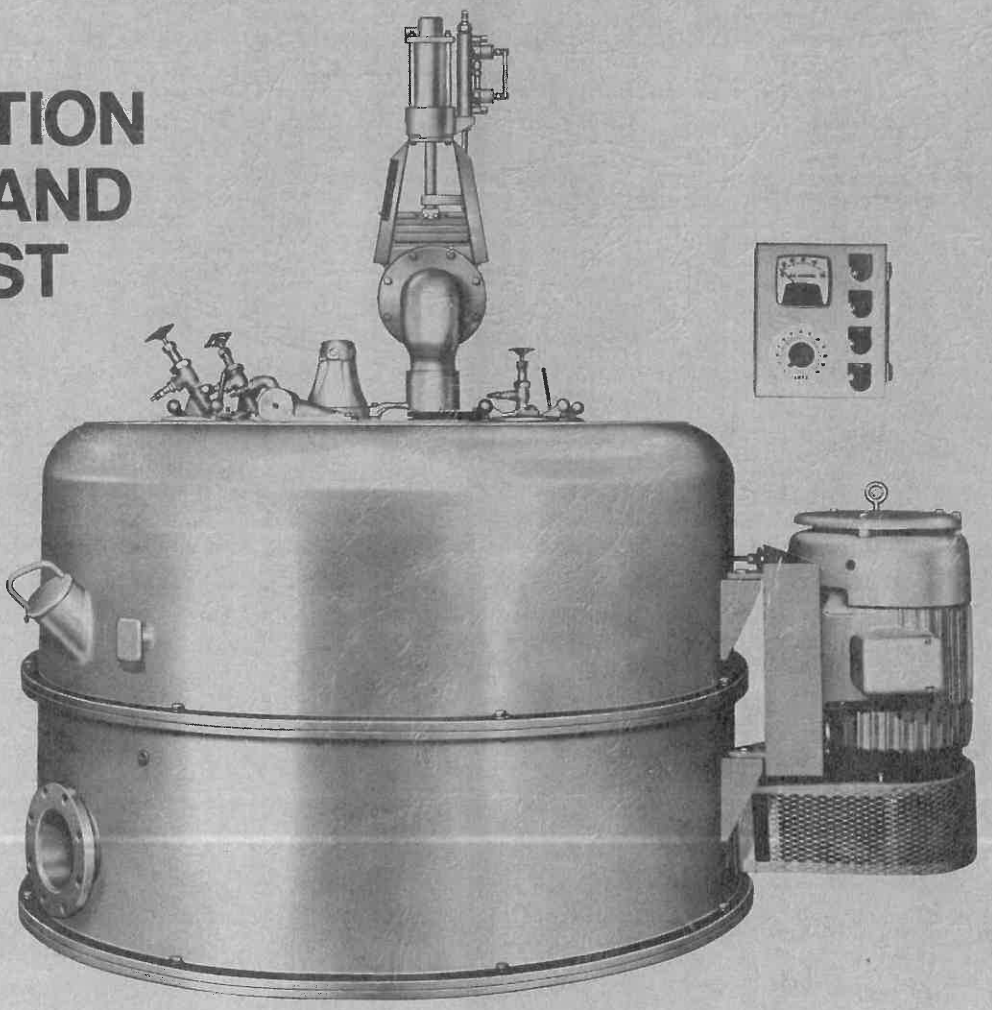
Continuous Centrifugal

INSTALLATION MANUAL AND PARTS LIST



THE WESTERN STATES MACHINE COMPANY

1798 Fairgrove Ave., Hamilton, Ohio 45012 Phone: 513-863-4758 Telex: 214-577

631

TRANSMITTAL SHEET OF DRAWINGS
FURNISHED ON JOB #80530 &B
HOLLY SUGAR CORP.,
BRAWLEY, CALIFORNIA

Model	CC-V 37" x 30°
Customer's Order	CN-17575
	Installation Manual
	Maintenance Bulletin
	Spare Parts Catalog
General Arrangement	B-8099
Centrifugal Assembly	B-8104
Load Control Piping	043-0104-00-4
Curb Top Assembly	B-8105
Load Pipe Assembly	082-0003-00-4
General Piping Arrangement	8316-
Wash & Steam Panel	B-8106
Elementary Wiring Diagram	064-0230-00-4
Connection Wiring Diagram	066-0189-00-4
Lubricating Oil System	H-4327-F
50 H.P. Motor Information	51 x 3451-03

THE WESTERN STATES MACHINE CO.
HAMILTON, OHIO DATE: 6/11/75

TABLE OF CONTENTS

SECTION I
CONTINUOUS CENTRIFUGAL INSTALLATION

1-1. GENERAL.

1-2. RECEIPT OF EQUIPMENT. Check shipment against packing list. Missing items or damage should be reported immediately to avoid unnecessary delays in parts shipments. Store the equipment in a clean dry area until the installation is made.

1-3. READ ALL INSTRUCTIONS. Study the Western States drawings and read all instructions before starting the installation. Plan every step and have all items at the installation site as they are needed. The instructions, as presented in this manual, have been arranged in a logical order as would normally be required in a new installation.

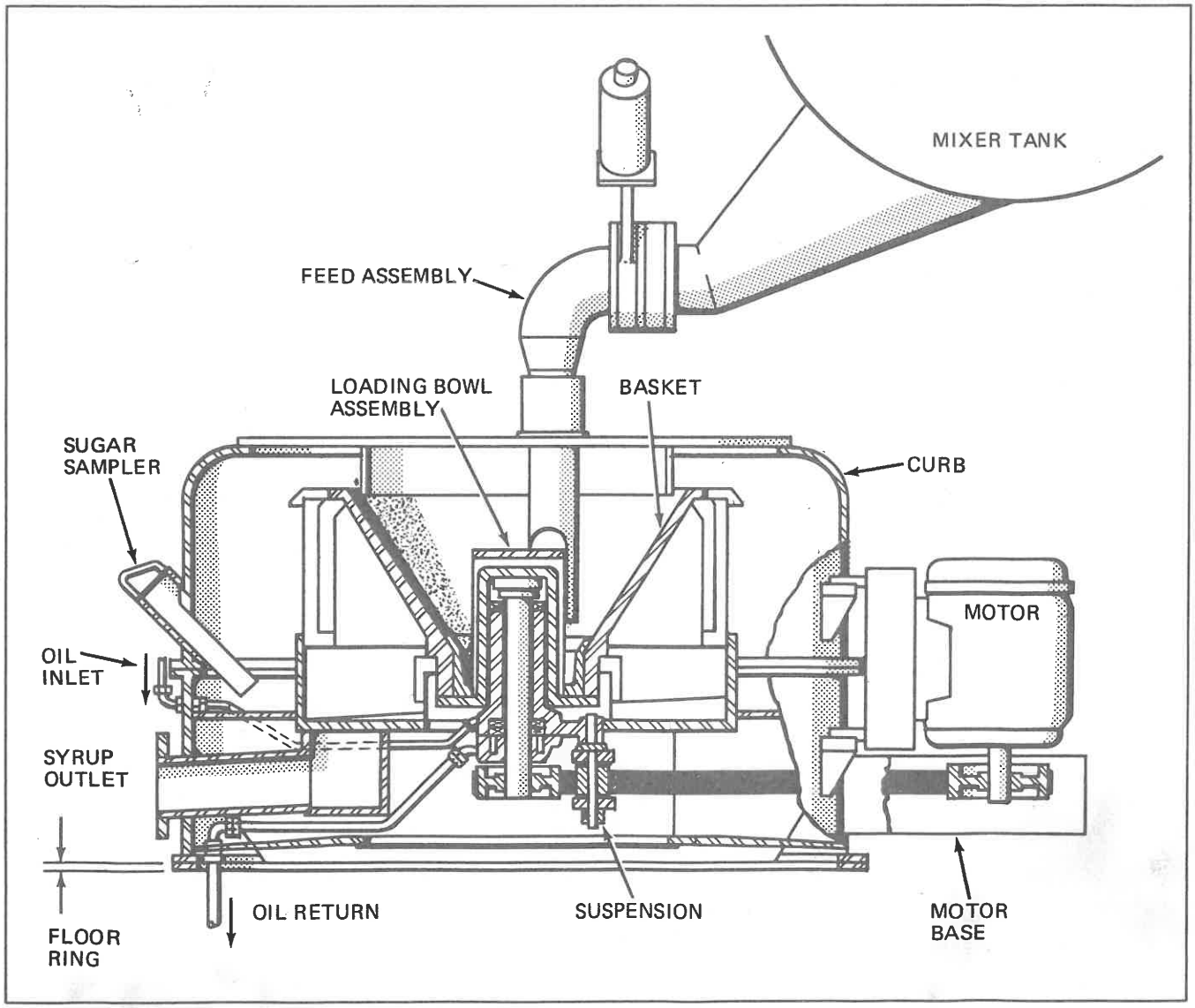


Figure 1. Centrifugal Components

1-4. SERVICE REQUIREMENTS.

The installation site must have the following service requirements available:

a. **For Steaming Sugar.** 10-20 PSIG (0.7 — 1.4 KG/CM^2) Steam — approximately 20 lbs (9 KGS) steam per minute per machine.

b. **For Washing Sugar.** 50 PSIG (3.5 KG/CM^2), Water — 5 gpm (19 LPM) maximum per machine at 180°F (85°C) minimum.

c. **Compressed Air.** 100 PSIG (7 KG/CM^2), clean and dry as possible. One standard CFM (0.028 m3) at atmospheric pressure intermittently per machine.

d. **Power Supply.** 40-, 50- or 60-KVA depending on which motor is supplied. All controls operate on single phase power supplied through a control transformer. Refer to wiring diagrams supplied for your particular installation.

e. **Lubrication System.** A tank and pump of sufficient capacity is supplied by Western States Machine Co.

1-5. CENTRIFUGAL INSTALLATION.

1-6. SUPPORT STEEL AND MIXING TANKS. Existing support steel and mixing tanks should be checked for level and plumb. Check all bolts for proper torque. Check mixer tank weld to support steel for rigidity.

1-7. FLOOR DRAINS. Provision should be made that all floor drains etc. are directed away from under the station.

1-8. PRELIMINARY ASSEMBLY. Clean all component parts. Bolt the floor ring to the bottom of the centrifugal. Refer to overall space requirements as shown on the general layout drawing.

1-9. LOCATE CENTRIFUGAL IN PLACE. Position the centrifugal in relation to the mixer tank. Use the windage shield, figure 2, to approximately position the massecuite feed pipe, massecuite valve and mixer spout to the mixer tank.

Note

Apply "NEVER SEEZ", graphite and oil, or white lead to bolts before installing.

Note

The feed pipe, massecuite valve and mixer spout assembly drawings furnished by Western States Machine Company show the position in which these components are to be mounted.

CAUTION

Care must be taken when the massecuite valve is bolted in place, to prevent springing the gate plate and seat from its proper position.

1-10. MASSECUITE VALVE INSTALLATION. The mounting bolt circle and flange diameter correspond to the A.S.A. 125 P.S.I. standard. The massecuite valve in the closed position should have the massecuite pressure exerted against that side of the moving plate which causes the plate to seat.

1-11. LEVEL AND ALIGNMENT OF THE CENTRIFUGAL.

a. Remove the curb top and place a mechanics level across the top of the basket assembly, see figure 3.

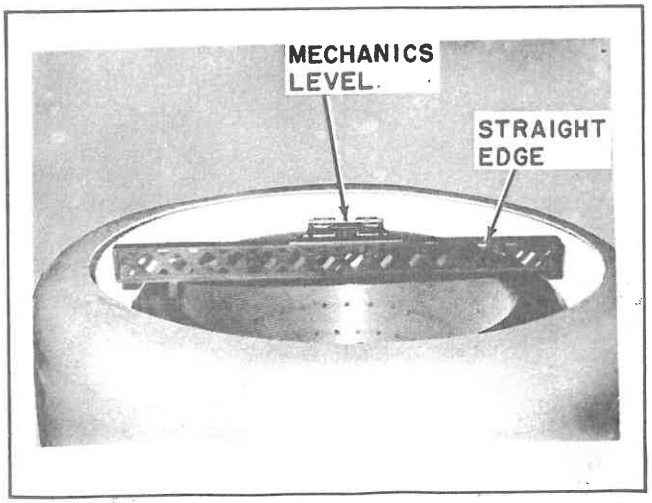


Figure 3. Leveling Centrifugal

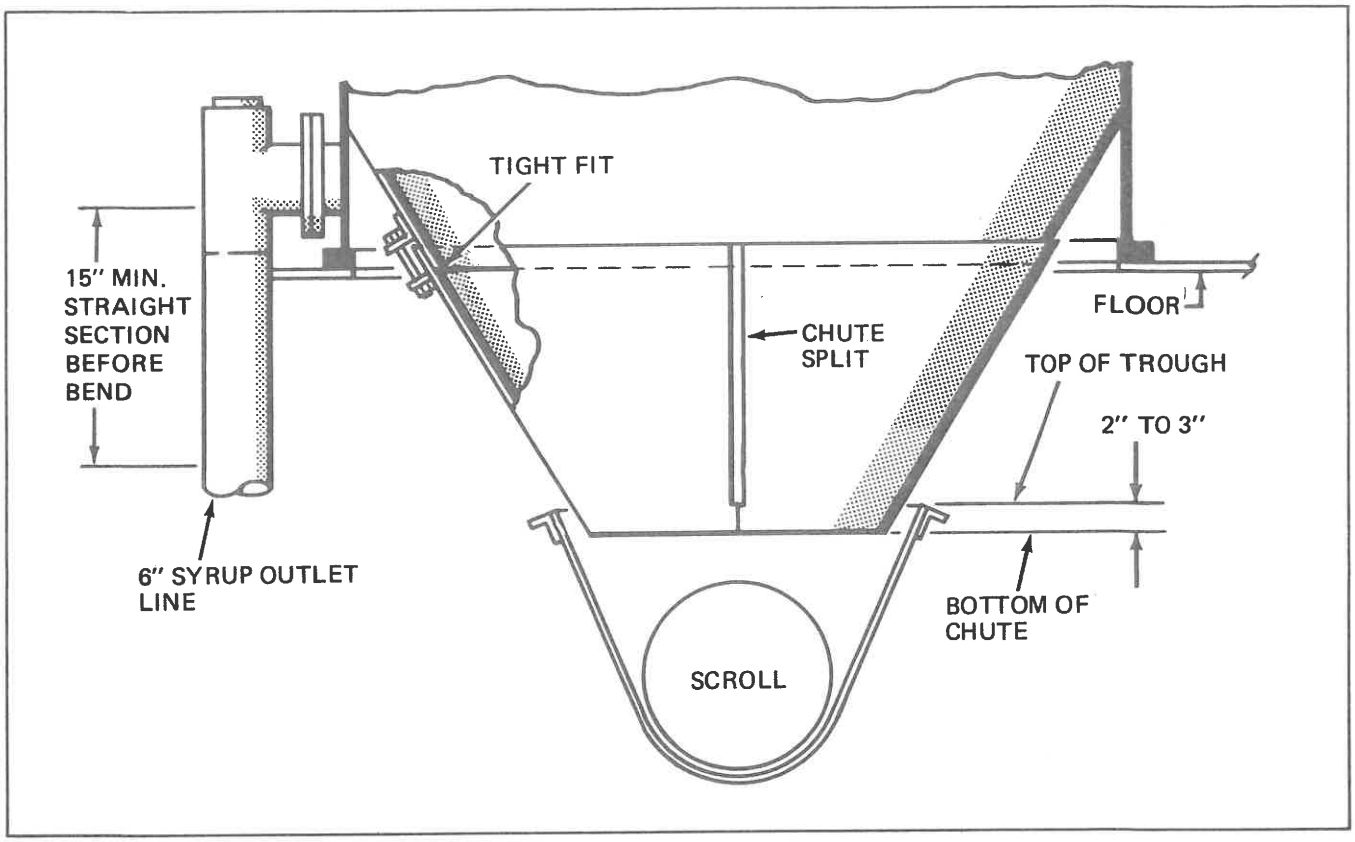


Figure 5. Syrup Outlet and Sugar Chute Connections

TABLE 1. EQUIVALENTS OF REGAL G OIL

OIL COMPANY	BRAND NAME
Atlantic	Bureka Oil K
Baum's Castorine	Tena Film 400 K
Cities Service	Pacemaker No. 80
Continental	Dectoh HH
Esso	Terresso 85
Fiske Brothers	Empire Engine Oil (A)
Gulf	Harmony 76
Houghton	Hydro-Drive MIH 40
New York, New Jersey Lubricating Co.	F-B 140
Pennzoil	Pennbell No. 5
Phillips Petroleum	Condor Lub Oil No. 1012
Pure	Puropale RX Spec Hvy
Richfield	Eagle Oil Hvy
Shell	Tellus 72
Sinclair	Duro 900
Socony	Mobil DTE B-B
Standard Oil — California	Chevron OC Turbine 36
Standard — Indiana	Stanoil 95
Standard — Ohio	Sohivis 85
Sun	Sunvis 777
Texas	Regal G (R & O)
Tidewater	Avalon 78
Valvoline	E.T.C. Heavy

SECTION II
TUBING AND PIPING CONNECTIONS

2-1. GENERAL.

a. Tubing should be bent wherever possible to reduce the number of fittings. Bend tubing as accurately as possible. Use a tube bender if available. Tubing should be anchored firmly to prevent fatigue cracking.

