

Culligan[®]



ESTATE[®] 2/2M WATER CONDITIONER Installation and Operating Manual

MODELS FROM 1999

⚠ WARNING: IF INCORRECTLY INSTALLED, OPERATED OR MAINTAINED, THIS PRODUCT CAN CAUSE SEVERE INJURY. THOSE WHO INSTALL, OPERATE, OR MAINTAIN THIS PRODUCT SHOULD BE TRAINED IN ITS PROPER USE, WARNED OF ITS DANGERS, AND SHOULD READ THE ENTIRE MANUAL BEFORE ATTEMPTING TO INSTALL, OPERATE OR MAINTAIN THIS PRODUCT.

CULLIGAN COMPANY
NORTHBROOK, ILLINOIS 60062

Attention Culligan Customer:

The installation, service and maintenance of this equipment should be rendered by a qualified and trained service technician. Your local independently operated Culligan dealer employs trained service and maintenance personnel who are experienced in the installation, function and repair of Culligan equipment. This publication is written specifically for these individuals and is intended for their use.

We encourage Culligan users to learn about Culligan products, but we believe that product knowledge is best obtained by consulting with your Culligan dealer. Untrained individuals who use this manual assume the risk of any resulting property damage or personal injury.

 WARNING — Prior to servicing equipment, disconnect power supply to prevent electrical shock.

ESTATE[®] 2/2M WATER CONDITIONER

Installation and Operating Manual

Models from 1999

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SAFE PRACTICES

Throughout this manual there are paragraphs set off by special headings.

NOTICE: Notice is used to emphasize installation, operation or maintenance information which is important, but does not present any hazard.

Example: **NOTICE:** *The nipple must extend no more than 1 inch above the cover plate.*

CAUTION: Caution is used when failure to follow directions could result in damage to equipment or property.

Example: **CAUTION:** *Disassembly while under water pressure can result in flooding.*

WARNING: Warning is used to indicate a hazard

which could cause injury or death if ignored.

Example: **WARNING: ELECTRICAL SHOCK HAZARD! UNPLUG THE UNIT BEFORE REMOVING THE TIMER MECHANISM OR COVER PLATES!**

The Culligan water conditioner bears two separate serial numbers; one for the control assembly and one for the media tank. The control assembly serial number can be found on the left rear side of the timer mounting plate. The media tank serial number is on the side of the tank. **DO NOT REMOVE OR DESTROY THESE SERIAL NUMBER DECALS. THEY MUST BE REFERENCED IF EVER YOU REQUIRE REPAIRS OR PARTS REPLACEMENT UNDER WARRANTY.**

This publication is based on information available when approved for printing. Continuing design refinement could cause changes that may not be included in this publication.

Introduction

Please read this booklet carefully before beginning the installation of the Estate® Water Conditioner. It contains important information about the unit, including the tools and materials needed for installation, accessories available for hook-up to the plumbing, and instructions covering

installation, settings, start-up, and operation. The Estate 2/2M Water Conditioner has been thoughtfully designed and engineered to provide soft, conditioned water for many years when properly applied, installed and operated.

Specifications

ESTATE[®] 2/2M WATER CONDITIONER

	0.7 FT ³ MODEL	1.0 FT ³ MODEL	1.5 FT ³ MODEL
Control Valve Type	5-cycle Reinforced Thermoplastic	5-cycle Reinforced Thermoplastic	5-cycle Reinforced Thermoplastic
Overall Conditioner Height	51 in 1,295 mm	49 in 1,245 mm	63 in 1,600 mm
Media Tank Dimensions (Dia. x Ht.)	8 x 44 in 203 x 1,118 mm	10 x 40 in 254 x 1,016 mm	10 x 54 in 254 x 1,372 mm
Salt Storage Tank Dimensions (Dia. x Ht.)	16 x 43 in 457 x 1,092 mm	18 x 43 in 457 x 1,092 mm	18 x 43 in 457 x 1,092 mm
	18 x 43 in 457 x 1,092 mm		
Exchange Media, Type and Quantity	Cullex [®] Media, 0.7 ft ³	Cullex Media, 1.0ft ³	Cullex Media, 1.5 ft ³
Underbedding, Type and Quantity	Cullsans [®] Underbedding, 6 lb.	Cullsans Underbedding, 8 lb.	Cullsans Underbedding, 8 lb.
Exchange Capacity @ Salt Dosage Per Recharge ¹	14,700 gr @ 4 lb	22,557 gr @ 5.0 lb	28,160 gr @ 7 lb
	17,900 gr @ 12 lb	30,270 gr @ 11 lb	40,969 gr @ 14 lb
	19,000 gr @ 12 lb	35,714 gr @ 17 lb	46,803 gr @ 20 lb
Freeboard to Media ²	15.2 - 16.2 in	14.3 - 15.3 in	18 - 19 in
Freeboard to Underbedding ³	39 in	36.5 in	50.75 in
Salt Storage Capacity	250 lb or 350 lb	375 lb	375 lb
Rated Service Flow @ Pressure Drop	5.9 gpm @ 15 psi	7.2 gpm @ 15 psi	7.0 gpm @ 15 psi
Total Hardness, Maximum	75 gpg	99 gpg	99 gpg
Total Iron, Maximum (dissolved)	5 ppm	5 ppm	5 ppm
Hardness to Iron Ratio, Minimum	8 gpg to 1 ppm 140 mg/L to 1 mg/L	8 gpg to 1 ppm 140 mg/L to 1 mg/L	8 gpg to 1 ppm 140 mg/L to 1 mg/L
Operating Pressure	20 - 125 psi 140 - 860 kPa	20 - 125 psi 140 - 860 kPa	20 - 125 psi 140 - 860 kPa
Operating Temperature	33 - 120°F 1 - 50°C	33 - 120°F 1 - 50°C	33 - 120°F 1 - 50°C
Electrical Requirements	120V/60 Hz	120V/60 Hz	120V/60 Hz
Electrical Power Consumption, Min./Max.	3 Watts/35 Watts	3 Watts/35 Watts	3 Watts/35 Watts
Drain Flow, Maximum ⁴	1.6 gpm	2.0 gpm	2.0 gpm
Recharge Time, Average	90 min	90 min	90 min
Recharge Water Consumption	64 gal	64 gal	64 gal

1 Capacities and corresponding salt dosages pertain to low hardness waters. Capacities given per recharge

2 Measured from top of media to top of inlet fitting (backwashed and drained)

3 Measured from top of underbedding to top of inlet fitting

4 Backwash at 120 psi (830 kPa)

Preparation

COMPONENT DESCRIPTION

The water conditioner is shipped from the factory in three cartons. Remove all components from their cartons and inspect them before starting installation.

Control Valve Assembly — Includes the 5-cycle regeneration control valve and electronic timer assembly. A small parts package contains installation hardware and consumer literature, including an Owner's Guide and warranty policy.

Media Tank — Contains the media tank complete with Cullex[®] ion exchange resin, underbedding and outlet manifold.

Salt Storage Tank Assembly — Includes salt storage container with support plate and Dubl-Safe[™] brine refill valve and chamber.

TOOLS AND MATERIALS

The following tools and supplies will be needed, depending on installation method. Observe all applicable codes.

