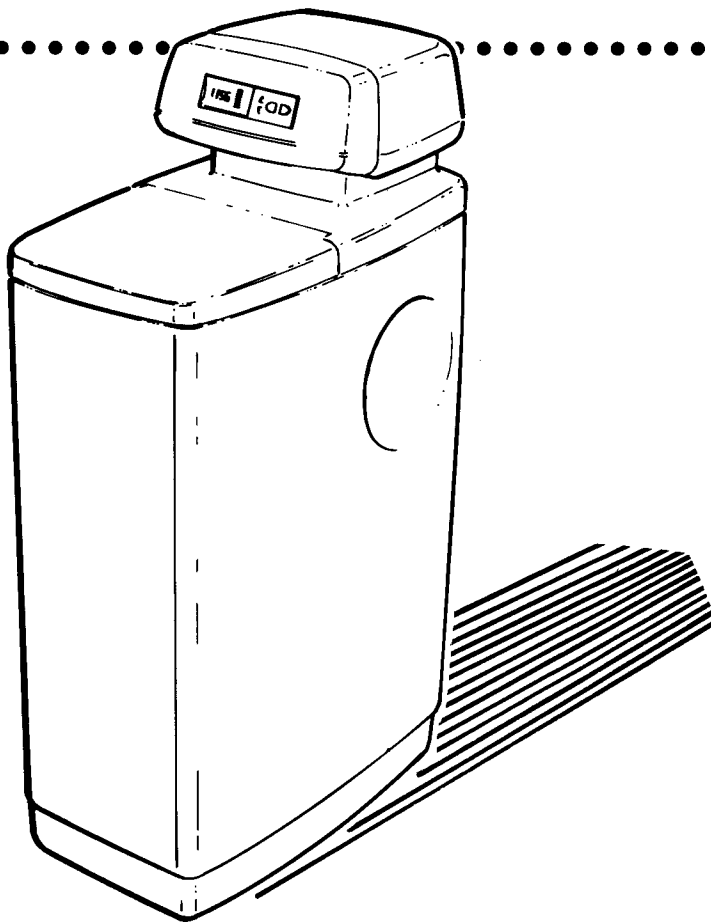


OWNERS MANUAL

How to maintain and operate your
EcoWater electronic demand water system

.....

SERIES
3000, 3002
and 3200



ECOWATER
SYSTEMS®



UNPACKING

EcoWater Systems units, Series 3000 and 3002, Models R20 and R30, are shipped from the factory in 1 master carton, consisting of resin tank, brine tank and controller. The carton also includes a skin-pack of small parts needed to assemble and/or install the softener, and this manual.

Series 3000 and 3002, Models R40 and R70 are shipped in 2 cartons. These contain:

- (1) – brine tank, controller and covers, skin-pack of small parts, manual
- (2) – resin tank assembly

Thoroughly check the Eco System unit for possible shipping damage and parts loss. Also inspect and note any damage to the shipping carton(s). Notify the transportation company if damage is present. EcoWater is not responsible for in-transit damages.

Remove and discard (RECYCLE) all packing materials. We suggest you keep the small parts on the skin-pack until you are ready to use them. Minimal assembly is needed in all models. . .See page 7.

TABLE OF CONTENTS

	Page
Warranty	3
Dimensions	4
Water/Water Conditioning.....	5-6
Assembly	7
Planning Installation	8-9
Installation Steps.....	10-15
Programming Face Plate-Timer	14-15
Features/Options	15-18
Extra Recharges (Regenerations)	16
Eco System Unit Operation.....	19-22
Electronics	19
Service/Regeneration/Water Flow	19-22
Service Information	23-27
Refilling with Salt.....	23
Troubleshooting.....	25-27
Wiring Schematic	32
Repair Parts	28-31

SAFETY GUIDES

FOLLOW THE INSTALLATION INSTRUCTIONS CAREFULLY. FAILURE TO INSTALL THE ECO SYSTEM UNIT PROPERLY VOIDS THE WARRANTY.

BEFORE YOU BEGIN INSTALLATION, READ THIS ENTIRE MANUAL. THEN OBTAIN ALL THE MATERIALS AND TOOLS YOU WILL NEED TO MAKE THE INSTALLATION.

CHECK LOCAL PLUMBING AND ELECTRICAL CODES. THE INSTALLATION MUST CONFORM TO THEM.

USE ONLY LEAD-FREE SOLDER AND FLUX FOR ALL SWEAT-SOLDER CONNECTIONS, AS REQUIRED BY STATE AND FEDERAL CODES.

USE CARE WHEN HANDLING THE ECO SYSTEM UNIT. DO NOT TURN UPSIDE DOWN, DROP OR SET ON SHARP PROTRUSIONS.

DO NOT LOCATE THE ECO SYSTEM UNIT WHERE FREEZING TEMPERATURES OCCUR. DO NOT ATTEMPT TO TREAT WATER OVER 120°F. FREEZING, OR HOT WATER DAMAGE VOIDS THE WARRANTY.

AVOID INSTALLING IN DIRECT SUNLIGHT. EXCESSIVE SUN HEAT MAY CAUSE DISTORTION OR OTHER DAMAGE TO NON-METALLIC PARTS.

THE ECO SYSTEM UNIT REQUIRES A MINIMUM WATER FLOW OF 3 GALLONS PER MINUTE AT THE INLET. MAXIMUM ALLOWABLE INLET WATER PRESSURE IS 125 PSI. IF DAYTIME PRESSURE IS OVER 80 PSI, NIGHTTIME PRESSURE MAY EXCEED THE MAXIMUM. USE A PRESSURE REDUCING VALVE IF NECESSARY. (ADDING A PRESSURE REDUCING VALVE MAY ALSO REDUCE THE FLOW.)

THIS ECO SYSTEM UNIT WORKS ON 24 VOLT – 60 Hz ELECTRICAL POWER ONLY. BE SURE TO USE THE INCLUDED TRANSFORMER.

WARRANTY

EcoWater Systems, Inc.

**Advantage Warranty
Series 3000 E/D Water System**

EcoWater Systems, Inc., guarantees to the original owner, that:

1. for the **lifetime of the original owner**, the **salt tank** and the **fiberglass mineral tank** will not rust, corrode, leak, burst, or in any other manner fail to perform their proper functions; and that
2. for a period of **five (5) years after installation**, the **electronic computer control panel**, the **valve body**, and all **other parts** will be free from defects in material and workmanship, and perform their normal functions.

If during such respective period a part proves, after inspection by EcoWater, to be so defective, EcoWater will, at its sole option, either replace or repair the defective part without charge except normal shipping and installation charges. During the first three (3) years after installation, parts and replacement service necessary to maintain the mineral tank, brine tank, valve body and electronics in factory operating condition in accordance with specifications published in the Owner's Guide, shall be furnished at absolutely no cost other than normal shipping charges. Service necessary to maintain all other parts is limited to one (1) year.

General Provisions

The above warranties are effective **provided** that the water conditioner is operated at water pressures not exceeding 125 p.s.i. and at temperatures not exceeding 120 degrees F; provided further that the water conditioner is not subject to abuse, misuse, alteration, neglect, freezing, accident or negligence; and provided further that the water conditioner is not damaged as the result of any unusual force of nature such as, but not limited to flood, hurricane, tornado or earthquake. EcoWater Systems, Inc. is excused if failure to perform its warranty obligations is the result of strikes, government regulation, materials shortages, or other circumstances beyond its control.

To obtain warranty service, notice must be given within thirty (30) days of the discovery of the defect to your local EcoWater Systems dealer.

THERE ARE NO WARRANTIES ON THE WATER CONDITIONER BEYOND THOSE SPECIFICALLY DESCRIBED ABOVE. ALL IMPLIED WARRANTIES, INCLUDING ANY IMPLIED WARRANTY OF MERCHANTABILITY OR OF FITNESS FOR A PARTICULAR PURPOSE, ARE DISCLAIMED TO THE EXTENT THEY MIGHT EXTEND BEYOND THE ABOVE PERIODS. THE SOLE OBLIGATION OF ECOWATER SYSTEMS, INC. UNDER THESE WARRANTIES IS TO REPLACE OR REPAIR THE COMPONENT OR PART WHICH PROVES TO BE DEFECTIVE WITHIN THE SPECIFIED TIME PERIOD, AND ECOWATER IS NOT LIABLE FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES. NO ECOWATER DEALER, AGENT, REPRESENTATIVE, OR OTHER PERSON IS AUTHORIZED TO EXTEND OR EXPAND THE WARRANTIES EXPRESSLY DESCRIBED ABOVE.

Some states do not allow limitations on how long an implied warranty lasts or exclusions or limitations of incidental or consequential damage, so the limitations and exclusions in this warranty may not apply to you. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state. This warranty applies to consumer-owned installations only.

**GUARANTEE
BOND**

The Continental Casualty Company, an Illinois corporation, has issued its bond in the form shown below, guaranteeing full performance by EcoWater Systems, Inc.

CONTINENTAL CASUALTY COMPANY, Chicago, Illinois, hereinafter called "Surety," guarantees unto Harris Trust and Savings Bank, 111 West Monroe Street, Chicago, Illinois, as Trustee holding said Guarantee Bond under the terms of a Trust Agreement dated September 15, 1963, for the use and benefit of original purchasers of residential EcoWater Systems Units within the Continental United States, as described herein, that EcoWater Systems, Inc., will discharge the obligations of the "EcoWater Bonded Parts and Service Guarantee Policy."

PROVIDED, HOWEVER, that:

1. Liability of Surety hereunder shall not exceed the sum of FIVE HUNDRED AND 00/100th DOLLARS (\$500.00) as to any one installation, and shall not exceed the sum of FIVE HUNDRED THOUSAND AND 00/100th DOLLARS (\$500,000.00) in the aggregate, and
2. There shall be no liability hereunder as to any purchaser to whom there has not been issued at the time of installation and purchase completed registration card which is enclosed with a facsimile of this bond, and who has not returned such card in accordance with this guarantee.
3. Claim must be made by such original purchaser in writing within 30 days from the expiration of these guarantees upon EcoWater Systems, Inc., P.O. Box 64420, St. Paul, MN 55164, to perform the terms of said guarantee, and notice of any default on such guarantee must be sent to Surety at its address by Registered Mail.

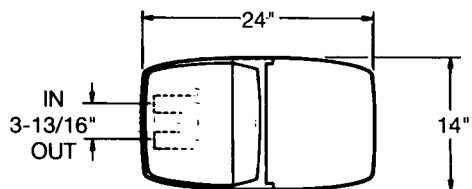
CONTINENTAL CASUALTY COMPANY

attest: R. A. Krehen
assistant secretary
by: Robert H. Keller
vice-president

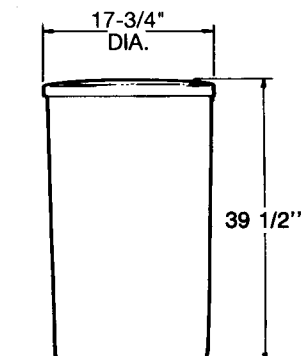
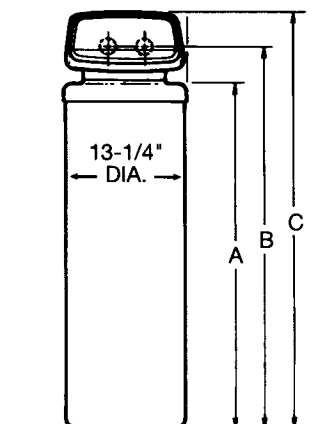
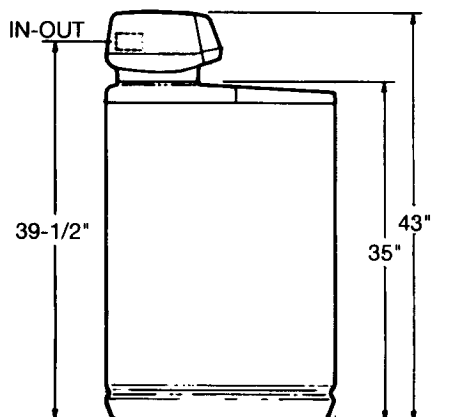
This is to certify that the original of the above guarantee and bond is on file with Harris Trust and Savings Bank, 111 West Monroe Street, Chicago, Illinois.

HARRIS TRUST AND SAVINGS BANK
As Trustee

by: R. H. Hain
authorized officer



NOTE: See the product brochure for operating specifications.



SALT STORAGE CAPACITIES

Round Brine Tank - 300 lbs.
Rectangular Brine Tank
Free Standing - 400 lbs.
Tank-in-Tank - 300 lbs.

MODEL	NOMINAL RESIN TANK SIZE	A	B	C
R20	8" DIA. x 35"	35"	39 1/2	43
R30	10" DIA. x 35"	35"	39 1/2	43
R40	10" DIA. x 47"	47"	51 1/4	55
R70	12" DIA. x 54"	53"	57 1/4	61

FOR FUTURE REFERENCE, ENTER THE FOLLOWING INFORMATION.

MODEL NO. ① ② _____ SERIAL NO. ① ② _____

DATE CODE ② _____

DATE OF INSTALLATION: _____

WATER HARDNESS _____ GPG IRON CONTENT _____ PPM

WATER HARDNESS (SETTING): _____ see page 15

① on rating decal ② on shipping carton

WATER

Man's very existence depends on water. It is 1 of the basic commodities of life. Water is best as nature provides it, is a common misconception. Practically all natural water needs refinement or treatment to make it safe to drink or more satisfactory to use.

The earth's water supply cycle starts in the upper cloud layers. As it falls to the earth as rain or snow, it picks up impurities and gases from the atmosphere. Landing on earth, it seeps over and through the ground, dissolving earth minerals. Passing through limestone, it dissolves calcium and magnesium, the hardness minerals. Iron deposits impart iron to the water. Acidity and sediments are other water conditions.

Municipal water supplies come from surface reservoirs, such as lakes or rivers, or from underground reservoirs. Usually, municipalities chlorinate the water to make it safe to drink. Sediment is removed by filtration. Tastes and odors are reduced or eliminated. The water is conditioned to comply with certain specifications. However, hardness minerals and/or tastes and odors are not always reduced to the most desirable levels.

Underground reservoirs provide our private water supplies. Because the water is raw and untreated, it can have varying amounts of hardness, iron, tastes, odors, acidity, or combinations of these. Different localities and water levels affect mineral contents.

WATER CONDITIONING

Water conditioning is the treatment of 4 general conditions. These are ① Hardness, ② Iron, ③ Acidity, ④ Sediments.

① **HARDNESS** is a term to describe the presence of calcium and magnesium minerals in water. A chemical analysis accurately measures the amount of minerals in grain weight. For example, 1 gallon

of water with 5 grains per gallon (gpg) hardness has dissolved minerals, that if solidified, about equals the size of 1 ordinary aspirin tablet. One gallon of water, 25 gpg hard, has a mineral content equal in size to 5 aspirin tablets. Water hardness varies greatly across the country. It generally contains anywhere from 3 to 100 gpg.

Hard water affects living in general. Hardness Minerals combine with soap to make a soap curd. The curd greatly reduces the cleaning action of soap. Precipitated hardness minerals form a crust on cooking utensils, appliances, and plumbing fixtures. Even the tastes of food are affected. A water softener conditions the water and removes the hardness minerals to eliminate these problems, and others. Pages 19-22 describe how the Eco System Unit works.

