

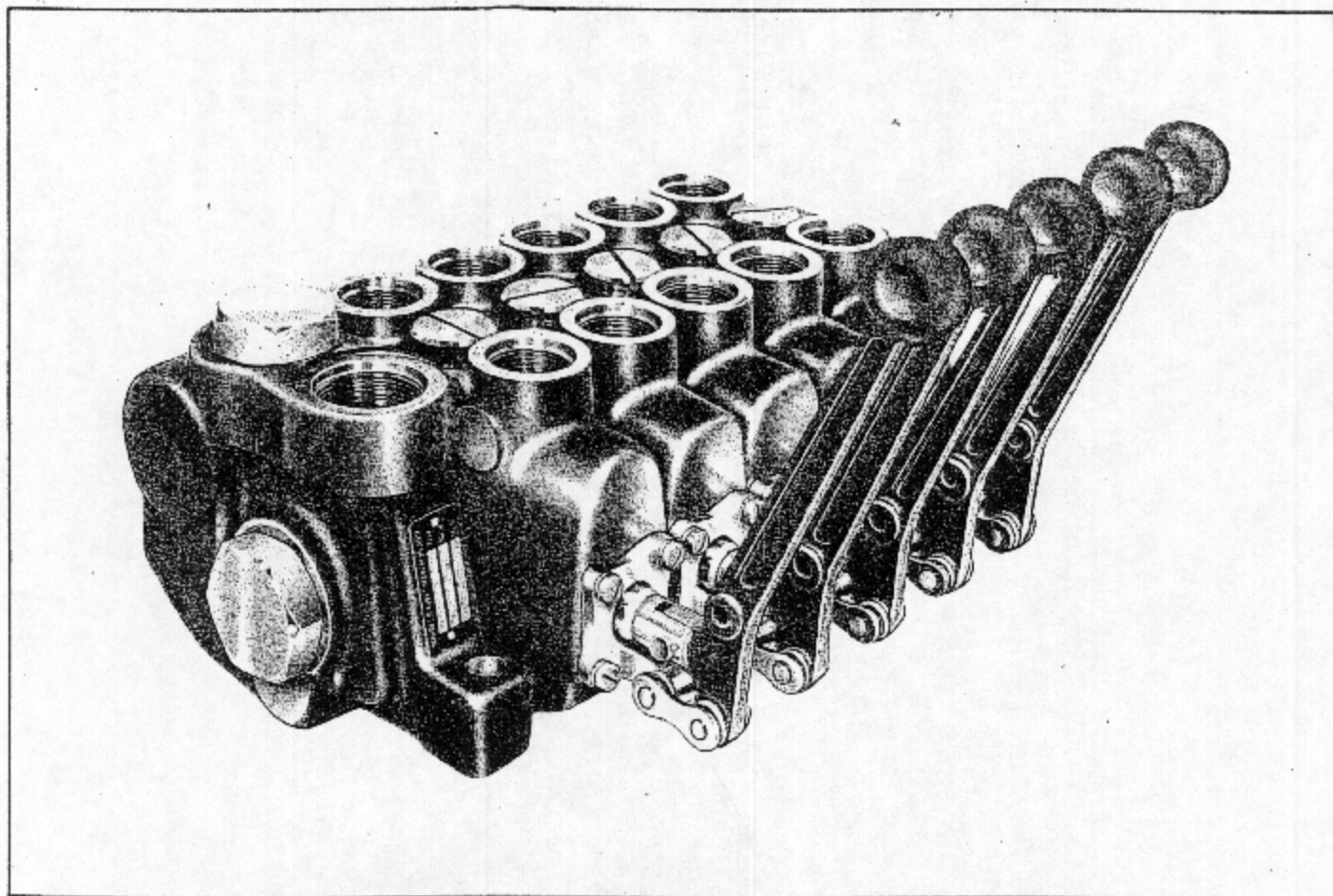
GRESEN®



**HYDRAULIC
COMPONENTS**

**MODEL V42
SECTIONAL BODY
DIRECTIONAL CONTROL VALVE**

SERVICE and PARTS MANUAL



MOBILE

INDUSTRIAL

AGRICULTURAL

Contents

	Page No.
Section I Introduction	1-1
Section II Description	2-0
Section III Maintenance	3-0
Section IV Parts Listing	4-0

List of Illustrations

Figure 3-1. Schematic View of Typical Model V42 Control Valve Assembly	3-0
Figure 3-2. Spool Seal Assembly	3-1
Figure 4-1. Model V42 Directional Control Valve, Typical Main Assembly	4-0
Figure 4-2. 3-Way, 3-Position Work Section	4-2
Figure 4-3. 4-Way, 3-Position Work Section	4-3
Figure 4-4. 4-Way, 4-Position Float Work Section	4-4
Figure 4-5. 4-Way, 4-Position Regenerative Work Section	4-5
Figure 4-6. 4-Way, 3-Position Work Section with Pressure Detent Release	4-6
Figure 4-7. Split Flow Mid-Inlet Section	4-7
Figure 4-8. Combined Flow Mid-Inlet Section	4-8
Figure 4-9. 2-Position Mid-Inlet Section	4-9
Figure 4-10. Spring Load to Split Flow Positioner	4-10
Figure 4-11. Spring Load To Combined Flow Positioner	4-11
Figure 4-12. Spring Return to Neutral Positioner	4-12
Figure 4-13. Spring Extended Spool Positioner	4-13
Figure 4-14. 3-Position Detent Positioner	4-14
Figure 4-15. Float Positioner	4-15
Figure 4-16. Rotary Positioner	4-16
Figure 4-17. Internal Pressure Detent Release Positioner	4-17
Figure 4-18. Spool "IN" Detent With Spring Return To Neutral Positioner	4-18
Figure 4-19. Regenerative Spool Positioner	4-19
Figure 4-20. Vertical Handle	4-20
Figure 4-21. Horizontal Handle	4-21
Figure 4-22. Standard Seal Retainer	4-21
Figure 4-23. Handle Bracket	4-22
Figure 4-24. Spool Protective Boot	4-22
Figure 4-25. Model RP60 Relief Valve	4-23
Figure 4-26. Model KC Relief Valve	4-24
Figure 4-27. No Relief "NR" Plug	4-25
Figure 4-28. Upper Anti-Cavitation Check Valve	4-25
Figure 4-29. Lower Anti-Cavitation Check Valve	4-26
Figure 4-30. Model RP51 Relief Valve	4-27
Figure 4-31. Model WHA Relief Valve	4-28
Figure 4-32. Model WH Relief Valve	4-29
Figure 4-33. Lower Anti-Cavitation Plug	4-30
Figure 4-34. Upper Anti-Cavitation Plug	4-30

SECTION I INTRODUCTION

This manual contains pertinent, step-by-step maintenance instructions plus parts ordering information and a complete part and service kit listing for Gresen's Model V42 Directional Control Valve.

If further assistance is required, contact:
Your Gresen Distributor or Representative

SECTION II DESCRIPTION

Gresen's Model V42 Directional Control Valves are available with five different types of work sections, plus various options to meet specific job specifications.

The following paragraphs describe the five work sections and options with reference to the parts illustrations in Section IV in this manual.

3-WAY, 3-POSITION WORK SECTION (Refer to Figure 4-2)

Provides control of single acting cylinders or start and stop of non-reversible hydraulic motors where free-wheeling of motor is NOT required. The cylinder port is blocked in neutral position.

4-WAY, 3-POSITION WORK SECTION (Refer to Figure 4-3)

Provides control of double acting cylinders without the floating action plus hydraulic motor start, stop, and reverse control where free-wheeling is NOT required. Cylinder ports are blocked in neutral position.

4-WAY, 4-POSITION FLOAT WORK SECTION (Refer to Figure 4-4)

Provides control of double-acting cylinders requiring a floating action such as: loaders, dozers, snow plows, etc. Incorporated into the work section is a 4-position float positioner. Three positions are standard double-acting with spring return to neutral. The fourth position is detented to hold in float position (both cylinder ports open to tank).

4-WAY, 4-POSITION REGENERATIVE WORK SECTION (Refer to Figure 4-5).

Same as 4-way, 3-position work section except that the fourth "regeneration" position provides a large volume of oil for fast cylinder action, but with little force.

4-WAY, 3-POSITION WORK SECTION WITH PRESSURE DETENT RELEASE (Refer to Figure 4-6).

Provides automatic return to neutral position as soon as work cycle is completed. The spool is held in either power position by a detent assembly until released by predetermined pressure setting in the power circuit. Spool returns to neutral.

MID-INLET CONVERSION SECTION (Refer to Figure 4-7 thru 4-9).

Provides an inlet port for a secondary pump downstream in the valve assembly. Conversion sections are available in split flow, combined flow, and a two-position section for two-speed split or combined flow application.

SPOOL ACTION OPTIONS

SPRING RETURN TO NEUTRAL (Standard) (Refer to Figure 4-12).

Spool will return to neutral position from A or B power position when handle is released.

SPRING EXTENDED SPOOL, "A" Option (Refer to Figure 4-13).

Eliminates spring return to neutral. Spring returns to the spool "OUT" position only. Usually used for cam operation of spool.

INTERNAL HYDRAULIC DETENT RELEASE, "KO" Option (Refer to Figure 4-17).

Automatically returns spool to a neutral position as soon as work cycle is completed.

ROTARY SPOOL ACTUATOR, "W" Option (Refer to Figure 4-16).

Movement of spool is controlled by a rotary movement of the handle. Allows 90° rotation of spool in each direction from center.

3-POSITION DETENT, "D" Option (Refer to Figure 4-14).

Valve spool remains in any of three detented positions. No spring return to neutral.

1-POSITION SPOOL "IN" DETENT, "R" Option (Refer to Figure 4-18).

Work port "B" remains open to tank in detent position. Allows a single-acting cylinder to float. Spring returns spool to neutral.

REGENERATIVE SPOOL (Refer to Figure 4-19).

Regeneration position provides a large volume of hydraulic oil to cylinders for fast action, but with little force.

SOLENOID CONTROL (Refer to Gresen's Service and Parts Manual No. SC-1252).

HYDRAULIC CONTROL, "HR", "HRO" or "HRH" Option (Refer to Gresen's Service and Parts Manual No. SC-1253).

HANDLE ASSEMBLIES (Refer to Figures 4-20 thru 4-24). Provides a choice of either horizontal or vertical handle assemblies and coated with either red or black plastic or plain.

INLET and OUTLET COVERS (Refer to Section III, Parts Ordering Information).

RELIEF VALVES and WORK PORT CHECKS (Refer to Figures 4-25 thru 4-34).

SECTION III MAINTENANCE

REPLACING, ADDING OR REMOVING WORK SECTION ASSEMBLIES

NOTE

For clarification, the side containing the inlet cover (the cover containing the main relief valve) will be called the left end of the valve assembly. Refer to Figure 3-1.

1. Before disassembly, it is suggested that each work section be marked numerically to avoid incorrect reassembly.

2. Remove four hex nuts (Item 29, Figure 4-1) from the right end of the valve assembly using a 9/16" socket wrench. If the valve assembly consists of only one or two work sections, bolts and lock washers must be removed instead.
3. Remove the outlet cover and each section by sliding from assembly studs (Item 29, Figure 4-1).
4. If work sections are to be added or subtracted from the valve assembly, the four studs must be removed from the inlet cover and replaced with studs of proper length. Refer to Table 3-1.

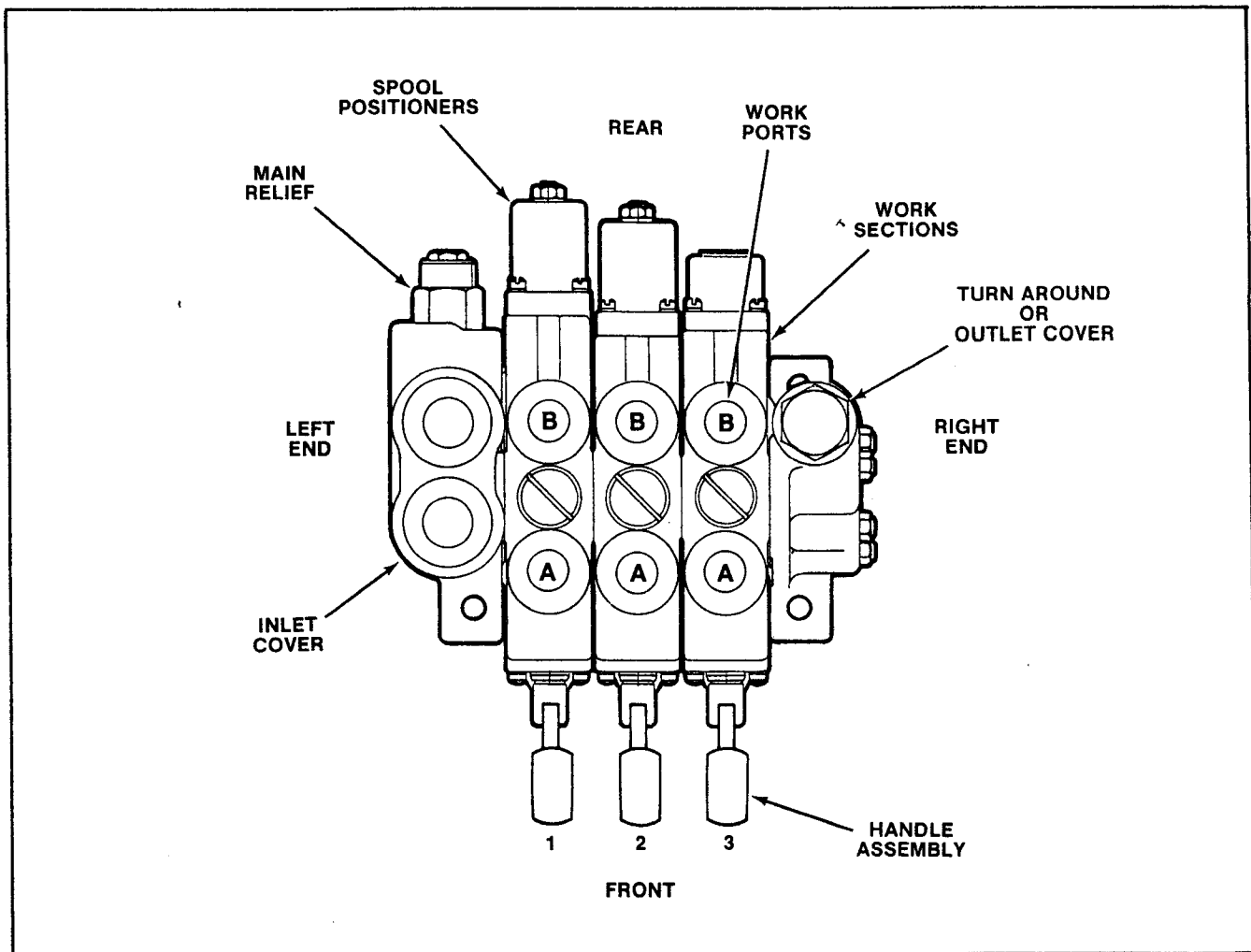


Figure 3-1. Schematic View of a Typical Model V42 Control Valve Assembly.

Table 3-1. Bolt and Stud Part Numbers

NO. OF WORK SECTIONS	OUTLET COVERS (RIGHT SIDE)		DESCRIPTION
	PART NO. 8090-TOP OUTLET	PART NO. 8091-END OUTLET	
1	3732-127	3732-122	Bolt } Use Lock Washers
2	3732-130	3732-128	Bolt } Part No. 1039-001
3	3493-001	1672-001	Stud }
4	3493-002	1673-001	Stud }
5	3493-003	1674-001	Stud } Use Stud Nuts
6	3493-004	1675-001	Stud } Part No. 1665-001
7	3493-005	1755-001	Stud } Nuts are lock nuts,
8	3493-006	1756-001	Stud } no lock washers required
9	3493-007	3493-008	Stud }

NOTE

Use lock nuts, part no. 1665-001, four required, with all assembly studs. Except for valve assemblies containing only one or two work sections, NO LOCK WASHERS required. Studs are of stress-proof material and should be replaced only with original equipment replacement parts. If the valve assembly contains only one or two work sections, assembly bolts with lock washers, part no. 1039-001, are used.

CAUTION

If stud nuts are not tightened to the proper torque, valve spools may bind or stick, or cause section seals to extrude.

REPLACING SPOOL SEALS

Figure 3-2 shows spool assembly — less the complete handle assembly. When the handle bracket is furnished, retainer plate and retainer screws are not used. Seal assembly is retained by handle bracket and its attaching parts.

5. Thoroughly clean O-ring counterbores and ground surfaces of each section.
6. Replace the three O-ring seals, two part no. 1621-001 and one part no. 1622-001. Buna-N seals are standard. For optional Viton Seals, see Cross Reference Chart on page 4-31.
7. Replace work sections on assembly studs in the same order in which they were removed. O-ring counterbores (with O-rings in place) should be to your left when facing the "A" port or front side of the valve assembly.

NOTE

Use care in replacing work section to avoid dislodging O-rings from counterbores.

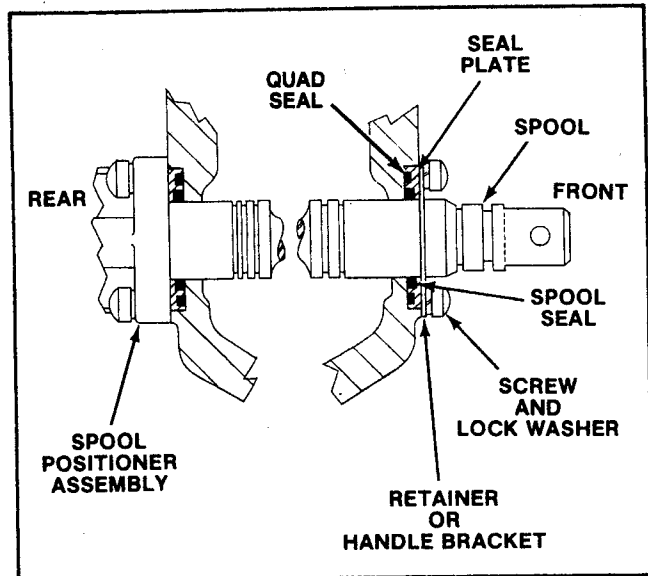


Figure 3-2. Spool Seal Assembly.

8. When all work sections and the outlet cover are positioned on the assembly studs, replace stud nuts and tighten evenly to 24-26 foot pounds [33-35 Nm].

1. Remove spool positioner assembly from rear of work section. Keep in order of disassembly.

2. Remove complete handle bracket assembly or retainer and retainer screws from front of work section.
3. Remove seal plate from each end of work section.
4. Remove quad seals and spool seals from seal plates and thoroughly clean plates.
5. Lightly oil new seals. Insert them into grooves in seal plate.
6. Slide the seal plates over each end of the spool into the counterbore in the work section.
7. Reassemble parts in reverse order of disassembly.
8. Torque bonnet screws and handle bracket or seal retainer screws to 8-10 foot pounds [11-14 Nm].

