

## TROUBLE SHOOTING - CONTINUED

3. Make sure that the operating mode the Equipment Module is presently in, is an operating mode that will allow the heater to come ON. Refer to Operating Instructions.
4. Make sure that all valves, if equipped, are open, to allow a full flow of water through the system. Limited water flow will NOT build up enough pressure to allow the heater to come on.
5. Clean the filter to assure maximum water flow.
6. Make sure that the timer, if equipped, is in a position that will allow heat. See **TIMER OPERATING INSTRUCTIONS**.

### **D. WATER WILL NOT ATTAIN PROPER TEMPERATURES:**

1. The spa should have a thermal cover. A spa will lose the majority of its heat from the surface of the water.
2. Turn thermostat **CLOCKWISE** to a higher temperature setting.
3. If the Equipment Module is equipped with an optional Tri-Timer or heating timer, increase the amount of time allowed for heating.

### **E. PULSATING OR MINIMAL WATER FLOW IN HIGH SPEED MODE:**

1. Make sure water level of the spa is above the highest jet or skimmer.
2. Make sure that all valves, if equipped, are open.
3. Make sure the filter is full of water.
4. Make sure the filter is clean.
5. Make sure the suction lines are free of debris.

### **F. WATER DOES NOT CLEAR UP:**

1. Make sure that the filter is clean.
2. Check water chemistry for proper chemical balance.
3. If the Equipment Module is equipped with an optional filtering timer, increase the filtering timer setting.

### **G. BLOWER WILL NOT BLOW AIR INTO THE SPA:**

1. Check air blower connections for leaks.
2. Make sure the air blower is plugged into the air blower receptacle, located on the side of the Equipment Module.

### **H. UNIT WILL RUN BUT WON'T SWITCH MODES OF OPERATION:**

1. Equipment Modules with air operated switching: Make sure the air tubing is attached properly from the air switch receiver(s), located on the right side of the Equipment Module, to the air button at the spa side. The air tube should not be tightly stretched between these two points, be pinched, or have water in it.
2. Equipment Modules with electronic spa-side controller: Make sure the spa-side control is connected to the spa-side control receptacle, located on the side of the Equipment Module.

## HEATER HIGH-LIMIT SWITCH

The Equipment Module is equipped with a high-limit safety switch. This switch will shut the heater OFF if the temperature within the heater assembly reaches a factory-set, non-adjustable limit of approximately 122°F (50°C).

If the high-limit switch trips, allow the spa water to cool below 104°F (40°C), and depress the high-limit reset button, located on the front of the Equipment Module. If the high-limit switch trips repeatedly, DO NOT operate the Equipment Module until a qualified service technician has corrected the problem.

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## TROUBLE SHOOTING

### A. EQUIPMENT MODULE WILL NOT OPERATE:

1. Check the Ground Fault Circuit Interrupter, if equipped, to see if the RESET button has popped out. If so, press RESET button inward. (Electrical power must be applied to the Equipment Module). If the GFCI trips repeatedly, contact a qualified electrician to correct the problem.
2. Check the main circuit breaker panel. If the circuit breaker has tripped, reset breaker. If the circuit breaker trips repeatedly, contact a qualified electrician to correct the problem.
3. For cord and plug connected units only, check the receptacle used for the Equipment Module by plugging in another electrical appliance. If appliance does not work, contact a qualified electrician to correct the problem.
4. Make sure that the System Power switch, if equipped, is ON.
5. Make sure the timer, if equipped, is in a position that will allow the pump to operate - See TIMER OPERATING INSTRUCTIONS.

### B. PUMP WILL RUN BUT THERE IS NO WATER FLOW:

1. Make sure all valves, if equipped, are in the open position.
2. Make sure the filter is clean.
3. Make sure the suction lines are free of debris.
4. Make sure the water level of the spa is above the highest jet or skimmer.
5. Make sure there is no air trapped in the pump. With the pump operating in HIGH speed, loosen the the pump inlet union (turn counterclockwise) approximately one turn to release any air trapped in the pump. When there is water flow into the spa, tighten the pump inlet union securely. NOTE: Water may spray out of the loosened union. A towel may be wrapped around the union during this operation.

