum jelly to 4-1/4" I.D. seal, and install in seal groove of the bearing housing see Fig. 14.

14 Apply petroleum jelly to 3/8" I.D. seal. Install seal in case drain groove of bearing housing.

15 Install 2 studs (earlier models), diagonally opposed, in bolt holes of bearing housing, see Fig. 15. If you replace studs with bolts, use 2 studs for alignment purposes when stacking parts.

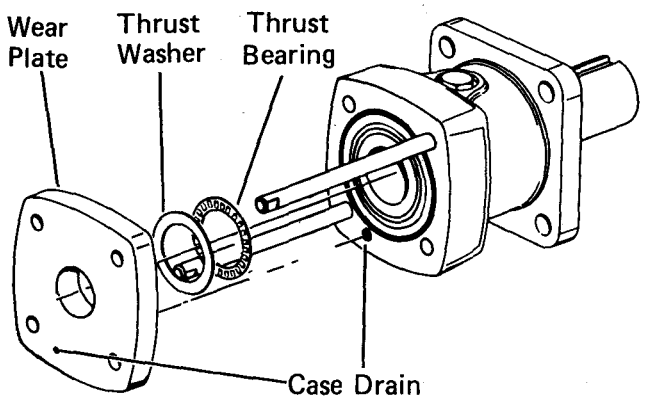


Figure 15

16 Install thrust washer and thrust bearing in wear plate—washer first, see Fig. 15. A light film of lubricant on the washer and bearing will help hold them in place.

17 Align case drain hole in wear plate with case drain hole in bearing housing. Install wear plate flush against bearing housing, see Fig. 15.

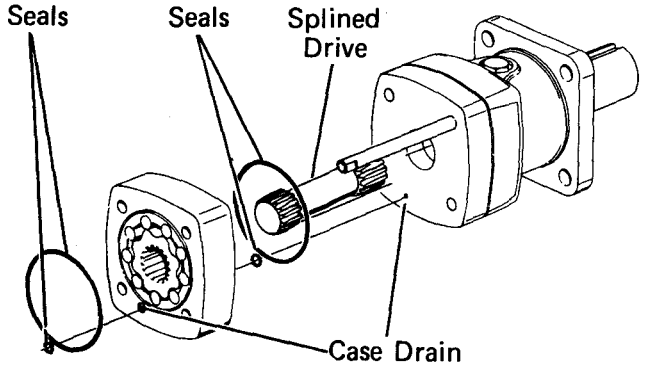


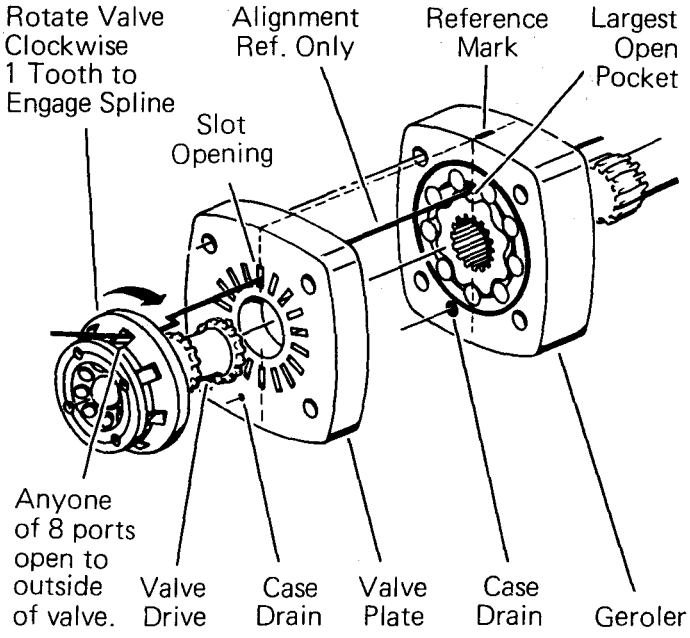
Figure 16

18 Install splined drive in output shaft. For 20 cubic inch displacement motor insert longer splined end of drive first, see Fig. 16.