All Installations

- Safety glasses
- Phillips screwdrivers, small and medium tip
- Gauge assembly (PN 00-3044-50 or equivalent)
- Silicone lubricant (PN 00-4715-07 or equivalent) - **DO NOT USE PETROLEUM-BASED LUBRICANTS**
- A bucket, preferably light-colored
- Towels

Special Tools

- Torch, solder and flux for sweat copper connections
- Threading tools, pipe wrenches and thread sealer for threaded connections.
- Saw, solvent and cement for plastic pipe connections.

Materials

- Brine line, 5/16" (PN 00-3031-28 or equivalent)
- Drain line, 1/2" (PN 00-3030-82, gray, semi-flexible; or PN 00-3319-46, black, semi-rigid; or equivalent)
- Thread sealing tape
- Pressure reducing valve (if pressure exceeds 125 psi [860 kPa], PN 00-4909-00 or equivalent)
- Pipe and fittings suited to the type of installation
- Water softener salt (rock, solar or pellet salt formulated specifically for water softeners)

BYPASS

A bypass valve is included with the control valve assembly.

APPLICATION

Water quality — Verify that raw water hardness and iron are within limits. Note the hardness for setting the salt dosage and recharge frequency.

Pressure — If pressure exceeds 125 psi (860 kPa), install a pressure reducing valve (see materials checklist). On private water systems, make sure the minimum pressure (the pressure at which the pump starts) is greater than 20 psi (140 kPa). Adjust the pressure switch if necessary.

⚠ CAUTION: The use of a pressure reducing valve may limit the flow of water in the household.

Temperature — Do not install the unit where it might freeze, or next to a water heater or furnace or in direct sunlight.

LOCATION

Space requirements — Allow 6-12 inches (15-30 cm) behind the unit for plumbing and drain lines and 4 feet (1.3 metres) above for service access and filling the salt container.

Floor surface — Choose an area with solid, level floor free of bumps or irregularities. Bumps, cracks, stones and other irregularities can cause the salt storage tank bottom to crack when filled with salt and water.

Drain facilities — Choose a nearby drain that can handle the rated drain flow (floor drain, sink or stand pipe). Refer to the Drain Line Chart, Table 1 (page 7), for maximum drain line length.

NOTICE: Most codes require an anti-siphon device or airgap.

Electrical facilities — A 6-foot grounded cord is provided. The customer should provide a 3-prong grounded receptacle, preferably one not controlled by a switch that can be turned off accidentally. Observe local electrical codes.

⚠ WARNING: ELECTRICAL SHOCK HAZARD! DO NOT REMOVE THE GROUNDING PRONG! IF THE RECEPTACLE IS DESIGNED ONLY FOR 2-PRONG PLUGS, OBTAIN A 3-PRONG ADAPTER AND GROUND IT SECURELY TO THE RECEPTACLE. DO NOT USE EXTENSION CORDS.

Installation

PLACEMENT

Refer to Fig. 1.

- Set the media tank on a solid, level surface near water, drain and electrical facilities. Place the outlet (black coupling) of the tank on the left.
- Set the brine system on a flat, smooth, solid structure as near the media tank as possible.

MOUNT THE CONTROL VALVE

See Fig. 2.

1. Remove the two plastic caps from the tank couplings and lubricate the two O-rings with silicone lubricant. **NOTICE:**

Do not use a petroleum base lubricant, for this will cause swelling of the rubber parts.

2. **NOTICE:** *The black molded tank adapter is marked with "IN" and "OUT", corresponding to the inlet and outlet of the tank. Position the tank with the inlet coupling on the right and the outlet coupling on the left.*
3. The control valve is marked also with "IN" and "OUT" (Fig. 2). Place the control onto the tank with the inlet and outlet of the control corresponding with the inlet and outlet of the tank. Press firmly onto the couplings.
4. Locate the two U-clamps and screws in the small parts package. Install the clamps on both sides of the control as indicated in Fig. 2 and secure them with the screws.

