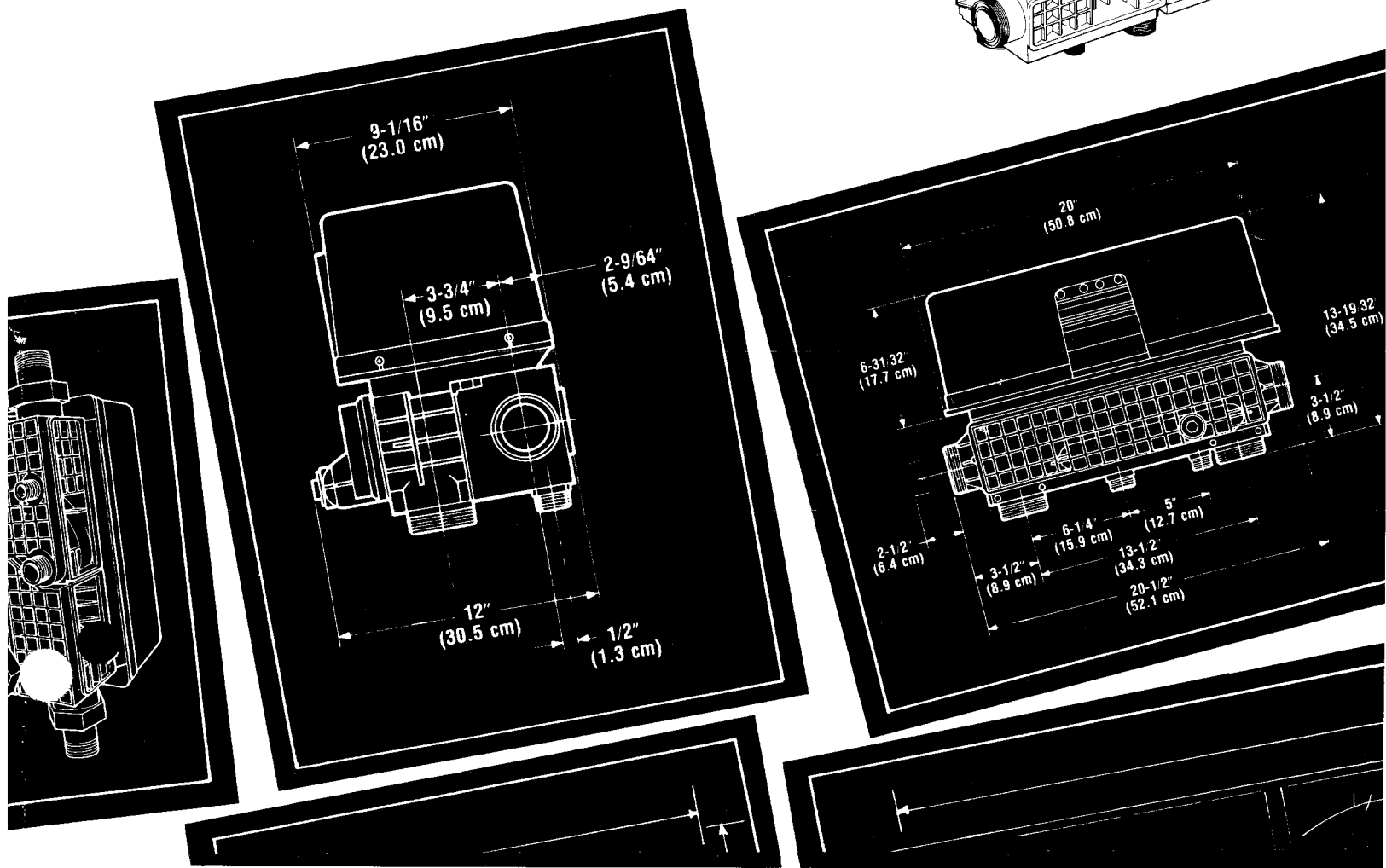
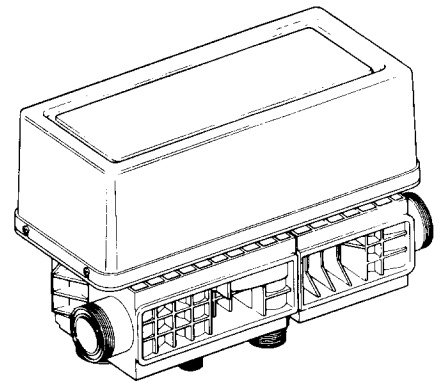


Series 172

Commercial/Industrial Water Softener Control System

INSTALLATION, OPERATION & MAINTENANCE MANUAL

INSTALLATION • START-UP PROCEDURE • MANUAL OPERATION
FLOW DIAGRAMS • TECHNICAL DATA • SERVICE DATA • PARTS LIST



Installation

General

The control system is sometimes shipped as a sub-assembly to avoid damage in transit. The water conditioner should be assembled, piped and wired according to the manufacturer's recommendations. The following instructions are provided as a general guide.

Plumbing

Valve Installation (See Figure 1)

If the control system is not already assembled to the tank, insert between flanges on tank piping. "Top of Tank" fitting connects to inlet pipe at top of conditioner tank. The valve timer will face upward and the cover will face forward. Always install control system on right side of tank to insure access to the brine injector.

Apply silicone grease liberally to the "O" rings during assembly. Carefully hand tighten the fittings and then add no more than 1/4 turn by wrench. Do not overtighten.

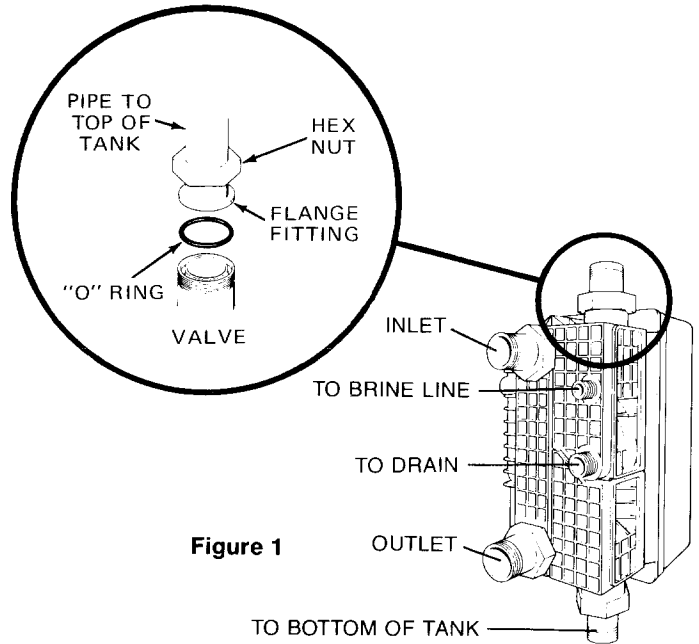
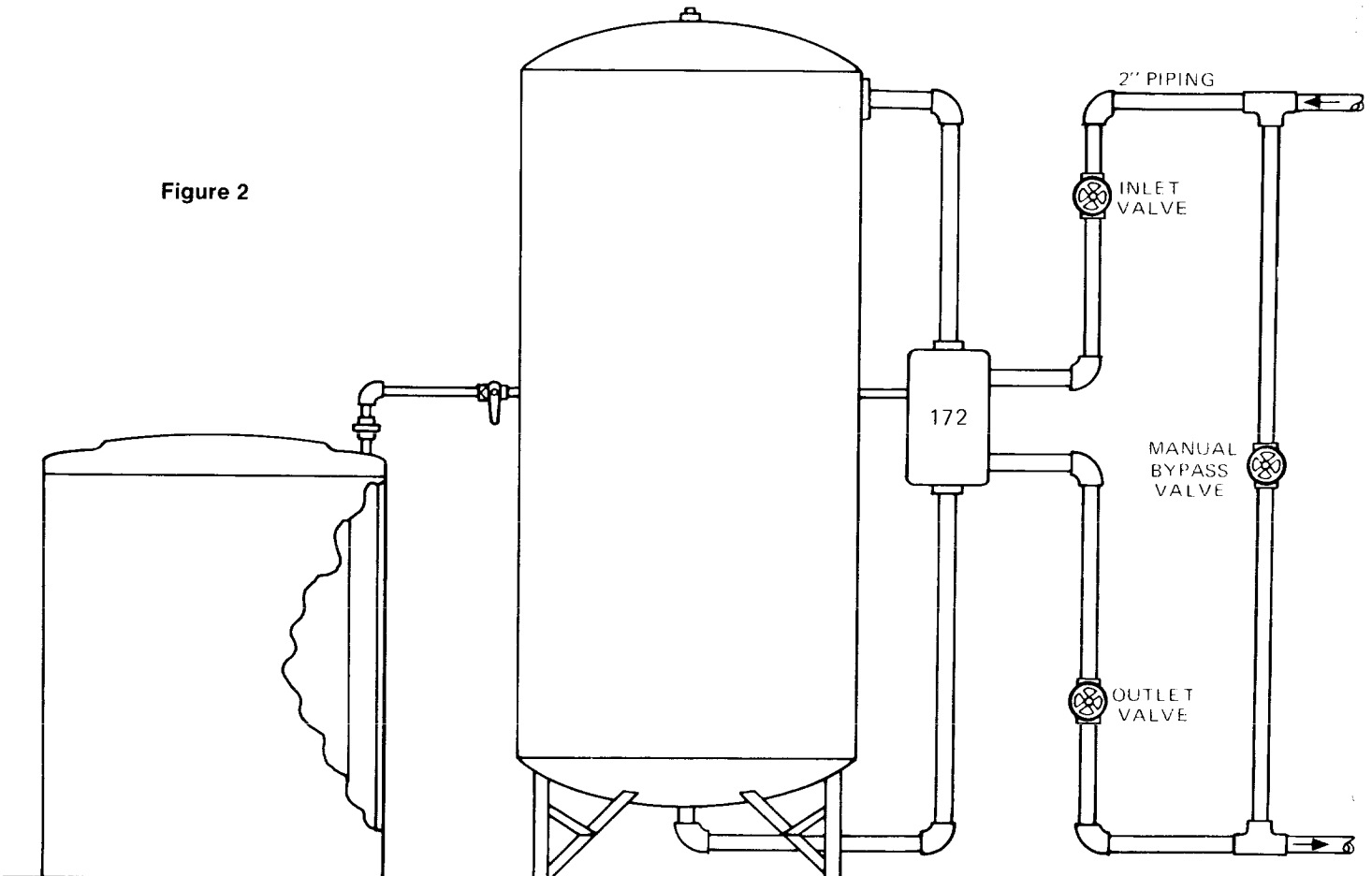


