VALVE AUTOMATIC MODEL C96 and C97

The C96 valve offers automatic or single cycle operation. It also provides controlled pressing speed, and features distance reversal or pressure reversal.

This is basically a four way valve with the shuttle acting as the four way spool. The manual control spool and the movable sleeve between the shuttle and the body are the controls that cause reciprocation of the shuttle. The movable sleeve is operated by adjustable stop collars on the shipper rod, and the manual control spool is actuated by an eccentric crank. A spring arrangement holds the crank in the idle position but it will lock in the continuous cycle position, and remain there until released.

To initiate automatic operation, (the ram being up, or in the idle position with sequence port open to tank) (see fig. 1) the control handle is moved from idle position to continuous cycle position. This movement brings the control spool down closing the tank port, and control port to the control port so that fluid is directed to the bottom of the shuttle. The fluid pressure lifts the shuttle against its spring force and pump volume is directed to the top cylinder port thus forcing the ram down. (see fig. 2)

As the ram moves downward it removes the support which held the movable sleeve in the up position thereby allowing the spring force to center the sleeve. When the sleeve is centered the sequence port is closed. However, the shuttle remains up because of the back pressure of the exhaust oil from the bottom cylinder port, as shown in (fig. 3).

The exhaust oil passes through a spring loaded check valve back into the pressure line, thus giving a differential circuit for fast ram approach. (see fig. 3)

Pressing speed distance is regulated by a movable stop collar on the flow control sleeve. When the ram has descended to the point where controlled pressing speed is desired a weight supported by the platen contacts the stop collar and moves the flow control sleeve down, thus opening the exhaust port and allowing exhaust flow to be directed to a needle valve. (see fig. 4) As soon as the exhaust port opens, the differential circuit is cut out. The pressure drop across the needle valve is transmitted to both ends of the flow control spool and when this pressure differential is great enough to overcome the flow control spring force, the flow control spool wil ascend thus partially opening the pressure port and allowing pump volume to go to tank. (see fig. 4) If the needle valve is fully closed the full pump volume will be diverted to tank thus causing the ram to stop. Any percentage of full pressing speed can be obtained by simply adjusting the needle valve.

When the ram presses against the work the pump builds up pressure to the setting of the main relief valve which spills the flow to tank. Since the ram stops. the exhaust flow ceases, and therefore, the back pressure that was transmitted to the bottom of the shuttle dissipates thru the needle valve and the shuttle is forced down by its spring.

As soon as the shuttle drops the pump volume is diverted to the bottom cylinder port. The top cylinder port is now open to tank, so with pressure entering the bottom cylinder port, the ram starts up. (see fig. 5)

The ram will continue moving upwardly until the platen contacts the upper stop collar moving the sleeve up, which opens the sequence port thus initiating a new cycle since pump volume is one again directed to the bottom of the shuttle These cycles will continue automatically until the control handle is moved to the idle position. The ram will then finish its cycle and return to its up position and stop for the pump volume is then directed thru the sequence port to tank.

If distance reversal is desired rather than pressure reversal, the lower stop collar should be set at the required reversal position. When the ram contacts this stop collar, the movable sleeve is pulled down against its spring, thus partially opening the T. C. port to tank thru the undercut on the sleeve and partially restricting the flow of oil from the B. C. port. The ram therefore stops and exhaust flow ceases so that the shuttle drops and the ram goes up.

Single cycle operation is obtained by moving the control handle to the single cycle position to initiate the cycle. The handle may then be released and the ram will go thru one cycle and return up and stop.

Inching is accomplished by moving the control handle past the emergency reverse position. The control spool then acts as a pump and pumps oil to the bottom of the jack, thus raising the shuttle. The shuttle can be raised, dropped, and held at any desired positions, thus giving positive control to ram movement.

Emergency reverse can be obtained at any point in the cycle by moving the control handle to the emergency reverse position. This movement opens the C. P. to tank so that the shuttle is forced down due to its spring force and the ram goes up.

SEMI AUTOMATIC OPERATION(C97)

Semi-automatic operation differs from automatic operation in the oil cannot go directly from the sequence port to the control port, but must be directed to it thru valving on an external mechanism Oil is delivered to the external mechanism only when the main ram is in the up position. Semi-automatic operation is accomplished by changing plugs as indicated on the circuit. Oil from any external source can be applied to the control port to initiate a cycle.