Note

All lubricating piping should be cleaned before connecting to the oil supply tank and centrifugal. Use of pipe "dope" should be held to a minimum to avoid clogging of oil lines and contamination of oil. "Teflon" tape is recommended for all threaded fittings. The teflon should be kept back from the first two threads to avoid getting tape into the lines. See figure 6.

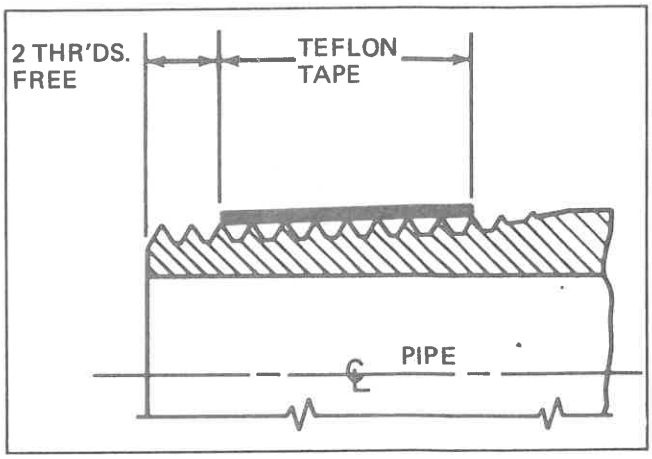


Figure 6. Teflon Tape on Piping Threads

b. Avoid short straight line connections wherever possible. Cut tube ends square. Burr inside of tube and remove burrs from outside edge. Excessive chamfer on outside edge will destroy bearing of tube end on the fitting seat.

c. See figure 7 for correct method of making tubing connections.

d. Layout all piping systems so that they are easy to install and present a neat appearance. Care should be taken to eliminate stress from tubing lines. Long tubing runs should be supported by brackets or clips.

e. Before installing tubing, inspect the tube to see that it conforms to the required specification, is the correct diameter and wall thickness and is not out of round.

f. To avoid difficulty in assembly and disconnecting, a sufficient straight length of tube must be allowed from the end of the tube to the start of the bend. Allow twice the length of the nut as a minimum.

g. Tubes should be formed to assemble with true alignment to the center line of the fittings, without distortion or tension. A tube which has to be sprung from position "A" (see figure 7), to be inserted into the fitting has not been properly fabricated, and when so installed and connected, places the tubing under stress.

h. When assembling the tubing, insert the longer leg to the fitting as at "C" and then insert the other end into fitting "D". Do not screw the nut onto the fitting at "C". This holds the tubing tight and restricts any movement during the assembly operation. With the nut free, the short leg of the tubing can be easily moved and brought to proper position with and inserted into the seat in fitting "D". The nuts can then be tightened as required.

2-2. LUBRICATION SUPPLY LINE.

a. If more than one centrifugal is supplied, a supply header should be installed of sufficient capacity to satisfy the number of machines being installed. A 3/4 inch (19 mm) supply line will supply 5 centrifugals. A shutoff valve, supplied by customer, should be located in each branch line as close to the header as possible. Black pipe is recommended for oil lines when copper tubing is not used.

b. The inlet oil connection (pressure line) to centrifugal is underneath the centrifugal (see figure

header line to the centrifugal station. The suggested location is beneath the mixer tank to the rear of the mixer spouts. However, this line can be installed in any other convenient location. This line should be capable of supplying clean, dry air at 100 PSIG (7 KG/CM^2) pressure to the centrifugal. A 3/4 inch (19 mm) air header will adequately supply air to 5 centrifugals.

b. If there is more than one machine, branch lines to each machine should have a shut-off valve, supplied by customer, installed as close to header as possible.

Note

All air piping should be carefully cleaned before installation and before connection to the centrifugal.

c. The air piping connection supplies air to the solenoid valves. These valves control the air flow to the massecuite valve cylinder which opens and closes the massecuite valve.

d. Complete the tube connections from the solenoid valve bracket to the massecuite valve cylinder and Cyl-Check speed control. These connections are illustrated on the "Massecuite Control Piping" drawing. Sufficient tubing and fittings to make these connections are furnished.

2-5. STEAM CONNECTIONS.

a. Black pipe is recommended. Install the steam supply line to the centrifugals. A 1-1/2 inch (38 mm) steam supply header will adequately supply five centrifugals. This supply should be dry steam adjusted to 40 PSIG (2.8 KG/CM^2) by the pressure regulator. There are four points at which steam must be connected to the centrifugal. Each of these points must be provided with a shut-off valve.

b. The first connection is for steaming the sugar in the basket. Two shut-off valves are required for this connection. One shut-off valve (furnished by customer) should be located near the steam supply header in the branch line between the header and the centrifugal. The second shut-off valve (furnished by Western States) is located on the steam and wash piping bracket. The incoming steam supply is connected to this second shut-off valve. A union connection should be made somewhere between these two shut-off valves. An adequate length of flexible hose and hose clamps are supplied for making the connection between this steam and wash piping bracket and the steam pipe in the top of the centrifugal.

c. The second steam connection from the header shut-off valve (supplied by customer) is a 3/8-inch (10 mm) female pipe connection. The purpose of this connection is to steam out the "sugar" compartment.

d. The third steam connection from the header shut-off valve (supplied by customer) is a 3/8 inch male pipe connection. The purpose is to steam out the "syrup" compartment.

e. The fourth steam connection from the header shut-off valve is to the feed spout upstream and downstream of the massecuite feed valve.

2-6. WATER CONNECTIONS.

a. Brass pipe is recommended. A one inch (25.4 mm) header line will adequately supply wash water to five centrifugals. This header should be capable of supplying 50 PSIG (3.5 KG/CM^2) pressure. The pressure can be adjusted by the pressure regulator which is supplied for each centrifugal.

b. A shut-off valve (supplied by customer) should be inserted in all water supply branch lines.

c. Adequate lengths of flexible hose, hose clamps and shut-off valves are provided for making the connections between the "wash water and steam piping bracket" (mounted by customer as previously mentioned), the wash water pipe which is located in the hinged cover next to the steam pipe at the top of the centrifugal, and loading bowl wash located in the feed spout nozzle.

d. Adjustment of the wash pipe can be made in two directions, the depth at which the wash pipe extends into the basket and the angle at which the wash nozzle sprays into the basket.

e. The depth can be adjusted by loosening the socket head setscrew located in front of the wash pipe bracket and pulling the pipe up or down.

f. The angle can be adjusted by loosening the hex head capscrew at the rear of the wash pipe bracket and swinging the pipe to the desired spray angle. A

SECTION III
ELECTRICAL COMPONENT INSTALLATION AND WIRING

3-1. WIRING. Connect the motor starters, breakers, massecuite valve control, pressure switches, solenoid valves, pushbutton stations and other electrical devices in accordance with electrical drawings supplied. The capacity of the power circuit (3 phase) should be 40-, 50-, or 60-KVA, capable of handling a 40-, 50-, or 60-H.P. Drive Motor and its auxiliaries. A 115-volt single phase lamp circuit is also required.

3-2. PUSHBUTTON STATION. Install the pushbutton station to the side of each centrifugal and locate in a convenient spot. It may be supported on brackets raised from the floor, suspended from the mixer tank or mounted to the frame.

3-3. STARTER AND MASSECUITE VALVE CONTROLLER. Mount the combination controller in an accessible location, free from vibrations. This location does not necessarily have to be at the centrifugal.

3-4. MOTOR BELT TENSION. Check the rotation of the main drive motor and belt tension. The centrifugal must rotate in a clockwise direction when looking down from the top. The belt should be tight enough to avoid slipping but should not be

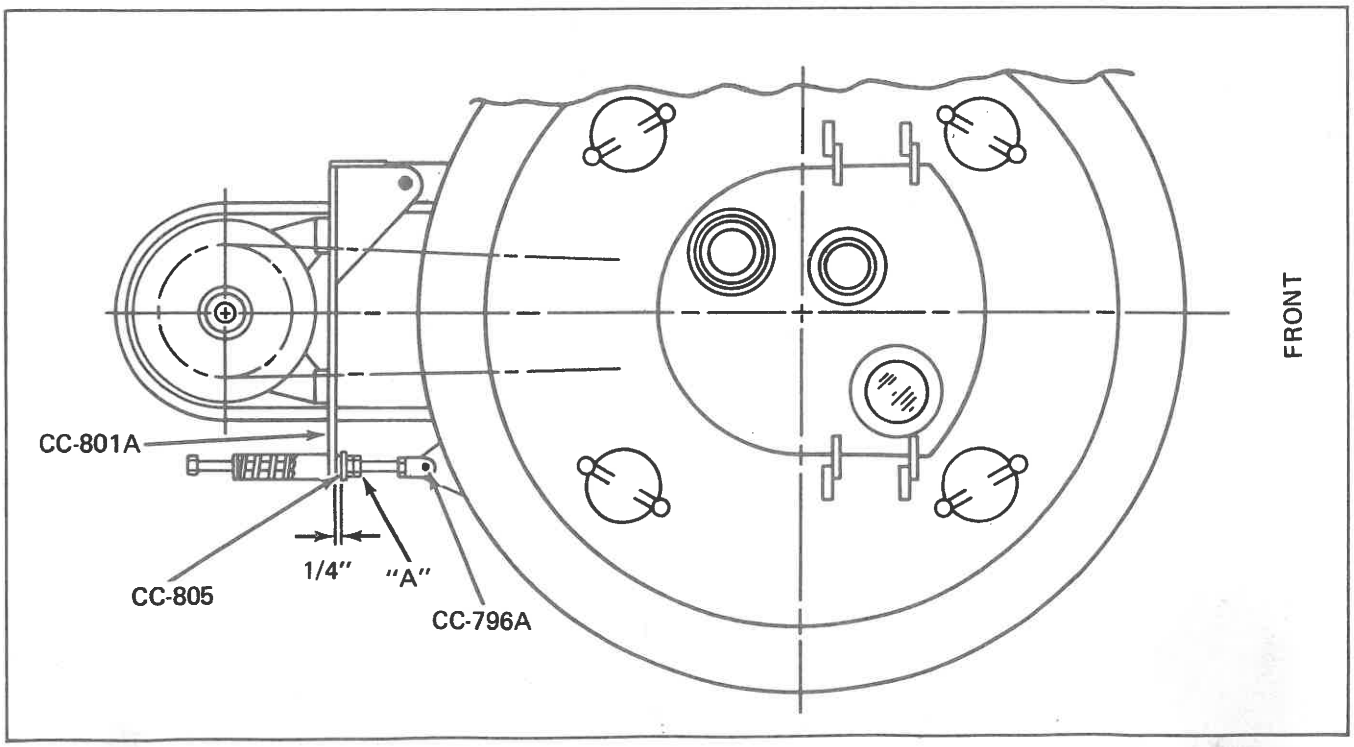


Figure 8. Motor Base Adjustment

SECTION IV

PREOPERATION CHECK LIST

4-1. PREPARATORY STEPS BEFORE OPERATION OF THE CENTRIFUGAL.

a. Check carefully that all of the installation instructions have been properly completed.

b. Check carefully to see that no debris is inside the basket, curb or anywhere else where it might damage equipment.

c. Start the oil pump and bleed the air from the oil lines by loosening the fittings at the oil pressure or flow switch(s). After the centrifugal is operating and the oil has warmed up, the oil pressure should be adjusted to 10 PSI (0.7 KG/CM^2), approximately one-quarter pint (120 cc) per minute.

d. Check the wiring and setting of the lubricating oil pressure or flow switch for each centrifugal. If they have been properly wired, the main drive motor of the centrifugal will not start until correct oil pressure or flow is supplied. THE OIL SYSTEM AND PRESSURE SWITCH OR FLOW SWITCH MUST WORK IN THIS MANNER.

e. The steam pipe is mounted in a clamp which can be adjusted by loosening the pipe clamp bolts. The mounting bracket also has slots in which the mounting bolts in the curb top are located. This allows adjustment of the steam pipe relative to the basket wall. The steam pipe should be adjusted in the best position for steaming the sugar.

f. Close the curb top covers.

g. Open the steam valve at the top of the curb. Adjust the steam pressure to 4 PSI (0.3 KG/CM^2).

h. Open the shut-off valves which supply steam to the two connections in the curb to heat the machine. Adjust pressure to 4 PSI (0.3 KG/CM^2).

i. Open the shut-off valve which supplies hot water at the top of the curb. Adjust water pressure to 4 PSI (0.3 KG/CM^2), about 1/2 gallon per minute (2 liters).

j. Open the air line. Adjust the air pressure to 60 PSI (4.3 KG/CM^2).

k. Check all piping for leaks.

4-2. MANUAL MASSECUITE VALVE CONTROL Figure 10.

4-3. DESCRIPTION. Before the massecuite valve can be operated, the main drive motor starter must be energized, and other interlocks (e.g. scroll) closed. The massecuite valve is electropneumatically actuated. Solenoid valves operate a double acting air cylinder to open and close the valve. The solenoids are controlled by a three-position spring loaded selector switch which is marked "OPEN-OFF-CLOSE." The switch is mounted on the control cabinet.

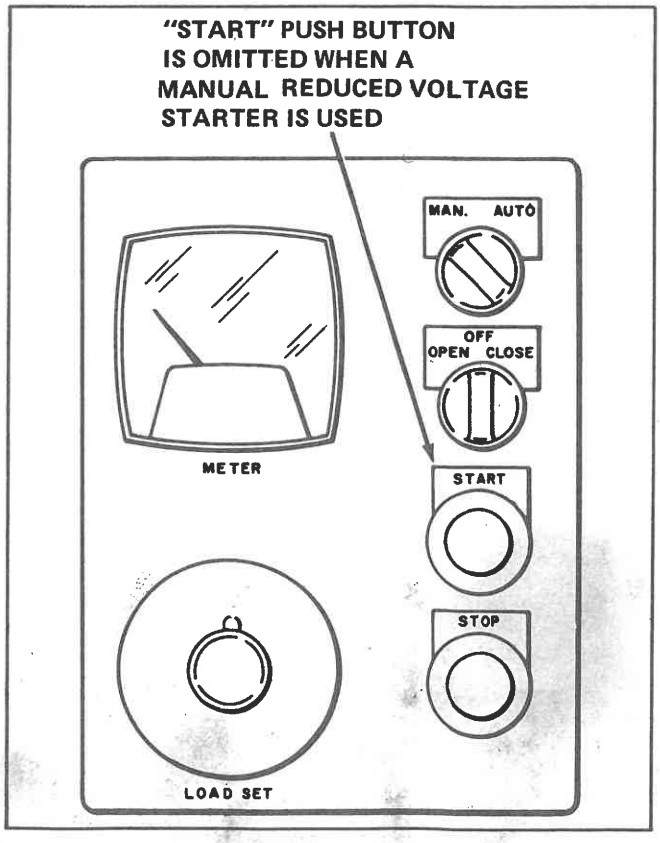


Figure 10. Manual Massecuite Valve Control Cabinet

4-10. AUTOMATIC MASSECUITE VALVE CONTROL, Figure 11.

4-11. DESCRIPTION. Two modes of operation are possible, with selection of the desired mode being made at the operator's control station by means of the Manual-Automatic Selector Switch. Operation in the Manual mode is as described in paragraph 4-9. In Automatic operation, the massecuite valve controller automatically makes adjustments to the massecuite valve aperture which controls the massecuite feed rate. The controller senses variations in motor load which is directly affected by the amount of massecuite fed into the centrifugal. The controller compares the motor load to the load value setting on the controller load set dial, and actuates the massecuite valve accordingly, to increase or decrease the massecuite feed rate.

