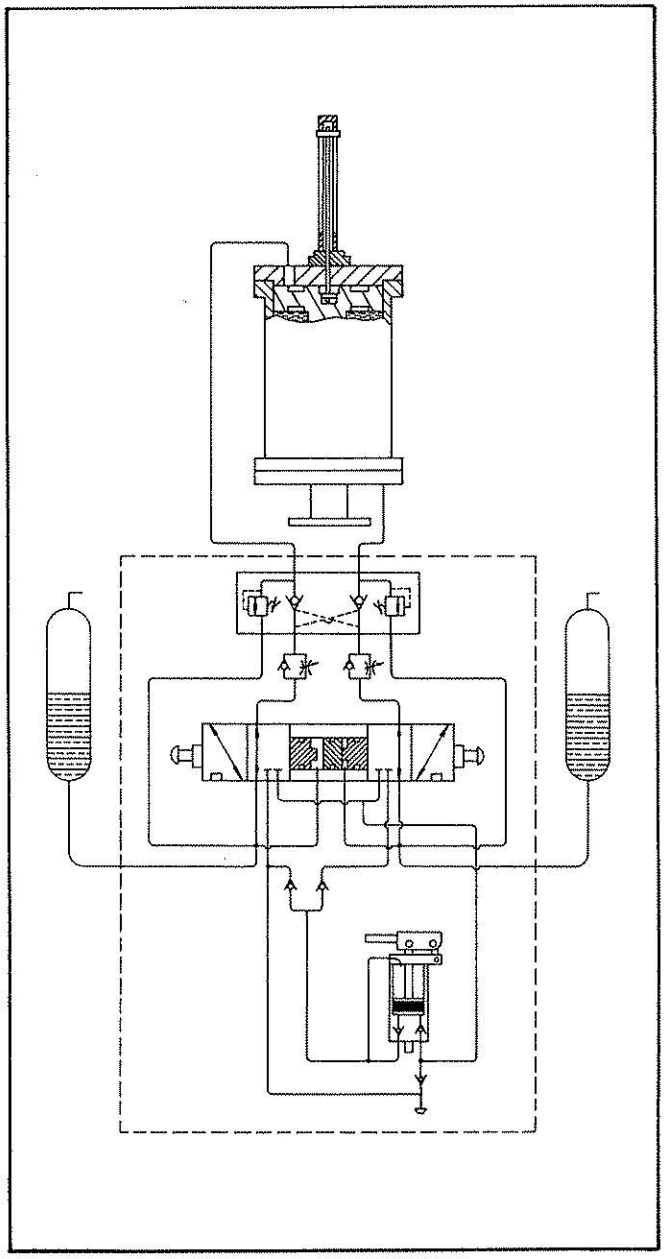
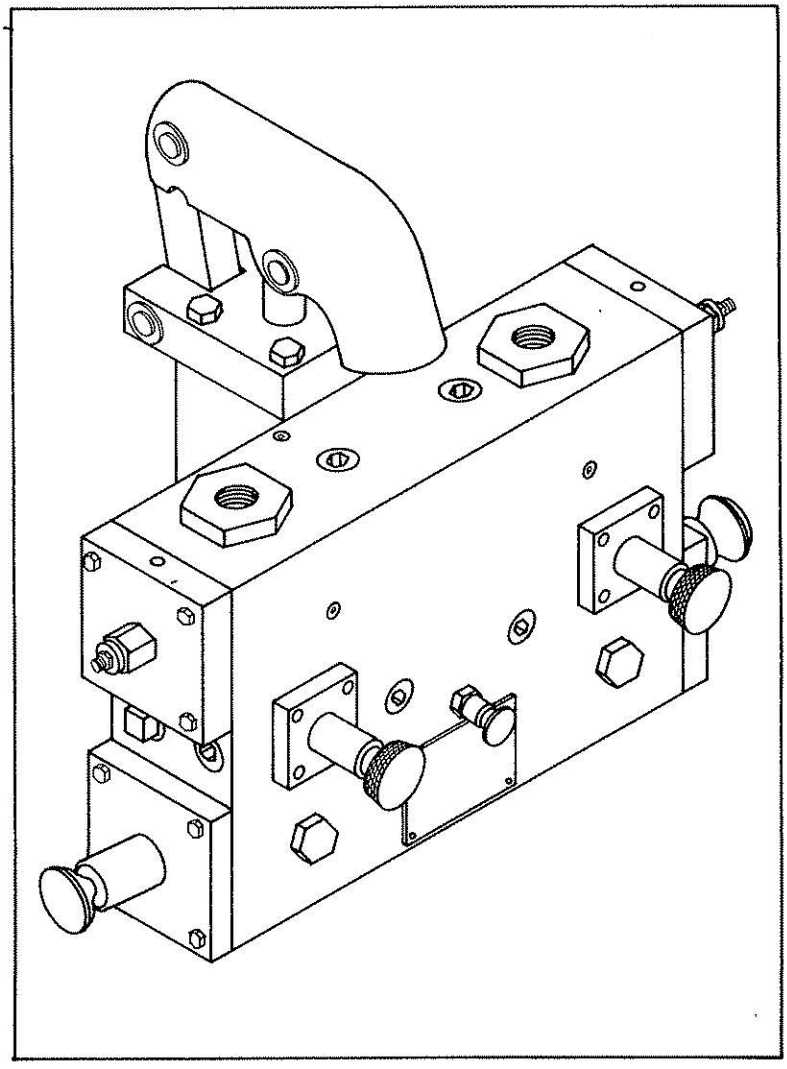
Shafer™

HAND PUMP - DOUBLE HOLDING VALVE

MAINTENANCE AND SERVICE MANUAL

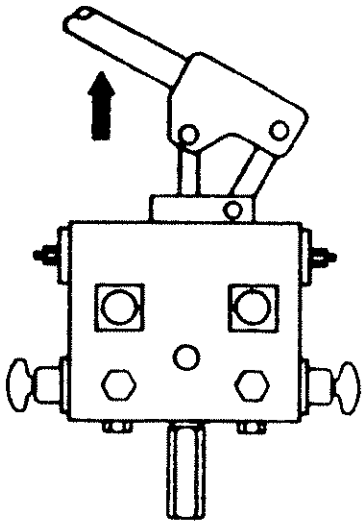




BULLETIN HP/DHV

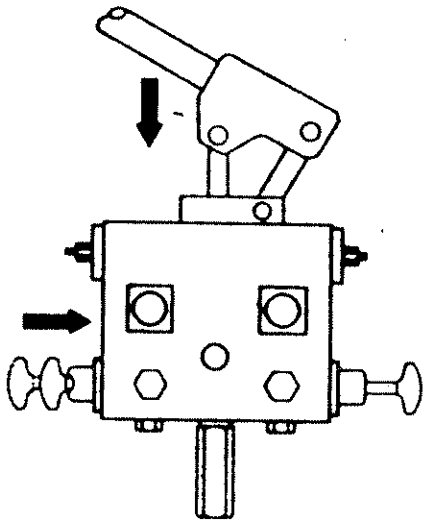
BASIC CHECK-OUT PROCEDURES

The following three tests illustrate the proper working functions of the shafer hand pump. Failure of any of these procedures may result in operating problems for the valve operator.