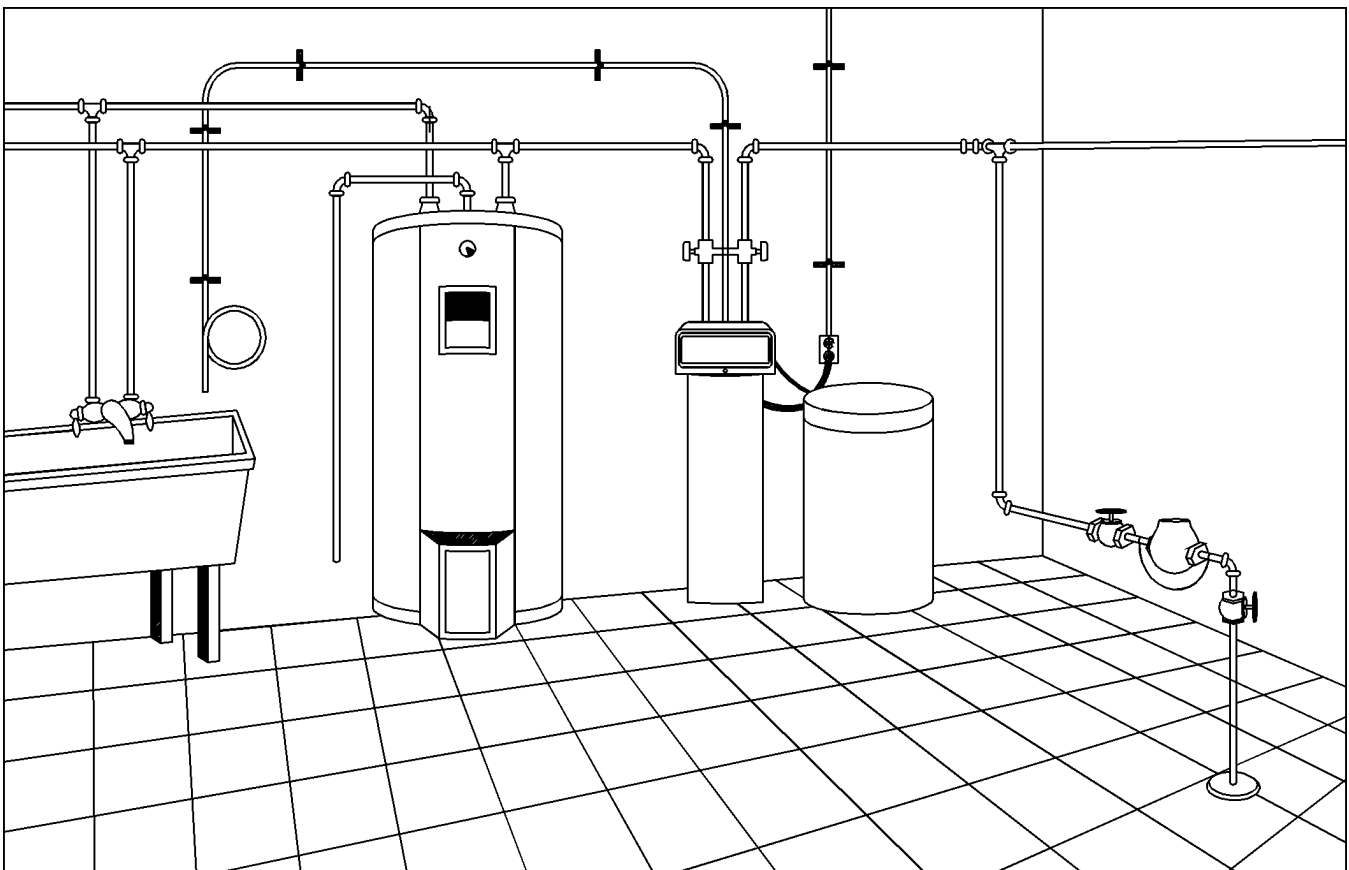


FIG. 1

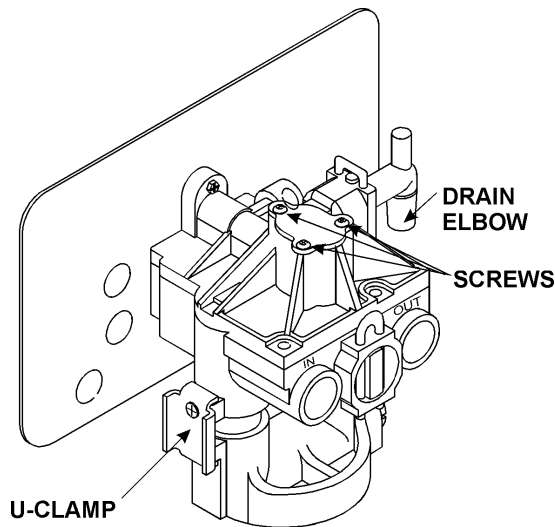


FIG. 2

TEN INCH SOFTENERS

As shipped from the factory, each control is equipped as a 8-inch unit. A 10-inch eductor and flow control is included with each unit for conversion for use with 10-inch softener tanks. **NOTICE:** To prevent injury, convert units to ten inch configuration prior to installation.

For the eductor, refer to Fig. 2.

- Remove the three screws on the eductor cap and remove cap.
- Remove the eductor screen.
- Pull out the blue nozzle and replace with the light brown.
- Reverse the procedure for reassembly. To prevent leaks, make sure the gasket is in proper position.

For the backwash flow control.

- Remove the u-clip of the drain elbow assembly and pull the drain elbow straight off.
- Remove the back wash flow control located behind the elbow. Put the #2 restrictor in it's place.
- Reverse the procedure to reassemble.

PLUMBING CONNECTIONS

Two methods of connecting the water softener to the plumbing system are available. Shipped with each softener is a Culligan® Cul-Flo-Valv® bypass valve, either PN 01-0124-88 or PN 01-0102-38. If local conditions warrant, you may use the sweat adaptor kits, PN 00-3314-44 or PN 00-3314-45.

NOTICE: The Soft-Minder® meter cannot be used with the sweat adaptors.

⚠ CAUTION: Close the inlet supply line and relieve system pressure before cutting into the plumbing! Flooding could result!

⚠ CAUTION: When making sweat connections, remove all plastic and rubber components which contact brass or copper. Damage to these components may result when not removed.

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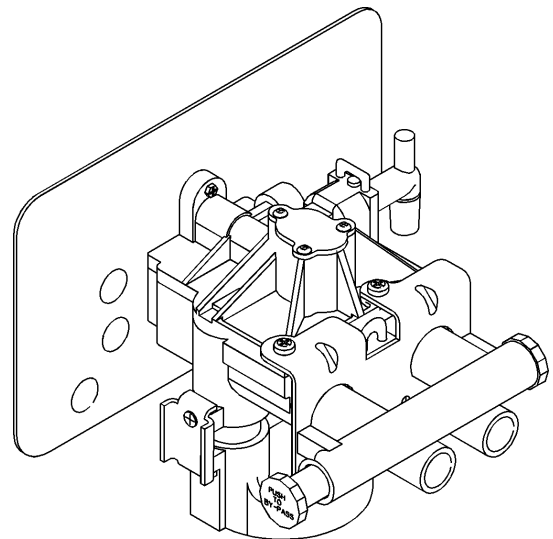


FIG. 3

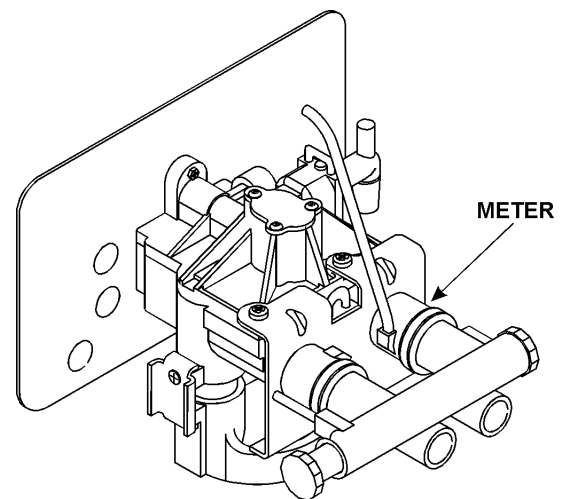


FIG. 4

BYPASS VALVE INSTALLATION - TIME CLOCK UNITS ONLY

The bypass valve connects directly to the backplate of the valve with a pair of screws (Fig. 3). To facilitate this connection, remove the plate by pulling up on the u-clip on the back of the valve. Lubricate all o-rings with silicon lubricant.

BYPASS VALVE INSTALLATION - SOFT-MINDER METER ONLY

The Soft-Minder meter is placed between the bypass valve and the control (Fig. 4). Make sure the meter is on the outlet port of the control. A pair of elongated bolts are packaged with the meter to hold the bypass valve to the back plate of the control. Lubricate all o-rings with silicon lubricant.

SWEAT ADAPTOR INSTALLATION

The sweat adaptors use a snap ring to hold them to the backplate of the control valve. The back plate will need to be removed from the valve for this connection. A pair of snap ring pliers, PN 00-5916-09, are needed for this connection.

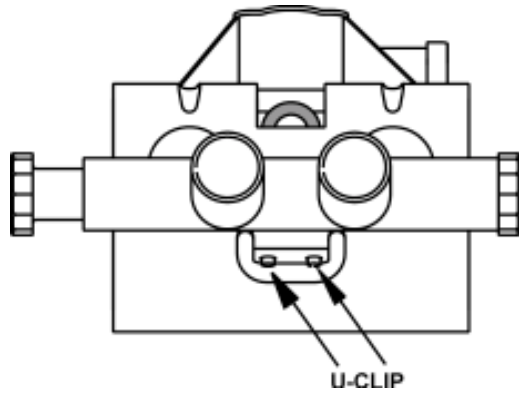


FIG. 5

⚠ CAUTION: When reinstalling back plate to control valve, make sure the u-clip fully engages the two bottom holes of the bracket (Fig. 5). Secure bracket from the top with the two mounting screws provided.

CONNECT THE BRINE LINE

Refer to Fig. 6.

- Measure a length of brine line sufficient to reach from the brine tank to the brine fitting and then add four feet (1.3 meters). Cut both ends squarely and cleanly.
- Remove the brine valve from the brine tank and remove the white nut and insert. Return float rod to its original position.