Figure 1

Figure 2



Inlet and Outlet Piping (See Figure 2)

All inlet and outlet piping should be anchored or supported adequately to avoid placing stress on the control system. Follow good plumbing practices and conform to any local codes. Figure 2 illustrates a suggested hookup involving the use of separate inlet, outlet and bypass valves. This arrangement provides shut-offs and emergency bypass of unconditioned water in the event the unit must be serviced.

The flanged fittings provided will be one of the following:

- a — 2" NPT brass
- b — 2" BSPT brass
- c — 2" PVC for solvent welding
- d — 63 mm PVC for solvent welding

Be sure to apply adequate silicone grease lubrication on all "O" rings. Hand tighten cast metal nuts to valve being careful not to cross thread. Then wrench tighten a maximum of ¼ turn.

Drain Line Piping (See Figures 1 and 3)

The valve drain fitting, located on back of valve and marked DRAIN, is 1½" NPT or optionally BSPT. The valve does not provide any internal means of backwash flow control. Backwash flow rate is predetermined by the tank size. A properly sized flow controller (Figure 3) must be installed in the drain line to prevent mineral loss.

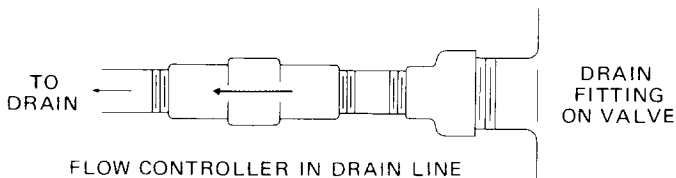


Figure 3

To prevent possible regeneration problems the following drain line cautions should be observed:

- a. Piping 1 inch or larger; valve is plumbed 1½"
- b. Overall length less than 20 feet (6.1m)
- c. Not elevated higher than valve
- d. Not restricted
- e. No shut-off valves
- f. Minimum number of elbows and fittings
- g. Piping must be self-supporting without strain on valve drain fitting
- h. Open end termination to provide a siphon break
- i. Proper flow controller assembled into the line as close to valve as possible.

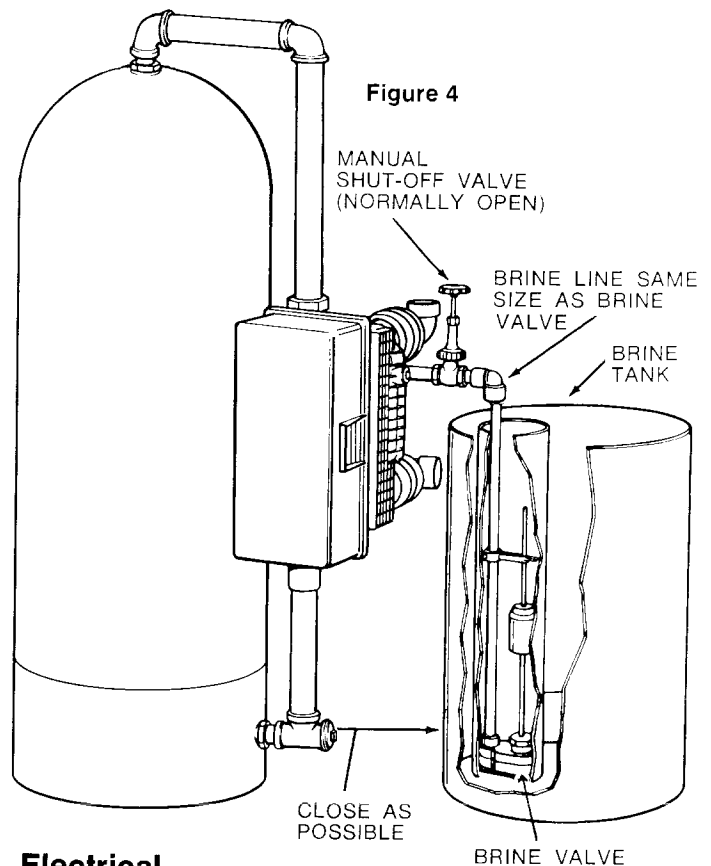
The actuator drain fitting, located on the side of the actuator is a ¾" (9.5mm) fitting complete with nut for connecting a ¾" (9.5mm) plastic tube, not to exceed 20 ft. (6.1m) in length. This fitting, marked DRAIN, is visible through the opening in the valve cover.

Brine Line Piping (See Figure 4)

The brine connection, located on back of valve and marked BRINE is 1" NPT or optionally BSPT.

The brine tank should be located as close as possible to the softener tank. A float type brine valve must be used in the brine tank. Since the brine line is normally pressurized, a manual shut-off valve should be installed to facilitate any brine system servicing.

Brine line size should be no smaller than brine valve size. The brine line should be made self-supporting. Use a minimum of fittings to assure unrestricted brine draw.



Electrical

A fused, 120 volt 60 Hz (240 volt 50 Hz optional) power supply is required (refer to General Specifications, page 10). The outlet used should not be switch controlled. Low wattage requirements (less than 3 watts) allow the use of a three-wire flexible cord. However, local electrical codes must be met. The holes in top plate are adaptable to conduit, BX, Romex, etc.

Any interruptions in electrical power will cause a change in the desired time of regeneration. When occurring during regeneration, the valve will stay in a particular position until power is restored. Timer must be reset after a power interruption.

Start-Up Procedure

Includes Procedures to Pressurize Softener Tank and Fill Brine Tank

With all piping and installation completed, and with mineral in the tank, proceed as follows:

1. Disconnect electric power to timer.
2. Remove valve cover to expose timer and mechanism.
3. **Open** manual bypass valve, **close** manual inlet and outlet valves (see Figure 2).
4. Push in on RED KNOB on timer, turn counter-clockwise until arrow on the camshaft/timer support points to the BACKWASH position indicated on #1 cam (see Figure 5).

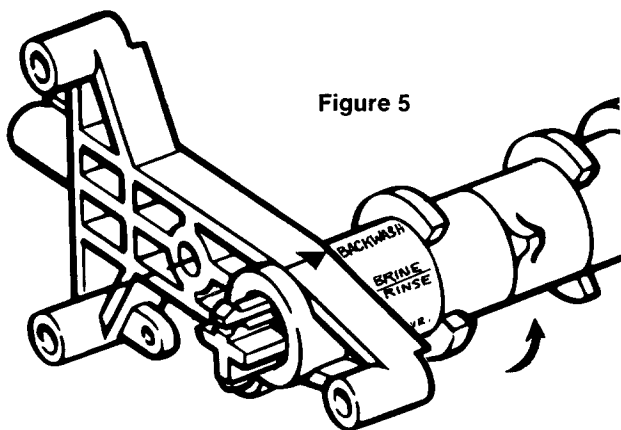


Figure 5

9. Fill the brine tank with the proper amount and type of salt recommended for use with the system.
10. Push in RED KNOB and index pilot valve to PURGE. Allow water to flow to drain until clear. During this time the brine tank will fill until the float closes the brine tank valve. Check that all brine fittings are tight and that water level in brine tank is according to softener specifications.
11. Index the valve to SERVICE position.
12. Close manual by-pass valve and open outlet valve fully.