### C. PUMP RUNS AND THERE IS WATER FLOW BUT NO HEAT:

1. Turn Thermostat CLOCKWISE (COUNTERCLOCKWISE on units with an electronic spa-side control) to a higher temperature setting. Do NOT expect to feel hot water coming from the jets.
2. Check if high limit switch reset button, located on the front of the Equipment Module, has popped outward. If so, reset by pressing button inward.

## SPA MAINTENANCE

Contact a qualified spa or swimming pool dealer for advice on maintaining proper chemistry of the spa water. Please be aware that the mineral content of spa water increases from water evaporation and with the addition of algaecidal and sanitizing chemicals. If the mineral concentration of the water becomes too high, the minerals will precipitate and deposit on the spa, in the filter, and on the Heater. The spa water must be changed when the amount of dissolved solids becomes excessive.

Algaecidal and sanitizing chemicals are either alkaline or acidic. Sodium and calcium hypochlorite are alkaline. Chlorine gas and practically all other dry chlorine products are acidic. Whichever type of chlorine is used, it is *extremely* important that the pH level be checked frequently and maintained between 7.2 and 7.8.

**CAUTION:** Do *NOT* store spa or pool chemicals near the Equipment Module because their corrosive fumes may cause damage.

Change the spa water frequently, typically every 3 to 4 months or when the water clarity and cleanliness can no longer be maintained by chemical treatment.

It is recommended that the total alkalinity of the spa water be kept from 80 to 100 parts per million (ppm) when sodium or calcium hypochlorites are used, and 100 to 120 ppm when other dry chlorine products or chlorine gases are used.

**CAUTION:** Failure to maintain the proper chemical levels as stated above may cause excessive damage to components in contact with the spa water. Damage to components determined to be the result of improper chemical maintenance will *NOT* be covered under the warranty.

Clean the filter regularly. A dirty filter restricts pump and heater performance.

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## WINTERIZING INSTRUCTIONS

If the spa is to be left unused for an extended period of time in areas where freezing temperatures *do not* occur, it may be desirable to turn the heater **OFF**. This is accomplished by rotating the thermostat to the **OFF** position. To keep the spa water clean and sparkling, set the timer, if equipped, to filter the water several times each day. When preparing the spa for use, check the water chemistry to assure correct chlorine and pH levels.

If it is desired to keep water in the spa during the time of year when freezing at the spa location may occur, the thermostat may be set to the **COLD** or **FREEZE PROTECT RANGE**. If the Equipment Module is equipped with a Tri-Timer, set the Mode Selector Switch to the "C" and set the timer to operate the pump continuously at low speed. This is accomplished by pushing the Timer Lugs inward toward the center of the Timer. If the Equipment Module is equipped with a Heating timer set the Heating timer by-pass switch to the Thermostatic Control position. The heater will operate as required to prevent the water from freezing. However, **CAUTION** must be used with this approach. In the event of electrical power interruption, regardless of cause, the heater and pump will stop operating and freeze protection will be lost, possibly resulting in freeze damage to the spa, spa plumbing and/or Equipment Module components. Such damage is not covered by the Equipment Module warranty.

If the spa is to be drained for an extended period of time, and located where freezing temperatures exist, make sure all water has been drained from the spa. When all the water has been drained from the spa turn all power to the spa **OFF**. Models EM-190 & EM-104 - Use a 9/16 inch wrench to remove the pump drain plug, located on the front of the Pump housing, and drain all water from the pump housing. Replace the pump drain plug. Models EM-100 & EM-105 - Rotate the heater plumbing union **COUNTERCLOCKWISE** until all water has been drained from the heater and pump. Tighten the heater plumbing union. Close all shut off valves, if equipped. Check the spa manufacturers instructions regarding winterizing the filter assembly and spa plumbing. Covering the spa is highly recommended.