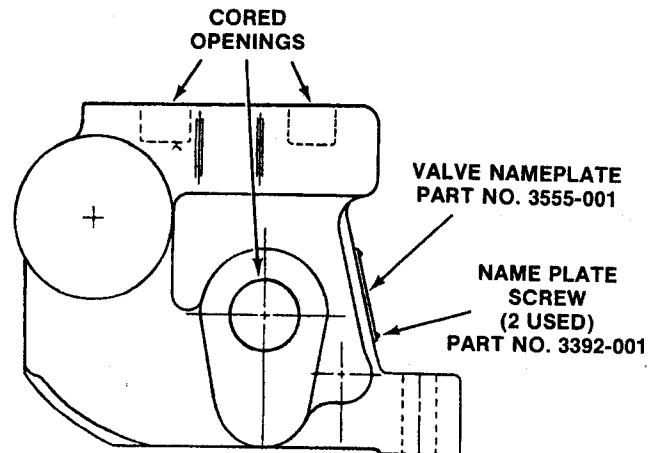
PARTS ORDERING INFORMATION

INLET COVER

Part No. 8089-

All inlet covers are machined to accept Models KC, RP60 or NR plug. If the outlet port is not machined, then the outlet port in the right or outlet cover must be used for a tank return line. The inlet cover may be machined with several different combinations of port sizes and locations.

Use the following porting chart to determine the proper machining modification number. NPT and SAE threads cannot be intermixed in the same casting.

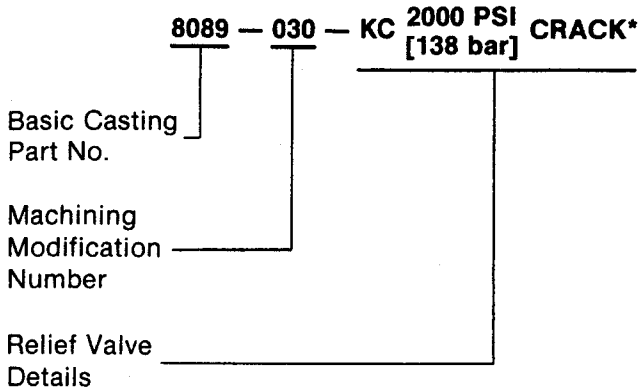


PORT LOCATION	NPT**	SAE				
		16	16	20	16	20
End In*	1-1/4"	16	16	20	16	20
Top In*	1-1/4"	16	16	20	16	20
End Out	1-1/4"	—	—	—	20	20
Top Out*	1-1/4"	16	20	20	20	20
Machining Modification Number	-030	-001	-004	-005	-007	-006

*These port locations are cored and will be plugged if not required.

**Ports with NPT pipe threads are limited to 2000 PSI [136 bar] max.

Ordering Example For Inlet Covers



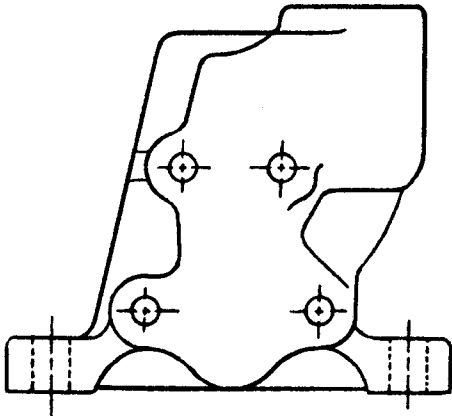
*Specify:

1. Model number of relief valve to be used. (See Figures 4-25 and 4-26).
2. Relief setting required. Crack pressure is setting when relief is passing 1 GPM [3.8 litres/min.]. Full flow is pressure setting when relief is passing specified GPM [litres/min].
3. "NR" (no relief) if plug is to be installed.
4. If "With no relief assembly or "NR" plug installed" is specified, relief cavity will be plugged with only a plastic shipping plug.

OUTLET COVERS

A choice of two outlet covers for the Model V42 is available: top outlet, part no. 8090-; and end outlet, part no. 8091-.

Top Outlet Cover, Part No. 8090—



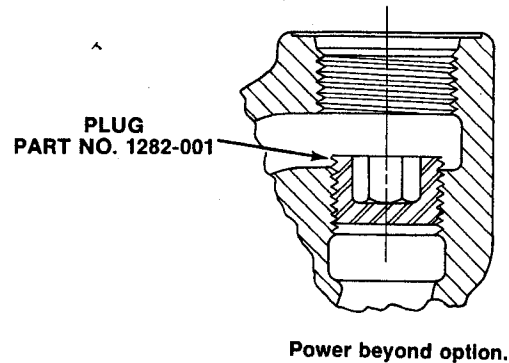
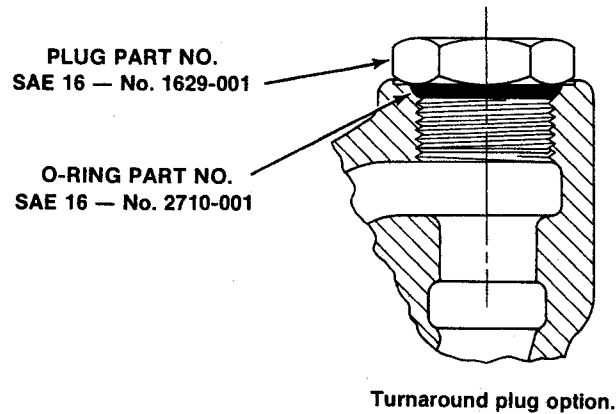
Standard machining provides a top outlet port for open center applications. When the top outlet port is plugged to provide a turnaround outlet flow, the outlet port must be located in the inlet cover.

Two options are available for the no. 8090 top outlet cover . . . power beyond and closed center applications. For power beyond, the core between the open

center and exhaust passages is tapped and plugged. The top outlet port becomes the power beyond port. The tank outlet port must be located in the inlet cover.

When the top power beyond port is plugged, the Valve Assembly may be used in a closed center application. For future conversion from standard open center to either power beyond or closed center applications, the outlet cover may be ordered with the core tapped but not plugged (for field conversion machining).

Options For The No. 8090 Outlet Cover



Use the following porting chart to determine the proper machining modification number for the no. 8090 outlet cover. NPT and SAE threads cannot be intermixed in the same casting.

PORT LOCATION	NPT		SAE	
	Top Outlet		16	—
Power Beyond or Closed Center Option	1" — 1 1/2"	—	16	
Machining Modification Number	-005	-006	-002	

FUNCTION OF SECTION*	Check one for each section <input type="checkbox"/> 3-Way, Casting No. 8045, see Figure 4-2. <input type="checkbox"/> 4-Way, Casting No. 8045, see Figure 4-3. <input type="checkbox"/> 4-Way Float, Casting No. 8046, see Figure 4-4. <input type="checkbox"/> 4-Way Regenerative, Casting No. 8138, see Figure 4-5.
OPTIONAL FEATURES	<input type="checkbox"/> 3-Way, Free Flow <input type="checkbox"/> 4-Way, Free Flow <input type="checkbox"/> _____
WORK PORT SIZES "A" and "B" WORK PORTS	<input type="checkbox"/> SAE 12 (1-1/16" — 12 UN) Standard <input type="checkbox"/> SAE 16 (1-15/16" — 12 UN) <input type="checkbox"/> 3/4" — 14 NPT <input type="checkbox"/> 1" — 11-1/2 NPT Ports with NPT threads are limited to 2000 PSI [136 bar] max.
WORK PORT OPTIONS	Specify for "A" and "B" work ports <input type="checkbox"/> Anti-Cavitation Check, A-C <input type="checkbox"/> Upper Option Plug <input type="checkbox"/> Lower Option Plug <input type="checkbox"/> Work Port Relief, Model WH _____ <input type="checkbox"/> Work Port Relief, Model RP51 _____ <div style="text-align: right;">Specify relief setting</div>
HANDLE-END OPTIONS**	<input type="checkbox"/> Standard Steel Retainer Assembly, LCHA <input type="checkbox"/> Vertical Handle, CVHA <input type="checkbox"/> Horizontal Handle, CHHA <input type="checkbox"/> Spool Boot Assembly <input type="checkbox"/> Less Handle Only, includes link assembly, LHO <input type="checkbox"/> Handle Bracket Only, less link assembly, HBO

*Each spool is fitted to its work section housing at the factory and neither part can be purchased separately. O-ring grooves are machined on the left side (when viewed from the "A" work port end) of each work section housing.

MID-INLET CONVERSION SECTIONS

The following information is necessary for proper specification when ordering a mid-inlet conversion section:

1. Type of section
2. Port size
3. Relief valve type and setting

FUNCTION OF SECTION	<input type="checkbox"/> Combined Flow <input type="checkbox"/> Split Flow <input type="checkbox"/> 2-Position, combined or split flow
PORT SIZES	<input type="checkbox"/> SAE 16 (1-15/16" — 12 UN) Standard <input type="checkbox"/> 1" — 11-1/2 NPT Ports with NPT pipe threads are limited to 2000 PSI [136 bar] max.
RELIEF VALVE OPTIONS	For split or combined flow sections only <input type="checkbox"/> Model KC, _____ <input type="checkbox"/> Model RP60, _____ For 2-position selective sections only <input type="checkbox"/> Model WH, _____ <input type="checkbox"/> Model RP51, _____ <div style="text-align: right;">Specify relief setting</div>

SECTION IV PARTS LISTING

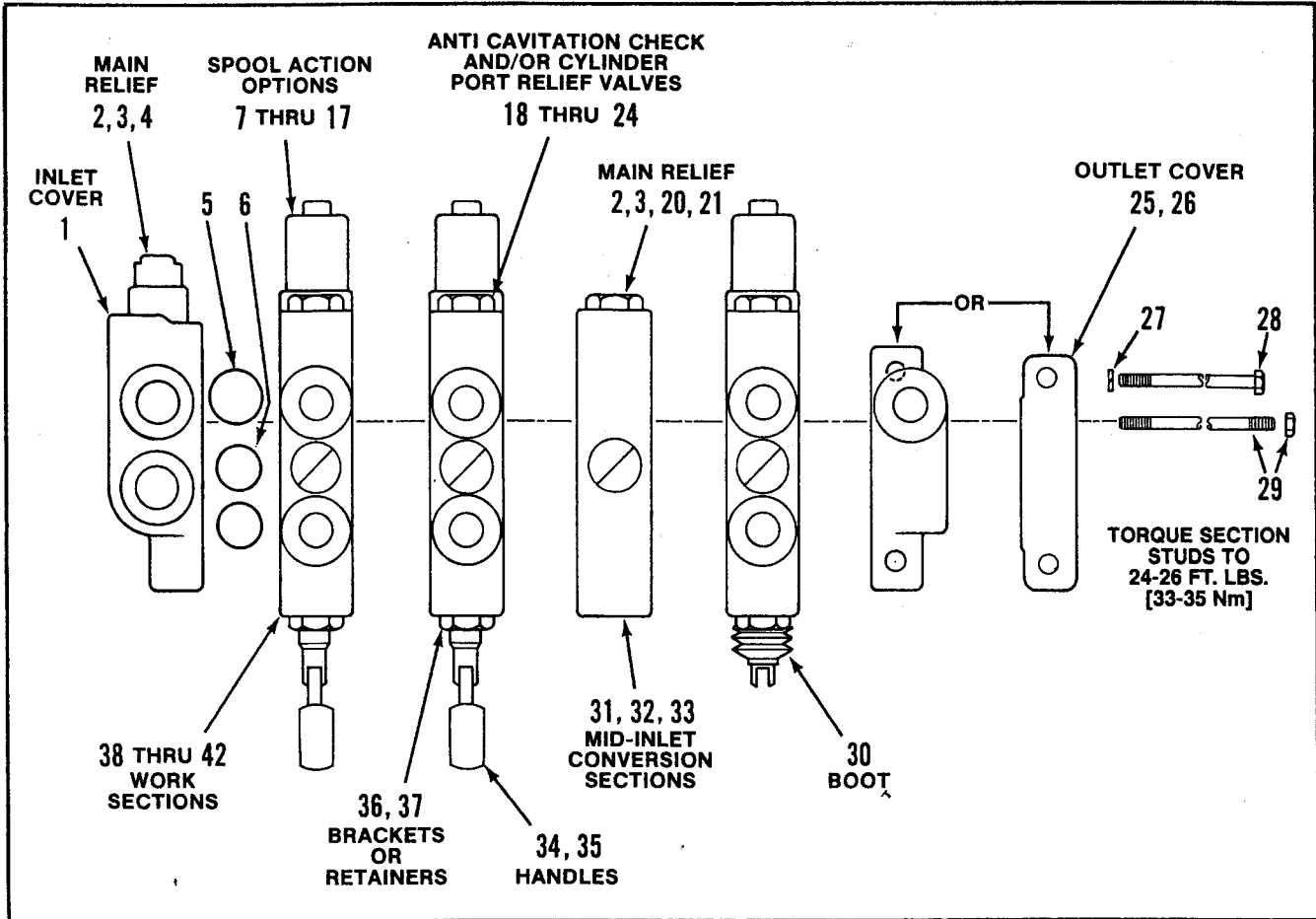


Figure 4-1. Model V42 Directional Control Valve, Typical Main Assembly.

MODEL V42 DIRECTIONAL CONTROL VALVE ASSEMBLY, TYPICAL MAIN ASSEMBLY

Item No.	Part No.	Description	Quantity Per Assembly
1	8089	COVER, Inlet (Refer to page 3-2)	1
2		RELIEF, RP60 (See Figure 4-25)	A/R
3		RELIEF, KC (See Figure 4-26)	A/R
4	K-7014	PLUG, No Relief, (NR) (See Figure 4-27)	A/R
5	1622-001*	O-RING, Large	1 plus 1 per section
6	1621-001*	O-RING, Small	2 plus 2 per section
7	K-28060	POSITIONER, Spring Return to Neutral (See Figure 4-12)	A/R
8		POSITIONER, Spring Extended Spool (See Figure 4-13)	A/R
9	K-28025	POSITIONER, 3-Position Detent, "D" (See Figure 4-14)	A/R
10	K-28061	POSITIONER, Float, (See Figure 4-15)	A/R
11	K-28103	POSITIONER, Rotary, "W" (See Figure 4-16)	A/R
12		POSITIONER, Internal Pressure Detent Release, "KO" (See Figure 4-17)	A/R

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. SC-1253)	A/R
16		POSITIONER, Hydraulic Remote (Refer to Catalog No. SC-1253)	A/R
17		POSITIONER, Solenoid Control (Refer to Catalog No. SC-1252)	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, Model RP51 (See Figure 4-30)	A/R
21		RELIEF, Model WHA (See Figure 4-31)	A/R
22		RELIEF, Model WH (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.

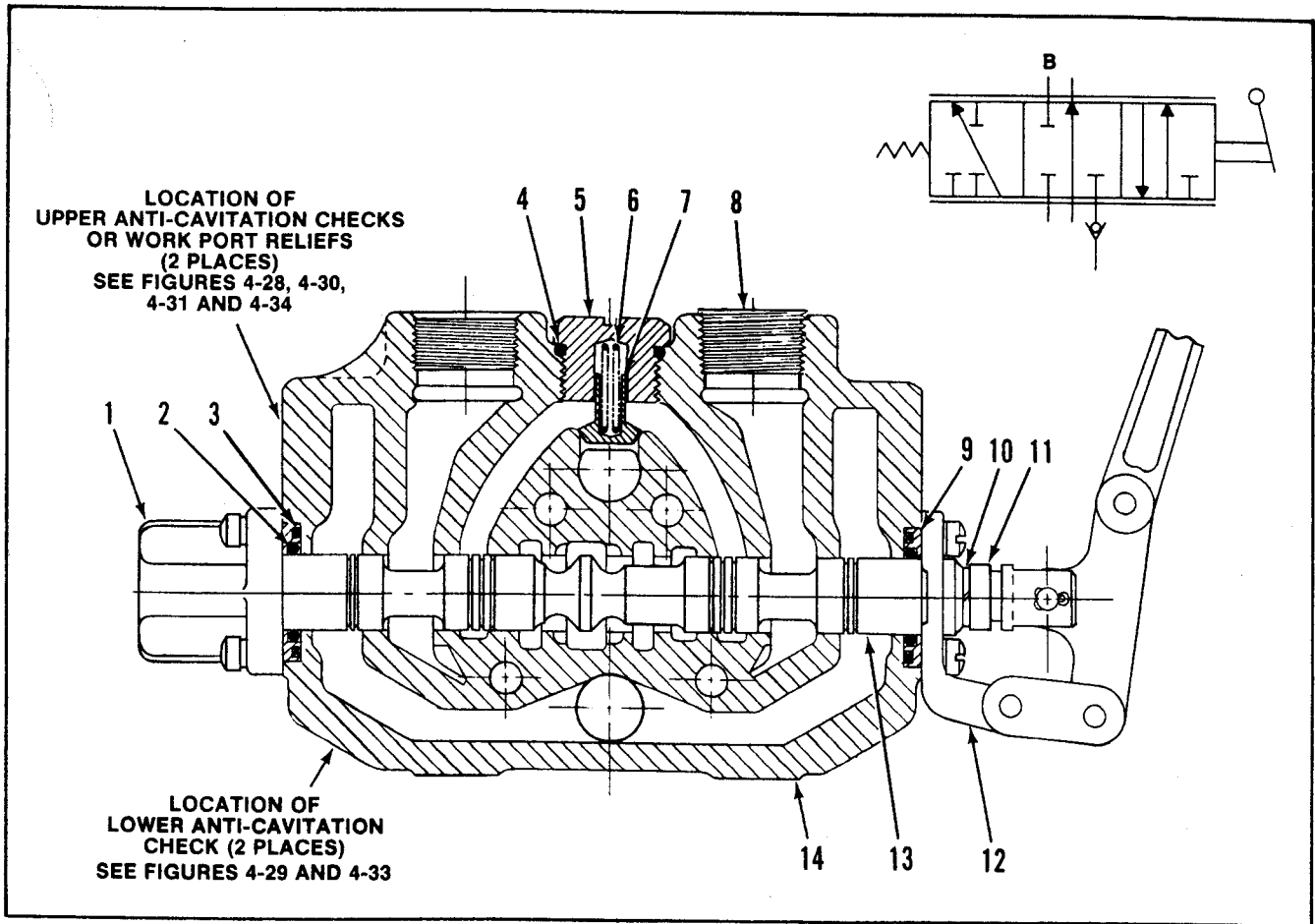


Figure 4-2. 3-Way, 3-Position Work Section

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	8017-002*	SEAL, Spool	2
3	12173-001*	SEAL, Quad	2
4	2709-001*	SEAL, O-Ring	1
5	7790-001	PLUG, Load Check	1
6	2796-001	SPRING	1
7	7791-001	POPPET	1
8		PLUG (See Table 4-3 for part number)	1
9	12172-001	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	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.