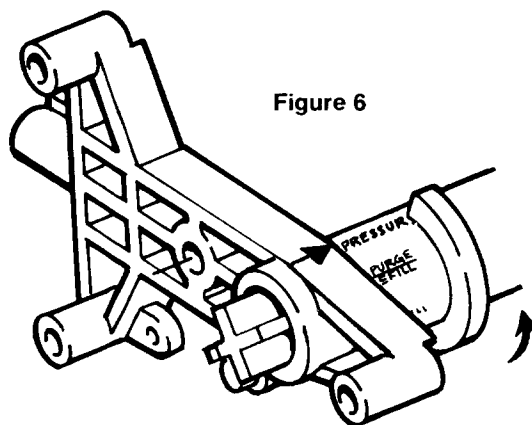


Figure 6

5. Slowly open manual inlet supply valve. DO NOT open fully. Water will enter from the bottom of mineral tank as air is expelled from the top to the drain. Full flow of water could cause loss of mineral. Continue to fill slowly until air is expelled and only water flows to drain.

NOTE: If top cover of softener tank can be removed to vent air, the tank may be filled more quickly. Observe the level and replace cover before tank overflows.

6. When ONLY water flows to drain, open inlet valve fully and backwash until water looks clean when caught in a container.
7. Push in RED KNOB and index timer counter-clockwise to BRINE/RINSE position (arrow on camshaft/timer support pointing to BRINE/RINSE on #1 cam). Observe a slow flow of water to the drain.
8. Push in RED KNOB and index timer to PRESSUR. (pressurize) position indicated on #1 cam (see Figure 6). Keep in this position for 5 minutes. This allows the tank to return to line pressure and permits easier movement of the valve discs.

Set Timer

Determine a regeneration schedule for the softener and adjust the automatic timer (see Figure 9) as follows:

1. Put all SKIPPER PINS up (away from control).
2. Rotate SKIPPER WHEEL until DAY ARROW points to day of week.
3. Depress SKIPPER PIN(S) for day(s) regeneration is required.
4. Pull TIMER KNOB out (away from timer face) and rotate until BLACK ARROW on tripper arm points to correct time of day on Face Plate.
5. Timer will automatically initiate regeneration on preset days at 2:30 A.M. To alter time, simply reset TIMER KNOB to an earlier or later time which will change the time of regeneration by the same number of hours. (Time indicated at BLACK ARROW will no longer be correct.)

Set BACKWASH timing (Figure 7)

Make sure timer is in the SERVICE position. Loosen the screw (A) on the white gear (B) and rotate the grey gear (C) with the numbered decal until desired time (3, 6, 9, 12, 15 minutes) aligns with pointer on box (D). Tighten the screw on the white gear.

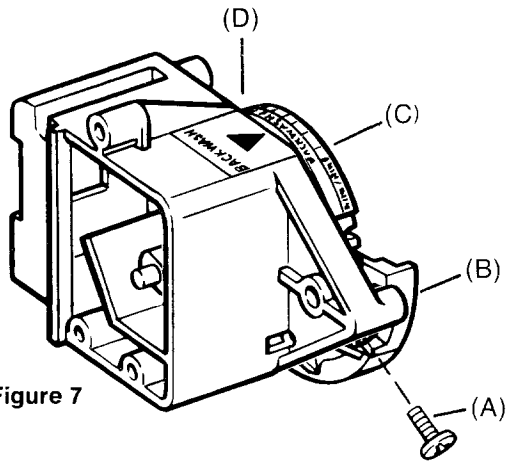


Figure 7

Set BRINE/RINSE timing (Figure 8)

Make sure timer is in the SERVICE position. Loosen the screw (E) on the grey gear (F) with the pointer (B) until the pointer aligns with the desired time (22-62 minutes). Tighten the screw.

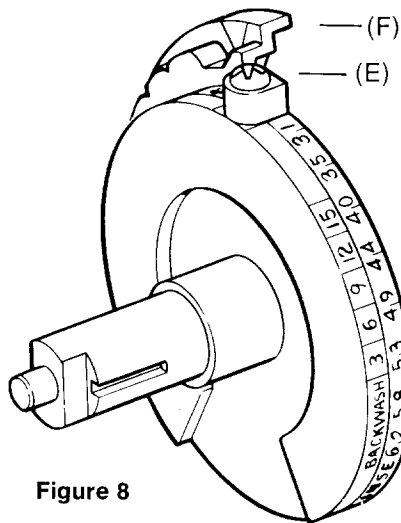


Figure 8

Final Check-Out

1. Test for soft water from a convenient soft water tap.
2. Manual by-pass valve must be closed (see Figure 2).
3. Manual inlet and outlet valves open (see Figure 2).
4. Brine line shut-off valve open (see Figure 4).
5. Drain line clear and unobstructed.
6. Electrical power to timer (not controlled by switch).
7. Time of day, frequency of regeneration, backwash time and brine/rinse time set properly.
8. Proper liquid level in brine tank and supply of salt.

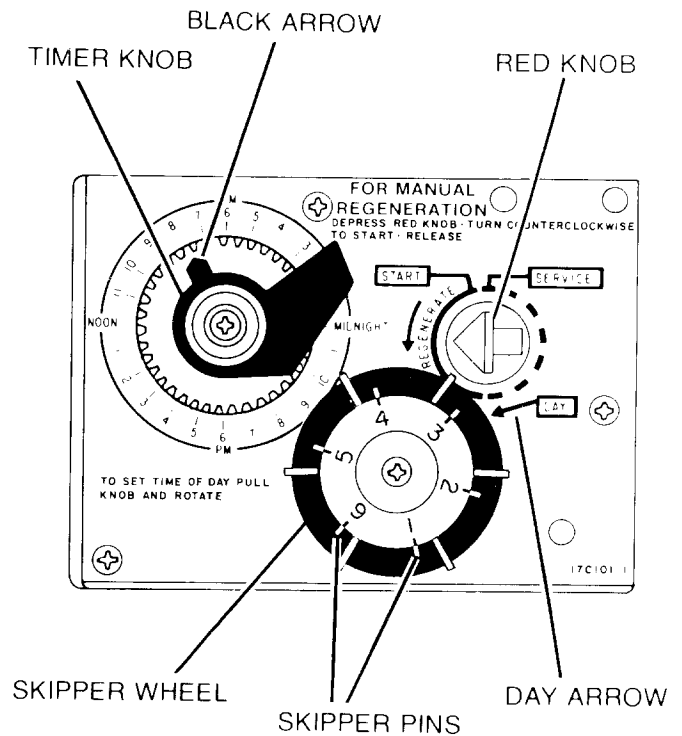


Figure 9

Manual Operation

A. Start-Up or Inspection Regeneration.

1. Disconnect electric power.
2. Push in RED KNOB and turn counter-clockwise past START to BACKWASH. Leave in position for desired time.
3. Push in RED KNOB and repeat for all desired cycles. NOTE: At PRESSUR. (pressurize) position **pause for at least 5 minutes** or until tank is pressurized.

B. Manual Initiation of Regeneration.

1. Reconnect electric power.
2. Push in RED KNOB and turn counter-clockwise to the START position. Release. Unit will then go through a complete regeneration as programmed.