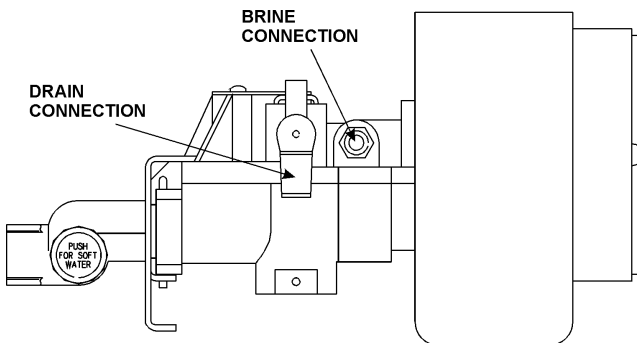


FIG. 6

- Slip the white nut over one end of the tubing and press the plastic insert into the end of the tubing. Connect to the brine valve and tighten nut. (Fig. 7)
- Remove white nut and insert from wire tie around drain elbow.
- Slip the white nut over one end of the tubing and press the plastic insert into the end of the tubing. Connect to the brine connection on the valve and tighten nut.

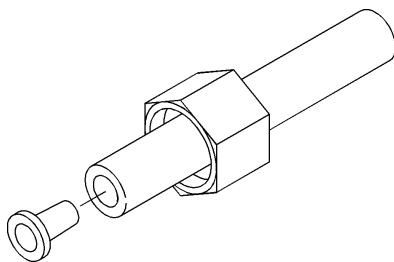


FIG. 7

DRAIN LINE CONNECTION

Refer to Table 1, under the applicable tank size for drain line length and height limitations.

- Remove 1/2" pipe clamp from end of drain elbow.
- Route a length of 1/2" drain line from the drain elbow to the drain.
- Fasten the drain line to the elbow with the clamp.
- Secure the drain line to the drain to prevent its movement during regeneration. A loop in the end of the tube will keep it filled with water and will reduce splashing at the beginning of each regeneration.

NOTICE: Observe all plumbing codes. Most codes require an anti-siphon device or air gap at the discharge point!

FILL THE SALT STORAGE CONTAINER

Fill the salt storage container with water until the level reaches about 1 inch above the salt support plate. Pour salt into the container. Fill to within a few inches of the top.

TABLE 1

Average Water Pressure Psi/kPa	Height Drain Discharge Above Floor on which Softener Stands							
	4"/ 09m	1Ft/ .31m	2Ft/ .61m	3Ft/ .91m	4Ft/ 1.22m	5Ft/ 1.52m	6Ft/ 1.83m	7Ft/ 2.13m
30/ 207	56/ 386	50/ 345						
50/ 345	112/ 772	106/ 731	96/ 662	86/ 593	76/ 524			
70/ 483	143/ 986	137/ 945	127/ 876	117/ 807	107/ 736	97/ 669		
90/ 621	153/ 1055	147/ 1014	137/ 945	127/ 876	117/ 807	107/ 736	97/ 669	
120/ 827	159/ 1096	153/ 1055	143/ 986	133/ 917	123/ 848	113/ 779	103/ 710	93/ 641

SOFT-MINDER® METER CONNECTION

To connect the meter leads, refer to the instructions listed below and the wiring schematic.

- Remove the timer face plate & set it aside.
- Remove the two screws holding the timer cover. Set the timer cover aside.
- Locate the 1/2" hole in the timer plate at the center rear. Remove the plastic plug.
- Slip the meter cable through the hole and toward the circuit board.
- Connect the red wire from the flow meter cable to the common terminal of the lockout switch. Connect the red wire from the flow meter connection to the normally closed terminal of the lockout switch.
- Connect the flow meter harness to the circuit board. The meter terminal is labeled "METER".
- Locate the strain relief bushing in the parts pack. Place it on the cable at the point of entry to the rear of the timer plate and push it into the hole.

Settings

The Estate[®] 2 and 2M Water Conditioners are designed to perform efficiently on a wide range of water supplies. Before the unit can be recharged and put into service, several settings must be made.

BACKWASH

Backwash, the first step in the recharge cycle, expands and loosens the resin bed, and flushes away accumulated turbidity. The backwash interval is preset at the factory for 10 minutes, which is adequate for most water supplies. It is adjustable, however, from 5 to 30 minutes. It is recommended that backwash last long enough so that the effluent from the drain line is clear. Backwash too long and water is wasted, not long enough and the tank becomes fouled with sediment.

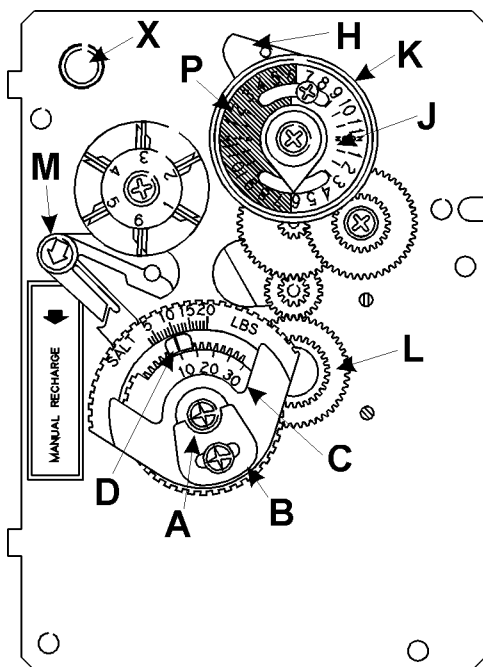


FIG. 8

If backwash time adjustment is needed, refer to Fig. 8.

- Grasp the front cover by the slots and carefully pull forward to remove cover. Lay the cover aside in a safe place.
- Loosen screw (A) about 1½ turns. DO NOT loosen screw (B).
- Holding the cam gear (located beneath the backwash dial), rotate the backwash dial (C) until the desired backwash time lines up with indicator mark (D).
- Tighten screw (A).

NOTICE: *Adjusting the backwash time may cause the salt dosage setting to change. If the salt dosage needs to be reset, do not tighten screw (A), and refer to the Salt Dosage section.*

TIME OF RECHARGE

Although the need to recharge is determined by the Soft-Minder control, time of day the conditioner will actually recharge can be set on the timer mechanism.

The timer is factory set to recharge about 2:00 a.m., a time when water usage is at a minimum for most families. If water is drawn during recharge, hard water will automatically be bypassed to service. If it would be more convenient to have the water conditioner recharge at a different time of day, the setting may be changed as follows, referring to Fig. 8.

- Remove the timer cover.
- The position of the peg (H) in relation to the time-of-day dial (J) determines the time when the unit will begin to recharge.

- Loosen the screw and lift the white time-of-day dial and rotate it until the desired time of recharge is opposite the peg (H). Please note that whenever the time of recharge is changed, the time-of-day setting may be changed also.

TIME OF DAY

Upon completing the installation, the timer must be set to the correct time of day. Time of day must also be reset after any kind of power interruption, such as that caused by an electrical storm. See Fig. 8.

- Determine the correct time of day.
- Grasp the gear (K) and lift straight up (the white time-of-day dial will lift with it). Rotate the gear until the correct time of day lines up with the pointer (P). The dial is spring-loaded and will return its position when released. Make sure the teeth mesh.

Note that the silver half of the time-of-day dial designates the daytime hours, while the black half designates the nighttime hours.

GUEST CYCLE

An extra recharge can be initiated any time extra soft water is required by pushing the Manual Recharge lever (M) in the

direction of the arrow, then releasing. The unit will still recharge at its regular frequency as determined by the meter device. On models with meter control, the red button (X) must also be pushed briefly before the recharge cycle can begin.

