Installation,
Operating and
Service
Instructions

CULLIGAN®

Global Electronic (GBE)
Softener & Filter Controller
For Commercial/Industrial Applications

Models from 2008

Culligan

Read this Manual First

Before you operate the Culligan Global Controller, read this manual to become familiar with the device and its capabilities.

Watch for Special Paragraphs

Please read the special paragraphs in this manual. Examples are shown below.

NOTE	*A Note provides information or highlights a procedure.*

CAUTION

A Caution tells how failing to follow instructions might cause injury or damage the equipment in some way.

About this Manual

Contents

This manual:
- familiarizes the operator with the equipment
- explains installation and setup procedures
- provides basic programming information
- explains the various modes of operation
- gives specifications and troubleshooting information

 WARNING! Electrical shock hazard! Unplug the unit before removing the cover or accessing any internal control parts.

 WARNING! This device complies with part 15 of the FCC rules subject to the two following conditions: 1) This device may not cause harmful interference 2) this device must accept all interference received including interference that may cause undesired operation.

 CAUTION! To reduce the risk of fire, use only No. 26 AWG or larger telecommunicaitons line cord.

This equipment complies with Part 15 of the FCC rules. Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment. Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.
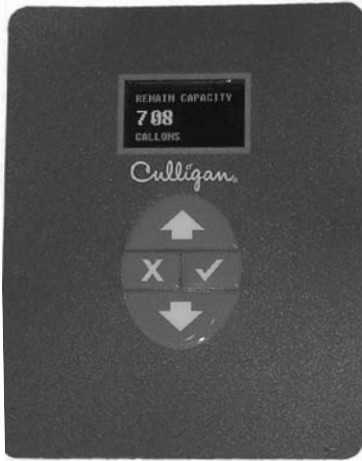
Installation,
Operating and
Service
Instructions

CULLIGAN®

GLOBAL ELECTRONIC (GBE) SOFTENER & FILTER CONTROLLER

Controller Features

The Culligan Global Electronic control (GBE) primary function is to initiate and control the regeneration process via methods that are most convenient and cost effective for the customer while offering many operational features and benefits. The controller is designed to operate a wide range of existing and new softener and filtration valves.

Take control of your system and your productivity

The Culligan Global Electronic Controller (GBE) is an advanced design engineered to handle regeneration and monitoring of your water treatment equipment. It offers powerful programming options that can be used to operate and monitor any softener or filter system. It also provides sensing capabilities, expanded communications and a multifunction keypad—all in one simple to use unit.
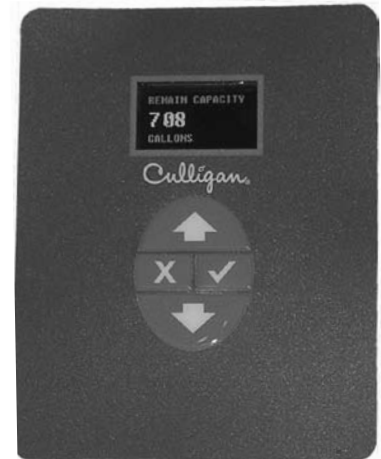
GBE Controller Features

- **Advanced Lighted OLED Display**
  The user is guided through brightly lit graphical menu screens with clear, multi-line, full text prompts

Figure 1

- **Membrane Keypad**
  The keypad uses sealed contacts for programming. No buttons to get dirty

- **Program Beeper**
  Emits an audible beep when keys are depressed to help identify valid (short beep) or invalid (3 short beeps) pushes. Can be enabled or disabled.

- **Power Source**
  Electrical power required is 24 Volt 50/60 Hz AC current. A UL listed plug-in transformer (120V/24V) is provided.

- **Time of Day**
  Displays current time of day in either 12-hour or 24 hour format

- **Real Time Clock with a 5 Year Battery Back-up**
  Keeps accurate time even during a power outage. Updates automatically when the GBE is equipped with optional modem capability

Figure 2

- **English or Metric Values**
  Displays can be set to either English or Metric

- **Regeneration Interval**
  Provides the ability to initiate a time clock regeneration based on a number of days (1 to 99) or a specific day of the week.

- **Regeneration Start Delay**
  Allows a user determined number of hours (0-9) to be set for the purpose of increasing the amount of time between regenerations in a multi unit installation.

- **Auxiliary Input**
  Capable of accepting a remote signal from a dry contact device such as an operator push button for the purpose of initiating a regeneration sequence

- **Auxiliary Output on Alarm**
  Capable of sending a signal when an alarm/error is recognized

- **Expansion Board for Additional Outputs**
  o   Control blocking valves
  o   Control external solenoids or chemical feeders

- **Progressive Flow Trip Point**
Allows multiple tank systems operating with flow meters to bring tanks on-line or off-line as facility flow demands increase or decrease

- **Multiple Unit Communication**
A communication cable interconnects multiple units to operate the controller in the Progressive Flow mode and prohibits them from regenerating at the same time.

- **Diagnostics**
The user can check the operation of sensors, progressive flow communication, motor positions, or an optional wireless display

- **Transformer is UL and CUL Listed**
- **RoHS Compliant**

Optional GBE Features

- **Flow Meter/Sensor Input**
Supports various types of Hall effect flow sensors using a programmable "K" factor to initiate a regeneration sequence

- **AquaSensor Input**
Supports the patented digital Culligan AquaSensor technology used to efficiently initiate and control a regeneration sequence

- **Telephone Modem**
   o   Calls in reports on regenerations and alarm conditions
   o   Automatically updates time and date when calling in
   o   Automatically checks for and installs and firmware updates when calling in

- **Wireless Remote Display**
Displays the current status of the unit. It can be located up to 200 feet away from the GBE controller (depending on building and interference). The telephone modem can optionally be installed in the remote display

- **Smart Brine Tank Probe**
This probe monitors conditions inside the brine tank.
   o   Predicts when more salt is needed
   o   Detects the presence of a salt bridge
   o   Detects eductor line plugging
   o   Signals brine tank overfilling condition

Operation

Modes of Operation

Time Clock
The controller will initiate a regeneration based upon a time schedule of intervals of days (i.e., every 3 days) or on a specific day of week schedule (i.e., Mondays, Wednesdays and Saturdays). Because regeneration will occur at the prescribed schedule regardless of water use, this method is usually the most inefficient method of water softener operation.

Flow Meter/Sensor
When a flow meter or sensor is connected to the controller circuit board, the controller has the ability to measure the amount of water treated and initiate a regeneration sequence based upon the gallon capacity of the water treatment equipment. The controller can delay the regeneration signal until a convenient time of day (known as a delayed regeneration) or act and initiate the regeneration sequence as soon as the signal is received (known as immediate regeneration).

When installing an alternating duplex system (one tank on-line, the other in standby), only one flow measuring device is required to be installed in the common outlet header of the system. Parallel systems (multiple tank systems, all on-line simultaneously) require one flow device for each mineral tank in the system.

This method is a proven, cost effective means to operate a water softening system.

Aqua-Sensor (Softener use only)
The Aqua-Sensor detects when a softener resin bed has reached its point of exhaustion and, as a result, initiate a regeneration sequence. This is the most cost-effective method of operation and may be combined with any of the operational modes previously described.

Progressive Flow
The Progressive Flow mode is used with up to six and as few as two mineral tanks in a system. It allows more than one tank in a system to either be on-line or off-line depending upon the downstream flow demand. If flow demand is greater than the flow capability of the tank on-line, another tank can be brought on-line to help satisfy the excess demand. Once the demand has decreased, the second tank is returned to a standby mode and the system reverts to just one tank on-line providing treated water.

The progressive flow mode of operation relies on a user programmable set point or Trip Point. The Trip Point is a unit of flow (gallons or liters) on a per minute basis. Once attained the trip point will cause the second unit (in multiple resin tank system) to come on-line. Each additional tank in the system will subsequently be brought on-line as multiples of the trip point are attained. (Example: a 3 tank system with a trip point of 50 gpm will bring two tanks on-line once the facility flow demands is equal to or greater than the 50 gpm trip point. Should the flow demand reach 100 gpm or more, the third tank shall be brought on-line.)

Additional tanks shall be returned to stand-by once the facility flow demand is <95% of the trip point for two tank systems, <95% of 2X the trip point for triplex systems and <95% of 3X the trip point for quad systems, and remains there for 60 seconds.

Utilizing the progressive flow feature may allow the owner to use smaller units, resulting in the potential for reduced capital and operation costs.

Differential Pressure (Filters only)
When combined with an optional differential pressure device, the Culligan MVP controller has the ability to initiate a backwashing sequence when the pressure differential across the media bed reaches a preset amount (usually 8 to 10 psi).

ELECTRICAL INSTALLATION

CAUTION!
Observe the precautions listed below before electrical installation of your GBE controller.
Failure to do so may cause permanent damage to the controller.

1. Follow the local electrical code requirements.

2. Be sure electrical power is off and disconnected at the source before completing any wiring/cabling connections.

3. Provide a dedicated 120-volt circuit for the GBE system to ensure maximum electrical protection.

4. DO NOT include the GBE wiring cables in any conduit or raceway containing other 120-volt or higher circuits.

5. Maintain a distance of at least 10 feet between the GBE controller and any electrical distribution panels, raceways carrying 300 volts or more, and electrical motors of 1 horsepower or more.

6. Use the cabling provided. Failure to do so may effect performance of the GBE controller adversely.

Note: One transformer is required for each controller in the system. Do not attempt to operate multiple controllers without a dedicated transformer for each or your system will experience operational difficulties.

WIRING PROCEDURES AND DIAGRAMS

Preparation

1. Loosen the screws or latches securing the controller access cover (Figure 3 or 4) on each controller provided.
2. Using a small screwdriver, loosen all the terminal strip binding screws on the main circuit board that do not contain wires by turning counterclockwise until the wire clamp has been fully opened (see Figure 5).

Figure 4
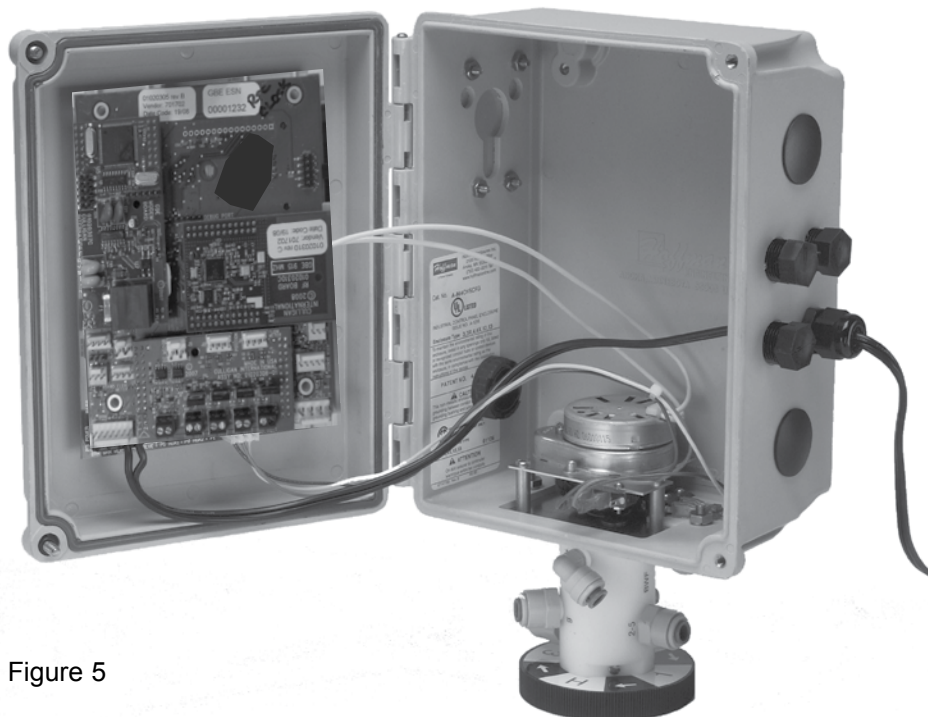
Figure 3

Figure 5

Cable Routing

All input and output connections to the circuit board are 24 volt or less.

Although the cables do not have to be run in conduit, it is necessary that long runs of cable be supported or protected by strapping them to the equipment piping. If conduit will be used to route the shielded cables, three factors must be considered:

1. **DO NOT** share the same conduit or raceway with 120 volt or higher circuits.
2. Keep cables at least 6 inches away from 120 volt or higher electrical circuits.
3. GROUND the conduit (if metallic) to a known "earth ground" location.

A series of holes are located on the sides of the controller (see Figure 6 and 7). Strain relief fittings are provided with the controller enclosure for interconnecting wiring. Install the plastic fittings as needed. Remove the compression nut and rubber sleeve from each fitting. Prior to connection of the cable wires to the circuit board, slide the compression nut and sleeve over the cable for the wiring connections. When wiring is completed, apply a small amount of silicone to the rubber sleeve and reassemble. This will assure all wiring is secure and assist in making the tightening of the fitting easier. Insert the plugs provided to block any holes not used for wiring or other accessories.

Right Side View

Left Side View

Brine Reclaim Solenoid (optional)

Input Connection for Flow Sensor

Output Connection for Remote Accessories

Input Connection for Remote Accessories

24 Volt Power Input Connection

Brine Reclaim Solenoid (optional)

Brine Refill Valve

Figure 6

Figure 7

Blocking Solenoid for Alternating Operation
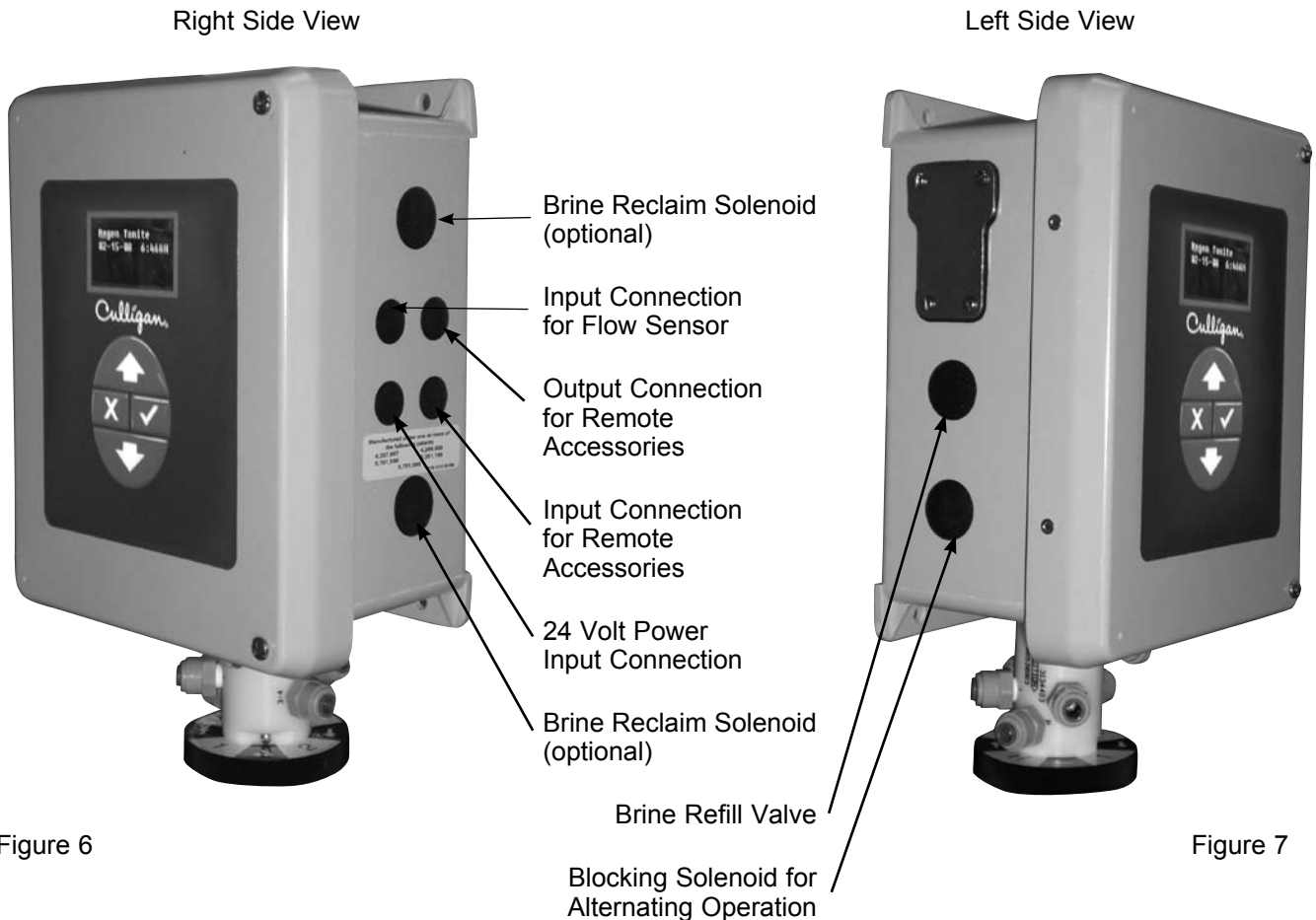
Schematic

GBE Circuit Board Layout—Front

OLED Display

Battery
CR2032 (Postitive Side Up)

Keypad connector
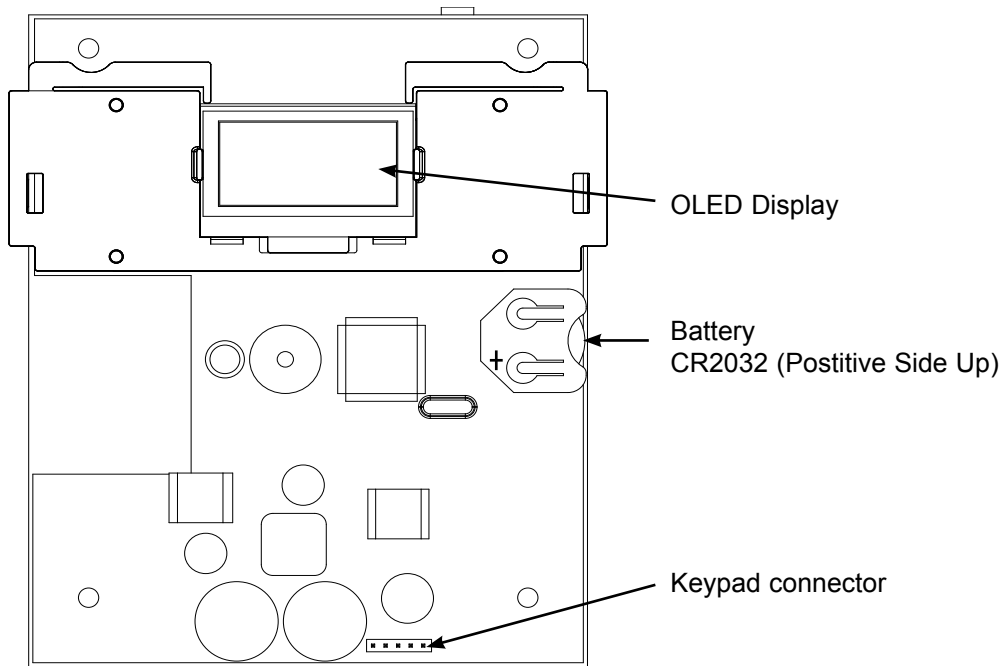
Figure 8

GBE Circuit Board Layout—Back

Phone line
connection
(optional)

Motor position cable

Multiple unit jumper

Communication cable (optional)

Flow meter cable
(optional)

Smart Brine Tank cable (optional)

External regeneration
signal connection (optional)

Motor
connection

Blocking valve
connection (optional)

Programmable outputs (optional)

Data port

Future use
Do not connect
anything to these.

Aqua-Sensor
cable (optional)

Power cable
from transformer

Figure 9

Outputs

	CAUTION
⚠	**Connecting 24V to the 2.5v connection on the circuit board will damage the circuit board.**

The circuit board supports four outputs:
- Motor control (DC Motor)
- Blocking valve (Use Aux Out 4)
- Four programmable auxiliary outputs (Aux Out 1 through 4)
- Controller interface (communication between multiple controllers) (RS485).

