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Culligan®



**SYSTEM 19 AND 23
WATER CONDITIONERS
(FILAMENT WOUND TANK)
Installation and Operating Instructions**

CULLIGAN INTERNATIONAL COMPANY/NORTHBROOK, IL & SUBSIDIARIES OR DIVISIONS
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Dear Culligan Customer:

Your local Culligan Dealer employs trained service and maintenance personnel who are experienced in the installation, functioning, and repair of Culligan equipment. This publication has been written for the purpose of assisting and training these individuals, and is intended for their use.

While we do not discourage increased knowledge by Culligan users concerning the functioning of our Culligan products, there are certain risks of property damage and personal injury inherent in the installation and repair of any mechanical product by untrained individuals. We therefore offer you this publication with the understanding that you accept all responsibility for liability from property damage or personal injury resulting from its use.

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

SYSTEM 19 AND 23 WATER CONDITIONERS (FILAMENT WOUND TANK) Installation and Operating Instructions



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Introduction

The Culligan System 19 and 23 Automatic Water Conditioners feature designs which will give years of dependable, economical operation when properly applied, installed, and maintained. Please read this manual carefully before beginning the installation of this Culligan 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 System 19 and 23 Water Conditioners bear two separate serial numbers; one for the control assembly and one for the media tank. The control assembly serial number decal can be found on the left side rear of the control case. The media tank serial number appears on the label affixed to the side wall 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.

The model incorporates features such as:

1. A timer programmer with adjustments for time of recharge, time of day, frequency of recharge, and manual recharge (guest cycle).

2. An adjustable refill regulator which allows the selection of the most efficient salt dosage.
3. Ease of unpacking and installation.
4. An electrical circuit, driven by one 3-watt motor, uses less electricity for recharge.
5. Tank construction consisting of blow-molded ABS liner with helical filament winding of exterior.
6. Injection molded glass-reinforced plastic tank adapter.
7. The drive controller, which regulates cycles, moves on Teflon coated seals for less friction and long life.
8. A salt storage assembly of thick molded plastic, incorporates a **Dubl-SafeTM** refill float brine valve.

Your familiarity with the contents of this manual will help ensure trouble-free installation and operation of the new System Water Conditioner.

For more information regarding benefits of conditioned water and simple maintenance tips which are not in this manual, refer to the System Water Conditioner Use and Care Guide.

Specifications

CULLIGAN. SYSTEM 19 AND 23 WATER CONDITIONERS

	System 19	System 23
Control Valve Type	5-Cycle, Plastic	5-Cycle, Plastic
Timer	6-Day Timeclock	6-Day Timeclock
Overall Conditioner Height	42 in. (107 cm)	50 in. (127 cm)
Media Tank Dimensions (D x H)	8 x 38.5 in. (20 x 97.8 cm)	12 x 45 in. (30 x 114 cm)
Salt Storage Tank Dimensions (D x H)	16 x 43 in. (41 x 109 cm)	18 x 43 in. (46 x 109 cm)
Exchange Media, Type & Quantity	Cullex, 0.63 cu. ft. (18 liters)	Cullex, 0.70 cu. ft. (19.8 liters)
Underbedding	Cullsant, 7 lbs. (3.2 kg)	None
Exchange Capacity @ Salt Dosage ⁽¹⁾ per Recharge	14,500 grains (940 grams) @ 5 lbs. (2.2 kg) 15,500 grains (100.4 grams) @ 7 lbs. (3 kg) 17,600 grains (1141 grams) @ 11 lbs. (5 kg)	16,100 grains (1043 grams) @ 5.6 lbs. (2.5 kg) 17,200 grains (1115 grams) @ 7.8 lbs. (3.5 kg) 19,600 grains (1270 grams) @ 12.2 lbs. (5.5 kg)
Freeboard to Media ⁽²⁾	14 in. (35.5 cm)	19-20 in. (48-51 cm)
Freeboard to Underbedding ⁽³⁾	35 in. (89 cm)	Not applicable
Salt Storage Capacity	250 lbs. (144 kg)	375 lbs. (170 kg)
Rated Service Flow @ Pressure Drop	8.0 gpm @ 15 psi (3.0 l/min. @ 1 bar)	8.8 gpm @ 15 psi (3.3 l/min. @ 1 bar)
Total Hardness, Maximum	50 gpg (855 mg/l)	75 gpg (1300 mg/l)
Total Iron, Maximum	2 ppm (2 mg/l)	5 ppm (5 mg/l)
Hardness to Iron Ratio, Minimum	8 gpg (140 mg/l) Hardness	8 gpg (140 mg/l) Hardness
Operating Pressure	20-120 psi (1.4-8.3 bar)	20-120 (1.4-8.3 bar)
Operating Temperature	33-120° F (1-50° C)	33-120° F (1-50° C)
Electrical Requirements	120 Volts AC, 60 Hertz	120 Volts AC, 60 Hertz
Power Consumption, Continuous, Maximum	3 watt/25 watt	3 watt/25 watt
Drain Flow, Maximum ⁽⁴⁾	3.4 gpm (13 l/min)	3.4 gpm (13 l/min)
Recharge Time, Average	75 minutes	75 minutes
Recharge Water Consumption Average	70 gal (265 l)	70 gal (265 l)

1. Total Capacity expressed as CaCO₃
2. Measured from top of media bed to top of inlet fitting.
3. Measured from top of underbedding to top of inlet fitting.
4. Fast rinse at 120 psi (8.3 bar) w/o rapid rinse plate.
5. 15 minute backwash, 9.5 lbs (4.3 kg) salt dosage, and 4 minute fast rinse at 60 psi (4.1). Fast rinse plate installed.

Component Description

The Culligan System 19 and 23 Water Conditioners are designed to be attractive as well as functional. It is a high performance appliance which brings the marvelous benefits of softened water into your home.

ELECTRO-TIMER™

Time and frequency of recharge are controlled by an adjustable, yet simple, timer mechanism. The Culligan Electro-Timer mechanism can be adjusted to suit a wide range of water types and family sizes. A manual recharge lever permits an extra supply of soft water for temporary increases in water usage.