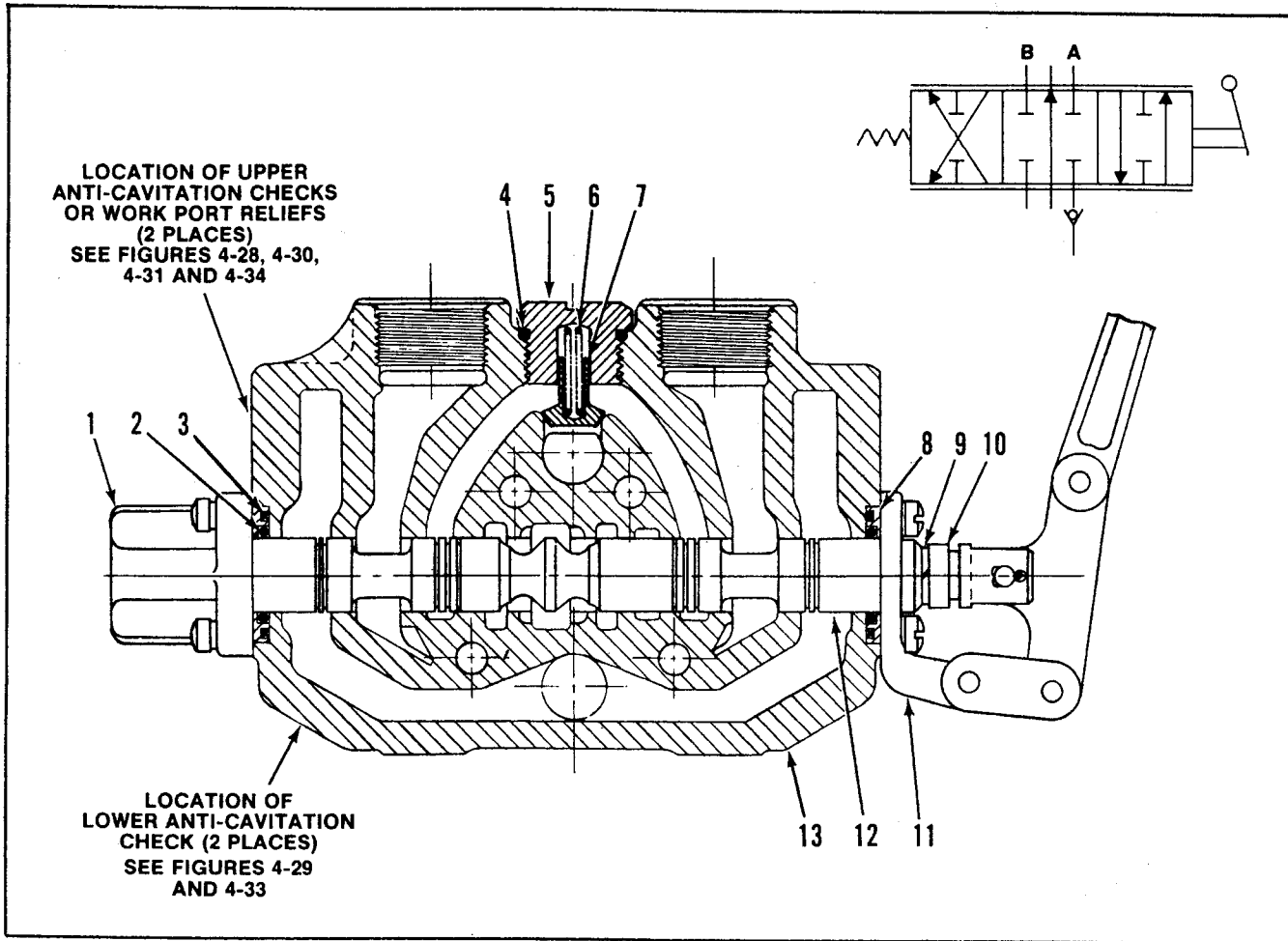


Figure 4-3. 4-Way, 3-Position Work Section

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	8017-002*	SEAL, Spool	2
3	12173-001*	SEAL, Quad	2
4	2709-001*	SEAL, O-Ring	1
5	7790-001	PLUG, Load Check	1
6	2796-001	SPRING	1
7	7791-001	POPPET	1
8	12172-001	PLATE, Seal	2
9	1039-001	WASHER, Lock	1
10	8351-001	ADAPTER, Clevis	1
11	8064-015	HANDLE, BRACKET or RETAINER (See Figure 4-20 thru 4-24)	1
12	8060-001	SPOOL, 4-Way	1
13	8045-XXX	HOUSING, 4-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.

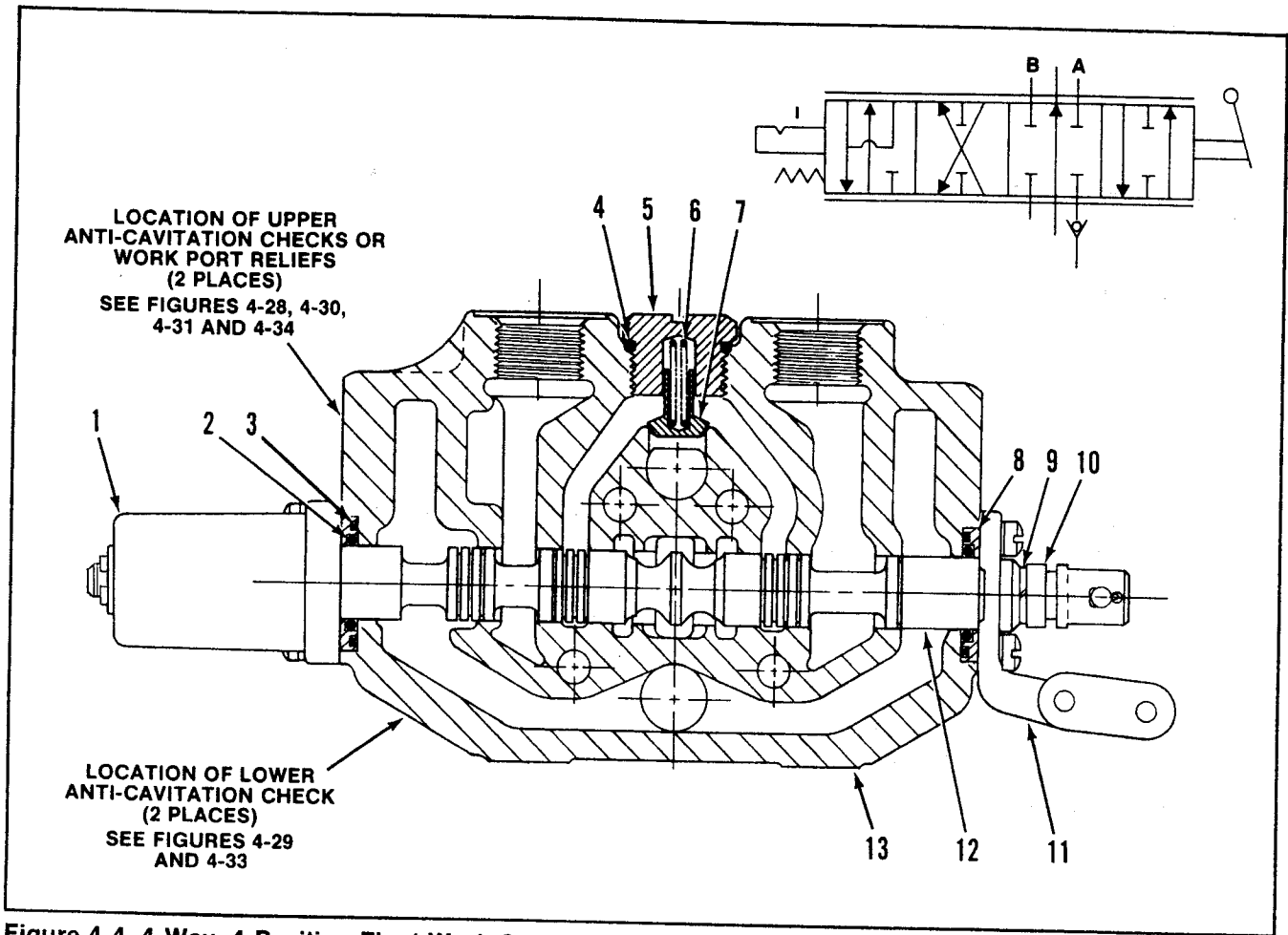


Figure 4-4. 4-Way, 4-Position Float Work Section.

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	8017-002*	SEAL, Spool	2
3	12173-001*	SEAL, Quad	
4	2709-001*	SEAL, O-Ring	2
5	7790-001	PLUG, Load Check	
6	2796-001	SPRING	1
7	7791-001	POPPET	
8	12172-001	PLATE, Seal	1
9	1039-001	WASHER, Lock	2
10	8351-001	ADAPTER, Clevis	1
11		HANDLE, BRACKET or RETAINER (See Figure 4-20 thru 4-24)	1
12	8061-001	SPOOL, Float	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.

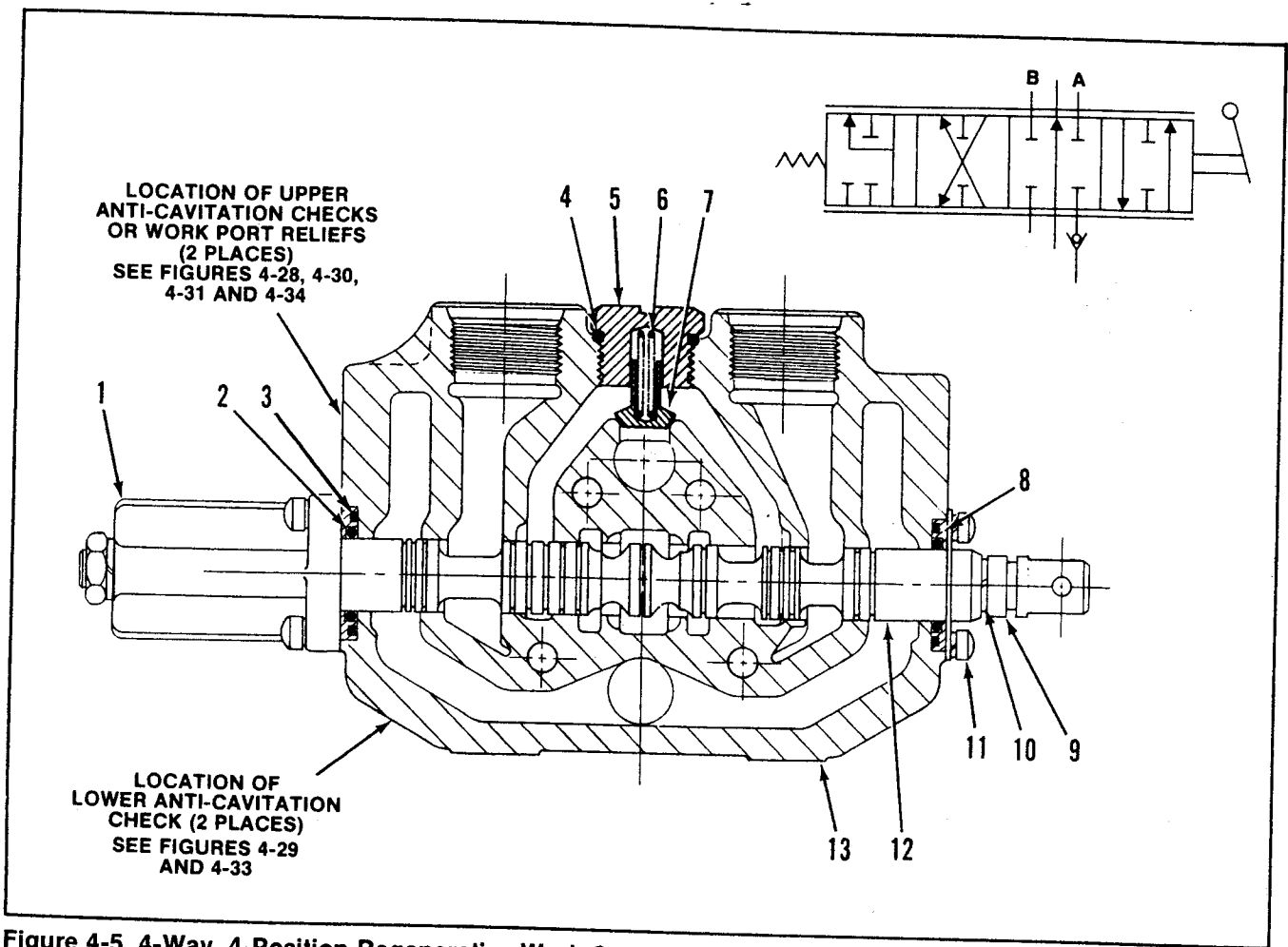


Figure 4-5. 4-Way, 4-Position Regenerative Work Section

4-WAY, 4-POSITION REGENERATIVE WORK SECTION

Item No.	Part No.	Description	Quantity
	K-28029*	SEAL KIT (Contains items 2, 3 and 4 plus section seals)	
	K-7018*	SERVICE KIT (Contains items 4 thru 7)	
1	K-28059	POSITIONER, Regenerative (See Figure 4-19)	1
2	8017-002*	SEAL, Spool	2
3	12173-001*	SEAL, Quad	2
4	2709-001*	SEAL, O-Ring	1
5	7790-001	PLUG, Load Check	1
6	2796-001	SPRING	1
7	7791-001	POPPET	1
8	12172-001	PLATE, Seal	1
9	8351-001	ADAPTER, Clevis	2
10	1039-001	WASHER, Lock	1
11		HANDLE, BRACKET or RETAINER (See Figure 4-20 thru 4-24)	1
12	8140-001	SPOOL, Regenerative	1
13	8138-XXX	HOUSING, 4-Way, Regenerative	1

Not Sold Separately. Order K-28029

Not Sold Separately. Order K-7018*

See Note

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.

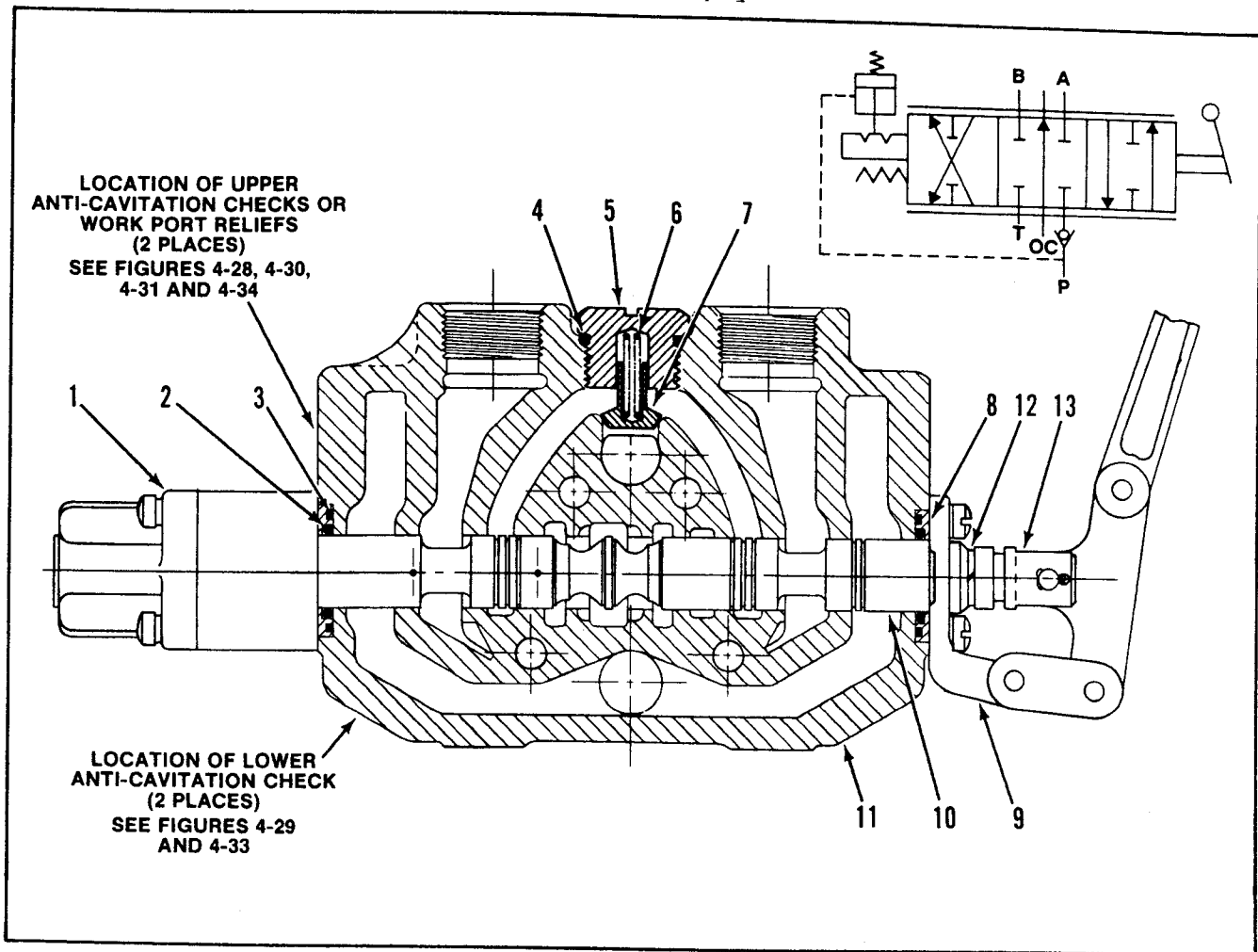


Figure 4-6. 4-Way, 3-Position Work Section With Pressure Detent Release.

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 plus section seals)	
	K-7018*	SERVICE KIT (Contains items 4 thru 7)	
1		POSITIONER, Pressure Detent Release (See Figure 4-17)	1
2	8017-002*	SEAL, Spool	2
3	12173-001*	SEAL, Quad	2
4	2709-001*	SEAL, O-Ring	1
5	7790-001	PLUG, Load Check	1
6	2796-001	SPRING	1
7	7791-001	POPPET	1
8	12172-001	PLATE, Seal	2
9		HANDLE, BRACKET or RETAINER (See Figure 4-20 thru 4-24)	1
10	8264-001	SPOOL, Pressure Detent Release	1
11	8045-XXX	HOUSING, 4-Way	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.