Note: If you are using Aqua-Sensor, you should run the 2.5v wiring now as the cable is run through the same cord grip. See page 15 for details.

1. Locate the power cord among the controller parts. It has a white connector on one end and two spade connectors on the other.
2. Locate the cord grip among the parts.
3. To assemble the power cord, first run the cord grip nut over the spade terminal end of the power cord.
4. Next, run the spade terminals through a hole in the side of the controller FROM THE INSIDE. See figure 10.
5. Finally, run the cable through the bottom end of the cord grip, and assemble the grip to the controller wall.
6. Plug the board connector to the board where it says "**24v**". The connector has four (4) connections but only two wires are connected. The other end of the power cord (with spade terminals) should be connected to the two **24VAC** terminals on the transformer (see figure 12).

DO NOT PLUG THE TRANSFORMER INTO THE WALL UNTIL ALL WIRING IS COMPLETED.

Repeat the process for any additional units in the system.

Schematic

24V Transformer

The GBE control is powered by a 24V/50VA transformer. If there are multiple controls in the system being installed, each control will require its own transformer. It is recommended that the transformer be plugged into a dedicated 120V circuit.

> ⚠ **CAUTION**
> Connecting 24V to the 2.5V connection on the circuit board will damage the circuit board

1. Connect one wire from the 24V cable to the outermost 24VAC transformer screw terminal (Reference Figure 12). The other end of the wire should be connected to one of the 24V terminals on the GBE control circuit board (Figure 11) by way of the white connector.
2. Repeat the process for the other 24V power supply wire attaching the second wire to the opposite terminal on the transformer and next to the other wire connected to the 24V pins on the GBE board.

24V Power Connection
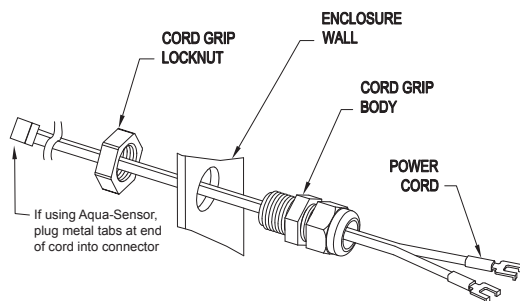
Figure 10

POWER SUPPLY
ONE transformer is required for each Control
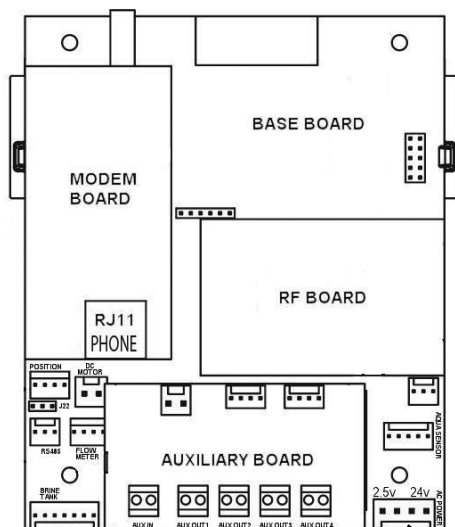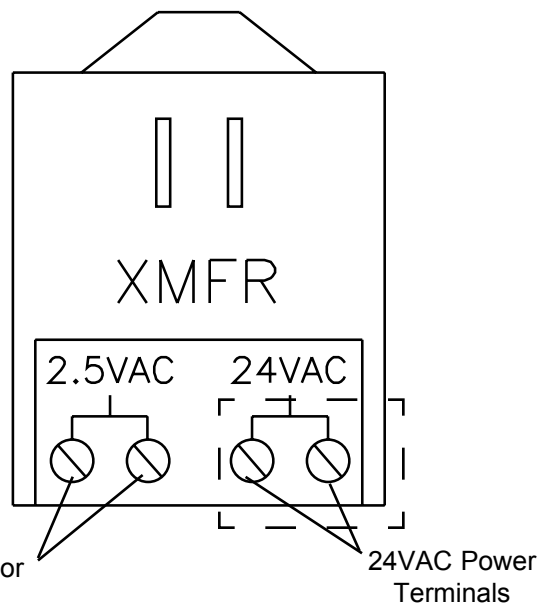
Transformer connection

Figure 11

2.5VAC Aqua-Sensor Power Terminals

24VAC Power Terminals

Figure 12

Brine Refill Valve Wiring

*This only applies to Culligan CSM Softeners.

1. Installation of the solenoid coil and connector

Locate the solenoid coil and connector cord. Assemble it to the brine refill valve as shown in Figure 13.

Figure 13
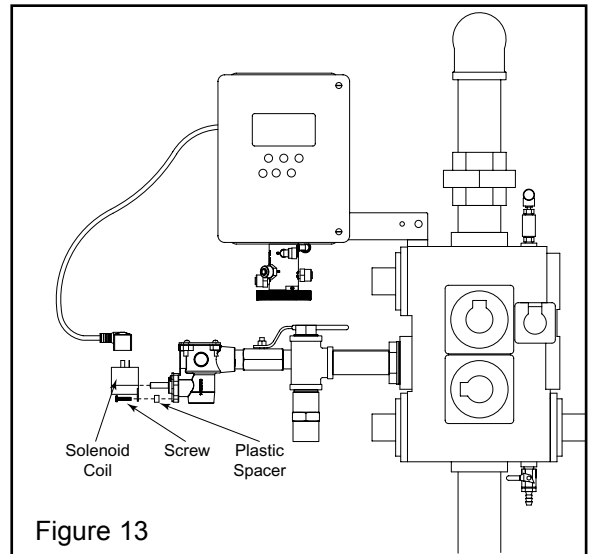
2. Installation of the cord grip

Remove the hole plug from the left side of the MVP controller enclosure. Locate the cord grip fitting and nut. Assemble them through the open hole and thread the solenoid coil cord through the cord grip fitting as shown in Figure 14. Tighten the cord grip onto the cord.
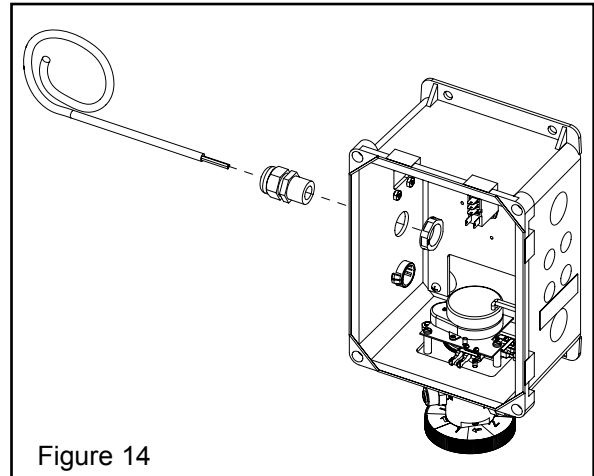
Figure 14

3. Wiring

Wire the valve to Aux Out 2 as shown in the diagram in Figure 15. The wires can be trimmed to a suitable length.

Figure 15
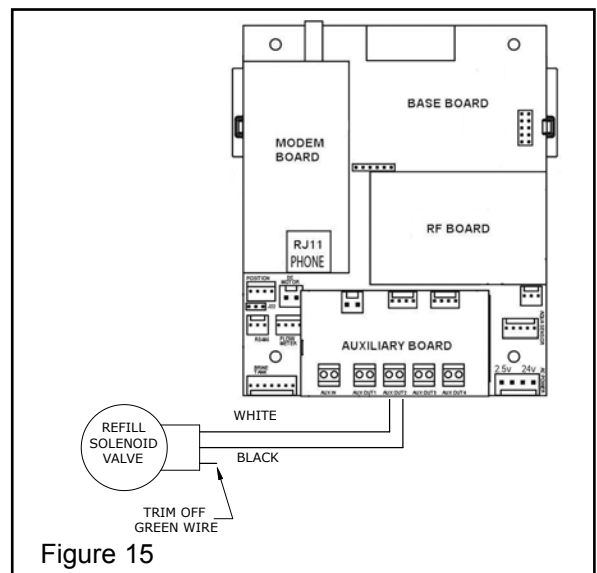
Schematic

Communication Cable - Multiple Units

NOTE: Disregard this information and proceed to flow sensor schematic (optional) information when installing single tank configurations.

Multiple units require a communication cable between each unit. Refer to the table below for the cable type, part number and quantity required. Cables are attached to the RS485 terminal of the circuit board.

Table 2

System Configuration	Cable Part Number	Qty of Cables required	"Kit" Part Number	Qty of blocking solenoids used.
Duplex Alternating	01016342	1	01016369	2
Duplex Parallel	01016327	1	N/A	0
Triplex Parallel	01016327	2	N/A	0
Duplex Progressive	01016327	1	01016333	2
Triplex Progressive	01016327	2	01016334	3

Multiple units can be set up as progressive flow, alternating or parallel operation. Refer to the instructions and schematics below and on the following pages for connection to the circuit board.

Most multiple tank configurations will also require blocking valves (with the exception of the Hi-Flo 3e softener). These are used to hold tanks offline until needed. Based on the chart above, you can determine how many blocking solenoids are used. These solenoids are included in the alternating and progressive flow kits.

Blocking Solenoid Connection (used on Alternating and Progressive flow systems)

The solenoid valve wiring attaches to the Aux Out 4 output connection on the auxiliary circuit board. See Figure 16 .
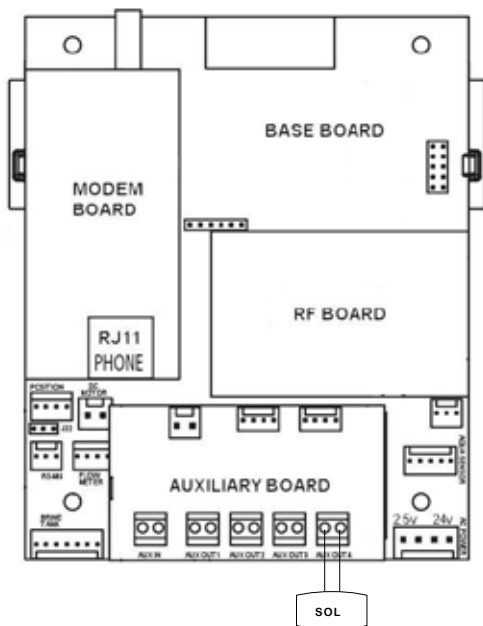
Figure 16

Progressive Flow or Parallel Flow

IMPORTANT
Setting the Jumpers for Progressive Flow
For progressive flow to operate properly, the first and last units must have the jumpers set to pins 1 and 2 (see figure at right). All middle units should have the jumpers on pins 2 and 3 (see figure at right). The diagram below (figure 17) shows duplex connections. Repeat the connections on any additional systems.

Jumper location for first and last units (end units).

1 2 3

Jumper location for middle units.

Communication Cable 01016327

To Additional Units (if necessary)

Jumper Location

BASE BOARD

MODEM BOARD

RF BOARD

RJ11 PHONE

POSITION   DC MOTOR

AUXILIARY BOARD

BRINE TANK

AUX IN   AUX OUT1   AUX OUT2   AUX OUT3   AUX OUT4

2.5v   24v   AC POWER

AQUA SENSOR

Flow Meter

Unit 1

BASE BOARD

MODEM BOARD

RF BOARD

RJ11 PHONE

POSITION   DC MOTOR

AUXILIARY BOARD

BRINE TANK

AUX IN   AUX OUT1   AUX OUT2   AUX OUT3   AUX OUT4

2.5v   24v   AC POWER

AQUA SENSOR

Flow Meter

Unit 2

Figure 17

Progressive/Parallel Communication Cable 01016327

To RS 485 Comm Port on GBE Circuit Board, #1

To RS 485 Comm Port on GBE Circuit Board, #2

Additional communication cable connections are used when there are 3 or more controls. Connect end of 2nd-(01016327) cable to this connector and other end of cable to RS 485 Comm Port on 3rd GBE Circuit Board.

PARALLEL
————————
CABLE 01016327
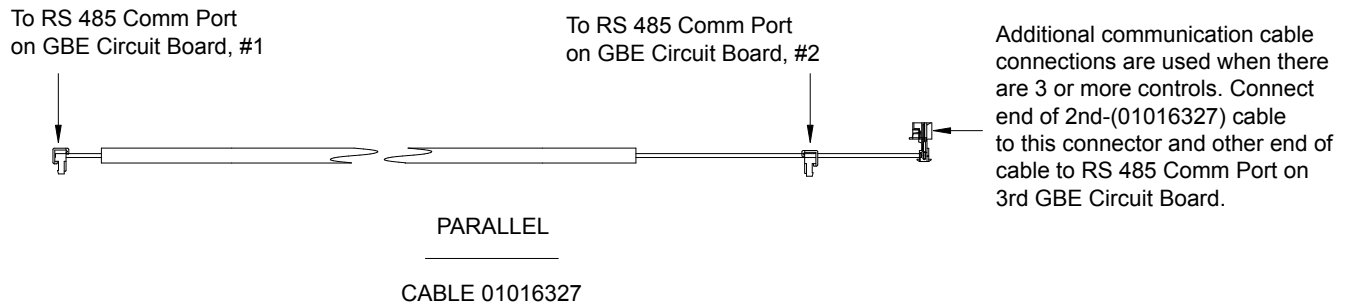
Schematic

Duplex Alternating with Meter option

Communication Cable 01016342

Unit 1

Unit 2

Flow meter
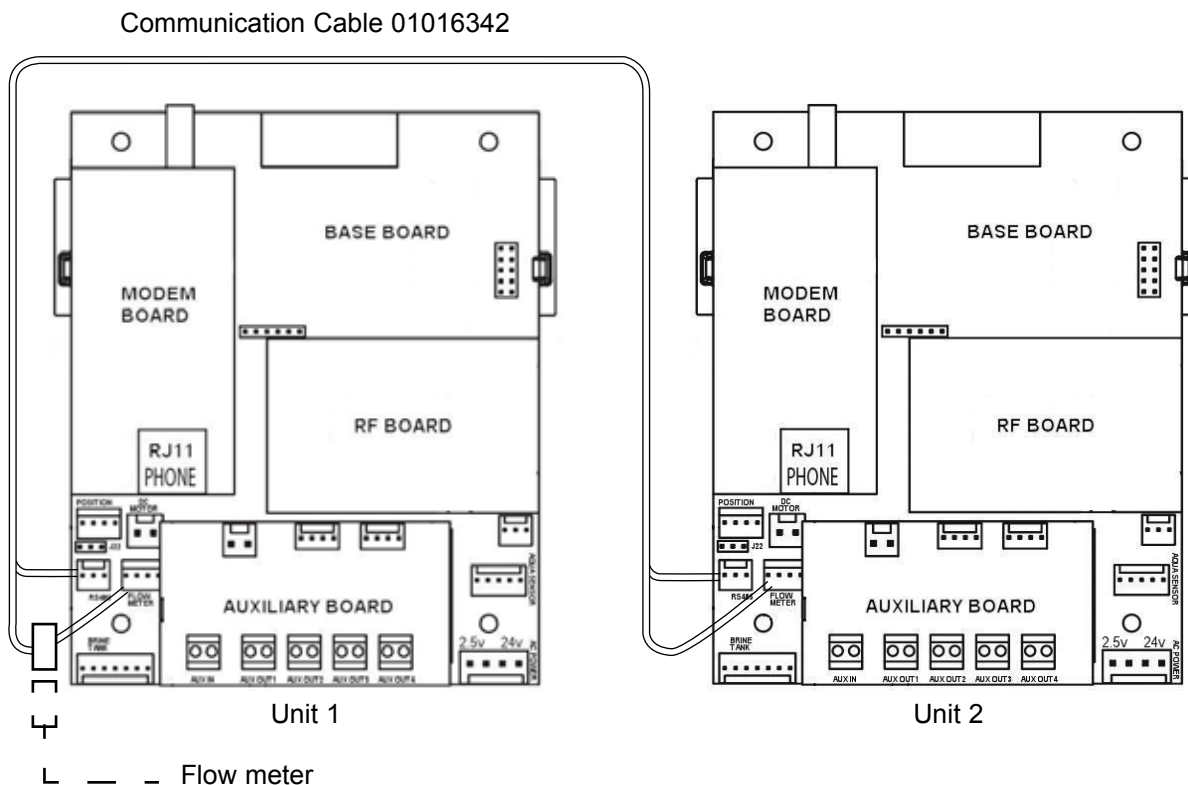
Figure 18

For triplex, quad, etc alternating, you must use a meter on each unit and connect the same way as progressive flow.

Duplex Alternating Cable 01016342

To RS 485Comm Port
on GBE Ciruit Board, #1

To RS 485Comm Port
on GBE Ciruit Board, #2

To Flow Meter Connection
(on GBE Circuit Board).

Flow Meter Connector
(from meter).

To Flow Meter Connection
on GBE Circuit Board.

DUPLEX ALTERNATING

CABLE 01016342
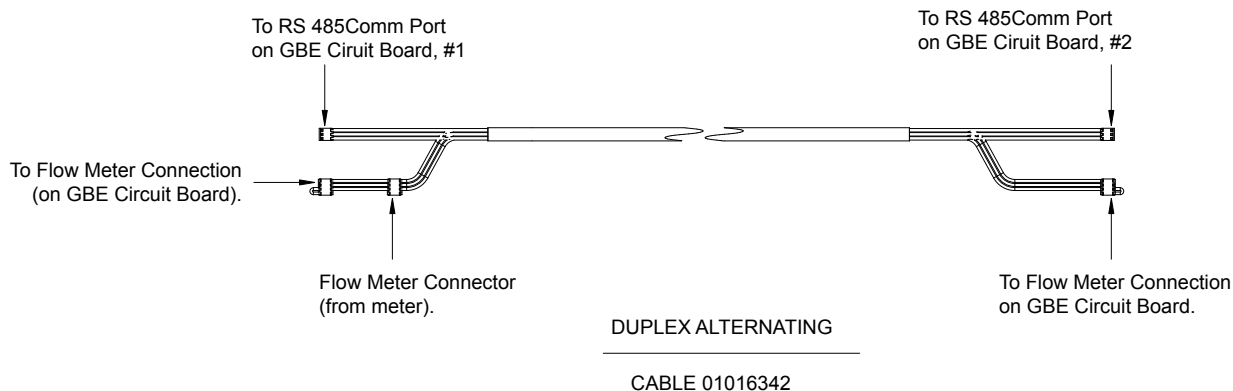
Flow Sensor Meter Connections (Optional)

The GBE Controller is capable of detecting the signal from a Hall effect sensor device to provide flow rate information, totalization and volume based regeneration initiation.

There are several different types of flow measuring devices and differences in the wiring of the devices to the GBE circuit board do exist. Refer to the drawings below.

For all but duplex alternating, a meter needs to be connected to each circuit board at the location shown below in the drawing. For duplex alternating meter connection, please refer back to page 13, Duplex Alternating with meter option.

SEE PAGE 41 FOR PROGRAMMING AND PAGE 63 FOR K FACTORS.

Figure 19

Connector 01010255 included with controller

Connector located at end of meter cable

Signet 2535 & 2536 (optional)

2" Autrol Turbine Meter (optional)

Seametrics Paddle Wheel (optional)

2"Clack Meter (optional)

SINGLE OR PROGRESSIVE

Schematic

Aqua-Sensor Schematic (Optional)

The Aqua-Sensor device requires a 2.5 VAC power source. This source is provided via two of the posts on the 24VAC/2.5VAC transformer (see figure 20). The two leads from the transformer are run through the same cable grip as the 24VAC and then must be pushed into the white power connector for connection to the 2.5v power pins on the GBE circuit board.

The wire connector from the Aqua-Sensor probe is then routed through the included cable grip and plugged into the Aqua-Sensor terminal on the GBE circuit board. See below.

