DENISON DIVISION
Abex Corporation
Columbus, Ohio 43216

INDEX TABLE SERVICE INSTRUCTIONS
A31 & A33 SERIES

The Denison index table is a self-enclosed unit with geneva motion driven by fluid motor. It incorporates a mechanical driven lock pin in addition to the normal geneva motion lock, insuring greater accuracy of index. The two types described and illustrated in this catalog are the A33 six station and the A31 twelve station table.

Within the table housing a machined track permits installation of a cam riser radially in any desired location.

The cam has three levels for operating the internal spools to obtain "fast traverse", "speed control", and "control port" positions. When the press ram is up and oil is first delivered to the index table from the sequence port of the control valve, the cam is in the "fast traverse" position.

The follower is on the intermediate level of the cam so that the sequence and flow control spools are both 3/8 of an inch to the left of the position shown. The flow control port is blocked by the flow control spool, so that oil is directed through the sequence line to the inlet of the fluid motor. The fluid motor exhaust is open to tank through porting on the sequence spool.

The inlet oil is open to tank through orifice E which softens shock during acceleration of fluid motor.

During the "fast traverse" position of the cycle, the geneva driver does not engage the arbor; the lock eccentric, however, is disengaged. When the cam moves to the "speed control" position, the follower is on the low level of the cam as illustrated on the circuit. Thus, the sequence line is opened to the flow control port which opens to the bottom of the flow control spool, the adjustable orifice, and orifice A.

With the adjustable orifice fully open, the table will not move since the full pump volume is diverted to tank through the adjustable orifice and orifice A.

With the adjustable orifice closed, the table will move at its maximum "speed control" rate of indexing. This maximum rate is determined by the size of orifice A. Any rate of indexing between these two extremes can be obtained by simply adjusting the adjustable orifice. The orifice causes a pressure drop and this pressure difference is transmitted to both ends of the flow control spool.

When this pressure difference is great enough to overcome the flow control spring force, the flow control spool will move to the left, thus partially blocking the flow control port and diverting more oil to the fluid motor inlet.

It is during this "speed control" portion of the cycle that the geneva driver engages, the geneva arbor thus indexing the table top. After the table top is indexed, the geneva drive disengages. The cam then moves to the "fast traverse" position again. The flow control port is then blocked and full sequence flow is diverted to the fluid motor inlet (except the small amount that goes through orifice E.) The lock eccentric engages during this "fast traverse" portion of the cycle thus locking the geneva arbor and table top in position.

When the cam moves to the "control port position", the cam follower is on the high point of the cam. The sequence spool then blocks the tank port and also opens the control port.

The pressure build up around the sequence spool is transmitted to the control port of the control valve, which initiates the rams cycle, thus closing the sequence port. Orifice C,D, and E all help to decelerate the fluid motor so that the cam is stopped with the follower on the intermediate level and the cycle is completed.