19 Apply petroleum jelly on 2 seals 3/8" I.D. and 2 seals 4-1/4" I.D. Install them in the seal grooves of the Geroler, see Fig. 16, (one of each seal on both sides of the Geroler).

Note: Installation at this point involves 3 steps in the timing of the motor. Timing determines the direction of rotation of the output shaft.
The timing parts include . . . .

1. Geroler
2. Valve Drive
3. Valve Plate
4. Valve



Timing Alignment

Figure 17

Timing Step # 1—Locate the largest open pocket in the Geroler and mark it on the outside edge of the Geroler, See Fig. 17.

20 Align case drain hole in Geroler with case drain hole in wear plate. Install Geroler on wear plate, see Fig. 16. Be sure to retain rollers in Geroler assembly.

21 Install valve drive in Geroler.

22 Align case drain hole in valve plate with case drain hole in Geroler. Install valve plate flush against Geroler, see Fig. 17.

Timing Step # 2—Locate the slot opening in the valve plate which is in line with the largest open pocket of the Geroler. See Fig. 17.

23 Use the following procedure for installing the valve on the valve plate.

Timing Step # 3—Locate any one of the side openings of the valve that goes through to the face of the valve. Line up this side opening with the open slot of the valve plate that is in line with the largest open pocket of the Geroler. Rotate the valve clockwise until the spline teeth engage (1 spline tooth), see Fig. 17. This will provide the rotation shown when pressurized as shown, see Fig. 18.

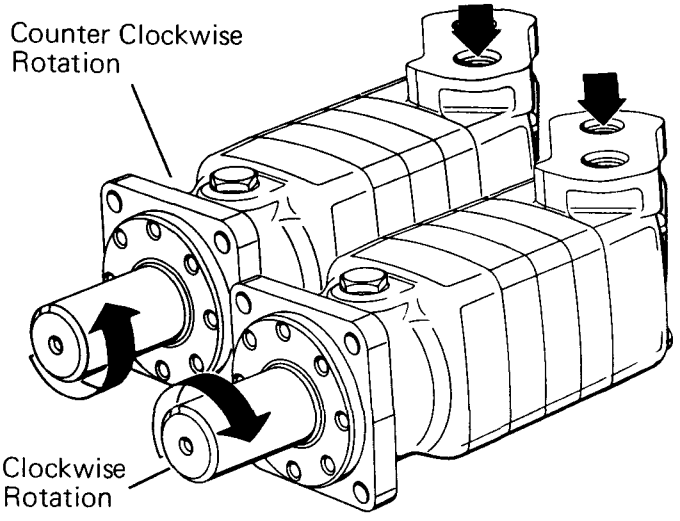


Figure 18

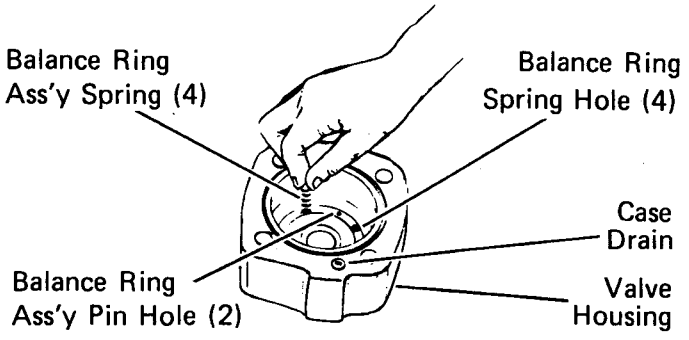


Figure 19

24 Apply grease to 4 balance ring assembly springs. Install springs in 4 holes located inside bore face of valve housing, see Fig. 19.