Sodium Information: Water softeners using sodium chloride (salt) for regeneration add sodium to the water. Persons who are on sodium restricted diets should consider the added sodium as part of their overall intake.

② **IRON** in water is measured in parts per million (ppm). The total* ppm of iron, and type or types*, are determined by chemical analysis. Four different types of iron in water are: **A** Ferrous (clear water), **B** Ferric (red water), **C** Bacterial and organically bound iron, **D** Colloidal and inorganically bound iron (ferrous or ferric).

*Water may contain 1 or more of the 4 types of iron and any combination of these. Total iron is the sum of the contents.

A **Ferrous (clear water)** Iron is soluble and dissolves in water. It is usually detected by taking a sample of water in a clear bottle or glass. Immediately after drawing, the sample is clear. As the water sample stands, it gradually clouds and turns slightly yellow or brown as air oxidizes the iron. This usually occurs in 15 to 30 minutes. An Eco System Unit will remove moderate amounts of this type of iron. (See specifications).

continued from page 5 –

ⓑ Ferric (red water), and ⓐ Bacterial and organically bound irons are insoluble. This iron is visible immediately when drawn from a faucet because it has oxidized before reaching the home. It appears as small cloudy yellow, orange, or reddish suspended particles. After the water stands for a period of time, the particles settle to the bottom of the container. Generally, these irons are removed from water by filtration. Chlorination is also recommended for bacterial iron. An Eco System Unit will remove minimal quantities (see specifications) of ferric iron.

ⓓ Colloidal and inorganically bound iron is a form of ferrous or ferric iron that will not filter or exchange out of water. In some instances, treatment may improve colloidal iron water but always CONSULT A QUALIFIED WATER CHEMISTRY LAB before attempting to treat it. Colloidal iron water usually has a yellow appearance when drawn. After standing for several hours, the color persists and the iron does not settle, but remains suspended in the water.

Iron in water causes stains on clothing and plumbing fixtures. It negatively affects the taste of food, drinking water, and other beverages.

③ ACIDITY or acid water is caused by carbon dioxide, hydrogen sulfide, and sometimes industrial wastes. It is corrosive to plumbing, plumbing fixtures, water heaters, and other water using appliances. It can also damage and cause premature failure of seals, diaphragms, etc., in water handling equipment.

A chemical analysis is needed to measure the degree of acidity in water. This is called the pH of water. Water testing below 6.9 pH is acidic. The lower the pH reading, the greater the acidity. A neutralizer filter or a chemical feed pump are usually recommended to treat acid water.

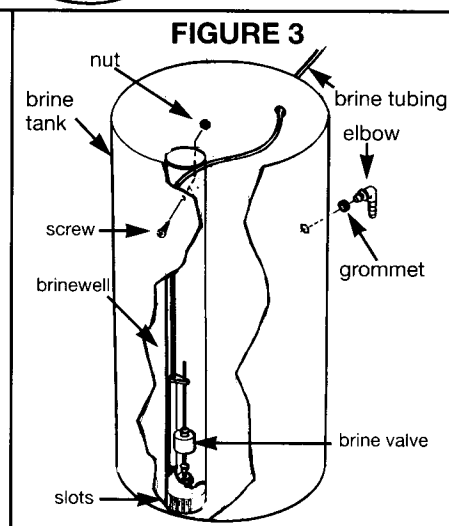
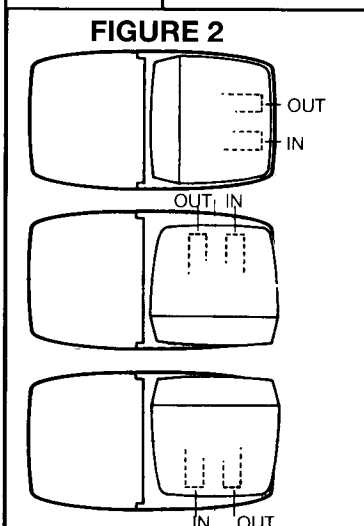
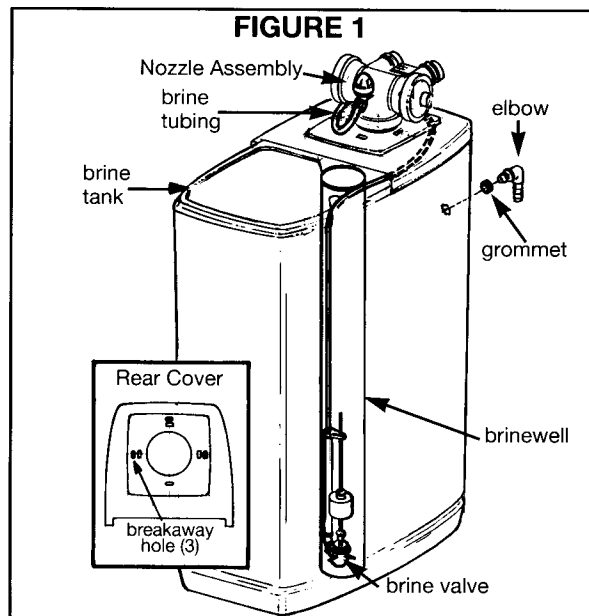
④ SEDIMENT is fine, foreign material particles suspended in water. This material is most often clay or silt. Extreme amounts of sediment may give the water a cloudy appearance. A sediment filter normally corrects this condition.

R20/R30 RECTANGULAR MODELS TANK-IN-TANK

1. Be sure the brinewell is correctly located, held at top and bottom by the brine tank (FIG. 1). Remove the brinewell cover and check the brine valve to be sure the float stem is vertical to the brine valve body.
2. Orient the valve and resin tank, as desired, relative to the brine tank (FIG. 2).
3. **CONNECT BRINE TUBING:** Looking at FIG. 1, route the brine tubing under the covers, around and behind the resin tank. Open 1 of the "break-away" holes in the rear cover and pass brine tubing through it. Connect to the nozzle and venturi housing, using the nut-ferrule on the skin pack. Tighten by hand, then another 1/4 turn with a pliers. **ALSO SEE FIG. 9, PAGE 11.**

RECTANGULAR AND ROUND "FREE-STANDING" BRINE TANKS

1. Locate the brinewell in position. On a round brine tank, locate the slots, on the bottom of the brinewell, toward the wall-to-bottom curvature (figure 3). Then, use the screw and nut (on skin-pack) to fasten the brinewell in place.
2. Lower the brine valve, into the brinewell. Push the tubing into the brinewell slot (FIG. 1 or 3), then route out of the brine tank. . .
 . . . through the larger hole in the round tank sidewall.
 . . . through 1 of the "break-away" holes, toward backside of valve, in the rear cover on the rectangular tank (FIG. 1).
3. Install the brinewell cover.

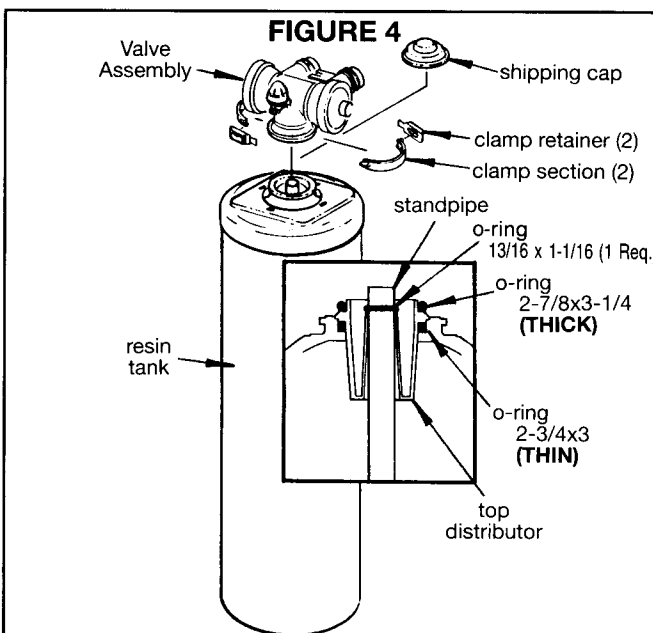


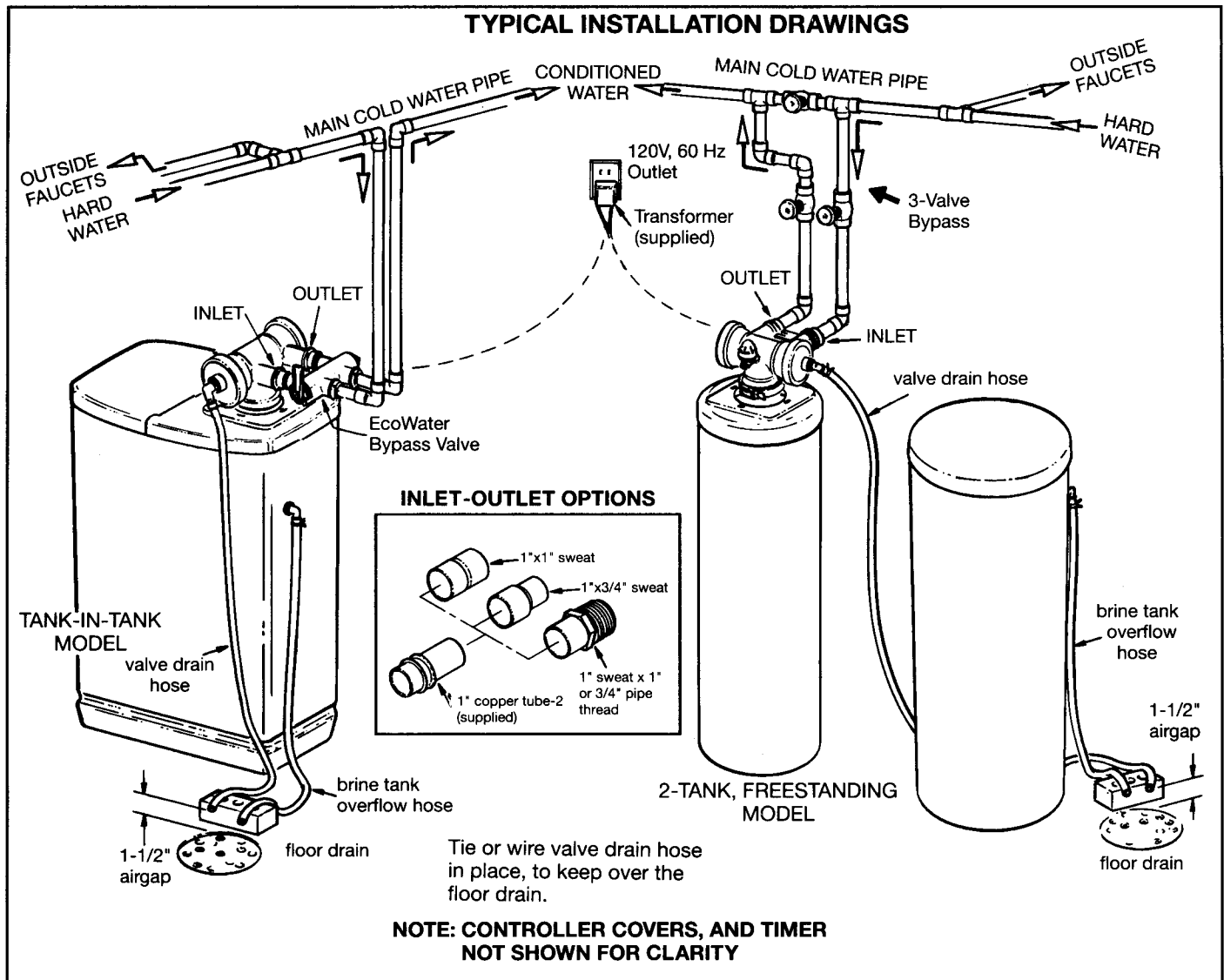
R40/R70 RESIN TANK AND CONTROLLER

1. Unclamp and remove the shipping cap from the resin tank (FIG. 4).
2. **BE SURE ALL O-RING SEALS ARE IN PLACE**, then position the valve on the resin tank, over the bottom distributor standpipe.
3. Push down on the valve while installing the 2 clamps, and clamp retainers. **BE SURE THE RETAINERS ARE LOCKED INTO PLACE.**

ALL MODELS

1. Install the brine tank overflow grommet and elbow, in the 3/4" dia. hole, in the brine tank sidewall (FIG. 1 or 3).
2. Controller covers and the face plate assembly are installed after installation, see pages 12 and 13.





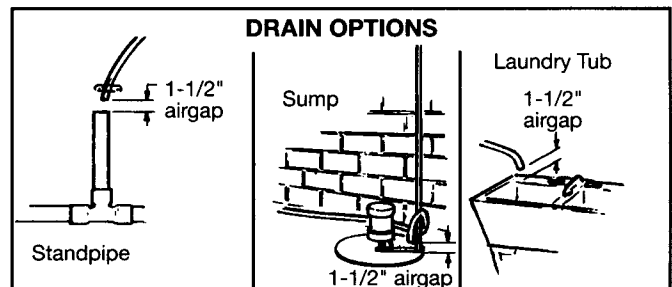
INLET-OUTLET PLUMBING OPTIONS

1. ALWAYS INSTALL the EcoWater bypass valve – or – a 3 valve bypass.
2. Use 1" – or – 3/4" (minimum) pipe and fittings.
3. Use sweat copper – or – threaded pipe* – or – CPVC plastic pipe.*

*Sweat soldering is required to adapt to the fittings (1" male) supplied with the Eco System Unit, or obtain approved compression adaptors. PVC plastic adaptors, part no. 7104546, are available from EcoWater. BE SURE TO COMPLY WITH ALL LOCAL PLUMBING CODES.

OTHER REQUIREMENTS

4. A drain is needed for regeneration discharge water. A floor drain, close to the Eco System Unit is preferred. A laundry tub, sump, standpipe, etc., are other options.



5. A 120V-60Hz, grounded electrical outlet (continuously "live") is needed within 10' of the Eco System Unit.

TOOLS YOU MAY NEED

- common screwdriver
- cross point screwdriver
- pliers
- tape measure

SOLDERED COPPER THREADED CPVC PLASTIC

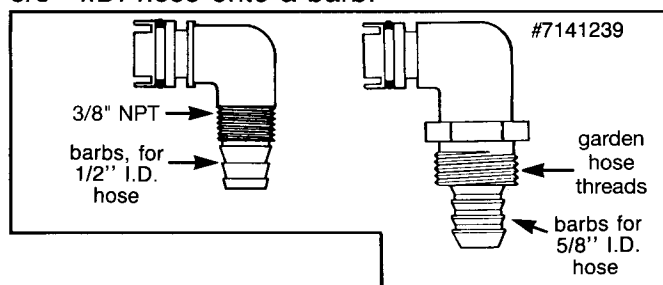
- | | | |
|------------------------------------|--------------------------|---------------------|
| • tubing cutter | • hacksaw or pipe cutter | • hacksaw |
| • propane torch | • threading tool | • adjustable wrench |
| • LEAD-FREE solder and flux | • pipe joint compound* | • solvent cement* |
| • emery cloth | | • primer |
| • sandpaper or steel wool | | |

*approved for use on potable water

MATERIALS YOU MAY NEED

- bypass valve, or 3 valves
- pipe and fittings as required
- 1/2" I.D. high quality, flexible hose for the valve drain*, and brine tank drain (brine tank elbow accepts either 1/2 or 3/8" I.D. hose)

***VALVE DRAIN OPTIONS:** Flexible drain hose is not allowed in all localities (Check your codes.) For a rigid valve drain run, cut the barbed section off the drain fitting for access to the 3/8" pipe threads. Then plumb a rigid drain, as needed. An optional drain fitting (part no. 7141239) is available from EcoWater to connect a standard garden hose, or 5/8" I.D. hose onto a barb.