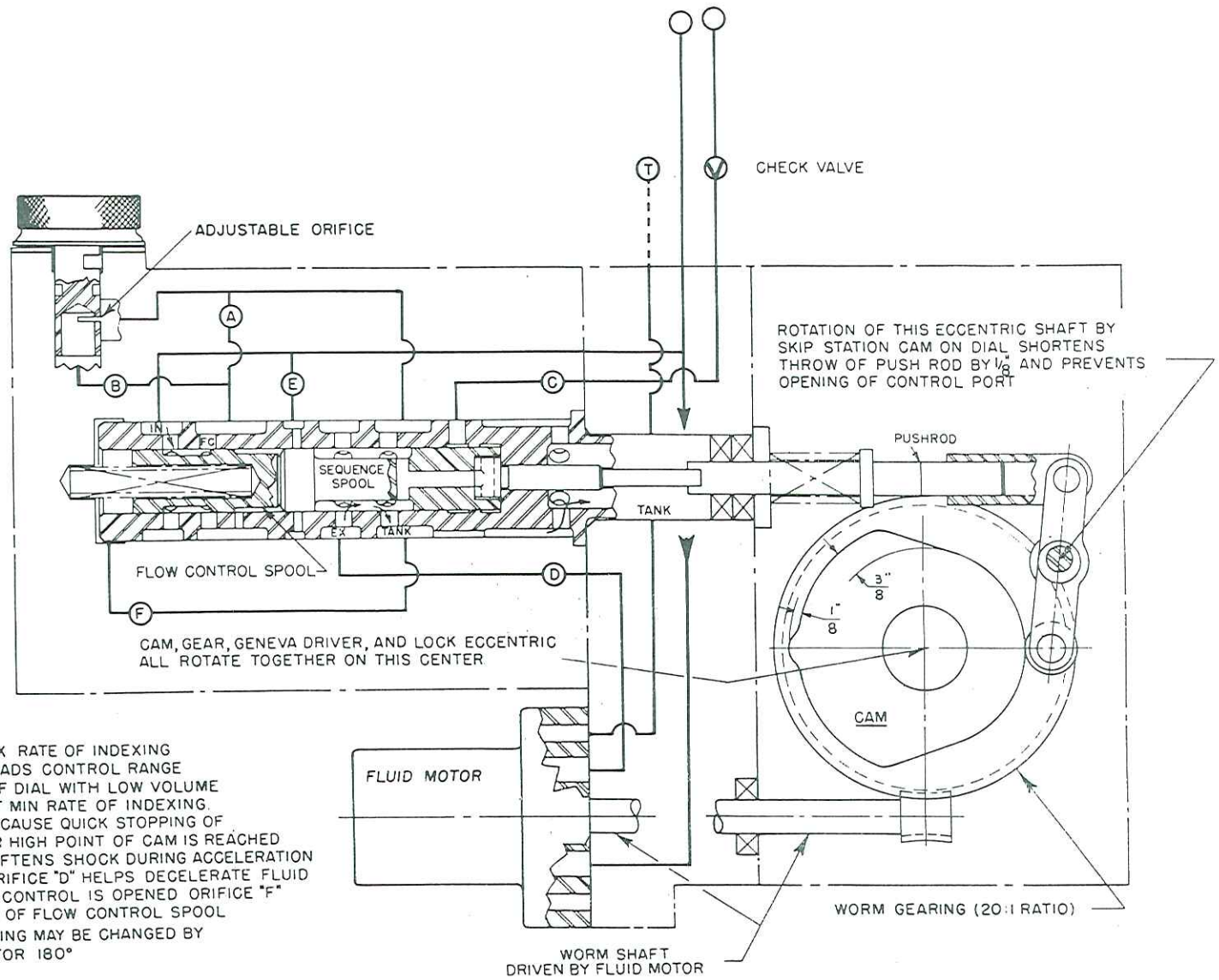
INSTRUCTIONS

1 - Fill table with nine gallons of a good grade of oil similar to that used in the hydraulic system. The fill pipe is located at the right rear of the table.

2 - The speed sequence valve and fluid motor are flange mounted to the left rear of the table. The sequence valve contains a knurled knob speed adjustment. Speeds are adjustable from 20 to 60 cycles per minute on the six station, or A33 table and 20 to 70 cycle per minute on the twelve station or A31 table. These speeds are computed without the ram operation being in the cycle.

3 - The direction of the table may be changed by simply removing the fluid motor from the subplate mounting and rotating it 180° and remounting.

4 - Operating pressures for the index table may be checked by installing a 2000 psi gauge in the 1/4" pipe opening in the subplate of the master relief valve, usually located near or at power source. By reading this gauge during the index the pressures required for operation may be ascertained.