5-CYCLE CONTROL VALVE

The reliable hydraulically operated control valve directs the flow of water during recharge. Constructed of durable, noncorroding materials, the cartridge design sets the standard for dependable operation and ease of maintenance.

MEDIA TANK

The media tank features Culligan's new fiberglass construction consisting of a blow-molded ABS liner, helically wound on the outside with continuous fiberglass filament. The tank is filled with Cullex high capacity resin and Cullsans filter media, both of which meet Culligan's rigid specifications.

TANK ADAPTER

An injection molded fiberglass reinforced plastic adapter, assembled to the tank, provides the means of control valve mounting.

SALT STORAGE TANK

Up to 375 pounds (114 kg) of salt can be stored in the attractively styled salt storage tank. This component doubles as a salt storage tank and brine maker. It stores and produces the needed brine solution necessary for recharging the Cullex resin.

Preparation

The success of the installation will depend to a great extent on advance planning and preparation. Careful attention to the unit's location, accessibility to electrical and drain facilities, and availability of the proper tools will ensure a professional looking installation. Of equal importance is the assurance that the conditioner has been properly applied and meets all specifications.

APPLICATION

Essential to correct application is a complete analysis of the water to be treated. Culligan extends to its customers, through its dealers, a water analysis service. Compare specified water limitations in the Specifications Section (Page 3) with your water analysis. Contact the Culligan dealer immediately if any discrepancies are found. In addition, your unit is designed to operate within certain pressure and temperature limitations.

Hardness

Hardness is a term which describes the minerals dissolved in the water which form scale in pipes and water heaters, stubborn deposits in cookware, bathtub ring, soap curds, and greying of laundry, just to name a few. Your softener will perform best when total hardness is less than the maximum limit specified.

Iron

Iron, though not always visible when water is drawn, can cause reddish staining of bathroom fixtures and clothing, and even a dry, metallic taste in drinking water. It also causes hot beverages, such as coffee and tea, to turn a murky black color. Excessive amounts of iron, and iron in different forms, may require additional treatment.

PRESSURE

Your conditioner is designed to operate within a pressure range of 20 to 120 psi (1.4 to 8.3 bar). Pressures below 20 psi (1.4 bar) may cause the unit to perform and recharge inefficiently, while pressures above 120 psi (8.3 bar) can cause damage and noisy operation of the control valve.

Low pressure is generally not a problem with municipal water supplies, although some adjustment of the well pump system may be required on private supplies. Although uncommon, some municipal supplies may exceed the high pressure limit. A pressure reducing valve (Part No. 4009-00) should be installed if such pressures are encountered (Fig. 1). Keep in mind that some municipal supplies have higher pressures during nighttime hours.

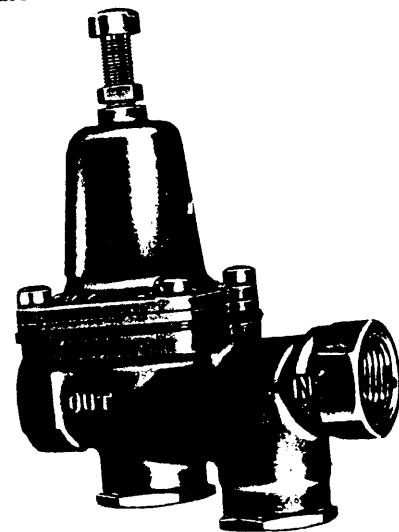


Fig. 1

Check the available water pressure with a guage assembly (Part No. 3044-50) to determine what adjustments, if any, are necessary (Fig. 2). Place the guage on a raw water line and open a nearby faucet. Adjust the faucet until the flow is about two gallons per minute (8 litres per minute) and check the pressure. In the case of a private well system, allow water to run until the pump cuts in. If the pressure is less than 20 psi (1.4 bar) at this point, adjust the pump pressure switch as required to raise the cut-in pressure above 20 psi (1.4 bar).

Pressure Drop

Whenever water is flowing, a certain amount of pressure is lost due to resistance from pipe, fittings, and appliances connected to the water supply. The amount of pressure drop encountered depends on how fast the water is flowing and how much resistance it meets. The amount of pressure available at a tap is also determined by its height above the source of supply. For example, if water pressure in the basement is 50 psi (3.5 bar), it will be about 45 psi (3.1 bar) on the ground floor, and about 40 psi (2.8 bar) on the second floor or a reduction of about 5 psi (0.3 bar) for every 10 feet (3 meters) of elevation.

Particularly in the case of private water supplies, it may be necessary to increase the pump pressure system to overcome pressure drop through the conditioner so that adequate pressure is available at all taps.

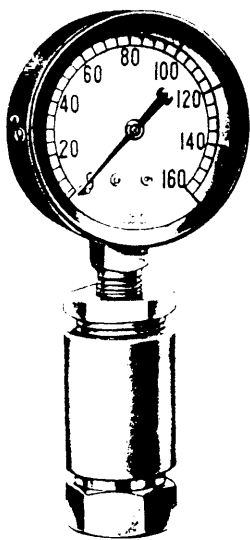


Fig. 2

LOCATION

The location in which the conditioner is placed should be selected on the basis of the following factors. If at all possible, lines normally requiring unconditioned water should be bypassed (Fig. 3). This may not be practical, however, in all cases.

TEMPERATURE

Temperature is an important consideration. The conditioner should be installed in an area protected from extremes in temperature. Do not allow the conditioner to freeze, but at the same time, do not install it directly adjacent to a furnace or water heater, or in an area where it may be exposed to direct sunlight.