25 Apply a light film of petroleum jelly to 3/8" I.D. seal. Install seal in case drain groove of valve housing.

26 Apply a light film of petroleum jelly to 4-1/4" I.D. seal. Install seal in outside seal groove of the valve housing.

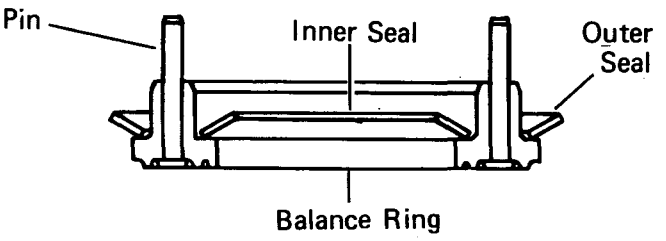


Figure 20

27 Apply petroleum jelly to inner and outer face seals. Install them on balance ring as shown in Fig. 20.

Important: Install these face seals in the positions shown or the motor will not operate properly. Do not force or bend these face seals. Any damage to these seals will affect the operation of the motor.

28 Align 2 pins in balancing ring assembly with 2 holes in valve housing as shown in Fig. 19. Install the balancing ring assembly in the valve housing.

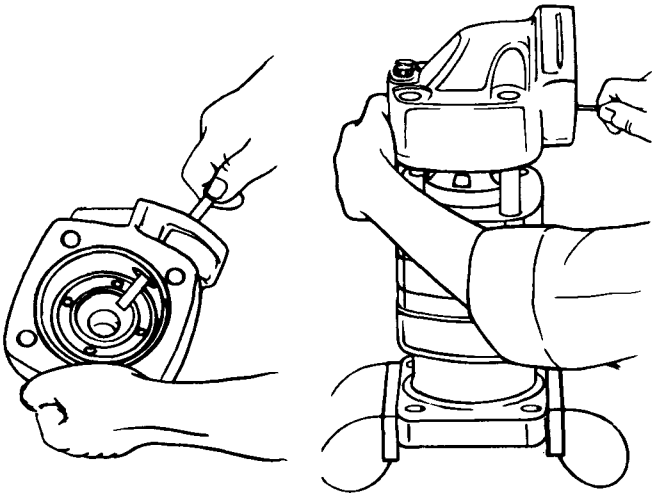


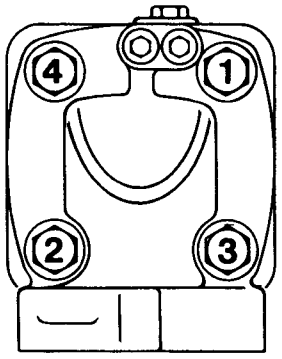
Figure 21

29 Insert a flat brass rod, or similar flat tool, through port of valve housing to hold balance ring assembly in position until you install valve housing. Align case drain hole in valve housing with case drain hole in valve plate. Install valve housing against valve plate, see Fig. 21. Remove brass rod as balance ring contacts the valve.

Note: After installing valve housing on valve plate, check for proper placement. Push down on the valve housing. You should get a slight spring action.

Note: After installing valve housing on valve plate, visually check between body parts of motor for unseated seals.

Reassembly



Bolt Torquing Sequence

Figure 22

30 Install and finger tighten 2 bolts (or studs for earlier models) opposite alignment studs. Remove alignment studs and install remaining bolts (or studs, 4 washers, and 4 nuts for earlier models). Torque bolts (or nuts) to 90 - 100 foot pounds, in sequence, see Fig. 22.

31 Install 2 check balls in valve housing, one ball in each hole. To seat check balls, (on new valve housings only), tap lightly on ball with a punch, using a plastic (or rubber) hammer.