ORIFICE "A" SETS MAX RATE OF INDEXING
ORIFICE AT "B" SPREADS CONTROL RANGE OVER FULL SWING OF DIAL WITH LOW VOLUME PUMPS, OR WILL SET MIN RATE OF INDEXING.
ORIFICES "C" AND "E" CAUSE QUICK STOPPING OF FLUID MOTOR AFTER HIGH POINT OF CAM IS REACHED
ORIFICE "E" ALSO SOFTENS SHOCK DURING ACCELERATION OF FLUID MOTOR ORIFICE "D" HELPS DECELERATE FLUID MOTOR WHEN FLOW CONTROL IS OPENED ORIFICE "F" PREVENTS CHATTER OF FLOW CONTROL SPOOL
DIRECTION OF INDEXING MAY BE CHANGED BY ROTATING FLUID MOTOR 180°

5 - A cam arrangement may be installed on the dial to cause the table to continue indexing past any given station. These cams operate a skip station plunger which is located approximately 95° counter-clockwise from the pressing station.

6 - To remove the dial to facilitate mounting of tools, it is suggested that the following procedure be followed:

a - Remove 3/4" socket screw in the center of the dial.

b - Remove the three 3/4" socket screws located around the center screw.

c - Remove two of the ½" set screws and replace with two eye bolts.

d - Place a rod through the eye bolts, and lift the dial straight up. Be certain in reassembling that the dial is placed in the same relative position as it was before removal.

CAUTION

With tooling and parts mounted to the dial, there should be .005-.015 clearance between dial and table casting.

DISASSEMBLY INSTRUCTIONS

1 - Remove screws #2 and #3.

2 - Remove nuts #5 from set screw #4.

3 - Raise dial #7A or #7B up and off geneva arbor, #49A or #49B by adjusting set screws downward against arbor.

4 - Lift off dial.

5 - Remove skip-station assembly #72 thru 82, 84, 85, and 86.

6 - Remove screws #10 and fluid motor #8 screws #93, speed and sequence valve #9.

7 - Remove subplate #91 and gasket #92. (#92 not always furnished)

8 - Remove screws #37, clamp arbor to plug (57), then lift cover #38.

9 - Remove pipe plug #33. Use soft brass rod and tap worm gear #30 until it can be removed from assembly.

10 - Remove screws #39 and plate #71A or #71B.

11 - Remove pin #68 and lock.

12 - Screw #65 must be removed to permit lock to raise above dowel pin.

13 - Eye-bolts should now be inserted in the driver #50A or 50B and arbor #49A or 49B in the tapped holes provided. A strong rod can now be inserted thru both eye-bolts allowing them to be lifted together.

14 - Now by lifting first on the arbor and driver, and then on the lock #66A or 66B, all three items may be removed.

15 - Remove bushing #14, spring #15, and washer #16.

16 - Unscrew push rod #18 from clevis #19.

17 - Remove pin #79, clevis #19, pin #20 and cotter pin #21 from inside of table housing.

Assembly is completed in reverse order.

CAUTION:

1 - When reassembling be certain that cam is set on high point.

2 - When push rod and linkage are re-assembled be certain that the end of link #11 extends exactly ½" past subplate #97. If this ½" measurement is not held, sequence will be lost between ram and table. There is no locking mechanism needed after this distance is once set.

After assembly, the push rod should be movable by hand. Be certain to try this before reassembling the fluid motor, speed and sequence valve.

LUBRICATION

1 - Be certain that plug #94 is tight before attempting to fill table with oil.

2 - Raise lid on elbow at right rear of table and fill with 9 gallons of oil of the same type that is in press tank. (See oil specification sheets)

3 - On the cover #38, spaced evenly around the periphery are four lubrication fittings. Use a soft grease about the consistency of petroleum jelly to lubricate the bottom of dial #7A or 7B. This should be done at least once a day.

ADJUSTMENT

Turn off power - To index dial manually remove pipe plug #33. Place 5/8" square socket wrench on end of worm gear #30. Table can be indexed either forward or backward.

SPEEDS

Regulation of dial speeds are provided in a range between 20 to 70 indexes per minute on the A31 index table (12 station). On the A33 index table (6 station) the speed ranges between 20 and 60 indexes per minute. (See table)

These speeds are computed with ram adjustment out of cycle.