## OPTIONAL SPA LIGHT

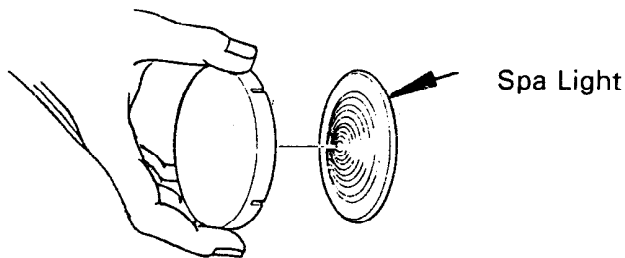
All Equipment Modules have an *ORANGE* colored receptacle, located on the side of the Equipment Module. This receptacle is provided for the connection of an optional spa light.

If the Equipment Module is equipped with a spa light, the spa light may be turned **ON** or **OFF** by pressing the **LIGHT** or **ACCESSORY** button, usually located on the lip of the spa.

**NOTE:** Units with a "X" or "Y" suffix in the catalog number have a spa side switch controlled, 12 volt output. All other units have 120 volts available at this receptacle at all times that power to the Equipment Module is ON. If a spa light operating at more than 15 volts is connected to this receptacle, a Ground Fault Circuit Interrupter (GFCI) must be provided for the light circuit. The conductors on the load side of the GFCI shall not occupy conduit, boxes, or enclosures containing other conductors unless the additional conductors are also protected by a GFCI.

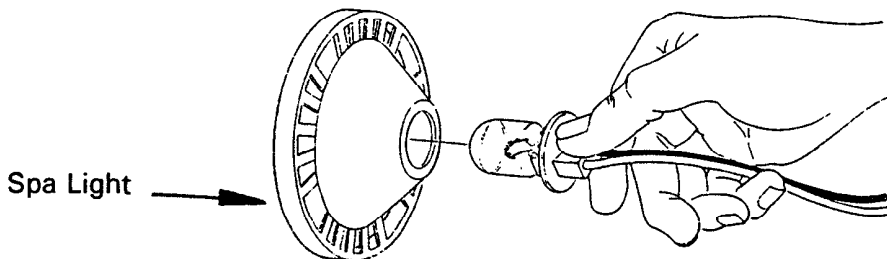
### SPA LIGHT LENS INSTALLATION

Colored lenses may be included with the spa light option. To install or remove lenses simply push **ON** or pull **OFF** of the spa light, as shown below.



### SPA LIGHT BULB REPLACEMENT

To replace the spa light bulb; turn *ALL* power to the Equipment Module **OFF**. Locate the rear of the spa light and remove the bulb socket by pulling on the socket (not the wires), as shown below. Pull the bulb from the socket and replace by reversing the above steps.



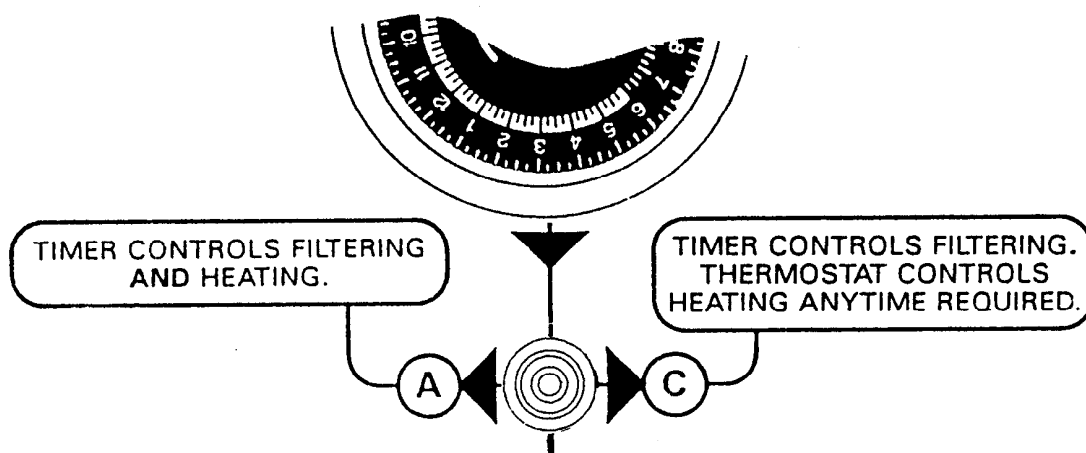
**CAUTION:** The replacement bulb must be the same rating as the factory installed bulb (Brett Aqualine replacement part number 37-0101FK2, package of two, or standard automotive type #912).