Series 172 Control System Altern

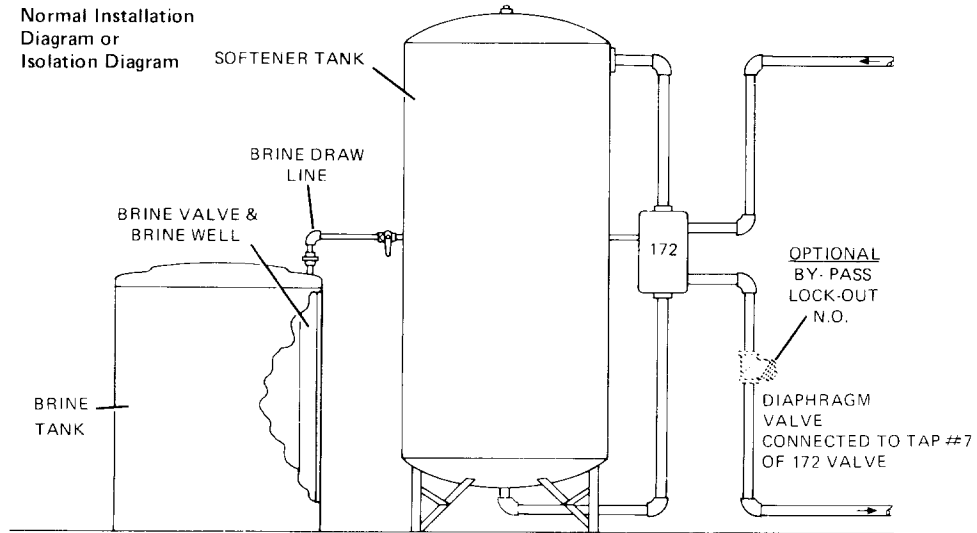


Figure 10

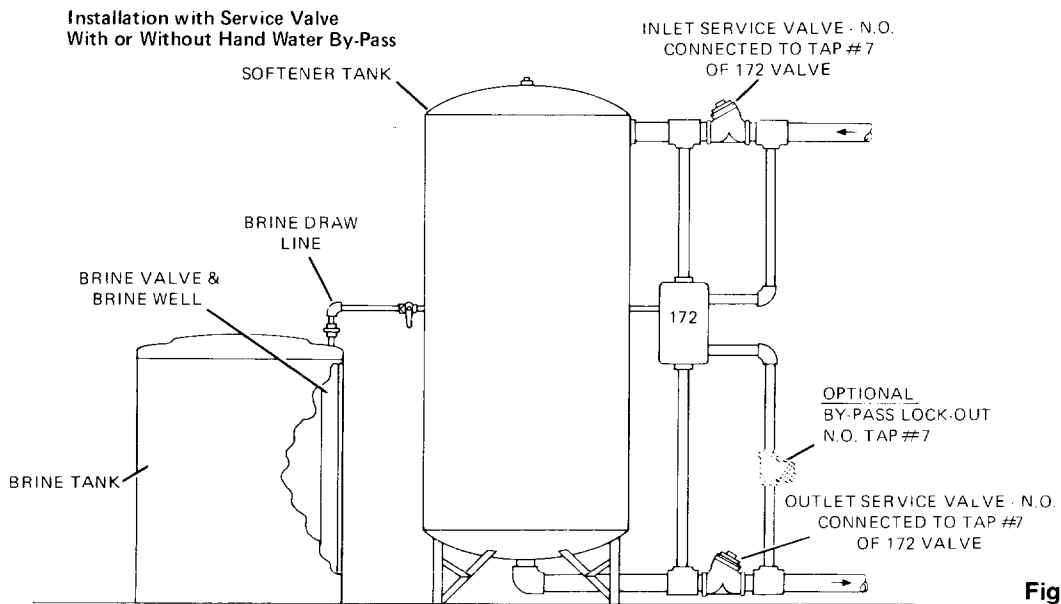


Figure 11

ate Plumbing Diagrams

Full-Flow By-Pass Diagram

CAUTION:

When providing full-flow by-pass valve either with or without service valves, be sure that system supply is adequate to provide regeneration water for the softener at a minimum of 25 psi (1.7 BAR).

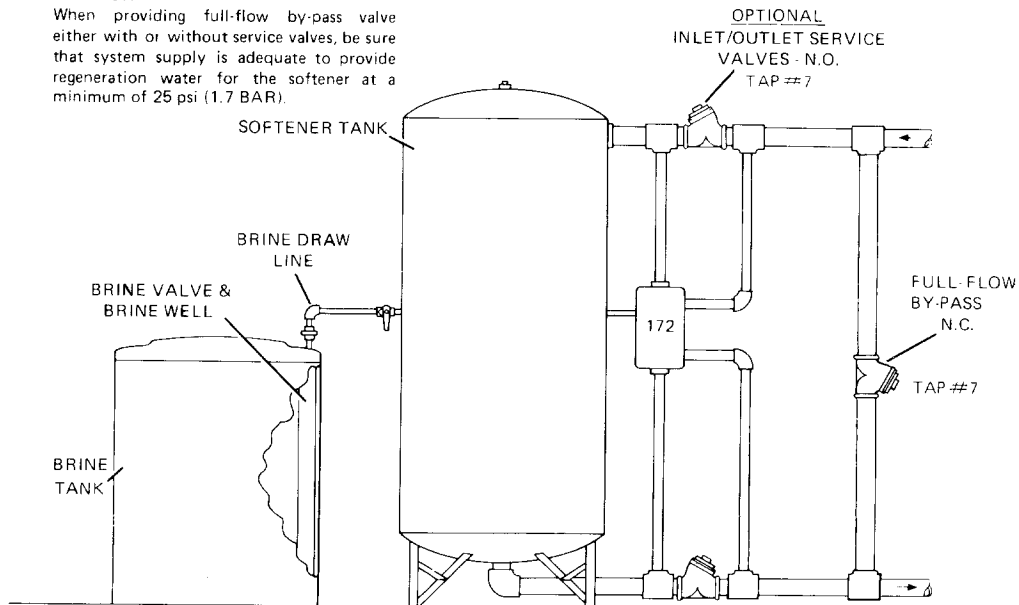


Figure 12

Full-Flow Backwash Diagram

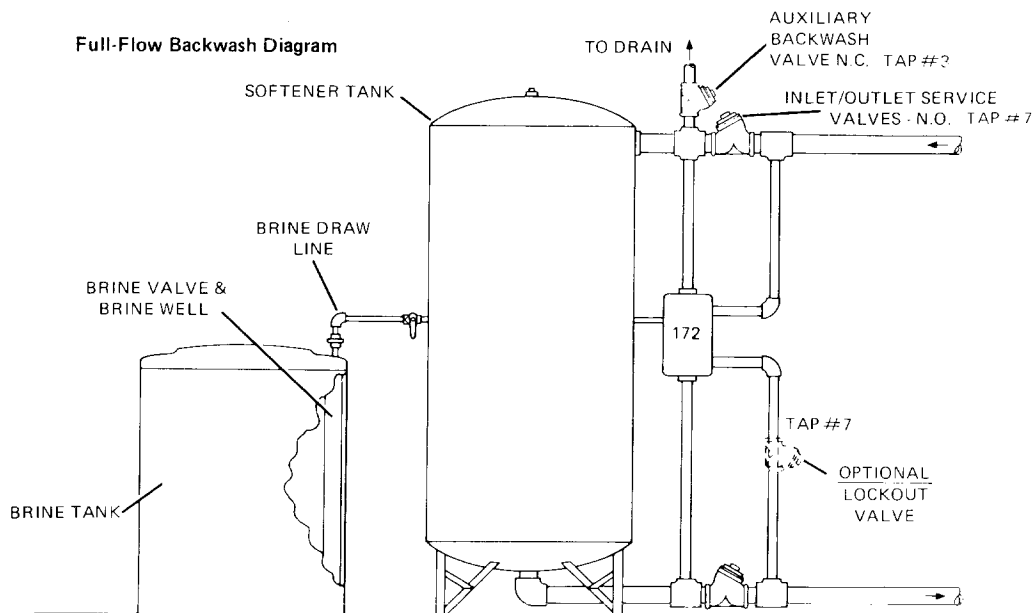


Figure 13

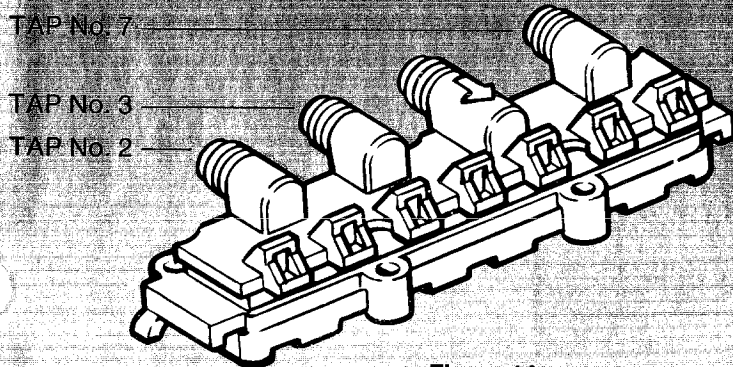


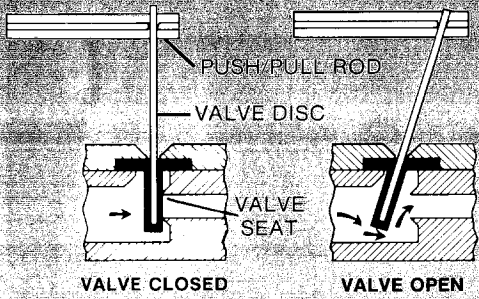
Figure 14

Three pressure taps are available on the Pilot Valve for use in actuating external diaphragm valves.

Pressure TAP No. 2 will give a pressure signal during SERVICE, BRINE RINSE, PURGE and BRINE REFILL cycles; pressure TAP No. 3 will give a pressure signal during the BACKWASH cycle; and pressure TAP No. 7 will give a pressure signal throughout the entire REGENERATION cycle.