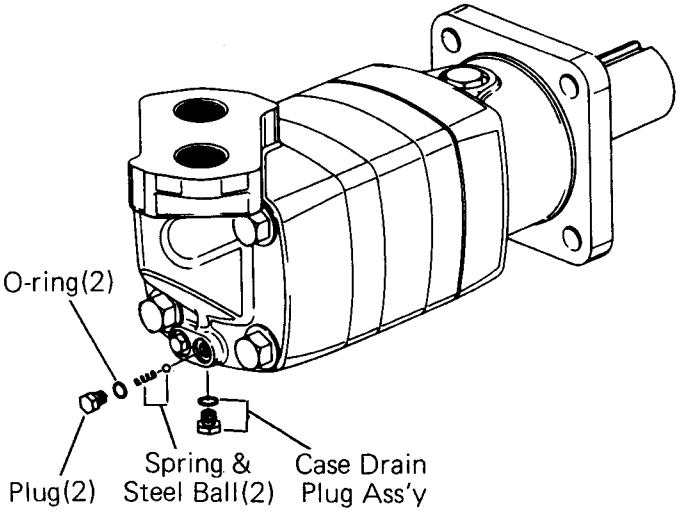


Figure 23

32 Install 2 springs in check valve holes, one spring in each hole. Install o-rings on plugs, then install plugs.

33 Install case drain plug assembly.

Wheel Motor

On wheel motors,a different bearing housing is used, see Fig.24. Other than this the parts are the same as the standard motor and the same disassembly and reassembly procedures apply.

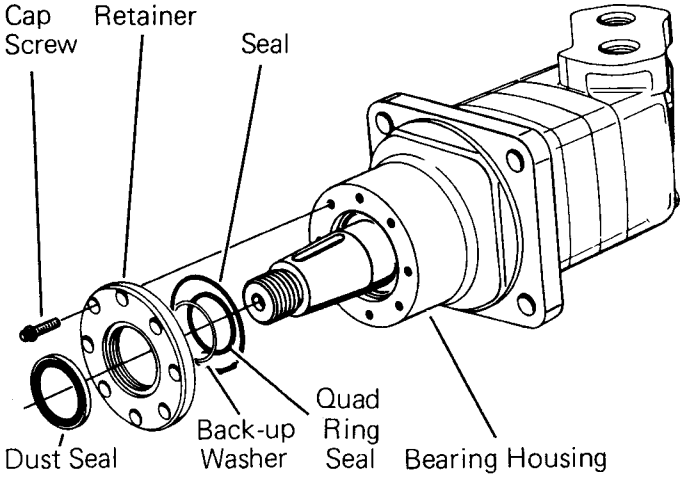


Figure 24

Bearingless Motor

This motor is the same as the standard motor without the shaft/bearing assembly, retainer, and bearing housing (mounting flange replaces the bearing housing--see Fig. 25. Also, a thrust washer and needle thrust bearing are not required in the wear plate for this bearingless motor.

Follow the same disassembly and reassembly procedures as rear section of standard motor.

Important: Loctite information for bearingless motor on page 11.

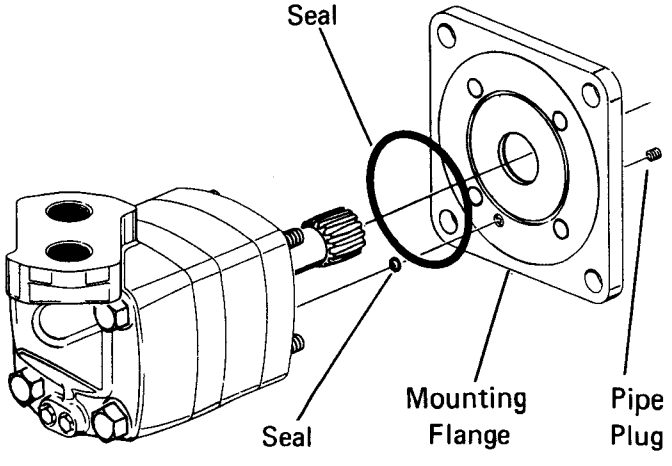


Figure 25

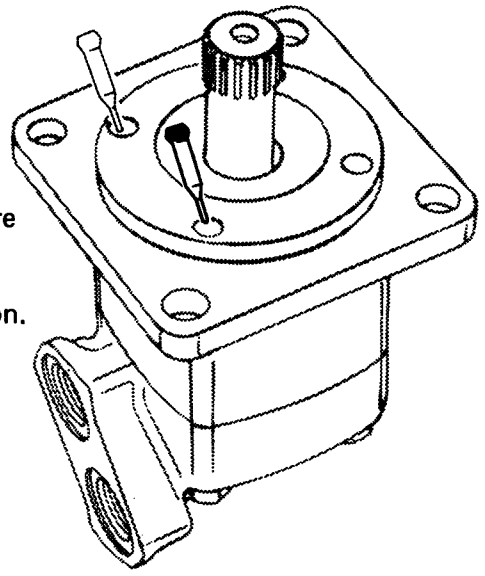
Important: This motor requires Loctite in threaded holes of mounting flange.