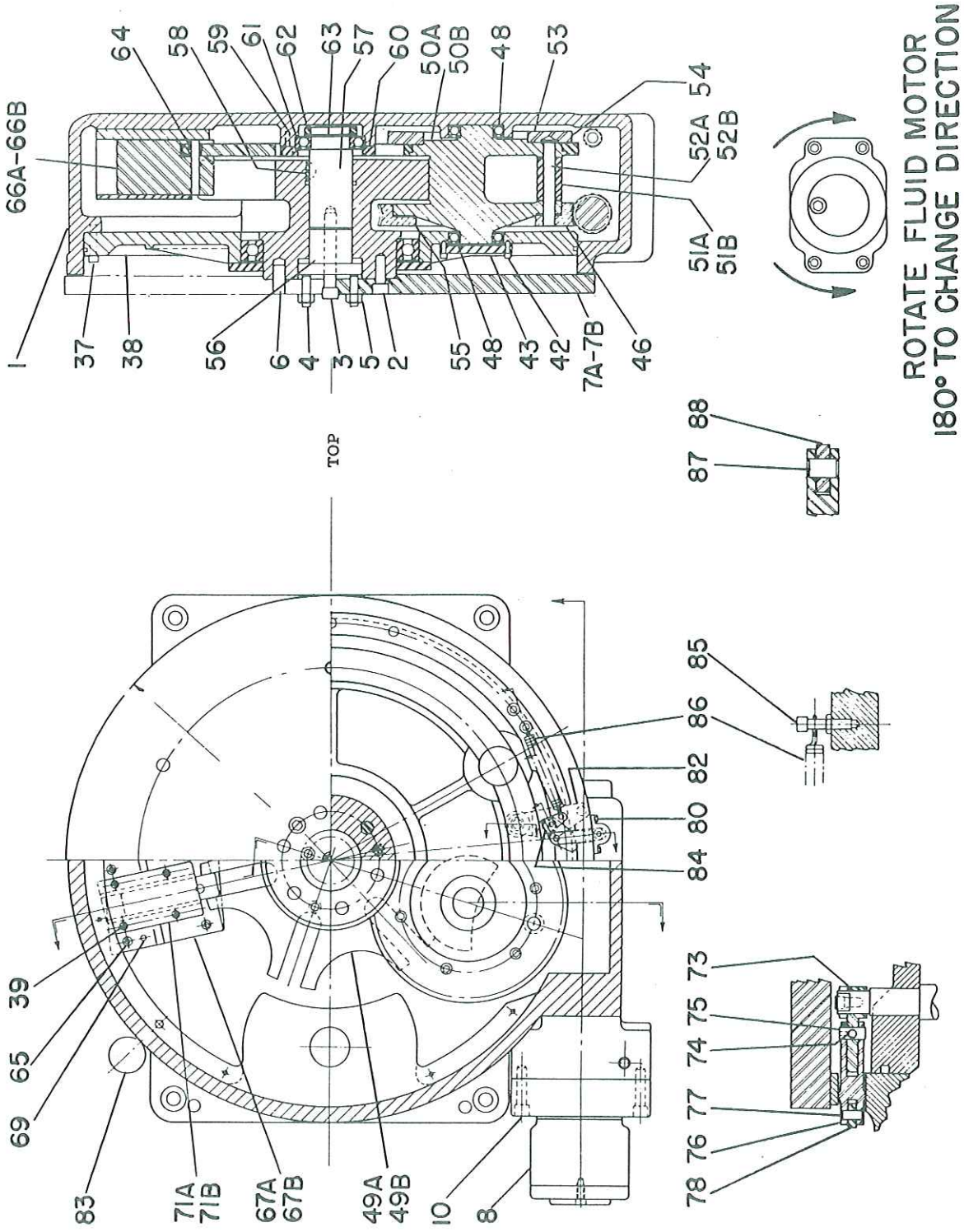
A simple knurled knob adjustment, located at left rear of table on the speed and sequence valve #9, is easily regulated for the various speed requirements and can be changed even though table is in motion.