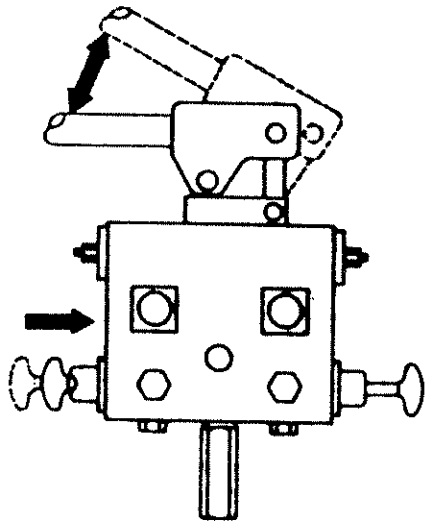
Test 1

With both palm buttons out (automatic position) and with the ram in the "UP" position and fluid in the pump cylinder, stroke the hand pump. - If the ring seals, valve sleeves and the manual discharge check ball are sealing properly, it should be impossible to pull the pump ram down. The ram can be lowered or pulled down by holding in the manual discharge relief and pulling the ram down at the same time.



Test 2

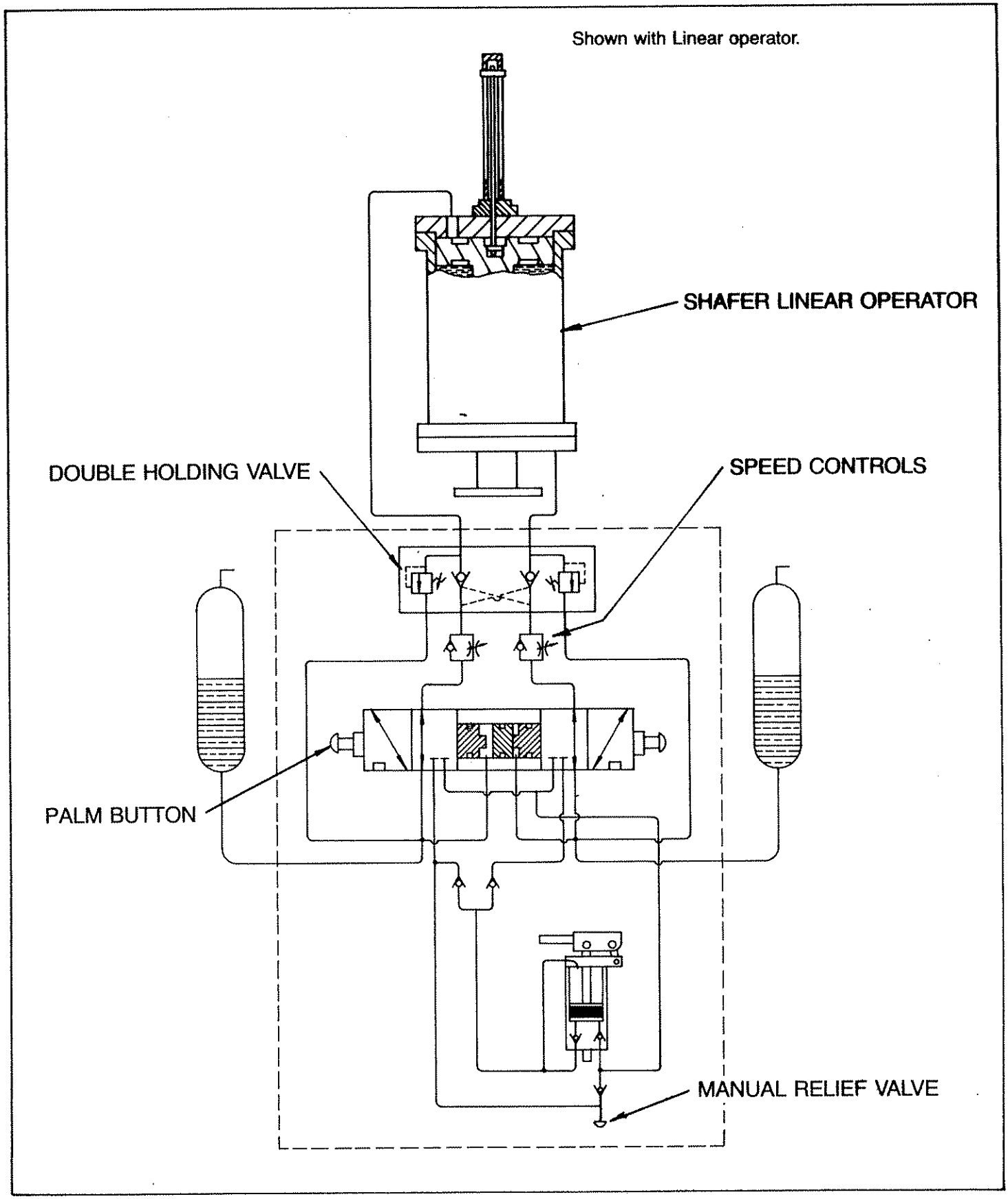
With one palm button in (either open or close position) and pulling the pump ram up, fluid is being pulled up into the pump cylinder. If the pump fails in the suction cycle, an immediate inspection should be made of the oil reservoir to which the suction of the pump is connected. Check to determine if there is hydraulic fluid in the tank. If there is fluid in the reservoir tank and the pump fails in the suction cycle, the pump and valve assembly should be disassembled and checked as shown in a later illustration.