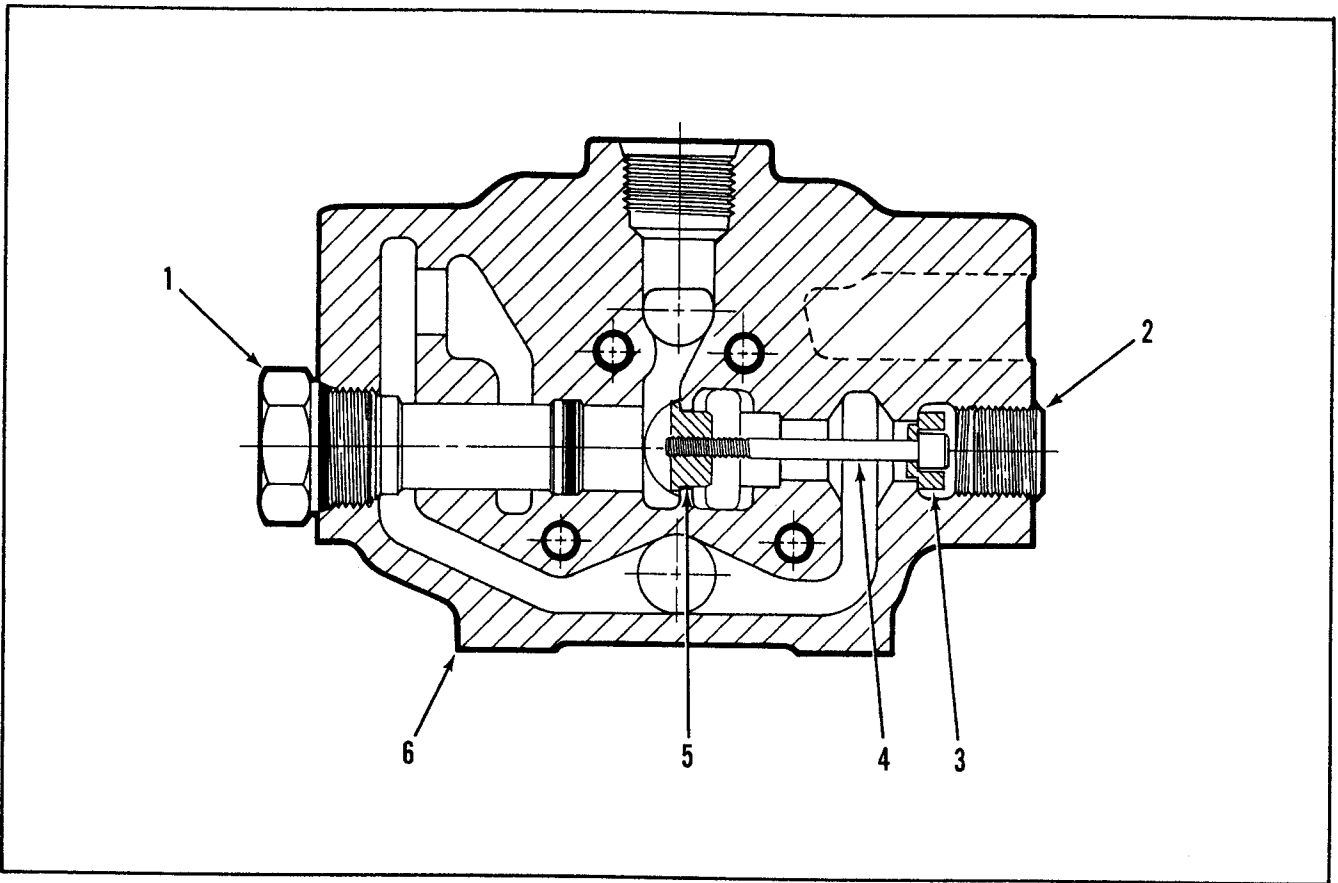


Figure 4-7. Split Flow Mid-Inlet Section

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 Combined Flow Conversion Kit

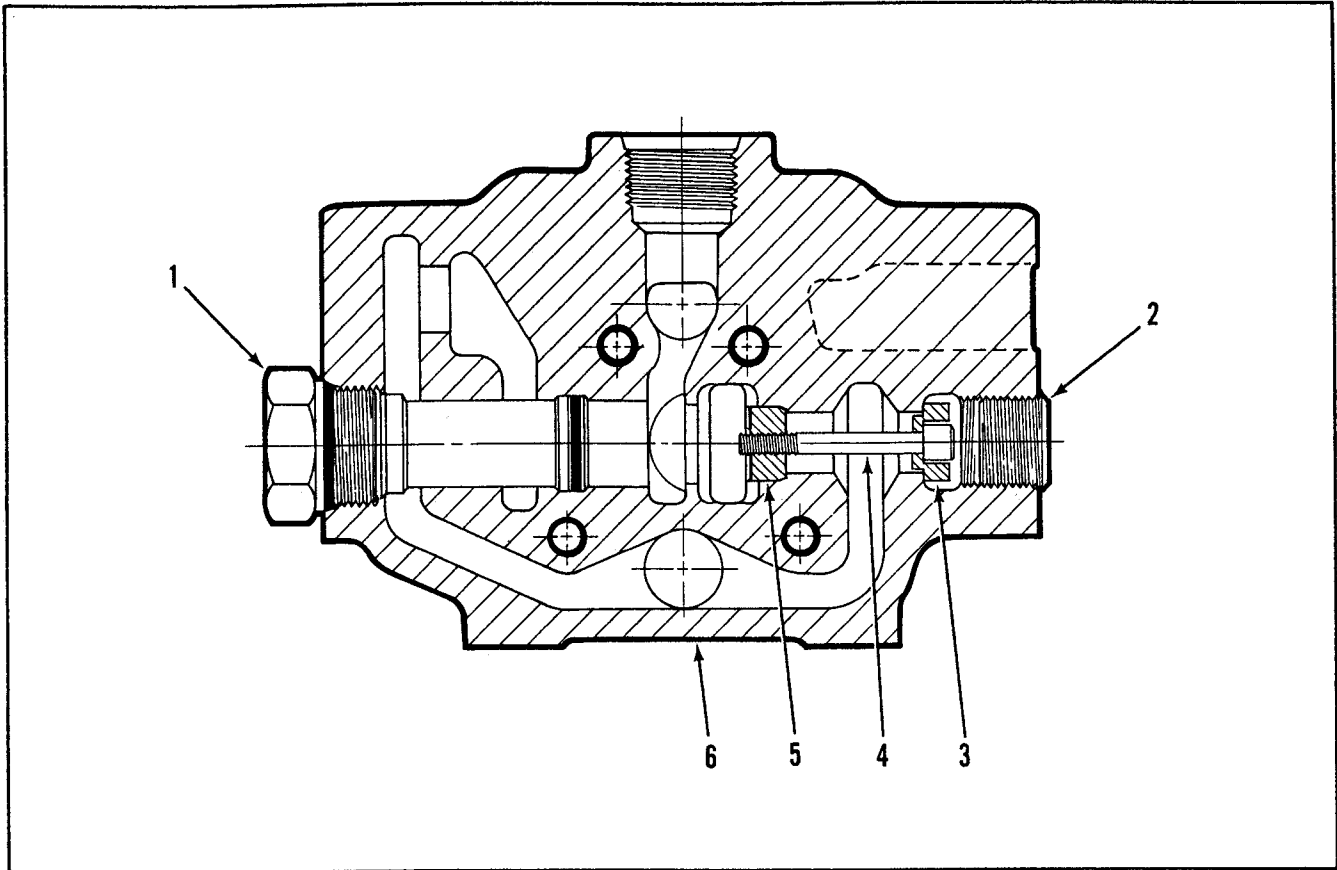


Figure 4-8. Combined Flow Mid-Inlet Section

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 Split Flow Conversion Kit.

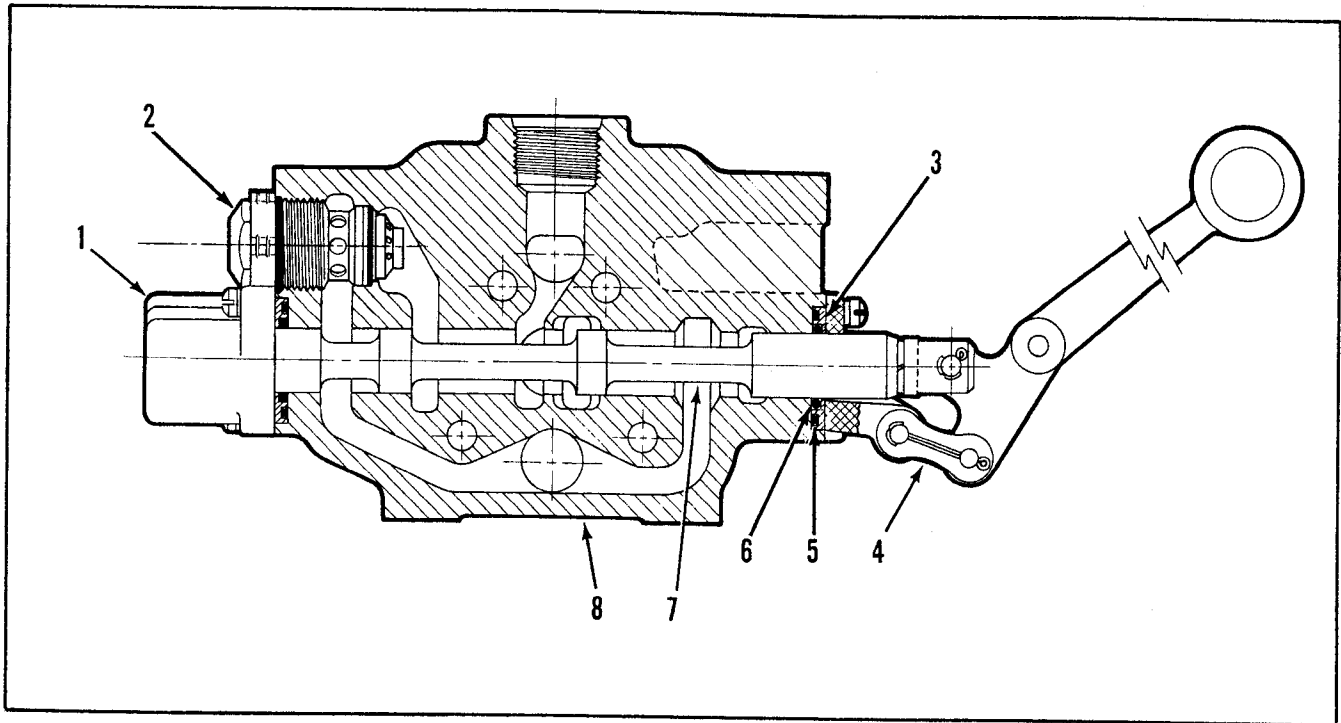


Figure 4-9. 2-Position Mid-Inlet Section

2-POSITION MID-INLET SECTION

Item No.	Part No.	Description	Quantity
1	K-28029*	SEAL KIT (Contains items 5 and 6 plus section seals) POSITIONER, Load To Split Flow (See Figure 4-10) POSITIONER, Load To Combined Flow (See Figure 4-11)	1 1
2		RELIEF VALVE (See Figures 4-30 thru 4-32)	1
3	12172-001	PLATE, Seal	2
4		HANDLE ASSEMBLY (See Figures 4-20 thru 4-24)	1
5	12173-001*	SEAL, Quad	2
6	8017-002*	SEAL, Spool	2
7	3968-001	SPOOL	1
8	3953-XXX	HOUSING	2

} Not Sold Separately. Order K-28029

} See Note

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.