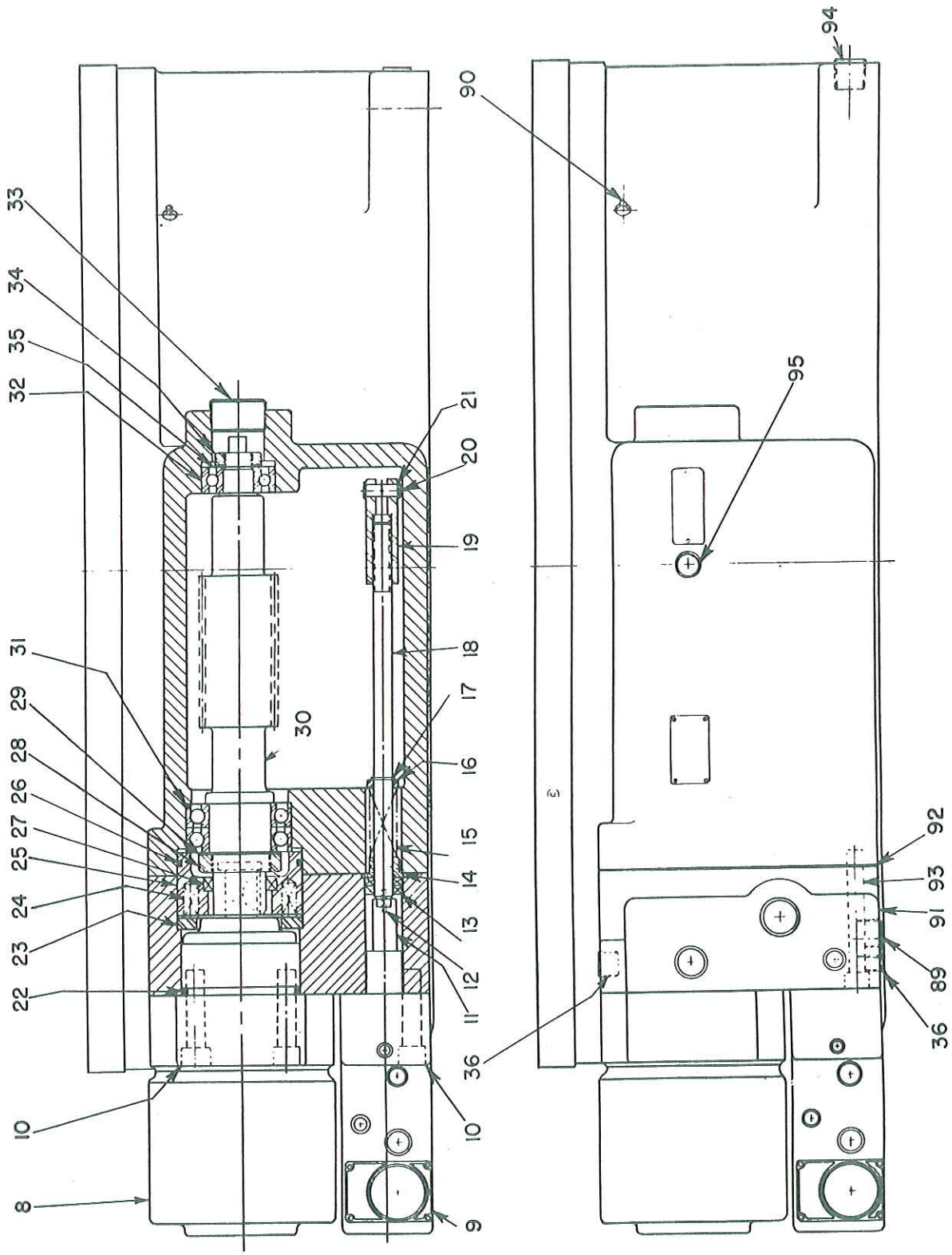
ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	35-13191-W	Housing - Index table	1
2		Screw - Cap soc hd, 3/4 - 10 NC x 1-1/4 in. lg.	3
3		Screw - Cap, soc hd, 3/4 - 19 NC x 4½ in. lg.	1
4		Screw - Soc. set ½ - 13 NC x 2 flat point	4
5		Nut - hex std. ½ - 13 NC	4
6		Dowel - Pin .7511/.7509 dia. x 2 in.	6
7A	35-13237-X	Dial six station	1
7B	35-13253-X	Dial twelve station	1
8	25-2904-W	Motor - Fluid .010-.00337 OR 339	1
9	25-1882-X	Valve - Speed and Sequence 010-.00977 - 978 - 979	1
10		Screw - Cap, soc hd, 5/8 - 11 NC x 2½ in. lg.	8
11	35-13243-Z	Link - Spacer	1
12		Groove - Pin (Type 4) 5/32 Dia. x 3/4 in.	1
13	MD63-89	Seal 620-.60089	2
14	35-13242-Z	Bushing	1
15	35-12006-Y-6	Spring 030-22296	1
16	D-1330-Z	Washer 030-.22664	1
17	5100-62	Ring Retaining 356-31062	1
18	35-13240-Y	Rod Pusher	1
19	35-13231-Z	Clevis	1
20	AN-396-33	Pin 321-39633	1
21	AN-380-3-3	Pin, Cotter 322-03240	1
22	6230-17	Gasket-"O" Ring .671-00239	1
23	35-13230-Z	Retainer, Spring	1
24	35-12002-Y-40	Spring, Compression 030-22087	12
25	35-13929-Y	Retainer, Bearing	1
26	6230-19	Gasket, "O" Ring 671-00241	1
27	898	Seal 620-50898	1
28	N-10	Nut 030-17681	1
29	W-10	Washer 350-01010	1