IDLE POSITION

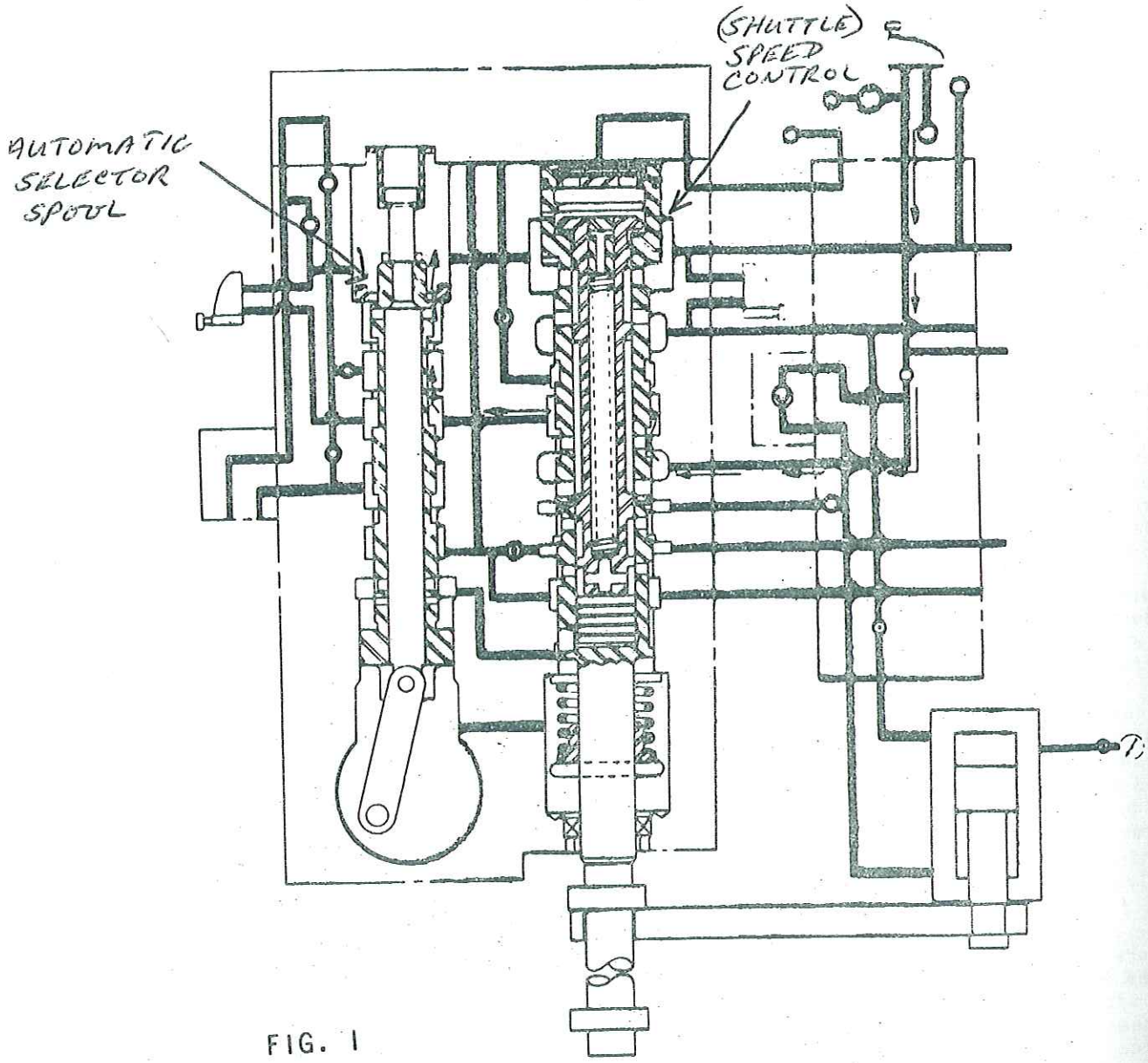


FIG. 1

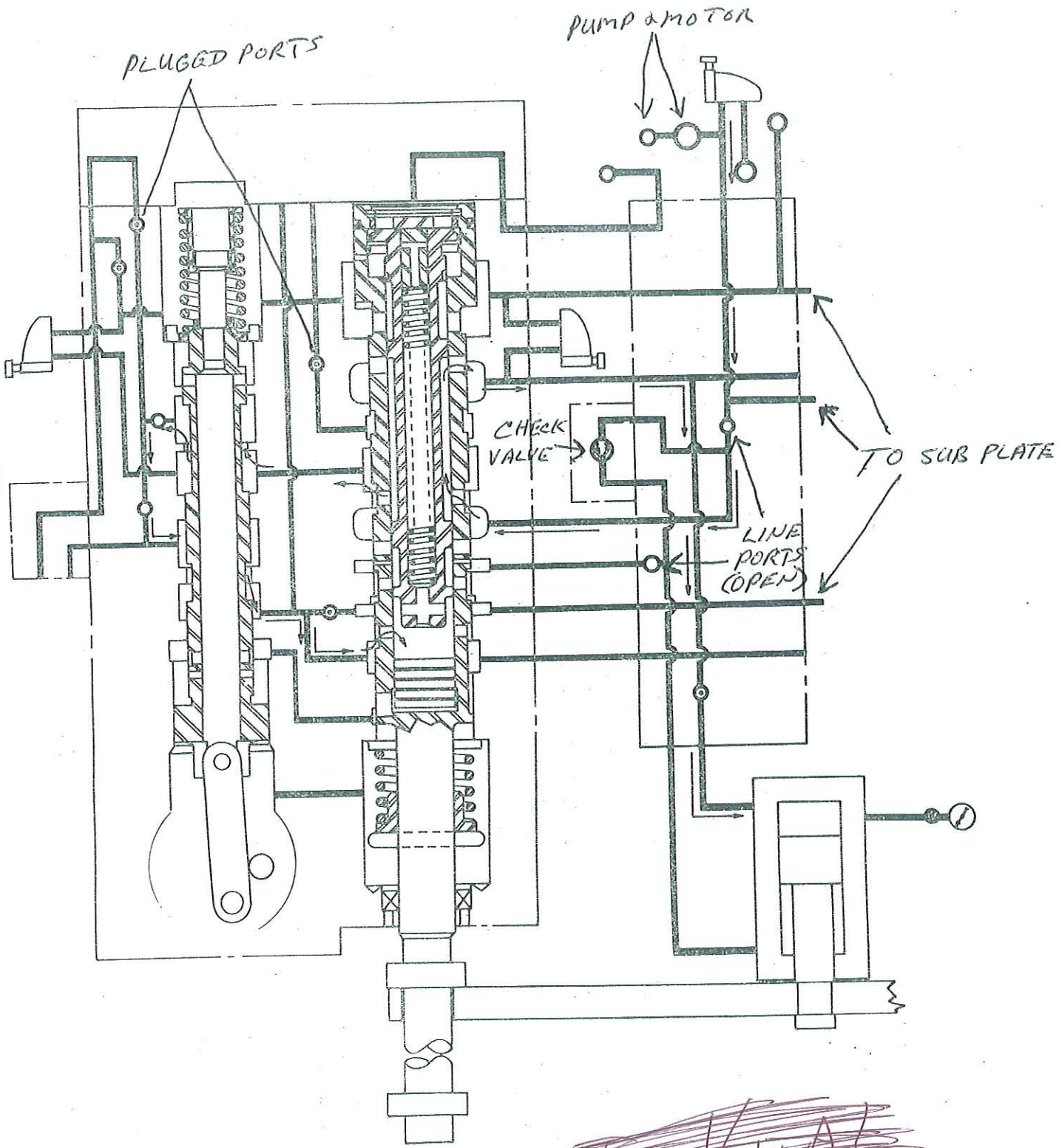

PLUGGED PORTS
PUMP & MOTOR
CHECK VALVE
TO SUB PLATE
LINE PORTS (OPEN)