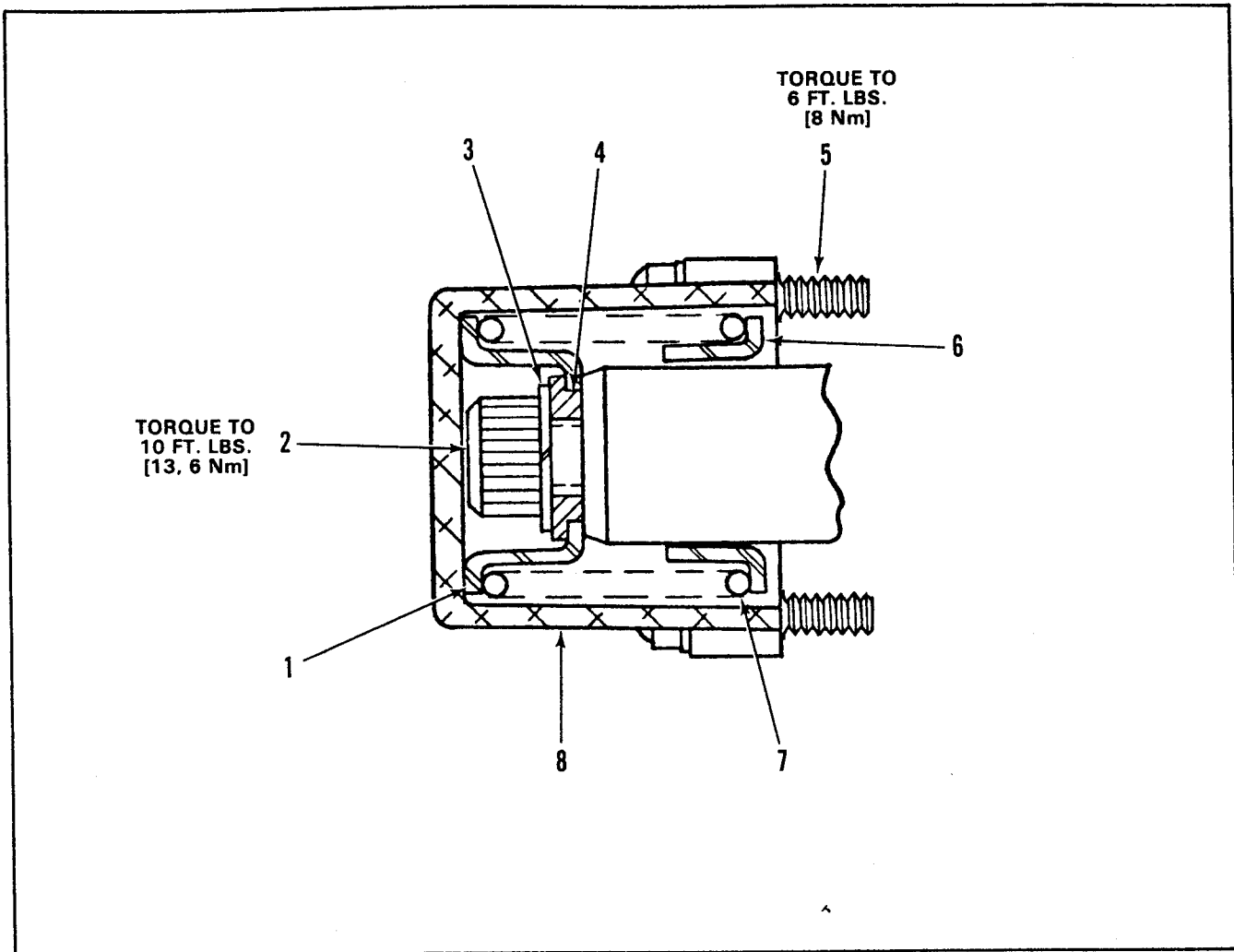


Figure 4-10. Spring Load To Split Flow Positioner

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

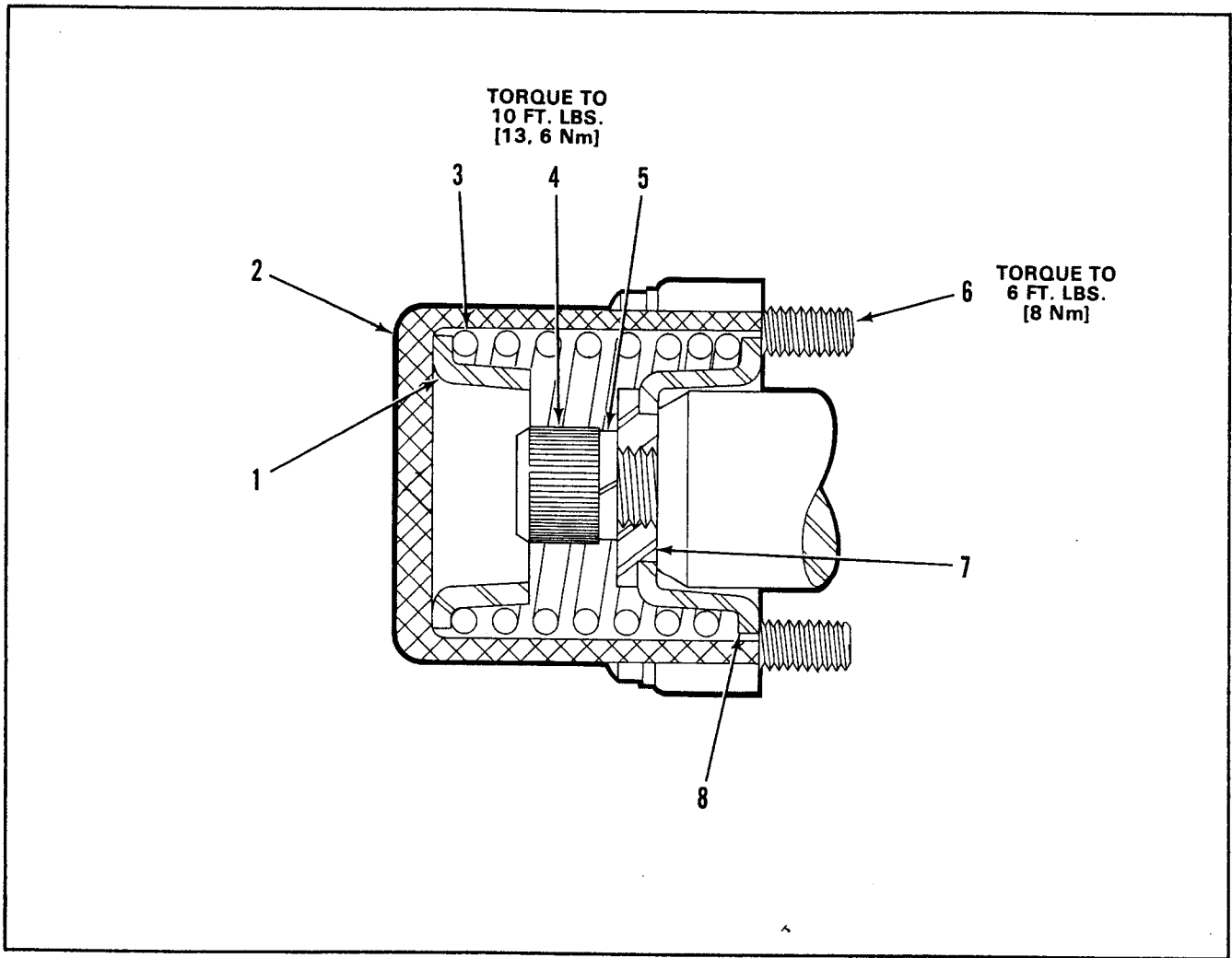


Figure 4-11. Spring Load To Combined Flow Positioner

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

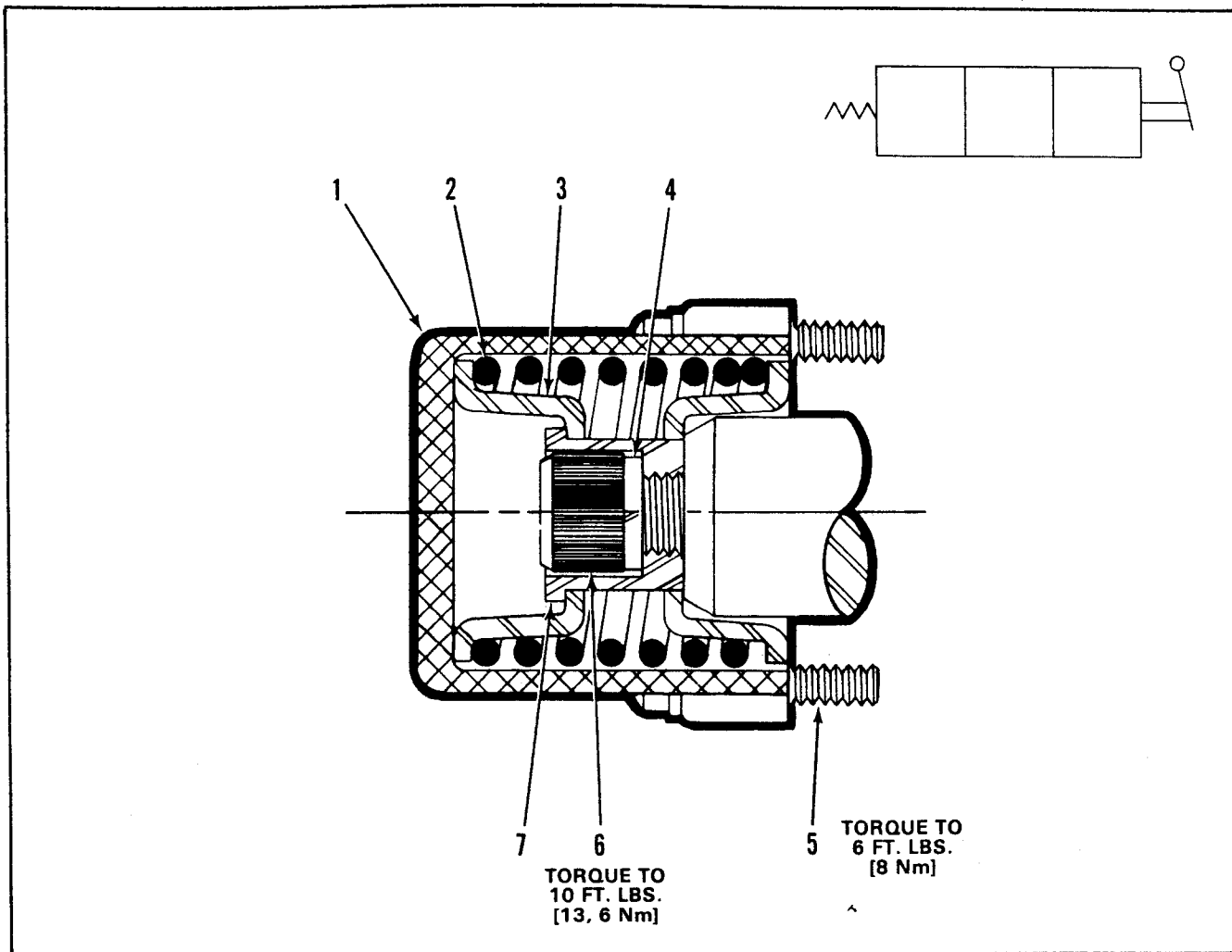


Figure 4-12. Spring Return to Neutral Positioner

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

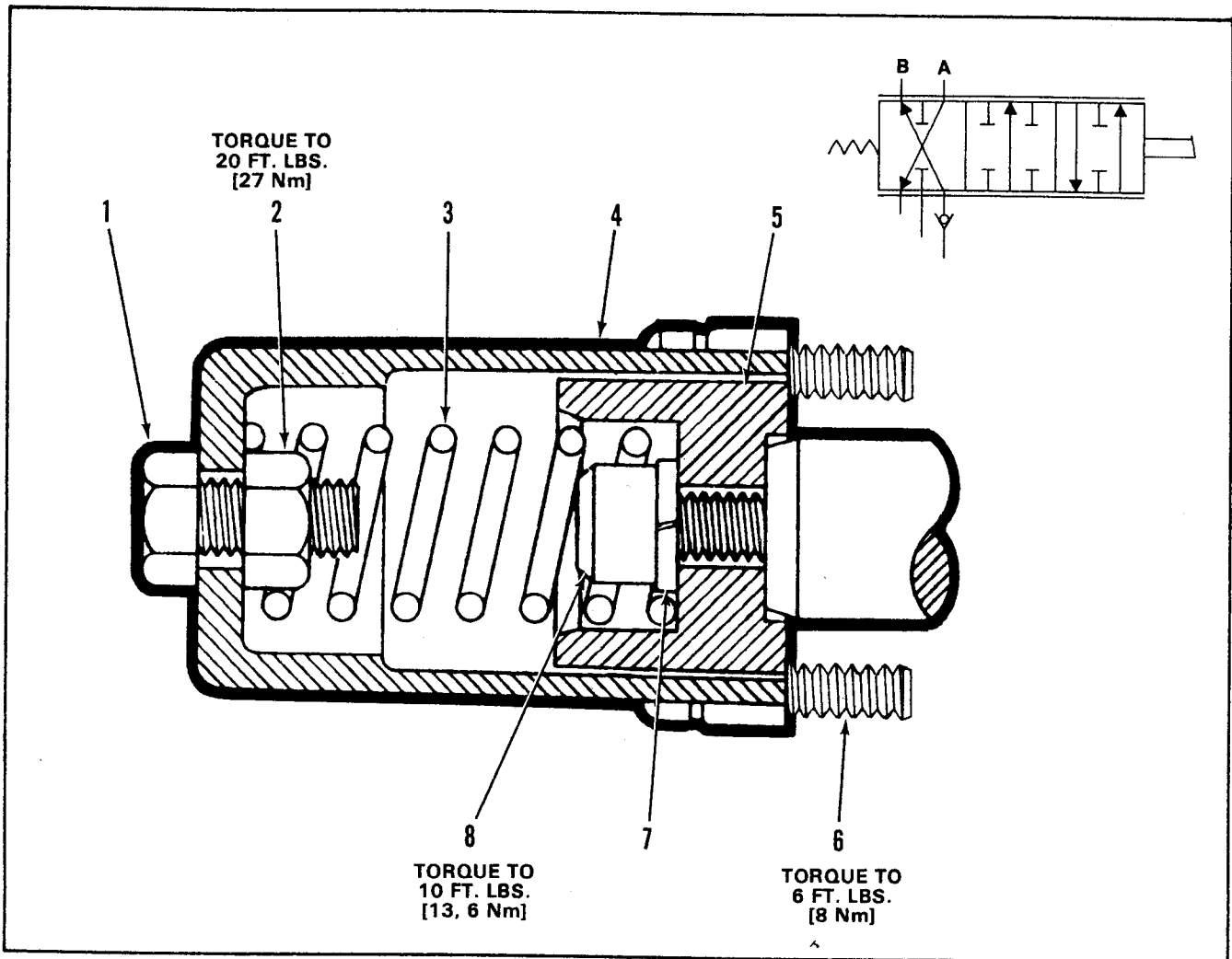


Figure 4-13. Spring Extended Spool Positioner

SPRING EXTENDED SPOOL POSITIONER

Item No.	Part No.	Description	Quantity
	K-28028	REPLACEMENT KIT (Contains all items listed below)	
1	3732-108	SCREW	1
2	1665-001	NUT Hex	1
3	1761-001	SPRING	1
4	3482-001	BONNET	1
5	3588-001	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

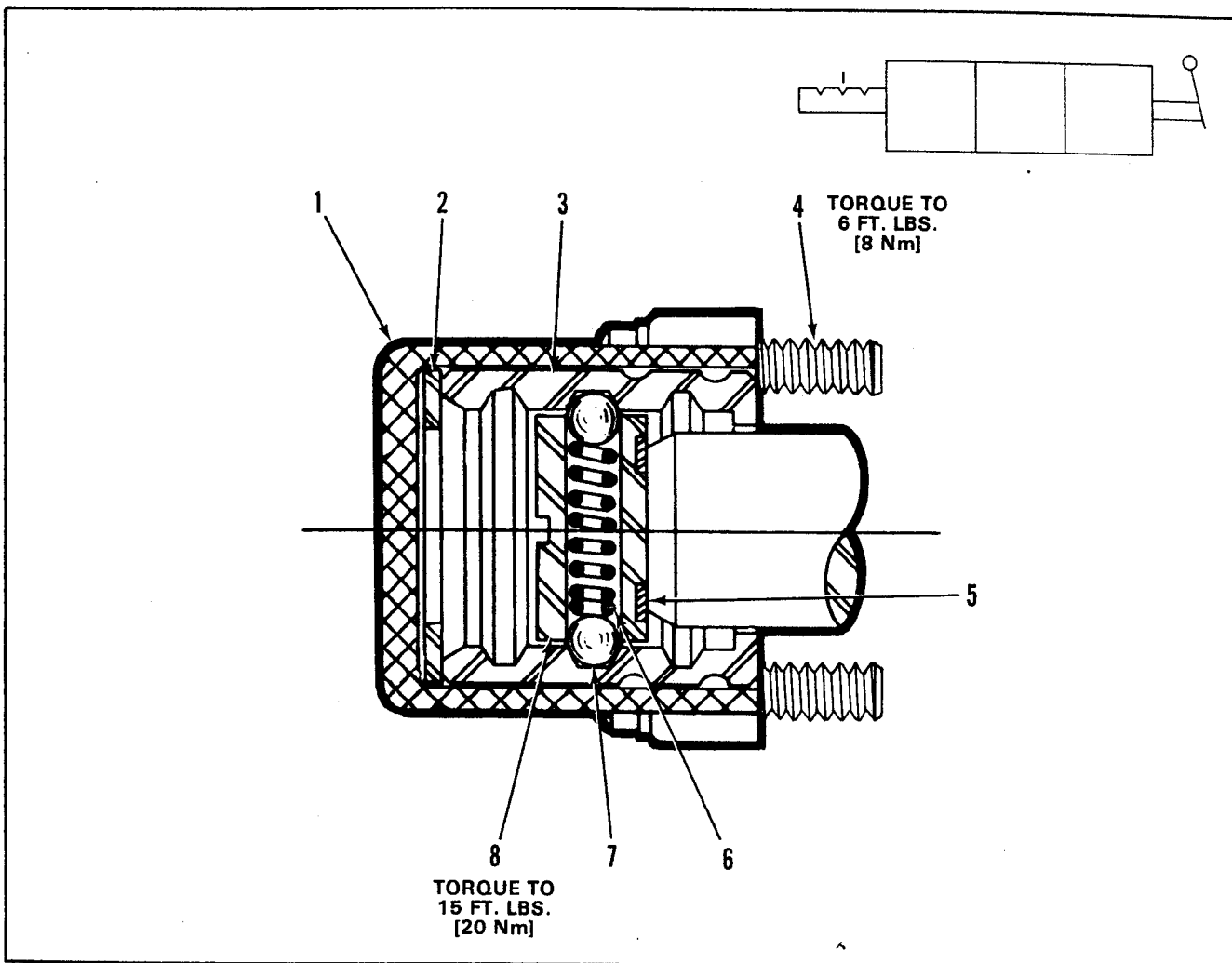


Figure 4-14. 3-Position Detent Positioner

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

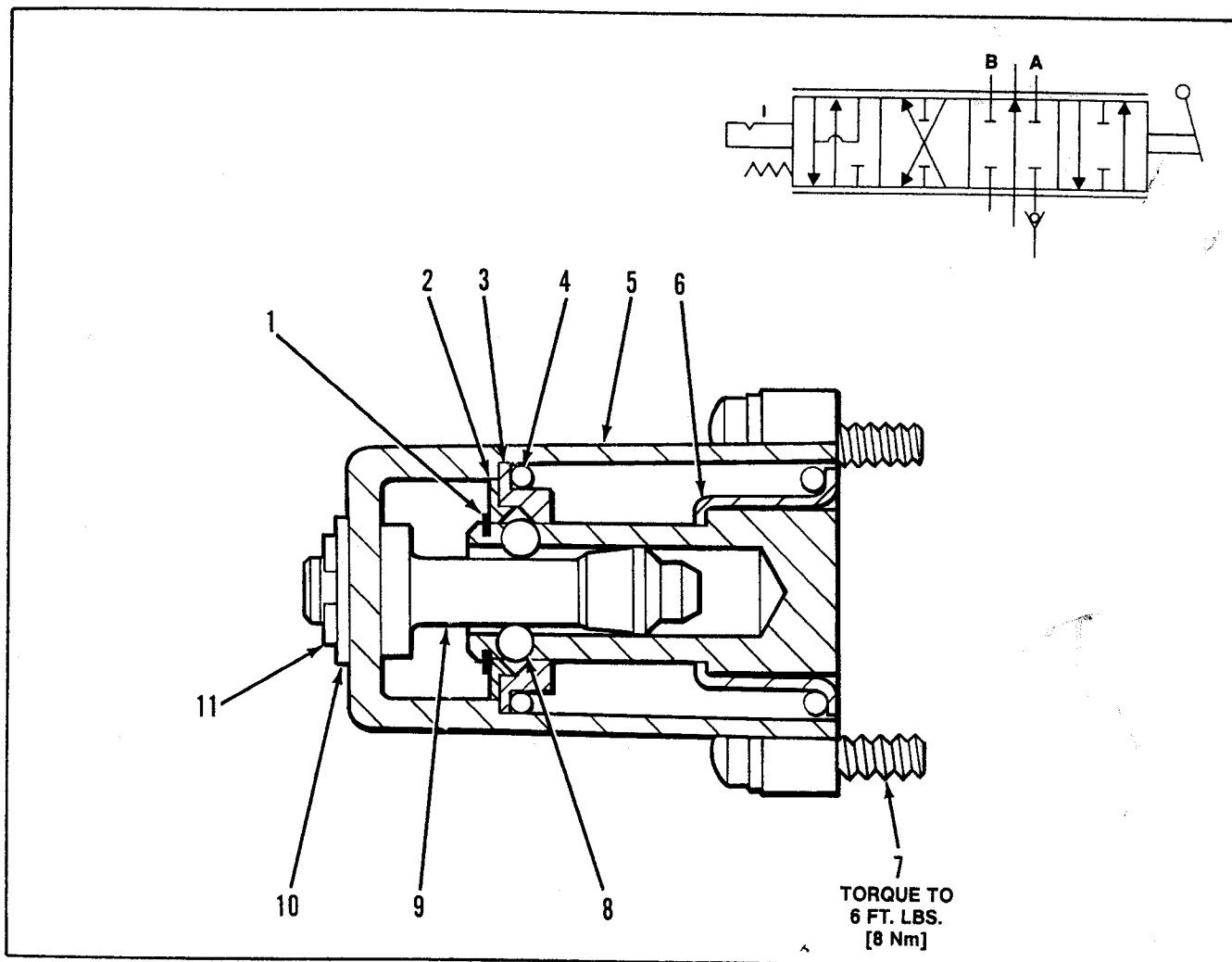


Figure 4-15. Float Positioner

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	12175-001	ADAPTOR, Float Detent	1
10	509-001	WASHER	1
11	7442-001	RING, Retaining	1

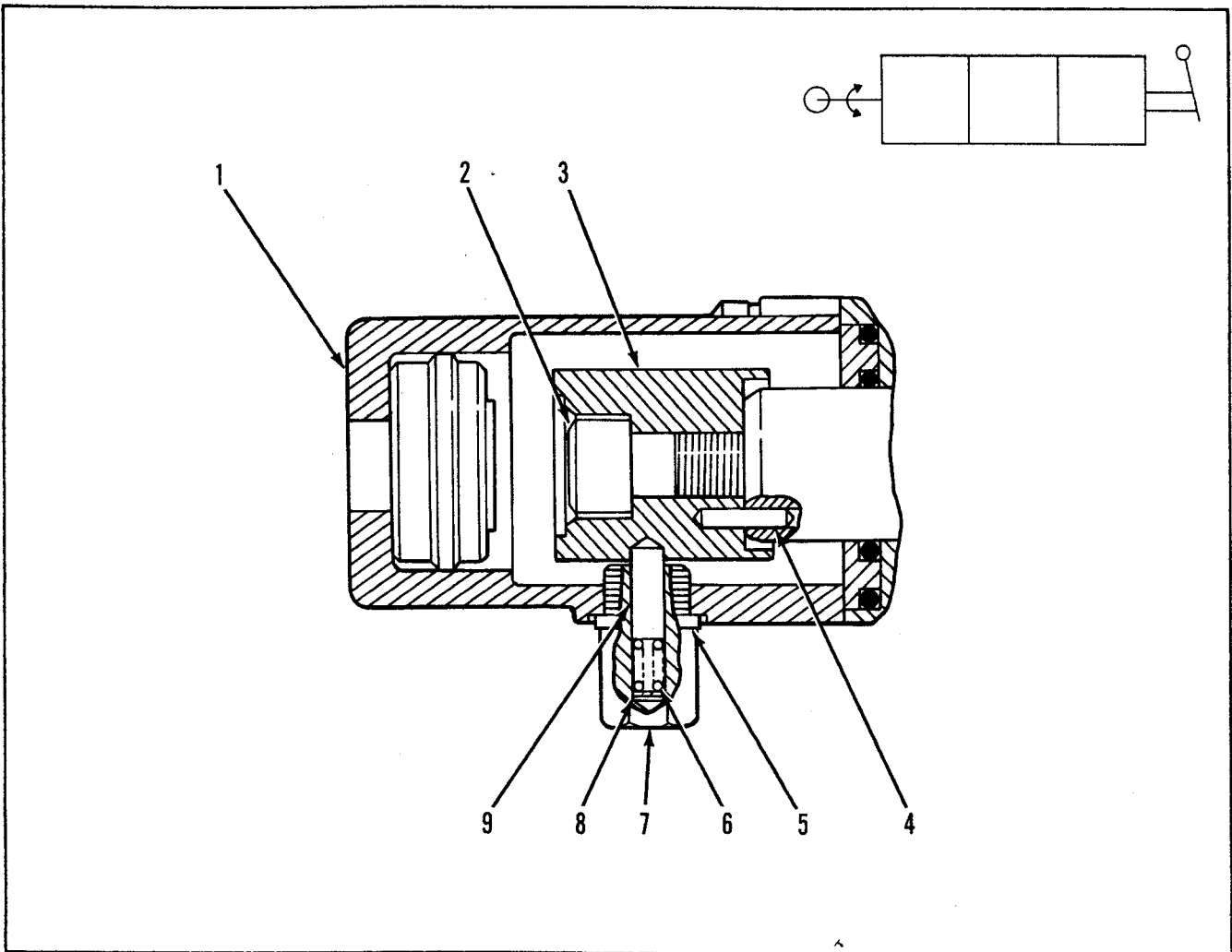


Figure 4-16. Option "W" Rotary Spool Positioner.

OPTION "W" ROTARY SPOOL POSITIONER

Item No.	Part No.	Description	Quantity
	K-28103	REPLACEMENT KIT (Contains all items listed below)	
1	11624-002	BONNET	1
2	3731-199	SCREW, HSHC	1
3	11580-001	BODY, Rotary Cam	1
4	0888-001	PIN, Lock	1
5	8743-001	WASHER	1
6	8808-001	SPRING	1
7	8744-001	CAP, Rotary Detent	1
8	8653-001	SHIM (.020 inch [0,5mm] thick)	1
	8653-002	SHIM (.040 inch [1,0mm] thick)	1
9	2676-001	PIN, Detent	1

NOTE: Valve Assemblies manufactured prior to June, 1985 will not readily accept new Rotary Positioner (shown above) without replacing or modifying valve spool. For more information contact the factory.

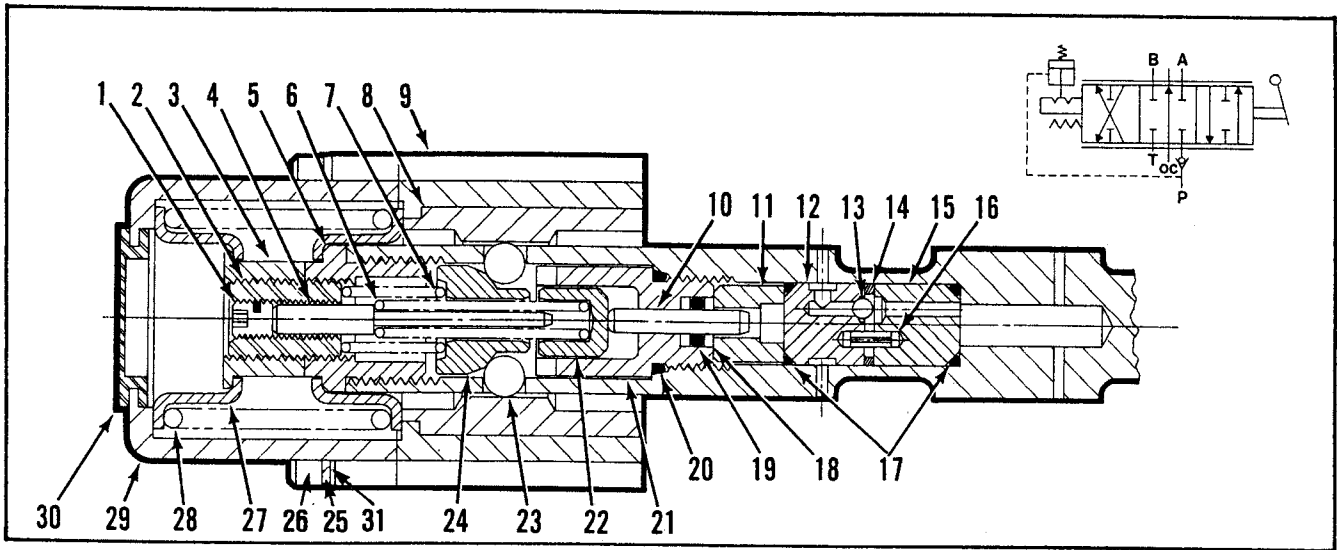


Figure 4-17. Internal Pressure Detent Release Positioner

INTERNAL PRESSURE DETENT RELEASE POSITIONER

Item No.	Part No.	Description	Quantity
	K-28088	SEAL KIT (Contains items 17 thru 20)	
	K-28100	SERVICE KIT (Contains asterisked items listed below)	
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
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	DIAPHRAM	1
31	7904-001	BEARING PLATE	4

Not Sold Separately, Order K-28088

*Parts included in service kit number K-28100.