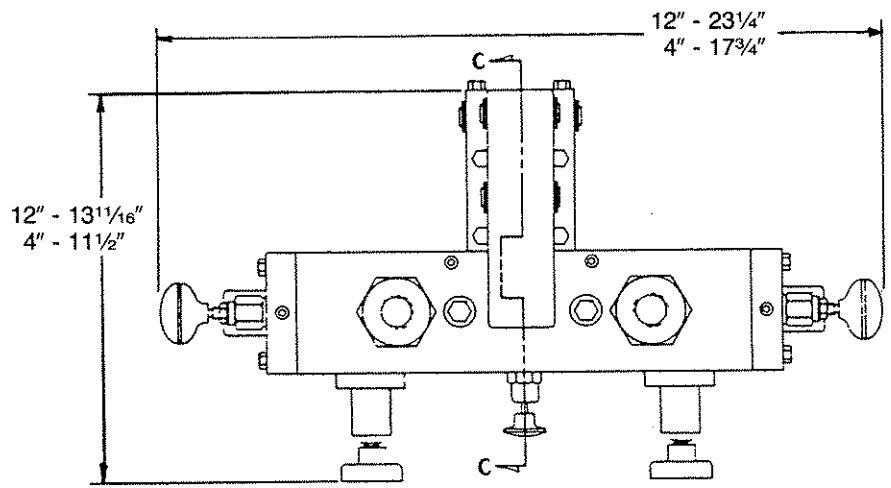
Test 3

The final test is accomplished by pushing in the palm button to whatever position the valve is in, "open" or "closed". Raise the pump handle to draw fluid into the cylinder and then force the ram downward. The ram will discharge fluid until the actuator is fully stroked (open or closed). When the gate actuator is fully stroked, there will be no leaking across the seals and the ram will not move downward after the gate actuator is fully stroked until the manual relief is pushed in and the ram pulled down.

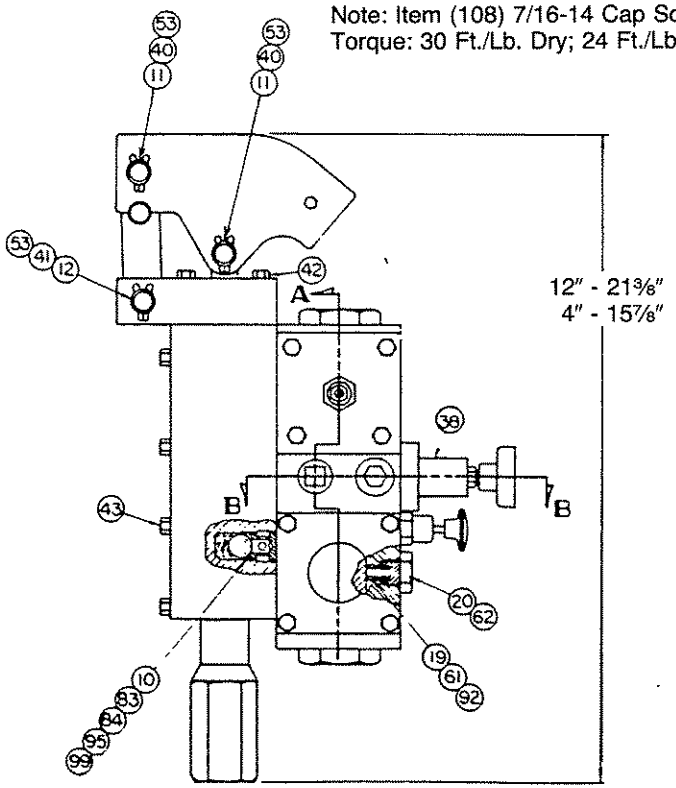
GAS HYDRAULIC SYSTEM CIRCUIT



GAS-HYDRAULIC HAND PUMP

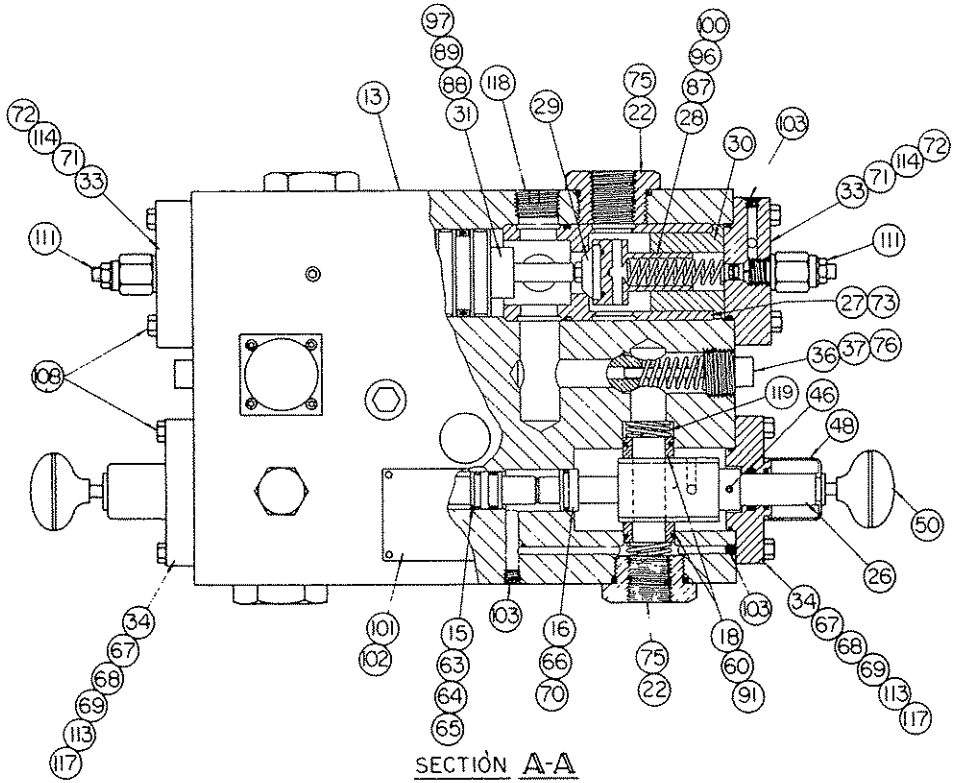


Note: Item (108) 7/16-14 Cap Screw
Torque: 30 Ft./Lb. Dry; 24 Ft./Lb. Lub.