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## OZONE GENERATOR ELECTRICAL CONNECTION

All Equipment Modules have a *YELLOW* colored receptacle, located on the side of the Equipment Module. This receptacle is provided for the connection of an ozone generator.

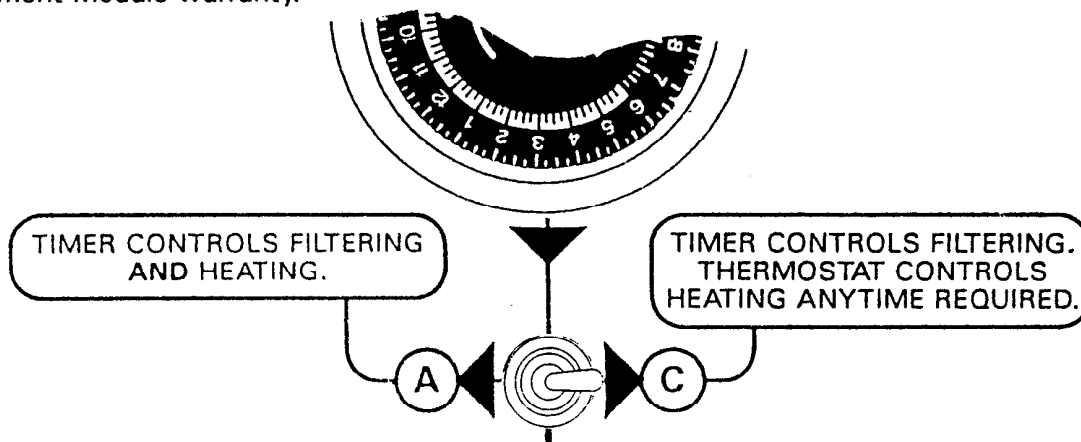
**NOTE:** 120 volts is available at this receptacle whenever the Pump is operating in **LOW** speed. Therefore, an ozone generator plugged into this receptacle will operate automatically any time the Pump is operating in **LOW** speed.



**MODE SELECTOR SWITCH IN MODE "B" - *TIMER CONTROLS FILTERING. NO HEATING***

In this mode the Tri-Timer will operate the pump LOW speed as determined by the setting of the timer lugs. When the timer reaches an ON time the pump LOW speed will operate. When the timer is in an OFF position the pump LOW speed will not operate. In this "B" Mode the heater will *not* operate regardless of the thermostat setting.

**CAUTION:** In this mode the heater will *not* operate. This may be desirable when the spa is not to be used for several days or more. However, caution must be used if the spa is located in an area where freezing temperatures can occur, due to the possibility of freeze damage to the spa, spa plumbing, and/or Equipment Module. Such damage is *not* covered by the Equipment Module warranty.



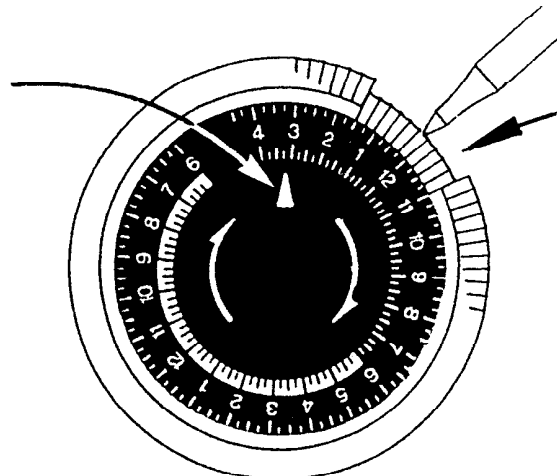
**MODE SELECTOR SWITCH IN MODE "C" - *TIMER CONTROLS FILTERING. THERMOSTAT CONTROLS HEATING ANYTIME REQUIRED.***

In this mode the Tri-Timer will operate the pump LOW speed *and* heater as determined by the setting of the timer lugs. When the timer reaches an ON time, the pump LOW speed will operate. During this ON time the heater will operate as determined by the thermostat setting to maintain the spa water temperature. When the timer is in an OFF position the pump LOW speed will turn OFF, *unless* the thermostat is calling for heat. Anytime that the thermostat is calling for heat the pump LOW speed *and* heater will operate together to maintain the water temperature in the spa as determined by the setting of the thermostat.