SELECT INSTALLATION LOCATION

Consider all of the following as an installation location for the Eco System Unit is selected.

- To condition all water in the home, install the Eco System Unit close to the water supply inlet, and before all other plumbing connections, **EXCEPT FOR OUTSIDE WATER PIPES**. Outside faucets should remain on hard water to avoid wasting conditioned water and salt.

- A nearby drain is needed to carry away regeneration discharge water. A floor drain is preferred, with a laundry tub, sump, standpipe, etc. other possibilities (check your local codes).
- The Eco System Unit works on 24 volts only. A transformer is included to reduce 120V-60 Hz house electrical power. Provide an approved, grounded outlet within 10' of the Eco System Unit. The Eco System Unit includes a 10' power cable for connection between the transformer and the timer.
- Position the Eco System Unit at least 6" from surrounding walls, or other appliances, to allow access for adding salt and servicing.
- Locate the Eco System Unit, in the plumbing system, **AFTER** all other installed water conditioning equipment, except for a taste and odor filter. A taste and odor filter is installed after all other equipment. **ALWAYS INSTALL THE ECO SYSTEM UNIT BEFORE THE WATER HEATER** (See Safety Guides on page 2). To reduce the risk of hot water back-up, conditioned water piping between the Eco System Unit and water heater should be as long as possible.
- Install the Eco System Unit in a place water damage is least likely to occur if it develops a leak.
- If installing the Eco System Unit in an outside location, be sure to provide protection from the elements, contamination, vandalism and sunlight heat. The sun's heat can melt plastic parts.

1. INSTALL INLET AND OUTLET FITTINGS

Note: All fittings are on the small parts skin-pack.

- Slide the water meter turbine onto the stainless steel pin, of the turbine mounting assembly (figure 6).
- Insert the turbine mounting assembly into the valve outlet port (push in firmly), up to the shoulder. Check the turbine for free movement by blowing air into the port.

NOTE: If installing the EcoWater bypass valve, see separate instructions included with it.

- Slide a lubricated o-ring onto 1 of the copper tubes. Carefully insert the copper tube into the outlet port. . .inset drawing, figure 6. . .and secure in place with a plastic "C" clip.

NOTE: For lubrication, use silicone grease approved for use on potable water supplies.

- Repeat step C on the inlet side.

IMPORTANT: BE SURE COPPER TUBES ARE FIRMLY HELD IN PLACE BY THE PLASTIC "C" CLIPS.

2. TURN OFF WATER SUPPLY

- Close the main water supply valve, near well pump or water meter.
- Shut off the electricity or fuel supply to the water heater.

- Open high and low faucets to drain all water from house pipes.

3. INSTALLING 3-VALVE BYPASS

If installing a 3-valve bypass system, plumb as needed, using figure 5 as a guide. If installing sweat copper, be sure to **USE LEAD-FREE SOLDER** as required by Federal and State codes. Use pipe joint compound on outside pipe threads.

4. MOVE ECO SYSTEM UNIT INTO PLACE

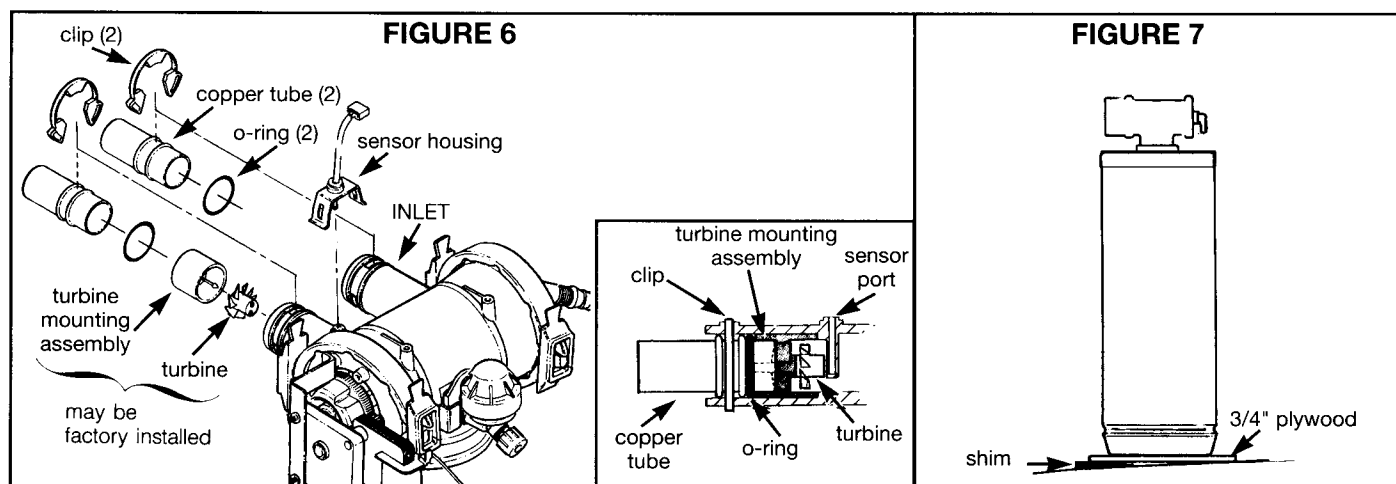
Move the Eco System Unit (resin tank, if "free-standing" model) into the installation position, setting on a solid, smooth and level surface. If needed, place the Eco System Unit on a section of 3/4" plywood. Then shim under the plywood to level the Eco System Unit (figure 7).

CAUTION: DO NOT PLACE SHIMS DIRECTLY UNDER THE BRINE TANK. The weight of the tank when full of water and salt, may cause the tank to fracture at the shim.

5. ASSEMBLE INLET AND OUTLET PLUMBING

Measure, cut and loosely assemble pipe and fittings from the main water pipe (or from bypass valves installed in step 3), to the Eco System Unit inlet and outlet copper tubes.

continued



BE SURE HARD WATER SUPPLY PIPE GOES TO THE ECO SYSTEM UNIT INLET SIDE. Trace the water flow direction to be sure.

6. CONNECT INLET AND OUTLET PLUMBING

Complete the inlet and outlet plumbing as applicable.

a. SOLDERED COPPER

- (1) Thoroughly clean and flux all joints.
- (2) Remove the inlet and outlet tubes from the valve (pull plastic "C" clips), and o-rings from the tubes. DO NOT SOLDER WITH TUBES IN THE VALVE. SOLDERING HEAT WILL DAMAGE THE VALVE.
- (3) Make all solder connections. Be sure to keep fittings fully together, and pipes square and straight.
- (4) AFTER PLUMBING HAS COOLED, repeat steps 1c and 1d.

b. THREADED PIPE

- (1) Apply pipe joint compound to all outside pipe threads.
- (2) Tighten all threaded joints.
- (3) If SOLDERING TO INLET AND OUTLET TUBES, observe steps (1) through (4) above.

c. CPVC PLASTIC PIPE

- (1) Clean, prime and cement all joints (follow instructions of the plastic pipe and fittings manufacturer).

- (2) IF SOLDERING TO INLET AND OUTLET TUBES, observe preceding steps a(1) through a(4).

7. COLD WATER PIPE GROUNDING

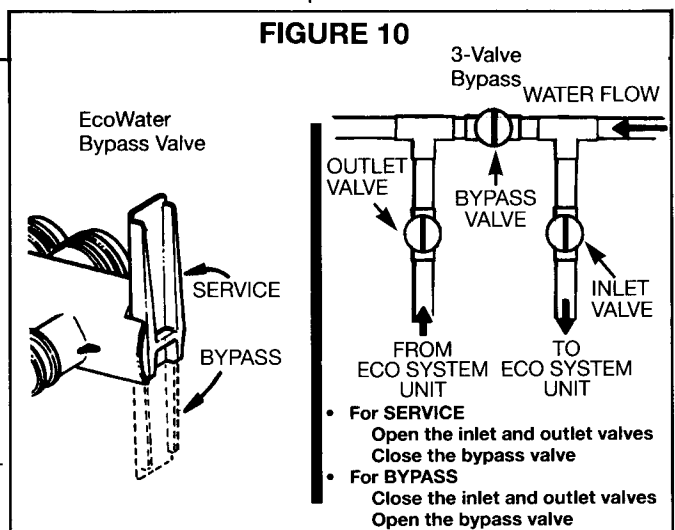
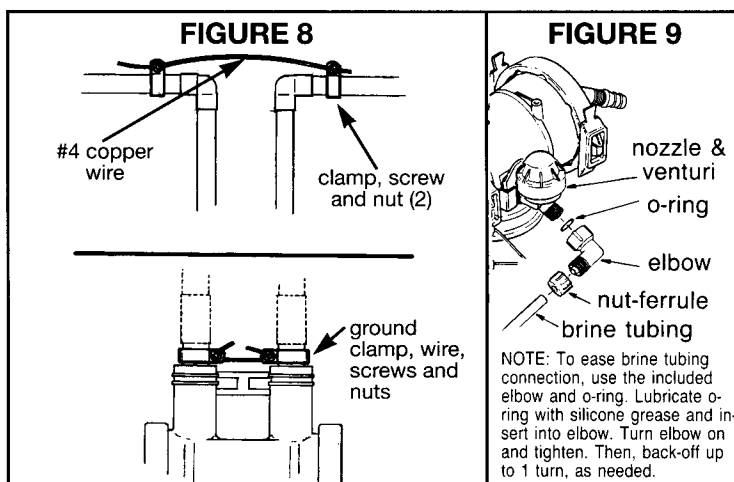
The house cold water pipe (metal only) is often used as a ground for the house electrical system. The 3-valve bypass type of installation, shown in figure 5, will maintain ground continuity. If you use the plastic bypass valve at the Eco System Unit, continuity is broken. To restore the ground, install 1 of the following grounds.

- a. Use the included "c" clamps and wire to jumper across the inlet and outlet copper tubes (figure 8).
- b. Install a #4 copper wire across the removed section of main water pipe, securely clamping on both ends.

8. INSTALL VALVE DRAIN HOSE

NOTE: See valve drain options on page 9.

- a. Connect a length of 1/2" I.D. hose (flexible hose not allowed by codes in all localities) to the valve drain elbow, on the controller. . figure 5. Use a hose clamp to hold the hose in place. Route out through the notch in the bottom cover.
- b. Run the hose to a floor drain, and as typically shown in figure 5, tie or wire the end to a brick or other heavy object. This will prevent "whipping" during regenerations. Be sure to provide a 1-1/2" minimum air gap, to prevent possible sewer water backup.



NOTE: In addition to a floor drain, you can use a laundry tub, sump or stand pipe as a good drain point for this hose. Avoid long drain hose runs, or elevating the hose over 8' above the floor.

9. IF INSTALLING A 2-TANK, FREESTANDING MODEL, move the brine tank into position next to the resin tank. Observe instructions in step 4, page 10.

10. INSTALL BRINE TANK OVERFLOW

- a. Connect a length of 1/2" I.D. hose to the brine tank overflow elbow and secure with a hose clamp.
- b. Run the hose to the floor drain, or other suitable drain point no higher than the drain fitting. THIS IS A GRAVITY DRAIN. If the brine tank should overflow with water, the excess is carried to the drain. DO NOT ELEVATE THIS HOSE.

11. On 2-tank, freestanding models, connect the brine tubing to the nozzle and venturi housing. . . figures 1, 3 and 9. Use the nut-ferrule, included on the skin-pack. Tighten the nut by hand, then another 1/4 turn with a pliers.

NOTE: Route the tubing neatly out of the way and cut to desired length. For longer distances, order the optional parts, page 29, to extend the tubing.

12. PRESSURE TESTING FOR LEAKS

TO PREVENT EXCESSIVE AIR PRESSURE IN THE ECO SYSTEM UNIT AND PLUMBING SYSTEM, DO THE FOLLOWING STEPS IN ORDER.

- a. Open 2 or more conditioned water faucets, both hot and cold.
- b. Referring to figure 10, turn the bypass valve(s) to SERVICE position.
- c. SLOWLY OPEN THE MAIN WATER SUPPLY VALVE. When water from the faucets runs smoothly, with no air bubbles, close the faucets.
- d. Check your complete installation for leaks. If rework is required, be sure to observe precautions in step 6.

13. ADD WATER AND SALT INTO BRINE TANK

- a. Using a pail, or garden hose, add about 3 gallons of water into the brine tank. DO NOT POUR INTO THE BRINEWELL (figures 1 and 3, page 7).
- b. Fill the brine tank with salt. You can use most water conditioner salts, but it must be clean (recommended NUGGET or PELLET salt has less than 1% impurities). Salt storage capacity is shown on the specification page.

NOTE: See page 23 for additional information on salt.

14. INSTALL BOTTOM CONTROLLER COVER

Referring to figure 11A, slide the bottom cover (spread slightly) into place, under the controller to tank clamp. Position and lock the cover tabs into the holes in. . .

. . .the rear brine tank cover, tank-in-tank models.

. . .the resin tank top shroud cover on freestanding models.

15. Snap the face plate timer and top controller cover together. . .figure 11B. First, attach at the top (①). Rotate the bottom of the timer against the top cover (②).

16. CONNECT ALL LEADWIRES

- a. Connect the wire harness to the valve switches. . .see figure 12. Both switches are on the outlet valve cover, behind the motor. The connector with the red wires goes to the inboard switch. The connector with the white wires attaches to the outboard switch. DO NOT REVERSE OR THE VALVE WILL CYCLE INCORRECTLY.

NOTE: Check to be sure the connector is secure, on the back of the timer.

- b. Fasten the sensor housing over the valve outlet port. Tabs, on the outlet port, snap into the sensor housing to hold it in place.

IMPORTANT: BE SURE THE SMALL PORT, IN THE OUTLET FITTING THAT HOUSES THE SENSOR, IS COMPLETELY DRY (figure 6).

- c. Attach the valve motor leadwire male connector to the matching female connector on the face plate timer.
- d. Connect the power cable leads to the 2 terminals on the transformer.

17. Insert the tabs, on the back of the top cover, onto the bottom cover. . . ③ in figure 11C. Then, rotate the top cover and timer down and lock into the bottom cover. . . ④.

CAUTION: BE SURE ALL WIRING IS AWAY FROM THE VALVE CAM, WHICH ROTATES DURING REGENERATIONS.

18. SANITIZING THE ECO SYSTEM UNIT

Care is taken at the factory to keep your Eco System Unit clean and sanitary. Materials used to

make the Eco System Unit will not infect or contaminate your water supply, and will not cause bacteria to form or grow. However, during shipping, storage, installing and operating, bacteria could get into the Eco System Unit. For this reason, sanitizing, as follows, is suggested ① when installing.

. . . Remove the brinewell cover and pour about 1-1/2 oz. of common household bleach (Clorox, Linco, BoPeep, White Sail, Eagle, etc.) into the softener brinewell (see figures 1 and 3, page 7).

REPLACE THE BRINEWELL COVER.

- ① Recommended by the Water Quality Association. On some water supplies, the Eco System Unit may need periodic disinfecting.

19. CONNECT TO ELECTRICAL POWER

Plug the transformer into a continuously "live," grounded, 120V-60 Hz house electrical outlet, approved by local codes.