Follow these procedures:

Adequate Loctite penetration and sealing depend highly on cleanliness and dryness of threads. Use a non-petroleum base solvent to clean excess oil from threads of flange after disassembly. You may need to use a tap to clean threads of excess old Loctite. Then, after you've fully reassembled the motor, apply 2 to 3 drops of Loctite no. 290 at top of threaded holes--see example.

Note: Allow Loctite 5 minutes for thread penetration before installing motor on gear case.

Attention:
Do not use more than 3 drops of Loctite on threaded portion.



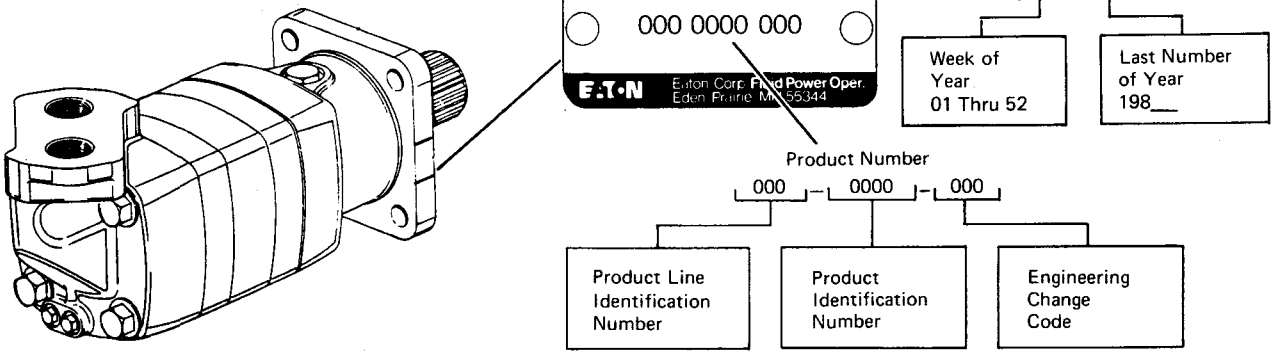
CHAR-LYNN®
HYDRAULIC MOTOR
REPAIR MANUAL
NO. 7-112

Each Order Must Include
the Following Information

1. Product Number
2. Date Code
3. Part Name
4. Part Number
5. Quantity of Parts

Refer to parts list 6-119 for replacement parts and seal kits.

Type of Motor	Type of Shaft	Port Connectors	Displacement (cu. in./rev.) and Product Number			
			20.65	29.22	40.55	57.36
Standard	Straight	1⅛" Threaded	119-1028	119-1029	119-1030	119-1031
		1¼" Split Flange	119-1040	119-1041	119-1042	119-1043
	Splined	1⅛" Threaded	119-1032	119-1033	119-1034	119-1035
		1¼" Split Flange	119-1044	119-1045	119-1046	119-1047
	Tapered	1⅛" Threaded	119-1036	119-1037	119-1038	119-1039
		1¼" Split Flange	119-1048	119-1049	119-1050	119-1051
Wheel	Straight	1⅛" Threaded	120-1005	120-1006	120-1007	120-1008
		1¼" Split Flange	120-1017	120-1018	120-1019	120-1020
	Splined	1⅛" Threaded	120-1009	120-1010	120-1011	120-1012
		1¼" Split Flange	120-1021	120-1022	120-1023	120-1024
	Tapered	1⅛" Threaded	120-1013	120-1014	120-1015	120-1016
		1¼" Split Flange	120-1025	120-1026	120-1027	120-1028
Bearingless		1⅛" Threaded	121-1007	121-1008	121-1009	121-1010
		1¼" Split Flange	121-1011	121-1012	121-1013	121-1014



Standard Motor 119–
Wheel Motor 120–
Bearingless Motor 121–

Eaton Corporation Fluid Power Operations **Hydraulics Division** 15151 Highway 5 Eden Prairie, MN 55344 Telephone (612) 937-9800

EATON Fluid Power Products

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