Aqua-Sensor
If you are going to install an Aqua-Sensor, you can set up the 2.5V power now.
1. Locate the power cord packed with the Aqua-Sensor. It has two spade terminals on one end of the cable and two metal "slip in" tabs on the other.
2. Locate the cord grip.
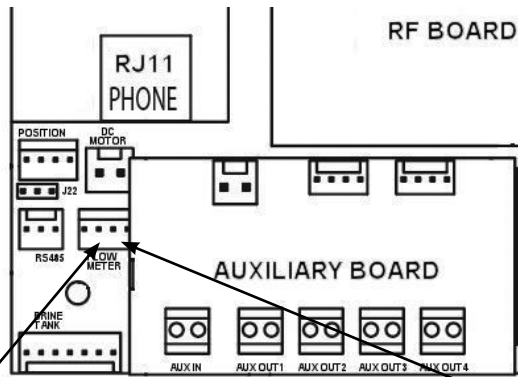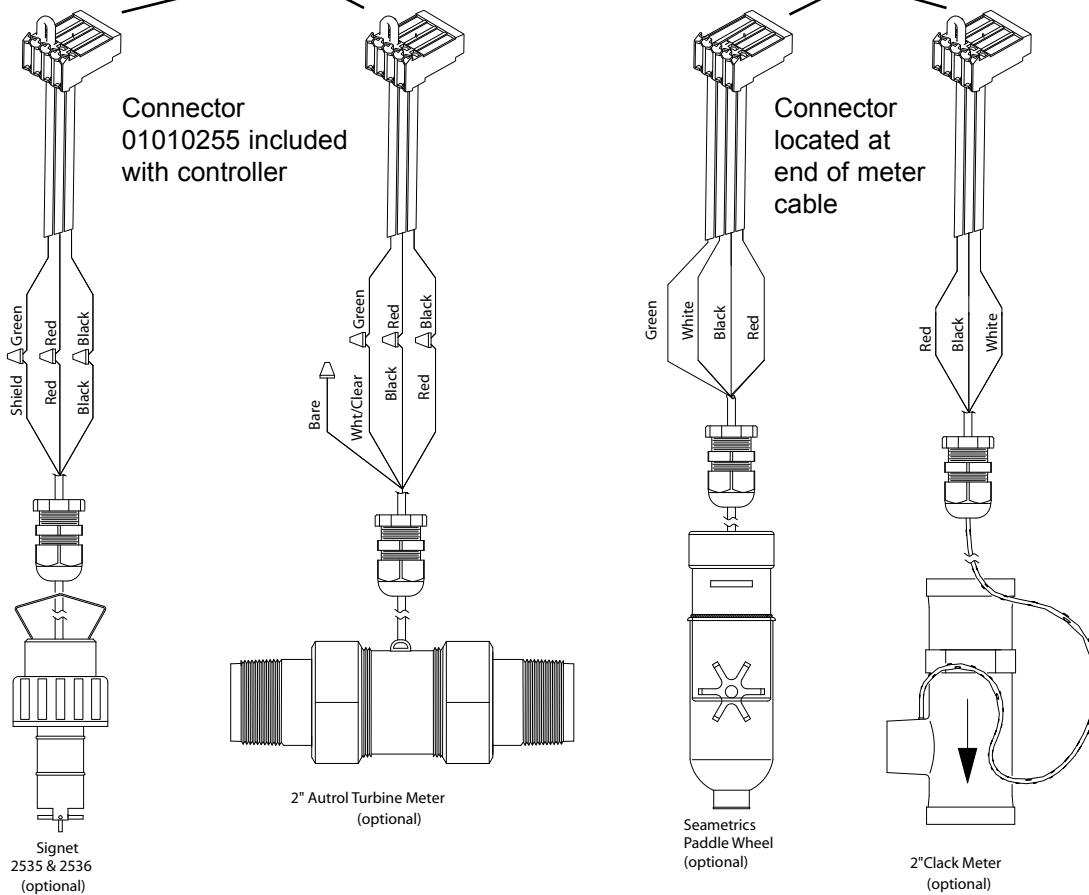3. The cable can be run through the cable grip and wall from either end of the cable. Make sure the end with the metal tabs goes INSIDE the controller. The spade terminals should be coming out the top end of the grip.
4. Locate the connector at the end of the power cord. You may have already plugged it into the board.
5. Press the two metal tabs on the end of the power cord into the open slots on the connector. They will connect to the pins labeled "2.5V' on the Base Board.The other end of the power cord with the spade terminals should be connected to the two **2.5VAC** terminals on the transformer (see figure 20).

> ⚠️ CAUTION - Verify wiring from terminals to circuit board are correct before applying power to control. 24vac power must not be applied to the 2.5 vac terminals of the circuit board.

2.5V Aqua-Sensor Power Connection

Figure 20

POWER SUPPLY
ONE transformer is required for each Control

XMFR

2.5VAC   24VAC

Power to circuit board 2.5VAC only required for Aqua-Sensor installations

Power to circuit board 24V

2.5V POWER CORD

24VAC on TRANSFORMER

ENCLOSURE WALL

CORD GRIP BODY

CORD GRIP LOCKNUT

METAL TABS Connect to white connector on main power cord

BASE BOARD

MODEM BOARD

RF BOARD

RJ11 PHONE

AUXILIARY BOARD

Blue
Black
Red
White

> ⚠️ **CAUTION**
> Connecting 24V to the 2.5V connection on the circuit board will damage the circuit board.

Auxiliary Outputs (Optional)

The Auxiliary Outputs - reference Figure 21) are output triacs that can be programmed to provide power to a "normally open" (normally no power to auxiliary output until power required) or a "normally closed" contact (user choice). These 24VAC outputs can be used for energizing a relay coil only. (2.1 Amp maximum power draw)

Refer to the section on Programming (page 46) for additional information on the uses of this feature.
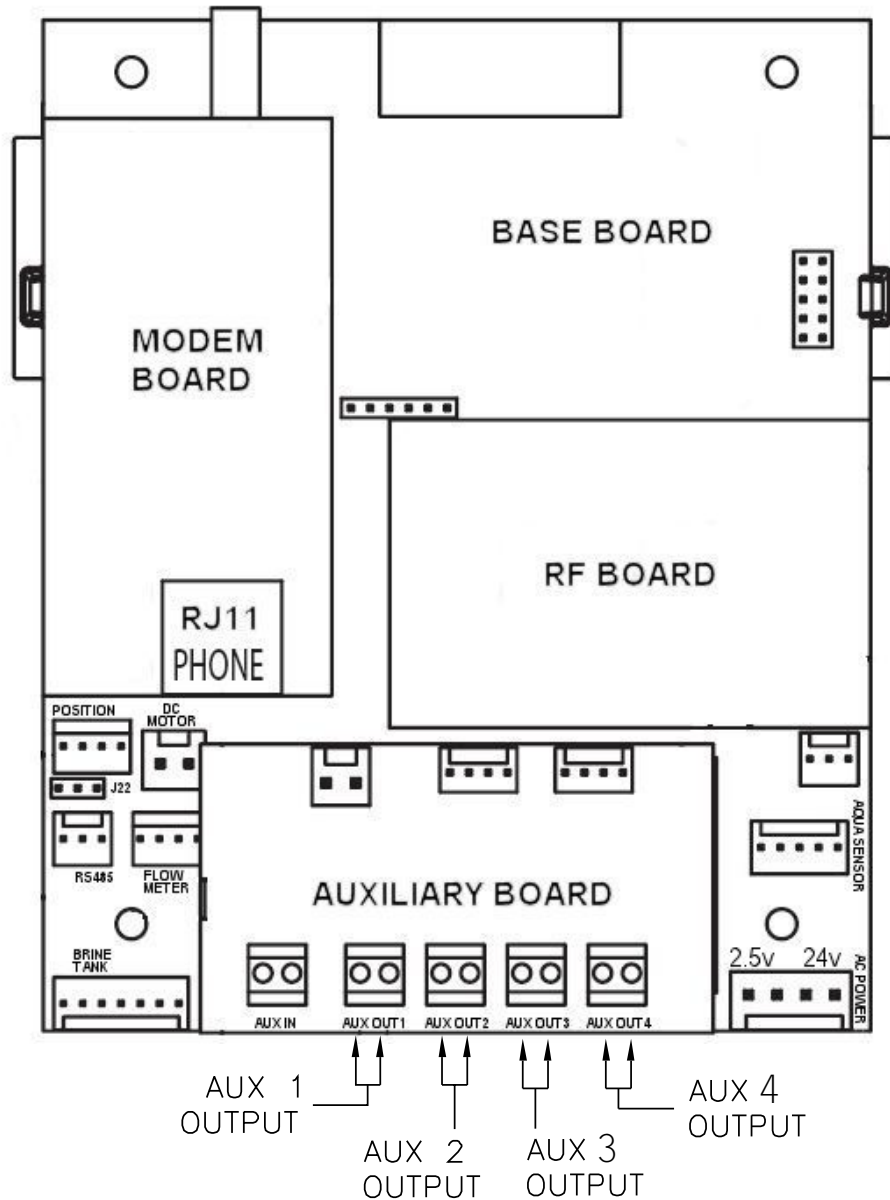
Figure 21

Schematic

Auxiliary Input (Optional)

One auxiliary input is provided for optional signal devices such as remote push buttons, differential pressure switches, hardness monitors, turbid meters, etc. for the purpose of receiving a regeneration signal.

Select an UN-POWERED contact within the remote device that will close when regeneration is desired. The duration of the switch closure can be as low as 0 seconds; 6 seconds is the recommended minimum and default but can be as long as 999 seconds. The contact must automatically open following the start of a regeneration sequence. Connect this contact to the Aux In terminal shown in Figure 22. The illustration below is an example of how to use an external source to initiate regeneration.
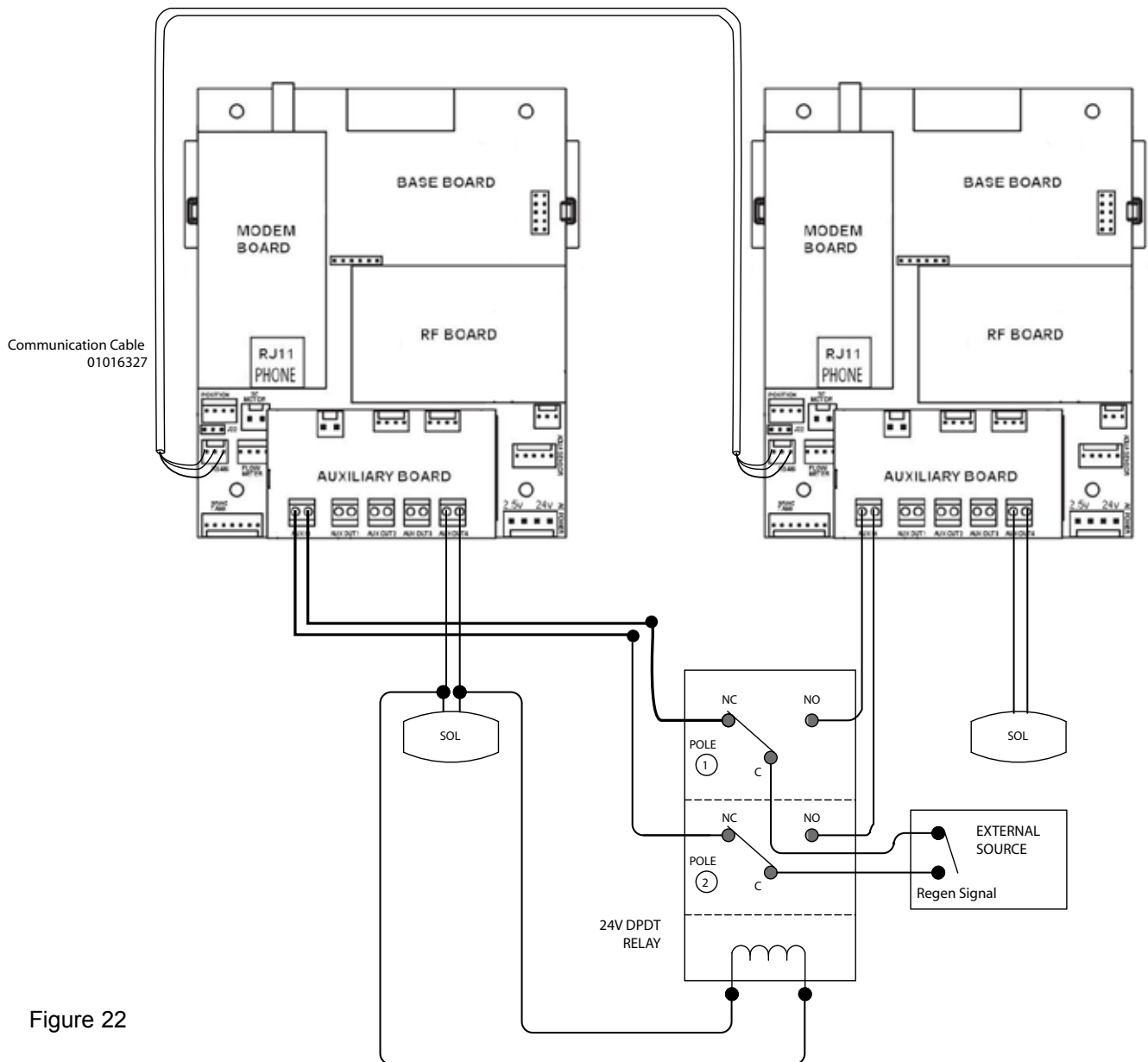
Figure 22

DUPLEX ALTERNATING WITH EXTERNAL SOURCE

Programming

The programming process requires various types of data input. The following information pertains to calculating the softening capacity of the water softening system. Filters do not have a capacity setting so this section can be skipped when programming a filter.

Capacity Settings
The capacity of a water softener is determined by two factors; resin amount and water chemistry.

Single Tank Systems
Normally a single tank system has enough resin capacity to soften water for a minimum period of 24 hours. Time of regeneration is usually set to occur very early in the morning or at a time when no softened water is required. This is because when the softener is regenerating, hard water is typically bypassed through the system and into the facility if a demand for water if present.

If regeneration is desired at a time of day when there is no water usage then the system must have a "reserve" capacity which must last an entire day if the regeneration signal (time clock, Aqua-Sensor and/or meter) occurs at the beginning of the day. Subtract this reserve capacity from the total capacity to determine "capacity to signal".

> **Note:** If the reserve capacity is more than 1/3 of the total capacity, a meter system may not reduce salt consumption relative to a timeclock system.

Multiple Tank Systems
Multiple tank systems offer the benefit of continuous soft water supply. When using the Aqua-Sensor to initiate a regeneration sequence, the system capacity may be set for the maximum amount the system is capable of producing. However multiple tank systems using only water meters and or time clock as the basis for regeneration initiation are recommended to be set up with a 10% reserve capacity. The purpose of the reserve capacity in multiple tank systems is to allow for subtle changes in water chemistry. You will be able to get the reserve capacity during programming.

Determining Batch Set Point
To determine the batch set point for programming the Culligan GBE controller, use the following formula:

$$\text{Gallons} = \frac{\text{Total Capacity - Reserve Capacity}}{\text{Hardness}}$$

The GBE will calculate this for you automatically. you can use the formula above to verify the setting.

For more information on programming multi-tank systems, see page 41.

Programming

Program Data Input

There are a couple of items to note that can make the programming of the Culligan GBE control a little easier. They are:

Slew Rates — This term refers to the speed at which the display moves through the input of material. For example, holding down the up arrow key for (5) seconds when inputting minutes for Time of Day will cause the minutes to pass in (10) minute blocks of time. Press the up arrow or down arrow keys for shorter periods (less than 5 seconds) will slow the rate. To move through the programming slowly, do not hold down the up arrow or the down arrow keys.

Beeper — A beeper is available to assist the user by providing an audible tone (about 70 decibels) to signify valid (0ne beep) and invalid (three beeps) key presses. The beeper can be deactivated in the programming mode. (If error occurs, beep will still be ON even if set to "No" programming.)

Programming Mode Timeout — If there is no keypad activity for a (3) minute period while in the programming mode, the controller will exit the programming mode and return to the main display. Any setting that was changed prior to the control timing out will revert back the original value. Pressing the check mark key saves the setting.

Program Input Acceptance — For programming information to be accepted, the check mark key must be depressed prior to programming mode timeout.

```
  SYSTEM OK
9:17 AM 1-17-08
```

This is the "home" screen. Press any key except **CANCEL** ("**x**") takes you to the main menu.

```
› 1) INFORMATION
  2) BYPASS
  3) REGENERATE
  4) SET TIME AND DATE
```

```
  1) INFORMATION
› 2) BYPASS
  3) REGENERATE
  4) SET TIME AND DATE
```

This is the main menu. The pointer shows where you are in the menu. The **UP** and **DOWN** arrows move thru the menu.

UP button

CHECK MARK or **OK** button

CANCEL button

DOWN button

```
  1) INFORMATION
  2) BYPASS
› 3) REGENERATE
  4) SET TIME AND DATE
```

```
  REGENERATION

       OFF
```

Pressing the **CHECKMARK** key selects that item on the menu.

```
  REGENERATION

     › OFF
```

Here we see the current value for "regeneration" is "OFF". Press the **CHECK MARK** turns on the pointer symbol. The pointer indicates that you can change the current value using the arrow keys.

```
  REGENERATION

     › NOW
```

```
  REGENERATION

     › TONITE
```

The arrow keys allow you to scroll thru the available options.

```
  REGENERATION

      TONITE
```

Pressing the **CHECK MARK** key to select the new setting. The pointer symbol turns off to show this is the selected value.

```
› 1) INFORMATION
  2) BYPASS
  3) REGENERATE
  4) SET TIME AND DATE
```

Pressing the **CANCEL** button from inside the menu always takes you one step closer to the "home" screen.

```
REGENERATION TONITE
  9:18 AM 1-17-08
```

Now we are back to the home screen. Note that the display has changed to show that regeneration is now scheduled for tonight.

Programming

GBE Controller Programming

The programming for the GBE controller is all menu based. There are 5 top level menus with additional options below each. The top 5 are:

1) INFORMATION
2) MANUAL MODE
3) SET DATE / TIME
4) ACCESSORIES
5) ADVANCED SETUP

Here is a brief explanation of what you will find under each menu

1) INFORMATION
   Selecting this menu item will scroll through the operating information for the unit.

2) MANUAL MODE
   Use this menu item to initiate a manual regeneration.

3) SET TIME / DATE
   Use this menu item to make changes to the time and/or date. This is initially done during first time set up and the information is saved in memory even in the event of a power outage.

4) ACCESSORIES
   Use this menu item to set up any installed accessories. This includes meters, Aqua-Sensor, Smart Brine Tank probe, Modem, Wireless Remote, Aux In and Aux Outs.

5) ADVANCED SETUP
   This menu item allows customization of the unit. There are 5 sub-menus which offer customization settings.

   1) SYSTEM SETUP

      This menu allows customization of many of the initial setup information. Water Hardness, Iron, Salt Type, Resin Volume are among the settings.

   2) REGENERATION SETUP

      This menu allows customization of the salt dosage, reserve capacity, regeneration time and regeneration mode.

   3) CYCLE TIMES

      This menu allows customization of the units cycle times.

   4) REGERATION TRIGGER

      This menu allows customization of what can trigger regeneration, the regeneration interval, predict mode and days of regeneration.

   5) DIAGNOSTICS

      This menu allows diagnostics to be performed on sensors, wireless, progressive flow, motor control, data port, phone line (modem) and advanced statistics.

Typical Commercial Setup

Setting up the GBE for a commercial installation requires a few additional steps. Follow the outline below to make sure everything is covered.