FIG. 2

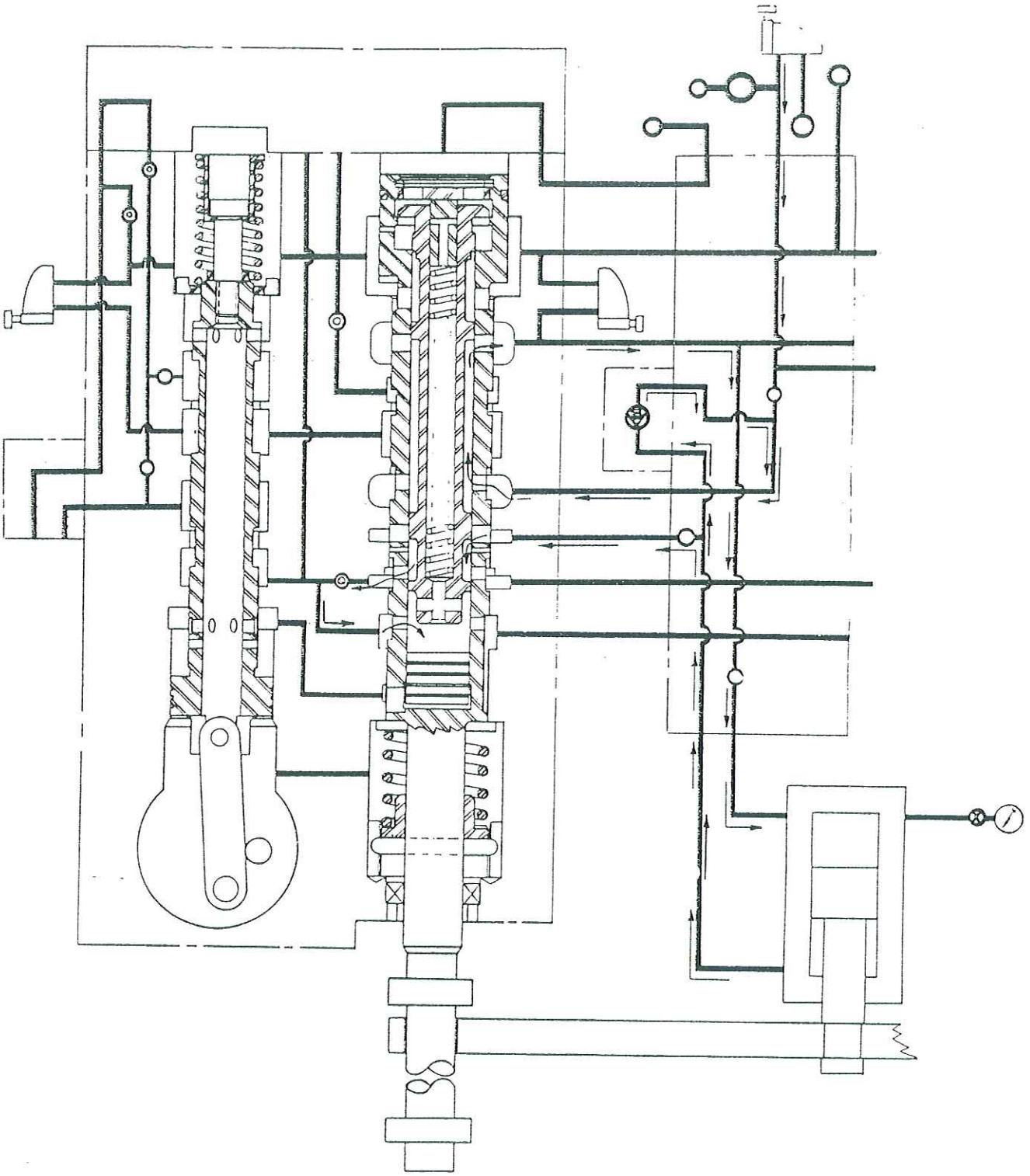


FIG. 3