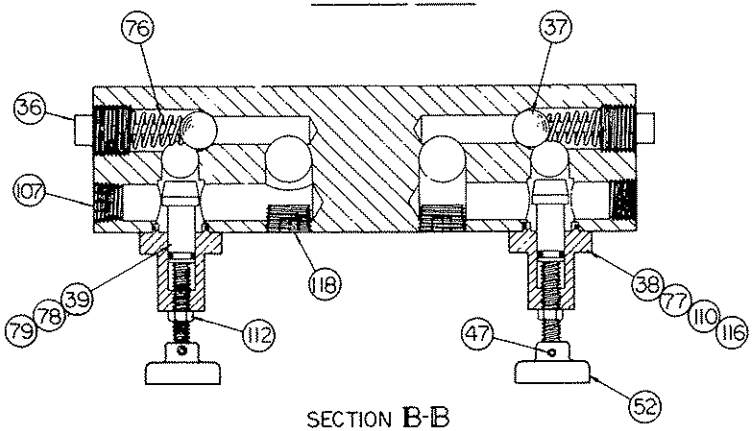


Bill of Material

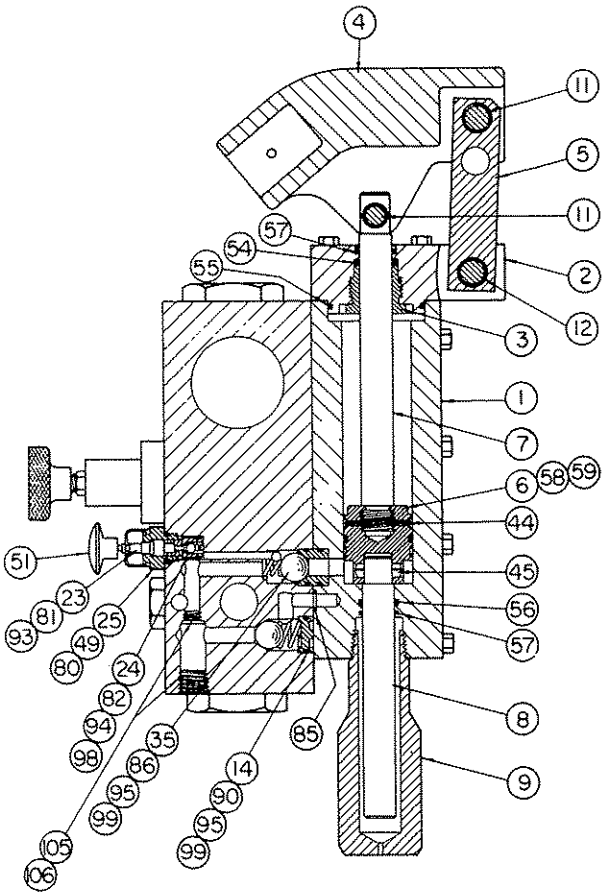
1	1	Pump Body	
2	1	Pump Head	
3	1	Packing Gland	
4	1	Clevis	
5	1	Pilot Bar	
6	1	Pump Piston	
7	1	Top Ram	
8	1	Bottom Ram	
9	1	Ram Protective Cover	
10	1	Pump Suction Seat	
11	2	Clevis Pin S.S.	
12	1	Clevis Pin S.S.	
13	1	Valve Body	
14	2	Suction Cap	
15	1	Pilot Piston	
16	1	Right Valve Sleeve	
17	1	Left Valve Sleeve	
18	4	Ring Seal	
19	2	Ring Seal	
20	2	Valve Cap	
22	4	Operator Port Cap	
23	1	Relief Stem	
24	1	Relief Seat	
25	1	Relief Cap	
26	2	Stem	
27	2	Seat Poppet Guide	
28	2	Poppet Pin	
29	2	Poppet	
30	2	Poppet Guide	
31	1	Piston	
33	2	Holding Valve End Cap	
34	2	Palm Valve End Cap	
35	1	Discharge Check Seat	
36	2	Flow Control Check Valve Plug Sub Ass'y.	
37	2	Nylon Ball	
38	2	Flow Control Cap	
39	2	Flow Control Stem	
40	4	Acetal Bearing	
41	2	Acetal Bearing	
42	4	Head Bolt–Hex Hd. Cap Screw–S.S.	
43	4	Valve Bolt–Hex Hd. Cap Screw–S.S.	
44	1	Top Ram Spring Pin	
45	1	Bottom Ram Spring Pin	
46	2	Stem Spring Pin	
47	2	Flow Control Stem Spring Pin	
48	2	Stem Boot	
49	1	Relief Boot	
50	2	Stem Knob	
51	1	Relief Knob	
52	2	Flow Control Knob	
53	6	X-Washer	
54	1	Upper Ram Seal	
55	1	Pump Head O-Ring	70 Duro
56	1	Ram O-Ring	70 Duro
57	2	Ram Wiper	90 Duro
58	1	Piston O-Ring	70 Duro
59	2	Piston Guide Ring	
60	4	Ring Seal O-Ring	70 Duro
61	2	Ring Seal O-Ring	70 Duro
62	2	Valve Cap O-Ring	70 Duro
63	1	Pilot Piston O-Ring	70 Duro
64	1	Pilot Piston Guide Ring	
65	2	Pilot Piston Back-Up Ring	Teflon
66	2	Valve Sleeve O-Ring	70 Duro
67	2	End Cap O-Ring	70 Duro
68	2	End Cap O-Ring	70 Duro
69	2	Wiper	90 Duro
70	2	Valve Sleeve Back-Up Ring	Teflon
71	2	Holding Valve End Cap O-Ring	70 Duro
72	2	Manifold O-Ring	70 Duro
73	2	Seat–Poppet Guide O-Ring	70 Duro
75	4	Operator Port Cap O-Ring	70 Duro
76	2	Flow Control Check Spring	
77	2	Flow Control Cap O-Ring	70 Duro
78	2	Flow Control Stem O-Ring	70 Duro
79	2	Flow Control Stem Back-Up Ring	Teflon
80	1	Relief Cap O-Ring	70 Duro
81	1	Relief Stem O-Ring	70 Duro
82	1	Relief Seat O-Ring	70 Duro
83	1	Suction Seat O-Ring	70 Duro
84	1	Suction Seat O-Ring	70 Duro
85	1	Body Manifold O-Ring	70 Duro
86	2	Discharge Check Seat O-Ring	70 Duro
87	2	Poppet O-Ring	70 Duro
88	1	Holding Valve Piston O-Ring	70 Duro
89	2	Holding Valve Piston Back-Up	Teflon
90	2	Suction Cap O-Ring	70 Duro
91	2	Ring Seal Spring	
92	2	Ring Seal Spring	
93	1	Relief Stem Spring	
94	1	Relief Spring	
95	4	Suction & Discharge Check Spring	
96	2	Holding Valve Poppet Spring	
97	2	Holding Valve Piston Wiper Ring	
98	1	Relief Ball – Nylon	
99	4	Check Valve Ball–Nylon	
100	2	Hex Jam Nut	
101	1	Instruction Plate	
102	4	Plate Screws	
103	15	Flush Plug – ⅞ Taper	
104	1	Flush Plug – ⅞ Taper	
105	11	Flush Plug – ⅞ Taper	
106	1	Flush Plug – ⅞ Taper	
107	2	Flush Plug – ⅞ Taper	
108	16	Hex Hd. Cap Screw	
110	8	Soc. Hd. Cap Screw	
111	2	Relief Valve	
112	2	Flow Control Locknut	
113	2	End Cap Back-Up Ring	
114	2	End Cap Back-Up Ring	
116	2	Flow Control Cap Back-Up Ring	
117	2	Stem Back-Up Ring	
118	4	1 Pipe Plug – ¾ Taper	
119	2	Ring Seal Spring	