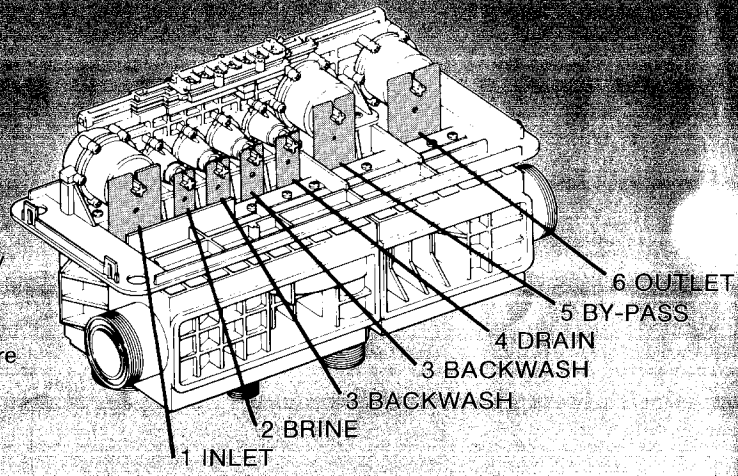
Before attaching a 1/4" (6.2 mm) tube to any pressure tap, drill out the barrier in the tap using a 1/8" (3.1 mm) drill. Use a 1/4" (6.2 mm) plastic ferrule nut to make the connection. Insert the drill into the opening of the tap and drill the hole in the barrier being careful not to drill through the backwall of the tap.

Flow Diagrams



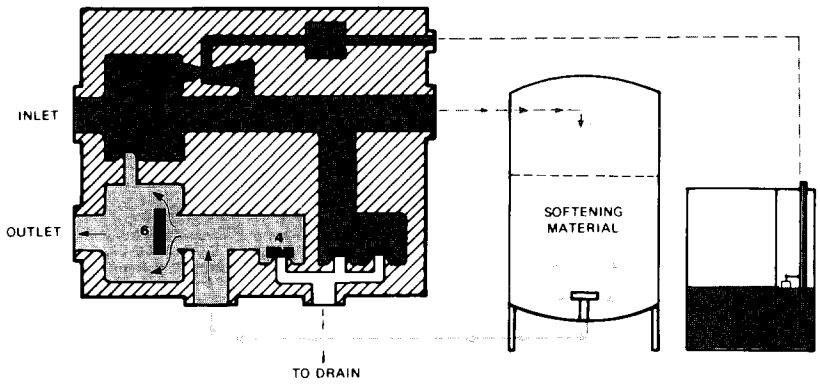
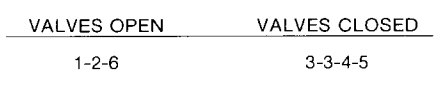
Valve disc numbers 1 through 6 correspond with disc numbers on accompanying FLOW DIAGRAMS.

Drawings at left illustrate the simplicity of Autotrol's flapper valve design: Discs open against pressure and close with pressure insuring positive closure.



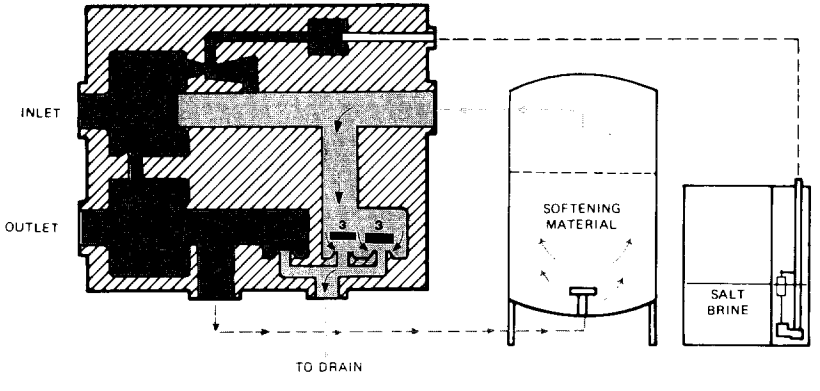
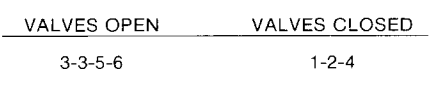
Position 1

Service



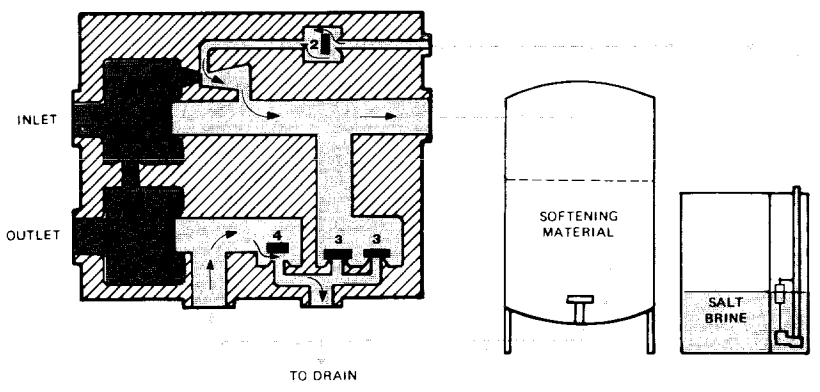
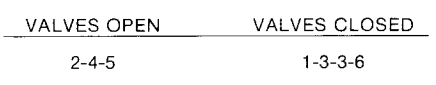
Position 2