1) Run the first time setup (see pages 24 to 27)

2) Set up accessories (see pages 33) This includes:

   • Water Meter (remember to set K Factor)
   • Aqua-Sensor
   • Aux In
   • Aux Outs (needed for multi-tank, brine reclaim and refill on 4-cycle valves)
   • Smart Brine Tank Sensor
   • Wireless Remote
   • Modem
   • Service Phone
   • External Filter

3) You must tell the controller if it is a multi-tank system. This is under Advanced Setup/System Setup (see pages 29). The MultiTank System setting is set to PROG FLOW for ALL multi-tank systems. Trip point settings will determine how unit operates (progressive, parallel or alternating - page 42).

4) If you are using immediate regeneration, you must change the Reserve Capacity setting under Advanced Setup/REGEN SETUP and the REGEN MODE. See pages 30.

5) Set/Review Cycle Times – This is under Advanced Setup/Cylce Times. Especially check the Brine Draw/ Slow Rinse (BD/RINSE) and the Fast Rinse. 5-cycle valves have separate refill. See pages 31.

6) **You need to do this setup procedure on each control in the system.** You may want to write down the settings you change.

7) Refer to Appendix D for a quick programming chart.

First Time Setup Process

First Set-up Procedure

If at any time you need to re-run First Time Setup - refer to instruction on page 58.
After completing the plumbing connections to the water softener, follow these steps to turn on and program the softener controller.

STEP 1: Plug in the wall transformer

STEP 2: Perform the on-display "First Time Setup" process (below)

⬆️   Moves up the menu

⬇️   Moves down the menu

✓   Changes the display, accept desired change

X Cancel or exit

Controller

Remote

1. When a new controller is first turned on, the display shows the following:

```
FIRST TIME SETUP
HIT DOWN ARROW
```

Press the down arrow to move tot he next question.

2. Electronic Serial Number

```
S/N: 00000123
```
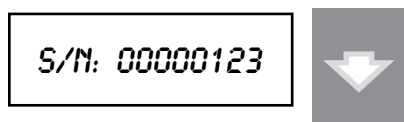
This screen is very important as it shows the electronic ID number of the controller.

Note: *If this unit will be installed with a modem, it is required that this electronic ID number is reported back to Culligan on the IQR form.*

Press the **DOWN** arrow button to change the display to read "Set Month".

3. Set Month

```
SET MONTH
JAN
```

- If the default selection is correct, press the **DOWN** arrow to accept that value and move to the next question.

- If the value displayed is NOT correct then press the **CHECK MARK** button to change the display to show a ">" symbol next to the displayed value.

```
SET MONTH
› FEB
```

- The ">" symbol indicates that this value may be changed by pressing the **UP** and **DOWN** arrow buttons. For example, pressing the **DOWN** arrow while the ">" mark is displayed changes the display from "JAN" to "FEB".

- Once the desired value is displayed accept the value by pressing the **"CHECK MARK"** button.

Press the **DOWN** arrow to accept that value and move to the next question.

4. Set Day

```
SET DAY
1
```

- If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

Press the **DOWN** arrow to accept that value and move to the next question.

5. Set Year

```
SET YEAR
2008
```

- If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

Press the **DOWN** arrow to accept that value and move to the next question.

6. Set 12 Hour or 24 Hour Clock

```
12 HR OR 24 HR CLOCK
12
```

- If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

Press the **DOWN** arrow to accept that value and move to the next question.

7. Set Hour

```
 SET HOUR
    7
```

*   If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

    Press the **DOWN** arrow to accept that value and move to the next question.

8. Set Minute

```
 SET MINUTE
    32
```

*   If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

    Press the **DOWN** arrow to accept that value and move to the next question.

9. Set AM or PM

```
 SET AM OR PM
   7:32 AM
```

*   If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

    Press the **DOWN** arrow to accept that value and move to the next question.

10. Set Valve Type (4-cycle or 5-cycle)

```
 VALVE TYPE
  4-CYCLE
```

CSM and Hi-Flo 50 are 4-cycle valves and Hi-Flo 22 and Hi-Flo 3e are 5-cycle valves.

*   If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

    Press the **DOWN** arrow to accept that value and move to the next question.

11. Set Units (US-inch or metrics)
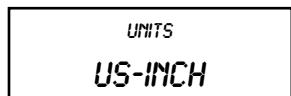
```
         UNITS
      US-INCH
```

• If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

   Press the **DOWN** arrow to accept that value and move to the next question.

12. Set Softener or Filter

```
IS THIS A SOFTENER OR FILTER?
      SOFTENER
```

• If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

   Press the **DOWN** arrow to accept that value and move to the next question.

13. Set Water Hardness

```
      WATER HARDNESS
      10 GRAINS
```

• If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

   Press the **DOWN** arrow to accept that value and move to the next question.

14. Set Softener Resin Volume
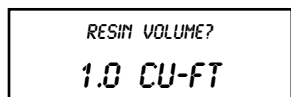
```
      RESIN VOLUME?
      1.0 CU-FT
```

• If the value displayed is NOT correct, pressing the **"CHECK MARK"** button will change the display, to show a ">" symbol next to the displayed value. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the **"CHECK MARK"** button.

   This value is found in the products installation manual in the specification table.

   Press the **DOWN** arrow to accept that value and move to the next question.

First Time Setup Process

15. Setup is Complete

```
      SYSTEM OK
 7:32 AM 2-1-08
```

The circuit board microprocessor automatically calculates softener capacity. The control then automatically homes. Contact your Culligan Man if the settings need to be customized.

> **Note:** *For all commercial applications, you must adjust the cycle times. Most important is refill time. Refer to the Brine System charts in the product's installation manual for cycle settings.*

The controller is designed to simplify the setup and installation process by making some default recommendations during the Initial Setup. The default settings are designed to be appropriate for most common installations.

Default Settings

- Downflow Brining[2]
- Standard Mesh Resin[1]
- Blue/Beige Eductor[1]
- 0.45 GPM Brine Flow Control[1]
- 0 PPM Iron[1]
- > 40 psi water pressure[1]
- NaCl Salt[1]
- Time of Regen = 2:00 AM[2]
- Regen Time = Delayed[2]
- Dosage (calculated)[2]
- Predict Mode ON[3]
- 30% Reserve Capacity[2]
- Time Clock Backup = OFF[3]
- Day-of-week Regen = OFF[3]
- Pre-Rinse Mode = OFF[1]

[1] = these items are changed on the Main Menu / Advanced / System Setup Menu
[2] = these items are changed on the Main Menu / Advanced / Regen Setup Menu
[3] = these items are changed on the Main Menu / Advanced / Regen Trigger Menu

There may be times when the installer would prefer to override the default regeneration selections. See Advanced Setup Menu, Regeneration Setup Menu or Regeneration Trigger Menu for information on changing default selections.

Advanced System Set-up Menu

- Press the **UP** ⬆ or **DOWN** ⬇ arrow to scroll to menu item
- Press the **CHECKMARK** ✓ key to select a menu item
- Press the **UP** ⬆ or **DOWN** ⬇ arrow to change a selection
- Press the **CHECKMARK** ✓ key to save your selection

Default Values are shown for each selection

```
      SYSTEM OK
  7:32 AM 2-1-08
```

```
› 5) ADV SETUP
```
Scroll to **ADV SETUP** and select

```
› 1) SYSTEM SETUP
```
Select **SYSTEM SETUP**

Customizing the Setup

VALVE TYPE
4-CYCLE
	The GBE controller can operate several types of valves. Select from **4-CYCLE**, **5-CYCLE** or **GBV**.
	    For Softeners: For Filters:
	    CSM and Hi-Flo 50 are 5-CYCLE All are 4-CYCLE
	    Hi-Flo 22 and Hi-Flo 3e are 4-CYCLE

RESIN TYPE **STANDARD**	The type of resin changes how the **GBE** calculates capacity. Select from **STANDARD** or **FINE**. Unless you change from the standard Cullex®, leave this at **STANDARD**.
HARDNESS GPG **25**	Enter the water hardness (softeners only). This can be from an onsite test or from a water analysis. Enter in the units shown on screen. For **US-INCH**, enter the hardness in grains per gallon (gpg).
DIAL-A **SOFTNESS A**	This does NOT APPLY to commercial valves. Leave this set to A.
IRON **PRESENT 0 PPM**	Enter the amount of iron present. This value can come from an onsite test or a water analysis. Enter the value in ppm (mg/l).
LINE PRESSURE **ABOVE 40 PSI**	This setting is either **ABOVE** or **BELOW 40 PSI**. If the pressure is below 40 psi, the brine rinse time will be extended. This can be overridden by setting the brine rinse time manually by going to **5) ADV SETUP**, then **3) CYCLE TIMES**.
SALT TYPE **NACL**	Either standard sodium chloride (**NACL**) salt or potassium chloride (**KCL**) salt can be used. The **GBE** needs to know which type is being used.
MULTITANK SYSTEM **SINGLE**	Select either **SINGLE** tank or **PROGRESSIVE**. Selecting **PROGRESSIVE** implies a multi-tank system. Please refer to page 41 for details on setting up a multi-tank system.
BRINE REFILL FLOW **0.45 GPM**	THIS CAN BE IGNORED FOR COMMERCIAL APPLICATIONS.
RESIN VOLUME **1.00 CU/FT**	Enter the volume of resin in the tank. This information can be found in the product's installation manual on the specifications page. Enter in the units shown. For **US-INCH**, enter the value in cubic feet.
UNITS **US INCH**	Select either **US INCH** or **METRIC** units. This will change the units when entering programming values such as resin volume and flow rates. If you change this to **METRIC**, please review your input for accuracy.
PRERINSE MODE **OFF**	Set this to **ON** or **OFF**. This setting will tell the unit to rinse to drain at the time intervals and duration set. IF PRERINSE MODE IS SET TO ON
RINSE IF NO FLOW **)FOR 24 HOURS**	Select a prerinse time value from 1 to 240 hours. This tells the unit to rinse to drain if no flow is detected for this duration.
RINSE FOR **)5 MINUTES**	Select the number of minutes the unit should rinse to drain when the **NO FLOW** duration has passed.

This concludes the Advanced System Set-Up Menu. Continue to press the **X** key to return to the Main Menu.

Regeneration Set-up

- Press the **UP** ↑ or **DOWN** ↓ arrow to scroll to menu item
- Press the **CHECKMARK** ✓ key to select a menu item
- Press the **UP** ↑ or **DOWN** ↓ arrow to change a selection
- Press the **CHECKMARK** ✓ key to save your selection

Default Values are shown for each selection

```
    SYSTEM OK
 7:32 AM 2-1-08
```

```
› 5) ADV SETUP
```

Scroll to **ADV SETUP** and select

```
› 2) REGEN SETUP
```

Select **REGEN SETUP**

```
   SALT DOSAGE
    9.0 LBS
```

This value is the salt dosage in pounds (LBS) for **US INCH** (total number of pounds of salt used per regeneration). The salt dosage contributes to calculating the resin capacity and is also used when a Smart Brine Tank Sensor is installed to help calculate salt usage and salt remaining. The higher the salt dosage the higher the capacity. Refer to the appendix of the unit's installation manual for information on setting the salt dosage.
For example, for a CSM 300-2 (10 ft³ of resin), and a desired capacity of 250,000 grains, the chart in the manual shows the dosage at 102 pounds.

```
 RESERVE CAPACITY
      30%
```

This setting is generally used for a single-delay system. For a multi-tank system, reserve capacity is not necessary and should be set to zero (0). If you do not change this value in a multi-tank system, your unit will regenerate when 30% of the capacity remains.

```
  TIME OF REGEN
    2:00 AM
```

This setting is used for time clock regeneration. This is the time of day that the unit will regenerate when needed.

```
   REGEN MODE
    DELAYED
```

Select either **DELAYED** or **IMMEDIATE**. For multi-tank systems, this is normally set to **IMMEDIATE**. If immediate is selected, be sure to change the Reserve Capacity setting.

```
  REGEN LOCKOUT
  FOR 0 HOURS
```

Use this setting to prevent back-to-back regenerations on multi-tank systems, if necessary. When one unit is done regenerating, the next regeneration cannot begin until the set amount of time has passed.

This concludes the Regeneration Set-Up section. Continue to press the ✖ key until reaching the Main Menu.

Customizing the Setup

Cycle Times

- Press the **UP** ⬆ or **DOWN** ⬇ arrow to scroll to menu item
- Press the **CHECKMARK** ✓ key to select a menu item
- Press the **UP** ⬆ or **DOWN** ⬇ arrow to change a selection
- Press the **CHECKMARK** ✓ key to save your selection

Default Values are shown for each selection

```
     SYSTEM OK
7:32 AM 2-1-08
```

```
, 5) ADV SETUP
```
Scroll to ADV SETUP and select

```
, 3) CYCLE TIMES
```
Select CYCLE TIMES

```
    CYCLE TIMES
,USE DEFAULTS
```
Select either USE DEFAULTS or CUSTOM. When USE DEFAULTS is selected, the program calculates the cycle times based on hardness and resin volume. When CUSTOM is selected, you can set custom cycle times.

```
   BACKWASH TIME
10 MINUTES
```
Use this setting to adjust the number of minutes for backwash. You generally will not need to change this setting.

```
  BRINE DRAW-RINSE
71 MINUTES
```
For commercial applications, this value can normally be set to 60 minutes. It can be extended if you find the brine is not being rinsed out properly within this time.

```
    FAST RINSE
7 MINUTES
```
This value is calculated for household units. For commercial units, you should adjust this value to 10 minutes, but it is not required.

```
     FILL TIME
7 MINUTES
```
This will only show if you have selected a 5-cycle valve. This is the refill time. This value can be found in the unit's installation manual. For example, if you have a Hi-Flo 22 WS-90 water softener (3 ft³) and you want to set a capacity of 60,000 grains, then using the chart in Appendix A of the Hi-Flo 22 manual show a time setting of 12 minutes.

For a 4-cycle valve, the refill is controlled by AUX OUTPUT 2 and the refill time is set there. See page 46.

This concludes the Cycle Times section. Continue to press the ✖ key to return to the Main Menu.

Regeneration Triggers

- Press the **UP** ⬆ or **DOWN** ⬇ arrow to scroll to menu item
- Press the **CHECKMARK** ✓ key to select a menu item
- Press the **UP** ⬆ or **DOWN** ⬇ arrow to change a selection
- Press the **CHECKMARK** ✓ key to save your selection

Default Values are shown for each selection

```
      SYSTEM OK
  7:32 AM 2-1-08
```

```
› 5) ADV SETUP
```

Scroll to ADV SETUP and select

```
› 4) REGEN TRIGGER
```

Select REGEN TRIGGER

```
     FLOW METER
   CAN TRIGGER
```

```
    AQUA SENSOR
   CAN TRIGGER
```

This setting requires an optional flow meter (except Hi-Flo 22) or optional Aqua-Sensor. Use this setting to tell the controller whether the optional flow meter or Aqua-Sensor is used to trigger a regeneration. If set to CAN TRIGGER, the flow meter is used to count the gallons of soft water until the batch value is reached, at which time a regeneration is triggered. You can install water meter and use it just to monitor flow rate and total usage, and not use it to trigger the regeneration. An Aqua-Sensor device (softeners) or differential pressure switch (filters) can be used to trigger the regeneration. You can have both the water meter and Aqua-Sensor/differential pressure installed and able to trigger regeneration. Either one can trigger the regeneration and everything is reset when regeneration is complete.

```
   REGEN INTERVALS
 NUMBER OF DAYS: 0
```

Use this setting if using time clock regeneration only or if you would like to have a time clock backup for the installed trigger device. It is common to set this at 3 days, although not necessary.

```
    PREDICT MODE
      ›OFF
```

The Predict Mode is used in the flow meter mode to determine the optimum regeneration point. Before the regeneration starts, the control will compare the remaining capacity value with the average daily water use. If the average daily water usage is less than the remaining capacity, the controller will wait 24 more hours be3fore regeneration. If the remaining capacity is less than the average daily water usage, the control will initiate regeneration. This works in delay mode only. At any time, if the total capacity value is reached, the control will initiate an immediate regeneration.

```
 REGENERATION ON MONDAY
      ›OFF
```

Use this setting to select the days of the week to regenerate. This is most useful when running the system as time clock only. For commercial multi-tank systems, leave all days to OFF.

```
 REGENERATION ON MONDAY, ...
      ›OFF
```

The program will go through the rest of the days of the week to set regeneration on or off.

This concludes the Regeneration Trigger section. Continue to press the ✗ key to return to the Main Menu.

Installation of Accessories

Installation of the Aqua-Sensor Probe

After installing the Aqua-Sensor kit 01008779 - CSM, Hi-Flo 50 or the 01018959 - Hi-Flo 22, it is necessary to configure some settings.

The Aqua-Sensor probe should be installed prior to loading the resin in the tank. Run the probe lead through the opening in the top of the tank. Systems with fiberglass tanks will have a tank plug on the cord. Systems with steel tanks require a 3/4" x 1/2" reducing bushing (included in kit) for the cord grip. Run the probe through the bushing prior to inserting into tank. Use a supplied strain relief to run the connector into the controller. Plug the connector into the circuit board at the position labeled Aqua-Sensor. Figure 23.
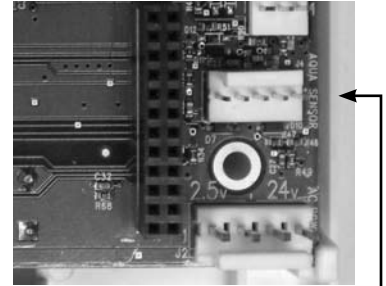
Connect Aqua-Sensor connector here at lower right corner of circuit board
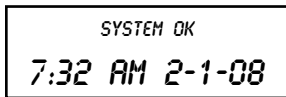
```
        SYSTEM OK
   7:32 AM 2-1-08
```

```
 › 4) ACCESSORIES
```

From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.

```
 › 1) AQUA SENSOR
```

From the **ACCESSORIES** screen, press the **CHECK MARK** button at **AQUA SENSOR**.

```
     AQUA SENSOR
   ›INSTALLED
```

Press the **CHECK MARK** button to change **AQUA SENSOR** setting. Press the **UP** or **DOWN** arrow to change from **NOT INSTALLED** to **INSTALLED**. Press the **CHECK MARK** when the correct **AQUA SENSOR** mode is displayed.

Beeper Mode
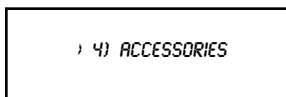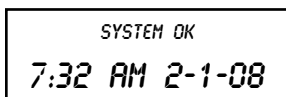
```
        SYSTEM OK
   7:32 AM 2-1-08
```

```
 › 4) ACCESSORIES
```

From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.

```
 › 2) BEEPER
```

Press the **DOWN** arrow button to scroll to BEEPER. Press the **CHECK MARK** button at **BEEPER**.

```
     BEEPER MODE
   ›ALWAYS OFF
```

Press the **CHECK MARK** button to change **BEEPER MODE** setting. Press the **UP** or **DOWN** arrow to change from **ALWAYS OFF**, **ALWAYS ON**, **12 HR WARNINGS OR 24 HR WARNINGS**. Press the **CHECK MARK** when the correct **BEEPER MODE** is displayed.

	key Press Beeps	Beeps on Alarm
Always ON	Always	Always
Always OFF	Never	Never
12 hour mode	Never	Between 8AM-8PM
24 hour mode	Never	Always

Installing the Smart Brine Tank (SBT Probe) in to the Brine Tank

1. Place the smart brine probe on top of the brine plate as shown in Figure 24 .
2. Loop the two zip ties thru the holes in the probe housing and loop the zip ties around the outside of the brine well as shown in Figure 25. **IMPORTANT! Tighten zip ties securely to prevent movement.**
3. Use zip tie to snug the top of the brine tank probe against the top of the brine well.
4. Route the smart brine tank probe cable to an appropriate opening in the valve control housing. Use the strain-relief plug provided with the SBT probe for installation.
5. Plug the SBT probe connector into the circuit board at the position labeled "Brine Tank" - Figure 26.