20. Install, or close, the salt tank cover. **COMPLETE THE PROGRAMMING STEPS ON PAGES 14 AND 15, AND RESTART THE WATER HEATER, STEP 7, PAGE 15.**

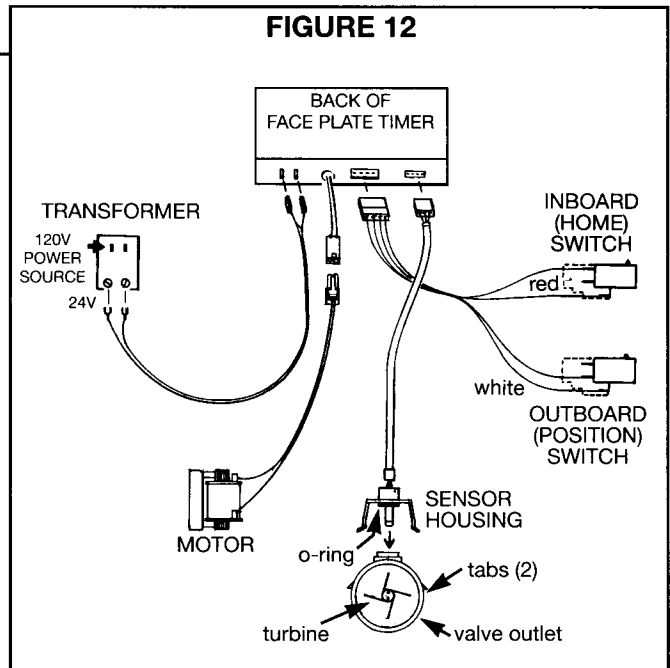
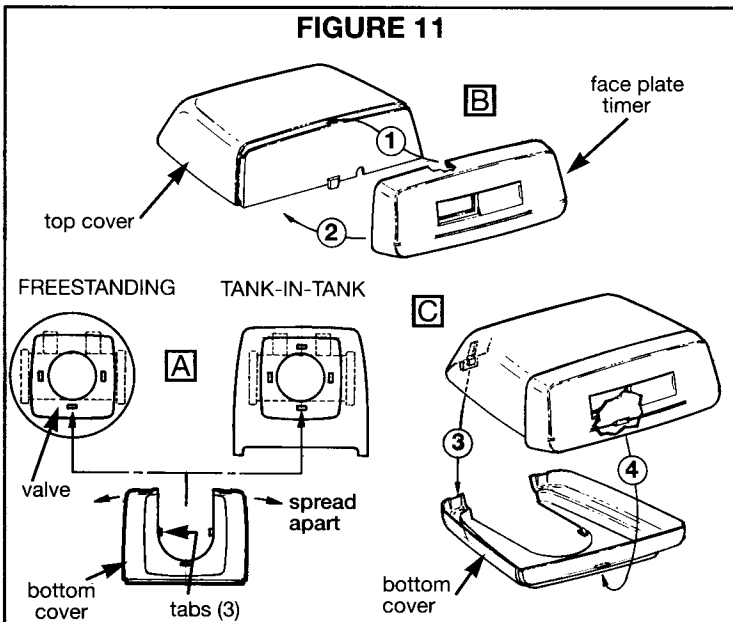
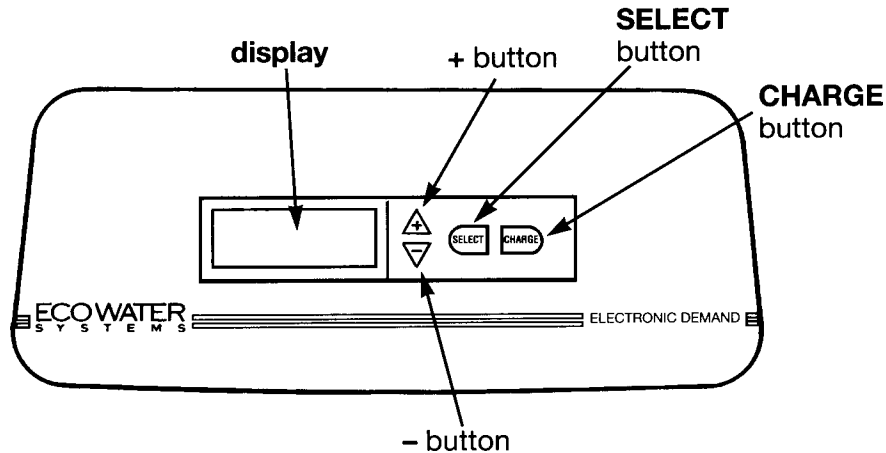
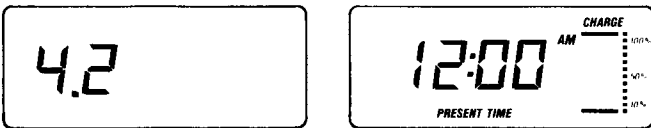


FIGURE 13



When the transformer is plugged in, a “beep” will sound, followed by the factory set model code for a few seconds. Then a test number (example: 4.2) shows, followed by a 12:00 AM present time display.



1. MODEL CODE: The timer is factory set to the R model code (see table), which provides the shortest recharge times and greatest water savings. For operation at higher efficiency levels (see the product specification sheet), the HR model selection is required. Do the following to change to the

HR code, if desired.

- Press SELECT and hold for 3 seconds.
- Again, press SELECT and hold for 3 seconds to display the factory set R code.
- Use the (Δ) button to set the HR code. If you pass by the correct HR code, use the (∇) button. BE SURE TO SET THE CORRECT CODE, OR THE ECO SYSTEM UNIT WILL OPERATE ON INCORRECT TIMING.

When you are certain the correct code appears, press SELECT to set. A test number (example: 4.2) will show again for a few seconds, followed by a flashing 12:00 AM. The charge bar will show 10% . . . or 0% beginning with 5.0 test number software . . . until after the first regeneration (see page 15).

MODEL NUMBER (on rating decal) →	3000 R20 3002 R20 3200 R20		3000 R30 3002 R30 3200 R30		3000 R40 3002 R40		3000 R70 3002 R70	
	R20	HR20	R30	HR30	R40	HR40	R70	HR70

• **SOUND “BEEPER”** - A “beeper” sounds while pressing buttons for timer set-up. One beep signals a change in the face plate display. Repeated beeps means the timer will not accept a change from the button you have pressed, telling you to use another button. For example, while setting the hardness, the beeper sounds repeatedly when the display reaches 1 using the (∇) button, or 125 using the (Δ) button.

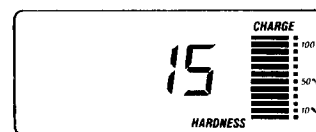
2. SET THE PRESENT TIME: Again, use the (Δ) or (∇) to set the present time of day, being sure a.m. or p.m. shows, as required. Press (Δ) to move the time ahead; press (∇) to move the time backward. NOTE: each press of the (Δ)

or (∇) button changes the time by 1 minute. Holding a button in, changes the time 32 minutes each second.



NOTE: TO RESET THE PRESENT TIME, IF FLASHING AFTER A POWER OUTAGE, DO STEP 2. Then, press SELECT 4 times to steady the display.

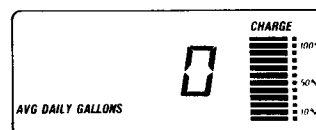
3. SET WATER HARDNESS: Press the SELECT button once to display a flashing 15 and HARDNESS. Set the grains per gallon hardness of your water supply (determined by water analysis or call your local water department). Use the (Δ) button to advance the number; use the (∇) button to reduce the number. Each press of a button changes the display by 1, between 1 and 25. Between 25 and 125 the display changes 5 at a time. Hold the buttons in for fast number advance. NOTE: To compensate for iron in the water supply, add 5 to the hardness number for each 1 ppm of iron.



4. SET RECHARGE (REGENERATION) TIME: Press SELECT to display a flashing 2:00 a.m. and RECHARGE TIME. At this setting, the Eco System Unit begins recharge or regeneration at 2:00 a.m., ending no later than 4:30 a.m. This is a good time in most households, because water is not being used. (If hot water is used while the Eco System Unit is regenerating, the water heater will refill with hard water.) To select a different recharge start time, use the (Δ) or (∇) button.



5. Press SELECT to display AVERAGE DAILY GALLONS (no adjustments), then press SELECT once more to return the present time of day.



6. Press the CHARGE button and hold for 3 seconds until RECHARGE begins to flash in the display, starting a recharge. This recharge draws the bleach (installation step 18, page 13) through the Eco System Unit to sanitize it and to purge any air remaining in the Eco System Unit.



7. RESTART THE WATER HEATER: Turn on the electric or fuel supply to the water heater, and light the pilot, if applies.

NOTE: The water heater is filled with hard water and, as hot water is used, it refills with conditioned water. In a few days, the hot water will be fully conditioned. To have fully conditioned hot water immediately, wait until the recharge (step 6) is over, then drain the water heater until water runs cold.

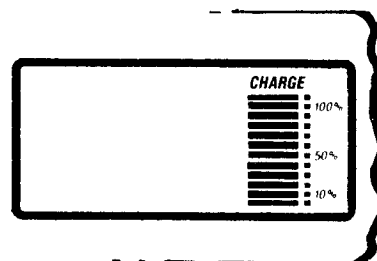
INSTALLATION OF THE ELECTRONIC DEMAND ECO SYSTEM UNIT IS COMPLETE. Additional face plate timer features and options are described below and on following pages.

FEATURES AND OPTIONS

CHARGE BAR DISPLAY

The charge bar is continually displayed and shows, at a glance, the percentage of conditioned water capacity remaining. After a recharge or regeneration, the charge bar returns to the 100% charge position.

NOTE: When electrical power is applied to the timer, the charge bar is at 0% or 10%, depending on software revision, until after the initial regeneration (step 6, above).



FLASHING "RECHARGE"

While the Eco System Unit is in a recharge cycle, the word "RECHARGE" flashes in the display until the Eco System Unit returns to conditioned water service.

FLASHING "RECHARGE" TONIGHT

When the face plate computer determines that a recharge is needed to restore conditioned water capacity, it initiates "RECHARGE TONIGHT." At the next programmed recharge start time, the recharge cycle will begin. Flashing RECHARGE then replaces the flashing RECHARGE TONIGHT.

INITIATING EXTRA RECHARGES

1. RECHARGE NOW: Press and hold the CHARGE button for 3 seconds, until RECHARGE begins to flash in the display. A recharge begins immediately.

To assure an adequate supply of conditioned water, at times of unusual or unexpected high water use demand, use the RECHARGE NOW feature. For example, if you have guests and the charge bar is at or below 50%, you could deplete the conditioned water capacity before the next recharge is automatically initiated. To be sure this will not happen, use RECHARGE NOW to restore 100% conditioned water capacity when the recharge is over.

2. RECHARGE TONIGHT: Press and immediately release the CHARGE button. RECHARGE TONIGHT will flash in the display. When this feature is set, the Eco System Unit will regenerate at the next programmed recharge start time. This feature is beneficial to assure a sufficient conditioned water supply for an expected heavy water usage the next day.

To cancel a recharge when RECHARGE TONIGHT is flashing, press and immediately release the CHARGE button.

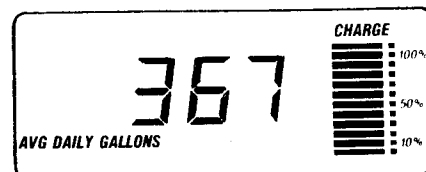
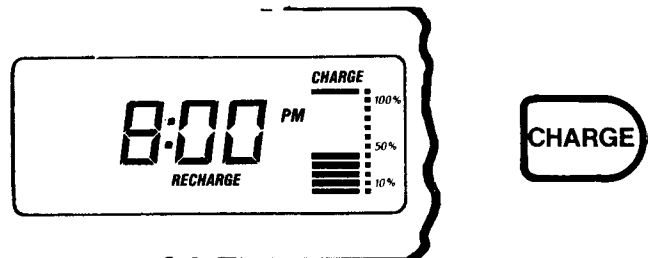
PROGRAM MEMORY

If electrical power to the Eco System Unit goes off, the time display is blank, but the face plate timer keeps the correct time for at least 2 days. When electrical power comes on again, you have to reset the present time only if the display is flashing. The MODEL CODE, HARDNESS and RECHARGE TIME never require resetting unless a change is desired.

Even if the timer is incorrect after a long power outage, the Eco System Unit works as it should to keep your water conditioned. However, regenerations may occur at the wrong time of the day until you reset the timer to the correct time of day. To reset present time, see step 2 on page 14.

AVERAGE DAILY GALLONS

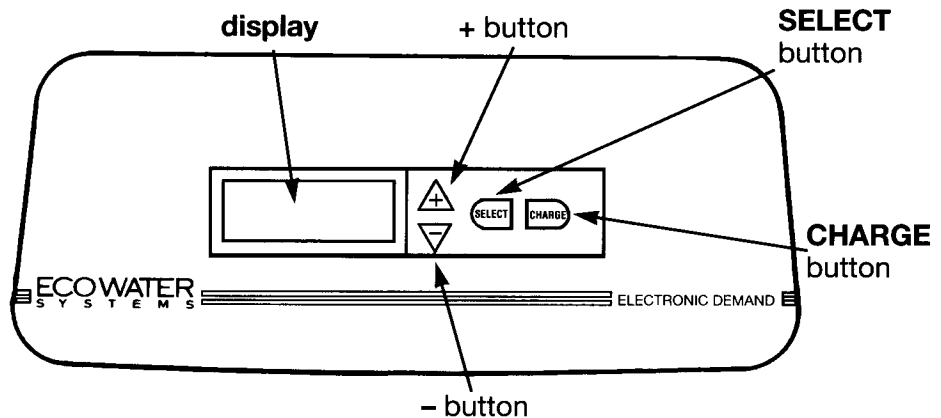
If you want to know the average gallons of water your household uses each day, press the SELECT button 4 times to display this water use fact. The average daily gallons is based on your past 7 days of water usage. The figure adjusts daily at midnight. Press SELECT once more to return the present time (or present time automatically returns in 4 minutes).



THE FOLLOWING FEATURES AND OPTIONS ARE SELECTED OR OBSERVED IN A **SECONDARY TIMER MODE**. SOME OF THESE MAY BE BENEFICIAL TO THE HOME-OWNER, AND OTHERS TO THE SERVICE TECHNICIAN. SOME FEATURES ARE USEFUL TO BOTH OWNER AND SERVICER. EACH FEATURE IS LISTED IN THE ORDER THAT DISPLAYS APPEAR WHEN PASSING THROUGH THE SECONDARY MODE.

NOTE: The present time display will return if more than 4 minutes pass without touching a face plate button.

TO ENTER THE SECONDARY MODE. . . Press SELECT and hold for 3 seconds.



1. GALLON (OR LITER) TOTAL COUNT: This is a measure of all water that has passed through the Eco System Unit since installation. The display will total up to 99,999 gallons before beginning over at 0.

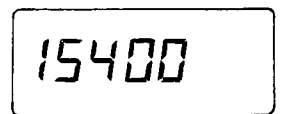
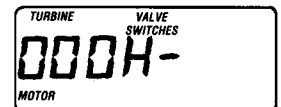
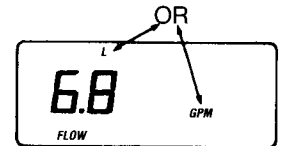
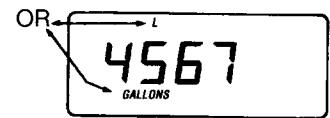
NOTE: When in this display, the total can be returned to 0 by pressing the (∇) button.