ELECTRICAL REQUIREMENTS AND POWER CONSUMPTION

The unit should be located near an electrical outlet, preferably one not controlled by a switch which could accidentally be turned off. The control is provided with an 8-foot cord with a 3-prong plug and should be plugged into a grounded receptacle. If the receptacle is designed only to accept 2-prong plugs, secure a 3-prong adapter (available at local hardware stores) and secure the ground wire to the receptacle plate mounting screw. **WARNING! Do not remove the grounding prong! An improperly grounded unit could cause injury from electric shock!**

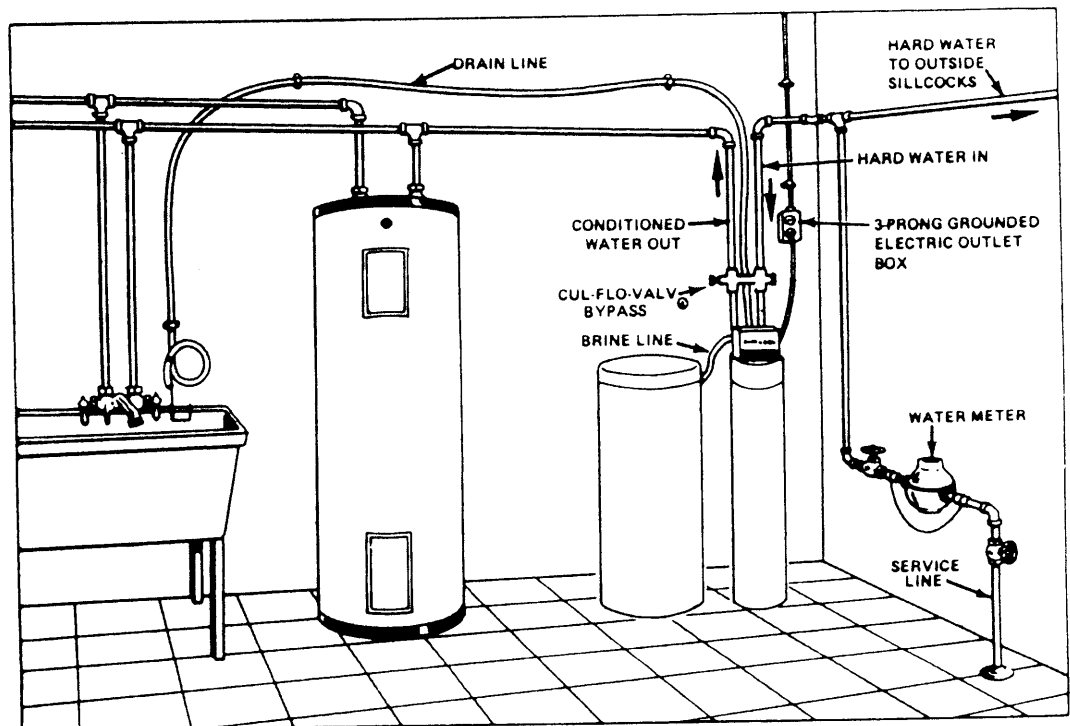


Fig. 3

When producing soft water and during recharge, the unit will use about 3 watts of electricity. This is required for the clock mechanism in the Electro-Timer assembly.

DRAIN REQUIREMENTS

Any open, free-flowing drain capable of carrying the maximum drain flow may be used. This may take the form of a floor drain, utility sink, or stand pipe. Most plumbing codes, however, require an air gap at the discharge of the drain line to prevent back siphoning of drain contents. Refer to Table 1, Drain Line Limitations, Page 12 for allowable drain line length.

SPACE REQUIREMENTS

Along with the availability of drainage and electricity, the physical location of the unit must be considered. Six to twelve inches (15 to 30 cm) clearance should be provided behind the unit for running plumbing and drain lines, and four feet (1.2 m) above the top of the unit for service access and for filling the salt storage tank. The floor must be level and smooth and free of foreign objects to prevent uneven stresses which might cause cracking or puncture of the salt storage tank. If necessary, the unit should be placed on a separate platform (thick plywood or fiberboard, for example) to compensate for a rough floor surface.

TOOLS AND MATERIALS

All installations will require a few basic tools, including standard and Phillips screwdrivers, a pair of pliers, measuring tape and some silicone-based lubricant (**DO NOT USE PETROLEUM-BASED LUBRICANTS**). Additional tools will be required depending on the piping materials to be used:

- Copper tubing: tube cutter or hacksaw, torch solder, flux, steelwool and file.
- Galvanized pipe: hacksaw, pipe dies, cutting oil, pipe compound, and pipe wrenches.
- Plastic pipe (if permitted by local plumbing codes) saw, solvent, cement, and rags.

If your household plumbing is galvanized and you intend to make your installation with copper, or vice versa, obtain dielectric unions to prevent galvanic (dissimilar metal) corrosion.

All installations will require 1/2-inch drain line (Part No. 3030-82, grey, semi-flexible or Part No. 3319-46, black semi-rigid). Purchase slightly more than you think you will need to cover for elevation over doorways, and so on.

BYPASS

Although the conditioner's control valve has a feature which makes unconditioned water available during recharge, a separate manual bypass is recommended to permit unconditioned water to be used in those lines which cannot be bypassed when the conditioner is plumbed in, or to permit use of unconditioned water in the event the unit must be removed from service for any reason.

One of two bypass methods is suggested. The most convenient is the Cul-Flo-Valv[®] Bypass (Fig. 4), which is designed specifically for use with your Culligan water conditioner. Three types are available for adaptation to a variety of plumbing types and sizes.

Part No.	Description	Size
3314-42	Cul-Flo-Valv [®] Bypass	3/4-inch Sweat
3314-43	Cul-Flo-Valv Bypass	1-inch NPT
3314-46	Cul-Flo-Valv Bypass	3/4-inch NPT