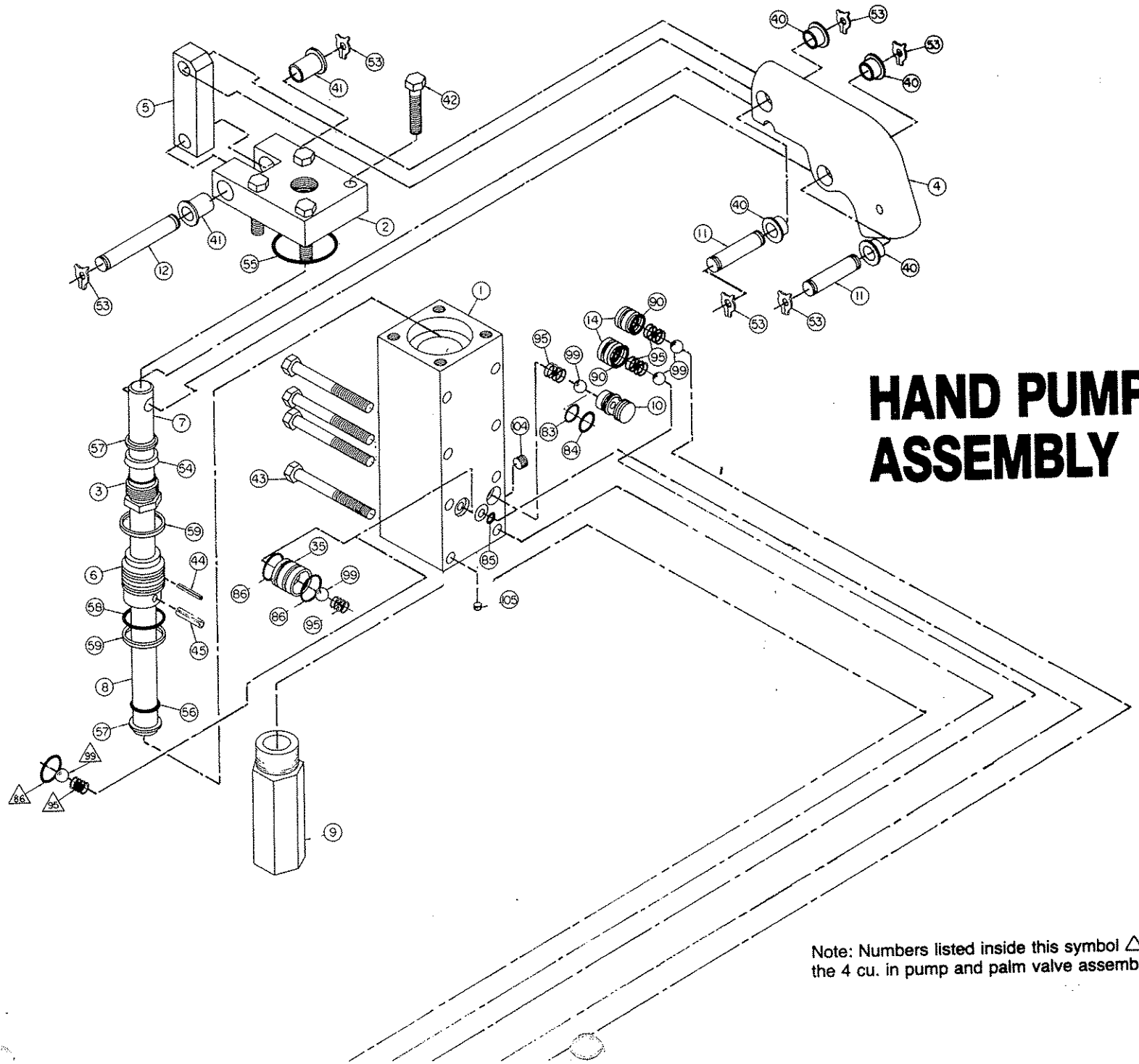
SECTION A-A



SECTION B-B



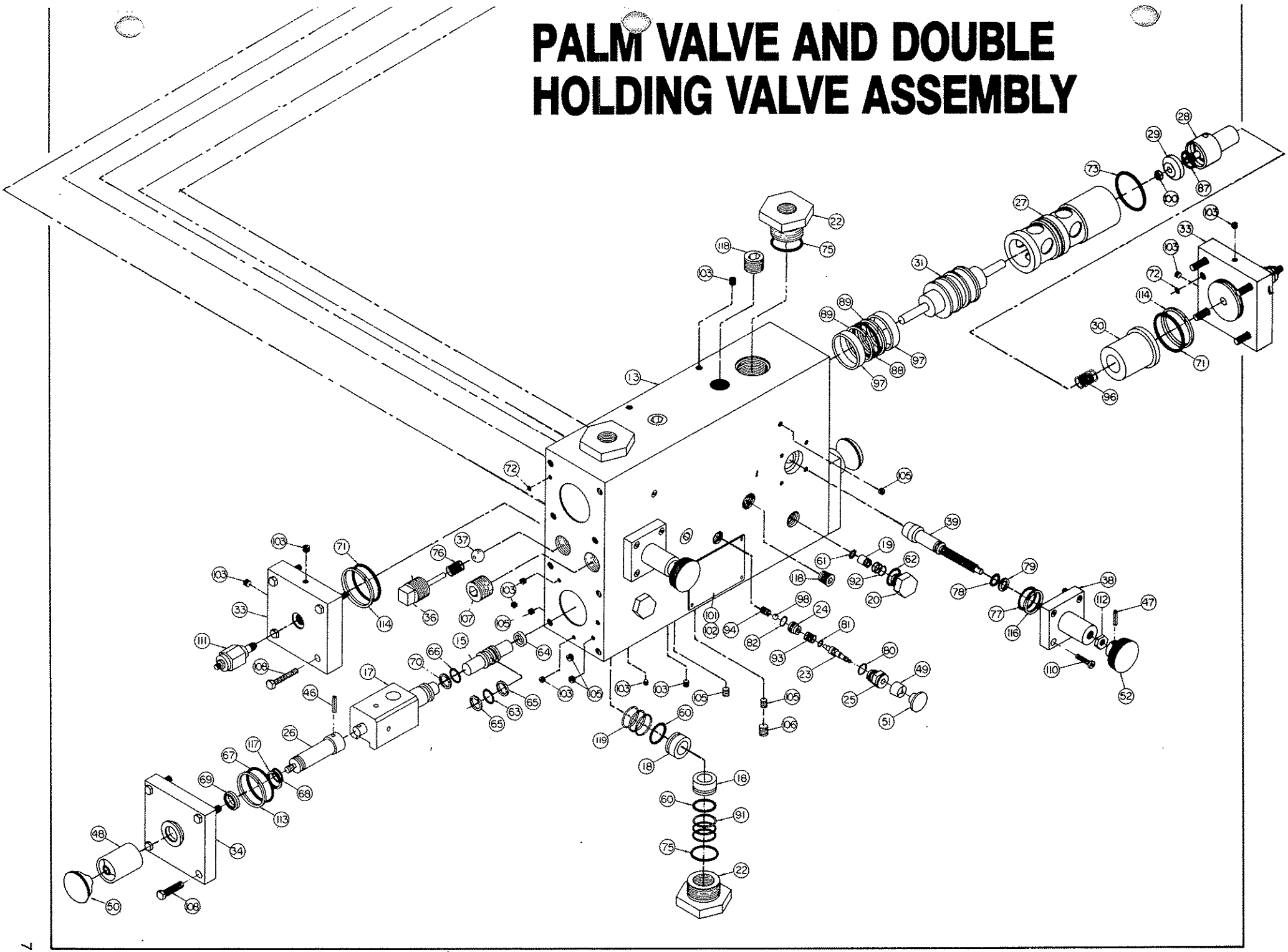
SECTION C-C



HAND PUMP ASSEMBLY

Note: Numbers listed inside this symbol △ pertain to the 4 cu. in pump and palm valve assembly.

PALM VALVE AND DOUBLE HOLDING VALVE ASSEMBLY



DISASSEMBLY OF PUMP AND VALVE COMPONENTS

(Refer to Pages 6 & 7)

Failure of the ram to "lock-up" as shown in Test #1 is a general indication of ring seal failure, suction check valve failure or manual relief check valve failure. Problem areas are usually due to a defective suction ball, discharge relief ball, ring seal or foreign matter imbedded in one or all three of the above mentioned components. A cut O-ring around the ring seal, suction check seat or discharge seat will produce the same malfunction.

NOTE: During any component disassembly all O-rings, wear rings, wipers and nylon balls should be replaced.

TO REMOVE THE MANUAL DISCHARGE RELIEF ASSEMBLY

1) Push the relief knob (51) in to neutralize any trapped gas or oil pressure in the system.
2) Pull both palm buttons (50) out into automatic position.
3) Remove the discharge relief knob (51), boot (49) and hex head cap (25), stem (23), and spring (93).
4) Place one hand over the discharge relief cavity and jerk the pump ram (7) down to "pop" the relief seat (24) up for removal.
5) Inspect the O-ring on the discharge relief seat (82), the chamfered seat and the nylon check ball (98) for scoring or deep scratches.

TO REMOVE VALVE SLEEVE ASSEMBLY

1) Push manual relief valve (51) down to neutralize any trapped gas or oil pressure in the system. (Neglect this if the relief assembly is already removed.)
2) Remove the palm valve knob (50), boot (48) and Palm Valve End Cap (34).
3) Carefully pull the stem (26) and valve sleeve assembly (17) out of the valve body (13).
4) Inspect the flat surfaces on the valve sleeve and the O-rings (68) on the stem (26).
5) To remove the pilot piston (15) inside the valve body (13) first remove the palm valve sleeve assembly (17). Care must be taken not to scratch or score the inside bore of the valve body. Replacement of the pilot piston O-rings (63) should be made at this time.

TO REMOVE THE RING SEAL ASSEMBLY

The valve sleeve assemblies for all pumps must be removed before removing the ring seal assemblies (18 and 19).

1) Disconnect the hydraulic tubing and fittings which connect the ports to the tanks and the discharge ports to the operator. The hex head cap retainers on the front face of the valve (13) also contain ring seal assemblies (19).
2) Remove hex head cap retainers (22 and 20) and springs (91 and 92).
3) Reach inside the valve body (13) through the valve sleeve hole and push the ring seals (18 and 19) out.