2. FLOW RATE, GALLONS (OR LITERS) PER MINUTE: Press SELECT once more to access this display. The display shows the flow rate, in gallons (or liters), passing through the Eco System Unit. If all water using appliances and faucets are off, the display will be 0. This display indicates positive water meter turbine operation.

3. OPERATING CAPACITY (BEGINNING WITH 5.0 SOFTWARE TEST NUMBER): Press SELECT to view the current operating capacity of the Eco System Unit. The display alternates between CAP and (example: 15400). Upon installation, capacity shown is the medium operating level of the Eco System Unit. After that, depending on water usage (see page 19), the actual grains capacity recharged displays.

4. VALVE SWITCHES, TURBINE, AND MOTOR DIAGNOSTIC: Press SELECT again for this diagnostic display. FOR ADDITIONAL INFORMATION ON THIS DISPLAY, PLEASE SEE PAGE 26.

5. 12 OR 24 HOUR CLOCK: Press SELECT to display a flashing 12 hour (or 24 hour). When "12 hour" is set, the present time and recharge time displays are shown in standard clock time. . . 1 to 12 p.m., 1 to 12 a.m. Military time, 0100 (1:00 a.m.) to 0000 (midnight), is shown in the present time and recharge time displays when "24 hour" is set. Use the (Δ) or (∇) buttons to set the desired clock.



6. **GALLONS OR LITERS MEASURE:** Press SELECT to show either GALLON or LITER flashing. If GALLON is selected, all water flow rate or usage displays are shown in gallons or gallons per minute. If LITER is selected, the same displays are in liters or liters per minute. The (Δ) or (∇) button is used to change this display.

GALLON

7. **MAXIMUM DAYS BETWEEN RECHARGES:** Press SELECT to display AUTO, or 1 day, 2 day, etc. through 7 day. The AUTO setting allows the face plate computer to control all recharges, with intervals based on water usage. AUTO provides the most economical Eco System Unit operation. To set a maximum time (in days) between recharges, use the (Δ) or (∇) buttons. For example, if you select 5 day in the display, the timer will assure that no more than 5 days will pass without a recharge.

LITER

AUTO
RECHARGE

2 DAY
RECHARGE

NOTE: If the 24 hour clock is selected (step 4, page 17), an alternating OFF/97 will display when SELECT is pressed again. This feature is mainly for the European market, which requires immediate recharge when 97% of the Eco System Unit capacity is used. To select this feature, press the (Δ) button to display ON.

8. **BACKWASH MINUTES:** Press SELECT and a flashing MIN./BACKWASH time shows in the display. The minimum time ① is either 8, 12 or 13 minutes, depending on the preprogrammed model code (see pages 14 and 27). The (Δ) or (∇) buttons are used to change this time, if desired, up to a maximum of 30 minutes.

BACKWASH
8 MIN

NOTE: The length of each stage (fill, brining and brine rinse, backwash, fast rinse) of the recharge cycle is automatically controlled by the face plate computer. This time is computed based on water usage, water hardness, size of the Eco System Unit resin bed etc. Although the length of backwash and fast rinse is changeable, to assure proper operation, only a qualified technician should adjust the times.

9. **2ND BACKWASH:** Press SELECT again to display 2ND BACKWASH/OFF. Two backwash cycles are beneficial on some water supplies, especially if it has high sediment or iron content. When selected, a backwash and fast rinse cycle will follow the fill cycle of recharge. Then the normal recharge sequence (brining, brine rinse, backwash, fast rinse) resumes. To select the 2nd backwash, press the (Δ) button to display ON, or press (∇) button to change from ON to OFF.

2ND BACKWASH
OFF

2ND BACKWASH
ON

10. **RINSE MINUTES:** Press SELECT and a flashing MIN./RINSE time shows in the display. The minimum time ① is 2, 3 or 4 minutes, depending on the preprogrammed model code (see pages 14 and 27). The (Δ) or (∇) buttons are used to change this time up to a maximum of 30 minutes.

RINSE
3 MIN

①Beginning with software test number 4.2, the minimum time adjustment available is 1 minute. The default time is the minimum adjustment on timers with test numbers lower than 4.2.

PRESS SELECT ONCE MORE TO RETURN THE PRESENT TIME DISPLAY.

NOTE: ALSO SEE SERVICE INFORMATION, PAGES 24 THROUGH 27.

ELECTRONICS

WATER METER:

The water meter, consisting of a turbine, turbine mounting assembly, and the sensor housing, is located at the valve outlet port (see figure 6 on page 10). As water passes through and spins the turbine, 2 magnets (in the turbine) cause a back-and-forth movement of a switch in the sensor housing. This switch movement sends a pulse to the face plate-timer.

FACE PLATE-TIMER:

The face plate-timer is actually a small computer. As it receives pulses from the water meter, it converts them to gallons of water passing through the Eco System Unit. It multiplies this water usage

information times the water hardness) preprogrammed into timer) to continually calculate the conditioned water capacity required. The computer adjusts daily to water using habits, seeking to supply conditioned water for the longest time, using the least, (and most efficient) amount of salt and water to regenerate.

When the computer determines more capacity is needed, at the next regeneration starting time (2:00 a.m., or as otherwise preset), it will schedule a regeneration. RECHARGE TONIGHT shows in the display to inform of the coming regeneration.

SERVICE, AND REGENERATION

The Eco System Unit is filled with a man-made resin material, called the resin bed. The resin looks somewhat like coarse sand, but the beads are round and smooth. This resin has the ability to remove hardness minerals from water by ion-exchange.

SERVICE (FIGURE 14):

Hard water enters the Eco System Unit, passes through the valve and down into the resin tank and resin bed. As it passes through the bed, hardness minerals are extracted from the water and held by the resin beads. Conditioned water exits the resin tank, through the bottom distributor, and flows up the internal standpipe, into the valve, then out to house pipes.

In time, the resin beads become coated with hardness minerals and cleaning with a salt solution (brine) is needed to remove it. Regeneration, and recharge, are words used to describe this cleaning.

REGENERATION, OR RECHARGE

The face plate-timer determines when a regeneration is needed (see above). Regeneration starts at 2:00 a.m., or other preselected time, and consists of 5 different steps, or cycles.

STEP 1 – FILL CYCLE (FIGURE 15): Salt, dissolved in water, is called brine. Brine is the cleaning agent for the resin bed. To make brine, water is needed in the brine tank salt storage area. A controlled water flow to the brine tank takes place during fill.

The Eco System Unit valve repositions slightly (motor energized), to open a passage allowing conditioned water to flow through the nozzle and venturi, to the brine valve, and into the brine tank. Fill cycle length is regulated by the timer, depending upon how much cleaning is needed to remove all hardness minerals and restore 100% capacity.

continued, page 21

WATER FLOW PATHS

FIGURE 14
SERVICE CYCLE

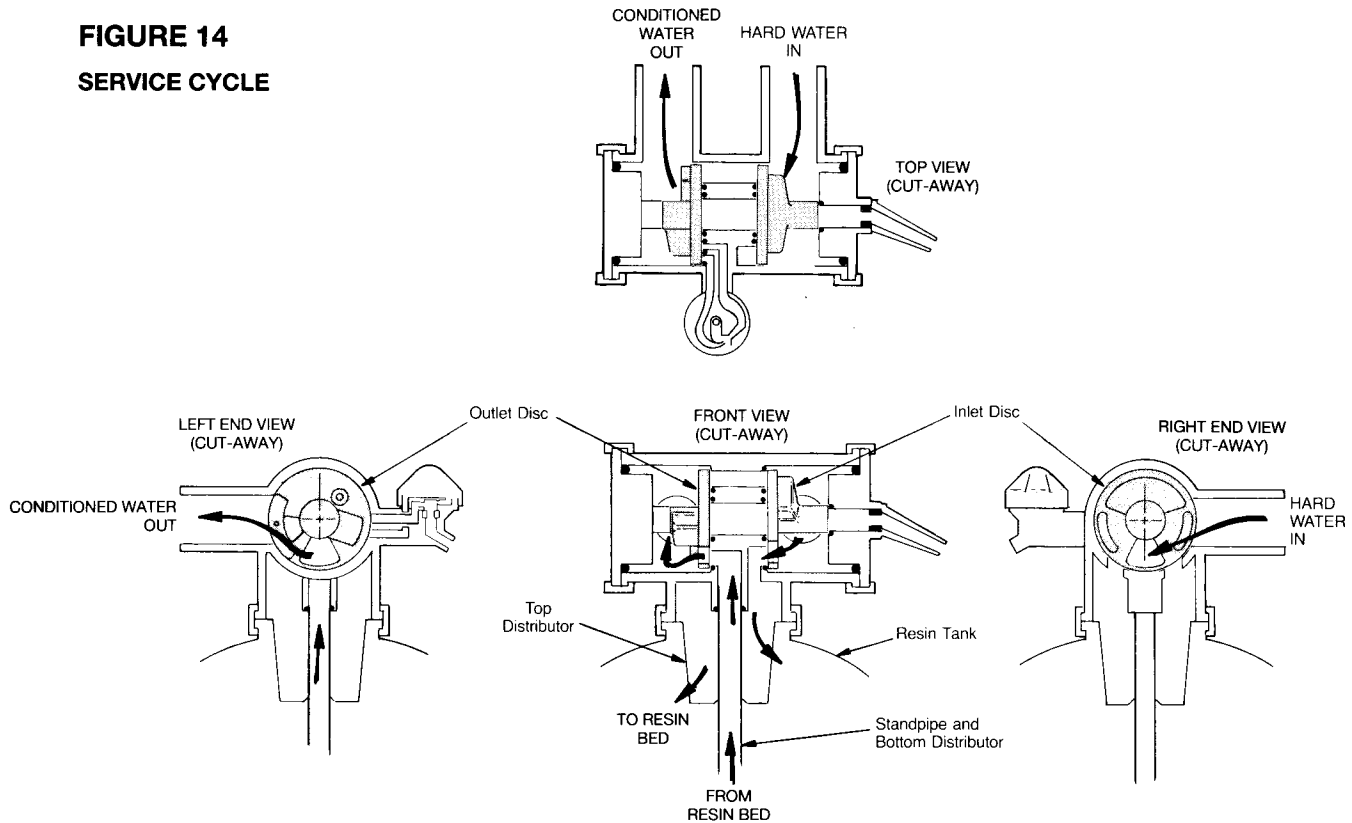
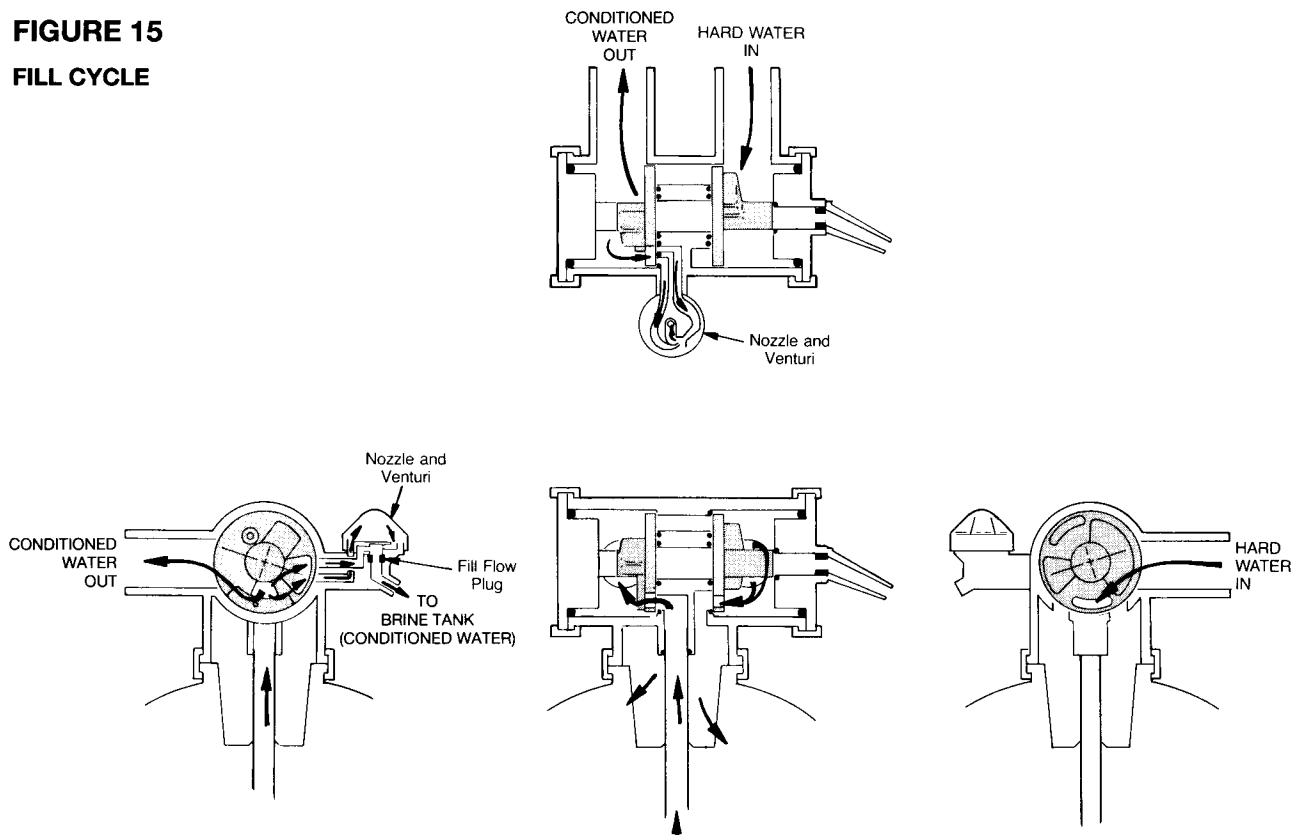


FIGURE 15
FILL CYCLE



**STEP 2 – BRINING CYCLE, and
STEP 3 – BRINE RINSE CYCLE (FIGURE 16):**

The timer energized motor moves the valve out of fill, and into brining. A port opens, routing water to the nozzle. Flow, through the nozzle and into the venturi, creates a suction in the brine tubing and brine valve. The suction draws brine out of the brine tank and it mixes with water at the nozzle and venturi. Brine and water flows back into the valve, down the internal standpipe, and into the resin bed. As brine passes through the resin bed, hardness minerals are released from the resin and carried with water flow, to the drain.

After all brine is drawn, from the brine tank, the brine valve float seats to prevent air induction. Water continues to flow in the same direction, except for discontinued brine flow. Hardness minerals and brine rinse from the resin bed and flow to the drain.

Brining and brine rinse time is also variable and controlled by the timer (see page 27).

BYPASS HARD WATER: During brining and brine rinse (also backwash and fast rinse, page 22) hard water is bypassed through the valve and available at house faucets. Avoid using **HOT** water however, because the water heater will refill with hard water.