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

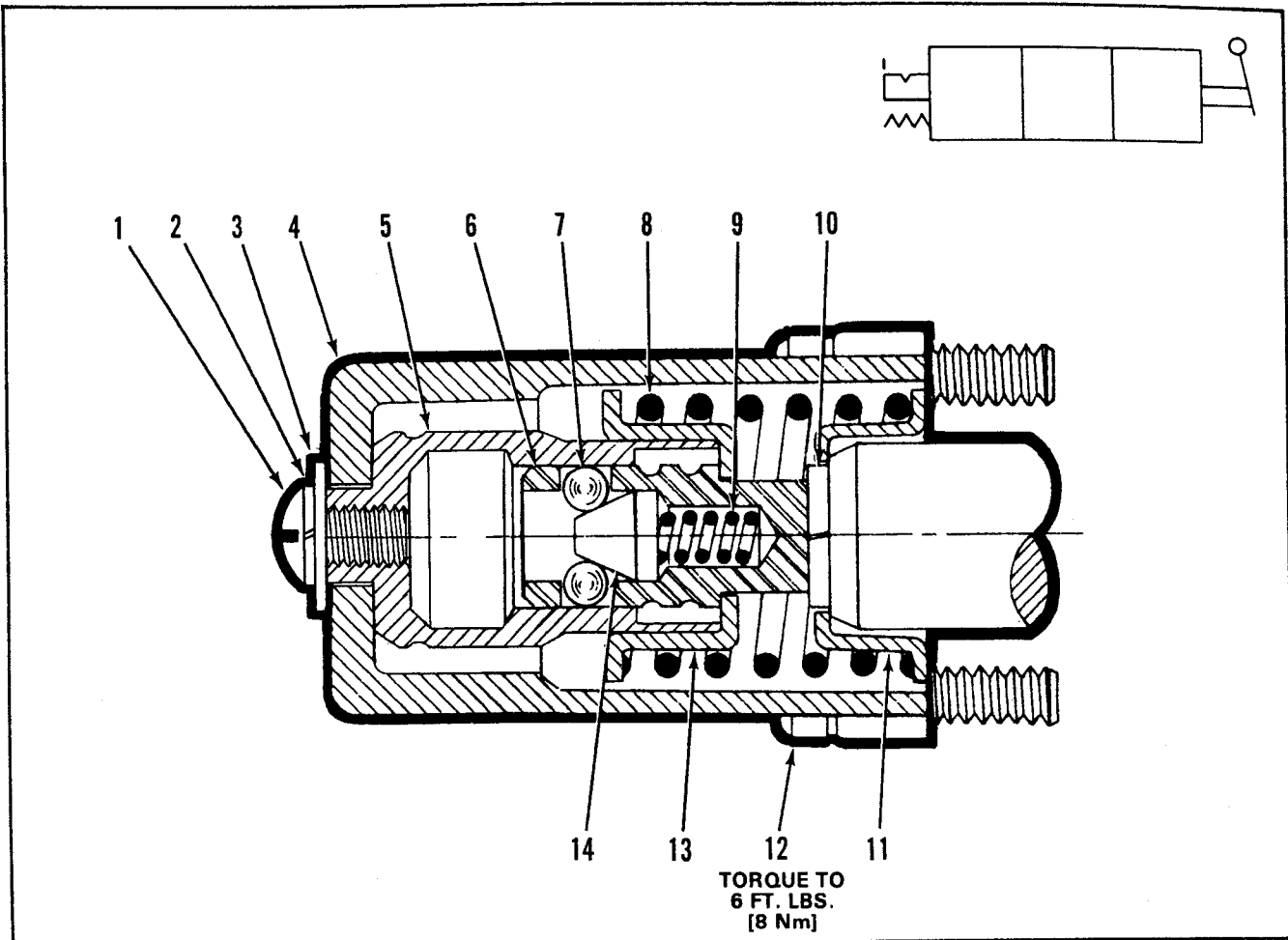


Figure 4-18. Option "R" Detent with Spring Return To Neutral Positioner

OPTION "R" DETENT with SPRING RETURN TO NEUTRAL POSITIONER

Item No.	Part No.	Description	Quantity
	K-28027	REPLACEMENT KIT, Spool "IN" (Contains all items listed below)	
	K-28091	REPLACEMENT KIT, Spool "OUT" (Contains all items listed below)	
	K-28092	REPLACEMENT KIT, Spool "IN and OUT" (Contains all items listed below)	
1	0510-001	SCREW, Machine, Rd. Hd., 1/4—20 by 1/2 inch long	1
2	0564-001	WASHER, Lock	1
3	3163-001	WASHER, Flat	1
4	3482-001	BONNET	1
5	7760-001	SLEEVE, Detent, Spool "IN" (Shown)	1
	7762-001	SLEEVE, Detent, Spool "OUT" (Not Shown)	1
	7761-001	SLEEVE, Detent, Spool "IN and OUT" (Not Shown)	1
6	3585-001	HOLDER, Detent	1
7	1700-001	BALL	4
8	6013-001	SPRING, Centering	1
9	1634-001	SPRING, Detent	1
10	1039-001	WASHER, Lock	1
11	1609-001	COLLAR, Stop	1
12	2673-001	SCREW, Fil. Hd., 1/4—20 by 1 inch long	4
13	1774-001	COLLAR, Detent	1
14	1773-001	FOLLOWER, Detent	1

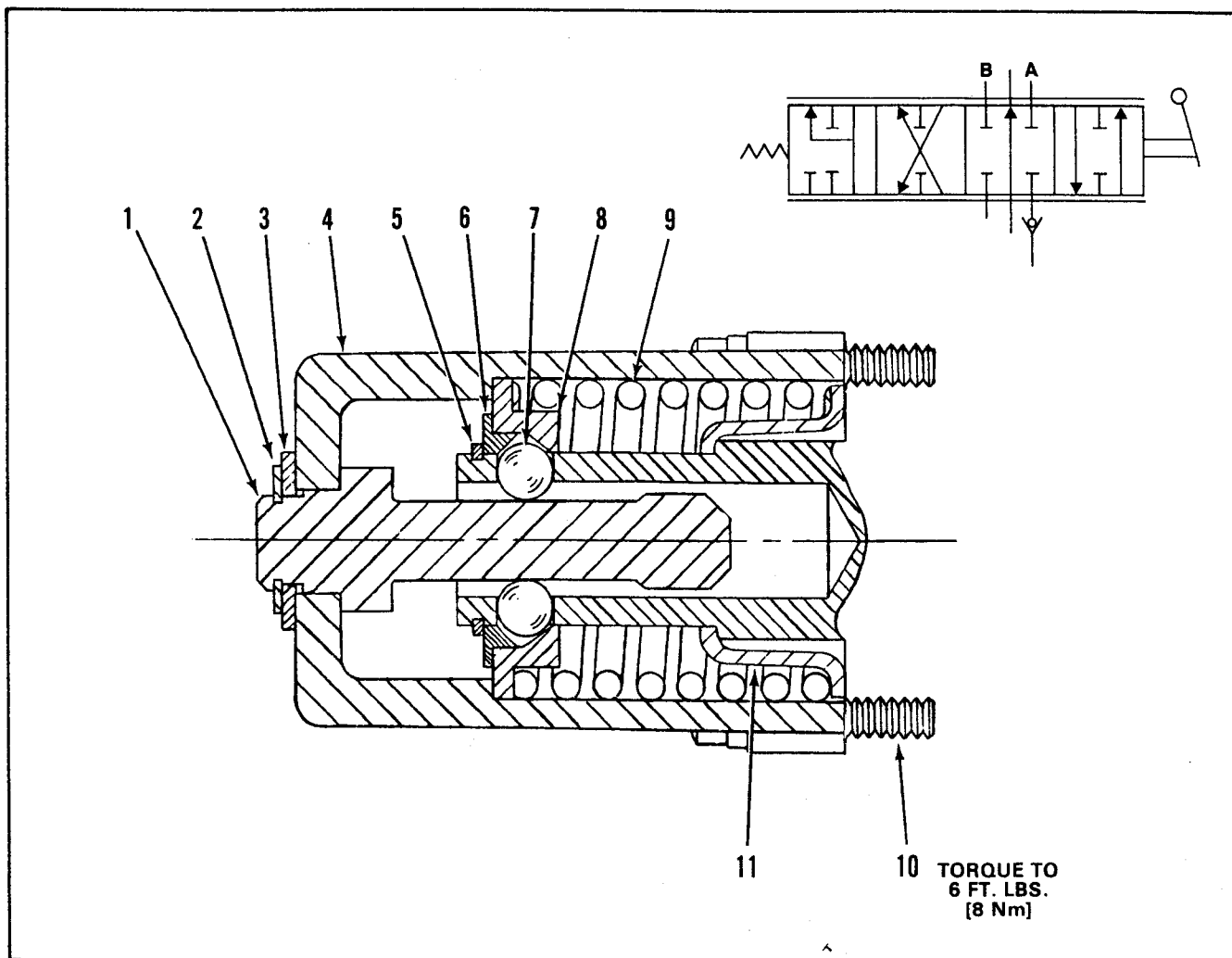


Figure 4-19. Regenerative Spool Positioner

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

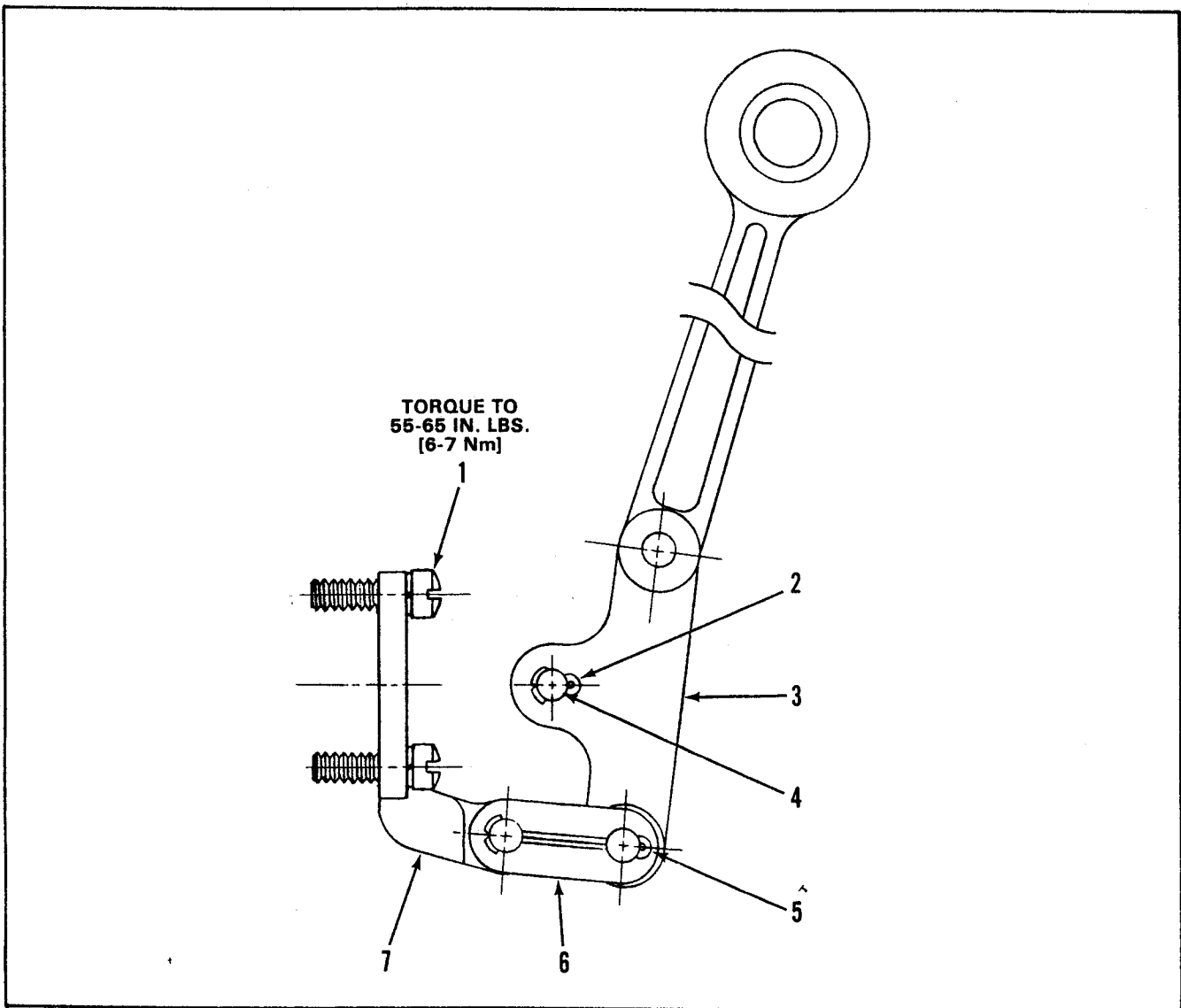


Figure 4-20. Vertical Handle

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	11824-001	BRACKET, Handle	1

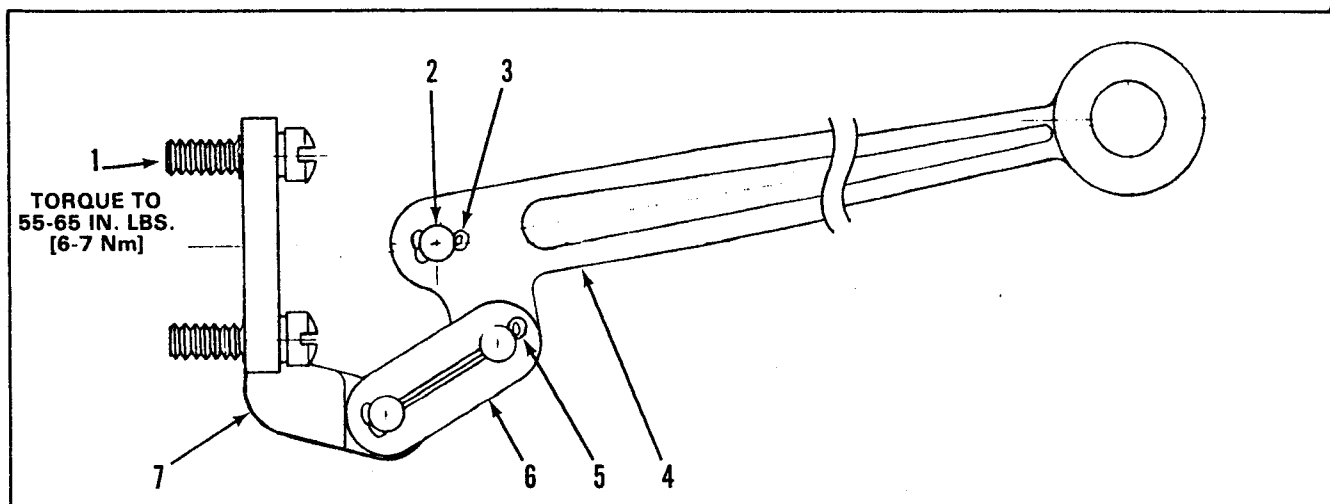


Figure 4-21. Horizontal Handle

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	11824-001	BRACKET, Handle	1

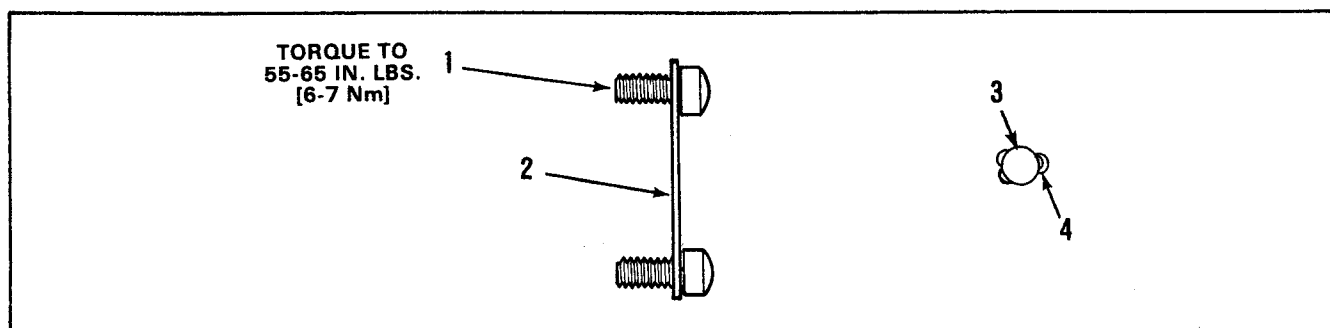


Figure 4-22. Standard Seal Retainer

STANDARD SEAL RETAINER

Item No.	Part No.	Description	Quantity
	K-28022	REPLACEMENT KIT (Contains items 1, 2, 3 and 4)	
1	0562-001	SCREW, Button Hd., 1/4—20 UNC by 5/8 inch long	4
2	11825-001	PLATE, Retainer	1
3	0085-001	PIN, Clevis	1
4	0086-001	PIN, Cotter, 0.078 by 0.50 inch long	1

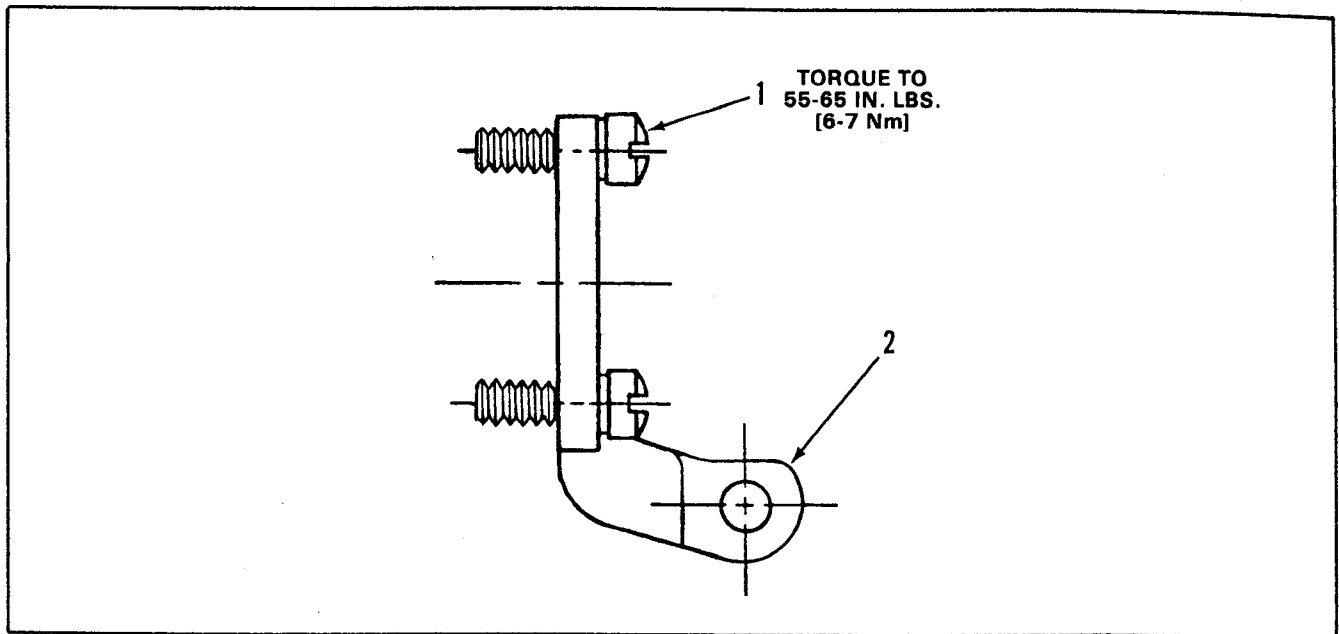


Figure 4-23. Handle Bracket

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	11824-001	BRACKET, Handle	1