4-12. On machines which are equipped for manual massecuite valve operation, only the motor amps are sensed and displayed on the meter at the operator's station. On machines equipped for automatic massecuite valve operation, the motor wattage is sensed. The meter display represents the load on the motor, not actual wattage or amperage. This load should be adjusted to obtain the desired quality of sugar and molasses, rather than any certain motor load reading.

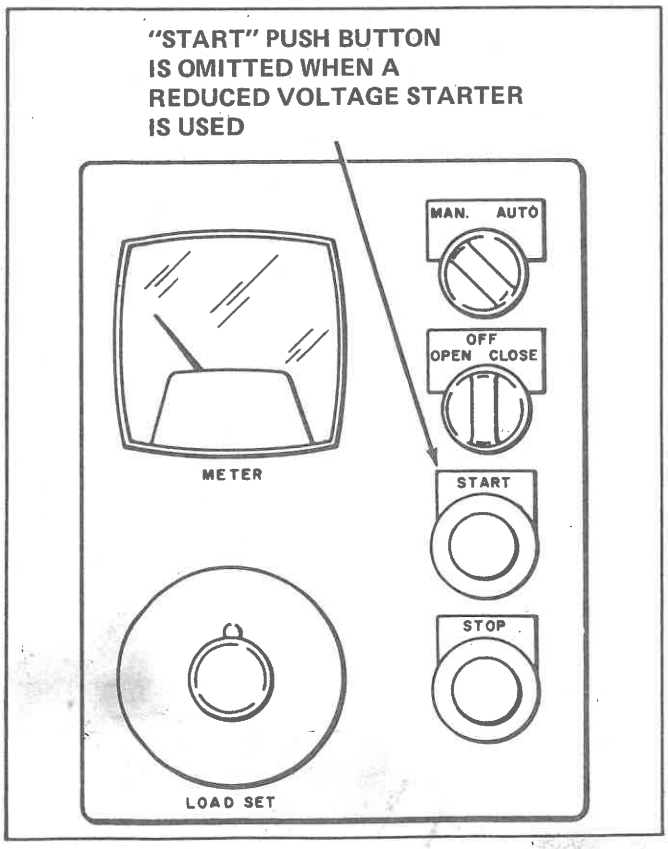


Figure 11. Automatic Massecuite Valve Control Cabinet

4-13. The massecuite valve is operated electro-pneumatically. Solenoid valves operate a double acting air cylinder which in turn operates the massecuite valve. In manual operation, the speed at which the massecuite valve opens or closes can be controlled by adjusting air restrictors installed in the exhaust ports of the solenoid valves, as described above. In automatic operation, the speed is controlled by needle valves incorporated in the hydraulic cyl-check assembly.

4-14. Power surges which are apt to affect the massecuite valve operation are corrected automatically within the controller without upsetting the preset massecuite feed rate. In the event of a complete power loss, the massecuite valve will close to provide a fail-safe operation.

4-15. A low load sensing circuit will close the massecuite valve when the mixer tank empties. After the mixer tank is refilled, the control switch is returned to MANUAL, the massecuite valve is opened and when the feed rate is again established, the switch is turned to AUTO.

4-16. The LOAD SET dial is graduated 0-100. The meter will provide a visual check on the motor load. It is also graduated 0.100, and hence does not represent the actual magnitude of watts, but does provide a visual indication of motor load. The LOAD SET dial is set at a value that will maintain the desired massecuite feed rate and the most efficient operation of the centrifugal. When the value is established, the dial is locked to prevent any change caused by vibrations, etc.

4-17. CONTROLLER OPERATIONAL CHECK. The controller can be checked with or without operating the motor.

4-18. Checks possible without operating the motor:

a. Remove motor leads T1, T2 and T3 from the load terminals in the combination starter. Close the air header supply valve to the massecuite valve. If a manually operated shut-off valve is installed, it should be closed.

b. Start the lubricating oil pump.

TABLE 3. RELAY/SOLENOID CHECKS

Step	Load Set Dial	Relays Energized	Solenoid Energized
I	25% below Motor No Load	After a 20 second wait 4CR and CR2	After a 20 second wait, none
II	Increase to Motor No Load	4CR and CR2 drop out without delay	GSV2-N.O. without delay
III	Increase to 25% above Motor No Load	3CR and CR2 after 20 second wait	After a 20 second wait GSV2-N.O. & GSV1-N.C.
IV	Decrease to Motor No Load	3CR and CR1 drop out without delay	GSV2 without delay
V	Decrease to 25% below Motor No Load	After a 20 second wait 4CR and CR2	After a 20 second wait, none

TABLE 5. RATIOS OBTAINABLE WITH 100 TO 250 AMPERE TRANSFORMERS

Maximum error ± 2.5 percent with burden of 5 volt-amperes at 60 cycles.

TRANSFORMER NAMEPLATE RATING				Primary Turns	Secondary Turns
100.5	150.5	200.5	250.5		
Actual Primary Current to Produce Secondary Current of 5 Amperes					
145	195	245	295	1	+9
140	190	240	290	1	+8
135	185	235	285	1	+7
130	180	230	280	1	+6
125	175	225	275	1	+5
120	170	220	270	1	+4
115	165	215	265	1	+3
110	160	210	260	1	+2
105	155	205	255	1	+1
100	**150**	**200**	**250**	**1**	**0**
	145	195	245	1	-1
	140	190	240	1	-2
	135	185	235	1	-3
	130	180	230	1	-4
	125	175	225	1	-5
	120	170	220	1	-6
	115	165	215	1	-7
	110	160	210	1	-8
	105	155	205	1	-9
72.5	97.5	122.5	147.5	2	+9
70	95	120	145	2	+8
67.5	92.5	117.5	142.5	2	+7
65	90	115	140	2	+6
62.5	87.5	112.5	137.5	2	+5
60	85	110	135	2	+4
57.5	82.5	107.5	132.5	2	+3
55	80	105	130	2	+2
52.5	77.5	102.5	127.5	2	+1
50	**75**	**100**	**125**	**2**	**0**
	72.5	97.5	122.5	2	-1
	70	95	120	2	-2
	67.5	92.5	117.5	2	-3
	65	90	115	2	-4
	62.5	87.5	112.5	2	-5
	60	85	110	2	-6
	57.5	82.5	107.5	2	-7
	55	80	105	2	-8
	52.5	77.5	102.5	2	-9
48.3	65	81.7	98.3	3	+9
46.7	63.3	80	96.7	3	+8
45	61.7	78.3	95	3	+7
43.3	60	76.7	93.3	3	+6
41.7	58.3	75	91.7	3	+5
40	56.7	73.3	90	3	+4
38.3	55	71.7	88.3	3	+3
36.7	53.3	70	86.7	3	+2
35	51.7	68.3	85	3	+1
33.3	**50**	**66.7**	**83.3**	**3**	**0**
	48.3	65	81.7	3	-1
	46.7	63.3	80	3	-2
	45	61.7	78.3	3	-3
	43.3	60	76.7	3	-4
	41.7	58.3	75	3	-5
	40	56.7	73.3	3	-6
	38.3	55	71.7	3	-7
	36.7	53.3	70	3	-8
	35	51.7	68.3	3	-9
36.2	48.7	61.2	73.7	4	+9
35	47.5	60	72.5	4	+8
33.7	46.2	58.7	71.2	4	+7
32.5	45	57.5	70	4	+6
31.2	43.7	56.2	68.7	4	+5
30	42.5	55	67.5	4	+4
28.7	41.2	53.7	66.2	4	+3
27.5	40	52.5	65	4	+2
26.2	38.7	51.2	63.7	4	+1

TRANSFORMER NAMEPLATE RATING				Primary Turns	Secondary Turns
100.5	150.5	200.5	250.5		
Actual Primary Current to Produce Secondary Current of 5 Amperes					
25	**37.5**	**50**	**62.5**	**4**	**0**
	36.2	48.7	61.2	4	-1
	35	47.5	60	4	-2
	33.7	46.2	58.7	4	-3
	32.5	45	57.5	4	-4
	31.2	43.7	56.2	4	-5
	30	42.5	55	4	-6
26	36	46	56	5	+6
25	35	45	55	5	+5
24	34	44	54	5	+4
23	33	43	53	5	+3
22	32	42	52	5	+2
21	31	41	51	5	+1
20	**30**	**40**	**50**	**5**	**0**
	29	39	49	5	-1
	28	38	48	5	-2
	27	37	47	5	-3
	26	36	46	5	-4
	25	35	45	5	-5
	24	34	44	5	-6
21.7	30	38.3	46.7	6	+6
20.8	29.2	37.5	45.8	6	+5
20	28.3	36.7	45	6	+4
19.2	27.5	35.8	44.2	6	+3
18.3	26.7	35	43.3	6	+2
17.5	25.8	34.2	42.5	6	+1
16.7	**25**	**33.3**	**41.7**	**6**	**0**
	24.2	32.5	40.8	6	-1
	23.3	31.7	40	6	-2
	22.5	30.8	39.2	6	-3
	21.7	30	38.3	6	-4
	20.8	29.2	37.5	6	-5
	20	28.3	36.7	6	-6
18.6	25.7	32.9	40	7	+6
17.9	25	32.2	39.3	7	+5
17.2	24.3	31.4	38.6	7	+4
16.4	23.6	30.7	37.9	7	+3
15.7	22.9	30	37.1	7	+2
15	22.2	29.3	36.4	7	+1
14.3	**21.4**	**28.6**	**35.7**	**7**	**0**
	20.7	27.9	35	7	-1
	20	27.2	34.3	7	-2
	19.3	26.4	33.6	7	-3
14.4	20.6	26.9	33.2	8	+3
13.8	20	26.3	32.6	8	+2
13.1	19.4	25.6	31.9	8	+1
12.5	**18.8**	**25**	**31.3**	**8**	**0**
	18.1	24.4	30.7	8	-1
	17.5	23.8	30.1	8	-2
	16.9	23.1	29.4	8	-3
12.8	18.3	23.9	29.4	9	+3
12.2	17.8	23.3	28.9	9	+2
11.7	17.2	22.8	28.3	9	+1
11.1	**16.7**	**22.2**	**27.8**	**9**	**0**
	16.1	21.7	27.2	9	-1
	15.6	21.1	26.7	9	-2
	15	20.6	26.1	9	-3
11.5	16.5	21.5	26.5	10	+3
11	16	21	26	10	+2
10.5	15.5	20.5	25.5	10	+1
10	**15**	**20**	**25**	**10**	**0**
	14.5	19.5	24.5	10	-1
	14	19	24	10	-2
	13.5	18.5	23.5	10	-3

10% of nameplate value; or a frequency within 5%. 220 volt motors can be used on 208 volt network systems, but with slightly modified performance characteristics. 230 volt motors should not be applied on 208 volt networks.

4-25. Motor and control wiring, overload protection and grounding should be in accordance with the National Electrical Code and local requirements. The acceleration of the centrifugal causes high motor currents over an extended time period. The motor thermal overload device must be selected with a large enough rating to permit acceleration, without tripping, in a normal start-up cycle. For this reason, the thermal protective elements in the motor starter are rated at approximately 140% of full load motor current.

4-26. OPERATION.

a. If motor has been stored in a damp location, dry out thoroughly before operating.

b. Jog motor to check rotation. To reverse rotation of motor, interchange any two line leads. Run motor under NO LOAD to observe whether any unusual noise or hot spots develop.

SECTION V
REPAIR, ADJUSTMENT AND MAINTENANCE

5-1. MAIN DRIVE MOTOR BELT. See Section III, paragraphs 3-4 thru 3-6, for belt adjustment and installation.

5-2. ADJUSTMENT OF SUSPENSION SYSTEM FOR CONTINUOUS CENTRIFUGAL.

5-3. There are two types of baskets used with the continuous centrifugal. One is 34 degrees by 34 inch diameter, the second is 30 degrees by 37 inch. Three suspension members under the centrifugal must be adjusted. The following steps should be taken to make these adjustments:

Note

The three "Un-Shako" self-locknuts are not for adjusting the suspension members. These locknuts hold the whole suspension assembly in place and should be tight. See figure 12.

a. Using a spanner wrench, tighten the three N-09 locknuts until they are up tight. This is to seat the suspension members properly.

b. After the locknuts are up, back them off again until they are loose.

c. Retighten the locknuts by hand until they are hand-tight.

d. After the locknuts (on the 34 degrees by 34 inch basket) are hand-tight, tighten them 3/4 turn with a wrench. Bend lock tab of washers up, to prevent locknuts from turning.

e. After the locknuts (30 degrees by 37 inch basket) are hand-tight, tighten them one full turn with a wrench. Bend lock tab of washers up, to prevent locknuts from turning.

5-4. PROCEDURE FOR INSTALLING A BASKET SCREEN.

a. Break the union connections to the steam and wash lines. Remove the upper windage shield, light, curb top cover, lower windage shield and screen retainer clips around the top of the basket.

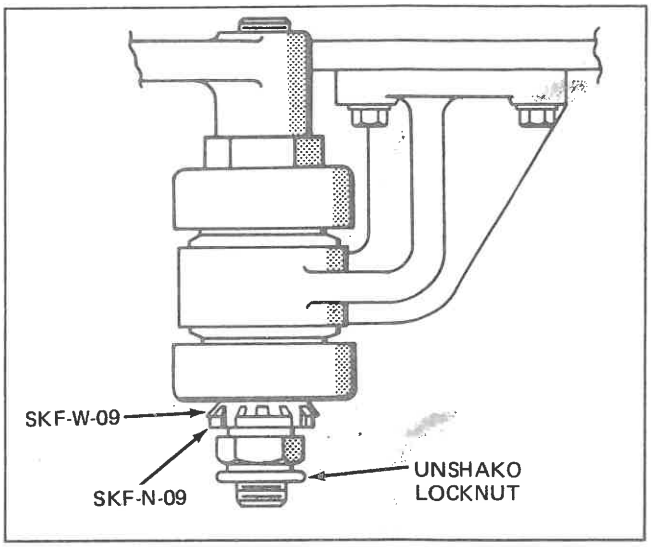


Figure 12. Suspension Member Assembly

b. If necessary, cap or plug the loading nozzle to prevent leaking, then wash the basket thoroughly. A thorough wash through the basket holes is necessary to dissolve any sugar that may have entered the syrup compartment when the screen broke.

c. In order to replace the screen, the top bolted loading bowl should be removed completely. Use inertia of the basket to break loose the four 5/8 inch hex nuts on top. Break first nut loose one quarter turn and proceed to each nut, breaking loose one quarter turn. This procedure should be followed until all nuts are removed. Remove the two 1/2 inch button head screws in center and install two 1/2 inch x 2 inch long square head jack screws. Tighten down the two 1/2 inch set screws enough to break the loading bowl loose from the basket hub. After the loading bowl is broken loose, remove the two 1/2 inch set screws. Insert in these holes the two special eyebolts provided and pull out the bowl. See figure 13.

d. Check the conical face of the basket, loading bowl and clamping surfaces. Clean the bowl thoroughly and remove any nicks that might have developed in the clamping area with a fine stone.