30	35-13192-Y	Gear, Worm	1
31	7210-D	Bearing 230-10025	1
32	8605	Bearing . 230-08605	1
33		Plug-1-1/2 Countersunk Pipe .410-92400	1
34	N-05	Lock Nut ~~341-10005~~ 341-10010	1
35	W-05	Lock Washer 350-01005	1
36		Plug- 1/2 Soc. Pipe 431-90800	2
37A		Screw-Cap, Soc Hd, 3/8 16 NC X 2⅜ in lg 358	2
37B		Screw- Cap, Soc Hd 5/16 18NC x 1 1/4 in lg 358	7
38	35-13200 W	Cover- Index Table	1
39		Screw- Cap, Soc Hd,, 1/4 - 20NC X 1/2 in lg 358-12080	4
40	35-13234-Z	Cover- Bearing	1
41	35-13233-Z	Gasket Bearing Cover	1
42		Screw- Cap, Soc HD 1/4 - 20 NC X 7/8 in lg	4
43	35- 13232-Z	Cover - Bearing	1
44	35-13235-Z	Gasket - Bearing cover	1
45	XLS - 8 -1/4	Bearing - 11.000 OD/ 8.250 ID X 1.375 .230-10013	1
46	35-13193-Y	Gear, Worm	1
47	35-13239-Z	Shim, 3/64 Laminated	1
48	210-S	Bearing .230-00210	2
49A	35-13054-W	Arbor, 6 Station	1
49B	35-13252-W	Arbor, 12 Station	1
50A	35-13053-W	Drive, Geneva 6 Station	1
50B	35-13254-W	Drive Geneva 12 Station	1
51A	35-13195-Z	Pin, Geneva Drive	1
51B	35-13261-Z	Pin, Geneva Drive	1
52A	35-13198-Z	Roller, Geneva Drive	1
52B	35-13260-Z	Roller, Geneva Drive	1
53		Screw- Cap, Soc Hd, 1/4-20 NC X 7/8 in lg . 358-12140	6
54	35-13223-Y	Cam, Valve	1
55		Screw- Cap, Soc Hd, 3/8- 16 NC X 3/4 in lg 358-16120	6