SERVICE POSITION

The timer assembly is in the service position when the toothless notch in the cam gear is over the teeth on the idler gear (L). The timer will return to this position after each recharge (Fig. 8).

TIME CLOCK SETTINGS

To set the Estate[®] 2 water conditioner for optimal performance, determine the hardness of the water along with the number of people in the household. Refer to Table 2. Locate the row corresponding to the number of people in the home and move across to the appropriate hardness column. The number in the shaded region is the salt dosage. The other number is the frequency of regeneration.

SALT DOSAGE

To set the salt dosage, refer to Fig. 8. Loosen screw (A) and rotate outer dial until the salt dosage dial line up with the indicator mark (D). Tighten screw (A).

TABLE 2A — CULLIGAN ESTATE 0.7FT³ WATER CONDITIONER SALT DOSAGE — FREQUENCY

*Persons in Household	Total Water Hardness in Grains Per Gallon (mg/L) as Calcium Carbonate										Water Usage Gal. (Litres) per day
	0-7 (0-120)	8-14 (121-240)	15-21 (241-360)	22-28 (361-480)	29-35 (481-600)	36-42 (601-720)	43-49 (721-840)	50-56 (841-960)	57-63 (961-1080)	64-75 (1081-1280)	
2	1 5	1 5	1 7	2 5	2 6	3 5	3 6	3 8	3 9	6 5	150(570)
3	1 5	1 7	2 5	2 7	3 6	3 9	6 5	6 5	6 6	6 8	225(850)
4	1 5	2 5	2 7	3 6	3 9	6 5	6 6	6 8	6 9	6 12	300(1135)
5	1 5	2 5	3 5	3 9	6 5	6 7	6 9	6 12	6 13		375(1420)
6	1 7	2 9	3 8	6 5	6 6	6 9	6 12				450(1705)
7	2 5	3 5	6 5	6 5	6 8	6 12					525(1990)
8	2 5	3 7	6 5	6 6	6 9						600(2270)
9	2 5	3 9	6 5	6 7	6 13						675(2555)
10	2 5	3 12	6 5	6 9							750(2840)

*In household application, not recommended for over 10 people because of pressure drop limitations.

TABLE 2B — CULLIGAN ESTATE 1.0FT³ WATER CONDITIONER SALT DOSAGE — FREQUENCY

*Persons in Household	Total Water Hardness in Grains Per Gallon (mg/L) as Calcium Carbonate										Gallons (Liters) of Water per day
	0-10 (0-170)	11-20 (171-340)	21-30 (341-515)	31-40 (516-685)	41-50 (686-855)	51-60 (856-1025)	61-70 (1026-1200)	71-80 (1201-1370)	81-90 (1371-1540)	91-100 (1541-1700)	
2			1 11	2 9	3 7	3 10	3 15	3 15	6 8	6 9	150(570)
3			3 7	3 9	3 11	6 7	6 11	6 12	6 13	6 14	225(850)
4			3 9	3 10	6 8	6 10	6 12	6 13	6 17	6 17	300(1135)
5	1 6		3 11	6 7	6 9	6 12	6 13	6 17			375(1420)
6	1 9	3 10	6 5	6 9	6 10	6 15	6 17				450(1705)
7	2 5	3 10	6 6	6 10	6 13	6 17					525(1990)
8	2 7	6 5	6 7	6 10	6 16						600(2270)
9	3 5	6 7	6 7	6 13	6 17						675(2555)
10	3 8	6 6	6 8	6 15							750(2840)

TABLE 2C — CULLIGAN ESTATE 1.5FT³ WATER CONDITIONER SALT DOSAGE — FREQUENCY

*Persons in Household	Total Water Hardness in Grains Per Gallon (mg/L) as Calcium Carbonate										Gallons (Liters) of Water per day
	0-10 (0-170)	11-20 (171-340)	21-30 (341-515)	31-40 (516-685)	41-50 (686-855)	51-60 (856-1025)	61-70 (1026-1200)	71-80 (1201-1370)	81-90 (1371-1540)	91-100 (1541-1700)	
2			1 9	2 7	3 6	3 8	3 11	3 12	6 9	6 9	150(570)
3			2 6	3 7	3 9	3 13	6 7	6 10	6 11	6 14	225(850)
4			3 6	3 8	6 6	6 8	6 11	6 12	6 17	6 20	300(1135)
5			3 7	6 5	6 7	6 10	6 14	6 18	6 20		375(1420)
6	1 8	3 5	3 9	6 7	6 9	6 13	6 18	6 20			450(1705)
7	2 5	3 6	6 5	6 8	6 12	6 16	6 20				525(1990)
8	2 5	3 6	6 6	6 8	6 13	6 20					600(2270)
9	2 6	3 8	6 6	6 11	6 16						675(2555)
10	2 7	3 9	6 7	6 12	6 20						750(2840)

REGENERATION FREQUENCY

To set the regeneration frequency, push the number of pins in which corresponds to the number located in Table 2 (refer to Fig. 9 and Table 3).

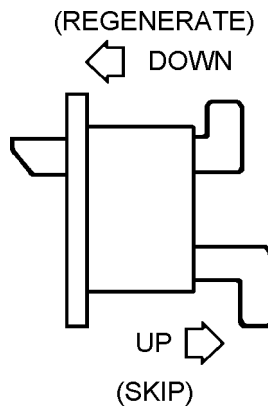


FIG. 9

TABLE 3 — RECHARGE FREQUENCY

No. Down on Salt Chart	Pin No. In on Frequency Dial	Recharge Frequency
1	1	Every six days
2	1 & 4	Every three days
3	1, 3 & 5	Every other day
6	All Pins	Every day

SOFT-MINDER METERING DEVICE

The Estate 2M water conditioners are equipped with a Soft-Minder meter which regenerates based upon the water consumption patterns of the household.

GALLONS SETTING

Determine the daily use for the household. Usually 75-100 gallons per day per person is adequate. Using Table 4, locate the hardness range for your water supply. Move down the column and locate the gallons setting and salt dosage which best suits the application. Usually two to three days between regenerations yields the best results. Allow for one half to one days water usage as reserve capacity. Set the salt dosage per the instructions on page 9.

Set the gallons setting on the circuit board. This is done by removing the two screws of the front cover. The circuit board is located on the upper left hand corner of the back plate. A set of six dip switches on the circuit board determine the gallons capacity. Refer to Table 5, Figs. 10 and 11 when setting the dip switches. Make sure all recharge frequency pins are pushed IN.

There are two pilot lights located on the circuit board.

- The green pilot light flickers when water is flowing through the water meter.
- The amber pilot light is a latching indicator, when the pre set gallon count has passed, the amber light will illuminate indicating that the unit will regenerate that night.