e. After the loading bowl is clean, insert back in

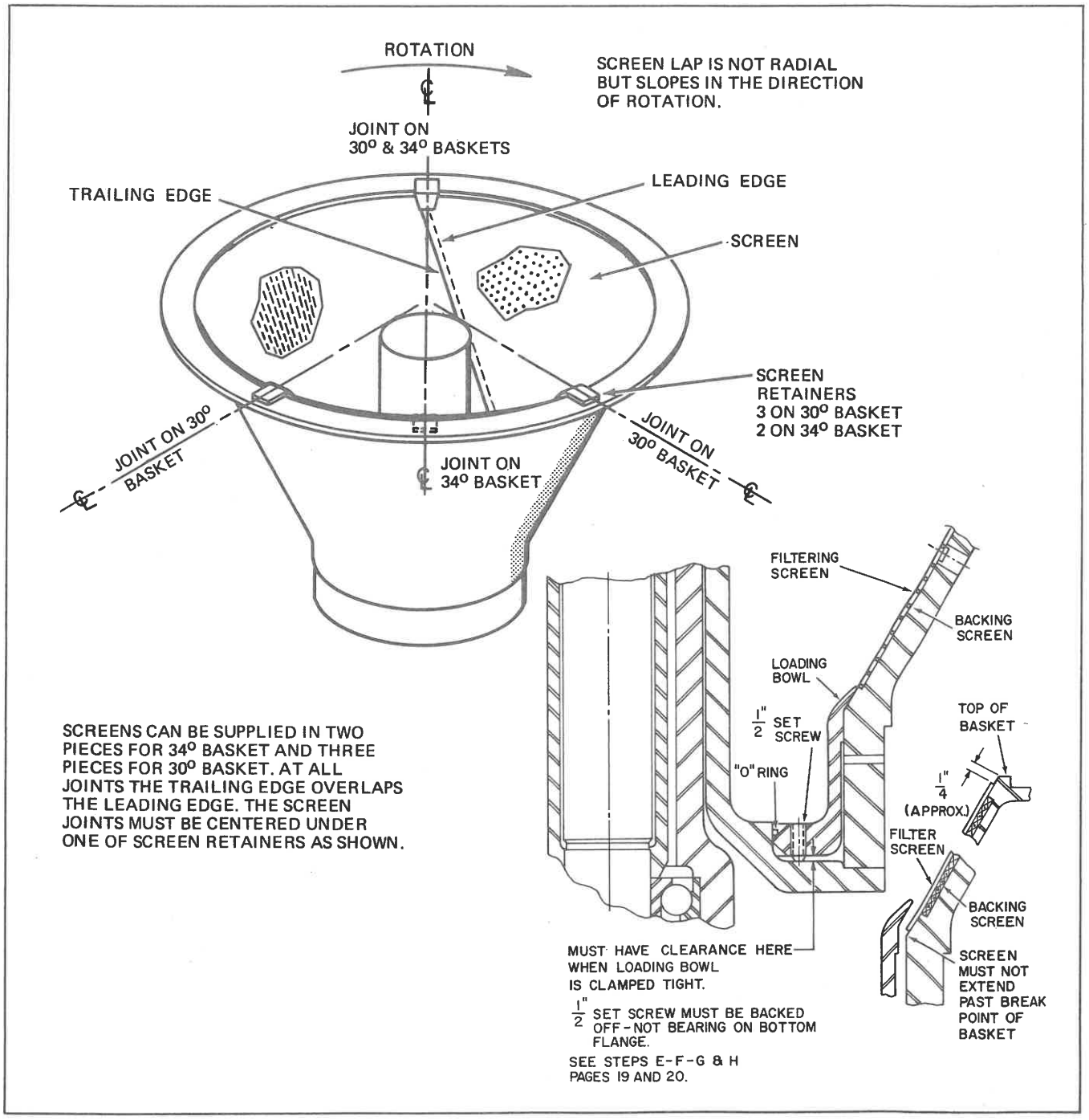


Figure 14. Filtering Screen Replacement

may be necessary to loosen the loading bowl and retainer clips, remove the wrinkles and retighten the bolts.

j. Check between the loading bowl lip and the screen with a 0.0015 inch (0.04 mm) feeler gauge, to insure the screen is tightly clamped over the entire surface.

k. Reinstall curb top and windage shield.

l. Reinstall the cover and other parts which were removed to replace the screen.

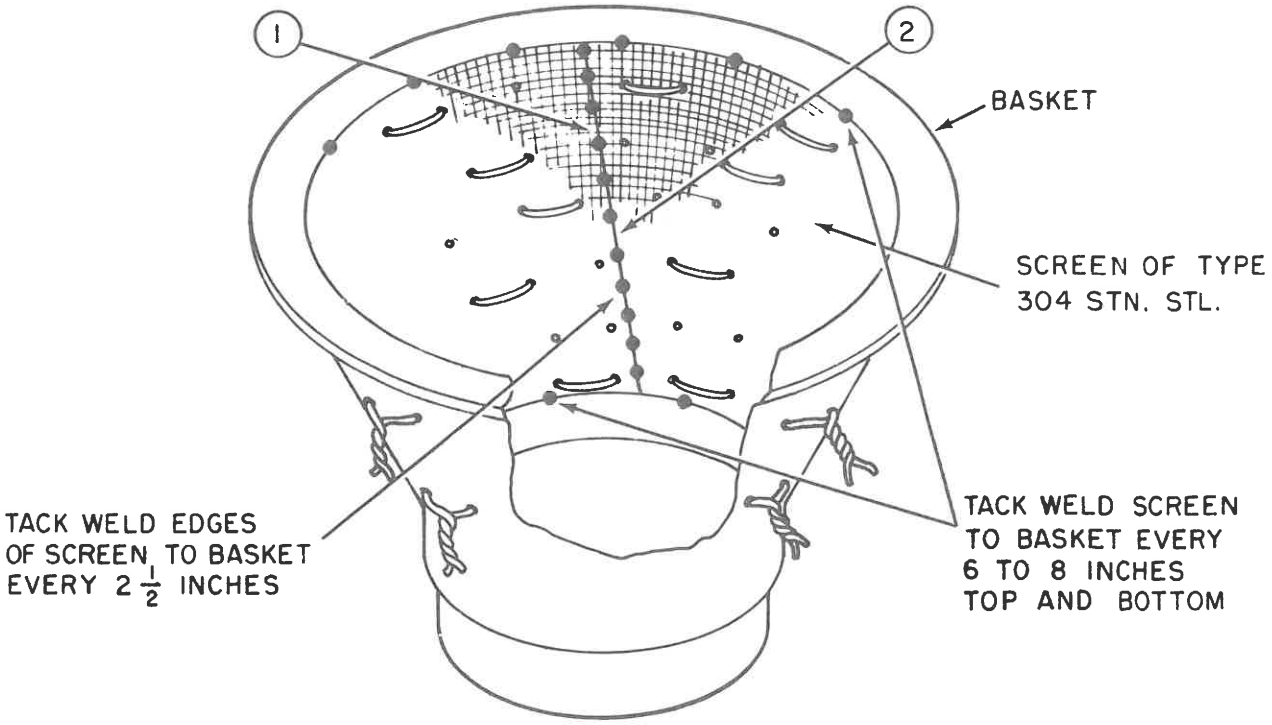


FIGURE 15. Installation of Basket Backing Screen

A. To install screen, place screen loosely in the basket with the flat side of the screen away from the basket wall.

B. Starting with edge of screened marked (1), fit the top and bottom of the screen into the machined recess in the basket. Wire the screen to the basket wall at that point as shown.

C. Progress around the basket stretching the screen flat and tight to the basket wall and securing in place with wires.

D. When the end of the screen is reached, edge (2) will overlap edge (1). Clamp a straight edge over the juncture of edges (1) and (2) and with a thin wheel grinder, cut off the overlapping portion of the screen.

E. Screen edges (1) and (2) should now line up and screen edge (2) can be pressed into the basket recess, butting together the screen edges with their top surfaces flush.

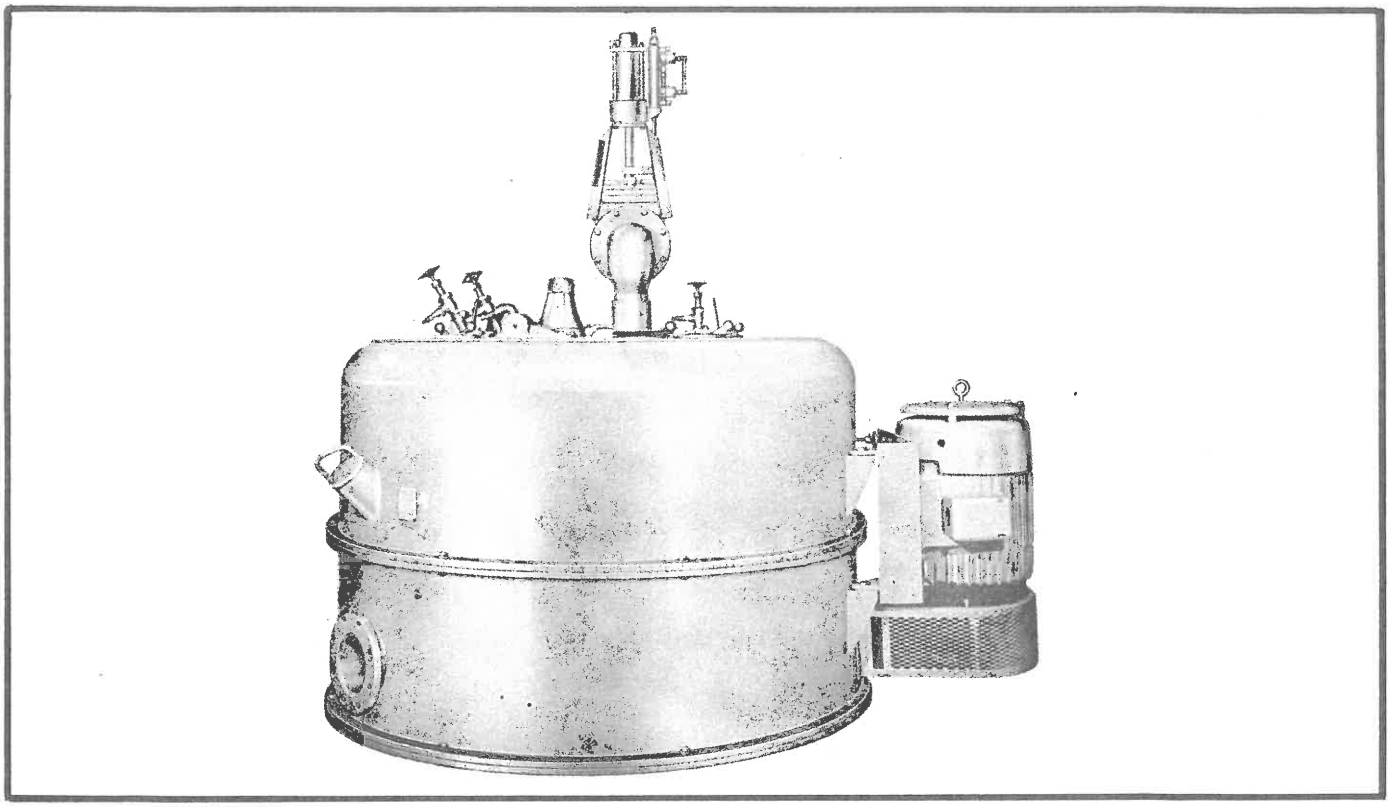
F. Tack weld screen edges (1) and (2) to the basket (every 2½ inches). (See sketch.) All welding to be metal arc inert gas shielded using 304 stainless wire. All welds to be approximately ¼ inch diameter. Weld with caution since a light weight section is being welded to a heavy metal part. Use minimum weld.

G. Tack weld backing screen to basket along the top and bottom edges, every six to eight inches.

H. Grind welds flush to avoid damage to filtering screen.

I. Remove all tie down wires.

CONTINUOUS CENTRIFUGAL



HOW TO ORDER REPLACEMENT PARTS

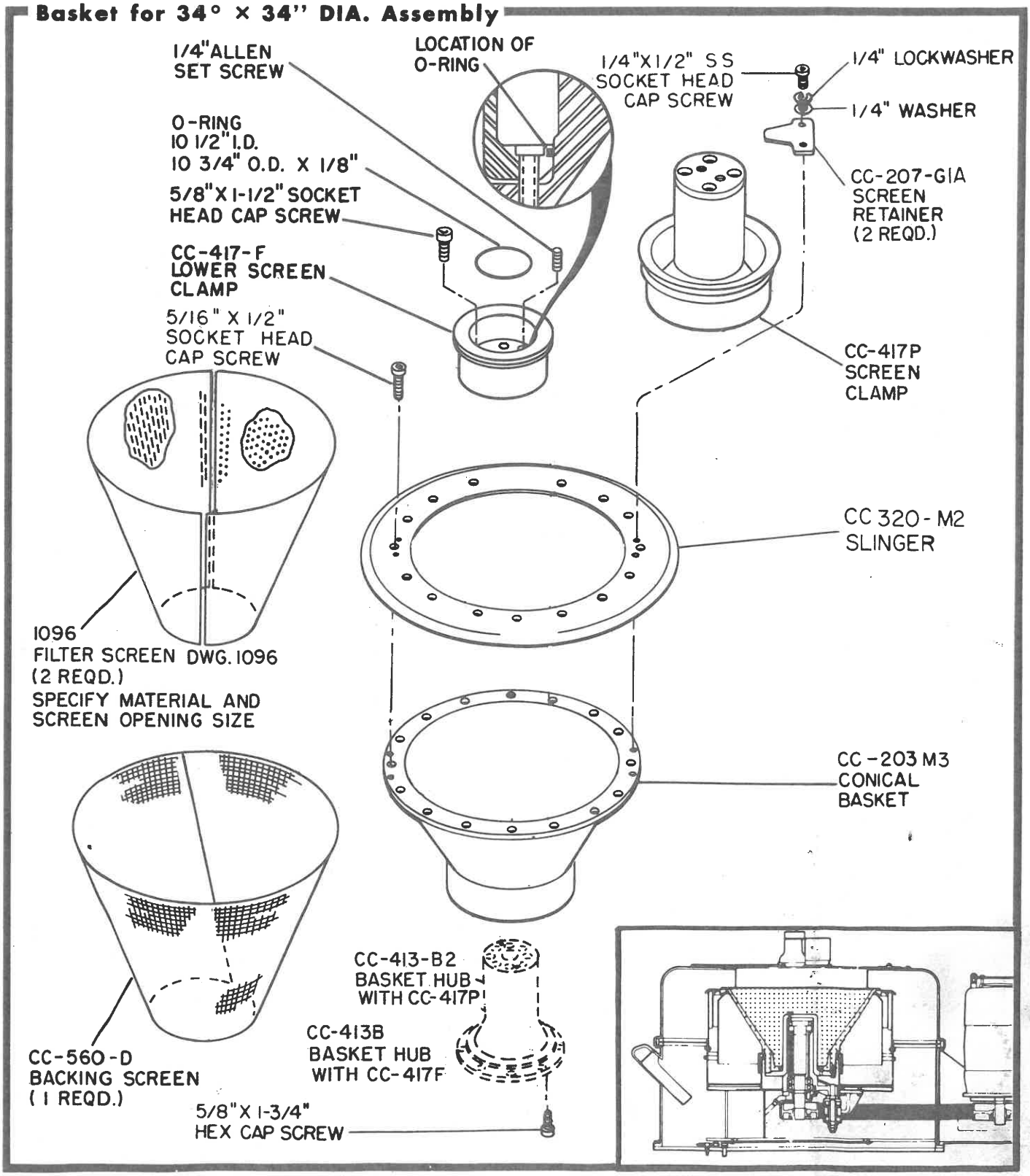
1. Every order must include the following information:
   a. The job number on nameplate
   b. The part number
   c. The complete part name
   d. The approximate date of the installation of the machines for which replacement parts are intended. This enables us to double-check any items of your order about which we may be in doubt.
2. When electrical parts are ordered, the required current characteristics must be given.
3. State clearly how goods are to be shipped, whether by freight, express, or mail. Give the specific address to which goods are to be shipped.

All of the foregoing instructions should be strictly followed if delay of your order due to lack of information is to be avoided.