WATER FLOW PATH

FIGURE 16

**BRINING AND
BRINE RINSE CYCLE**

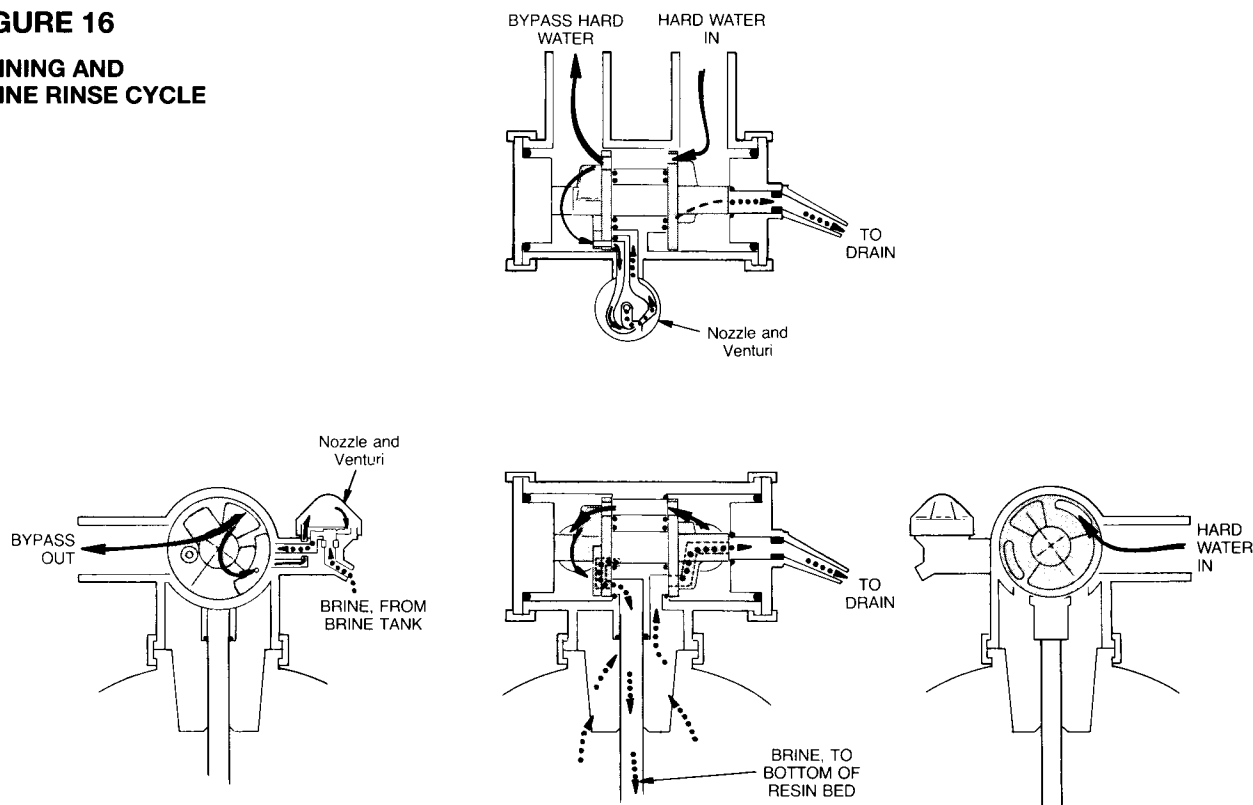
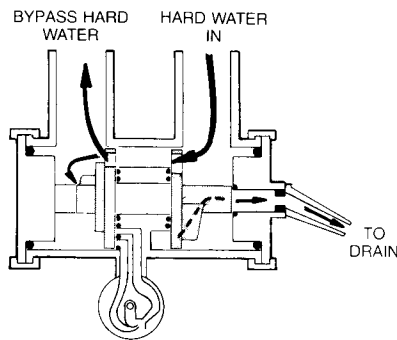


FIGURE 17- BACKWASH CYCLE

STEP 4 - The motor drives the valve to end brine rinse and begin backwash. In backwash, a fast upward flow of water, through the resin bed, flushes remaining



hardness minerals, brine, dirt, sediments, iron deposits, etc., from the bed and to the drain. The fast flow lifts and expands the resin bed for maximum cleaning.

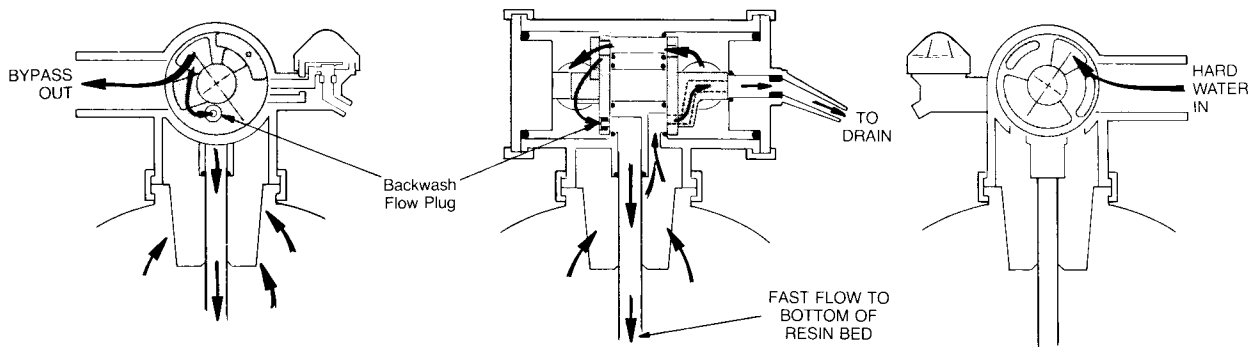
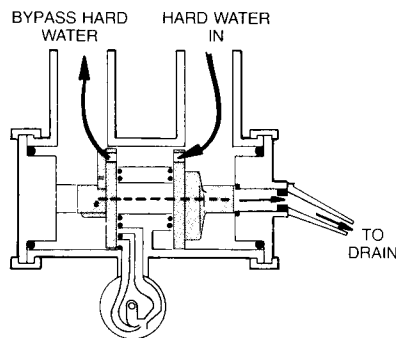
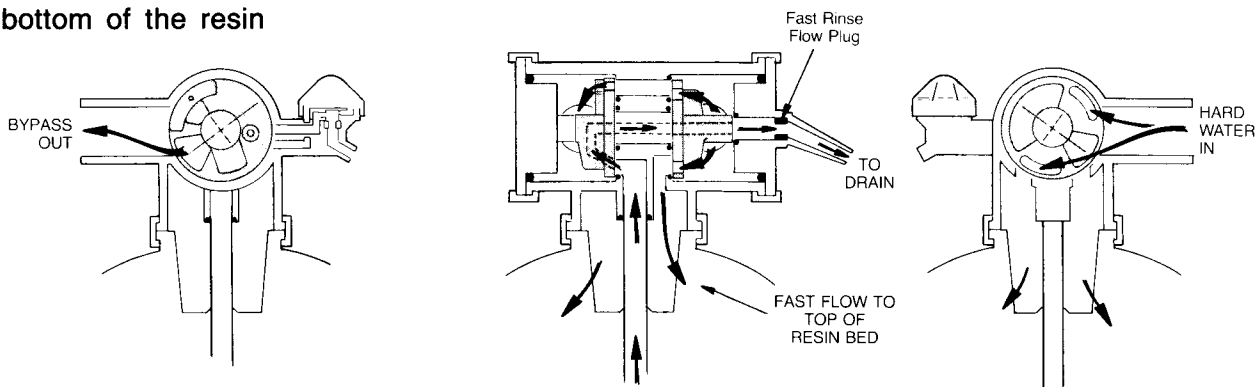


FIGURE 18- FAST RINSE CYCLE

STEP 5 - After backwash, valve rotation places the Eco System Unit in fast rinse. The continued fast flow of water changes directions to flow down through the resin bed. Any brine, hardness minerals, etc., still at the bottom of the resin



bed, are flushed up the standpipe and out the valve to the drain. The resin bed is packed by the fast flow, and prepared for service. The motor is energized a final time to return the valve to service.



REFILLING WITH SALT

Remove the brine tank cover and check the salt storage level frequently. If the Eco System Unit uses all the salt, before you refill it, you will get hard water. Until you have established a refilling routine, check the salt level at least every 2 or 3 weeks. Always refill if less than 1/2 full. **BE SURE THE BRINEWELL COVER IS ON.**

RECOMMENDED SALT: Nugget, pellet, button, etc. water conditioner salt is recommended. This type of salt is formed, or compressed into briquets, from high purity evaporated crystals. It has less than 1% insoluble (will not dissolve in water) impurities. Clean, high grade solar or rock salts are acceptable, but may require frequent brine tank cleaning to remove the "sludge" residue (insolubles).

SALT NOT RECOMMENDED: Rock salt, high in impurities, block, granulated, table, ice melting, ice cream making salts, etc., are not recommended.

SALT WITH IRON REMOVAL ADDITIVES: Some salts have an additive to help the Eco System Unit handle iron in the water supply. Although this additive may help keep the Eco System Unit resin clean, it may also release corrosive fumes that will weaken and shorten the life of some Eco System Unit parts.

BREAKING A SALT BRIDGE

Sometimes, a hard crust or salt bridge forms in the brine tank. It is usually caused by high humidity or the wrong kind of salt. When the salt bridges, an empty space forms between the water and salt. Then salt will not dissolve in the water to make brine. Without brine, the resin bed does not regenerate and you will have hard water.

If the storage tank is full of salt, it is hard to tell if you have a salt bridge. Salt is loose on top, but the bridge is under it. Take a broom handle, or like tool, and push it straight down into the salt. If a hard object is felt, it's most likely a salt bridge. Carefully push into the bridge in several places to break it.

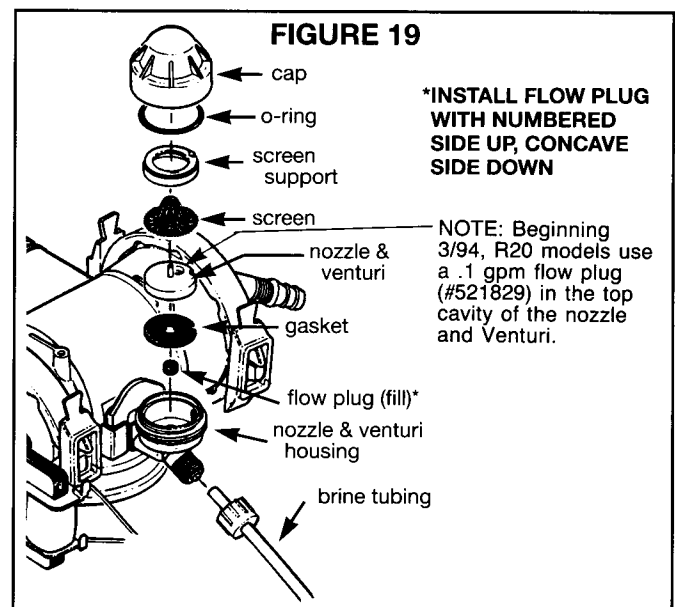
NOTE: In humid areas, it is best to keep the salt storage level lower, and to refill more often.

CLEANING THE NOZZLE & VENTURI

A clean nozzle and venturi (figure 19) is a must for the Eco System Unit to work right. This small unit moves brine from the brine tank to the resin tank during regeneration. If it becomes plugged with sand, silt, dirt, etc., the Eco System Unit will not work and you will get hard water.

To get to the nozzle and venturi, remove the Eco System Unit top cover. Be sure the Eco System Unit is in service cycle (no water pressure at nozzle and venturi), then turn off the cap from the nozzle and venturi housing. **DO NOT LOSE THE LARGE O-RING SEAL.** Lift out the screen support and screen, then the nozzle and venturi. Wash and rinse the parts in warm water until clean. If needed, use a small brush to remove iron or dirt. Also check and clean the gasket and flow plug if dirty.

Carefully replace all parts in the correct order. Lubricate the o-ring seal with silicone grease or Vaseline and place in position. Install and tighten the cap, **BY HAND ONLY. DO NOT OVERTIGHTEN AND BREAK THE CAP OR HOUSING.**



RESIN BED CLEANING

If the water supply contains "clear water" iron (see page 5), regular resin bed cleaning is needed to keep the resin bed from coating with iron. Use resin bed cleaner, available from EcoWater, following directions on the container. Clean the resin every 6 months, or more often if iron appears in your conditioned water supply.

ADDING RESIN

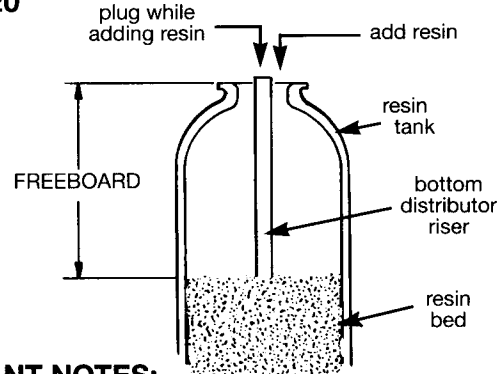
Normally, the resin bed (see figure 20) will last the lifetime of the Eco System Unit. However, certain conditions may require the resin bed to be partially or totally replaced. Some of these conditions are:

- (1) damaged top and/or bottom distributors have allowed resin to escape
- (2) resin bed iron fouled beyond use
- (3) some water supplies cause resin degradation

To add more resin, or to replace the entire bed, use the following guides. (See resin and gravel requirements, page 27.)

MODEL NUMBER	RESIN TANK SIZE	FREE BOARD RANGE	LBS. RESIN PER INCH BED DEPTH
3000, 3002, 3200 R20	8 x 35	8 1/2-12 1/2	1.2
3000, 3002, 3200 R30	10 x 35	10 1/2-14 1/2	2.0
3000, 3002 R40	10 x 47	14 1/2-18 1/2	2.0
3000, 3002, R70	12 x 54	18 1/4-22 1/4	2.9

FIGURE 20



IMPORTANT NOTES:

TURN OFF THE WATER SUPPLY AND RELIEVE PRESSURE (SEE BELOW).
HANDLE THE RESIN TANK CAREFULLY. IT IS HEAVY WHEN FULL OF RESIN AND WATER.
DO NOT LOSE ANY O-RING SEALS OR OTHER SMALL PARTS.

REFER TO THE ASSEMBLY INSTRUCTIONS, PAGE 7, AND TO INSTALLATION STEPS 1, 12, 16, AND 18 THROUGH 20 TO REASSEMBLE AND START-UP.

CAUTION: ALWAYS RELIEVE WATER PRESSURE IN ECO SYSTEM UNIT, as follows, before removing parts from the valve or resin tank.

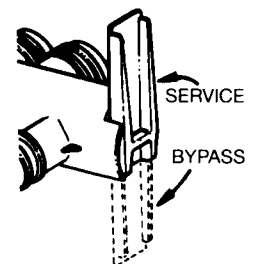
DEPRESSURIZE

1. Put bypass valve(s) in bypass position.
2. Do MANUAL ADVANCE step 1, page 27 (fill water to brine tank depressurizes resin tank).

REPRESSURIZE

1. Put bypass valve(s) in service position.
2. Do MANUAL ADVANCE steps 2-5, page 27, to return unit to service.

ECOWATER BYPASS VALVE



ALTERNATE METHOD

3-VALVE BYPASS

DEPRESSURIZE

1. Close the INLET valve.
2. Open HOT and COLD conditioned water house faucets.
3. Close OUTLET valve and open BYPASS valve.
4. Close house faucets.

PRESSURIZE

1. Open HOT and COLD house faucets.
2. Close BYPASS valve and open OUTLET valve.
3. Slowly open INLET valve.
4. Close house faucets.