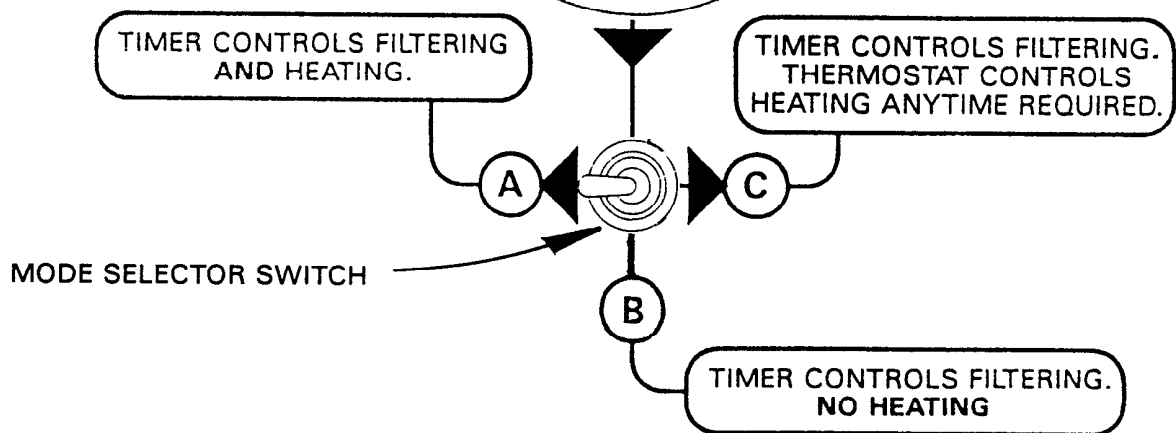
**NOTE:** With the thermostat set in the COLD or FREEZE PROTECT RANGE this position is ideal for freeze protection in areas where freezing temperatures can occur. However, because the small volume of water in the spa plumbing may freeze faster than the large volume of water in the spa, the pump should be operated continuously at LOW speed. This is accomplished by pushing *all* the timer lugs inward toward the center of the timer.

# TRI-TIMER® OPERATING INSTRUCTIONS

**Clock Set Point -**  
Rotate outer clock ring clockwise and set correct time of day opposite the set point arrow.



**Timer Lugs -** Push inward toward center of timer to set ON times. Each lug represents a 15 minute time period. Any combination of cycles is possible. The example shows ON at 11:00 PM and OFF at 1:30 AM. To cancel settings, push outward on the lugs.



## MODE SELECTOR SWITCH IN MODE "A" - *TIMER CONTROLS FILTERING AND HEATING.*

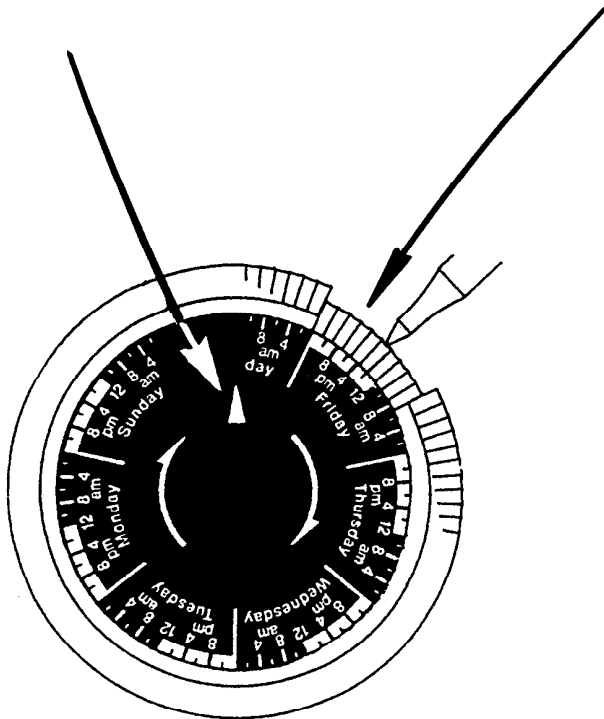
In this mode the Tri-Timer will operate the pump LOW speed *and* heater as determined by the setting of the timer lugs. When the timer reaches an ON time, the pump LOW speed will operate. During this ON time the heater will operate as determined by the thermostat setting to maintain the spa water temperature. When the timer is in an OFF position the pump LOW speed and heater will *not* operate.