Orders and correspondence should be sent to the Western States Machine Co. and addressed as follows:

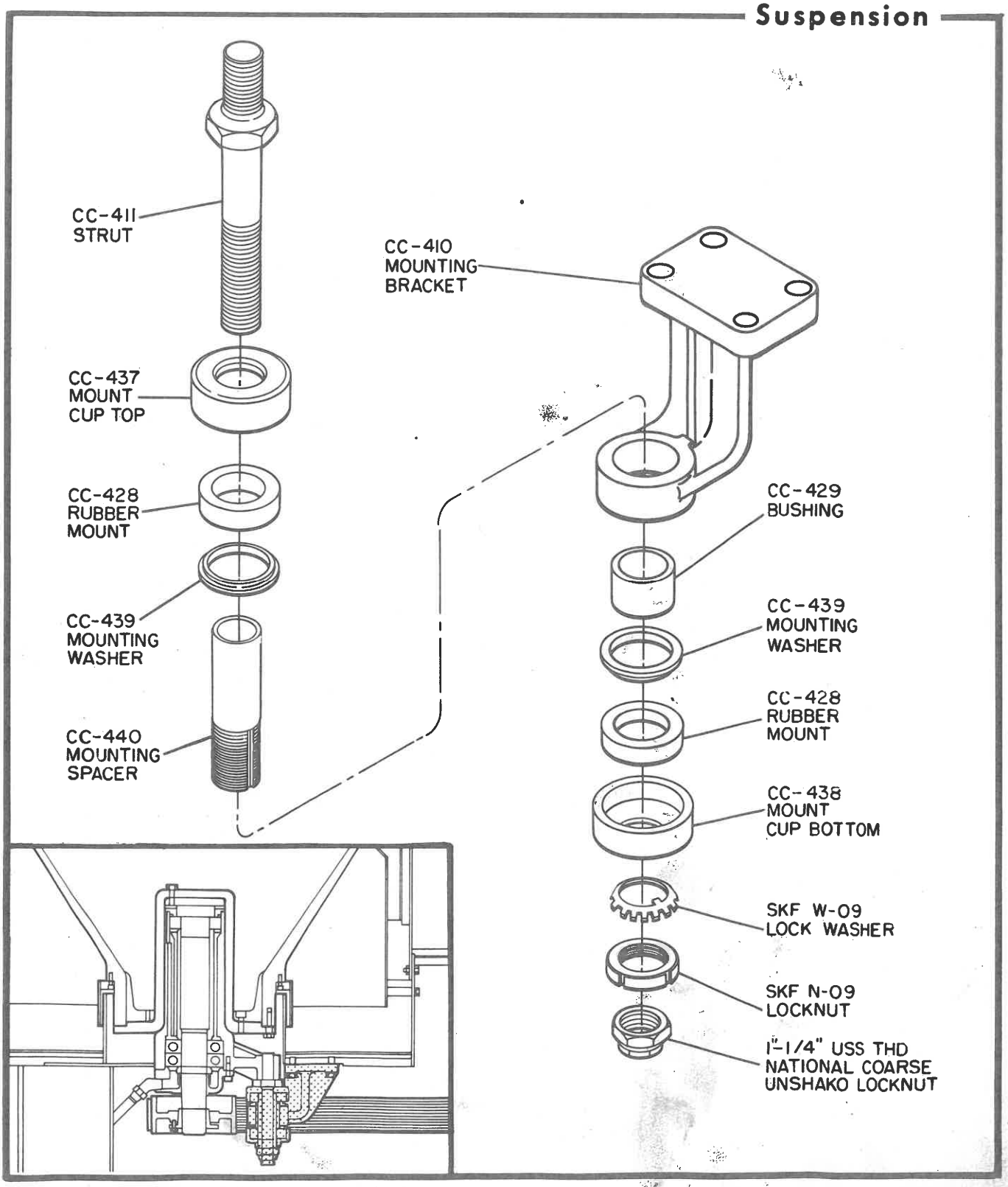
CONTINUOUS CENTRIFUGAL

Basket for 34° × 34" DIA. Assembly



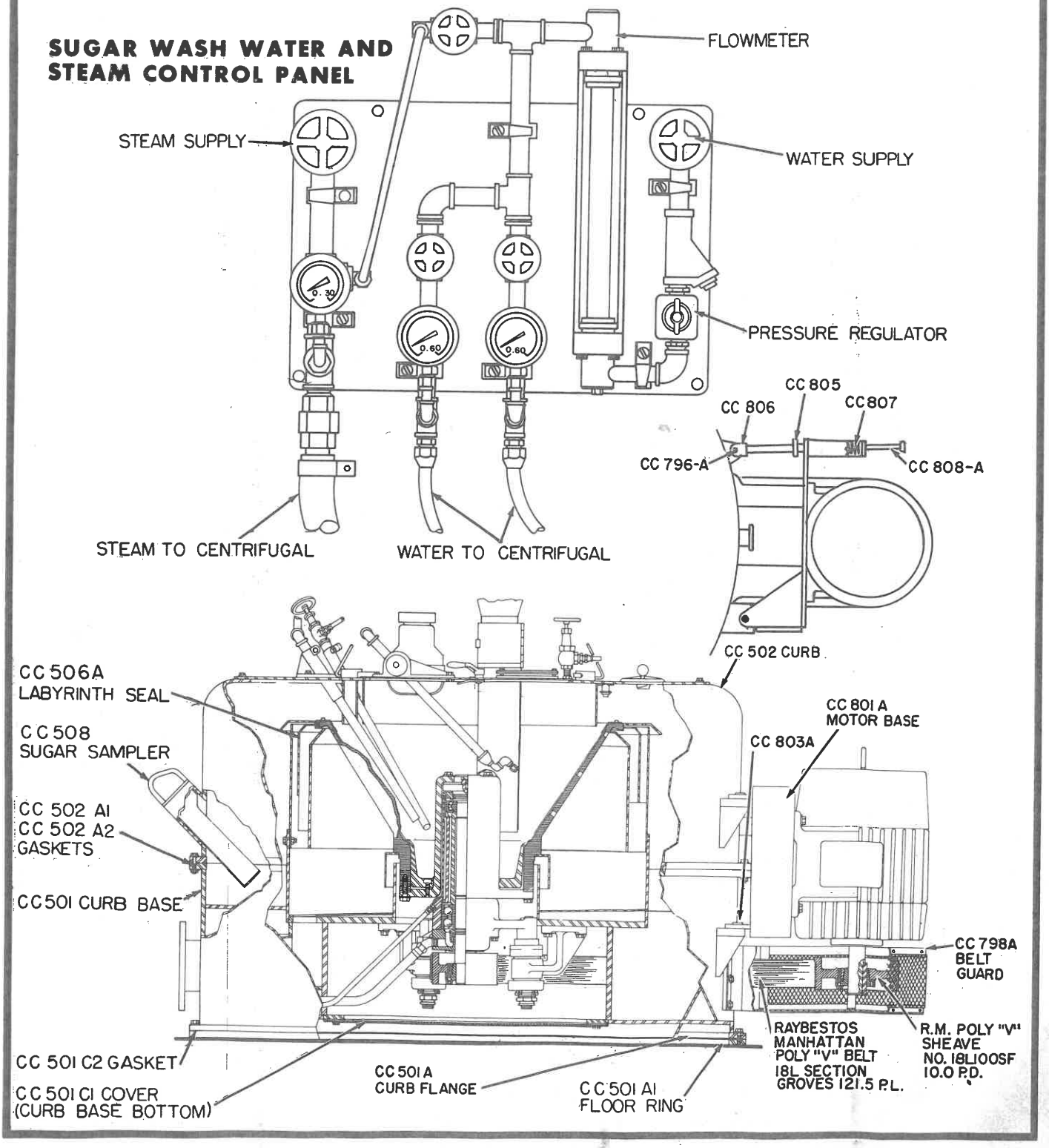
CONTINUOUS CENTRIFUGAL

Suspension



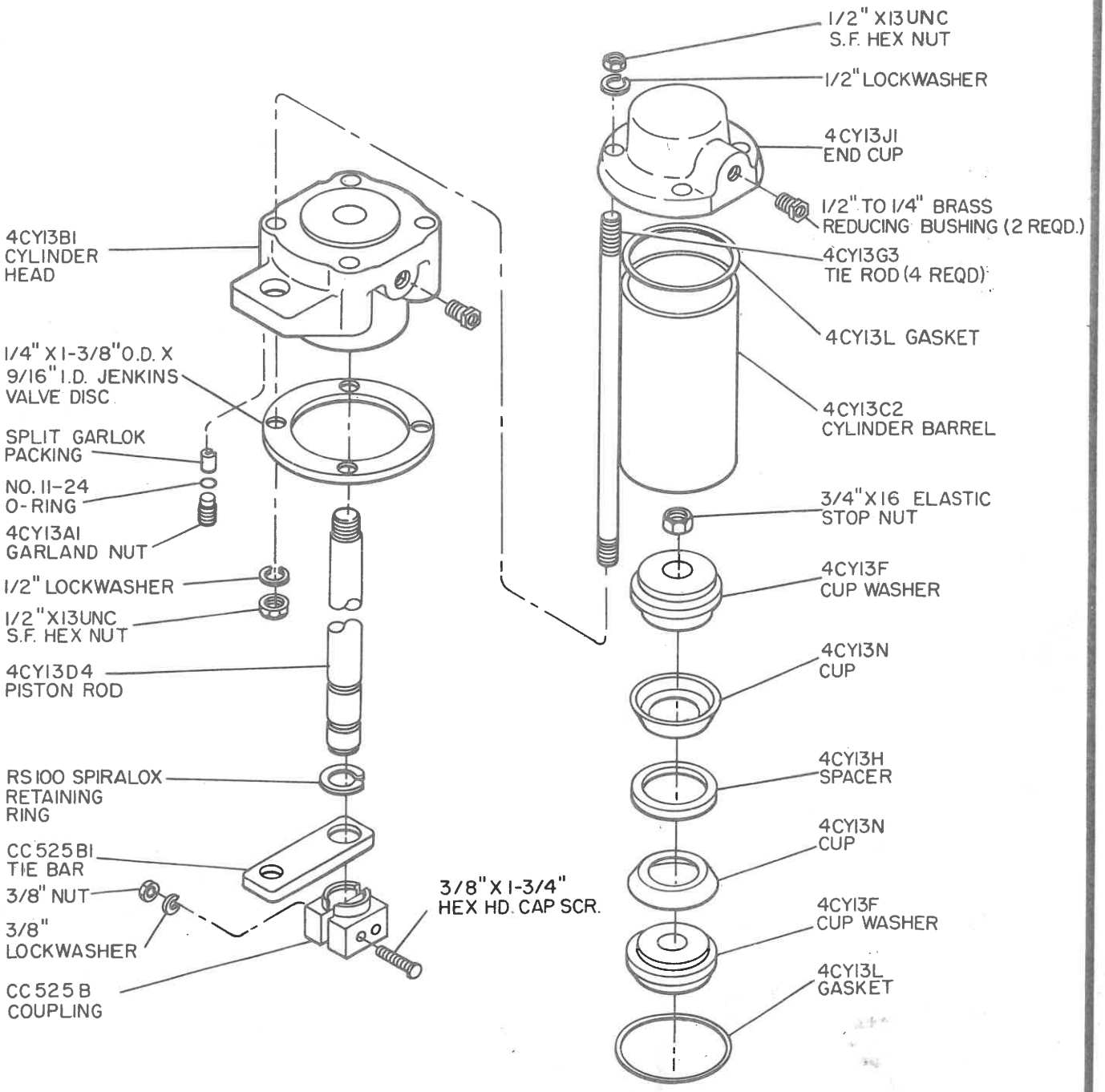
CONTINUOUS CENTRIFUGAL

CURB AND WASH ASSEMBLY



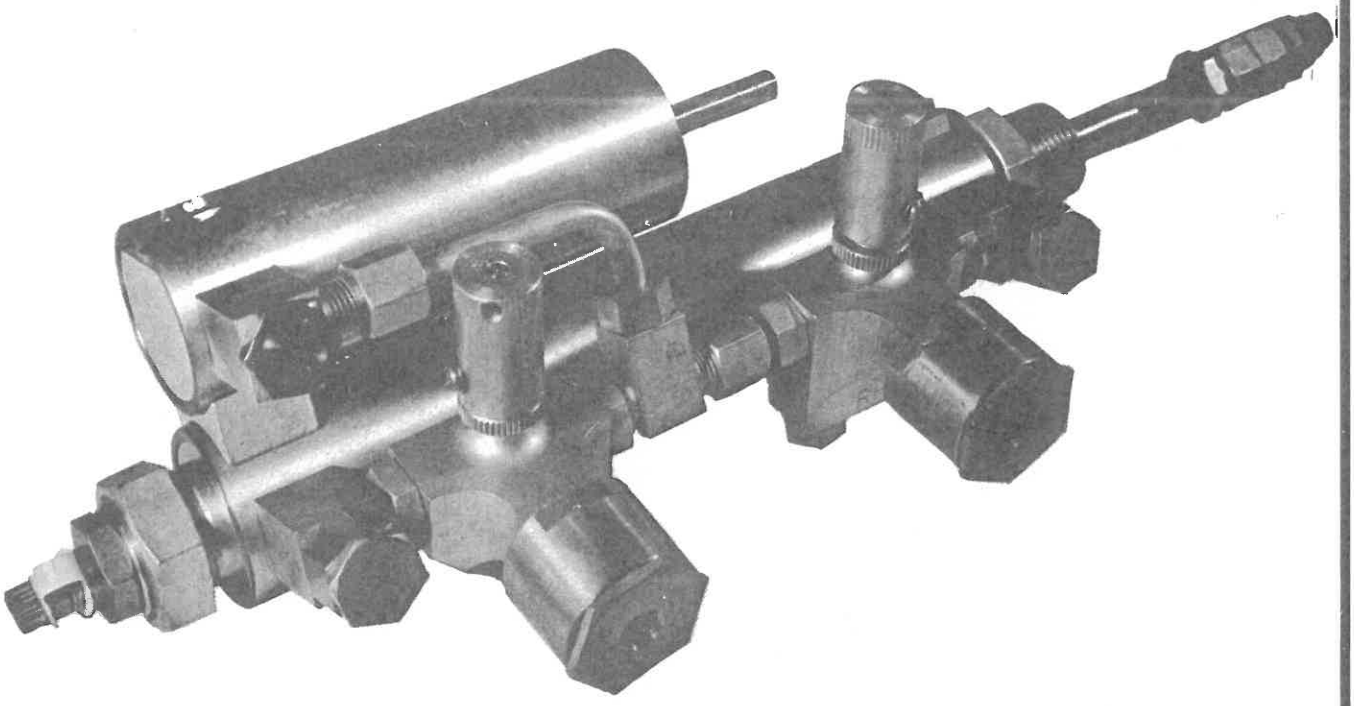
CONTINUOUS CENTRIFUGAL

Feed Valve Air Cylinder Assembly



CYL-CHECK

ALLENAIR CYL-CHECK



The ALLENAIR CYL-CHECK is a high-quality unit carefully designed, produced and assembled to provide long trouble-free service.

Maintenance consists principally of maintaining its fluid level. The rod seals are extremely efficient, but fluid in the form of a minute film will be carried past the seals and in time this will necessitate some replenishment and the Cyl-Check has been engineered to make this operation as simple as possible.

CYL-CHECK

2. The AllenAir Cyl-Check was designed for use with AllenAir Oil #76 only and the manufacturer accepts no responsibility for malfunction occurring as a result of using improper fluid.

3. In remounting the Cyl-Check, make sure the cylinder rod and Cyl-Check rods are parallel.

REPAIRING THE CYL-CHECK

NOTE: The oil reservoir of the Cyl-Check has a piston which is spring loaded to force the oil into the oil cylinder.

1. Should replacement of tubing, skip check assemblies, control valve assembly or seals become necessary, this can be done without completely draining the Cyl-Check in the following manner:

   a) Move Cyl-Check rod to fully retracted position.

   b) Clamp oil reservoir indicator rod with "C" clamp or vice grip pliers as near to oil reservoir as possible to prevent reservoir spring from forcing oil from system.

REPAIR SUGGESTIONS

Leakage at Flow Control Valve Knob (CH-1545-ASSY.)

This is probably caused by "O" ring CH-1549-V failure.

1. Remove the Cyl-Check from the feed valve bracket.

2. Follow procedure in step one of "Repairing the Cyl-Check".

3. Turn flow control valve knob counterclockwise until it no longer turns. DO NOT FORCE KNOB ANY FURTHER.

4. Remove brass locking ball screw (CH-1552).

5. Slowly turn Flow Control Knob until locking ball (CH-1551) is visible through the locking screw hole. Remove locking ball by tapping lightly on the opposite side of the Flow Control Valve Knob.

6. With locking ball removed, the Flow Control Valve Knob can be removed.

7. The needle valve can be removed by turning out the two Allen screws and tapping the needle through the top of the flow control knob.

8. Replace "O" Ring CH-1549V.

9. When assembling the Flow Control valve, be certain to place ball in cavity provided for it. DO NOT place on threads or damage of the valve body will result.

Skip Check (CH-1554 Assy.) Malfunction

Air or oil leakage from the vent hole. This is usually due to a faulty air or oil seal.

1. Follow procedure in step one of "Repairing the Cyl-Check".

2. Replace the entire assembly. Parts cannot be disassembled in the field.

Piston Rod Leakage

This is caused by failure of seals CH-1510V and 1527.

1. Entire unit must be drained of oil.

2. Insert #3 snap ring pliers and compress snap ring part number CH-1512. Center the ring in the groove, then pull the rod out of the cylinder, forcing the cylinder head out of cylinder tube.

3. Replace worn parts.
   NOTE: If piston rod is scored or scratched due to dirt or other foreign materials, the rod must be replaced. Seals will not give adequate life if piston rod is damaged.