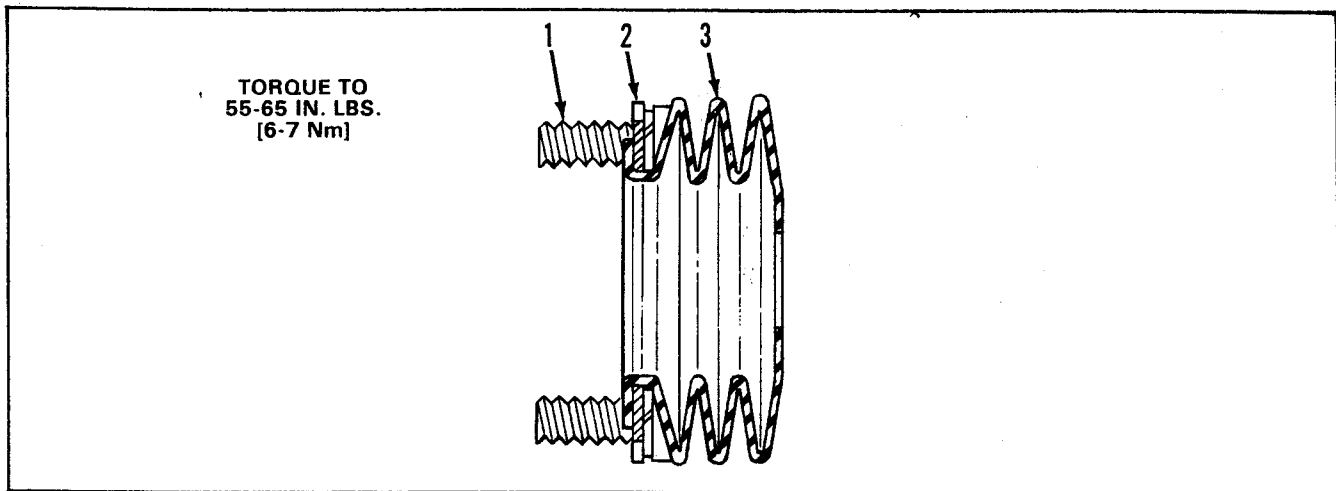


Figure 4-24. Spool Protective Boot

SPOOL PROTECTIVE BOOT

Item No.	Part No.	Description	Quantity
	K-7021	REPLACEMENT KIT (Contains items 1 thru 3)	
	K-28104	SPOOL BOOT/HANDLE BRACKET KIT (Contains Boot, Bracket and 4 Screws)	
1	0562-001	SCREW, Fil. Head, 1/4—20 x 5/8 inch long	4
2	11825-001	RETAINER, Boot	1
3	12118-002	BOOT, Dust	1

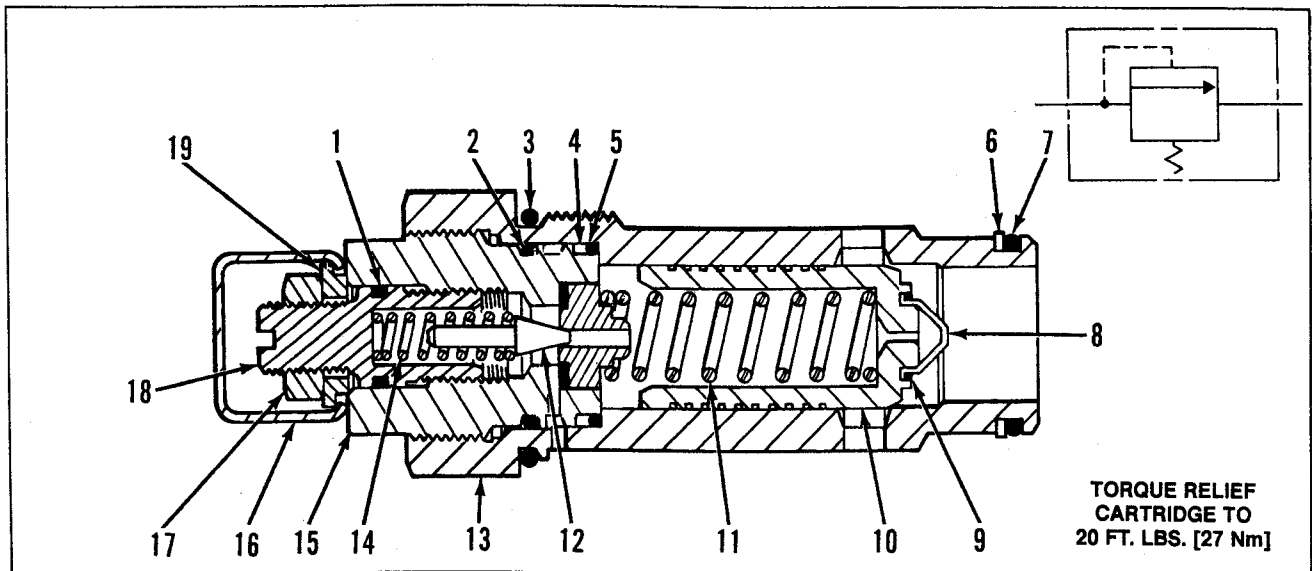


Figure 4-25. Model RP60 Pilot-Operated Main Relief Valve.

MODEL RP60 PILOT-OPERATED MAIN RELIEF VALVE

Item No.	Part No.	Description	Quantity
	K-19004*	SEAL KIT (Contains items 1 thru 7)	
1	6884-001*	SEAL, O-Ring	1
2	6814-002*	SEAL, O-Ring	1
3	2709-001*	SEAL, O-Ring	1
4	9020-019	RING, Back-Up	1
5	1660-001*	SEAL, O-Ring	1
6	1783-001	RING, Back-Up	1
7	1698-001*	SEAL, O-Ring	1
8	11671-001	SCREEN, Filter	1
9	11199-001	RING, Retaining	1
10	10072-001	POPPET, Main	1
11	10824-001	SPRING	1
12	8475-001	POPPET, Relief	1
13	10071-001	BODY, Relief	1
14	10059-001	SPRING	1
15	11059-001	BODY, Pilot Assembly	1
16	10034-001	COVER, Tamperproof (RP60N only)	1
17	9302-006	NUT, Hex Jam, 3/8" - 24	1
18	8956-001	SCREW, Adjustment	1
19	10035-001	WASHER, RP60N (Shown)	1
	10852-005	WASHER, ID, RP60A (Not Shown)	1

Not Sold Separately
Order K-19004*

NOTE
Due to close tolerances on working parts, Model RP60 is not field serviceable. If service other than seal replacement is required, contact the factory.

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

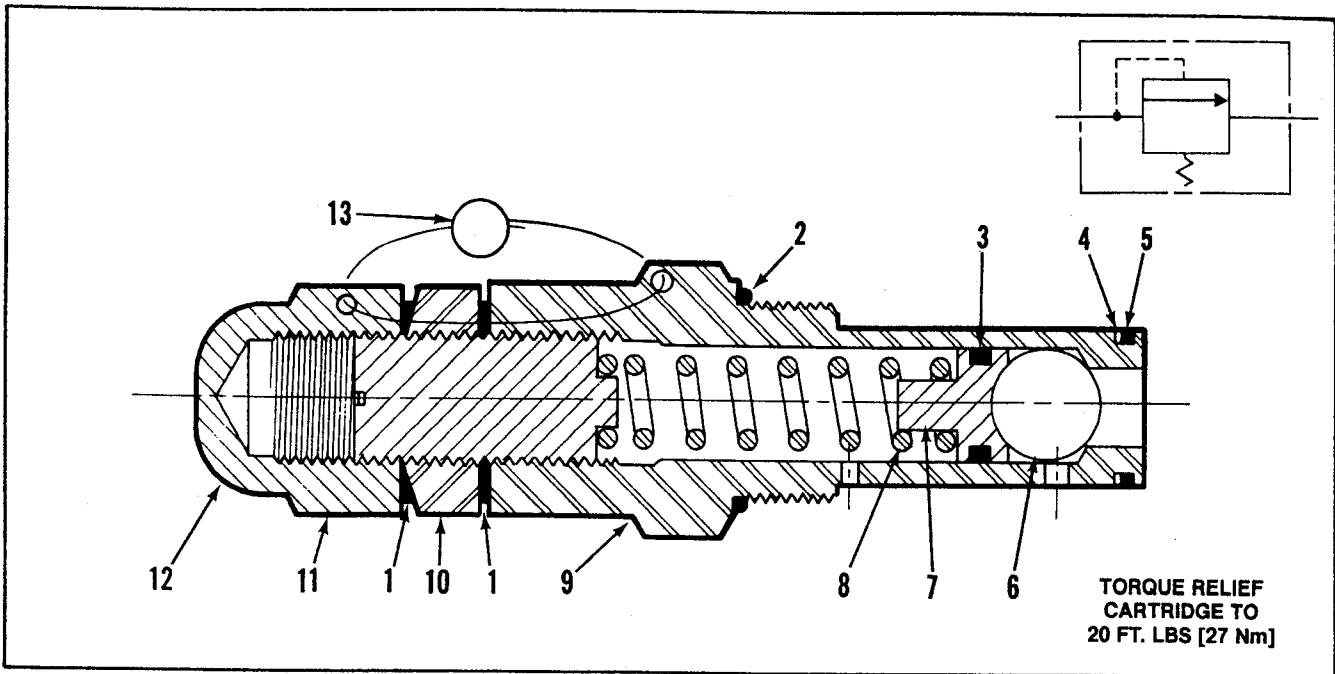


Figure 4-26. Model KC Ball/Spring Main Relief Valve.

MODEL KC BALL/SPRING MAIN RELIEF VALVE

Item No.	Part No.	Description	Quantity
	K-21001	SERVICE KIT, Standard (Contains items 1, 2, 3, 4, 5, 6, 7 and 8, Spring 1296-001)	
	K-21002	SERVICE KIT, High Pressure (Contains items 1, 2, 3, 4, 5, 6, 7 and 8, Spring 1233-001)	
	K-7004*	SEAL KIT (Contains items 1, 2, 3, 4 and 5)	
1	1295-001	WASHER, Screw Seal	2
2	2709-001*	SEAL, O-Ring, Relief Body	1
3	1136-001*	SEAL, Ball Guide	1
4	1783-001	WASHER, Back-Up	1
5	1698-001*	SEAL, O-Ring	1
6	1268-001	BALL, 3/4 inch diameter	1
7	1269-001	GUIDE, Ball	1
8	1233-001	SPRING, (High Pressure, 1501-2000PSI)	1
	1296-001	SPRING, (Low Pressure, 400-1500PSI)	1
	3230-001	SPRING, Stainless (1400-2000PSI)	1
9	1798-001	BODY, Relief, without hole for lockwire (Standard)	1
	2942-001	BODY, Relief, with hole for lockwire (Optional)	1
10	1273-001	NUT, Jam	1
11	1271-001	SCREW, Adjusting	1
12	1274-001	CAP, Acorn, Relief, without hole for lockwire (Standard)	1
	1222-001	CAP, Acorn, Relief, with hole for lockwire (Optional)	1
13	1234-001	LOCKWIRE AND LEAD SEAL (Optional)	1

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

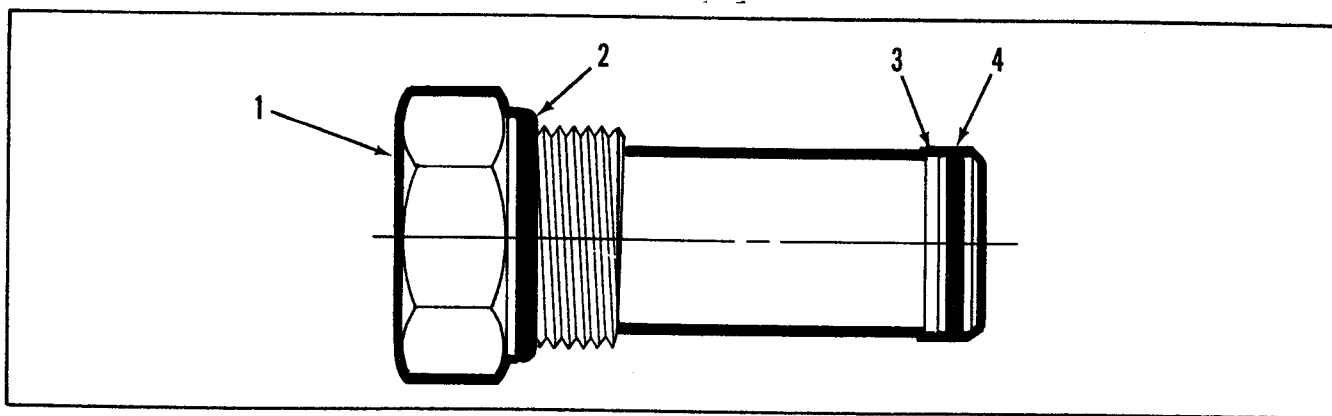


Figure 4-27. No Relief "NR" Plug (Main Relief)

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.

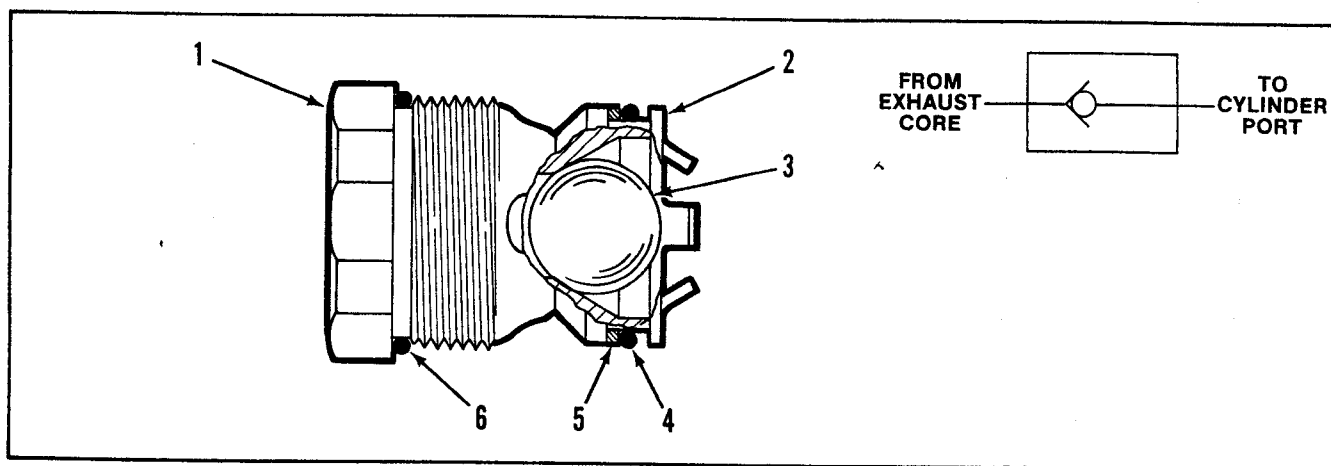


Figure 4-28. Upper Anti-Cavitation Check Valve

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	9020-022	WASHER, Backup	1
6	1615-001*	SEAL, O-Ring	1

} Not Sold Separately. Order K-28062

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

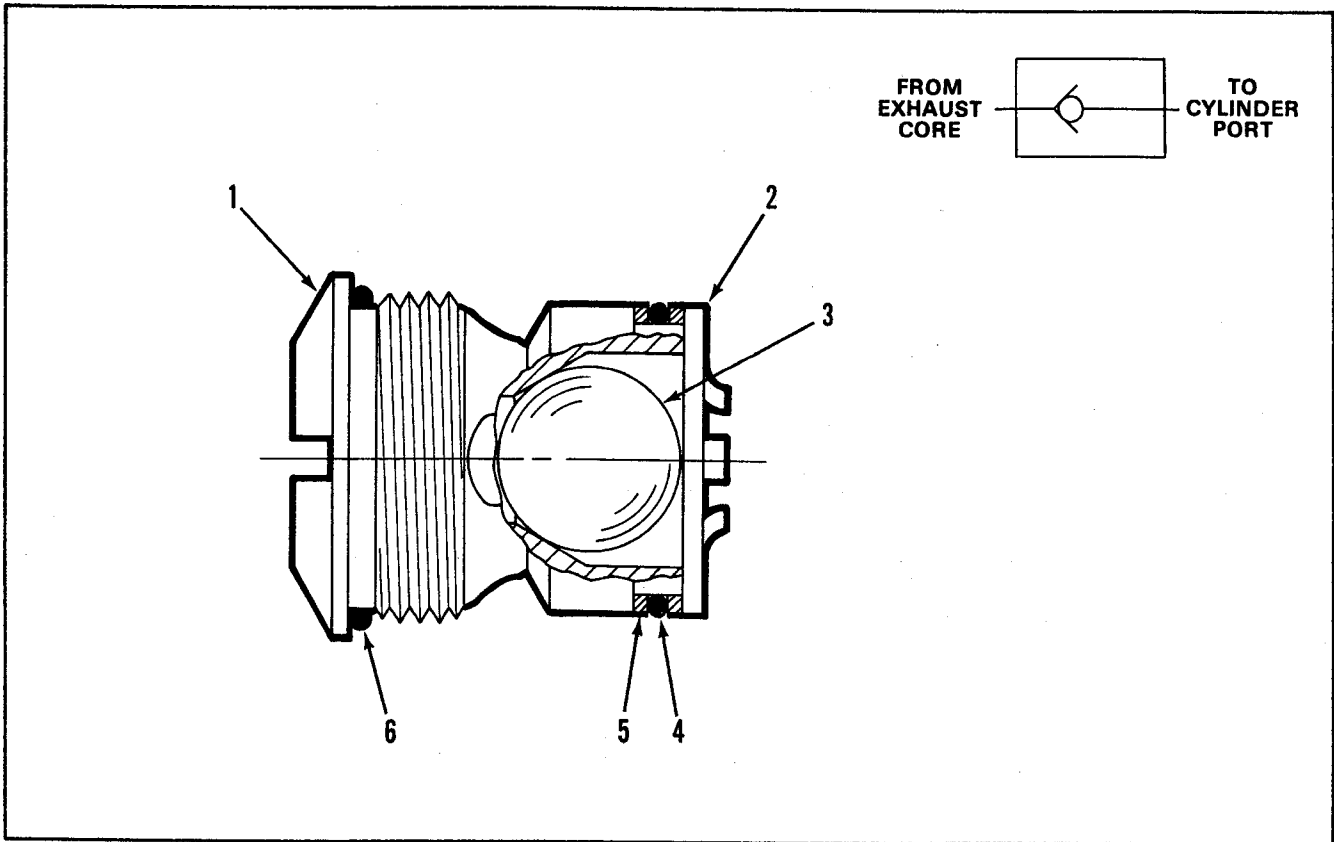


Figure 4-29. Lower Anti-Cavitation Check Valve

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	2
6	1698-001*	SEAL, O-Ring	1