**TABLE 4A — ESTATE® 2M 0.7FT³ GALLON CAPACITIES TO SIGNAL (RESERVE)
TOTAL WATER HARDNESS IN GRAINS PER GALLON (mg/l)**

SALT DOSAGE	0-10 (0-170)	11-20 (171-340)	21-30 (341-515)	31-40 (516-685)	41-50 (686-855)	51-60 (856-1025)	61-75 (1026-1280)
4	1200 (270)	500 (235)	300 (190)	200 (168)	NA	NA	NA
5	1300 (230)	500 (265)	300 (210)	200 (183)	200 (106)	NA	NA
6	1400 (200)	600 (200)	300 (233)	200 (200)	200 (120)	NA	NA
7	1400 (250)	600 (225)	400 (150)	200 (213)	200 (130)	NA	NA
8	1500 (210)	600 (255)	400 (170)	300 (128)	200 (142)	NA	NA
9	1500 (270)	700 (185)	400 (190)	300 (143)	200 (154)	NA	NA
10	1500 (270)	700 (210)	400 (207)	300 (155)	200 (164)	NA	NA
11	1600 (260)	700 (230)	500 (120)	300 (165)	200 (172)	200 (110)	NA
12	1700 (200)	800 (150)	500 (133)	300 (175)	200 (180)	200 (117)	NA

**TABLE 4B — ESTATE_® 2M 1.0FT³ GALLON CAPACITIES TO SIGNAL (RESERVE)
TOTAL WATER HARDNESS IN GRAINS PER GALLON (mg/l)**

SALT DOSAGE	0-10 (0-170)	11-20 (171-340)	21-30 (341-515)	31-40 (516-685)	41-50 (686-855)	51-60 (856-1025)	61-70 (1026-1200)	71-80 (1201-1370)	81-90 (1371-1540)	91-100 (1541-1700)
5	2000 (255)	900 (227)	500 (251)	300 (263)	NA	NA	NA	NA	NA	NA
6	2100 (285)	900 (292)	500 (295)	300 (296)	NA	NA	NA	NA	NA	NA
7	2300 (220)	1000 (260)	600 (240)	400 (230)	300 (204)	NA	NA	NA	NA	NA
8	2400 (255)	1100 (227)	600 (285)	400 (263)	300 (231)	NA	NA	NA	NA	NA
9	2500 (285)	1100 (292)	700 (228)	400 (296)	300 (257)	NA	NA	NA	NA	NA
10	2600 (310)	1200 (255)	700 (270)	500 (227)	300 (282)	NA	NA	NA	NA	NA
11	2800 (227)	1200 (213)	700 (309)	500 (256)	300 (305)	300 (204)	NA	NA	NA	NA
12	2900 (230)	1300 (265)	800 (243)	500 (282)	400 (226)	300 (221)	NA	NA	NA	NA
13	3000 (225)	1400 (212)	800 (275)	500 (306)	400 (245)	300 (237)	NA	NA	NA	NA
14	3000 (310)	1400 (255)	800 (303)	600 (227)	400 (262)	300 (251)	NA	NA	NA	NA
15	3100 (300)	1400 (300)	900 (233)	600 (250)	400 (280)	300 (266)	NA	NA	NA	NA
16	3100 (385)	1500 (242)	900 (261)	600 (271)	400 (297)	300 (280)	NA	NA	NA	NA
17	3100 (471)	1500 (285)	900 (290)	600 (292)	500 (214)	300 (295)	300 (210)	NA	NA	NA

**TABLE 4C — ESTATE_® 2M 1.5FT³ GALLON CAPACITIES TO SIGNAL (RESERVE)
TOTAL WATER HARDNESS IN GRAINS PER GALLON (mg/l)**

SALT DOSAGE	0-10 (0-170)	11-20 (171-340)	21-30 (341-515)	31-40 (516-685)	41-50 (686-855)	51-60 (856-1025)	61-70 (1026-1200)	71-80 (1201-1370)	81-90 (1371-1540)	91-100 (1541-1700)
7	2500 (316)	1100 (308)	700 (239)	400 (304)	300 (263)	NA	NA	NA	NA	NA
8	2700 (300)	1200 (300)	700 (300)	500 (250)	300 (300)	300 (200)	NA	NA	NA	NA
9	2900 (295)	1300 (297)	800 (265)	500 (298)	400 (239)	300 (232)	NA	NA	NA	NA
10	3100 (290)	1400 (295)	900 (230)	600 (247)	400 (278)	300 (265)	NA	NA	NA	NA
11	3100 (485)	1500 (292)	900 (295)	600 (296)	500 (217)	300 (297)	300 (212)	NA	NA	NA
12	3100 (670)	1600 (285)	1000 (256)	700 (242)	500 (254)	400 (228)	300 (238)	NA	NA	NA
13	3100 (840)	1700 (270)	1100 (213)	700 (285)	500 (288)	400 (256)	300 (262)	NA	NA	NA
14	3100 (996)	1800 (248)	1100 (265)	800 (224)	600 (219)	400 (282)	300 (285)	300 (212)	NA	NA
15	3100 (1125)	1900 (212)	1200 (208)	800 (256)	600 (245)	400 (204)	300 (203)	300 (228)	NA	NA
16	3100 (1235)	1900 (267)	1200 (245)	800 (283)	600 (267)	500 (222)	400 (219)	300 (241)	NA	NA
17	3100 (1335)	2000 (217)	1200 (278)	900 (208)	600 (287)	500 (239)	400 (233)	300 (254)	NA	NA
18	3100 (1410)	2000 (255)	1300 (203)	900 (227)	700 (202)	500 (251)	400 (244)	300 (263)	300 (201)	NA
19	3100 (1490)	2000 (295)	1300 (230)	900 (247)	700 (218)	500 (265)	400 (255)	300 (273)	300 (210)	NA
20	3100 (1580)	2100 (240)	1300 (260)	900 (270)	700 (236)	500 (280)	400 (268)	300 (285)	300 (220)	300 (168)

TABLE 5 — REGENERATION SCHEDULE

CAPACITY (GALS.)	SWITCH POSITION				
	SW2	SW3	SW4	SW5	SW6
10	OFF	OFF	OFF	OFF	OFF
100	ON	OFF	OFF	OFF	OFF
200	OFF	ON	OFF	OFF	OFF
300	ON	ON	OFF	OFF	OFF
400	OFF	OFF	ON	OFF	OFF
500	ON	OFF	ON	OFF	OFF
600	OFF	ON	ON	OFF	OFF
700	ON	ON	ON	OFF	OFF
800	OFF	OFF	OFF	ON	OFF
900	ON	OFF	OFF	ON	OFF
1000	OFF	ON	OFF	ON	OFF
1100	ON	ON	OFF	ON	OFF
1200	OFF	OFF	ON	ON	OFF
1300	ON	OFF	ON	ON	OFF
1400	OFF	ON	ON	ON	OFF
1500	ON	ON	ON	ON	OFF
1600	OFF	OFF	OFF	OFF	ON
1700	ON	OFF	OFF	OFF	ON
1800	OFF	ON	OFF	OFF	ON
1900	ON	ON	OFF	OFF	ON
2000	OFF	OFF	ON	OFF	ON
2100	ON	OFF	ON	OFF	ON
2200	OFF	ON	ON	OFF	ON
2300	ON	ON	ON	OFF	ON
2400	OFF	OFF	OFF	ON	ON
2500	ON	OFF	OFF	ON	ON
2600	OFF	ON	OFF	ON	ON
2700	ON	ON	OFF	ON	ON
2800	OFF	OFF	ON	ON	ON
2900	ON	OFF	ON	ON	ON
3000	OFF	ON	ON	ON	ON
3100	ON	ON	ON	ON	ON

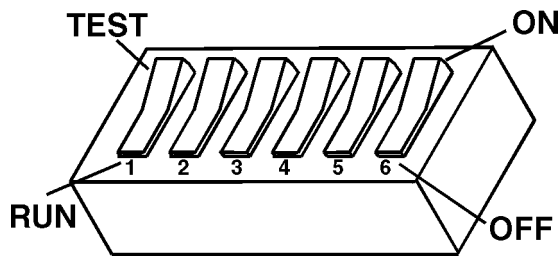


FIG. 10

	RUN	TEST
SW-1	OFF	ON

FIG. 11

The softener also has a ten gallon setting to assist the service personnel in trouble shooting the equipment. To trouble shoot the meter, set the dip switches to the OFF position. Run water into a measured pail. The green light will flicker. When ten gallons has passed, the amber light will light up. This will help determine if the meter is properly measuring the gallon count.