GENERAL COMMENTS

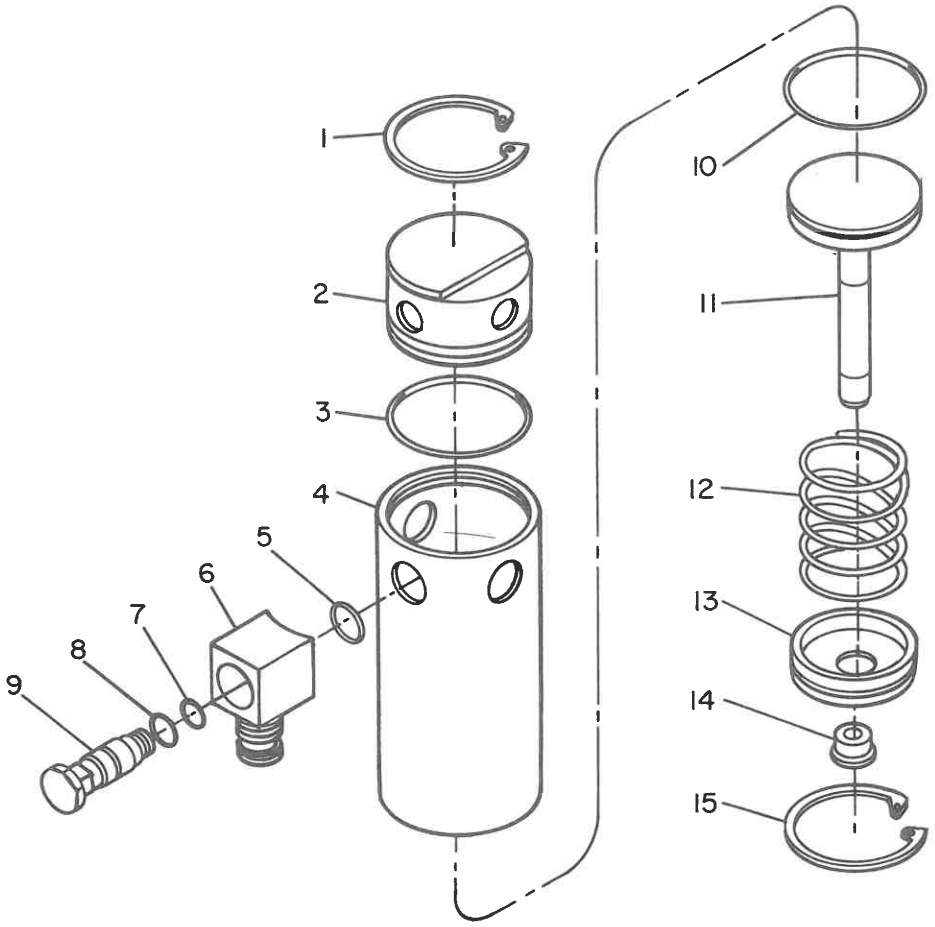
At anytime this unit is disassembled for any reason, new seals should be used to replace those affected by disassembly. Do not reuse seals.

When making repairs, extreme caution should be taken to prevent dirt and other foreign materials from entering the Cyl-Check.

NOTE: When ordering parts, always specify on orders that parts are for use on AllenAir Model CH-B-5-1-KAF-KAR Cyl-Check.

CYL-CHECK

BALANCE CYLINDER



BALANCE CYLINDER ASSEMBLY

Ref. No.	Part Number	Description	Qty
1	1512	Snap Ring	1
2	1530	Main Stud	1
3	1518V	Head Seals "O" Ring -01-218 (Viton)	1
4	1564	Balance Cylinder Tube	1
5	1533T	Stud Bottom Seal "O" Ring -17-012 Teflon	1 1
6	1534	Elbow	1
7	1577V	Stud Center Seal "O" Ring -01-012 (Viton)	1
8	1531V	Stud Top Seal "O" Ring -01-014 (Viton)	1
9	1576	Connecting Stud Assy	1
10	1516V	Piston "O" Ring -01-218 (Viton)	1
11	1569	Indicator Piston Rod Assy	1
12	1570	Balance Cylinder Spring	1
13	1573	Balance Cylinder Spring Guide	1
14	1566	Balance Cylinder Front Head Bearing	1
15	1512	Snap Ring	1

CYL-CHECK

AIR CYLINDER PARTS LIST

Ref. No.	Part Number	Description	Qty
1	1519	Filler Body Cap	1
2	1522V	Filler Cap Seal "O" Ring -01-010 (Viton)	1
3	1519-1-V	Filler Body Seal "O" Ring -02-17 (Viton)	1
4	1514	Head nut	1
5	1512	Snap Ring	1
6	1503	Rear Head Assy	1
7	1518V	Head Seals "O" Ring -01-218 (Viton)	1
8	1501	Cyl-Check-Tube	1
9	1528	Head Plug Assy	1
10	1538	Head Plug Spacer	1
11	1533T-17-012	Stud Bottom Seal, Teflon	1
12	1506	Piston Locknut	1
13	1517V	Piston Rod "O" Ring Seal	1
14	1505	Piston	1
15	1516V	Piston "O" Ring -01-218 (Viton)	1
16	1515	Piston Back-up Ring Teflon	1
17	1513	Piston Bearing	1
18	1509	Piston Valve Spacer	1
19	1518V	Head Seals "O" Ring -01-218 (Viton)	1
20	1502	Front Head	1
21	1512	Snap Ring	1
22	1510-1	Front Head D.R.P	1
23	1527-1	D.R.P. Back-up Ring	1
24	1511	Front Head Rod Bearing	1
25	1510-V	Front Head Packing	1
26	1527	Back-up Ring	1
27	1514-1	Head Nut Lockwasher	1
28	1514	Head Nut	1
29	1504	Piston Rod	1
30	1526	Rod Nut	1
31	1521	Filler Cap	1
32	1520	Filler Cap Retainer	1
33	1538	Head Plug Spacer	1
34	1539	Tube Spacer	1

CYL-CHECK

SKIP CHECK PARTS LIST

Ref. No.	Part Number	Description	Qty
1	1553-L.H.	L.H. Valve Body	1
2	1553-R.H.	R.H. Valve Body	1
3	1534	Elbow	2
4	1590	Balance Cylinder Tee	1
5	1533T	Stud Bottom Seal -17-012	2
6	1577V	Stud Center Seal -01-012	2
7	1531V	Stud Top Seal -01-014	2
8	1563	Stop Check Valve Stud Assy	2
9	1535V	Fitting Seals -01-013	4
10	1571	Skip Check Plug Assy	2
11	1554	Skip Cylinder	2
12	1562	Stop Cylinder Spring	2
13	1559	Stop Cylinder Piston Rod	2
14	1558V	Stop Cylinder Piston Seal	2
15	1556V	Stop Cylinder Head Seal	2
16	1555	Stop Sylinder Head	2
17	1535V	Balance Cylinder Tee Seal	2
18	1536, 1537	Balance Cylinder Locknut	2
19	1554 TA	Stop Cylinder Assy	2
20	1593	Check Valve Ball	2
21	1595	Check Valve Spring	2
22	1596	Check Valve Plug	2
23	1545	Flow control knob	2
24	1552	Flat Washer	2
25	1552	Locking Ball Screw	2
26	1549V	Flow Control Knob Seal	2
27	1546	Flow Control Locknut	2
28	1551	Flow Control Lock Ball	2
29	1543V	Balance Cylinder Tee Seal	2
30	1542	Locknut	1
31	1592X5		1
32	1540	Valve Stud Assy	2
	1543-1		
	1543-V		

Gems **FLOW SWITCHES**

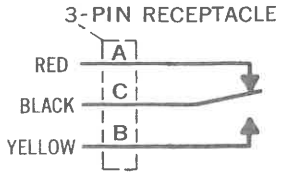
TECHNICAL BULLETIN

GEMS SERIES FS-920 FLOW SWITCHES assure the highest degree of "flow alarm" reliability in detecting excessive or insufficient flow rates in liquids or gases. These compactly designed, precision units are factory pre-set to actuate at any specified flow rate within broad unit limits. Three basic models of Series FS-920 offer a comprehensive range of flow set points from 50 cc/min. to 1.5 GPM.

Industry-oriented, Series FS-920 features these quality advantages:

- High pressure rating – 1000 psig.
- Hermetically sealed switch.
- Shock and vibration resistance.
- Can be calibrated for any mounting position.
- Non-corrosive throughout.
- Versatility.
- LOW LINE PRESSURE DROP!

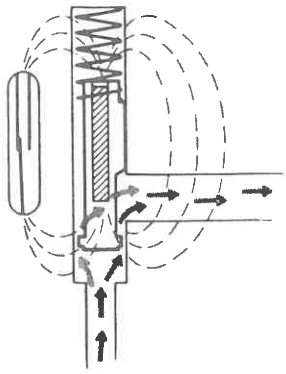
WIRING DIAGRAM . . .



OPERATING PRINCIPLE . . .

Operation of Series FS-920 units is extremely simple. A magnet-equipped piston, displaced by the pressure differential from fluid flow, magnetically actuates an SPDT reed switch sealed within the unit. This switch, in turn, operates a remote alarm or indicator; or may, through accessory relays, provide automatic system control.

The piston metering land diameter precisely sets the point of actuation within a wide flow range by regulating by-pass clearance. Spring return of the piston is positive as flow decreases.



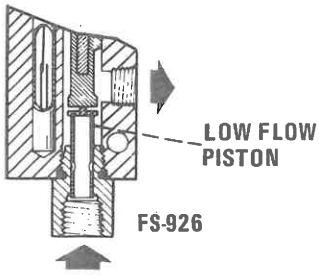
FS-926 . . . For liquids or gases . . . Actuation range . . . 50 to 300 cc/min.

How the Low-flow Piston Functions . . .

The lap fit of the low-flow piston in the inlet fitting prevents flow past it. Calibration of the unit is exactly determined by one or more metering orifice holes drilled in the top of the piston, which regulate by-pass flow through them, and therefore the actuation setting.

When metered by-pass flow is exceeded, the resultant pressure differential displaces the low-flow piston, moving the magnet carrier piston to actuate the hermetically sealed switch. Two large by-pass holes in the piston skirt are exposed after actuation to maintain low pressure drop. Fluids should be free of foreign particles which could clog orifices or jam the piston.

Temperature greatly affects viscosity of some liquids, causing variation in the orifice metering and the flow setting of the FS-926. With viscosity lowered by increasing temperature, a greater flow is required to create actuation pressure differential . . . and the flow setting is increased. The converse holds for lowered temperatures.



"O" Ring Seal . . . . . Viton
Max. Set Point Differential . . 20%

INSTALLATION AND MAINTENANCE . . .

Series FS-920 Flow Switches operate with complete reliability in any mounted attitude for which they are calibrated . . . mounting in other positions will alter flow settings slightly. Unless otherwise specified, units are calibrated in the vertical position (inlet port down). All thread sealing compound must be kept out of units during installation.

Unforeseen foreign particle accumulation is easily cleared by removing the inlet fitting and piston and spring assemblies, and cleaning the cylinder. Should electrical components sustain damage, they must be replaced at the factory.

	FS-926	
	CC/MIN. ±15%	EQUIV. GPM
STD. FLOW SETTINGS	50	.013
	100	.025
	150	.045
	200	.055
	250	.065
	300	.075

FISCHER & PORTER CO.

Series 10A3600 Flowrators

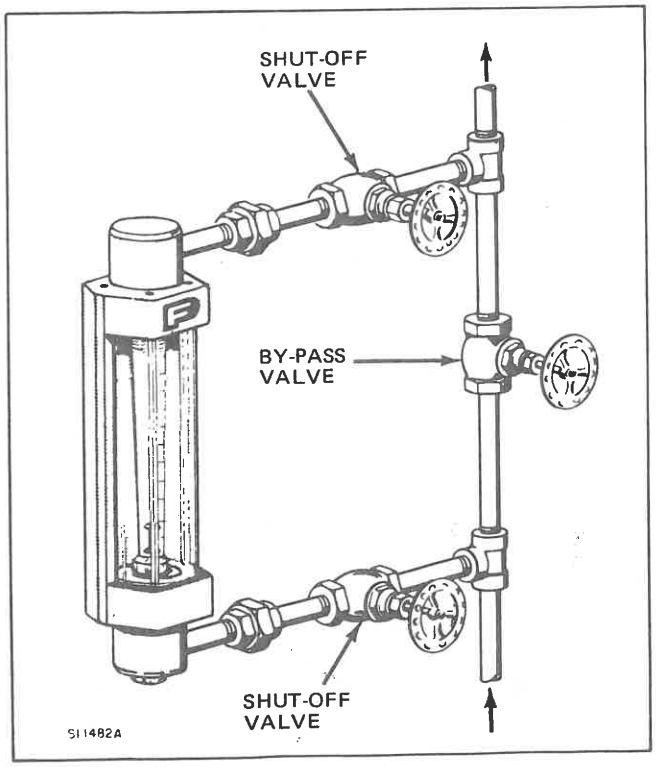
DESCRIPTION

The Fischer & Porter Series 10A3600 Flowrator® meter operates on the variable area principle to measure and indicate instantaneous fluid flow rate. Series 10A3600 Flowrators are sealed by conventional packing methods. The meters have an extruded aluminum body that retains inlet and outlet end fittings. These end fittings hold the meter tube and are designed to permit rapid removal of the meter tube for range changes or cleaning, yet permit operation under pressure or vacuum conditions.

MOUNTING AND PIPING

The Series 10A3600 Flowrator may be installed directly in the pipe line or mounted on an instrument panel with optional mounting hardware. Regardless of the mounting method, the meter must be installed vertically with the outlet (highest scale graduation) at the top. Use a spirit level or plumb bob to check the vertical alignment.

If possible, choose a location to mount the Flowrator that is **well lighted** so that the meter float is easily seen. The Flowrator should never be subjected to excessive vibration. Avoid the use of quick acting devices in the fluid stream to prevent shock waves from damaging the meter. It is recommended that a conventional three valve manifold be installed around the meter. This manifold permits the process to be operated while the meter is being cleaned.

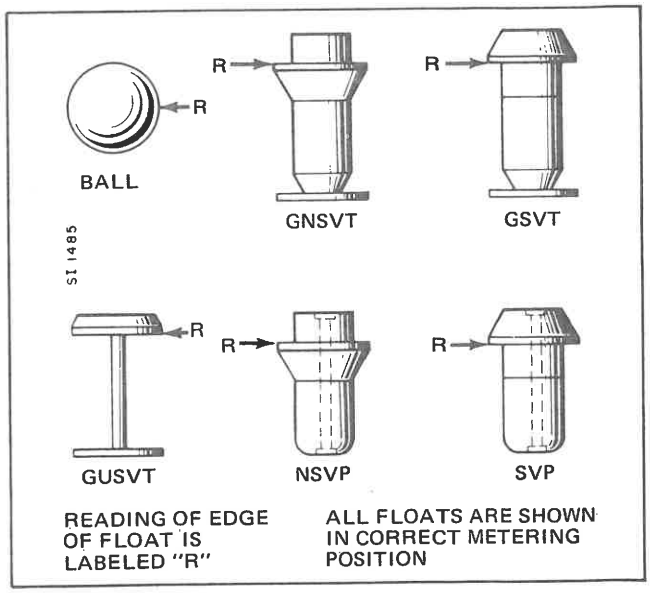


TYPICAL INSTALLATION – VERTICAL LINE FOR GAS OR LIQUID

PLACING IN OPERATION

Prior to placing the meter into operation the meter float must be installed as discussed in the Maintenance Section.

Meter readings must be taken from the scale at the graduation that coincides with the reading edge on the float. Various types of floats and their reading edges are illustrated below.



FLOAT READING EDGES

To prevent meter tube breakage or damage to the meter float, the flow of liquid through the meter should be started gradually. Assume that both the inlet and outlet shut-off valves are closed and that the by-pass valve is open, proceed as follows:

1. Slowly open the shut-off valve at the meter inlet to equalize the static pressure, then open the valve all the way.
2. Slowly open the shut-off valve at the meter outlet approximately ½ turn and allow the float to stabilize.
3. Gradually close the by-pass valve and simultaneously open the shut-off valve at the meter outlet.

The shut-off valve at the meter outlet may be used to throttle the fluid flow if desired. When it is desired to protect the meter from full line pressure or from pressure shock, the shut-off valve at the meter inlet may be used to throttle the flow.

MAINTENANCE

The only maintenance required is the occasional cleaning of the tube and float. The meter should be cleaned frequently enough to preserve the accuracy and float visibility.

The meter tube and the float are precision manufactured parts. Never subject the meter tube to unnecessary shock or strain. When removing the tube be careful not to drop the meter float. Handle the float with care as a nick or scratch will destroy the meter's accuracy.