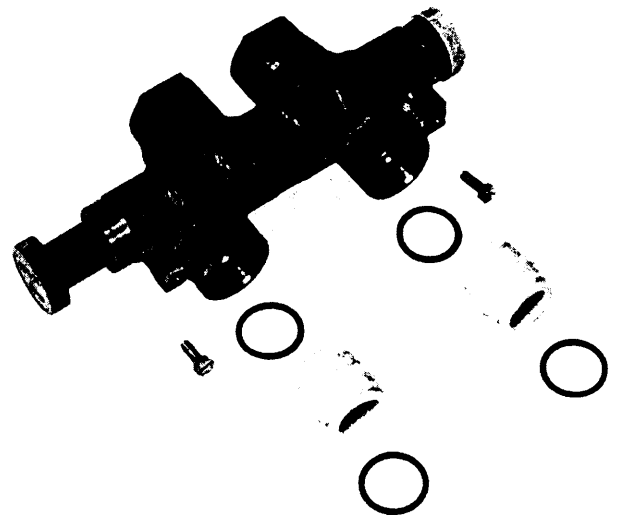


Fig. 4

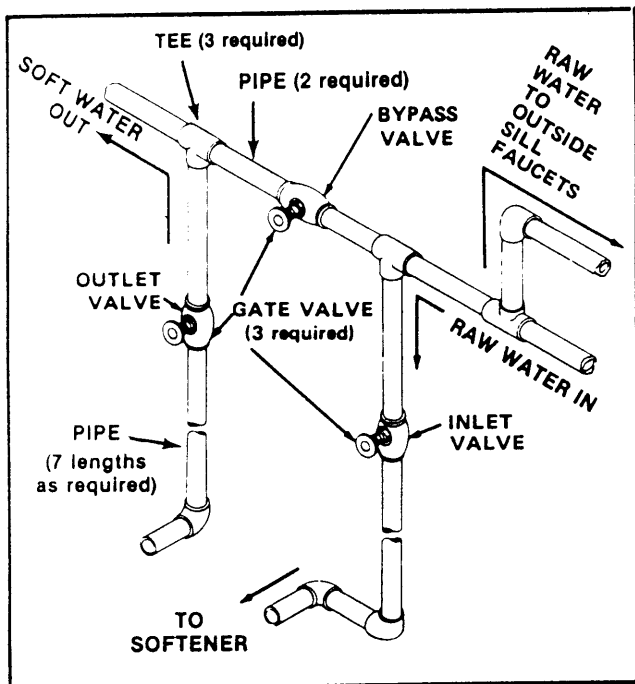
Another method is the three-valve bypass (Fig. 5), which can be made up with valves you obtain at your local hardware or plumbing supply store. You will also need special sweat adapters (Fig. 6) to adapt the control valve to the plumbing. These are available in two sizes:

Part No.	Description	Size
3314-44	Sweat Adapter Kit	3/4" Sweat
3314-45	Sweat Adapter Kit	1" Sweat

Snap-ring pliers (Fig. 7), are needed to attach the adapters to the control valve bracket. Additional fittings are required to connect the bypass valves to the adapters.

TOOLS AND MATERIALS CHECKLIST

1. Hand tools (screwdrivers, pliers, etc.)
2. Special tools (torch, pipe threading tools, snap-ring pliers, etc.)
3. Length of pipe or tubing for plumbing connections
4. Fittings, as required by the method of installation
5. Bypass valves—Cul-Flo-Vlav Bypass or 3-valve bypass.
6. Brine line (5/16").
7. Drain line (rigid or flexible, 1/2").
8. Pressure reducing valve, if needed.
9. Gauge assembly for checking line pressure.
10. Silicone lubricant (petroleum-base lubricants must not be used—they can cause rubber O-rings to swell and deteriorate.)



THREE VALVE BYPASS (SWEAT PLUMBING)

Fig. 5

SALT

Your water conditioner is equipped with a horizontal salt dissolver designed primarily to use rock salt. Any good grade salt, including granulated and pellets, may be used. However, if granulated or pellet salt is used, be aware that a condition called "bridging" may occur. Unlike rock salt, these processed or purified salts can cake up when exposed to humidity. Salt at the bottom of the tank is used up, but a caked shell forms which keeps salt in the upper part of the tank from settling. Bridging is characterized by hard water, even directly after recharge, and the appearance that no salt is being used. It may be necessary to periodically break up a bridged salt bed with a broom handle, or similar object, when pellet or granulated salts are used with a horizontal salt dissolver.

Because all salts contain some insoluble matter (purified salt contains less than rock salt) your salt storage container will require occasional cleaning.

Now that all your tools and materials are at hand, you are ready to begin installation of your water conditioner.

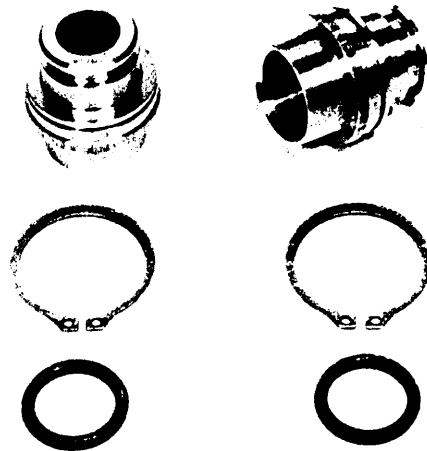


Fig. 6



Fig. 7

Installation

UNPACKING

At this point you will already have opened the carton containing the control valve. Open the cartons containing the media tank and salt storage container carefully to prevent damage to the exteriors of the items.

Media Tank

Open top flaps by cutting the tape which holds them. Cut the carton on all four sides about one inch (2.5 cm) from the bottom. Avoid cutting too deeply. Lift carton off and roll tank off of carton bottom.

Salt Storage Container

Carefully cut open top flap. Remove cover first, then lift container out.

Lay out in front of you all the items needed for installation. You should have the media tank, placed near where the installation will be made, the salt storage container, the control assembly, consisting of the control valve and timer, a small parts package, containing various hardware for fastening the control to the tank, the bypass valve(s), pipe and fittings, and the tools required for the method of installation you have chosen.

CONTROL MOUNTING

1. Remove the two plastic caps from the tank couplings and lubricate the two O-rings with silicone lubricant. **NOTE: Do not use a petroleum base lubricant for this will cause swelling of the rubber parts.**
2. **NOTE:** 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 in-

let coupling on the right and the outlet coupling on the left.

3. The control valve back plate is marked also with "IN" and "OUT" (Fig. 8). 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. 9, page 10, and secure them with the screws.



Fig. 8

PLUMBING CONNECTIONS

Make your plumbing connections at this time. If the Cul-Flo-Valv₃ Bypass is used, solder or screw the piping directly to the inlet and outlet connections as marked on the Cul-Flo-Valv Bypass casting.

If a three-valve bypass is used, assemble the valves to the adapters and to the plumbing according to the style of valve and piping materials used. Remember that the inlet to the water conditioner is to the right as you face the conditioner from the front.

Take the time to make a clean professional-looking installation. Use glue and solder sparingly when making sweat connections, and avoid excessive use of pipe compounds when using galvanized piping. If you have threaded galvanized pipe, clean out excess cutting oil and metal chips before assembly. Foreign objects, if allowed to enter the control valve, can cause operating problems.