Brine Valve "A" Dimension

The brine valve contains a float-actuated safety shut-off device to prevent overflow of the brine tank in the unlikely case of an electrical or mechanical failure during the brine tank refill cycle.

It is recommended that the brine valve float be used as intended, that is, as a **secondary**, safety shutoff. Remember, the timer mechanism provides the primary refill shut-off. To use the float as a safety shut-off, refer to Table 6 for the salt dosage and brine tank size being used. The "A" dimension is the distance between the filter screen and the bottom of the float (Fig. 12) when the float stem is in its fully raised position; adjust the float and rubber grommets accordingly.

RAPID RINSE

The rapid rinse time, which is established when setting the salt dosage, is usually adequate for most installations. It may be increased, if necessary, but it **MUST NEVER** be reduced from the salt dosage which is required for adequate regeneration.

To adjust rapid rinse refer to the section on Salt Dosage. Each one-pound increase in salt dosage will increase rapid rinse time, the brine valve float will become the **primary** brine refill shutoff. In this case refer to the correct Table 7 column for the salt dosage and brine tank size being used, and adjust the "A" dimension accordingly.

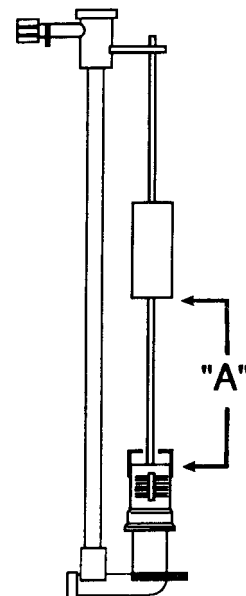


FIG. 12

TABLE 6 - "A" DIMENSION CHART

Salt Dosage (Pounds)	160 lb. Brine Tank "A" Dimension		250 lb. Brine Tank "A" Dimension				375 lb. Brine Tank "A" Dimension			
	Secondary (Only)		Secondary		Primary		Secondary		Primary	
	inches	(cm)	inches	(cm)	inches	(cm)	inches	(cm)	inches	(cm)
3	6	(15.2)	—	—	—	—	—	—	—	—
4	7-3/4	(19.7)	—	—	—	—	—	—	—	—
5	9-1/2	(24.1)	8	(20.3)	6	(15.2)	6-1/2	(16.5)	4-1/2	(11.4)
6	1-1/4	(28.6)	9-3/8	(23.8)	7-3/8	(18.7)	7-1/2	(19.0)	5-1/2	(14.0)
7	13	(33.0)	10-7/8	(27.6)	8-7/8	(22.5)	8-1/2	(21.6)	6-1/2	(16.5)
8	14-3/4	(37.5)	12-1/4	(31.1)	10-1/4	(26.0)	9-1/2	(24.1)	7-1/2	(19.0)
9	16-1/2	(42.0)	13-5/8	(34.6)	11-5/8	(29.5)	10-1/2	(26.7)	8-1/2	(21.6)
10	18-1/4	(46.3)	15	(38.1)	13	(33.0)	11-1/2	(29.2)	9-1/2	(24.1)
11	20	(51.0)	16-3/8	(41.6)	14-3/8	(36.5)	12-1/2	(31.7)	10-1/2	(26.7)
12	21-3/4	(55.2)	17-3/4	(45.1)	15-3/4	(40.0)	13-1/2	(34.3)	11-1/2	(29.2)
13	21-1/2	(59.7)	19-1/8	(48.6)	17-1/8	(43.5)	14-1/2	(36.8)	12-1/2	(31.7)
14	25-1/4	(64.1)	20-1/2	(52.1)	18-1/2	(47.0)	15-1/2	(39.4)	13-1/2	(34.3)
15	—	—	21-7/8	(55.5)	19-7/8	(50.5)	16-1/2	(42.0)	14-1/2	(36.8)
16	—	—	23-1/4	(59.0)	21-1/4	(54.0)	17-1/2	(44.5)	15-1/2	(39.4)
17	—	—	24-5/8	(62.5)	22-5/8	(57.5)	18-1/2	(47.0)	16-1/2	(42.0)
18	—	—	26	(66.0)	24	(61.0)	19-1/2	(49.5)	17-1/2	(44.5)
19	—	—	27-3/8	(69.5)	25-3/8	(64.5)	20-1/2	(52.1)	18-1/2	(47.0)
20	—	—	28-3/4	(73.0)	26-3/4	(68.0)	21-1/2	(54.6)	19-1/2	(49.5)

Start-Up Procedure

⚠ WARNING: FOR PROTECTION, A SANITIZING AGENT HAS BEEN ADDED TO THE SOFTENER TANK AT THE FACTORY. THIS SANITIZING AGENT MUST BE FLUSHED OUT BEFORE THE UNIT IS PLACED INTO SERVICE BY RUNNING AT LEAST 50 GALLONS OF WATER THROUGH THE UNIT DRAIN.

1. Connect the power cord to a grounded 3-wire, 120 Volt, 60 Hertz outlet, or a 2-wire outlet with a suitable 3-wire adapter (properly grounded to the outlet box or plate).
2. Set the timer to the correct time of recharge and time of day.
3. Caution the homeowner to not use water for about 30 minutes while you complete the start-up.
4. Shift the by pass valve to the SOFT WATER position by pushing in the blue knob. The mineral tank will begin to fill with water.
5. After about one minute, shift the bypass valve to the BYPASS position by pushing in the red knob.
6. Advance the cam gear of the timer clockwise to the back-wash position. This will expel air from the mineral tank to drain.
7. When all the air has been expelled from the mineral tank, advance the cam gear to the service position.
8. Repeat steps 4 through 7.
9. Repeat steps 4 through 7 again.
10. Shift the Bypass Valve to the SOFT WATER position, initiate a recharge and allow the recharge cycle to run to completion.

⚠ WARNING: ALTHOUGH NOT NORMALLY NECESSARY, SHOULD YOU NEED TO DISASSEMBLE ANY PART OF THE CONTROL VALVE OR REMOVE THE CONTROL FROM THE TANK ASSEMBLY OR ASSOCIATED PLUMBING, DEPRESSURIZE THE UNIT FIRST CLOSING THE MAIN SUPPLY VALVE, THEN OPEN A CONVENIENT FAUCET DOWN STREAM FROM THE WATER CONDITIONER.

During the recharge cycle, hard water will be available to all the lines in the household. Immediately following recharge, the water to service will be soft.