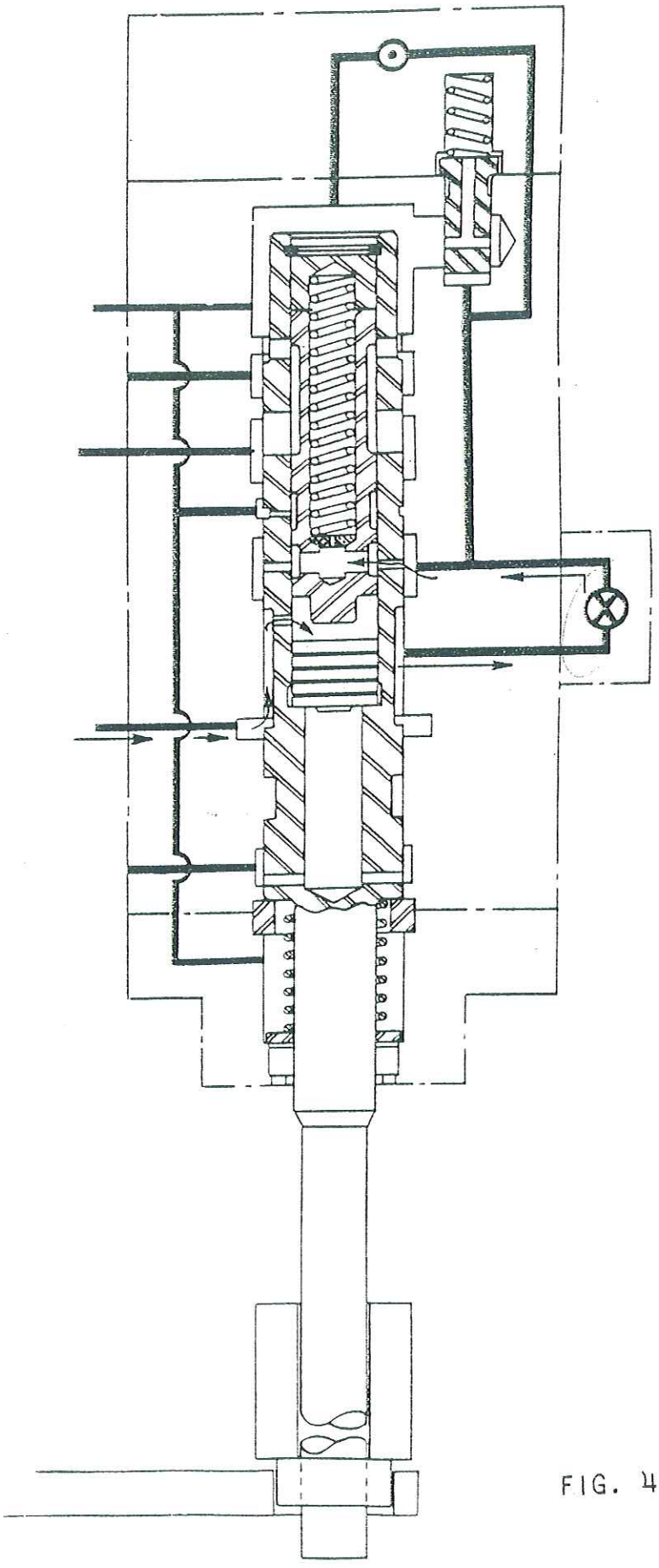


FIG. 4