Fig. 9

Once the plumbing connections have been made to the Cul-Flo-Valv Bypass, make certain the interior of the valve is clean and free of debris, lubricate the valve stem O-rings with silicone lubricant, reinsert the stem and replace the red or blue knob. The stem may be inserted in either direction.

The drain and brine fitting are preassembled onto the back of the valve (Fig. 8). Mount the Cul-Flo-Valv to the back plate of the control valve (Fig. 9). Make sure the O-rings of the white plastic adapters are lubricated with

silicon gel. Tighten the screws which hold the Cul-Flo-Valv to the back plate.

If a metallic push-button bypass valve or metallic three-way bypass valves are not utilized, the ground circuit is broken because of the plastic softener fittings; therefore install grounding clamps and connect a grounding wire between the inlet and outlet pipes (Fig. 10). This grounding is necessary to conform to electrical codes.



Fig. 10

SALT STORAGE CONTAINER

Place the salt storage container on a smooth, level surface as near the media tank as possible. Rough surface or foreign objects under the tank can result in uneven stresses which can crack or puncture the container. Rotate the container until the brine valve chamber is to the rear.

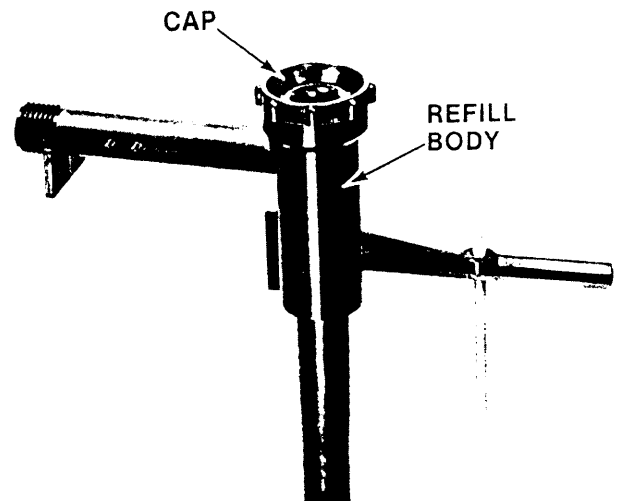


Fig. 11

BRINE REFILL FLOW CONTROL

The brine valve in the salt storage tank has a flow control located in the upper body. This flow control must be changed for proper operation. Refer to Fig. 11 and Fig. 12.

1. Unscrew the valve cap and lift out of the refill body (Fig. 11).
2. Remove the flow control from its nest inside the three fingers on the cap and replace it the the #3 flow control from the small parts package (Fig. 12). Insert the cap back into the valve body and retighten.

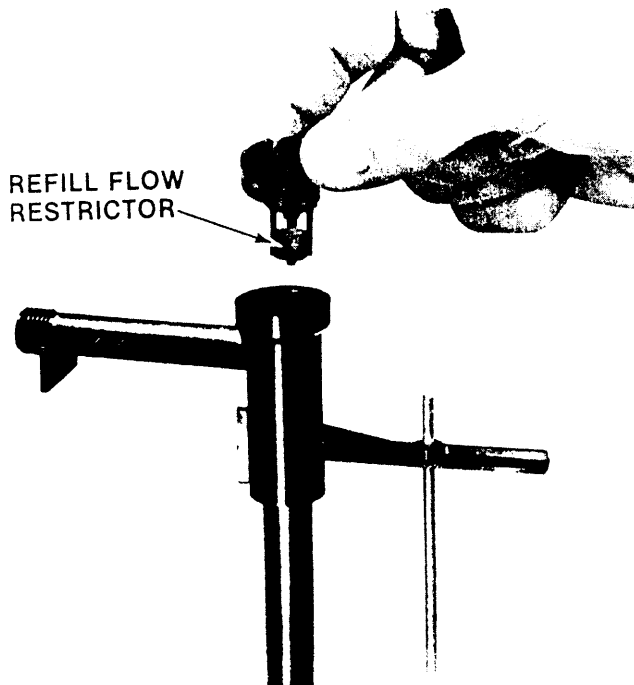


Fig. 12

DRAIN AND BRINE LINE CONNECTIONS

1. Measure the distance from the brine valve neck to the brine tee of control valve and cut a section of brine line tubing to the appropriate length. Slide a plastic nut onto each end of the brine line and push a brine line insert into both ends of the brine line (Fig. 13). Firmly seat one end of the brine line into the brine valve and hand tighten the plastic nut to obtain the proper seal.
2. Firmly seat the other end of the brine line into the brine tee and hand tighten the plastic nut to obtain the proper seal (Fig. 14).
3. Refer to Table 1 for allowable drain line length limitations.
4. Measure the distance from the top drain fitting to where the drain line will discharge into a suitable

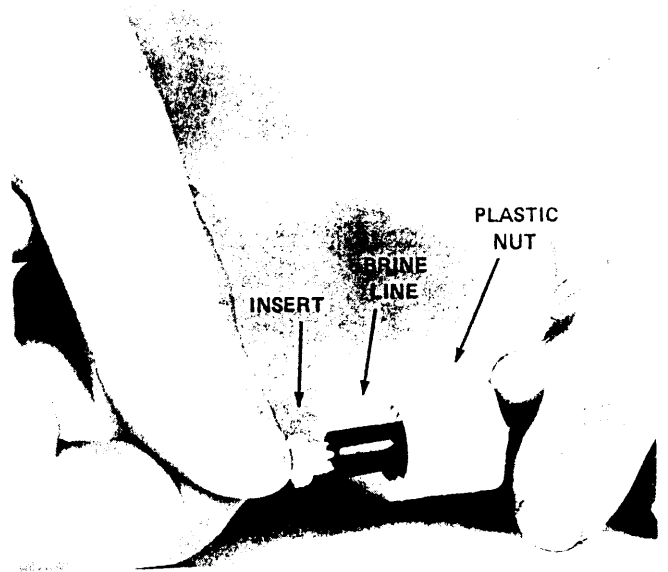


Fig. 13

waste outlet. Cut a section of 1/2-inch drain line to the appropriate length.