**CAUTION:** In this mode the heater will *not* operate when the timer is in an OFF position. This may be desirable where electricity rates are higher during peak usage hours. However, caution must be used if the spa is located in an area where freezing temperatures can occur, due to the possibility of freeze damage to the spa, spa plumbing, and/or Equipment Module. Such damage is *not* covered by the Equipment Module warranty.

# HEATING TIMER - 7 DAY OPERATION

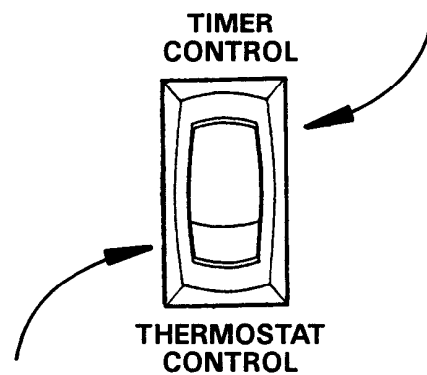
If the thermostat is calling for heat, and the timer reaches an ON time, the two-speed pump will operate at LOW speed and the heater will turn ON. When the water reaches the desired temperature the thermostat will turn the heater and pump OFF. This cycle will continue during each ON period as determined by the setting of the timer lugs.

**CLOCK SET POINT** - Rotate outer clock ring clockwise and set correct time of day opposite Set Point Arrow.



**TIMER LUGS** - Push inward toward center of clock to set ON times. Each lug represents a 2 hour period of a selected day of the week. The example shows ON at 6:00 A.M. Friday and OFF at Midnight Friday. To cancel settings push outward on the lugs.

In this position, the heating timer has control and will start and stop the heating cycle as determined by the settings of the timer lugs and the setting of the thermostat.



In this position, the heating cycle will be continuous, controlled only by the setting of the thermostat. The heater and pump will start and stop as required to maintain the desired temperature. This position is ideal for freeze protection. With the thermostat set in the FREEZE or COLD position, the heater and pump will automatically cycle to maintain a water temperature of approximately 50° F. The timer settings are not disturbed and timed cycles will begin again when this switch is returned to the TIMER CONTROL position.

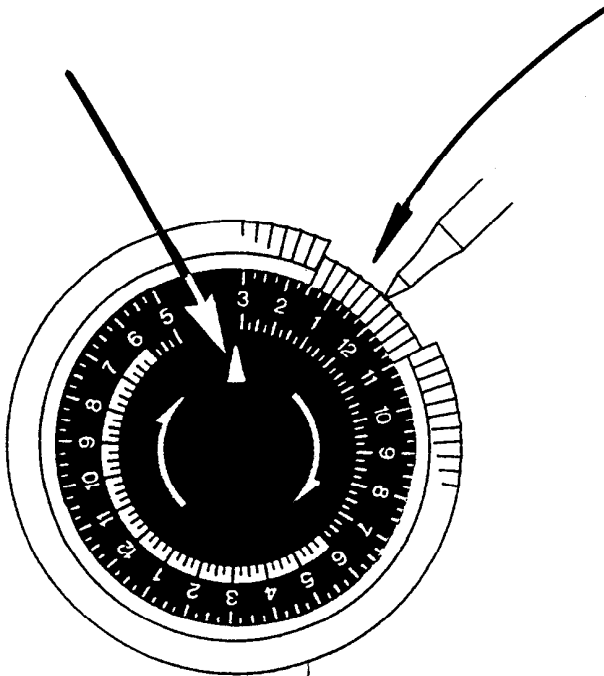
# TIMER OPERATION

The Equipment Module may be equipped with a filtering timer and/or heating timer, or Tri-Timer. These timers provide the ultimate in operating and economy. The spa water can be filtered daily, or several times each day, to maintain a sparkling clear, clean condition with ideal chemical distribution. The temperature of the water can be automatically controlled to be ready to use whenever desired, either every day or evening, or only on selected days. The following sections describe the operation of these various timer options.