4) Inspect the flat faces of the ring seals (18 and 19) for wear and the O-rings (60 and 61) for cuts. Replacement of the ring seals (18 and 19) and O-rings (60 and 61) should be done at this time.

DISASSEMBLY OF PUMP AND VALVE COMBINATION

1) Remove the four assembly bolts (43) located on the back of the pump body (1).
2) Carefully pull the valve body (13) and pump body (1) apart to prevent loss of the mounting O-rings between the two blocks.
3) To remove the pump suction seat (10) inserted in the pump body (1) place one hand over the seat cartridge (10) and one finger to hold the nylon discharge ball on its seat and jerk the pump ram (7) downward to create pressure to "pop" the cartridge (10) out into your hand.
4) Inspect the seat O-rings (83 and 84), check the ball (99), and chamfered seat for scratches and foreign matter.
5) NOTE: This pertains to the 12 cu. in. pumps only. Remove the discharge check seat (35) and inspect O-rings (86) and chamfered seat for scratches and foreign matter.

DISASSEMBLY OF PUMP RAM AND PISTON

1) Remove the snap ring (X-washers) (53) located outside each pin (11 and 12) in the clevis pivot arm assembly (4) and (5).
2) Remove the pins (11 and 12) clevis (4) and pivot bar (5).
3) Remove the 4 pump head bolts (42) located at the top of the pump cylinder (1).
4) Carefully pull the ram (7) and piston assembly (6) out of the pump cylinder (1).
5) Inspect the ram (7), pump cylinder bore (1), piston O-ring (58) and piston wear rings (59), for scoring and excessive wear. The O-ring (56) and Poly Pak lip seal (54) and wiper rings (57) around each pump ram (7) and (8) should be replaced at this time. One O-ring (59), Poly Pak lip seal (54) and wiper ring (57) can be found in the pump head (2). The other set can be reached by unscrewing the hex shaped ram cover (9) at the bottom of the pump body (1).

(Continued on Page 9)

DISASSEMBLY PROCEDURE FOR DOUBLE HOLDING VALVE/PALM VALVE ASSEMBLY

1) Remove the operator port caps item (22) located at the top and bottom of the valve body item (13). Remove and inspect the cap O-rings item (75).
2) Remove the four hex head cap screws item (108) on each end of the valve body item (13). Remove the holding valve end caps item (33) and inspect O-ring item (71) and back-up ring (114), care should be taken not to lose the manifold O-ring item (72) when the cap (33) is removed.
3) Unscrew and remove the thermal relief valve item (111) from each end cap (33) and inspect the O-ring.
4) Remove the poppet guides (30), the spring (96) and the poppet assembly (28 and 29). NOTE: To disassemble (28 and 29) remove the locknut (100). The poppet (Nylon) can be removed from the poppet pin (28) inspect the O-ring (87) between the poppet (29) and the poppet pin (28).
5) Remove the seat/poppet guides (27) and inspect O-ring (73).
6) Remove the pilot piston (31) and inspect O-ring (88) and wear rings (97).