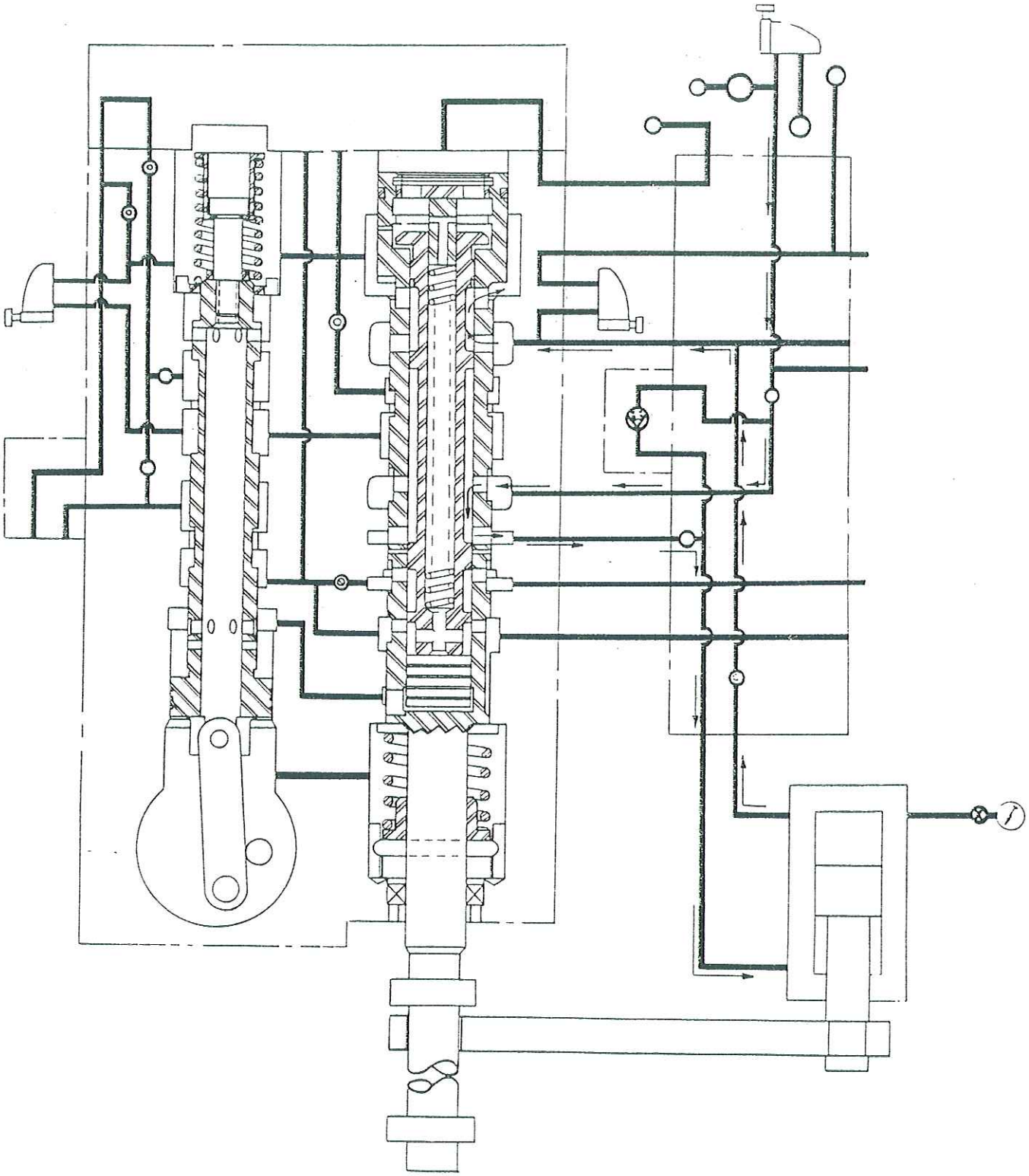
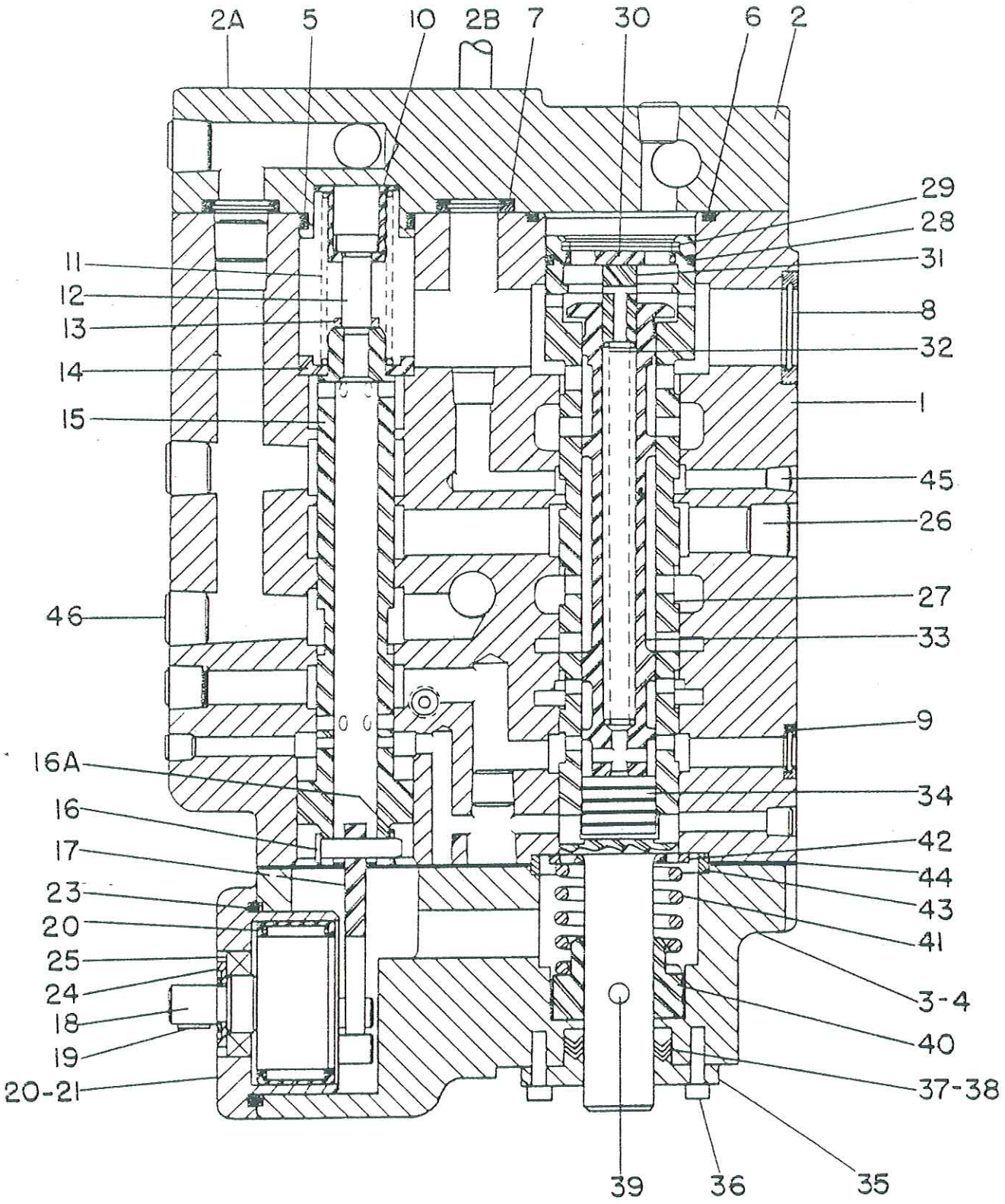