Figure 24

Figure 25
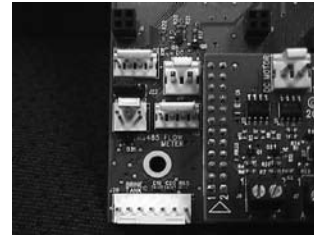
Figure 26

Installation of the Smart Brine Tank (SBT) Probe
After the Smart Brine Tank Probe is installed, it is necessary to configure some settings.
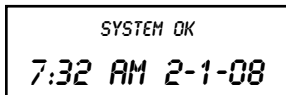
SYSTEM OK
7:32 AM 2-1-08

› 4) ACCESSORIES

From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.

› 5) SBT SENSOR

Press the **DOWN** arrow key to scroll to **SBT SENSOR**. Press the **CHECK MARK** button at **SBT SENSOR**.
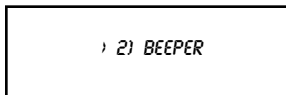
SBT SENSOR
›INSTALLED

Press the **CHECK MARK** button to change **SBT SENSOR** setting. Press the **UP** or **DOWN** arrow to change from **NOT INSTALLED** to **INSTALLED**. Press the **CHECK MARK** when the correct **SBT SENSOR** mode is displayed.

BRINE TANK AREA
›500 SQ/IN
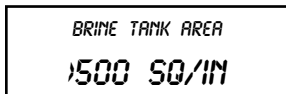
Press the **CHECK MARK** button to set **BRINE TANK AREA** setting. Press the **UP** or **DOWN** arrow to change **AREA SQ/IN**. See chart below for correct **BRINE TANK AREA**:

18 x 38 Brine Tank - 250 sq in   39 x 48 Brine Tank - 1190 sq in
24 x 40 Brine Tank - 450 sq in   42 x 48 Brine Tank - 1380 sq in
24 x 50 Brine Tank - 450 sq in
30 x 50 Brine Tank - 700 sq in

Press the **CHECK MARK** when the correct **BRINE TANK AREA** is displayed.

SALT GEOMETRY
›PELLET

Press the **CHECK MARK** button to change **SALT GEOMETRY** setting. Press the **UP** or **DOWN** arrow to change from **PELLET, ROCK OR BRICK**. Press the **CHECK MARK** when the correct **SALT GEOMETRY** is displayed.

Installation of Accessories

Installing the Wireless Remote

1. Select a location for the wireless remote monitor (Figure 27). The location must be near an electrical outlet. If a modem is to be used in the remote, then the location should also be near a standard RJ-11 type telephone wall jack.

2. Use the "Hole Drilling Template" as a guide to drilling two holes to mount the remote monitor. If drilling into wall board, drill two 5/16" dia holes and insert the plastic drywall anchors into the holes securing them with the two #10 screws provided. If drilling into a solid surface, drill two 7/32" holes into the surface and screw the two #10 screws into the holes. In either case, leave a gap of approximately 3/32" between the head of the screw and the wall.

> ⚠️ **Caution!** Do not touch any surfaces of the circuit board. Electrical static discharges may cause damage to the board. Handle the circuit board by holding only the edges of the circuit board. Keep replacement boards in their special anti-static bags until ready for use. Mishandling of the circuit board will void the warranty.

3. (Optional) If a modem is to be installed into the remote monitor, refer to page 37 for installation and setup.

4. Connect the power cord to the bottom of the remote monitor. If a modem is to be used in the remote, plug a standard telephone extension cord into the bottom of the remote monitor.

5. Hang the remote monitor on the two screws.

6. Disconnect power to the softener. Open the control and connect the RF board into the controller circuit board. Make sure the RF board is fully seated into all of the sockets (Figure 28). Reconnect power.

7. Install RF board into unit controller. Line up pins in RF board and press firmly into black connectors. Note orientation of RF board (Figure 28).

8. Follow the directions on the next page to program BOTH the main and remote monitor units to communicate with each other. If modem has been installed in the remote, it is also necessary to follow the directions in the next section of this manual to configure the main controller to use the modem in the remote.

5 3/8"

SCREWS

Figure 27a

MODEM CONNECTION

POWER CONNECTION

Figure 27b

Back of GBE Board

RF Board (Note orientation)
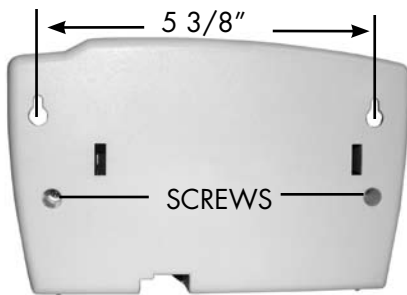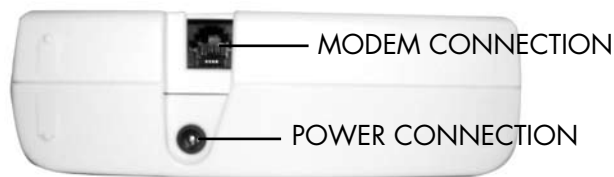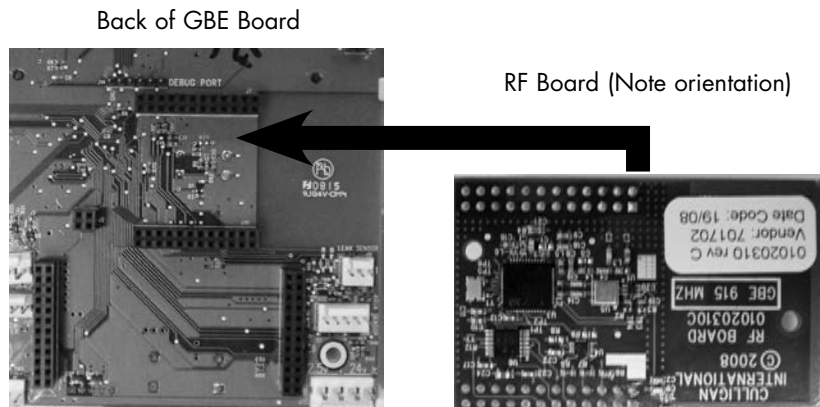
Figure 28

Control Valve Set-up

```
    SYSTEM OK
 7:32 AM 2-1-08
```

```
› 4) ACCESSORIES
```
From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.

```
› 6) WIRELESS REM
```
Press the **DOWN** arrow to scroll to **WIRELESS REM**.

```
  REMOTE DISPLAY
  ›INSTALLED
```
Press the **CHECK MARK** button to change **REMOTE DISPLAY** setting. Press the **UP** or **DOWN** arrow to change from **NOT INSTALLED** to **INSTALLED**. Press the **CHECK MARK** when the correct **REMOTE DISPLAY** mode is displayed.

```
    CHANNEL #
      ›1
```
Press the **CHECK MARK** button to change **CHANNEL #** setting. Press the **UP** or **DOWN** arrow to change **CHANNEL #**. Press the **CHECK MARK** when the correct **CHANNEL#** is displayed.

> ***NOTE: The CHANNEL # for the control valve must be the same as the CHANNEL # for the Remote Display.***

```
  RF FREQUENCY
  ›915 MHZ
```
> ***NOTE: Do not change RF FREQUENCY for North American installations.***

Wireless Remote Set-up

```
    SYSTEM OK
 7:32 AM 2-1-08
```

```
› 4) SETUP
```
From the home screen, press the **DOWN** arrow to **SETUP**. Press the **CHECK MARK** button.

```
› 1) RF SETUP
```
From the **SETUP** screen, press the **CHECK MARK** button at **RF SETUP**.

```
    CHANNEL #
      ›1
```
Press the **CHECK MARK** button to change **CHANNEL #** setting. Press the **UP** or **DOWN** arrow to change **CHANNEL #**. Press the **CHECK MARK** when the correct **CHANNEL#** is displayed.

```
  RF FREQUENCY
  ›915 MHZ
```
> ***NOTE: The CHANNEL # for the control valve must be the same as the CHANNEL # for the Remote Display.***

> ***NOTE: Do not change RF FREQUENCY for North American installations.***

Continue to press **X** to return to Home Screen.

Installation of Accessories

Check Signal Strength

Check the signal strength once the control valve and wireless remote are setup. On the Softener Controller, go to the Main Menu/Advanced setup/Diagnostics/Test Wireless to check signal strength. The signal strength indicator (SSI) will show a value of between 0 and 8. If the SSI is at least 4, then the installation is complete. It the SSI drops below 4, then it may be necessary to select an alternate location for the wireless remote.
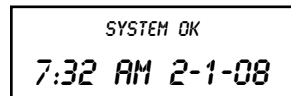
```
      SYSTEM OK
  7:32 AM 2-1-08
```

```
› 5) ADV SETUP
```
From the home screen, press the **DOWN** arrow to **ADV SETUP**. Press the **CHECK MARK** button.

```
› 5) DIAGNOSTICS
```
Press the **DOWN** arrow to scroll to **DIAGNOSTICS**.
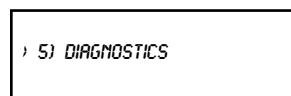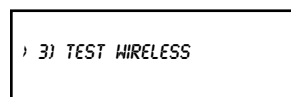
```
› 3) TEST WIRELESS
```
Press the **DOWN** arrow to scroll to **TEST WIRELESS**.
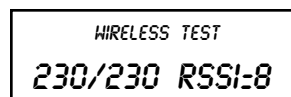
```
    WIRELESS TEST
  230/230 RSSI:8
```
From the **TEST WIRELESS** screen, press the **CHECK MARK** button to test.

Installing the Modem (optional)

Note: The modem can be installed into either the back of the main controller or the back of the remote control board. The functionality of the modem is the same in either installation with the important exception that automatic firmware updating is ONLY available on units which have the modem installed on the main controller.

1. Before installing the modem into the back of the GBE board or the back of the remote, the GBE circuit board or the remote must first be powered off.
2. When handling all circuit boards, take care to only touch the edges of the circuit boards – not the metal pins.   The electronics on all circuit boards can be damaged by static electricity.
3. Make sure all of the pins at all four connectors are aligned between the modem board and the main controller board.   Make sure that the modem board is fully seated into all four sockets.
4. When all connections have been made restore power.

Installing in GBE Board

Open the controller cover and locate the modem connection on the back of the board (see figure 29). Insert line modem board (P/N 01020307) into the socket on the back of the board. Make sure that all of the pins in all four connectors are aligned and make sure the modem is fully seated into all of the sockets.
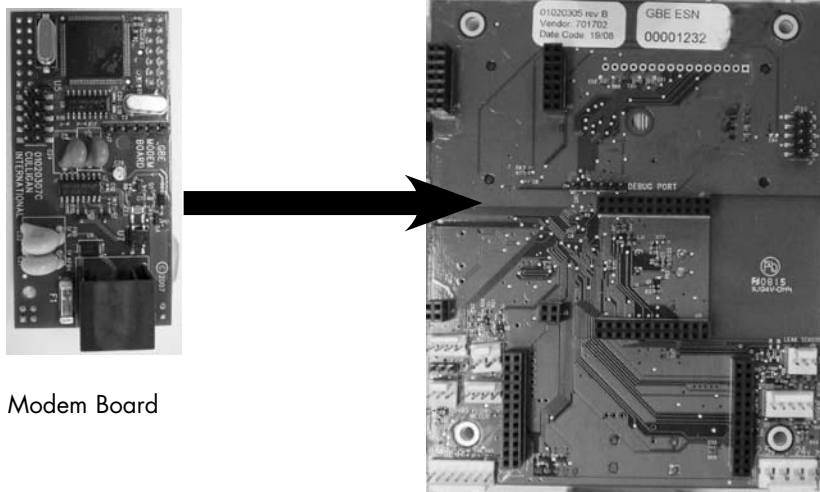
Figure 29

Modem Board

Back of GBE Board

Installing in Remote

Open the remote monitor housing by removing the two screws and squeezing the sides of the monitor housing slightly. Insert the modem board (P/N 01020307) into the socket on the back of the remote board (Figure 30). Make sure that all of the pins in all four connectors are aligned and make sure the modem is fully seated into all of the sockets. Snap the two halves of the remote housing back together using light finger pressure and insert the two screws.
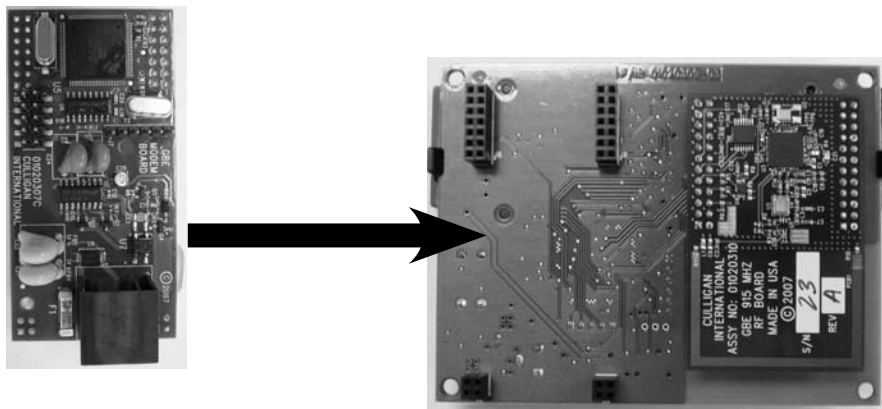
Figure 30

Modem Board

Back of Remote Circuit Board

Modem Setup - GBE
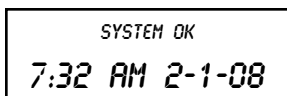
```
      SYSTEM OK
  7:32 AM 2-1-08
```

Installation of Accessories

`› 4) ACCESSORIES`	From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.
`› 7) MODEM`	Press the **DOWN** arrow to scroll to **MODEM**.
`TELEPHONE MODEM` `›INSTALLED`	If necessary, press the **CHECK MARK** button to change **TELEPHONE MODEM** setting. Press the **UP** or **DOWN** arrow to change from **NOT INSTALLED** to **INSTALLED**. Press the **CHECK MARK** when the correct **TELEPHONE MODEM** mode is displayed.
`MODEM LOCATION` `›IN MAIN CONTROL`	If necessary, press the **CHECK MARK** button to change **MODEM LOCATION** setting. Press the **UP** or **DOWN** arrow to select **IN MAIN CONTROL VALVE** or **IN REMOTE**. Press the **CHECK MARK** when the correct **MODEM LOCATION** is displayed.
`CALL FREQUENCY` `›EVERY 10 REGENS`	If necessary, press the **CHECK MARK** button to change **CALL FREQUENCY** setting. Press the **UP** or **DOWN** arrow to increase or decrease **CALL FREQUENCY**. Press the **CHECK MARK** when the desired **CALL FREQUENCY** is displayed.

The default value of **EVERY 10 REGENS** can be changed from 1 to 99 successful regenerations. If set to 1, the unit will call in the following morning after each regeneration. The interval can also be set to 0, meaning the unit would NEVER call in, unless there was a problem detected. It is recommended for a typical installation the default value of **EVERY 10 REGENS** is used.

`TIME ZONE` `›00:00`	Press the **CHECK MARK** button to change **TIME ZONE** setting. Press the **UP** or **DOWN** arrow to increase or decrease **TIME ZONE**. Press the **CHECK MARK** when the correct **TIME ZONE** is displayed.

When using a modem, the control will occasionally access the internet to synchronize the date and time.   In order to do this correctly, the control must be told which time zone it is installed in. The time zone is specified as so many hours ahead or behind GMT time. The "GMT offset" for some common cities are listed below:

GMT Offset	
New York	-5:00 (and anywhere in EST)
Chicago	-6:00 (CST)
Denver	-7:00 (MST)
Los Angeles	-8:00 (PST)
London	0:00
Paris	0:00
Rome	+1:00

```
     DEALER ID
    ›00000
```

Press the **CHECK MARK** button to change **DEALER ID** setting.   Press the **UP** or **DOWN** arrow to increase or decrease each digit of the **DEALER ID**.   Press the **CHECK MARK** to move to the next digit. Press the **CHECK MARK** when the correct **DEALER ID** is displayed. The dealer ID is your dealership's account number. Enter with leading zeroes, if necessary.

```
    DATA PHONE #
   ›18884137028
```

Press the **CHECK MARK** button to change **DATA PHONE** # setting.   Press the **UP** or **DOWN** arrow to increase or decrease each digit of the **DATA PHONE** #.   Press the **CHECK MARK** to move to the next digit. Press the **CHECK MARK** when the correct **DATA PHONE** # is displayed. Use a local number whenever possible.

It is necessary to provide a telephone number to be called by the unit. Typically, it is desired that the unit call a local access number. These local access numbers, for nearly every area code around the globe, can be found from the www.myculligan.com website at http://www.myculligan.com/technical/tech_ref-gbe-boards.asp. The unit can also be programmed with the default toll-free access number. Use a local number whenever possible.

Test Modem

This menu attempts to send in a "test message". The screen indicates whether or not this process is successful. Sending a "test message" will also update the time and date on the GBE controller to the correct time. If the modem is installed on the main controller (as opposed to installed in the remote control) then this testing process will also check to see if there is an updated version of firmware available on the Culligan servers.

After conducting a phone line test, it is important to verify that the new time and date settings on the controller are correct. If the new time setting has the incorrect value for the "hours" it is likely that the time zone setting on the control is incorrect. The time zone setting is found under the Main

Menu / Accessories / Modem screen and is displayed in the format of GMT +/- X hours. (See the section of this manual called "Installing the modem"

```
     SYSTEM OK
   7:32 AM 2-1-08
```

```
  › 5) ADV SETUP
```

From the home screen, press the **DOWN** arrow to **ADV SETUP**. Press the **CHECK MARK** button.

```
  › 5) DIAGNOSTICS
```

Press the **DOWN** arrow to scroll to **DIAGNOSTICS**.

```
  › 5) TEST PHONELINE
```

Press the **DOWN** arrow to scroll to **TEST PHONELINE**.

```
     MODEM TEST
  EMAILING NOW PLEASE WAIT...
```

From the **TEST PHONELINE** screen, press the **CHECK MARK** button to **TEST**.

Installation of Accessories

MODEM EMAIL	MODEM TEST TIME	MODEM TEST	MODEM TEST
SUCCESS	SET SUCCESS	CHECKING FOR NEW FW	NO NEW FW

POSSIBLE RESULTS

CONNECTING AN EXTERNAL FLOW METER

Most metered commercial units require an external flow meter device. this requires an entry in the programming for the meter chosen. The entry is the pulses per gallon, or K Factor. Refer to the table on the page 63 for meter K Factors.

› 4) ACCESSORIES

From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.

› 9) FLOW METER

Press the **DOWN** arrow key to scroll to **FLOW METER** and press the **CHECK MARK** button.

FLOW METER
80.0 PULS/GAL

To change the value, press the **CHECK MARK** button and then use the UP **ARROW** or **DOWN ARROW** keys. Press the **CHECK MARK** button when done. Note: Hi-Flo 22 is to be set at 78 puls/Gal.

Press the **X** key until you return to the main screen.

SETTING UP A MULTI-TANK SYSTEM

A Multi-tank system requires additional programming.

REMINDER: Any additional program changes such as REGEN SETUP, CYCLE TIMES and REGEN TRIGGER must be programmed into each control in the system.

SYSTEM OK
7:32 AM 2-1-08

› 5) ADV SETUP

From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.

› 1) SYSTEM SETUP

Press the **DOWN** arrow key to scroll to **SYSTEM SETUP** and press the **CHECK MARK** button.

```
   MULTITANK SYSTEM
    PROGRESSIVE
```

Scroll through the settings until you see MultiTank System. Press the **CHECK MARK** button and then use the **UP ARROW** or **DOWN ARROW** key to change from **SINGLE** to **PROGRESSIVE** flow. Press the **CHECK MARK** button when done.

NOTE: all multi tank systems are to be set to **PROGRESSIVE**. See below on adjustments needed for alternating or parellel operation.

```
    PROG FLOW TRIP
      210 GPM
```

Press the **CHECK MARK** button and then use the **UP** or **DOWN** arrow keys to set the progressive flow trip point. Press the **CHECK MARK** button when done.