Backwash



Position 3

Brine



Position

4

Rinse

VALVES OPEN

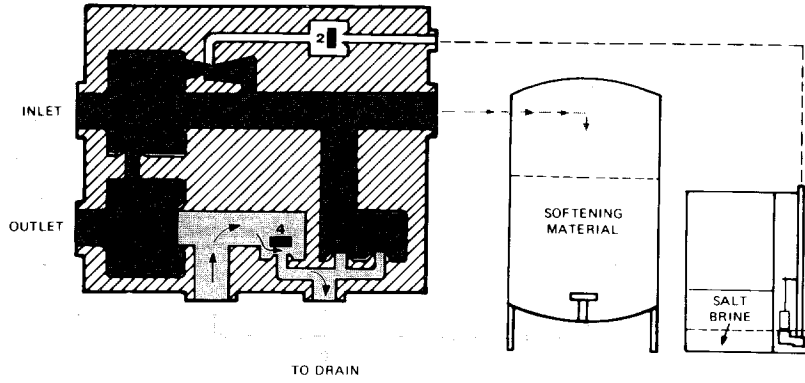
2-4-5

VALVES CLOSED

1-3-3-6

■ HARD WATER

□ RINSE WATER



Position

5

Pressurize

VALVES OPEN

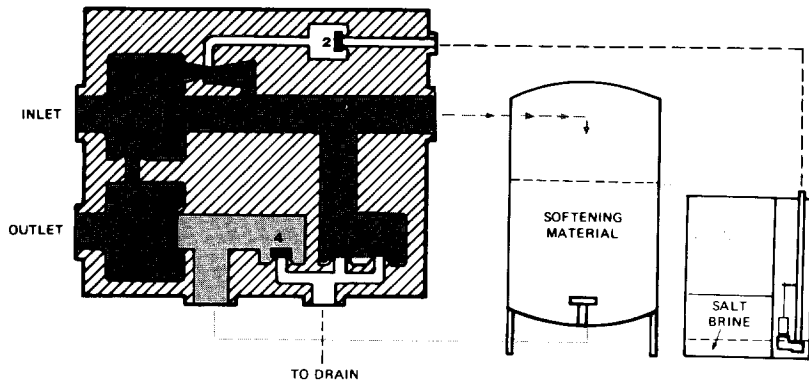
5

VALVES CLOSED

1-2-3-3-4-6

■ HARD WATER

□ RINSE WATER



Position

6

Purge and Brine Refill

VALVES OPEN

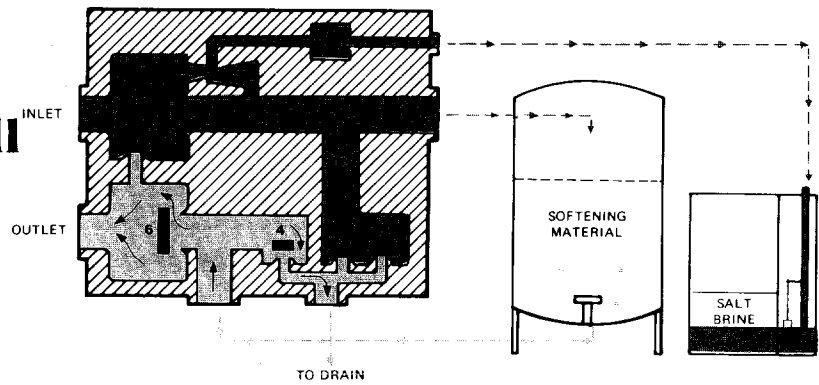
1-2-4-6

VALVES CLOSED

3-3-5

■ HARD WATER

□ PURGE WATER



Position

7

Brine Refill

VALVES OPEN

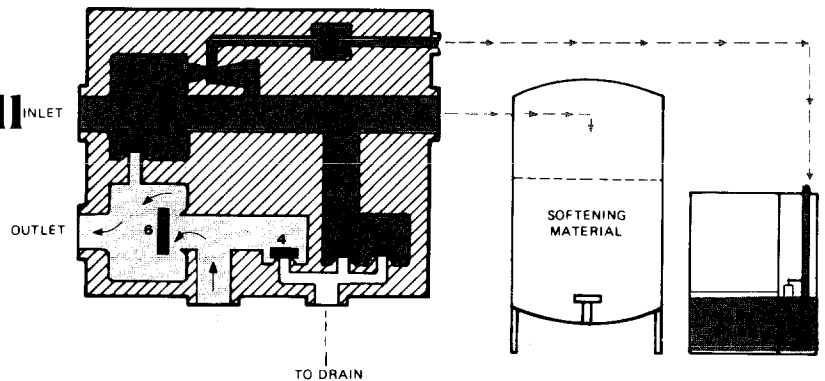
1-2-6

VALVES CLOSED

3-3-4-5

■ HARD WATER

□ SOFT WATER



Series 172

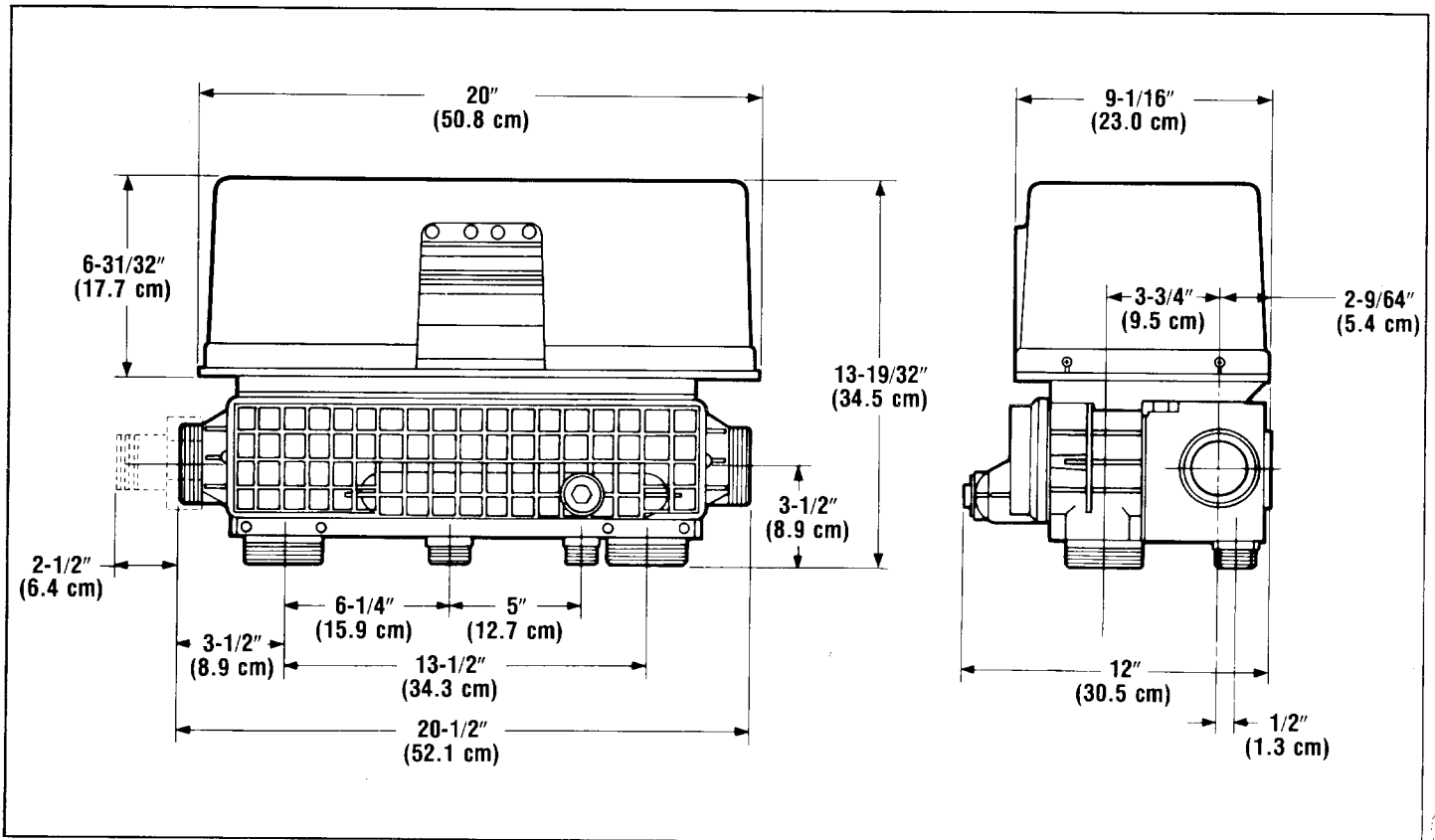
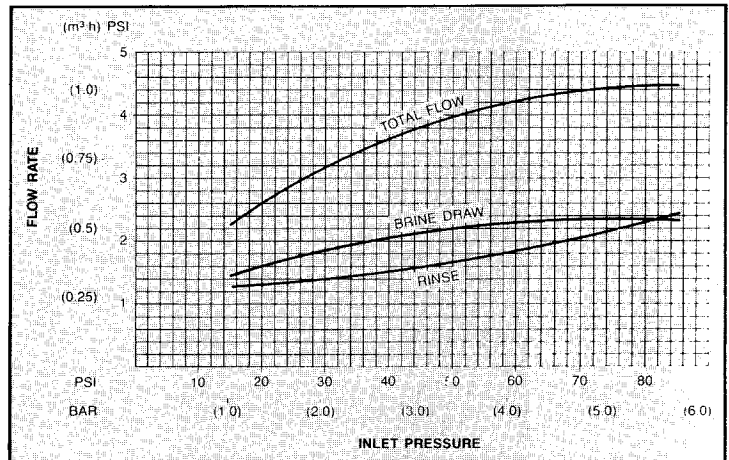
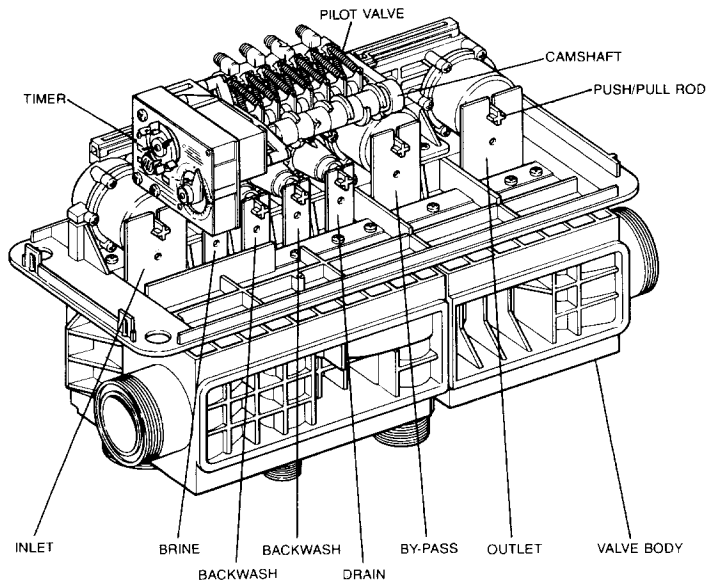