ECO WATER BYPASS VALVE

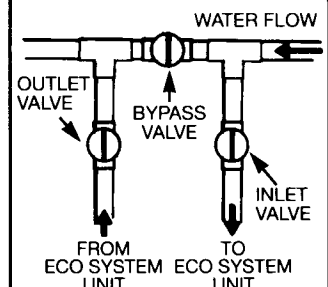
DEPRESSURIZE

1. Close house main water supply valve.
 2. Open HOT and COLD conditioned water house faucets.
 3. Turn bypass valve handle to bypass position.
- NOTE: For hard water bypass to house faucets, reopen the main water supply valve.

PRESSURIZE

1. Open HOT and COLD house faucets (main water supply valve open).
2. Turn the bypass valve handle to service position.
3. Close house faucets.

3-VALVE BYPASS



- For SERVICE
Open the inlet and outlet valves
Close the bypass valve
- For BYPASS
Close the inlet and outlet valves
Open the bypass valve

ECO SYSTEM UNIT OPERATION ELECTRONIC CHECKOUT

ALWAYS MAKE THE INITIAL CHECKS FIRST

- Does the time display show the correct time of day?
...If display is blank, check power source to the Eco System Unit.
...If time is flashing, power was off for over 2 days. The Eco System Unit resumes normal operation but regenerations occur at the wrong time.
...If an error code (Example: Err 03) shows in the face plate display, go to AUTOMATIC ELECTRONIC DIAGNOSTICS.
- Plumbing bypass valve(s) must be in Full Service position.
- The inlet and outlet pipes must connect to the Eco System Unit inlet and outlet respectively.
- Is the transformer plugged into a “live,” grounded wall outlet, and the power cable fastened securely?

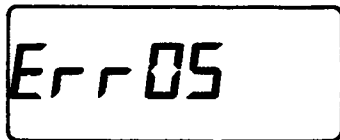
- The valve drain hose must be free of kinks and sharp bends, and not elevated over 8 ft. above the floor.
- Is there salt in the brine tank?
- Is the brine tubing connected? (See figure 9, page 11).
- Press the SELECT button 2 times to display the hardness setting. Be sure it is the correct setting for the household’s water supply. (Make a hardness test of the raw water and compare with the hardness setting. Also test a conditioned water sample to verify if a problem exists.) Press SELECT twice more to return present time in the display.

If you do not find the problem after making the initial checks, do the MANUAL INITIATED ELECTRONIC DIAGNOSTICS, and the MANUAL ADVANCE REGENERATION CHECK.

E.A.S.E.: EcoWater demand timers beginning with 5.0 software (test number) have the latest diagnostic technology. With E.A.S.E., or Electronic Automated Service Evaluation, a service person or homeowner can transmit operational data through the telephone, to a personal computer (PC). The PC processes the data to determine if all electrical functions are working normally, or helps to identify a problem should one occur. Ask your participating EcoWater dealer for more information on this feature.

AUTOMATIC ELECTRONIC DIAGNOSTICS

The face plate computer has a self-diagnostic function for the electrical system (except input power and water meter). The computer monitors the electronic components and circuits for correct operation. If a malfunction occurs, an error code appears in the face plate display.



POSSIBLE DEFECT

CODE	MOST LIKELY ←	→ LESS LIKELY
Err 01	motor inop. / wiring harness or connections to switches / both switches / face plate	
Err 02	wiring harness or connections to position switch / position switch / face plate	
Err 03	wiring harness or connections to home switch / home switch / face plate	
Err 04	face plate / position switch	
Err 05	face plate	

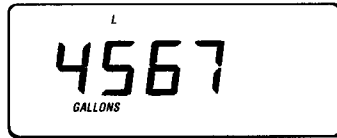
PROCEDURE FOR REMOVING ERROR CODE FROM FACE PLATE

- Unplug transformer
- Correct defect
- Plug-in transformer
- Wait for 6 minutes. The error code will return if the defect was not corrected.

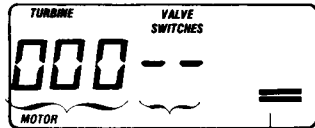
TROUBLE SHOOTING

MANUAL INITIATED ELECTRONICS DIAGNOSTICS

1. To enter diagnostics, press the SELECT button and hold (3 seconds) to display the gallons or liters of water used since installation.



2. Continue to press SELECT until the following display shows.



WATER METER - See (A).
SWITCHES - See (B).

VALVE CYCLE
POSITION
INDICATOR BARS
- See (C)

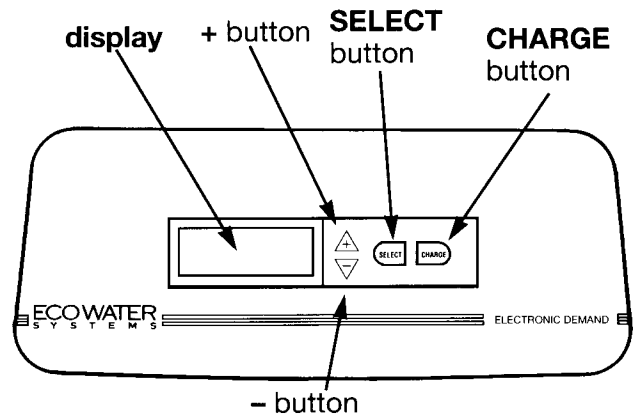
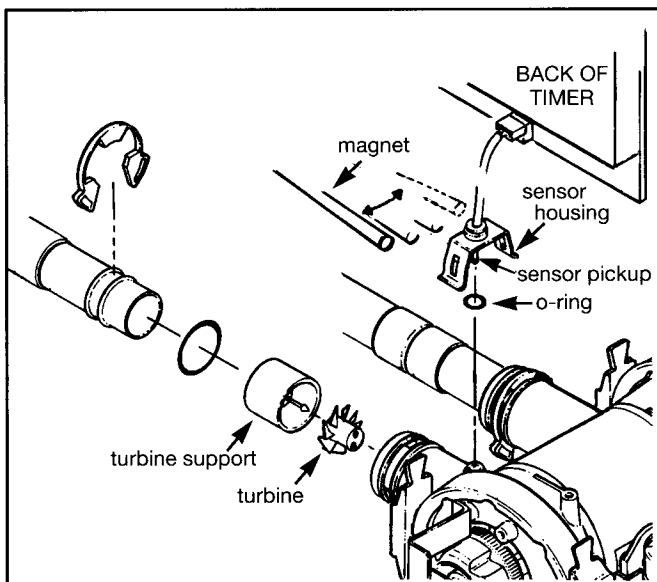
- (A). The first 3 digits indicate water meter operation as follows:

000 (steady) = conditioned water not in use
...no flow through the meter.

-OPEN A NEARBY CONDITIONED WATER FAUCET-

000 to 151 (continual) = repeats display for each gallon of water passing through the meter.

If you don't get a reading in the display, with faucet open, pull the sensor housing from the valve outlet port. Pass a small magnet back and forth in front of the sensor. You should get a reading in the display. If you get a reading, unhook the outlet plumbing and check the turbine for binding. If you don't get a reading, the sensor is probably defective.



Use the RECHARGE button to manually advance the valve into each cycle and check correct switch operation (B), and observe the valve position indicator bars (C).

- (B). The letter(s) and dash(s) indicate HOME (H) and POSITION (P) switch operation. The letter appearing means the switch is closed; the dash means the switch is open.

NOTE: The home and position switches are located on the valve, outlet end cap. The home switch is inboard, the position switch is outboard.

NOTE: The HOME switch is closed when the plunger is extended, and open when depressed. The POSITION switch works opposite (closed when the plunger is depressed, open when extended).

CORRECT SWITCH DISPLAYS	VALVE CYCLE STATUS
H -	Valve in service position
--	Valve in fill, brining, backwash or fast rinse position
- P H P	Valve rotating from one position to another

- (C). When advancing the valve through the recharge cycles, the charge bar indicates valve positioning as follows.

INDICATOR BARS	VALVE CYCLE POSITION
bar(s) flashing	valve moving from 1 position to another
no bars	service
1 bar	fill
2 bars	brining/brine rinse
3 bars	backwash
4 bars	fast rinse

D. While in this diagnostic screen, the following information is available and may be beneficial for various reasons. This information is retained by the computer from the first time electrical power is applied to the face plate.

...Press (Δ) to display the number of days this face plate has had electrical power applied.

...Press (∇) to display the number of regenerations initiated by this face plate since power was first applied.

E. Press SELECT several times until the present time display returns.

TROUBLE SHOOTING

MANUAL ADVANCE REGENERATION CHECK

This check verifies proper operation of the gearmotor, brine tank fill, brine draw, regeneration flow rates, and other controller functions. ALWAYS MAKE THE INITIAL CHECKS, AND THE MANUAL INITIATED DIAGNOSTICS.

NOTE: The face plate display must show a steady time (not flashing).

1. Press the CHARGE button and hold in for 3 seconds. RECHARGE begins to flash as the Eco System Unit valve enters the fill cycle of regeneration. Remove the brine well cover and, using a flashlight, observe fill water entering the tank.

a. If water **does not** enter the tank, look for an obstructed nozzle and venturi, fill flow plug or brine tubing (see figure 19, page 23).

2. After observing fill, press the CHARGE button to move the valve into brining.* A slow flow of water to the drain will begin. Verify brine draw from the brine tank by shining a flashlight into the brinewell and observing a noticeable drop in the liquid level.

*If the 2ND BACKWASH option is set, the valve will enter backwash and then fast rinse, before brining (see page 18).

NOTE: Be sure a salt bridge is not preventing water from contacting salt (see page 23).

a. If the Eco System Unit does not draw brine...
...nozzle and venturi dirty or defective (page 23)

...nozzle and venturi not seated on gasket, or gasket defective (page 23)

...restriction in valve drain, causing backpressure (bends, kinks, elevated too high, etc., see installation step 8)

...obstruction in brine valve, or brine tubing (see page 7 and figure 9, page 11)

...inner valve failure (obstruction in outlet disc, wave washer defective, etc.)

3. Again press CHARGE to move the valve into backwash. Look for a fast flow of water from the drain hose.

a. An obstructed flow indicates a plugged top distributor, backwash flow plug, or drain hose.

4. Press CHARGE to move the valve into fast rinse. Again look for a fast drain flow. Allow the Eco System Unit to rinse for a few minutes to flush out any brine that may remain in the resin tank from the brining cycle test.

5. To return the Eco System Unit valve to service, press CHARGE once.

SEE "OTHER SERVICE" ON BACK COVER PAGE.

MISCELLANEOUS SERVICE INFORMATION

MODEL CODE	20		30		40		70	
	R	HR	R	HR	R	HR	R	HR
LBS./CU. FT. RESIN ⑥	33	.63	49	.92	61	1.15	106	2.0
LBS. GRAVEL	8		10		10		12	
FILL CYCLE ① TIME	2	- 6	3	- 10	4	- 12	7	- 21
② FLOW	.3		.3		.3		.3	
BRINE CYCLE ③ TIME	37 ↑ 58	90 ↑ 103	41 ↑ 63	69 ↑ 108	54 ↑ 91	102 ↑ 141	58 ↑ 92	98 ↑ 152
④ FLOW	.11		.15		.15		.23	
BRINE R. CYCLE ④ FLOW	.07		.10		.10		.14	
BACKW. CYCLE ⑤ TIME	8		8		12		13	
④ FLOW	1.0		1.8		1.8		4.0	
FAST R. CYCLE ⑤ TIME	2		2		3		4	
④ FLOW	2.4		3.0		3.0		4.0	

① Minutes, varies with capacity operating level

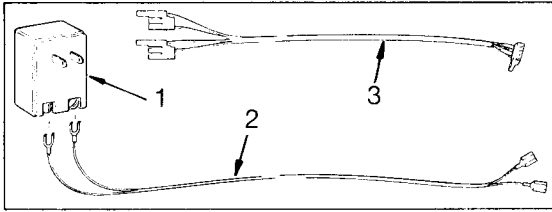
② Gallon per minute flow to brine tank

③ Includes brine rinse cycle minutes

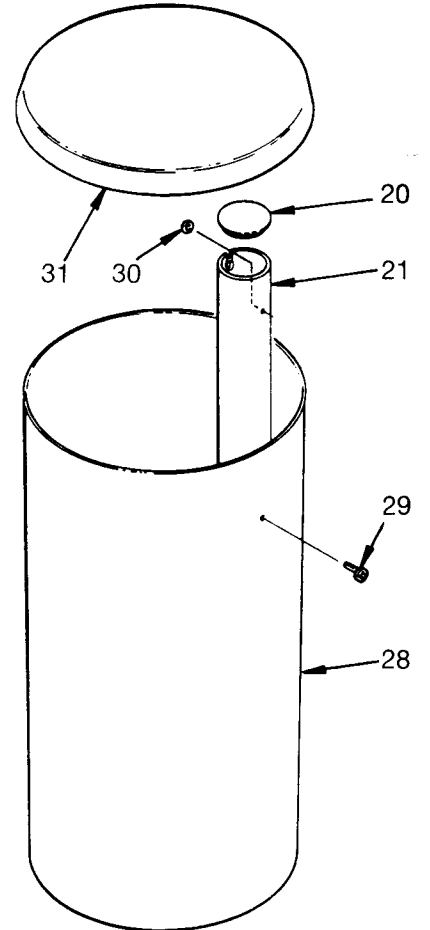
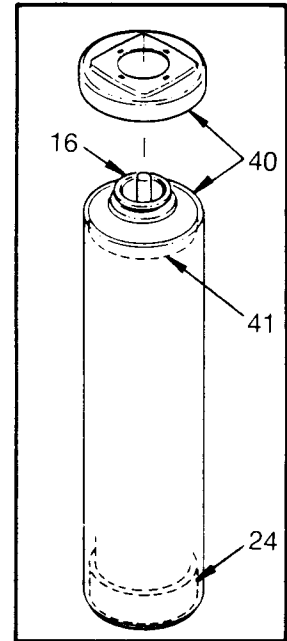
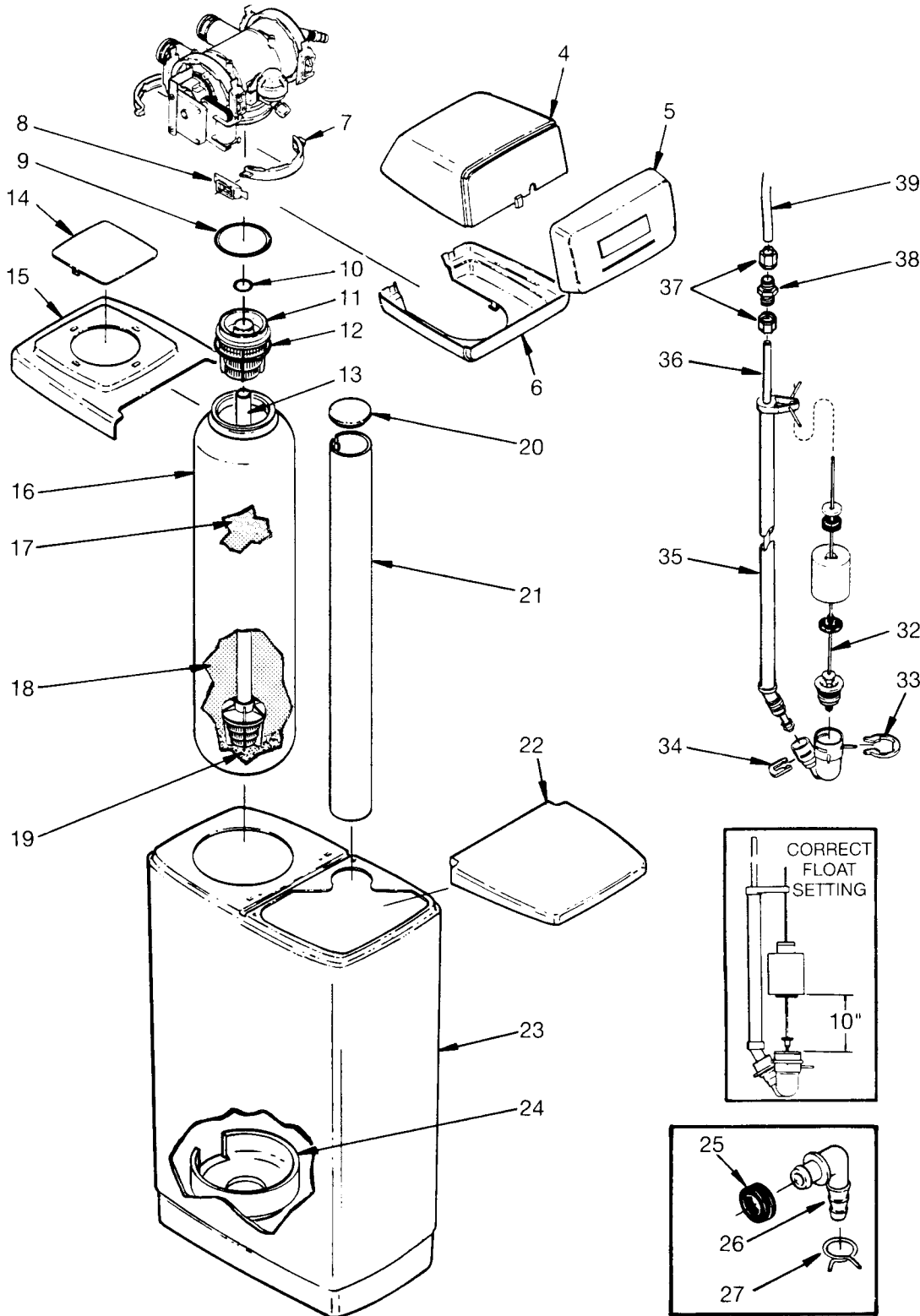
④ Gallon per minute flow to drain