This setting establishes a flow rate which, when attained, will cause another unit to come on-line until the total flow rate is less than the established trip point for 30 seconds. Should the flow demand exceed the trip point by a rate equal to or greater than two times the trip point, another unit shall be brought on-line (assuming the system has more than two units in total). Each subsequent equivalent increase in flow demand shall continue to bring additional units on line (up to six total units if the flow demand is six times the **TRIP** amount). Units shall be returned to a stand-by mode in the reverse order as the system flow decreases by a rate equal to or greater than the trip point. Generally, the trip point is the rated continuous flow rate of one unit. These values can be found in the unit's instruction manual.

NOTE: ALTERNATING OPERATION: To set up the **GBE** for alternating operation (one on, the rest standby), set the trip point to 999. It is unlikely that the system will reach 999 gallons per minute to bring on an additional unit.

```
  PROGRESS FLOW MASTER
```

In a multi-tank system, one unit must be specified as master. All other units are slaves. For example, in a triplex system, select one unit to be the master and set this setting to MASTER. In the 2nd unit, set this to **SLAVE 1**. In unit 3, set it to **SLAVE 2**. You can have up to 5 slaves connected to a master.

NOTE: PARALLEL OPERATION: To set up the **GBE** for parallel operation (all online), set the trip point to zero (0). As long as the flow is above zero, all units will stay online.
You must also set the jumpers as explained on page 12 for progressive flow.

Flow meters are required for progressive flow – one for each unit. See page 14 to set up the meters.

Continue pressing the down key to cycle through the rest of the options (refer to page 29). At the System Setup screen press the "**X**" key to return to the main screen.

NOTE: You must repeat this programming on all other units in the system. On slave units the **PROG FLOW TRIP** can be IGNORED; the only trip point recognized is the one set on the master unit.

Brine Reclaim

For brine reclaim, **AUX OUT 2** and **AUX OUT 3** must be set to open and close the valves to direct the brine. There are 4 things to set for each aux output.

1 – Cycle Type (**AUX X CYCLE TYPE**) – can be set to **NORMALLY ON** or **NORMALLY OFF**. For brine reclaim, set it to **NORMALLY OFF**.
2 – Cycle Position (**AUX OUT X**) – Any cycle position can be selected here. For brine reclaim, we want the **BRINEDRAW POS**.
3 – Delay (**AUX OUT DELAY**) – This is the delay before the **OUTPUT** is "activated" in minutes. For brine reclaim we want delay on **AUX 3** and no delay on **AUX 2**.
4 – On time (**AUX OUT ON**) – This is the number of minutes the **OUTPUT** is "activated" in minutes. For brine reclaim, cycle type is **NORMALLY OFF** so this is the amount of time the Aux contact is on.

Installation of Accessories

Refer to page 46 for more information on the operation of the Aux Outputs. Refer to the instructions below for step by step setting of these values.

- Press the **UP** ↑ or **DOWN** ↓ arrow to scroll to menu item
- Press the **CHECKMARK** ✓ key to select a menu item
- Press the **UP** ↑ or **DOWN** ↓ arrow to change a selection
- Press the **CHECKMARK** ✓ key to save your selection

Default Values are shown for each selection

```
      SYSTEM OK
  7:32 AM 2-1-08
```

```
› 4) ACCESSORIES
```
Scroll to ACCESSORIES and select

```
› 4) AUX OUTPUTS
```
Select AUX OUTPUTS

```
› 2) AUX OUT 2
  3) AUX OUT 3
```
Select AUX OUT 2

```
AUX2 CYCLE TYPE
NORMALLY OFF
```
Can be set to NORMALLY OFF or NORMALLY ON. For brine reclaim, set to NORMALLY OFF.

```
AUX OUT 2
SERVICE POS
```
This can be set to any cycle. For brine reclaim, change this to BRINEDRAW POS.

```
AUX2 OUT
DELAY 0 MINS
```
This is the activation delay. For brine reclaim, leave at zero (0).

```
AUX2 OUT
ON 0 MINS
```
Set this value to the number of minutes needed for aux 2 to be activated. Refer to the brine reclaim manual, 01018946, for recommended settings.

Now set AUX OUT 3

```
  2) AUX OUT 2
› 3) AUX OUT 3
```
Select AUX OUT 3

```
AUX3 CYCLE TYPE
NORMALLY OFF
```
Can be set to NORMALLY OFF or NORMALLY ON. For brine reclaim, set to NORMALLY OFF.

```
AUX OUT 3
SERVICE POS
```
This can be set to any cycle. For brine reclaim, change this to BRINEDRAW POS.

```
AUX3 OUT
DELAY 0 MINS
```

This is the activation delay. For brine reclaim, set this to the same value that AUX2 OUT is set to be ON (last setting on AUX2). This allows AUX3 to turn on immediately after AUX2 turns off.

```
AUX3 OUT
ON 0 MINS
```

Set this value to the number of minutes needed for aux 3 to be activated. Refer to the brine reclaim manual, 01018946, for recommended settings.

This concludes setting the AUX OUT values for Brine Reclaim. Press the **X** key until you return to the Main Menu.

SERVICE PHONE NUMBER

If the Modem is not installed it is possible, in addition to displaying the error message, to display a message that reads "Call Culligan at: XXXXXXXXXX" where the telephone number XXXXXXXXXX can be programmed by the dealership (typically programmed to be the telephone number of the dealership). This number is programmed under the menu: Main Menu / Accessories / Service Phone.

```
    SYSTEM OK
7:32 AM 2-1-08
```

```
> 4) ACCESSORIES
```

From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.

```
> 10) SERVICE PHONE
```

Press the **DOWN** arrow to scroll to **SERVICE PHONE**. Press the **CHECK MARK** button at **SERVICE PHONE**.

```
  SERVICE PHONE #

     >
```

Press the **CHECK MARK** button to change **SERVICE PHONE** # setting. Press the **UP** or **DOWN** arrow to increase or decrease each digit of the **SERVICE PHONE** #. Press the **CHECK MARK** to move to the next digit. Press the **CHECK MARK** when the correct **SERVICE PHONE** # is displayed.

EXTERNAL FILTER

The unit can provide alarm feedback for a sediment or carbon filter installed upstream of the unit. The Auxiliary flow alarm can be used to monitor the flow through this filter.

To use this feature it is necessary to specify the total lifetime totalized flow of the auxiliary filter in either gallons or liters at Main Menu/Accessories/Down Once set, it will begin to track the total gallons through the system flow meter. Once the total flow reaches the specified lifetime totalized flow, the system will display the error message "**Change Auxiliary Filter**" on the main display as well as the remote display and via the telephone modem if these secondary devices are used.

```
    SYSTEM OK
7:32 AM 2-1-08
```

Note: Once the auxiliary filter has been replaced, the auxiliary filter alarm must be reset by returning to the same menu: Main Menu / Accessories / Auxiliary Flow Alarm.

Installation of Accessories

> 4) ACCESSORIES

From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.

> 11) EXT. FILTER

From the **ACCESSORIES** screen, press the **CHECK MARK** button at **EXT. FILTER.**

EXTERNAL FILTER ALARM
>INSTALLED

Press the **CHECK MARK** button to change **EXTERNAL FILTER ALARM** setting. Press the **UP** or **DOWN** arrow to change from **INSTALLED** to **NOT INSTALLED**. Press the **CHECK MARK** when the correct **EXTERNAL FILTER ALARM** mode is displayed.

FILTER CAPACITY
>10000 GALLONS

Press the **CHECK MARK** button to change **FILTER CAPACITY** setting. Press the **UP** or **DOWN** arrow to increase or decrease **FILTER CAPACITY**.   Press the **CHECK MARK** when the correct **FILTER CAPACITY** is displayed.

Auxiliary Board

The auxiliary board comes installed in all commercial equipment. It can control up to four, 24 VAC outputs (max current 2.1 amps output). Aux Output 1 is used to power the 24 VAC drive motor found on all valves. When Aux Output 1 is used for this, then Aux Output 4 is automatically configured to operate a solenoid which can be used for a standby or blocking. Aux Output 4 is powered during all cycles except service, and unpowered during service.
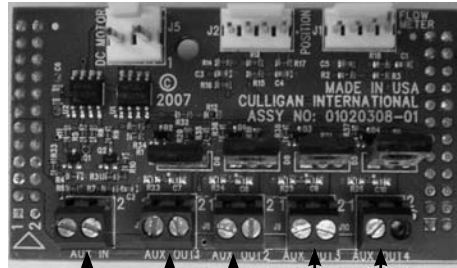
Figure 31

Auxiliary Input

Auxiliary Outputs

For CSM and Hi-Flo 50 softeners, Aux Output 2 is used to power the refill solenoid. The Aux Output 2 "On" time needs to be set based on the desired salt dosage/capacity as found in the appendix of the unit's installation manual. See the Aux Output 2 settings for a detailed example.

Each Aux Output has the following settings:

• Cycle Type (AUX X CYCLE TYPE) – Can be set to NORMALLY ON, NORMALLY OFF or REPEAT CYCLE. This means the Output can always be on or always be off until it reaches the chosen cycle position. REPEAT CYCLE allows the output to turn on and off at a set interval during the cycle chosen.

• Cycle Position (AUX OUT X) – Any cycle position can be selected here. This is the cycle position that the AUX OUT is "activated" (turned on or off).

• Delay (AUXX OUT DELAY) – This is the delay before "activating". You can have the AUX OUT activation delayed a specified number of minutes into the cycle.

• On time (AUXX OUT ON) – This is the number of minutes the AUX OUTPUT is "activated" in minutes. After the specified number of minutes, the OUTPUT is deactivated.

• Off Time (available only when Repeat Cycle is selected for Cycle Type) – This is the number of minutes of Off time during the chosen cycle. The aux output will cycle on and off during the selected cycle.

For example, the chart below shows how the timing would work if the **CYCLE TYPE** was set to **NORMALLY OFF**, the **CYCLE POSITION** was set to **BACKWASH**, the **DELAY** minutes greater than zero, and **ON** minutes greater than zero.

Delay Minutes

On Minutes

Figure 32

Service   Backwash   Brine Draw
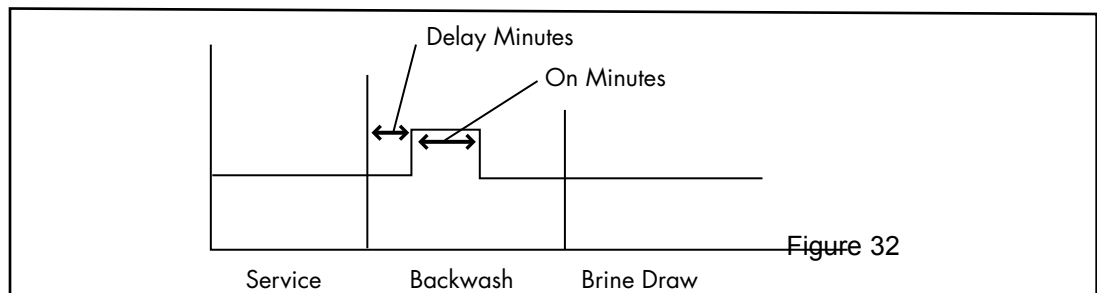
Auxiliary Contacts

Aux Output 2 Example

As mentioned above, for CSM and Hi-Flo 50 softeners, this output is used for the refill solenoid. As an example, let's say we have a CSM-300-2 and we need to set this up for refill minutes. We are looking for a capacity around 250,000 grains (10 lbs/ft³).

According to the chart on page 92 of the CSM installation manual (01016370), we are looking at a salt dosage of 10.2 lbs/ft³ and need to set the ON minutes of AUX2 to 17.

SYSTEM OK 7:32 AM 2-1-08	Here is how to set this up:
› 4) ACCESSORIES	Scroll to **ACCESSORIES** and select
› 4) AUX OUTPUTS	Scroll to **AUX OUTPUTS** and select
› 2) AUX OUT 2 3) AUX OUT 3	Scroll to **AUX OUT 2** and select
AUX2 CYCLE TYPE NORMALLY OFF	Leave this set at **NORMALLY OFF**. We want the output to energize (turn on) the refill solenoid
AUX OUT 2 SERVICE POS	This should be set to **SERVICE POS**.
AUX2 OUT DELAY 0 MINS	No delay is necessary.
AUX2 OUT ON 0 MINS	For our example, this would be set to 17.

AUX OUTPUT 3 has the same menu options. Refer to the chart on page 48 for quick reference.

```
    SYSTEM OK
 7:32 AM 2-1-08
```

To use the auxiliary contacts, some configuration settings must be changed.

```
› 4) ACCESSORIES
```

From the home screen, press the **DOWN** arrow to **ACCESSORIES**. Press the **CHECK MARK** button.

```
› 3) AUX IN
```

Press the **DOWN** arrow key to scroll to **AUX IN**.

(1)

```
  1) AUX INPUT
  › 6 SECONDS
```

```
4) AUX OUTPUTS
```

2)

```
 › 2) AUX OUT#2
   3) AUX OUT#3
```

AUX OUT 2 and **AUX OUT 3** menu selection are the same.

("NORMALLY ON" Type)   ("REPEAT CYCLE" Type)

```
AUX 2 CYCLE TYPE
› NORMALLY OFF
```

```
AUX 2 CYCLE TYPE
› NORMALLY ON
```

```
AUX 2 CYCLE TYPE
› REP EAT CYCLE
```

```
AUX OUT 2
› SERVICE
```

```
AUX OUT 2
› SERVICE
```

```
AUX OUT 2
› SERVICE
```

```
AUX2 OUT
DELAY › 0 MINUTES
```

```
AUX2 OUT
DELAY › 0 MINUTES
```

```
AUX2 OUT
GALLONS › 0
```

```
AUX2 OUT
ON › 0 MINUTES
```

```
AUX2 OUT
OFF › 0 MINUTES
```

```
AUX2 OUT
ON 0 MINUTES
```

```
AUX2 OUT
OFF 0 MINUTES
```

Manual Regeneration

Follow the procedure below to initiate a manual regeneration at the control valve or the remote display.

```
        SYSTEM OK
  12:00 AM 1-1-08
```

```
  1) INFORMATION
  › 2) MANUAL MODE
  3) SET DATE/TIME
  4) ACCESSORIES
```
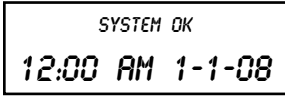
Press **DOWN** arrow. Scroll to **MANUAL MODE**.

Press the **CHECK MARK** button to select.

```
     MANUAL MODE
  ›REGEN OFF
```
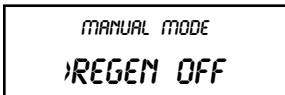
The "**REGEN OFF**" value is the default setting.

Press the **CHECK MARK** button to change manual mode setting. Use the **UP** or **DOWN** arrow to change the setting. Once the desired value is displayed, this value can be accepted by pressing the "**CHECK MARK**" button.

```
     MANUAL MODE
  REGEN TONITE
```
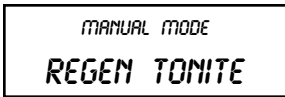
By selecting the "**REGEN TONITE**" value the softener will regenerate that night at 2:00 AM (or at the preset regeneration time)

```
     MANUAL MODE
  REGEN NOW
```

By selecting the "**REGEN NOW**" value the softener will begin regeneration immediately.

NOTE: In multi-tank systems, the regeration request is sent to the master control and it will allow the unit to regerate at the next availble time.

Press the "**CANCEL**" button to return to the "home" screen.

Manual cycling can be performed when the unit is starting either in SERVICE or while it is already within any portion of the REGENERATION process. If the unit is currently regenerating, the name of the current cycle position and the number of minutes remaining in the current cycle position will be displayed.

```
       SYSTEM OK
  7:32 AM 2-1-08
```

```
› 5) ADV SETUP
```

From the home screen, press the **DOWN** arrow to **ADV. SETUP**. Press the **CHECK MARK** button.

```
› 5) DIAGNOSTICS
```

Press the **DOWN** button to scroll to **DIAGNOSTICS**. Press the **CHECK MARK** button at **DIAGNOSTICS**.

```
› 5) MOTOR CONTROL
```

Press the **DOWN** button to scroll to **MOTOR CONTROL**. Press the **CHECK MARK** button at **MOTOR CONTROL**.

If control is not in regeneration, this is shown.

```
    MOTOR AT POS S
   UP: FORWARD
```

To cycle the control valve without stopping press the **CHECK** button. To stop the motor at the end of each cycle press the **UP** arrow.

Menu	Status
MOTOR AT POS S	Motor at service position
MOTOR AT POS B	Motor at backwash position
MOTOR AT POS E	Motor at brine draw/slow rinse position
MOTOR AT POS F	Motor at fast rinse/refill position

If cycling the control during regeneration, this screen is shown after **MOTOR CONTROL**.

```
 BACKWASH MINUTES LEFT: 8
   ›NEXT CYCLE
```

Press the **CHECK MARK** button to change **REGENERATION** setting. Press the **UP** or **DOWN** arrow to move to **NEXT** CYCLE, **END REGEN NOW** or **END/CANCEL TRIG**. Press the **CHECK MARK** when the correct **REGENERATION** setting is displayed.

Information

The following information can be displayed at the control valve or remote display.
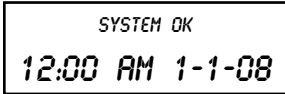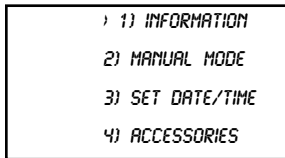
```
      SYSTEM OK
 12:00 AM 1-1-08
```

Press **DOWN** arrow

```
 › 1) INFORMATION
   2) MANUAL MODE
   3) SET DATE/TIME
   4) ACCESSORIES
```

Pressing the **CHECK MARK** button will change the display to show a ">" symbol next to the displayed value.

Press **DOWN** arrow to scroll through the "INFORMATION" menu.

```
 SALT TANK LEVEL
       OK
```
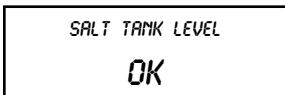
Displays salt level and approximate number of days of salt remaining. This screen will only be displayed if a Smart Brine Sensor is connected.

Press **DOWN** arrow to view next screen.

```
  APPROX 12 DAYS
 SALT REMAINING
```

Displays approximate number of days of salt remaining. This screen will only be displayed if a Smart Brine Tank Sensor is installed.

```
 REMAIN CAPACITY
      80%
```
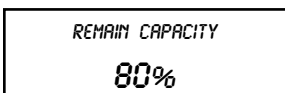
Press **DOWN** arrow to view next screen.

Displays the percent softening capacity remaining.

```
 REMAIN CAPACITY
  870 GALLONS
```
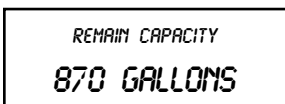
Press **DOWN** arrow to view next screen.

Displays the remaining softening capacity in gallons.

```
 CURRENT FLOWRATE
    0.0 GPM
```
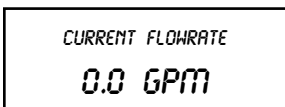
Press **DOWN** arrow to view next screen.

Displays the current flow rate.

```
  NEXT REGEN ON
      1/8
```
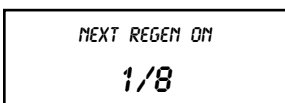
Press **DOWN** arrow to view next screen.

Displays the date when the next regeneration will occur (based on average daily water usage).

```
  TODAY'S USAGE
  115 GALLONS
```
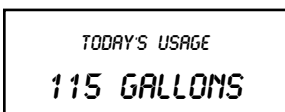
Press **DOWN** arrow to view next screen.

Displays today's water usage.

```
   AVERAGE DAILY
  275 GALLONS
```

Press **DOWN** arrow to view next screen.

Displays average daily water usage.

```
  EXT FILTR CAP REM
 10,000 GALLONS
```

Press **DOWN** arrow to view next screen.

Displays how many gallons remain before the optional filter cartridge needs to be replaced.

X

Press the "**CANCEL**" button to return to the "home" screen.