FIG.5

SERVICE TIPS

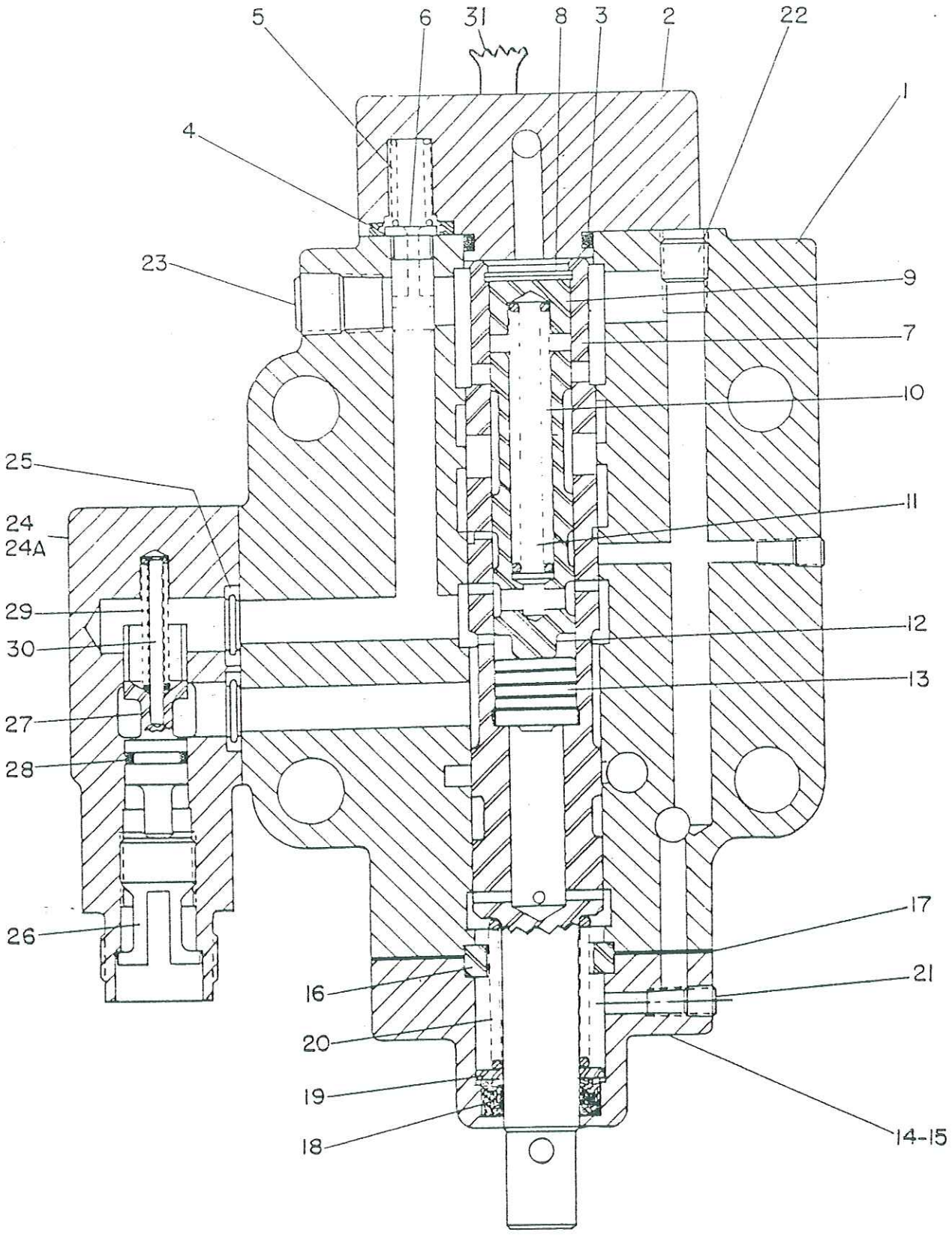
DIFFICULTY	REMEDY
A. Ram descends but will not return.	1. Check shuttle. Should move freely in sleeve. 2. Check spring in shuttle for breakage. 3. Examine orifice to be sure they are open. 4. Check relief valve for failure to open. 5. Weight must shift speed control rod.
B. Ram does not have fast approach on down stroke.	1. Check differential check valve for proper setting.
C. Ram will not descend.	1. Check relief valve setting. This valve's minimum operating pressure is 500 PSI. 2. Check relief valve for dirt, lint, etc. 3. Check system for dirt in valves. 4. Examine shuttle to see that it moves freely. 5. Check pump and pressure line. Line may be broken. 6. Top stop collar set too high.
D. Pressure will not build up before ram reverses.	1. Check lower stop collar. Arm should not contact it unless distance reversal is required. 2. Check relief valve setting, should be at least 500 PSI. 3. Check pressure lines for cracks and other leaks. 4. Check differential check valve for proper setting.


2A
5
10
2B
7
30
6
2
29
28
31
11
12
13
8
32
14
1
15
45
26
46
27
33
9
16A
34
16
42
17
44
43
23
41
20
25
3-4
24
40
18
19
37-38
20-21
39
36
35