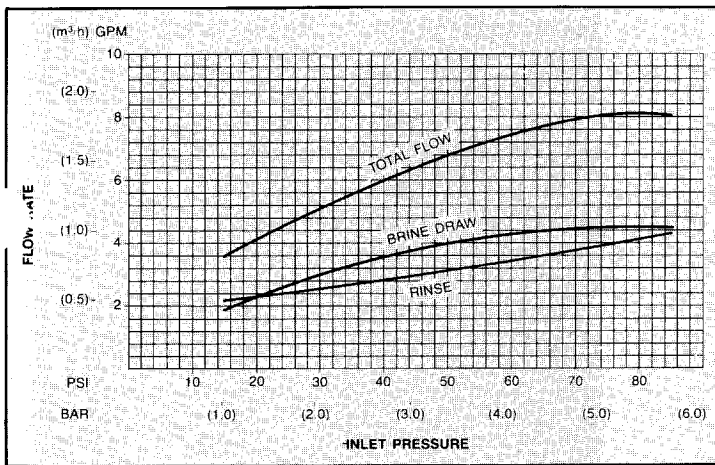
Figure 15

General Specifications

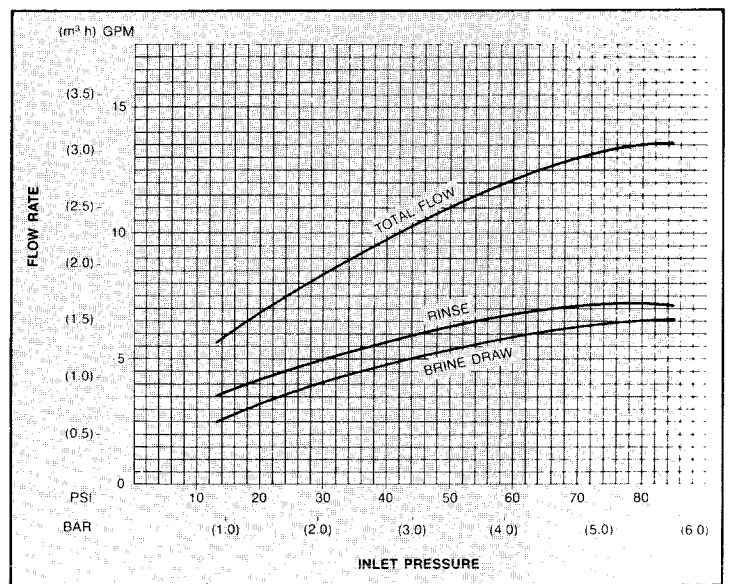
Hydrostatic Test Pressure	250 psi (17.0 BAR)
Working Pressure	20-100 psi (1.4-6.8 BAR)
Standard Electrical Rating	120 V. 60 Hz
Optional Electrical Ratings	240 V. 50 Hz; 120 V. 50 Hz; 24 V. 60 Hz; 24 V. 50 Hz.
Electrical Cord (when furnished)60" (150 cm) long 3 wire with plug
Electrical Connection1/2" (1.3 cm) conduit opening. Terminal strip inside.
Standard Plumbing Connections	2" NPT inlet, outlet, top and bottom of tank; 1" NPT brine; 1 1/2" NPT drain
Optional Plumbing Connections	2" BSPT inlet, outlet, top and bottom of tank; 1" BSPT brine; 1 1/2" BSPT drain
Union Type Fittings for Inlet, Outlet, Top and Bottom of Tank	2" brass pipe with O-ring seal to valve. Available in standard (NPT) or optional (BSPT) threads. Also available in PVC.
Rubber Parts	Compounded for cold water service
Control Body	Fiberglass reinforced thermoplastic
Injector4 sizes available — "AA," "BB," "CC," "DD." Refer to brine curve graphs on page 11.
Program Clock	Available in 6- or 7-day English, French, German, Italian, Spanish or Japanese inscription. Impulse timers also available.
Backwash Cycle	Adjustable for 3 to 15 minutes
Brine/Rinse Cycle	Adjustable from 22 to 62 minutes
Total Regeneration Time	Varies from 60 to 117 minutes as Backwash and Brine/Rinse Cycles are adjusted
External Backwash Controller Required	Sized to tank diameter
External Brine Valve Required	Must have positive shut-off on refill and draw down
Ambient Temperature	32°F (0°C) to 120°F (49°C). Valve to be drained if possibility of freezing.