} Sold Separately. Order K-28063

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

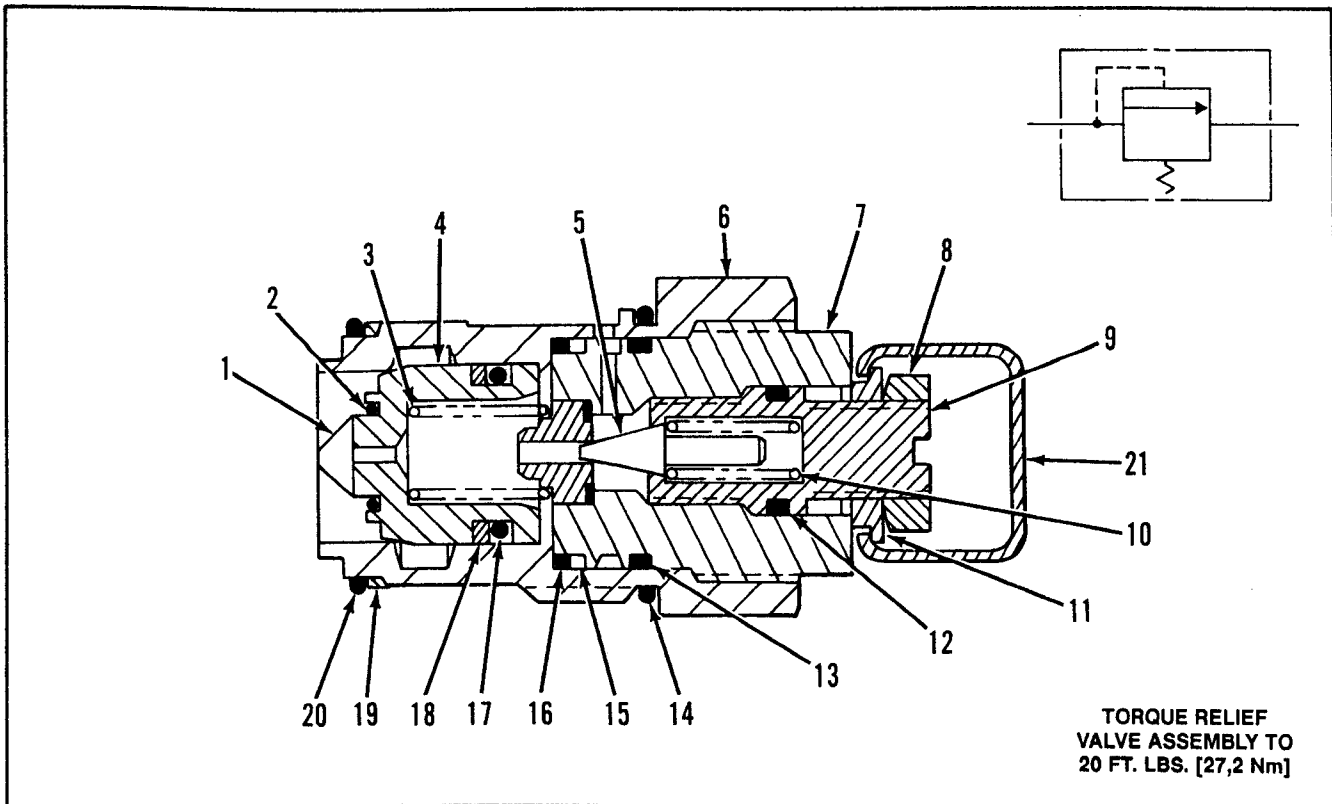


Figure 4-30. Model RP51 Pilot Operated Work Port Relief Valve.

MODEL RP51 PILOT OPERATED WORK PORT RELIEF VALVE

Item No.	Part No.	Description	Quantity Per Relief
	K-19005*	SEAL KIT (Contains items 12 thru 20)	
1	11671-001	SCREEN, Filter	1
2	11199-001	RING, Retaining	1
3	10354-001	SPRING	1
4	10299-001	POPPET, Main	1
5	8475-001	POPPET, Relief	1
6	8954-001	BODY, Relief Valve	1
7	11059-001	BODY, Pilot Assembly	1
8	9302-006	NUT, Hex Jam	1
9	8956-001	SCREW, Adjustment	1
10	10059-001	SPRING, Pilot	1
11	10035-001	WASHER, RP51-N (Shown)	1
	10852-001	WASHER, ID, RP51-A (Not Shown)	1
12	6884-001*	SEAL, O-Ring	1
13	6814-002*	SEAL, O-Ring	1
14	1615-001*	SEAL, O-Ring	1
15	9020-019	RING, Back-Up	1
16	1660-001*	SEAL, O-Ring	1
17	9000-113*	SEAL, O-Ring	1
18	9021-113	RING, Back-Up	1
19	9020-022	RING, Back-Up	1
20	1718-001*	SEAL, O-Ring	1
21	10034-001	COVER, Tamperproof (RP51-N only)	1

NOTE

Due to close tolerances on working parts, Model RP51 is not field serviceable. If service other than seal replacement is required, contact the factory.

Not sold separately.
Order K-19005

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

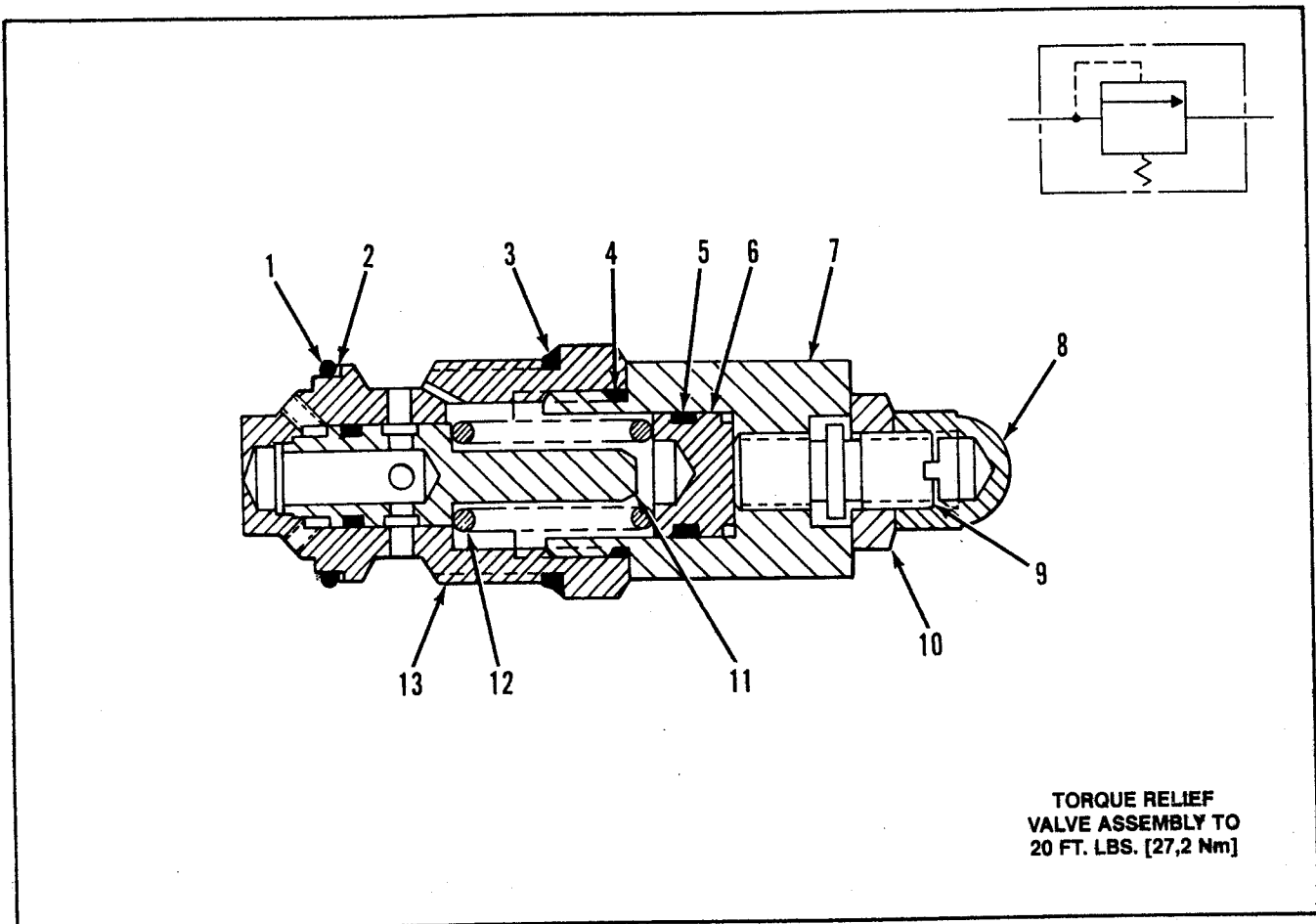


Figure 4-31. Model WHA Differential Poppet Work Port Relief Valve (Adjustable within the spring range).

MODEL WHA DIFFERENTIAL POPPET WORK PORT RELIEF VALVE (Adjustable within the spring range)

Item No.	Part No.	Description	Quantity Per Relief
	K-19012*	SEAL KIT (Contains items 1 thru 5)	
1	1718-001*	SEAL, O-Ring	1
2	9020-022	RING, Back-Up	1
3	1615-001*	SEAL, O-Ring	1
4	2707-001*	SEAL, O-Ring	1
5	1818-001*	SEAL, O-Ring	1
6	3495-001	PISTON	1
7	3498-001	CAP	1
8	3497-001	NUT, Acorn	1
9	3496-001	STEM, Adjusting	1
10	3500-001	NUT, Hex Jam	1
11	3936-001	POPPET	1
12	7638-001	SPRING, S.S., 750-1500 PSI [52-103 bar] Crack	1
	7078-001	SPRING, S.S., 1250-2000 PSI [86-138 bar] Crack	1
	1870-001	SPRING, S.S., 1500-2500 PSI [103-172 bar] Crack	1
	7497-001	SPRING, S.S., 2000-3000 PSI [138-207 bar] Crack	1
13	6533-001	BODY, WH Relief	1

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

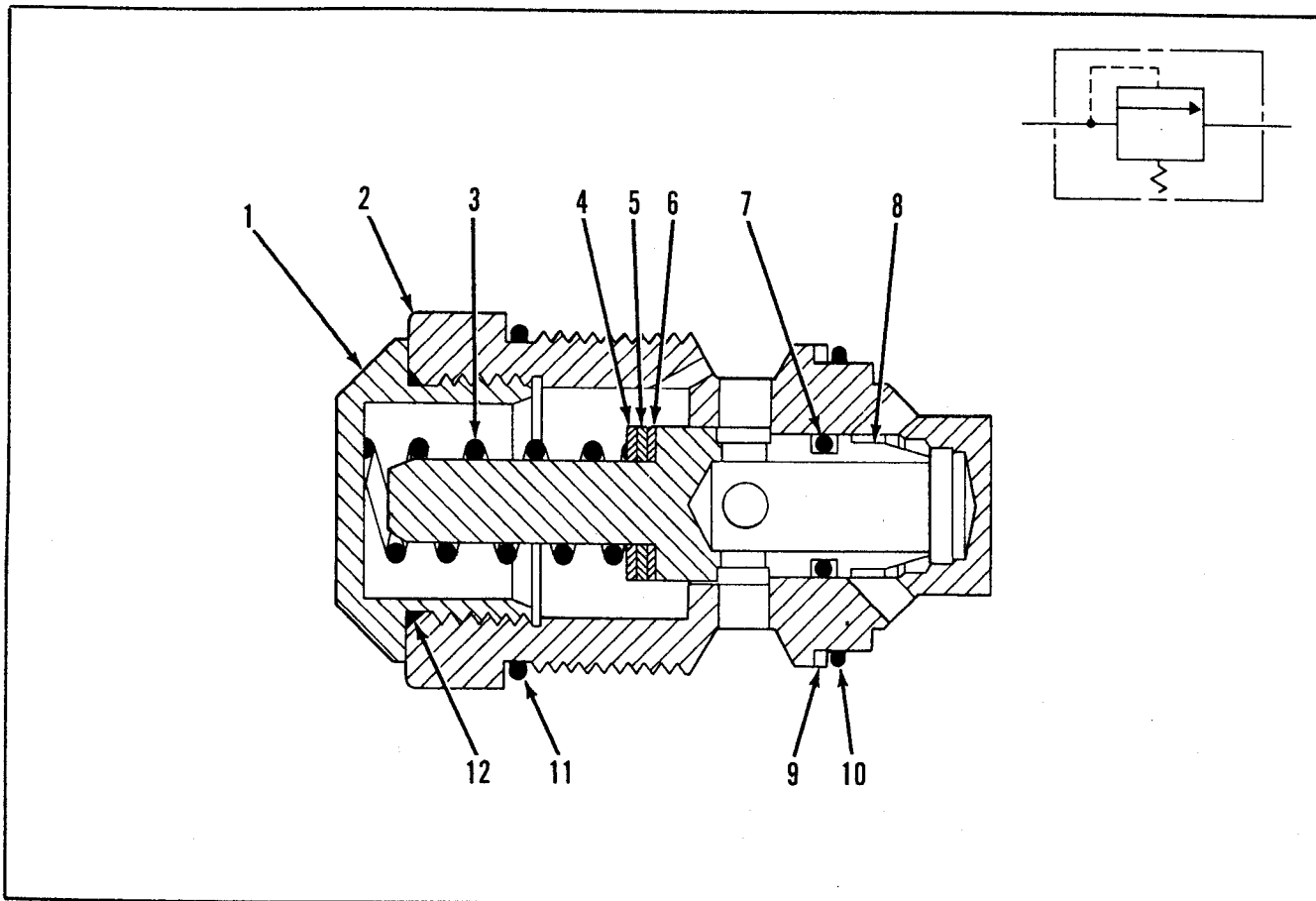


Figure 4-32. Model WH Differential Poppet Work Port Relief Valve (Non-Adjustable).

MODEL WH DIFFERENTIAL POPPET WORK PORT RELIEF VALVE (Non-Adjustable)

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, 1751-2000 PSI [122-138 bar]	1
	1865-001	SPRING, 2001-2600 PSI [138-179 bar]	1
	1870-001	SPRING, S.S., 2001-2600 PSI [138-179 bar]	1
	7497-001	SPRING, S.S., 2601-3200 PSI [180-221 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	1883-001	RING, Piston	1
8	1881-001	POPPET, Relief	1
} Not Sold Separately. Order K-19002			
9	9020-022	WASHER, Backup	1
10	1718-001	SEAL, O-Ring	1
11	1615-001*	SEAL, O-Ring	1
12	2707-001*	SEAL, O-Ring	1
} Not Sold Separately. Order K-19003			

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

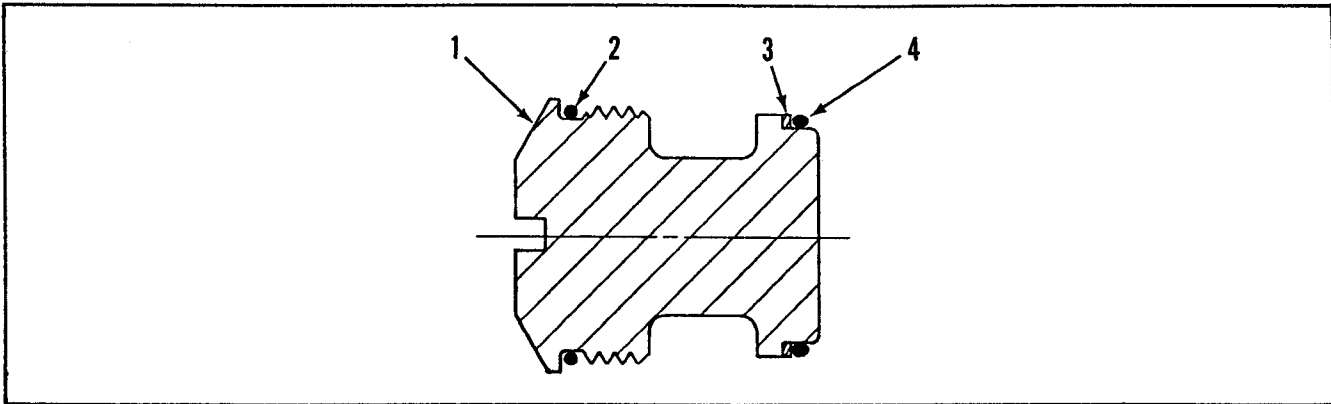


Figure 4-33. Lower Anti-Cavitation Plug

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	2
4	1660-001	SEAL, O-Ring	1

} Not Sold Separately. Order K-28063

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

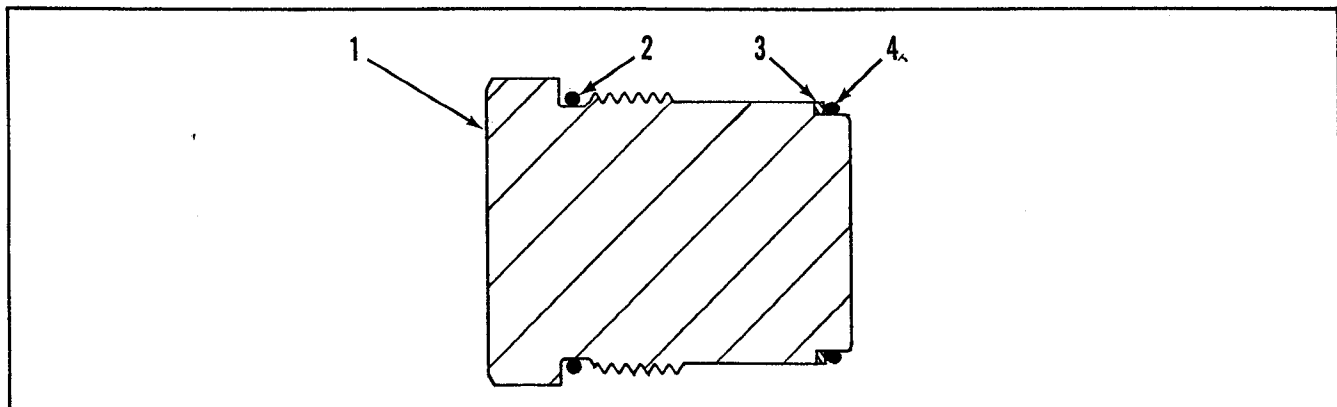


Figure 4-34. Upper Anti-Cavitation Plug

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	9020-022	WASHER, Backup	1
4	1718-001	SEAL, O-Ring	1

} Not Sold Separately. Order K-28062

*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 +200° F [-40° C to +93° 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
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 are also recommended for applications that have a continuous operating temperature of +200° F [+93° C] or more. 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-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