SET DATE/TIME

If the unit loses time for some reason, you can use this setting to reset the correct date and time. Please note that if you have a modem installed and connected to the phone line, the unit will check for the correct time each time it calls in.

To set the date and time:

```
    SYSTEM OK
  7:32 AM 2-1-08
```

```
 › 1) INFORMATION
```
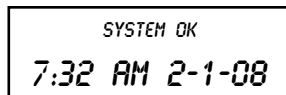
Scroll to Information and select

```
 › 3) SET DATE/TIME
```

Scroll to **SET/TIME**

```
    SET MONTH
```

Scroll up or down to set month

```
    SET DAY
```
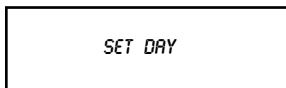
Scroll up or down to set the date

```
    SET YEAR
```
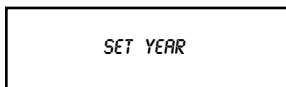
Scroll up or down to set the year (4-digit)

```
    CLOCK TYPE
```
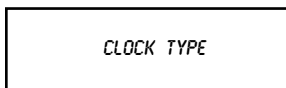
Choices are **24 HR** (00:00 to 23:59) or **12 HR** (AM/PM)

```
    SET HOUR
```
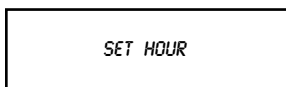
Based on choice of **CLOCK TYPE**, scroll to select the hour

```
    SET MINUTES
```
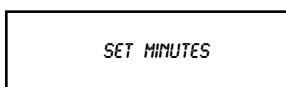
Scroll to set minutes

```
  DAYLIGHT SAVINGS
```

If you observe daylight savings in your area, set to **YES**.

Press the **X** key until you return to the Main Menu.

Error & Alert Codes

When the controller identifies that an error has occurred, it is programmed to take steps to attempt to correct the error on it's own. If it is unable to correct the problem, the controller will display the message "**PROBLEM FOUND**". When an error message is displayed (on either the GBE Controller or the remote display), pressing the "**CHECK-MARK"** on the keypad will display the detected error condition(s). Some of these messages will also provide additional information to help correct the error.

The following error messages may display on both the GBE controller display as well as the Remote Display (if one is connected:)

If the words "**PROBLEM FOUND**" appear on the main screen, it indicates that there are one or more errors detected. Pushing the "**CHECK MARK**" button will display the first error present. Pressing the DOWN arrow will show any additional errors present. At the bottom of this list the user can "**CLEAR THE ERROR**" or "**EXIT**". Pressing the "**CHECK MARK**" button on the "**CLEAR THE ERROR**" message causes the controller to re-check to see if the error condition still exists, if it still exists, the error will remain displayed on the main screen. If the error no longer exists the main menu will return to displaying "**SYSTEM OK**".

Error Description	Reason for Error	Comment/ Clearing Error Message
POSITION SENSOR ERROR	The motor is turning, but the position sensor appears to be incorrect	Check the motor using manual motor control and the position sensors using Main Menu/ Advanced/ Diagnostics Sensors
MOTOR POSITION ERROR	Motor did not move when it should. No feedback from switches.	Use manual motor control to see if motor is actually working and not jammed. Use Diagnostics/ Sensor menu to verify that the optical or mechanical position switches are working
BRINE BLOCKED	The flow rate of brine or water to or from the brine tank is fully or partially blocked	Check brine line for blockages or air leaks. Check eductor and eductor screen for blockages
REPLACE FILTER MEDIA	Total gallons thru the unit has exceeded the specified capacity of the media	Replace the media. Reset the media filter life at Main Menu/ Advanced Setup/Regen Settings/ Media Life
REPLACE AUX FILTER MEDIA	Total gallons thru the secondary filter (i.e. "Big Blue" filter) has exceeded the specified capacity of the big blue	Replace optional filter cartridge. Reset the aux. Filter media life at Main Menu/ Accessories/ Aux Filter menu
CALL CULLIGAN AT XXX-XXX-XXXX	This message is displayed if an error has been detected that requires servicing and no modem installed in the system	Call the number shown. If possible, place this call using a phone that will allow you to see and enter changes to the main controller if required by the service technician during the call
SALT BRIDGING	Brine tank has low concentration of brine	Use a tool to break up any salt bridge inside the brine tank
XX DAYS SALT REMAINING	This is a prediction of the number of days until it will be necessary to add salt to the brine tank	Salt can be added to the brine tank at any time. It is recommended that the brine tank be filled to approximately 2/3 full.
AQUA-SENSOR SALT ERROR	Aqua-Sensor did not detect brine during the regeneration cycle	Check brine tank - add salt if necessary. Check Z ratio of the Aqua-Sensor at Main Menu/ Advanced / Diagnostics/ Sensors
NO REMOTE RF SIGNAL	Main board is not receiving a signal from the remote	Remote is off, out of range or on a different channel from the main board. If interference is suspected, try moving the remote closer or switching to a different channel on both the main and remote units
LOW SALT LEVEL	Salt level is low; less than 15 days of salt remaining.	Contact Culligan dealer for salt deviery or fill brine tank with salt.
LOW BATTERY	Battery needs replacement.	Replace with Panasonic Model# CR 2032 3V battery.
BRINE OVERFILL	Too much water in brine tank. Plugged drain line flow control (Unit will not draw brine). Slow leak to brine line. Faulty eductor piston Power outage while control was in refill position.	Check edorctor; check fro brine draw. Clean drain line flow control. Clean eductor screen and nozzle. Replace ductor piston.
NO REFILL	Failure to refill brine tank. Refill restrictor plugged. Air in brine line causes float to slam shut.	Clean or replace refill restrictor. Verify all tubing connections are properly assembled.

There is a large number of diagnostic menu screens to aid in setup and troubleshooting of the GBE. Below is an overview of the menus.

Advanced Statistics

```
      SYSTEM OK
  7:32 AM 2-1-08
```

```
› 5) ADV SETUP
```

From the home screen, press the **DOWN** arrow to **ADV. SETUP.** Press the **CHECK MARK** button.

```
› 5) DIAGNOSTICS
```

Press the DOWN arrow button to scroll to **DIAGNOSTICS**. Press the **CHECK MARK** button at **DIAGNOSTICS**.

```
› 1) ADVANCED STAT
```

From the **DIAGNOSTICS** screen, press the **CHECK MARK** button at **ADVANCED STAT**.

```
   TOTALIZED FLOW
  18203 GALLONS
```

The total number of gallons of soft water since the unit was installed is displayed. Press **DOWN** arrow to view the next statistic.

```
  CURRENT FLOW RATE
     5.0 GPM
```

The **CURRENT FLOW RATE** of the unit is displayed. Press **DOWN** arrow to view the next statistic.

```
    TOTAL REGENS
        3
```

This is the total number of regenerations since the unit was installed   Press **DOWN** arrow to view the next statistic.

```
  REGENS IN LAST 14 DAYS:
        3
```

This is the number of **REGENS IN LAST 14 DAYS** of operation. Press **DOWN** arrow to view the next statistic.

```
  DAYS SINCE LAST REGEN:
        1
```

This is the number of **DAYS SINCE LAST REGENERATION** of unit. Press **DOWN** arrow to view the next statistic.

```
   LAST REGEN ON:
       1/3
```

This is the date of last regeneration of unit (January 3). Press **DOWN** arrow to view the next statistic.

```
   LAST REGEN TRIG
    FLOW METER
```

This shows what device triggered the last regeneration. Press **DOWN** arrow to view the next statistic.

```
  REMAINING CAPACITY
   613 GALLONS
```

This shows the **REMAINING CAPACITY** of the unit in gallons. Press **DOWN** arrow to view the next statistic.

```
   TOTAL CAPACITY
   891 GALLONS
```

This shows the **TOTAL CAPACITY** of the unit in gallons. Press **DOWN** arrow to view the next statistic.

Diagnostics

```
    FW110LT01
  MAY 9 2008
```
This shows the latest firmware version of unit. Press **DOWN** arrow to view the next statistic.

```
  S/N: 00001078
```
This shows the serial number of circuit board. Press **DOWN** arrow to view the next statistic.

```
   LAST POWER UP
01-01-08 12:01 PM
```
The date and time showed here is when the unit last was powered up. This can be helpful if there was a power outage to see how long the unit has been on.

Check Sensors - Main Board, Flow meter, and/or Aqua-Sensor.

```
    SYSTEM OK
 7:32 AM 2-1-08
```

```
› 5) ADV SETUP
```
From the home screen, press the **DOWN** arrow to **ADV. SETUP**. Press the **CHECK MARK** button.

```
› 5) DIAGNOSTICS
```
Press the DOWN arrow to scroll to **DIAGNOSTICS**. Press the **CHECK MARK** button at **DIAGNOSTICS**.

```
› 2) CHECK SENSORS
```
Press the DOWN arrow to scroll to **CHECK SENSORS.** Press the **CHECK MARK** button at **CHECK SENSORS**.

```
MAIN BOARD POSITION SENSOR
   HOME: OFF POS: OFF
```
MAIN BOARD POSITION: Position of Home & Program switches. Press **DOWN** arrow to view the next statistic.

Cycle	Home Switch	Program Switch
Service	Off	Off
Backwash	On	On
Brine Draw/Slow Rinse	On	Off
Fast rinse/Refill	On	On

```
   FLOW METER
  7 PULS/SEC
```
FLOW METER: Current pulses per second. (K-Factor) - refer to page 63 to varify correct reading. Press **DOWN** arrow to view the next statistic.

```
AQUASENSOR SUPPLY VOLTAGE
    2.5VAC: PASS
```
AQUASENSOR SUPPLY VOLTAGE: This will be either **PASS** or **FAIL**. If this reading is **FAIL**, check the Aqua-Sensor connection to the circuit board and to the power supply. Press **DOWN** arrow to view the next statistic.

```
     AQUASENSOR

   ZRATIO  1.075
   ZMINIMUM 1.070
   0.75% INCREASE
```

AQUASENSOR: Troubleshooting statistics.

- **Z-Ratio (impedance ratio)** - Number calculated by microprocessor on measured voltage values that are converted to a digital representation. This is the value that the control monitors in order to determine need for regeneration and salt rinse-out.

- **Z-Minimum (minimum impedance ratio)** - Reference point that the Z-ratio is compared to, in order to initiate a regeneration. This number is reset after every successful regeneration.

- **Increase Percent (impedance ratio increase)** - During service, this number represents the percent increase or z-ratio over z-minimum. A regeneration is initiated when it reaches 7.5% or more for at least 6 minutes.

Press **DOWN** arrow to view the next statistic.

```
     SBT SENSOR

   SALOMETER:OP
   SALT LEVEL:OP
   FR1:BL  FR2:OP
```

SBT SENSOR: Smart Brine Tank Probe troubleshooting statistics.

The SBT probe has four sensors within it. The Check sensor screen displays the current status (opened = "OP", or blocked ="BL") for all four sensors. The expected outputs from the SBT probe inside the brine tank are shown in Table 1 below while the expected outputs from an SBT probe "in air" are shown in the Table 2.

Table 1 - Expected Readings on the Sensor/Diagnostic screen when the SBT probe is installed inside the brine tank

	displays "BL"	displays "OP"
Salometer	Brine at least 1 inch above the salt plate.	
Salt Level	Normal Operation .– Salt level greater than 8" above the salt plate	Salt level less than 8" above the salt plate
Flow Rate #1	Water level in brine tank is below salt plate	Water level is brine tank is more than 1" above salt plate
Flow Rate #2	Water level is brine tank is more than 1" above salt plate	Water level in brine tank is below salt plate

Table 2 - Expected Readings from the SBT probe when the probe is just sitting in "air" (ie not installed in the brine tank)

	Normally	Probe Inverted
Salometer	"OP"	"BL"
Salt Level	"OP"	"OP"
Flow Rate #1	"BL"	"OP"
Flow Rate #2	"OP"	"BL"

Diagnostics

```
   SBT AVG T3
 30 SECONDS
```

SBT AVG T3: In addition to these four sensors, the SBT probe takes a measurement during each regeneration cycle called "T3". This measurement varies from system to system, but is typically between 10 and 60 seconds for a system. When the SBT is turned from UNINSTALLED to INSTALLED on the Accessories menu, the average value of T3 is erased and the system will use the next three regeneration cycles to compute a new T3 average number. During each subsequent regeneration, the new T3 is compared to the average T3 number. If the new T3 exceeds the average T3 by more than 50% then the system will display a "Brine Line Blockage – Check Brine Line" error message. The average T3 value is displayed on the diagnostic screen after the SBT sensor screen.

```
   SBT LAST T3
 30 SECONDS
```

Press **DOWN** arrow to view the next statistic.

SBT LAST T3: Smart Brine Tank Probe troubleshooting statistics. This is the last T3 valve recorded by the probe. Press **DOWN** arrow to view the next statistic.

Test Wireless: See page 37.

Test Progressive Flow:

```
   SYSTEM OK
 7:32 AM 2-1-08
```

```
 › 5) ADVANCED SETUP
```

Scroll to **ADVANCED SETUP** and select

```
 › 5) DIAGNOSTICS
```

Scroll to **DIAGNOSTICS** and select

```
 › 4) TEST PROGRESSIVE FLOW
```

Scroll to **TEST PROGRESSIVE FLOW** and Select

```
 PROGRESSIVE TEST
 1:0000, 2:0000
 3:0000, 4:0000
 5:0000, TX: 0000
```

The progressive test screen will show the data packet transmissions from the Master (Tx) and which slaves are recieving (1,2,3,4 and/or 5). For example, in a triple system, if the transmission from the master (Tx) is 0085, then you should see 1:0085 and 2:0085. 3,4, and 5 will remain all zeros since no other slaves are connected.

```
 MOTOR CONTROL
```

See page 50

```
 USE DATA PORT
```

See Appendix C, page 65

```
 TEST PHONE LINE
```

See page 40

```
 TEST WC APP
```

IGNORE THIS

Menu Lockout and Menu Default

Menu Lockout

It is possible to lock the keypad of the GBE controller so that users will only have access to the INFORMATION, MANUAL MODE, and SET DATE/TIME menu screens. The system can be locked by pushing the up and down arrow keys simultaneously and holding them down for 10 seconds. Repeating this process will unlock the keypad.

Menu Default

Below is the procedure to default the board to factory settings and begin the FIRST TIME SETUP.

1.   Power down the control.
2.   Press and hold "UP" and "CANCEL" buttons.
3.   Power up the control while continuing to hold "UP" and "CANCEL" buttons. for at least 5 seconds
4.   Release "UP" and "CANCEL" buttons. (display should be blank - if not go back to step 1)
5.   Power down the control.
6.   Power up the control again. You should see the display light up for 2 seconds and then show FIRST TIME SETUP.
7.   Follow FIRST TIME SETUP process on page 23.

Menu Overview

MAIN MENU

System OK
01-01-08 12:00AM

MENU

1)INFORMATION	Salt Tank Level OK	Apprxx 12 days Salt Remaining (displayed when salt is below sensor)	REMAIN CAPACITY XX%	REMAIN CAPACITY XXXXX Gal	TOTAL SALT USED X.X LBS	Current FlowRate X.X GPM	TODAY'S USAGE XXX GALLONS

2)MANUAL MODE	MANUAL MODE REGEN OFF	MANUAL MODE REGEN NOW	MANUAL MODE REGEN TONITE

3)SET DATE/TIME	SET MONTH JAN	SET DAY 2	SET YEAR 2008	CLOCK TYPE 12 HR	SET HOUR 7PM	SET MINUTES 40	DAYLIGHT SAVING YES

ACCESSORIES

4)ACCESSORIES	1)AQUASENSOR	2)BEEPER	3)AUX IN	4)AUX OUTPUTS

	AQUASENSOR INSTALLED	BEEPER MODE ALWAYS OFF	AUX INPUT 6	1)AUX OUT 2	AUX2 CYCLE TYPE Normally Off	AUX OUT 2 Service Position	AUX2 OUT DELAY 0 Mins

	AQUASENSOR DEBUG OFF	BEEPER MODE ALWAYS ON		2)AUX OUT 3	AUX3 CYCLE TYPE Normally Off	AUX OUT 3 Service Position	AUX3 OUT DELAY 0 Mins

BEEPER MODE 12 HR WARNINGS

BEEPER MODE 24 HR WARNINGS

AVEAGE DAILY XXX GALLONS	NEXT REGEN ON 4/18

	5)SBT SENSOR	6)WIRELESS REMOTE	7) MODEM	8)CHLORINATOR	9)FLOW METER	10)SERVICE PHONE	11)EXT. FILTER

| AUX2 OUT ON 0 Mins | SBT SENSOR INSTALLED | REMOTE DISPLAY INSTALLED | TELEPHONE MODEM NOT INSTALLED | CHLORINATOR NOT INSTALLED | FLOW METER 80.0 PULS/GAL | SERVICE PHONE # | EXT FILTER ALRM INSTALLED |

| AUX3 OUT ON 0 Mins | BRINE TANK AREA 250 SQ/IN | CHANNEL # 1 | MODEM LOCATION >IN MAIN CONTROL | | | | FILTER CAPACITY 100000 GALLONS |

| | SALT GEOMETRY PELLET | RF FREQUENCY 915MHz | CALL FREQUENCY >EVERY 10 REGENS | | | | RESET CAPACITY NO |

TIME ZONE >00:00

DEALER ID >00000000

DATA PHONE # >18884137028

Menu Overview

ADVANCED SETUP

5)ADVANCED SETUP

1)SYSTEM SETUP

VALVE TYPE
4-CYCLE

RESIN TYPE:
STANDARD

HARDNESS GPG
25
(1011 GAL)

DIAL-A-
SOFTENESS   A

IRON
PRESENT 0
          PPM

LINE PRESSURE
ABOVE 40 PSI

SALT TYPE
NACL

MULTITANK
SYSTEM
SINGLE

PROG FLOW TRIP
10 GPM

PROGRESS FLOW
MASTER

BRINE FILL FLOW
0.45
GPM

PROGRESSIVE FLOW
IF MULTI-TANK SYSTEM IS
GREATER THAN SINGLE
Not applicable for Smart Sensor
Advanced

2)REGEN SETUP

SALT DOSAGE
9.0
LBS

RESERVE CAPACITY
30%
(303 GAL)

TIME OF REGEN
2:00 AM

REGEN MODE
DELAYED

Regen Lockout
FOR 0
HOURS

3)CYCLE TIMES

CYCLE TIMES
USE DEFAULTS

BACKWASH TIME
10
MINUTES

BRINE
DRAW/RINSE
71

FAST RINSE TIME
7
MINUTES

4)REGENTRIGGER

FLOW METER
CAN TRIGGER

AQUASENSOR
CAN TRIGGER

REGEN INTERVAL
NUMBER OF DAYS:
0

PREDICT MODE
OFF

REGENERATION ON
MONDAY
OFF

REGENERATION ON
TUESDAY
OFF

REGENERATION ON
WEDNESDAY
OFF

REGENERATION ON
THURSDAY
OFF

REGENERATION ON
FRIDAY
OFF

REGENERATION ON
SATURDAY
OFF

REGENERATION ON
SUNDAY
OFF

DIAGNOSTICS

5)Diagnostics

1)ADVANCED STAT

TOTALIZED FLOW
XXXXX
GALLONS

CURRENT FLOWRATE
X.X
GPM

TOTAL REGENS
X

2)CHECK SENSORS

MAIN BOARD
POSITION SENSOR
HOME:OFF POS:OFF

FLOW METER
X
PULS/SEC

AQUASENSOR
SUPPLY VOLTAGE
2.5VAC: PASS

3)TESTWIRELESS

WIRELESS TEST
100 / 100
RSSI=8

4)TEST PROGRESSIVE
Flow

Progressive TEST
0
3:0000, 4:0000
5:0000   Sent:000

5)MOTOR CONTROL

MOTOR AT POS B
UP:Forward

6)USE DATA PORT

Mini Report:
Send...

7)TEST PHONELINE

MODEM TEST
Emailing now
Please Wait...