Because of the volume of water contained in the water heater, the hot water may not be soft for several days. Soft hot water can be made available almost immediately, however, if the water heater is drained immediately after recharge and allowed to refill with soft water.

BEFORE LEAVING THE INSTALLATION SITE

Make sure the brine tank is filled with water to the level of the float. Fill the tank with a hose or put the unit into a full recharge so that the brine refill cycle will fill the tank.

Explain the operation of the softener to the customer. Give the customer a copy of the Owner's Guide and warranty policy. Make sure the customer knows that there will be new sounds associated with the recharging of the unit. Advise the customer to periodically check and replenish the salt supply.

Clean up the unit and the installation site, removing any soldering or pipe threading residues from the equipment with a damp towel.

Operation, Care and Maintenance

Use of Bypass Valve

Depending on where the particular installation was made, the outside sill cocks may or may not be served by conditioned water. Ideally, all lines not requiring soft water should be taken off upstream of the softener. This is not always possible, however, due to the construction of the house, or the difficulty or expense of rearranging the piping in older homes.

You should bypass the conditioner:

- If the outside lines do not bypass the water softener and the water is to be used for lawn sprinkling or other outside uses.
- If water is not used for several days (e.g., during vacation periods).
- If you wish to inspect or work on the valve or salt container.
- If a water leak from a valve is evident.

Bypass Valve

With the blue knob pushed fully inward (knob up against the barrel of the valve), water is routed through the water conditioner where it is softened. Water may be bypassed around the conditioner by pushing the red knob fully inward. Avoid "slapping" the valve when shifting from one position to another.

NOTICE: If the media tank is to remain attached to the control, close the inlet valve, then open the bypass valve.

CARE AND CLEANING

Protect the operation and appearance of the water conditioner by following these precautions:

- Do not place heavy objects on top of the conditioner cover.
- Use only mild soap and warm water to clean the exterior of the unit. Never use harsh abrasive cleaners or compounds which contain acid or bleach.
- Protect the conditioner and drain line from freezing temperatures.
- Reset the timer as soon as possible after any interruption of electrical power to keep the unit on its normal schedule.

CLEANING THE SALT STORAGE TANK

Because all salts contain some insoluble matter (purified salt contains less than rock salt) your salt storage container will require occasional cleaning to keep your conditioner at peak operating efficiency.

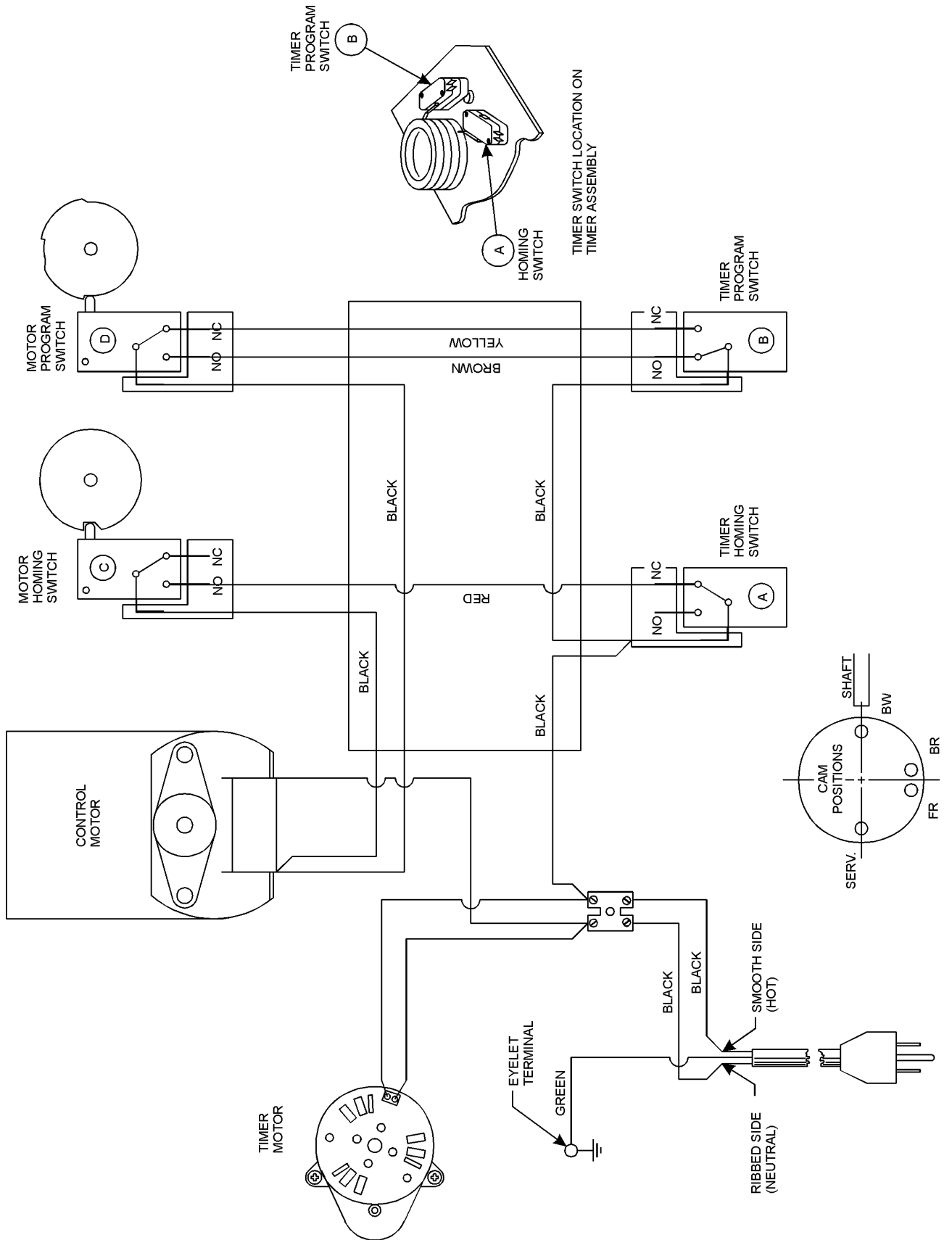
TOOLS NEEDED

Scoop
Clean, bucket-size container
Philips-head screwdriver
Garden hose
Household scrub brush or sponge

- Remove the salt storage tank cover and the cap from the brine valve chamber.
- Lift the brine valve out of the brine valve chamber and set aside in an upright position.
- If you'd like to save any clean, dry salt remaining in the tank, remove it and place it in a clean container.
- Using the scoop, dig out and discard as much remaining salt, water and debris as possible.

- Remove the brine valve chamber by removing the screws on the side of the salt tank.
- Remove the salt plate at the bottom of the brine tank.
- Lay the salt tank on its side and direct a brisk stream of water from your garden hose to its inside to rinse out all residue.
- Using a household scrub brush and a mild soapy solution, clean the salt plate. This will complete the tank cleaning.
- Stand salt tank upright. Replace the salt plate. Place brine valve chamber in position and affix with screws.
- Insert the brine valve into the chamber and replace valve chamber cap.
- Fill the storage tank with 4 to 6 inches of water.
- Fill the tank with salt to within a few inches from the top.
- Replace the salt storage tank cover.

Wiring Schematic Automatic Clock Timer



Wiring Schematic Timer with Soft-Minder® Meter