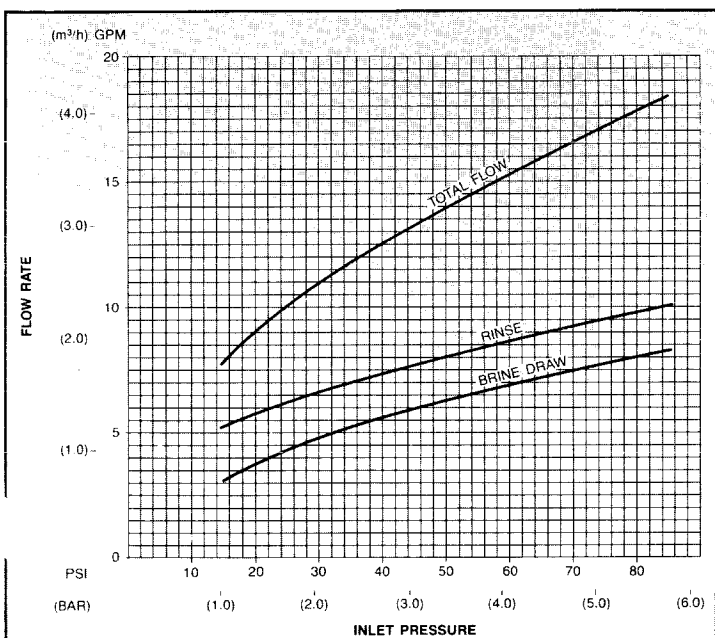
"AA" Injector



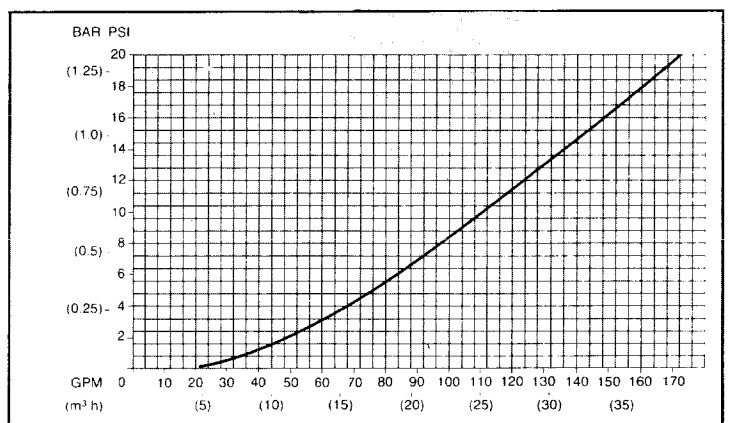
"BB" Injector



"CC" Injector



"DD" Injector



ΔP across 172 valve

Replacement Parts - Valve

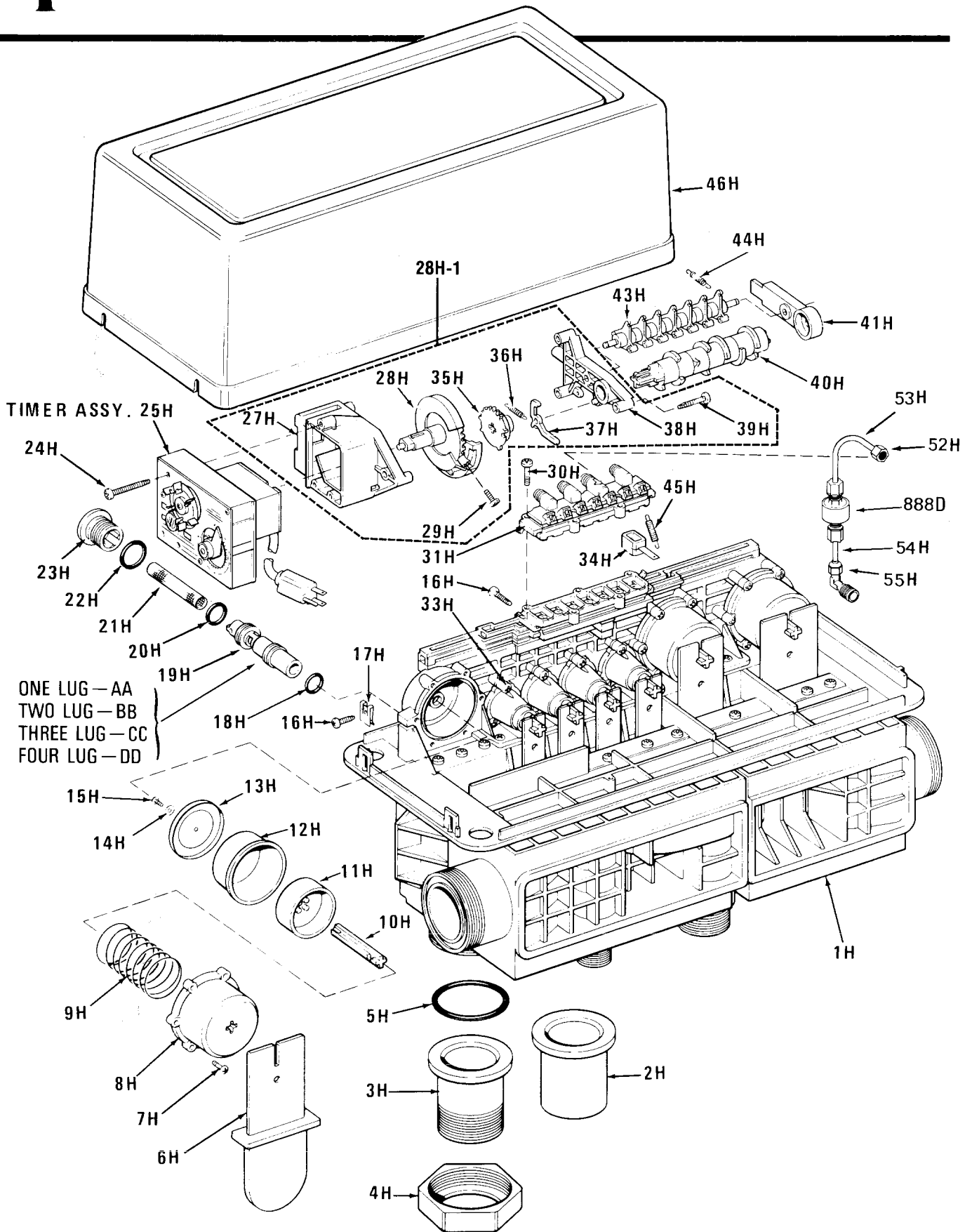


Figure 16

Replacement Parts List - Valve

ITEM	DESCRIPTION	No. Required	ITEM	DESCRIPTION	No. Required
1H-1	Valve Body NPT	1	19H	Injector—Specify AA, BB, CC or DD	1
1H-2	Valve Body BSPT	1	20H	O-Ring	1
2H-1	Adapter—2" PVC	4	21H	Injector Screen	1
2H-2	Adapter—63mm PVC	4	22H	O-Ring	1
3H-1	Adapter—2" NPT Brass	4	23H	Injector Cap	1
3H-2	Adapter—2" BSPT Brass	4	24H	Screw—Timer	3
4H-1	Nut—For 2" NPT, 2" BSPT & 2" PVC Adapter	4	25H	Timer—Specify Voltage; Frequency; 6- or 7-day	1
4H-2	Nut—For 63mm PVC Adapter	4	27H	Timer Mounting Bracket	1
5H	O-Ring	1	28H	Timing Gear	1
6H-1	Valve Disc #1 & #6	2	28H-1	Timing Gear Assembly	1
6H-2	Valve Disc #2	1	29H	Screw—Timing Gear	2
6H-3	Valve Disc #3 & #4	3	30H	Screw—Pilot Valve	5
6H-4	Valve Disc #5	1	31H	Pilot Valve Body Connection	1
7H	Screw	26	33H	Screw—Small Cap, Top	4
8H-1	Cap—Large	3	34H	Valve Disc—Pilot	7
8H-2	Cap—Small	4	35H	Gear—Timing	1
9H-1	Spring—Large	3	36H	Spring	1
9H-2	Spring—Small	4	37H	Locking Arm	1
10H	Push/Pull Rod	7	38H	Support—Camshaft & Timer	1
11H-1	Piston—Large	3	39H	Screw	3
11H-2	Piston—Small	4	40H	Camshaft Assembly	1
12H-1	Diaphragm—Large	3	41H	Camshaft Support	1
12H-2	Diaphragm—Small	4	43H	Rocker Arm Shaft Assembly	1
13H-1	Plate—Large	3	44H	Spring—Inlet	7
13H-2	Plate—Small	4	45H	Spring—Drain	7
14H	Washer	7	46H	Cover	1
15H	Screw	7	52H	Nut, Tube	1
16H	Screw	4	53H	Tube	1
17H	U-Nut	2	54H	Tube	1
18H	O-Ring	1	55H	Elbow-Tube	1
			888D	Pilot Valve Filter	1

Replacement Parts - Timer

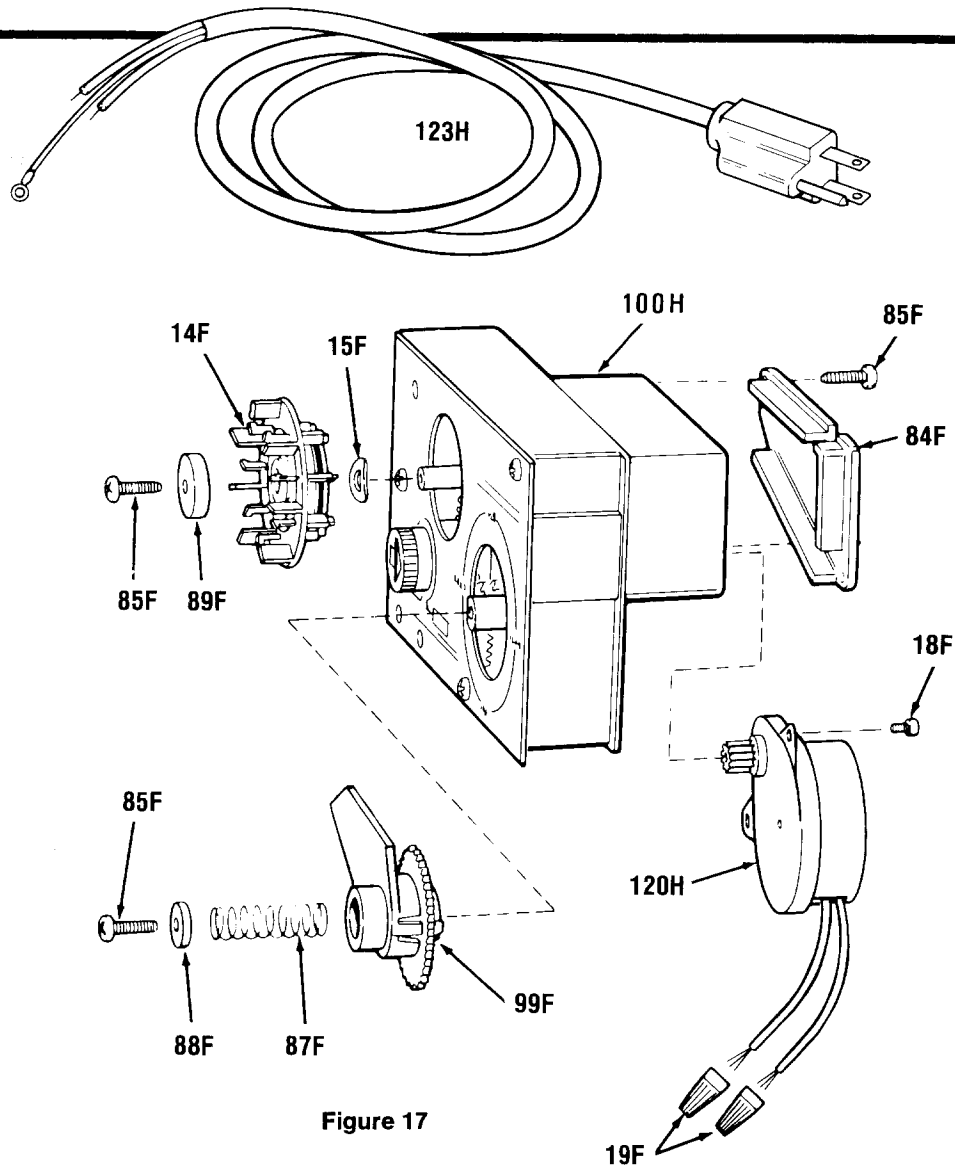


Figure 17

Replacement Parts List - Timer

ITEM	DESCRIPTION	No. Required	ITEM	DESCRIPTION	No. Required
14F-6	6-Day Skipper Wheel Assembly	1	87F	Spring	1
14F-7	7-Day Skipper Wheel Assembly	1	99F-3	6-Day Tripper & Gear	1
85F	Screw	2	99F-4	7-Day Tripper & Gear	1
89F	Plastic Washer	1	120H	Motor — Specify Voltage; Frequency	1
15F	Bowed Washer	1	18F	Screw — Motor Mounting	2
85F	Screw	1	19F	Wire Nut	2
88F	Plastic Washer	1	123H	Cord	1

Trouble-Shooting Procedure

Symptom	Possible Cause	Solution
Control will not regenerate automatically	<ul style="list-style-type: none"> a. No skipper pins in b. No power c. Motor burned out 	<ul style="list-style-type: none"> a. Push in skipper pins b. Check time of day and power c. Replace motor
No brine draw	<ul style="list-style-type: none"> a. Clogged injector/screen b. Low water pressure c. Obstructed drain line d. Closed valve in brine line e. Valve disc No. 1 not closed 	<ul style="list-style-type: none"> a. Clean b. Pressure must be above 20 psi c. Eliminate back pressure d. Check and open e. Flush seat by manually operating No. 1 pilot valve disc
Salt in water	<ul style="list-style-type: none"> a. Check for "No brine draw" as in steps (a) through (e) above, plus— b. Brine rinse time set too low 	<ul style="list-style-type: none"> a. As in (a) through (e) above b. Increase toward 62 minute time
Intermittent brine draw	<ul style="list-style-type: none"> a. Low pressure b. Clogged injector/screen 	<ul style="list-style-type: none"> a. Set up pressure b. Clean or replace as required
Hard water after regeneration	<ul style="list-style-type: none"> a. Unit out of salt b. Bypass (manual) open c. Valve disc No. 5 open d. Loss of resin 	<ul style="list-style-type: none"> a. Add salt and regenerate b. Close c. Flush seat by manually operating No. 5 pilot valve disc d. Add resin and locate reason for loss
Backwash rate extremely low or high	<ul style="list-style-type: none"> a. Plugged flow controller (low) b. Flow controller rubber insert missing (high) 	<ul style="list-style-type: none"> a. Clean b. Replace
Water dripping to drain in service	<ul style="list-style-type: none"> a. One or more valve discs not seated 	<ul style="list-style-type: none"> a. Flush seats by manually operating No. 3 and No. 4 pilot valve discs
Chattering during regeneration	<ul style="list-style-type: none"> a. Excessive flow rate through bypass 	<ul style="list-style-type: none"> a. Regenerate at a time when flow rate is lower