MODEM EMAIL
SUCCESS

MODEM TEST TIME
SET SUCCESS

8)TEST WC APP

| LAST REGEN ON 1/ 1 | LAST REGEN TRIG AQUASENSOR | LAST BD/SR TIME AQUASENSOR | REMAIN CAPACITY XXX GALLONS | TOTAL CAPACITY XXXX GALLONS | FWV119LT01 Aug 11 2008 | S/N:00001052 | LAST POWER UP 01-02-08 3:07PM |

| SBT AVG T3 30 SECONDS | SBT LAST T3 30 SECONDS |

Appendix A

Clack

Autotrol

Signet/ Seametrics

Flow Device K-Factor Data

Meter Type	Installation Fitting Type (if applicable)	Pipe Size	Flow Range (Gal. Per Min.)[1]	K-Factor - Gallons	K-Factor - Liters
Hi-Flo 22	Integral			78	295.2
Clack	Brass Tee	1.5"	0.75 to 75	37	140
Clack	Stainless Steel Tee	2.0"	1.5 to 150	20	75.7
Autotrol	Plastic Body w/SS ends	1.5"	7 to 250	15	56.8
Autotrol	Plastic Body w/SS ends	2"	7 - 250	15	56.8
SeaMetrics Paddlewheel	All	2"	3.1 - 195.8	18	58.1
	All	3"	6.6 - 440.6	11	41.6
	All	4"	11.74 - 783.2	6.5	24.6
Signet Paddlewheel (Blue Nut)	Sch. 80 PVC Tee	1"	0.6 - 42	352.4	1333.8
		1.25"	1.2 - 77	177.2	670.7
		1.5"	1.6 - 106	117.9	446.3
		2"	2.7 - 179	66.7	252.5
		2.5"	3.8 - 256	43.0	162.8
		3"	6.0 - 401	26.7	102.1
	Sch. 40 Galvanized Tee	1"	0.7 - 44	213.0	806.2
		1.25"	1.2 - 80	127.7	483.3
		1.5"	1.7 - 110	94.4	357.3
		2"	2.8 - 184	58.4	221
	Type K Copper Tee	1"	0.7 - 48	256.4	970.5
		1.25"	1.1 - 75	176.4	667.7
		1.5"	1.6 - 107	115.7	437.9
		2"	2.8 - 187	63.4	240
	Type L Copper Tee	1"	0.8 - 51	241.6	914.5
		1.25"	1.2 - 78	170.9	646.9
		1.5"	1.7 - 110	112.0	423.9
		2"	2.9 - 192	61.7	235.5
	Sch. 40 Steel Pipe Saddle	2.5"	4.5 - 298	37.6	142.3
		3"	6.9 - 460	23.2	87.8
		4"	11.9 - 793	13.3	50.3
	Sch. 80 PVC Saddle	2.5"	3.9 - 256	43.0	162.8
		3"	6.0 - 401	26.7	101.1
		4"	10.5 - 701	15.0	56.8
	Brazolet -Sch 40 Copper Pipe -Sch 40 Bronze Pipe -Sch 40 Brass Pipe Weldolet -Sch 40 Steel Pipe	2.5"	4.0 - 264	37.6	142.3
		3"	6.2 - 411	24.3	92
		4"	10.8 - 716	13.9	52.6

GBE Controller Parts & Accessories List

Part Number	Item
Complete Controls	
01020677	GBE Controller Complete for CSM, HF50 Softener
	GBE Controller Complete for CSM, HF42, HF50 Filter
	Hi-Flo 22 Softener Control Valve with GBE Controller
	Hi-Flo 22 Filter Control Valve with GBE Controller
	HF3e Conversion Kit – 2"
	HF3e Conversion Kit – 1-1/2"
Accessories and Replacement Parts	
01020745	Replacement GBE Board
01020497	Replacement Key pad
01020748	Auxiliary Board
01020747	Modem Board
01020750	RF Board
01020553	Remote Display - Complete
0101	Transformer
01020447	Smart Brine Tank Accessory
01008779	Aqua-Sensor – Steel Tank
01018959	Aqua-Sensor – Fiberglass Tank
CR 2032	Battery
Cables and Kits	
01016327	Communication Cable
01016342	Communication Cable – Duplex Alternating
01016333	Duplex Progressive Kit
01016334	Triplex Progressive Kit
01016369	Duplex Alternating Kit
0102	SBT Extension Cable, 20ft
0102	PLC-USB Communication Cable w/CD
0102	PLC-RS485 Communication Cable
0102	PLC-RS232 Communication Cable

Culligan GBE Controller – Data Port Output

The GBE controller is used to control water softeners, filters and commercial RO systems. This controller has the ability to provide "status messages" to a customer's equipment using RS-232 and RS-485 communication protocols. These protocols are commonly used to send information from the GBE to either a customer's PC or to a building management system or programmable logic controller (PLC). The information is "one-way" in that the GBE can send this information out, but the GBE cannot receive or respond to any commands sent into the communication port. The GBE sends a "status message" every 10 minutes. The information is send as a short text (ASCII), comma separated string of letters and numbers.

The information contained in the "status message" depends upon what type of equipment is being controlled by the GBE.

Single Water Softener or Filter controlled by GBE:

The format of the "status message" is: CULL,A,B,C,D,E,F

Example: CULL,52754,57.2,1,911,0x0000,1

Where the values for the fields A thru F are as follows:
   A = total gallons since new
   B = current flow rate in gallons per minute (57.2 means 57.2 gallons per minute)
   C = Current Status Indicator (0 = initialization, 1=service, 2=prerinse, 3=regen, 4= standby)
   D = capacity remaining in gallons
   E = Error Flag (see below)
   F = 1

Error Bit	Meaning
0	Internal Valve Leak
1	Salt Bridging Detected
2	Brine Line Blocked
3	Brine Tank Overfill Error
4	Replace Media Filter
5	No RF Remote Signal
6	AquaSensor Salt Error (possibly low salt or failed eduction)
7	Motor Homing Error
8	Motor Position Sensor Error
9	Low Salt Level in Brine Tank
10	(not used)
11	AquaSensor Probe Fault (probe has failed, not plugged in or AquaSensor transformer failed)
12	Less than 14 Days Salt

The error flag is sent as a hexadecimal number in the format 0xWXYZ as follows:

W				X				Y				Z			
15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0

Each error bit is either '0' meaning that this error is NOT present, or '1' meaning that this error IS present. Each of the four-bit sections (W, X, Y and Z) are then combined into a four digit binary word which is converted to a hexadecimal digit.

As an example, if there are no errors present, then the value would be 0x0000.

If there were a 'Replace Media Filter', 'Aquasensor Salt Err' and 'Motor Position Sensor Error' present then bits 4, 6 and 8 would be set to '1' respectively and all other bits would be '0'.

	W				X				Y				Z			
Error Bits	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Binary	0	0	0	0	0	0	0	1	0	1	0	1	0	0	0	0
hexadecimal	0				1				5**				0			
Error Flag	0x0150															

*note that the first two characters of the error flag are always "0x" to signify that this is a hexadecimal number
** In hexadecimal, the number 4 bit equals 1, the number 5 bit equals 2, the number 6 bit equals 4, and the number 7 bit equals 8. Therefore, when you add the #4 bit value to the #1 bit value, you get 5.

So the value of the error flag would be 0x0150 if these three errors were present.

NOTE: If the GBE is controlling a Filter (instead of a water softener) then the above message definitions are identical, but that error flags 1,2,3,6,9 and 11 will always be zero for a filter)

Progressive Flow System of Water Softeners controlled by GBE:

The format of the "status message" for a progressive flow network consists of a series of individual lines of information, one line for each of the gbe controlled softeners. For example, in a triplex progressive flow network, every 10 minutes, the data port on the master unit will send out the following three lines of information:

CULL,A1,B1,C1,D1,E1,1
CULL,A2,B2,C2,D2,E2,2
CULL,A3,B3,C3,D3,E3,3

example: CULL,52754,3.7,1,9110,0x0000,1
           CULL,42674,3.5,1,4321,0x0000,2
           CULL,10204,0.0,4,5444,0x0000,3

The '1' at the end of the first line indicates that this line is the status for the Master unit in the progressive flow network. The '2' and '3' on the subsequent lines indicate that this data is for slave unit **#1** and slave unit **#2** respectively. The information contained on each line is of the same format as described in the Single softener section above.

Electrical Connections

The Culligan Data Cable Connector is terminated with a D-sub9 style female termination. The customer must provide the following pin connections:

Appendix C

Pin		Function	
3	(input)	TD	(data coming FROM the GBE board)
2	(output)	RD	(this line is required even though no data is sent TO the GBE board)
7	(input)	RTS	
8	(output)	CTS	
5	(signal gnd)	GND	

The data coming from the GBE board is at the following conditions:

> Bits Per Second: 9600
> Data Bits: 8
> Parity: None
> Stop Bits: 1
> Flow Control: None

The following style data cables are available from Culligan:

Cable P/N: xxxxxxxx   9-pin female RS-232 output

Cable P/N: xxxxxxxx   9-pin female RS-485 output

Cable P/N: xxxxxxxx   USB style output cable - comes with CD-ROM which includes device drivers for Microsoft Windows VISTA, XP, and Windows 2000 operating systems

Test Data Port

Once your cables are set up, you can test your connection using the Windows' Hyperterminal program. This program is generally found under **Start/All Programs/Accessories/Communications/ Hyperterminal**

When you open Hyperterminal it will ask you to create a name for the connection. Enter any name you choose and click **OK**.

Next you are asked to select a COM port. From the drop down list, pick the COM port with the highest number and click **OK**.

Next you are asked to set the properties for this COM port. They should be set as shown.

After you click **OK**, Hyperterminal is ready to accept data.
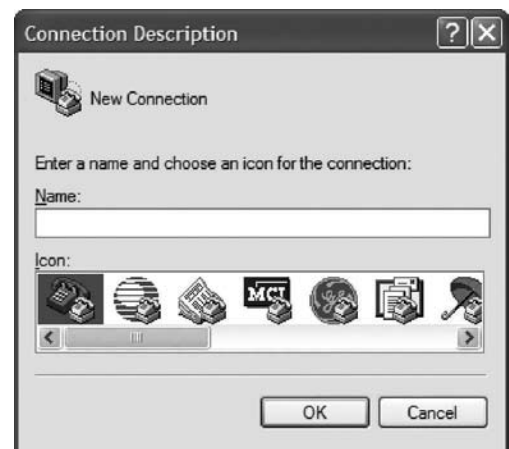
Return to the GBE controller and press the **Down Arrow** to enter the Menu.

Using the down arrow, scroll down to number 5, **Advanced Setup**, and press the **checkmark**.

Using the down arrow, scroll to number 5, **Diagnostics**, and press the **checkmark**.

Scroll to number 6, **Use Data Port**. When you press the **checkmark**, the GBE controller will send a test message to the Hyperterminal screen. It will look similar to this:

If you do not see the report, check your settings and make sure

*** MINI REPORT ***

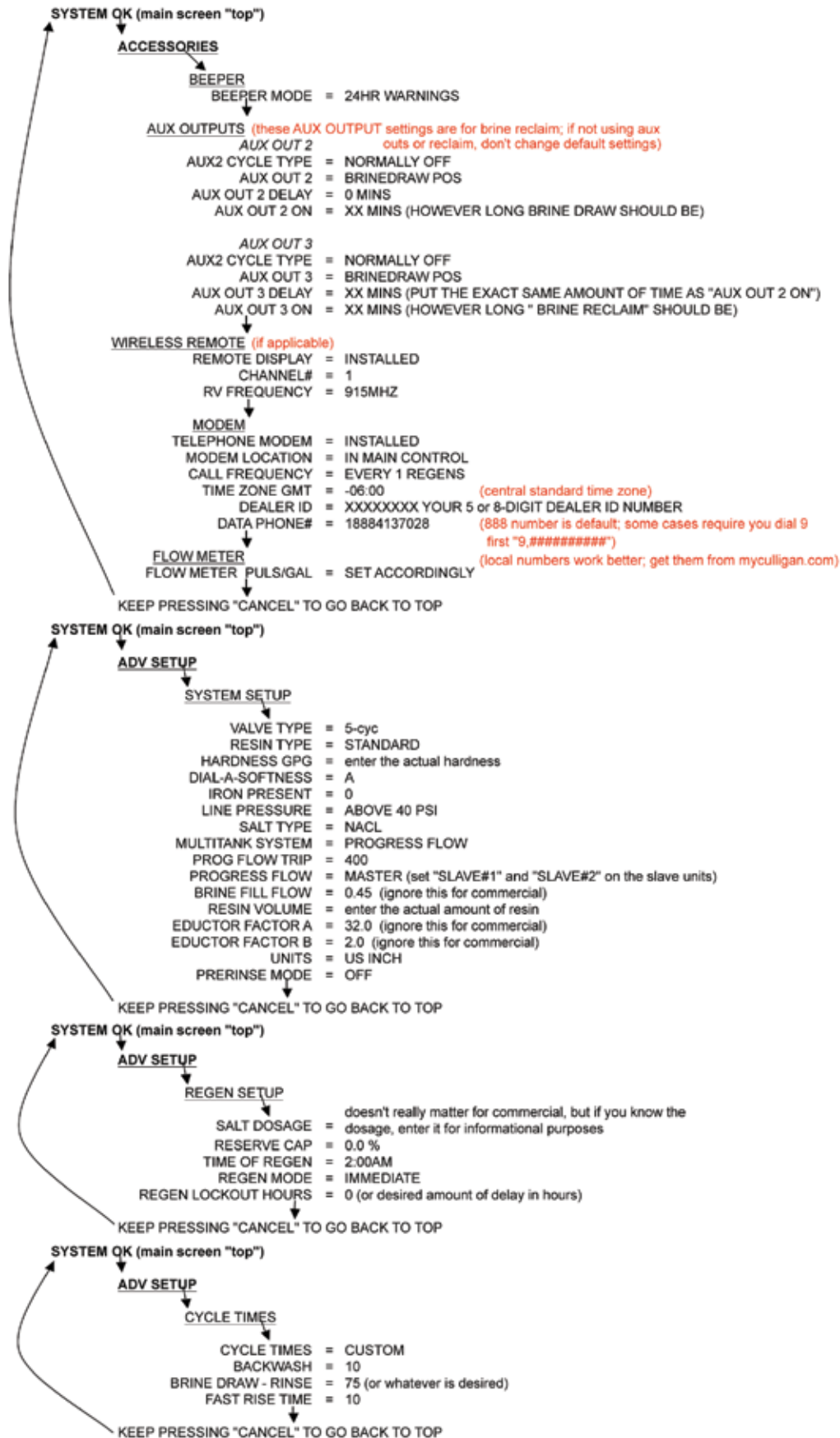|	
SN = 00001078	Fill = 441 sec
Date = 9/4/8	Dosage = 9.0 LBS
Time = 14:02	DAS = A
Total = 28696 GAL	Iron = 0 PPM
regen 14d = 0	Pressure = HIGH
trigger = Power Outage	Salt type = NaCl
type = softener	Resin type = std
hardness units = US	BF Flow control = 0.45 GPM
Hardness = 25 grains	Eductor Flow control = 32.0
Resin = 1.00 cu/ft	Reserve capacity = 25 %
avg mon = 710 GAL	flow meter trig = yes
avg tue = 937 GAL	aquasensor trig = yes
avg wed = 1201 GAL	regen interval = 7
avg thr = 839 GAL	predict mode = no
avg fri = 1364 GAL	day of week mode = none
avg sat = 85 GAL	brine type = Downflow
avg sun gal = 710 GAL	pre-rinse mode = yes
bw time = 10 min	prerinse after 24 hours
BD rinse = 71 min	prerinse for 5 mins
F rinse = 10 min	units = US
	A/S = not installed
	SBT = inst

the cables are firmly connected. If you still don't see the report, try some of the other COM ports.

Every 10 minutes you should see a status message on the screen that will look similar to this:

CULL,52754,57.2,1,911,0x0000,1

This message was described at the beginning of this Appendix.

Appendix D

SYSTEM OK (main screen "top")

ACCESSORIES

BEEPER
BEEPER MODE = 24HR WARNINGS

AUX OUTPUTS (these AUX OUTPUT settings are for brine reclaim; if not using aux
outs or reclaim, don't change default settings)

AUX OUT 2
AUX2 CYCLE TYPE = NORMALLY OFF
AUX OUT 2 = BRINEDRAW POS
AUX OUT 2 DELAY = 0 MINS
AUX OUT 2 ON = XX MINS (HOWEVER LONG BRINE DRAW SHOULD BE)

AUX OUT 3
AUX2 CYCLE TYPE = NORMALLY OFF
AUX OUT 3 = BRINEDRAW POS
AUX OUT 3 DELAY = XX MINS (PUT THE EXACT SAME AMOUNT OF TIME AS "AUX OUT 2 ON")
AUX OUT 3 ON = XX MINS (HOWEVER LONG " BRINE RECLAIM" SHOULD BE)

WIRELESS REMOTE (if applicable)
REMOTE DISPLAY = INSTALLED
CHANNEL# = 1
RV FREQUENCY = 915MHZ

MODEM
TELEPHONE MODEM = INSTALLED
MODEM LOCATION = IN MAIN CONTROL
CALL FREQUENCY = EVERY 1 REGENS
TIME ZONE GMT = -06:00 (central standard time zone)
DEALER ID = XXXXXXXX YOUR 5 or 8-DIGIT DEALER ID NUMBER
DATA PHONE# = 18884137028 (888 number is default; some cases require you dial 9
first "9,#########")
(local numbers work better; get them from myculligan.com)

FLOW METER
FLOW METER PULS/GAL = SET ACCORDINGLY

KEEP PRESSING "CANCEL" TO GO BACK TO TOP

SYSTEM OK (main screen "top")

ADV SETUP

SYSTEM SETUP

VALVE TYPE = 5-cyc
RESIN TYPE = STANDARD
HARDNESS GPG = enter the actual hardness
DIAL-A-SOFTNESS = A
IRON PRESENT = 0
LINE PRESSURE = ABOVE 40 PSI
SALT TYPE = NACL
MULTITANK SYSTEM = PROGRESS FLOW
PROG FLOW TRIP = 400
PROGRESS FLOW = MASTER (set "SLAVE#1" and "SLAVE#2" on the slave units)
BRINE FILL FLOW = 0.45 (ignore this for commercial)
RESIN VOLUME = enter the actual amount of resin
EDUCTOR FACTOR A = 32.0 (ignore this for commercial)
EDUCTOR FACTOR B = 2.0 (ignore this for commercial)
UNITS = US INCH
PRERINSE MODE = OFF

KEEP PRESSING "CANCEL" TO GO BACK TO TOP

SYSTEM OK (main screen "top")

ADV SETUP

REGEN SETUP

SALT DOSAGE = doesn't really matter for commercial, but if you know the
dosage, enter it for informational purposes
RESERVE CAP = 0.0 %
TIME OF REGEN = 2:00AM
REGEN MODE = IMMEDIATE
REGEN LOCKOUT HOURS = 0 (or desired amount of delay in hours)

KEEP PRESSING "CANCEL" TO GO BACK TO TOP

SYSTEM OK (main screen "top")

ADV SETUP

CYCLE TIMES

CYCLE TIMES = CUSTOM
BACKWASH = 10
BRINE DRAW - RINSE = 75 (or whatever is desired)
FAST RISE TIME = 10

KEEP PRESSING "CANCEL" TO GO BACK TO TOP

LET	CHANGE	BY	APRVD	DCO	DATE
A	NEW ART CREATED	BSM	KR	010703	08/13/08
A^1	Revisions	BSM	KR	010703	09/04/08
A^2	Revisions	BSM	KR	010703	09/18/08
A^3	Revisions	BSM	KR	010703	09/25/08
A^4	Minor revisions	BSM	KR	010703	10/02/08
A^5	Minor revisions	BSM	KR	010703	10/15/08
A^6	Minor revision	BSM	KR	010703	10/16/08