5. Place the spring type clamp several inches over one end of the drain line, push the drain line onto the rubber sleeve on the top drain fitting, and secure the spring clamp over the drain tubing to within 1/4-inch of the end of the tubing (Fig. 15).
6. Run the drain line to a waste outlet. *To prevent back siphoning of drain contents, an air gap is necessary and is required by law in most states. CAUTION: Care should be taken to make certain the drain line is not located where temperature may drop below freezing.* Secure the end of the drain line so that it will not be forced out of place during recharge of the water conditioner (Fig. 16).

TABLE 1

Drain line length limitations in feet based on installation with softener and brine tank together and on same level.

Average Water Pressure Psi	Height of Drain Discharge Above Floor on Which Softener Sits							
	4"	1 Ft.	2 Ft.	3 Ft.	4 Ft.	5 Ft.	6 Ft.	7 Ft.
30	28	16						
50	67	55	39	23	7			
70	92	80	64	48	32	16		
90	107	95	79	63	47	31	15	
120	114	102	86	70	54	38	22	6

FILLING THE SALT STORAGE CONTAINER

Fill the salt storage container with water until the level is about one inch (3 cm) above the salt plate. Fill to within a few inches of the top of the container with a good grade



Fig. 14



Fig. 15

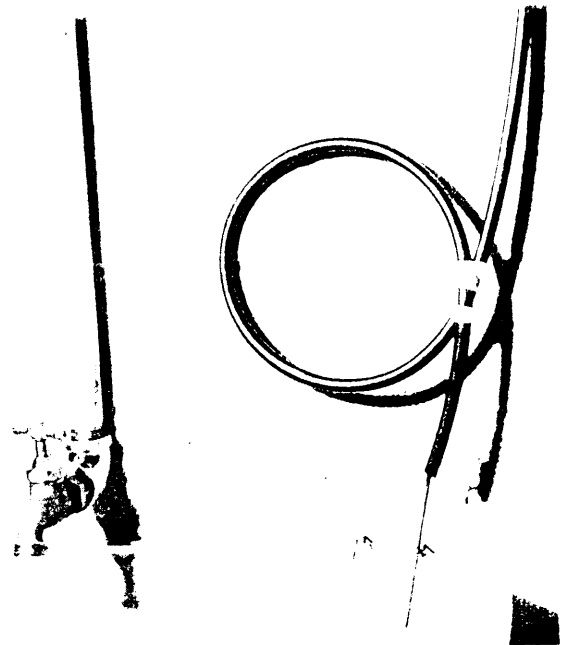


Fig. 16

Settings

Your Culligan Water Conditioner is 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, for 5 to 30 minutes. It is recommended that backwash last just 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.

If backwash time adjustment is needed, see Fig. 17. **THE TIMER MUST BE DISCONNECTED FROM THE POWER SUPPLY WHEN MAKING INTERNAL ADJUSTMENTS.**

1. Remove the timer from the case and turn it over to view the fiber electrical barrier.
2. Loosen both the screws holding the barrier in place and rotate the barrier to expose the cams and switches.
3. Refer to Fig. 17. Loosen screw (A) and rotate the black cam segment (B) until its pointer indicates the desired backwash time on the grey cam segment (C). Retighten screw (A).
4. Replace the fiber barrier and tighten the screws.

All normal adjustments from this point on may be made with the timer mechanism securely fastened within its case. The unit may be plugged in at this time.

TIME OF RECHARGE

The timer is factory-set to recharge at 2:00 a.m. (plus or minus 20 minutes), a time when water usage is at a minimum for most families. If water is used during recharge, hard water will be automatically 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. 18.

1. The position of the time-of-day dial (E) in relation to the peg (D) on the black tab determines when the conditioner will begin to recharge.
2. Lift the white time-of-day dial and rotate it until the desired time of recharge is opposite the peg (D). Please

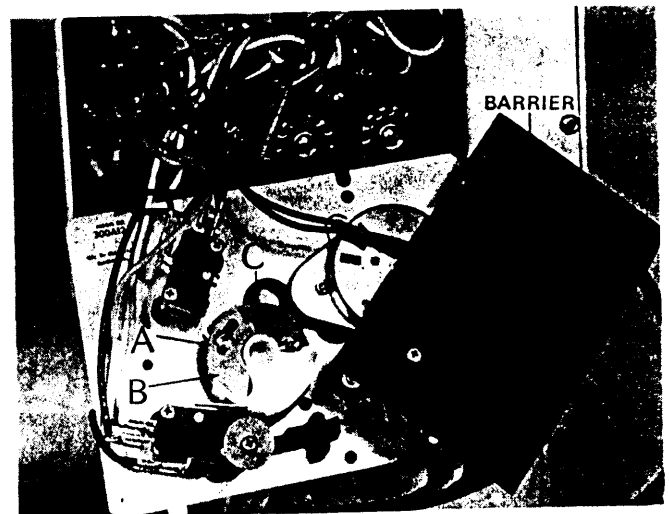


Fig. 17

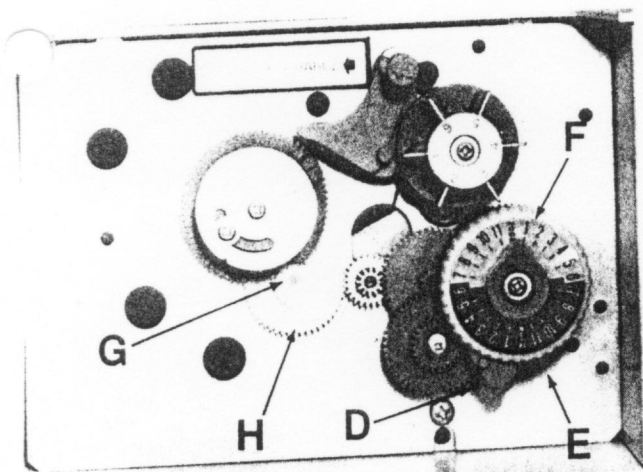


Fig. 18

note that whenever the time of recharge is changed, the time-of-day setting must 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. 18.

1. Determine the correct time of day.
2. Grasp the gear (F) and lift straight up (the white time-of-day dial will lift with it). Rotate the dial until the correct time of day lines up with the pointer. The dial is spring-loaded and will return to 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.