DISASSEMBLY OF THE SPEED CONTROL COMPONENTS (WHEN EQUIPPED)

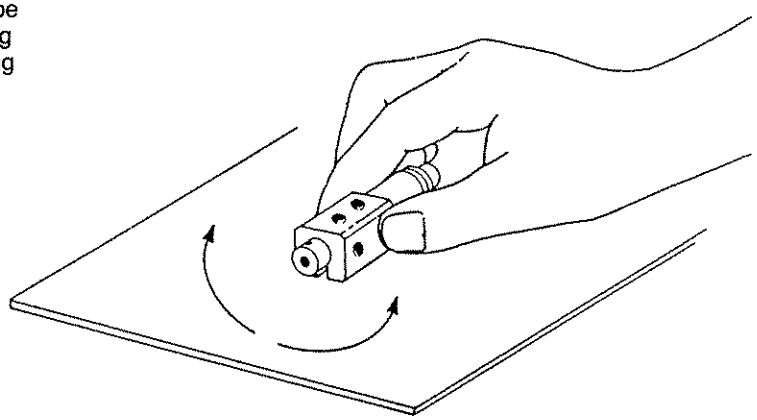
1) Remove the four socket head cap screws (110) and remove the flow control cap (38) from the valve body 13). To remove the flow control knob (52) from the stem (39), the spring pin must be removed.
2) Remove the locknut (112) and unscrew the stems (39) from the cap (38) inspect the O-ring and back-up ring (78 and 79).
3) Remove the square head pipe plug (36). Remove the spring (76) and the check-ball (Nylon) (37).

When the assembly is not equipped with the built-in speed control components remove the four socket head bolts and cap to replace the O-ring on the cap.

RECONDITIONING AND ASSEMBLY

RELAPPING THE VALVE SLEEVE

The valve sleeves (16 and 17) can be easily relapped to assure proper sealing surfaces; assuming the scratches in them are not too deep. Note each valve sleeve has four flat sides. Only the three with holes on them need to be relapped. A piece of plate glass and any valve grinding compound (Ajax, Babo or Comet) make an ideal relapping plate and lapping compound.



RECONDITIONING AND ASSEMBLY

RE-ASSEMBLY OF THE VALVE SLEEVE AND RING SEAL COMPONENTS

1) After relapping the valve sleeve items (16) and (17) the valve body (13) should be turned upside down in order to insert the ring seal spring items (119) and (91) on the 12 cubic inch model and items (19) on the 4 cubic inch model.

   See Figure "1" for re-assembly of springs (91), (119) ring seals (18) with O-rings (60).
2) Install the springs (119) on 12 cubic inch model and (91) on the 4 cubic inch model and the rings seals (18). Note: The lapped surface closest to the O-ring groove on the ring seal is the end to be installed first.
3) Start to install the left valve sleeve (17) indicated left by the letter "L" stamped on the unit. In order to complete installation of the valve sleeve (17) into the body (13), the ring seal (18) has to be compressed about ⅛ inch in order to allow the front end of the valve sleeve to slip by the ring seal and finally rest on the flat portion of the sleeve. Use a blunt instrument or tool to compress the ring seal (18) and spring (119) or (91) in order not to scratch the flat lapped surface of the ring seal.

NOTE: It is extremely important to insert the correct sleeve on each end of the valve body (13).

Each valve sleeve (16 and 17) has four holes drilled through the flat surfaces and one milled slot. One set of holes are 90° apart from each other and the other holes are drilled straight through. The 90° apart holes are smaller than the straight drilled through hole. When inserting the right valve sleeve (16) as shown in Figure "1" be sure to have the slot facing the bottom of valve body (13) and one of the 90° holes (smaller holes) should be facing the front of the valve body noted in Figure "1" by the sides or face with the instruction plate (101).

To complete one side of the sleeve ring seal installation, insert another ring seal (18) as shown in Figure "2" so that the flat surface closest to the O-ring groove on the ring seal (18) is *away* from the valve sleeve (16).

FIG. 2

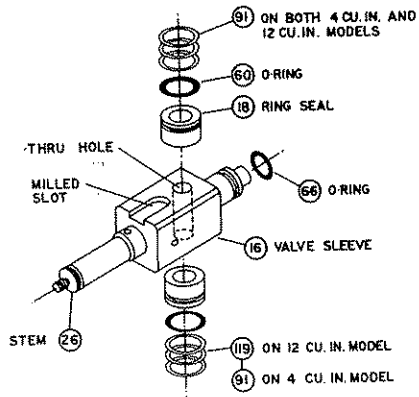
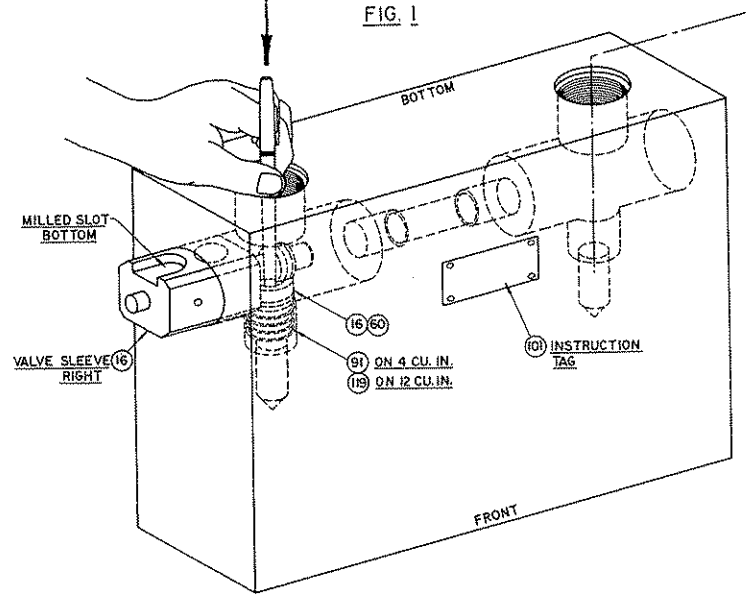