⑤ Factory set default minutes

⑥ Manufactured plastic styrene high capacity resin - for field replacement, use the following pounds of standard/fine mesh resins: R20 - 31/2 R40 - 57/4
R30 - 46/3 R70 - 100/6



**ECO SYSTEM UNIT
ASSEMBLY**

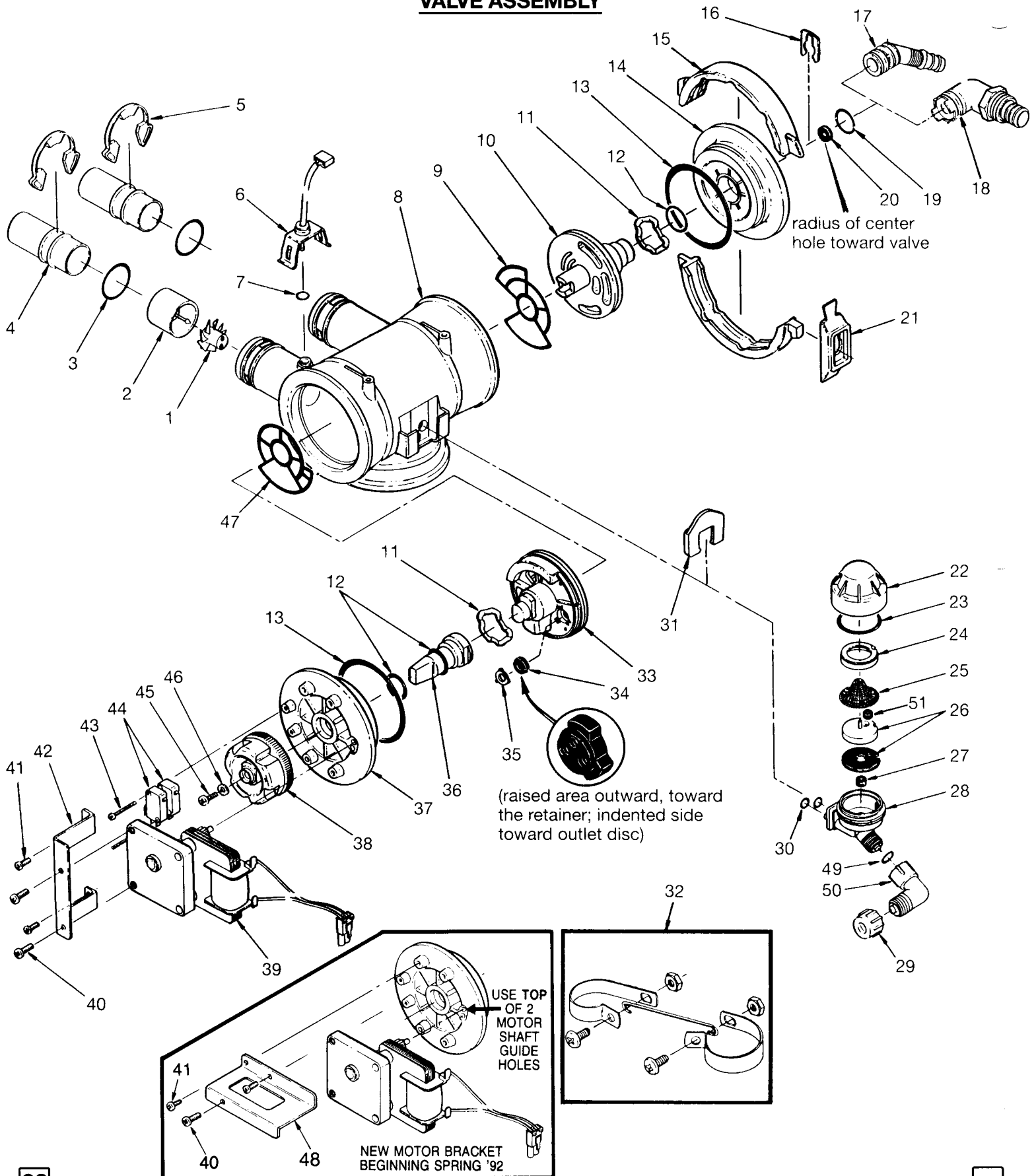


KEY NO.	PART NUMBER	PART DESCRIPTION - ECO SYSTEM UNIT ASSEMBLY	
1	7084550	Transformer, 24V-25 VA	
2	7084330	Power Cable	
3	7115937	Wire Harness (2 switches)	
4	7096468	Controller Top Cover	
5	7114779	Face Plate-Timer Assembly (Demand)	
6	7096476	Controller Base Cover	
7	7088041	Clamp Section, 2 req.	
8	7088033	Clamp Retainer (clip), 2 req.	
9	7079092	O-Ring, 2-7/8" I.D. x 3-1/4" O.D.	
10	900215	O-Ring, 13/16" I.D. x 1-1/16" O.D.	
11	7077870	Top Distributor	
12	7096183	O-Ring, 2-3/4" I.D. x 3" O.D.	
13	7105047	Repl. Distributor (bottom)	
14	7096921	Cover (not used on tank-in-tank models)	
15	7096256	Rear Cover (brine tank)	
16	7114787	Resin Tank, 8" dia. x 35" (Model R20)	
	7113066	Resin Tank, 10" dia. x 35" (Model R30)	
	7092202	Resin Tank, 10" dia. x 47" (Model R40)	
	7113074	Resin Tank, 12" dia. x 54" (Model R70)	
17	7052202	Resin, 1 cu. ft. (fine mesh)	} See page 27 for amount required
18	502272	Resin, 1 cu. ft. (standard mesh)	
	501741	Resin, 1/2 cu. ft. (standard mesh)	
19	7025027	Gravel (order amount needed)	
20	500283	Brinewell Cover	
21	7100819	Brinewell	
22	7096264	Salt Hole Cover	
23	7114795	Brine Tank (rectangular)	
24	7096939	Tank Base (Model R20) ②	
	7096947	Tank Base (Models R30 and R40) ②	
	7115911	Tank Base (R70)	
25	9003500	Grommet	
26	1103200	Hose Adaptor Elbow	
27	①	Hose Clamp	
28	7114800	Brine Tank (round)	
29	①	Screw, #6-32	
30	①	Nut, #6-32	
31	7101611	Brine Tank Cover	
32	7113008	Float, Stem and Guide Assembly	
33	1205500	Clip	
34	7080653	Clip	
35	7095470	Brine Tube	
36	7113016	Tubing Assembly, BV	
37	9003201	Nut-Ferrule, 2 req.	} optional parts not included
38	7094987	Union Connector	
39	0010316	Tubing (order length needed)	
40	7114818	Shroud kit	
	7096913	Cover, Top (only)	
41	7096955	Tank Top Support (Model R20)	
	7096963	Tank Top Support (Models R30 and R40)	
42	7131365	Screen (goes into brine valve body, under brine tube)	
■	7116488	Brine Valve Assembly (includes Key Nos. 32 through 36)	
■	7108118	Hose, 1/2" I.D. Drain (order length needed)	

① Standard hardware item – purchase locally

② Part numbers for plastic spacer under tank: R20 - 7119981, R30 - 7119999

VALVE ASSEMBLY



KEY NO.	PART NUMBER	PART DESCRIPTION - VALVE ASSEMBLY	
1	7101548	Turbine Assembly (Models R20 and R30)	
	7123061	Turbine Assembly (Models R40 and R70)	
2	7094898	Turbine Mounting Assembly (Models R20 and R30)	
	7119177	Turbine Mounting Assembly (Models R40 and R70)	
3	7083106	O-Ring, 1.109 I.D. x 1.387 O.D., 2-req.	
4	7077642	Copper Tube, 2-req.	
	7104546	PVC Nipple (not included - available option)	
5	7089306	Clip Retainer, 2-req.	
6	7096997	Sensor Housing	
7	9000803	O-Ring, 3/8" I.D. x 1/2" O.D. (no longer used after 4/92)	
8	7077480	Disc Valve Housing	
9	7078282	Inlet End Seal ③	
10	7078591	Inlet Disc ③	
11	7058216	Wave Washer, 2 -req.	
12	900208	O-Ring, 3/4" I.D. x 15/16" O.D., 3-req. ③	
13	7079092	O-Ring, 2-7/8" I.D. x 3-1/4" O.D., 2-req.	
14	7077498	Inlet End Cap	
15	7088041	Clamp Section 4-req. (2 not shown)	
16	7080653	Clip	
17	7108100	Drain Nipple	
18	7141239	Drain Hose Adaptor (not included - available option)	
19	900041	O-Ring, 5/8" I.D. x 13/16" O.D.	
20	1110600	Flow Washer, 2.5 F. Rinse (Model R20)	
	7097969	Flow Washer, 3.0 F. Rinse (Models R30 and R40)	
	7097977	Flow Washer, 4.0 F. Rinse (Model R70)	
21	7088033	Clamp Retainer 4-req. (3 not shown)	
22	7081188	Cap	
23	7039068	O-Ring, 1-3/16" I.D. x 1-3/8" O.D.	
24	7089893	Screen Support	
25	7090705	Screen	
26	7113032	Nozzle & Venturi (black) - Gasket Kit (Models R20, R30 and R40)	
	7114533	Nozzle & Venturi (blue) - Gasket Kit (Model R70)	
27	1148800	Fill Flow Plug, .3	
28	7137492	Nozzle & Venturi Assembly (Model R20) ①	
	7091866	Nozzle & Venturi Assembly (Models R30 and R40) ①	
	7085247	Nozzle & Venturi Assembly (Model R70) ①	
29	1202600	Nut-Ferrule	
30	900064	O-Ring, 1/4" I.D. x 3/8 O.D., 2-req.	
31	7081201	Clip, Nozzle & Venturi	
32	7114826	Ground Clamp Kit	
33	7078583	Outlet Disc (Order Key No. 34 and 35, if needed) ③	
34	7104774	Flow Washer, 1.0 Bkw. (Model R20)	
	7104570	Flow Washer, 1.7 Bkw. (Models R30 and R40) ②	
35	7078313	Retainer	
36	7091329	Driver, Outlet Disc	
37	7077503	Outlet End Cap	
38	7124237	Cam and Gear	
39	7112272	Motor (Also order #9028300 Male Connector)	
40	7011248	Screw, #10-32x1/2, 2-req.	
41	7103972	Screw, #8-18x7/16, 2-req.	
42	7090373	Motor Bracket	
43	7070412	Screw, #4-24x1-1/8, 2-req. *	
44	7081641	Switch, 2-req.	
45	7002493	Screw, #8-18x9/16	
46	9005900	Washer, #6	
47	7078274	Outlet End Seal ③	
48	7120102	Motor Bracket	
49	7003847	O-Ring, 1/4" I.D. x 1/2" O.D.	
50	7120526	90° Elbow	
51	521829	Flow Plug, .1 gpm (R20)	

① Includes Key Nos. 22 through 27. Model R20 also includes Key No. 51.

② Backwash flow washer not used on R70 models.

③ Parts included in Disc Kit, part no. 7116721.

* may have expansion pin, #7127065, in lower screw location

CHECKING THE MODEL CODE ENTRY (See page 14)

Unplug the transformer at the electrical outlet, then plug in again. A “beep” will sound, then the model code displays for a few seconds. The test number will then display for a few seconds, followed by the present time display.

CHANGING THE MODEL CODE

IMPORTANT: READ STEP 1, on page 14 **BEFORE** CHANGING THIS CODE.

1. Enter the secondary mode. . .press SELECT and hold for 3 seconds.

NOTE: If a test number of 4.2 or higher shows (see above), skip step 2 and go to step 3. Also, disregard the note after step 6.

2. Use the SELECT button to proceed **UP TO** the RINSE MINUTES setting, step 9, page 18.

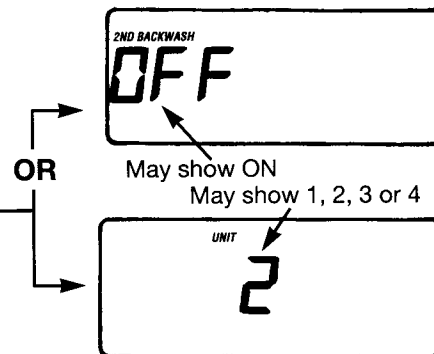
3. Press SELECT and hold in for 3 seconds. The current model code setting will display.

4. Use the (Δ) or (∇) button to display the desired model code.

5. Press SELECT to set.

6. Reset the timer (page 14) and reselect other desired options

NOTE: If a model code beginning with other than the letter R, was mistakenly selected and set, proceed **up to** display. . . in step 2 above. Then continue with step 3.



continued from page 27 -

OTHER SERVICE

HARD WATER BYPASS (hard water “bleeds” into conditioned water supply).

1. Defective inlet disc, seal, or wave washer (see pages 30 and 31).
2. Missing or defective o-ring(s) at resin tank to valve connection (see figure 4, page 7).

WATER LEAKS FROM DRAIN HOSE (during service).

1. Defective inlet disc, seal, or wave washer.
2. Defective o-ring on inlet disc shaft.
3. Defective outlet disc, seal, or wave washer.

WATER HAS SALTY TASTE

1. House water pressure low (adjust pump if well system).
2. Partially restricted valve drain hose, top distributor, backwash flow plug, resin tank internal riser or bottom distributor.