SERVICE POSITION

The timer assembly is in the service position when the toothless notch in the cam gear (G) is over the teeth on the idler gear (H). the timer will return to this position after each recharge (Fig. 18).

SALT DOSAGE/RECHARGE FREQUENCY

The salt dosage is the number of pounds of salt the softener will use with each recharge. The frequency is the number of recharges per six day period (or seven day period, with optional 7-day frequency wheel).

To determine the salt dosage and frequency, two things must be known:

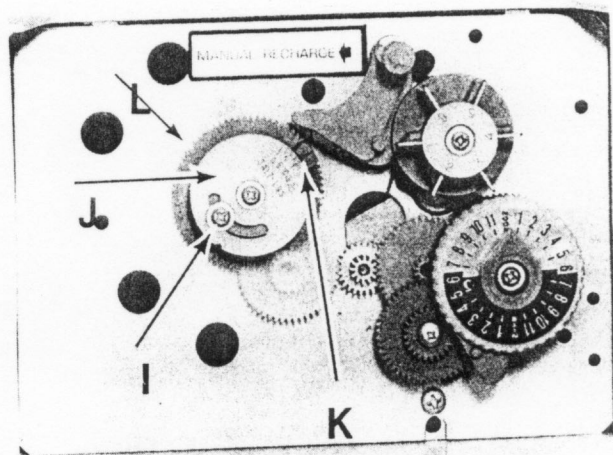


Fig. 19

1. Daily water usage as determined by the number of persons in the household or by actual gallonage measurements.
2. The total hardness of the water as shown on the Culligan Water Analysis Report.

With these factors known, refer to Salt Dosage/Frequency Charts, Table 2. Find the box in the right or left column with the number of individuals in the household, or the approximate daily average water usage. Move across until the box under the correct hardness range is reached. The number in the shaded portion of the box indicates the amount of salt, in pounds (kilograms), to be used for each recharge, and the number in the non-shaded portion indicates the number of recharges required per six-day period.

NOTE: The optional 7-day frequency wheel may be used when recharge is desired only on specific days of the week.

As an example, if four individuals live in the household, and the water has a total hardness of 18 grains per gallon, the salt dosage per recharge for a System 19C water conditioner will be 5 pounds (2.5 kg) and the recharge frequency will be 3 (or every 2 days). Monthly salt usage can be estimated, using these figures, at about 75 pounds (37.5 kg).

SALT DOSAGE SETTING

Set the salt dosage as follows, referring to Fig. 19.

1. Loosen screw (I).
2. Grasp the gear (L) and rotate the salt dosage dial (J) until the desired dosage is indicated by the pointer (K).
3. Retighten screw (I).

**TABLE 2
RECHARGE FREQUENCY**

No. Down on Salt Chart	Tab. No. Down 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

FREQUENCY

Starting with all pins in the up position, set the correct frequency on the frequency wheel by pushing down the appropriate number of pins. Refer to Fig. 21 and Tables 3 and 4.

1. Rotate the frequency wheel (O) until the pin beneath the number 1 is opposite the peg on the Manual Recharge Lever (N).
2. Refer to Table 3 and push down the pins under the numbers indicated.

TABLE 3-CULLIGAN SYSTEM 19 SALT DOSAGE FREQUENCY

*Persons Household	Total Hardness in Grains Per Gallon (Mg/l)					Gallons (litres) of Water/Day
	0-10 (0-171)	11-20 (172-342)	21-30 (343-513)	31-40 (514-684)	41-50 (685-855)	
2	1 5(2.5)	2 5(2.5)	3 5(2.5)	6 5(2.5)	6 5(2.5)	150 (570)
3	1 5(2.5)	2 7(3)	3 7(3)	6 5(2.5)	6 7(3)	225 (850)
4	1 5(2.5)	3 5(2.5)	3 9(4)	6 7(3)	6 11(5)	300 (1 135)
5	2 5(2.5)	3 11(5)	6 7(3)	6 9(4)		375 (1 420)
6	2 5(2.5)	6 5(2.5)	6 7(3)			450 (1 705)
7	2 7(3)	6 5(2.5)	6 9(4)			525 (1 990)
8	2 7(3)	6 5(2.5)				600 (2 270)
9	2 7(3)	6 7(3)				675 (2 555)
10	3 7(3)	6 7(3)				750 (2 840)

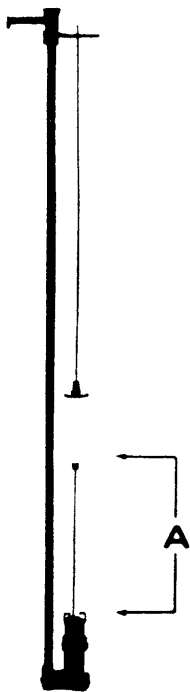


Fig. 20

*Based on 75 gallons per person per day water usage.

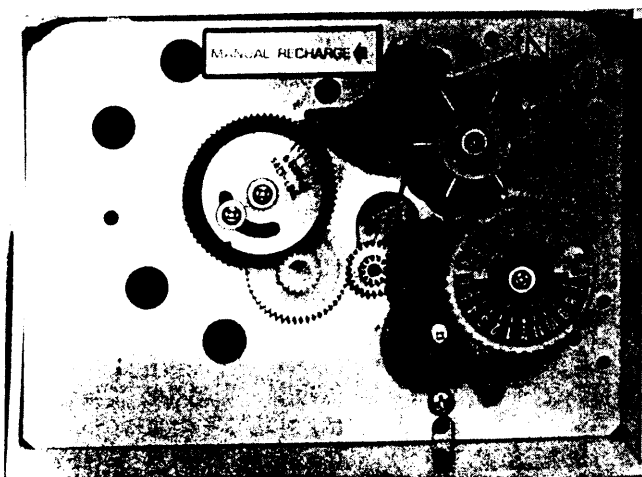


Fig. 21

If you use the optional 7-day frequency wheel, assign a number to each day of the week. For example, 1-Sunday, 2-Monday, 3-Tuesday, and so on. Line up the number corresponding to the present day of the week and push down only those pins corresponding to the days upon which you want the unit to recharge. All remaining pins must be in the up position.