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	35-13127-W	Body - valve	1
2	35-13115-X	Cap	1
2A	COMM.	Screw - cap, soc. hd #13 NC x 2 lg.	4
2A	COMM.	Screw - Cap, soc. hd. #13 NC x 1-3/4	2
2B	COMM.	Bolt - eye	1
3	35-13113-X	Cap	1
4	COMM.	Screw - Cap, soc. hd. #16 NC x 1 lg.	6
5	6227-23	Packing - "O" Ring 671-00218	1
6	6230-5	Gasket - "O" Ring 671-00227	1
7	46146	Vickerseal 630-46146	6
8	42305	Vickerseal 630-42305	1
9	56215	Vickerseal 630-56215	1
10	35-13107-Z	Stop - spool	1
11	35-12096-Y-28	Spring - compression	1
12	COMM.	Screw - shoulder	1
13	35-13106-Z	Spacer	1
14	35-13109-Z	Seat - spring	1
15	35-13120-Y	Spool - selector	1
16	AN394-29	Pin clevis 321-39429	1
16A	COMM.	Pin cotter 322-02160	1
17	35-13108-Z	Link	1
18	25-1858-Z	Eccentric 012-00972	1
19	#2	Key	1
20	GB-2816	Bearing - needle 230-02816	1
21	35-13102-Z	Cap - Eccentric	1
22	COMM.	Screw - Cap, soc. hd #20 NC x 1/2 lg.	4
23	6230-7	Gasket - "O" ring. 671-00229	1
24	5100-50	Ring - retaining 356-31050	1
25	141	Seal - garlock . 620-50141	1
26	COMM.	Plug 3/8 soc. pipe	7
27	35-13134-X	Sleeve - shuttle	1
28	COMM.	Ring - piston 625-21015 NOT USED ON NEW	1
29	5000-137	Ring - retaining waldes truarc 356-30137	2
30	35-13136-Z	Disc - retainer	1
31	35-13105-Z	Piston 1/2 dia. x 1-1/8	1
32	35-12002-Y-62	Spring . comp. 035-22109	1
33	35-13135-Y	Shuttle - 1-1/2 dia. x 6-1/2	1
34	35-13061-Z	Jack 1 dia. x 1	1
35	35-14371-Z	Gland	1
36	COMM.	Screw - Cap, soc. hd. #24 NC x 5/8 lg.	6
37	6225-18	Packing - V-type 614-25018	3
38	6229-18	Adapter - male . 614-29018	1
39	35-13142-Z	Pin	1
40	35-13110-Z	Collar	1
41	35-12007-Y-27	Spring - compression ~~035-22361~~ 630-22398	1
42	35-13104-Z	Washer	1
43	35-13103-Z	Ring - pilot	1
44	35-13111-Z	Gasket	1
45	COMM.	Plug - 1/16 soc. pipe	3
46	COMM.	Plug - 1/2 soc. pipe	4
*	35-13112-Y	Cap - accessory	1
*	COMM.	Plug - 3/4 soc. pipe	1
*	35-13529-Z	Plate - cover	2
*	49617	Vickerseal 630-49617	2
*	66945	Vickerseal 630-66945	2
*	4230	Vickerseal 630-42300	2

SI2-00974

* NOT SHOWN


5
6
31
8
3
2
22
1
4
23
9
7
10
25
11
24
24A
29
12
30
13
27
28
26
17
21
16
20
19
18
14-15

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	35-13014-W	Body - valve	1
2	35-13015-Y	Cap - top	1
2A	COMM.	Screw - Cap, soc. hd	4
3	6237-23	Packing 671-00218	1
4	46146	Vickerseal 630-46146	2
5	35-12003-Y-42	Spring - compression 032-22178	1
6	35-13066-Z	Poppet	1
7	35-13057-Y	Sleeve - Speed control	1
8	5000 93	Ring - retaining. 356-30093	2
9	35-13059-Z	Button	1
10	35-12003-Y-40	Spring - comp. 032-22176	1
11	35-14031-Z	Orifice	1
12	35-13058-Z	Spool - speed control	1
13	35-13061-Z	Jack	1
14	35-13076-Y	Cap - bottom	1
15	COMM.	Screw - Cap, soc. hd. #13 NC x 1" lg.	4
16	35-13071-Z	Stop	1
17	35-13073-Z	Gasket	1
18	COMM.	Packing 3-614-25018 & 1-614-29018	1
19	35-13072-Z	Washer	1
20	35-12007-Y-6	Spring - compression. 032-22340	1
21	COMM.	Plug 1/16 soc. pipe	2
22	COMM.	Plug 1/2 soc. pipe.	3
23	COMM.	Plug 3/8 soc. pipe.	3
24	35-13062-Y	Body.	1
24A	COMM.	Screw - Cap, soc. hd.	4
25	66945	Vickerseal 630-66945	2
26	35-11495-Z	Screw adjusting	1
27	35-11480-Z	Orifice - adj.	1
28	6227-11	Pacing 671-00113	1
29	35-12002-Y-5	Spring - comp. 032-22052	1
30	35-13063-Z	Pin	1
31	COMM.	Eye bolt	1
*	40439	Vickerseal 630-40439	1
*	49617	Vickerseal 630-49617	4
*	56215	Vickerseal 630-56215	1
*	42300	Vickerseal 630-42300	1
*	35-13085-Z	Orifice	1
*	COMM.	Plug - 1/2 soc. pipe.	1
*	COMM.	Plug - 1/8 soc. pipe.	3

* NOT SHOWN

NAMCO SOLENOID ON C96 (EB700-396-33) 120-10035 (110/60)
" " " C97 120-10094 (110/60)