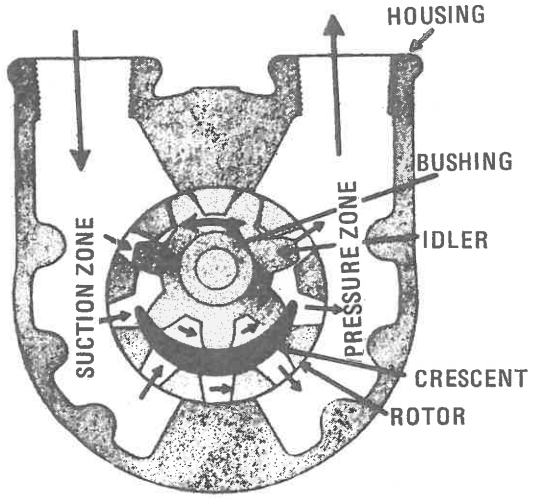
INSTALLATION AND SERVICE INSTRUCTIONS FOR MODEL L SERIES PUMPS

GENERAL DESCRIPTION

The Tuthill Model L is a compact, highly efficient, positive displacement, rotary internal-gear pump with mechanical seal. Built in five sizes, it provides capacities from 20 to 360 gallons per hour and pressures up to 600 P.S.I. and is available with 2-bolt flange or foot mounting. It is directional in rotation and designed for direct drive at standard motor speeds.

PUMPING PRINCIPLE

These pumps employ the Tuthill internal-gear principle which is based upon the use of a rotor, idler gear and a crescent-shaped partition that is cast integrally with the cover. (See accompanying figure.) Thus, only two moving parts comprise this efficient pumping element. Power is applied to the rotor and transmitted to the idler gear with which it meshes. The space between the outside diameter of the idler and the inside diameter of the rotor is sealed by the crescent. When the pump is started, there is an increase in volume as the teeth come out of mesh. This creates a partial vacuum, drawing the liquid into the pump through the suction port. The liquid fills the spaces between the teeth of the idler and rotor and is carried past the crescent partition to the pressure side of the pump. When the teeth mesh on the pressure side, the liquid is forced from the spaces and out through the discharge port.



SEAL

The seal is a device to prevent leakage between the stationary pump body and rotating drive shaft. This is done by providing a perfectly smooth surface on the housing plug bushing against which a perfectly smooth surface attached to the shaft can turn with such small clearance that resistance to fuel flow is great enough that fuel will not leak out and air will not be drawn in.

One face of the seal is spring loaded to maintain the closest possible fit. The seal face assembly turns with the shaft driven by a drive pin and by a copper washer which, when compressed by the hex seal nut, prevents fuel and air from leaking along the shaft past the seal. A flexible diaphragm incorporated in the seal is spring loaded to control the tension on the seal face.

INSTALLATION

METHOD OF DRIVING THE MODEL L PUMP

Direct motor drive through flexible coupling is the most satisfactory. The following points must be carefully considered to avoid excessive misalignment between motor and pump shafts:

NOTE

Model L pumps M U S T be driven in the direction of the arrow stamped on the pump body. There is a passage from the suction side of the pump to the seal chamber so a partial vacuum is created in the seal which tends to hold the seal faces together. Should the pump rotation be reversed, there will be a pressure on the seal which will force the seal off its seat as the pump pressure increases.

1. All pump and motor units are properly aligned at the factory. However, misalignment may occur due to abuse or conditions beyond our control.
2. Pipe strains often force the pump and motor shafts out of alignment. See that all piping leading to the pump is properly supported by wall brackets. Do not expect the pump to act as a pipe support.
3. Provide for proper expansion of pipes when handling hot liquid.
4. Model L pumps are not designed to take end thrust toward the cover. Provide sufficient clearance, 1/16" to 1/8" between coupling halves with shafts in closest operating position, to allow for end wear in the driving shaft.
5. Never align the pump and motor supplied with pin type coupling without first removing the pins.
6. Never depend upon sight or feel for freeness in aligning a pump.

THE WESTERN STATES MACHINE COMPANY

1798 Fairgrove Avenue Hamilton, Ohio 45012 Phone: 513–863-4758

INSPECTION

Check pump housing, rotor and idler gear for wear, chipped or broken teeth. Drop-off in capacity is generally caused by the abrasive action of foreign materials in the oil resulting in end play of the rotor. In most cases this can be taken up by changing to a thinner cover gasket so as to maintain end clearance of .001".

The rotor should be positioned in the housing and checked for clearance in the bearing. The shaft must turn freely without any detectable side play. Any side play will require replacement of the housing, rotor or both.

ASSEMBLY OF PUMP

The following points must be carefully followed when pump is reassembled:

1. Clean all parts thoroughly using great care to eliminate all dirt.
2. Install rotor in pump body.
3. Apply gasket and idler to cover and install on pump. (Align matching marks for proper location.) If pump has had a loss of capacity, a thinner gasket may be used to reduce excessive clearance. (Should be .001")
4. Install cover cap screws.

NOTE

Pull down gradually and evenly when tightening cover cap screws. The shaft should be revolved slowly as the cap screws are tightened gradually. Not one fastened down to the limit and another, and so on, but each screw in its turn, tightened a little at a time until all finally become secure and the shaft turns freely without any detectable end play.

WHAT TO LOOK FOR WHEN

1. NO OIL IS DELIVERED.

a. Suction lift too high for vapor pressures of liquid pumped. While Tuthill pumps will develop as high as 27 inches of vacuum, it is wise to reduce the vacuum to a minimum.

b. Bad leaks in suction line or port passages can be detected by submerging pressure line from discharge side of pump into a pail or oil, where the air will be seen in the form of bubbles.

c. Wrong direction of shaft rotation.

d. Pump shaft not rotating.

Coupling defective - tongue and groove or gear not engaged.

2. CAPACITY IS TOO LOW.

a. Suction lift too high.

b. Air leaks in suction line.

c. Suction line too small.

Can be detected by installing a vacuum gauge directly at the pump suction. The maximum vacuum at the pump suction should never exceed 15 inches of mercury. It is necessary to keep below 15 inches not because of the inability of the pump to handle a higher vacuum, but primarily because of the vaporization that is liable to take place at a higher vacuum. Vaporization caused by higher vacuums will generally result in capacity drop-off.

d. Pump speed too slow.

e. Strainer too small or obstructed.

f. Suction pipe or port not immersed in the liquid deep enough.

g. Piping improperly installed, permitting air pocket to form in pump.

h. Increased clearances or wear in the pump will sometimes cause the pump to deliver an insufficient supply of liquid.

3. PUMP WORKS SPASMODICALLY.

a. Leaky suction lines.

b. Suction lift too high.

c. Air or vapor in liquid.

d. Coupling slipping on pump shaft.

4. PUMP WASTES POWER.

a. Pressures too high.

b. Liquid more viscous than desired.

c. Suction or discharge lines obstructed.

KAY PNEUMATICS
12 Austin Boulevard, Commack, New York
ALPENA, MICHIGAN

Assembly Instructions for: Western States Valve Model #A 20011-10

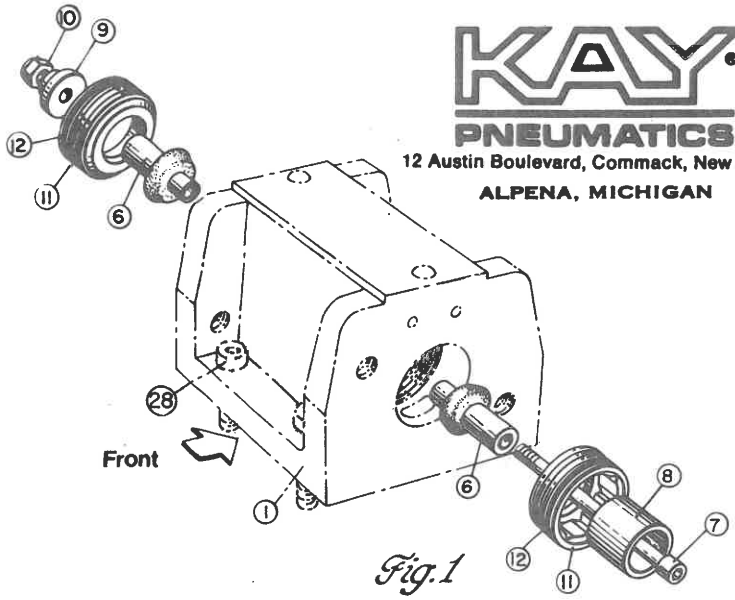


Fig. 1

SPOOL ASSEMBLY - FIG. 1

On Spool Stud (7) place Spring Housing (8) with large opening facing stud head, Seat (11) including "O" Ring (12) hex opening toward Spring Housing (8), and Poppet (6) with long end toward Seat (11)

Valve "front" has two mounting holes. In right end insert above assembly into the Valve Body (1).

Through left end of Valve Body (1), install second Poppet (6) long end out, second Seat (11) with "O" Ring (12) hex opening outward, Offset Spring Pilot (9) with small end out, and secure assembly together with Spool Nut (10).

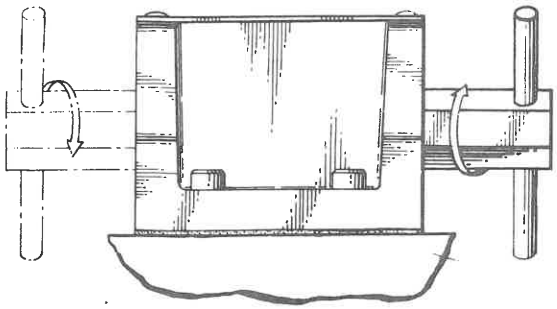


Fig. 2

INITIAL SEAT ASSEMBLY - FIG. 2

Using 3/4" Hex Adjusting Tool, screw Seat (11) in until it touches the internal stop, DO NOT FORCE the seat on stop - repeat at other end.

BODY ASSEMBLY - FIG. 2

Align mounting holes of Base Gasket with holes in Valve Body (1). Mount valve gasket and body to base with three 1/4-20 screws.

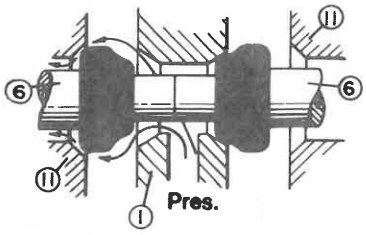


Fig. 3A

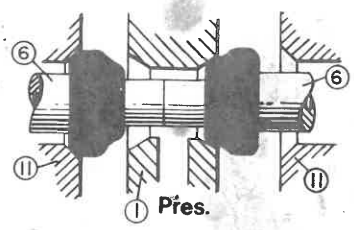
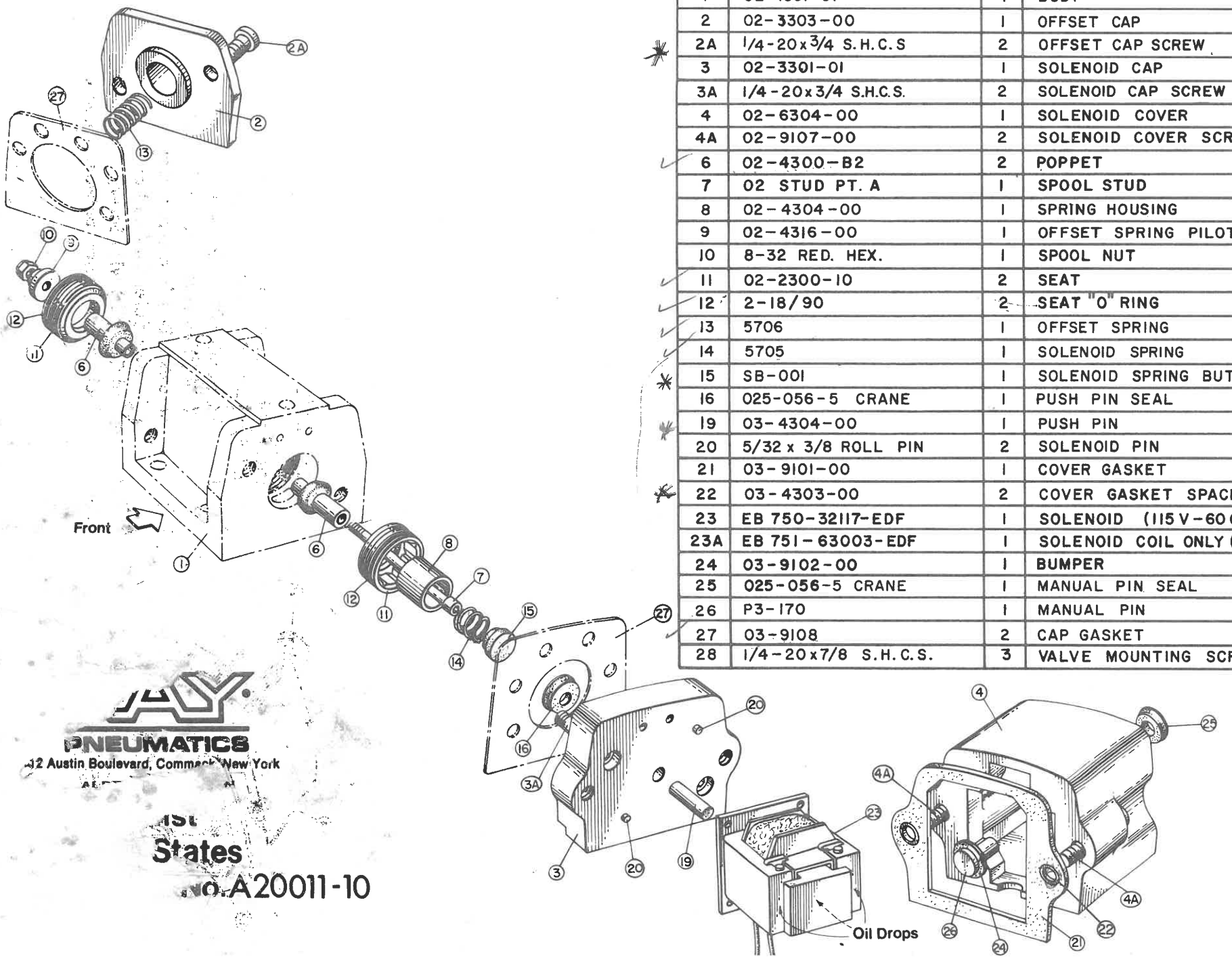


Fig. 3B

SEAT ADJUSTMENT - FIGS. 3A - 3B

Be sure Seat (11) is installed to "stop". If not fully installed, air will leak around poppet (Fig. 3A). Properly installed, both poppets will seal in both directions. (Fig. 3B)