FIG. 1



4 INCH DOUBLE HOLDING VALVE/PALM VALVE COMBINATION MANIFOLDED TO A 12 CUBIC INCH HAND PUMP

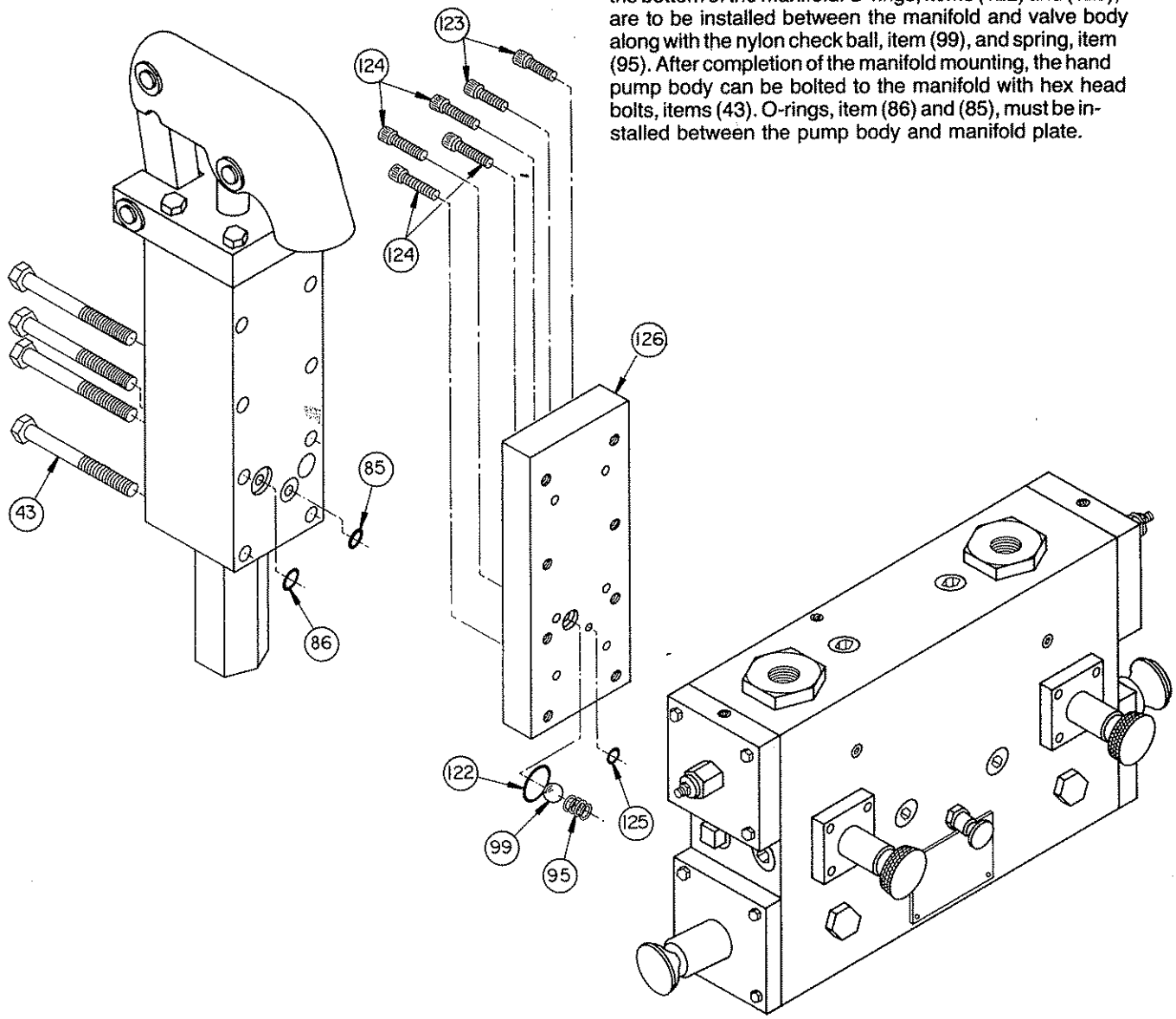
The following items pertain to the 4 inch/12 inch pump combination:

Item	Quantity	Description
122	1	O-Ring Discharge Check
123	2	Soc. Hd. Cap Screw
124	4	Soc. Hd. Cap Screw
125	1	O-Ring Suction Manifold
126	1	Manifold Plate

This assembly includes a manifold plate, item (35), to allow usage of a 12 cubic inch pump with the 4 inch valve combination.

The disassembly procedure is identical to the previously mentioned procedure with the exception of the following items:

Manifold plate, item (35), which bolts to the valve body, item (13), and to the pump body, item (1). This manifold, if first assembled to the valve body with two (2) cap screws, item (123) and four (4) cap screws, item (124), the cap screws, item (123), are to be installed at the top of the manifold and the cap screws, item (124), are to be installed near the bottom of the manifold. O-rings, items (122) and (125), are to be installed between the manifold and valve body along with the nylon check ball, item (99), and spring, item (95). After completion of the manifold mounting, the hand pump body can be bolted to the manifold with hex head bolts, items (43). O-rings, item (86) and (85), must be installed between the pump body and manifold plate.



THIS MANUAL PERTAINS TO THE FOLLOWING SHAFER ASSEMBLIES

BILL OF MATERIAL	PICTURE ASSEMBLY	DESCRIPTION
67558-FS	65980	12 Inch Pump / DHV Assembly ¾" NPTF Ports with speed controls
67557-FS	66597	12 Inch Pump / DHV Assembly ¾" NPTF Ports without speed controls
65980-FS	65980	12 Inch Pump / DHV Assembly 1" NPTF Ports with speed controls
66597-FS	66597	12 Inch Pump / DHV Assembly 1" NPTF Ports without speed controls
67280-FS	65980	12 Inch Pump / DHV Assembly 1¼" NPTF Ports with speed controls
67279-FS	66597	12 Inch Pump / DHV Assembly 1¼" NPTF Ports without speed controls
69460-FS	69460	4 Inch Pump / DHV Assembly ½" NPTF Ports with speed controls
69470-FS	69470	4 Inch Pump / DHV Assembly ½" NPTF Ports without speed controls
72007-FS	69460	4 Inch Pump / DHV Assembly ¾" NPTF Ports with speed controls
72008-FS	69470	4 Inch Pump / DHV Assembly ¾" NPTF Ports without speed controls
72060-FS	72057	12 Inch Pump Manifolded to 4 Inch DHV Assembly ½" NPTF Ports with speed controls
72061-FS	72062	12 Inch Pump Manifolded to 4 Inch DHV Assembly ½" NPTF Ports without speed controls
72058-FS	72057	12 Inch Pump Manifolded to 4 Inch DHV Assembly ¾" NPTF Ports with speed controls
72059-FS	72062	12 Inch Pump Manifolded to 4 Inch DHV Assembly ¾" NPTF Ports without speed controls

Shafer™

valve operating systems

SHAFER VALVE COMPANY
2500 Park Avenue West, Mansfield, OH 44906 • Phone (419) 529-4311 • FAX (419) 529-3688 • TLX 810-448-2818