NOTE: Item numbers with letter "A" indicate A33, 6 station table.
Item numbers with letter "B" indicate A31, 12 station table.

REVERSING ROTATION OF TABLE

This can be accomplished by simply rotating complete fluid motor (#8), 180°. Simply loosen bolts #10 and rotate motor.

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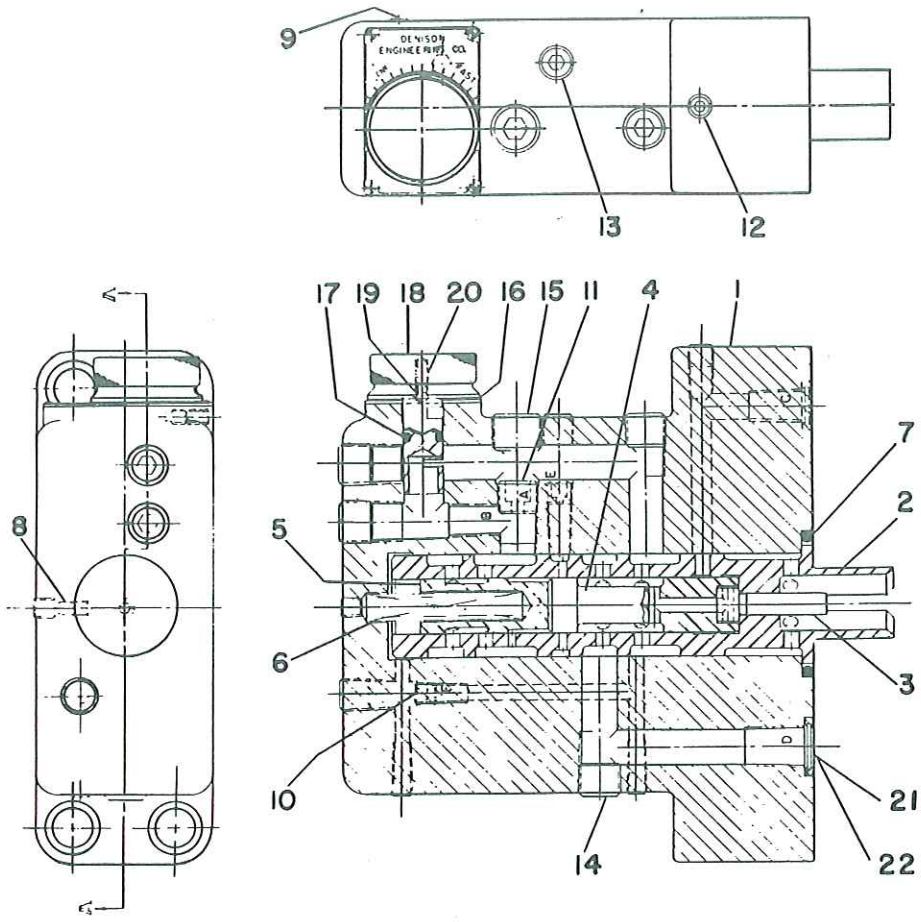
ITEM	PART NUMBER	DESCRIPTION	QUANTITY
56	35-13196-Z	Plug	
57	35-13197-Z	Plug	
58	1010	Key - Woodruff 211-.11004	
59		Screw - Cap, soc hd, 3/8-16 NC x 5/8 in. lg 358-.16100	4
60	35-13194-Y	Retainer - Bearing	
61	212-S	Bearing 230-.00212	
62	N-12	Nut - Lock 341-.10012	
63	W-12	Washer - Lock 350-.91012	
64	Group 5 #P53	Bushing - 3/4 OD x 1/2 ID x 3/4 in. lg 216-.91042	
65		Screw - Cap, soc hd, 3/8-16 NC x 1 in. lg 358-.16160	4
66A	35-13227-Z	Lock	
66B	35-13257-Z	Lock	
67A	25-2095-Y	Guide - Lock SEE B/M. 030-.13221	
67B	25-2094-Y	Guide - Lock SEE B/M.	
68	35-13281-Z	Pin	
69		Dowel - 3/8 dia. x 1 in. 324-.22416	2
70A	35-13222-Y	Eccentric - Lock	
70B	35-13256-Y	Eccentric - Lock	
71A	35-13226-Z	Plate	
71B	35-13259-Z	Plate	
72		Plug - 1-16 in. soc pipe 431-.90100	
73	35-13927-Z	Stop	
74		Screw - Set, cup pt. soc, 10-24 x 1/4 in. lg 311-.10040	
75	35-13924-Z	Pin	
76	35-13926-Z	Rod - Cam	
77	35-13925-Z	Pin 324-.22012	
78	35-11607-Z	Roller	
79	35-13928-Y	Pin	
80		Screw - Cap, hex hd, 10-24 NC x 3/8 in. lg 306-.10060	2
81	35-13279-Z	Cover - Skip station	
82	35-13228-Z	Crank	
83	1405	Elbow - Steel, oil style L. P. 1 in. pipe size 487-.21405	
84	35-13932-Z	Bushing	
85		Screw - Cap, soc hd, 5/16-18 NC x 1-1/4 in. lg 358-.14180	
86	D-8897-Z	Spring - Tension 030-.22815	
87	35-13943-Z	Pin 324-.24016	
88	35-13942-Z	Roller	
89		Plug - 1 in. soc pipe 431-.92502	
90	1610	Fitting 488-.11610	
91	35-13199-W	Plate - Sub	
92	35-13241-Y	Gasket	
93		Screw - Cap, soc hd, 1/2-13 NC x 3-1/2 in. lg 358-.20340	6
94		Plug - 3/4 in. soc pipe 431-.91200	
95		Plug - 1/2 in. soc pipe 431-.90800	