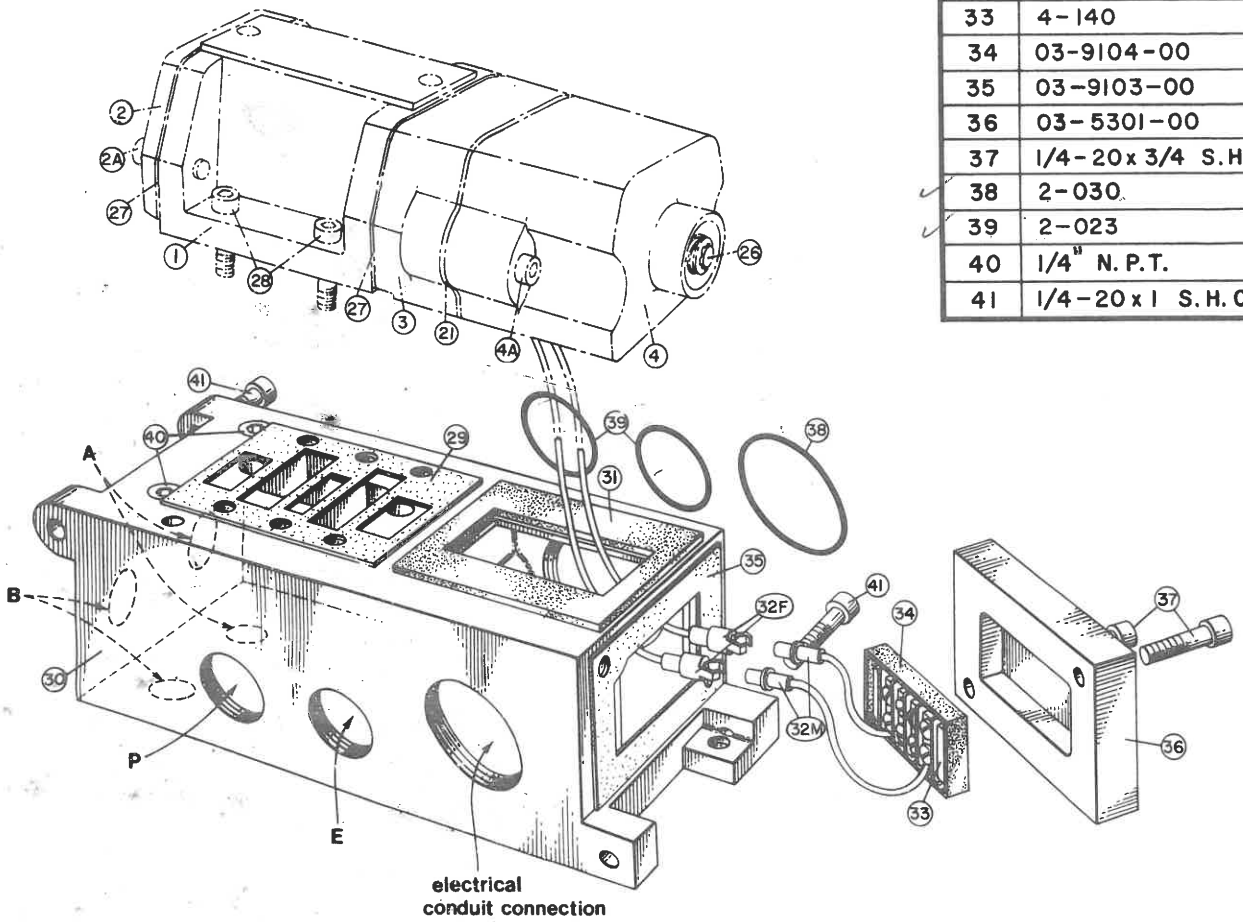
ITEM	PART NUMBER	QTY	PART NAME
1	02-1301-01	1	BODY
2	02-3303-00	1	OFFSET CAP
2A	1/4-20x3/4 S.H.C.S	2	OFFSET CAP SCREW
3	02-3301-01	1	SOLENOID CAP
3A	1/4-20x3/4 S.H.C.S.	2	SOLENOID CAP SCREW
4	02-6304-00	1	SOLENOID COVER
4A	02-9107-00	2	SOLENOID COVER SCREW
6	02-4300-B2	2	POPPET
7	02 STUD PT. A	1	SPOOL STUD
8	02-4304-00	1	SPRING HOUSING
9	02-4316-00	1	OFFSET SPRING PILOT
10	8-32 RED. HEX.	1	SPOOL NUT
11	02-2300-10	2	SEAT
12	2-18/90	2	SEAT "O" RING
13	5706	1	OFFSET SPRING
14	5705	1	SOLENOID SPRING
15	SB-001	1	SOLENOID SPRING BUTTON
16	025-056-5 CRANE	1	PUSH PIN SEAL
19	03-4304-00	1	PUSH PIN
20	5/32 x 3/8 ROLL PIN	2	SOLENOID PIN
21	03-9101-00	1	COVER GASKET
22	03-4303-00	2	COVER GASKET SPACER
23	EB 750-32117-EDF	1	SOLENOID (115V-60Cyc.)
23A	EB 751-63003-EDF	1	SOLENOID COIL ONLY (115V-60Cyc
24	03-9102-00	1	BUMPER
25	025-056-5 CRANE	1	MANUAL PIN SEAL
26	P3-170	1	MANUAL PIN
27	03-9108	2	CAP GASKET
28	1/4-20x7/8 S.H.C.S.	3	VALVE MOUNTING SCREW

JAY
PNEUMATICS
42 Austin Boulevard, Commack, New York

States

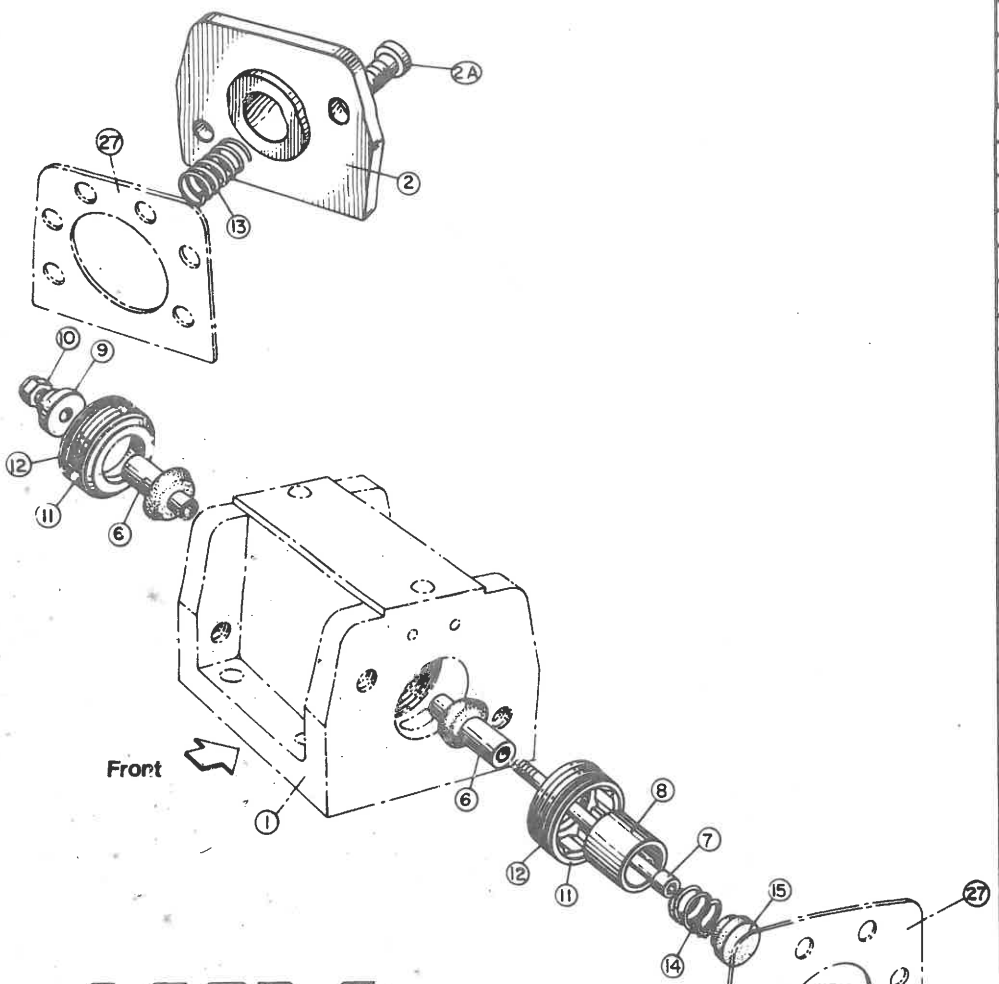
NO. A20011-10

ITEM	PART NUMBER	QTY	PART NAME
1-28	A-20011-10	1	VALVE ASSEMBLY
29	02-8301-01	1	BODY-BASE GASKET
30	03-7321-00	1	BASE
31	03-9100-00	1	SOL.- BASE GASKET
32F	EDF	2	FEMALE WIRE RECEPTACLE
32M	EDM	2	MALE WIRE PLUG
33	4-140	1	TERMINAL STRIP
34	03-9104-00	1	TERMINAL STRIP INSULATING BOOT
35	03-9103-00	1	TUCK COVER GASKET
36	03-5301-00	1	TUCK COVER
37	1/4-20x3/4 S.H.C.S.	2	TUCK COVER SCREW
38	2-030	2	"O" RING
39	2-023	2	"O" RING
40	1/4" N.P.T.	2	PIPE PLUG
41	1/4-20x1 S.H.C.S.	2	BASE CONNECTING SCREW

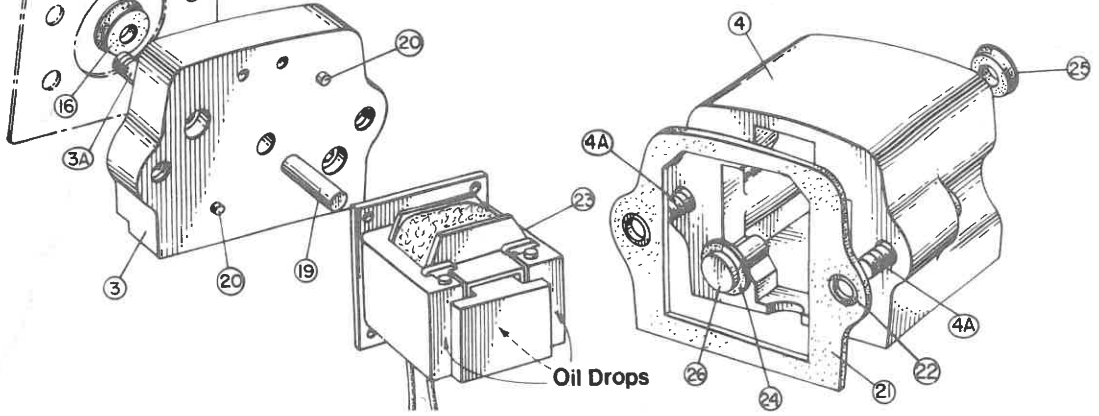


KAY PNEUMATICS
12 Austin Boulevard, Commack, New York
ALPENA, MICHIGAN

parts list
Western States
Valve-Base Assembly
Model No. 30810

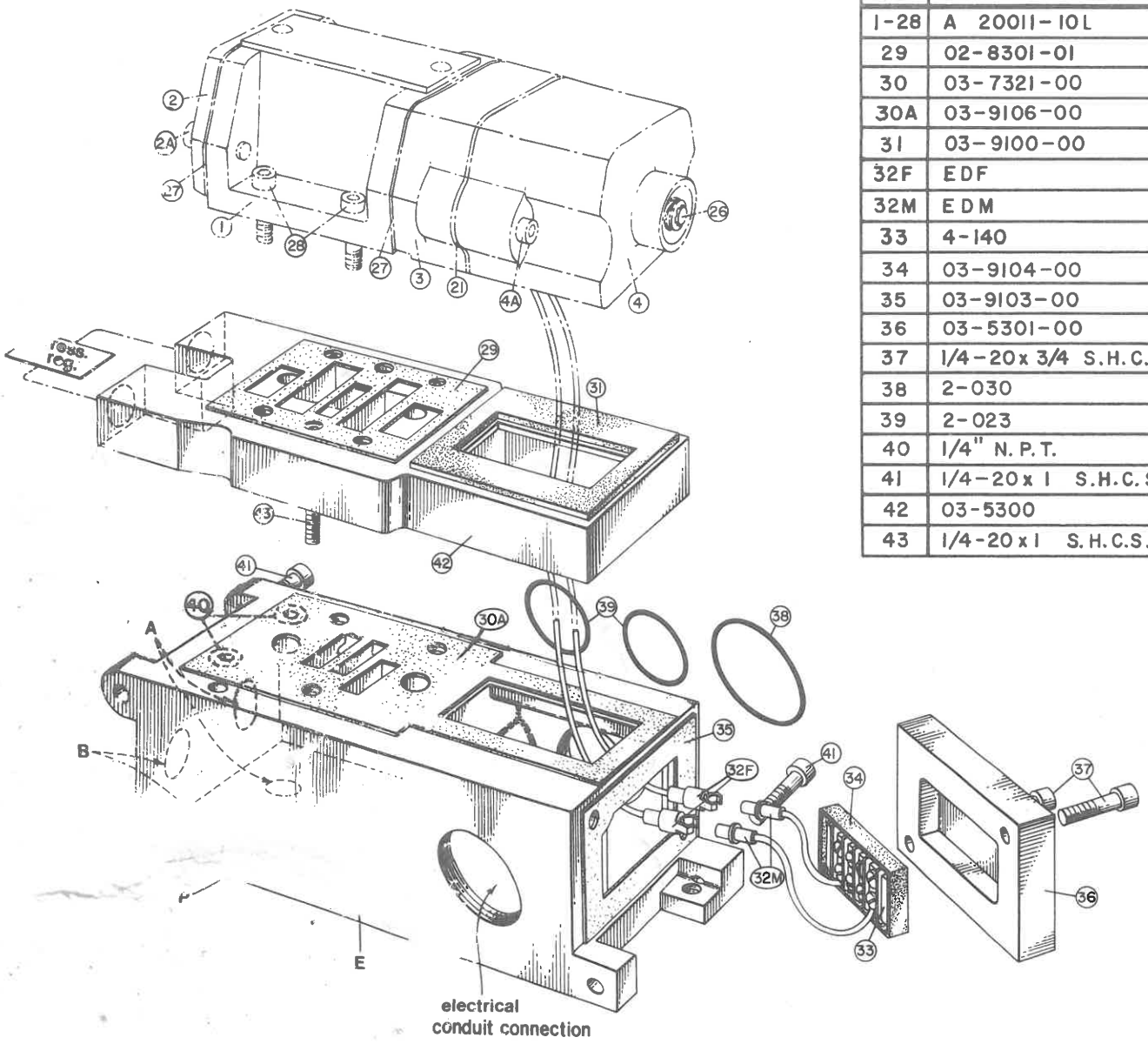


ITEM	PART NUMBER	QTY	PART NAME
1	02-1301-01	1	BODY
2	02-3303-00 L	1	OFFSET CAP
2A	1/4-20x3/4 S.H.C.S	2	OFFSET CAP SCREW
3	02-3301-01	1	SOLENOID CAP
3A	1/4-20x3/4 S.H.C.S.	2	SOLENOID CAP SCREW
4	02-6304-00	1	SOLENOID COVER
4A	02-9107-00	2	SOLENOID COVER SCREW
6	02-4300-B2	2	POPPET
7	02 STUD PT. A	1	SPOOL STUD
8	02-4304-00	1	SPRING HOUSING
9	02-4316-00	1	OFFSET SPRING PILOT
10	8-32 RED. HEX.	1	SPOOL NUT
11	02-2300-10	2	SEAT
12	2-18/90	2	SEAT "O" RING
13	5706	1	OFFSET SPRING
14	5705	1	SOLENOID SPRING
15	SB-001	1	SOLENOID SPRING BUTTON
16	025-056-5 CRANE	1	PUSH PIN SEAL
19	03-4304-00	1	PUSH PIN
20	5/32 x 3/8 ROLL PIN	2	SOLENOID PIN
21	03-9101-00	1	COVER GASKET
22	03-4303-00	2	COVER GASKET SPACER
23	EB 750-32117-EDF	1	SOLENOID (115V-60Cyc.)
23A	EB 751-63003-EDF	1	SOLENOID COIL ONLY (115V-60Cyc)
24	03-9102-00	1	BUMPER
25	025-056-5 CRANE	1	MANUAL PIN SEAL
26	P3-170	1	MANUAL PIN
27	03-9108	2	CAP GASKET
28	1/4-20x7/8 S.H.C.S.	3	VALVE MOUNTING SCREW



KAY
PNEUMATICS
12 Austin Boulevard, Commack, New York
ALPENA, MICHIGAN

parts list
Western States
Valve Mod. No. A20011-10 L



ITEM	PART NUMBER	QTY	PART NAME
1-28	A 20011-10L	1	VALVE ASSEMBLY
29	02-8301-01	1	BODY-BASE GASKET
30	03-7321-00	1	BASE
30A	03-9106-00	1	REG. PLATE-BASE GASKET
31	03-9100-00	1	SOL.-BASE GASKET
32F	EDF	2	FEMALE WIRE RECEPTACLE
32M	EDM	2	MALE WIRE PLUG
33	4-140	1	TERMINAL STRIP
34	03-9104-00	1	TERMINAL STRIP INSULATING BOOT
35	03-9103-00	1	TUCK COVER GASKET
36	03-5301-00	1	TUCK COVER
37	1/4-20x 3/4 S.H.C.S.	2	TUCK COVER SCREW
38	2-030	1	"O" RING
39	2-023	2	"O" RING
40	1/4" N.P.T.	2	PIPE PLUG
41	1/4-20x 1 S.H.C.S.	2	BASE CONNECTING SCREW
42	03-5300	1	REGULATOR PLATE
43	1/4-20x1 S.H.C.S.	3	REG. PLATE MOUNTING SCREW

KAY PNEUMATICS
12 Austin Boulevard, Commack, New York
ALPENA, MICHIGAN

parts list
Western States
Valve-Base Assembly
Model No. 30810-8