BRINE VALVE "A" DIMENSION

The "A" dimension setting of the brine valve is the distance from the top of the filter screen to the bottom of the float (Fig. 20 and "A" Dimension Chart.)

TABLE 4-CULLIGAN SYSTEM 23 SALT DOSAGE FREQUENCY

Persons Household	Total Water Hardness in Grains Per Gallon (mg/l) as Calcium Carbonate										Water Usage Gallons (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 (961-1 080)	64-75 (1 080-1 280)	
2	5	5	7	5	6	5	7	9	5	9	150 (570)
3	5	7	5	7	6	9	6	6	8	11	225 (850)
4	5	5	7	6	9	5	7	9	11	14	300 (1 135)
5	5	5	5	8	5	7	9	12	14		375 (1 420)
6	7	7	7	5	6	9	12				450 (1 705)
7	5	9	5	5	8	12					525 (1 990)
8	5	6	5	6	9						600 (2 270)
9	5	7	5	7	13						675 (2 555)
10	5	8	5	8							750 (2 840)

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

GUEST CYCLE (TO OBTAIN ADDITIONAL CONDITIONED WATER)

An extra recharge can be initiated by pushing the spring-loaded black lever (N) on the front of the timer all the way to the left in the direction of the arrow and the lever will return to its original position (Fig. 21). The conditioner will begin to recharge. After manual recharge, the unit will resume its automatic program cycle.

TABLE 5 - "A" DIMENSION CHART

Salt Dosage (Pounds)	System 19	System 23
	Brine Tank "A" Dimension inches (cm)	Brine Tank "A" Dimension inches (cm)
3	3-1/4 (8.3)	-
4	4-5/8 (11.7)	3-1/2 (8.9)
5	6 (15.2)	4-1/2 (11.4)
6	7-3/8 (18.7)	5-1/2 (14.0)
7	8-3/4 (22.2)	6-1/2 (16.5)
8	9-1/4 (23.5)	7-1/2 (19.1)
9	11-5/8 (29.5)	8-1/2 (21.6)
10	12-7/8 (32.7)	9-3/8 (23.8)
11	14-1/2 (36.8)	10-3/8 (26.4)
12	15-3/4 (40.0)	11-3/8 (28.9)
13	17-1/4 (43.8)	12-3/8 (31.4)
14	18-1/2 (47.0)	13-3/8 (34.0)
15	19-7/8 (50.5)	14-3/8 (36.5)
16	21-1/4 (54.0)	15-3/8 (39.1)
17	22-3/4 (57.8)	16-3/8 (41.6)
18	24-1/2 (62.2)	17-1/4 (43.8)
19	25-1/2 (64.8)	18-1/4 (46.4)
20	26-7/8 (68.3)	19-1/4 (48.9)

Start-Up Procedure

NOTE: For your added protection, a sanitizing agent has been added to the conditioner tank at the factory. This sanitizing agent must be flushed out before the unit is placed into service by initiating a recharge using the steps outlined below.

1. With the timer in the service position (Fig. 21) connect the three-wire power cord to an appropriate grounded electrical outlet. If a three-wire outlet is not available, purchase a "three-prong to two-prong adapter" from your local hardware store. The ground wire from the adapter should be affixed to the outlet box or plate.
2. Set the timer to the correct time of day, time of recharge, frequency of recharge and refill regulator assembly to proper number.
3. Place unit in manual recharge and slowly open inlet valve or slowly push push-button valve to service. If water is rapidly introduced into tank when in manual recharge, Cullex® resin could be thrown out into drain. Let recharge continue to flush out sanitizing agent.

To enjoy the fullest benefit of soft water at this time, it is advisable to drain your hot water tank of the hard water and allow it to be refilled with soft water. Otherwise, because of the capacity of the hot water tank, it may take two or three days to displace the hard water with soft water in the hot water tank.

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 serviced with conditioned water. Ideally, all lines not requiring soft, conditioned water should be taken off upstream of the conditioner. This is not always possible, however, due to the construction of the house, or the difficulty or expense of rearranging the piping on older homes.

You should bypass the conditioner:

1. If the outside lines do not bypass the water conditioner and you do not wish to waste soft water on lawn sprinkling or other uses.
2. During vacation periods, to save water and salt by not allowing the unit to recharge.
3. If you wish to inspect or work on the valve or salt container.
4. If a water leak from the valve is evident

Cul-Flo-Valv. Bypass

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

Three-Valve Bypass

To bypass, close the inlet and outlet valves and open the bypass valve. Reverses the process to get soft water once again. Be sure to close the bypass valve completely to avoid mixing hard water with soft water.

NOTE: If the media tank is to remain connected to the control, close only the inlet valve, and open the bypass valve. This will prevent excessive pressure build-up in the tank during warming conditions.

Care and Cleaning

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

1. Do not place heavy objects on top of the conditioner cover.
2. Use only a mild soap and warm water to clean the exterior of the unit. Never use harsh abrasive cleansers or compounds which contain acid or bleach.
3. Protect the conditioner and drain line from freezing temperature.
4. Reset the time as soon as possible after an 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) the salt storage container will require occasional cleaning to keep the conditioner at peak operating efficiency.

Tools Needed

Scoop

Clean, bucket-size container

Phillips-head screwdriver

Garden hose

Household scrub brush or sponge

1. Remove the salt storage tank cover and the cap from the brine valve chamber.
2. Lift the brine valve out of the brine valve chamber and set aside in an upright position.
3. To save any clean, dry salt remaining in the tank, remove it and place it in a clean container.
4. Using the scoop, dig out and discard as much remaining salt, water and debris as possible.
5. Remove the brine valve chamber by removing the screws on either side of the salt tank.
6. Remove the salt plate at the bottom of the brine tank.
7. Lay the salt tank on its side and direct a brisk stream of water from a garden hose to its inside to rinse out all residue.
8. Using a household scrub brush and a mild soapy solution, clean the salt plate. This will complete the tank cleaning.
9. Stand salt tank upright. Replace the salt plate. Place the brine valve chamber in position and affix with screws.
10. Insert the brine valve into the chamber and replace brine valve chamber cap.
11. Fill the salt storage tank with 4 to 6 inches of water.
12. Fill the tank with salt to within a few inches from the top.
13. Replace salt storage tank cover.