RECOMMENDED MAX. TOOL WEIGHT WITHIN DIAL WORK CIRCLE

INDEXES PER MINUTE	A33 6 STATION	A31 12 STATION
20	1000	1000
30	1000	1000
40	500	1000
50	200	1000
60	100	700
70	*	400

* NOT RECOMMENDED FOR SPEEDS OF 70 INDEXES PER MINUTE



The drawing above is a cross sectional view of the Fluid Motor Speed and Sequence Valve.

PARTS LIST

ITEM	PART NUMBER	DESCRIPTION	QUANTITY
1	35-13215-W	Body - Valve	1
2	35-13216-X	Sleeve	1
3	35-13217-Z	Pin	1
4	35-13218-Z	Spool - Sequence	1
5	35-13219-Z	Spool - Flow Control	1
6	35-12003-Y-15	Spring - Compression .930-46714	1
7	6227-33	Packing - "O" ring .671-00330	1
8		Pin 7/32 Dia. x 1/2 lg. 324-21208	1
9		Plug - 1/16 Soc. Pipe 431-90104	4
10	35-13085-Z	Orifice - Plug	2
11	35-10169-Z	Plug - Pipe	1
12		Plug - 1/8 Soc. Pipe . 431-90204	1
13		Plug - 1/4 Soc. Pipe . 431-90404	2
14		Plug - 3/8 Soc. Pipe . 431-90600	5
15		Plug - 1/2 Soc. Pipe . 431-90800	1
16	35-13236-Z	Plate - Dial	1
17	6227-10	Packing - "O" ring . 671-00112	1
18	35-13220-Z	Selector - Flow	1
19		Ball - 1/4" Hardened & Ground 201-08001	2
20	35-12001-Y-1	Spring - Compression .930-22020	2
21	56215	Vickerseal .630-56215	1
22	46146	Vickerseal .630-46146	2

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