## FILTERING TIMER - 24 HOUR OPERATION

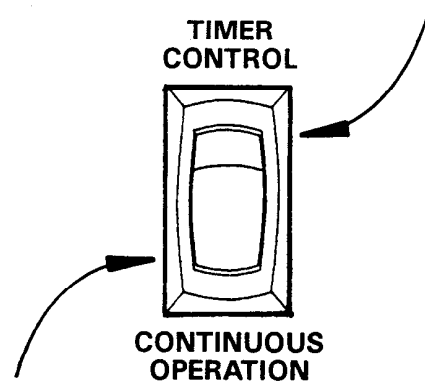
When the timer reaches an ON time, the two-speed pump will operate at LOW speed. For an initial setting, try four 30 minute ON settings spaced evenly around the timer. For example: 10:00 to 10:30 AM; 4:00 to 4:30 PM; 10:00 to 10:30 PM and 4:00 to 4:30 PM. Wait a few days and adjust as necessary to maintain sparkling clear water with the minimum of ON times.

**CLOCK SET POINT** - Rotate outer clock ring clockwise and set correct time of day opposite Set Point Arrow.



**TIMER LUGS** - Push inward toward center of clock to set ON times. Each lug represents a 15 minute time period. The example shows ON at 11:00 A.M. and OFF at 1:30 P.M. To cancel settings push outward on the lugs.

In this position, the timer has control and will start and stop the filtration cycle as determined by the settings of the timer lugs.



In this position the filtering cycle will be continuous. This is desirable when extra filtration is desired following periods of heavy spa usage or when adding chemicals. The Timer settings are not disturbed and timed cycle will begin again when the switch is returned to the TIMER CONTROL position.



(Electronic spa-side control, continued)

- The two-speed pump will continue to operate at LOW speed for a few moments after the heater has been turned OFF by either the THERMOSTAT or the SPA button. This assures that all of the heat has been removed from the heater assembly in order to provide maximum heater life.
- Depending upon controller provided, the HEAT ON indicator may not light if the heater is being controlled by an optional heating timer, or the SPA button has not been pressed.

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(4) SPA button

Press and release the SPA button once. The SPA indicator light will glow steadily and the LOW speed of the two-speed pump will operate. The heater will operate as required to maintain the spa water temperature as determined by the setting of the THERMOSTAT. Press and release the SPA button again to turn the LOW speed pump OFF.

- Anytime power to the system is interrupted, the system will automatically reset when power is reapplied.
- If the Equipment Module is equipped with an optional filtering timer, the filtering timer will control the operation of the two-speed pump LOW speed when the SPA button is OFF. Pressing the SPA button will override the filtering timer settings and the pump will operate at LOW speed.
- If the Equipment Module is equipped with an optional heating timer, the heating timer will control the operation of the heater when the SPA button is OFF. Pressing the SPA button will override the heating timer settings and allow the heater to operate as determined by the THERMOSTAT settings.
- The controller *may* incorporate a "clean-up" cycle. Press the SPA button once to activate the LOW speed pump. Press the SPA button a second time to activate the clean-up cycle. During the clean-up cycle the SPA indicator will blink rapidly and the LOW speed pump will operate for 30 minutes to provide filtration of the spa water. Press and release the spa button a third time to bypass the clean-up cycle and turn the LOW speed pump OFF.

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(5) JET button

After pushing the SPA button, press and release the JET button to activate the HIGH speed of the two-speed pump. Press and release the JET button again to turn the HIGH speed OFF. The pump HIGH speed will operate for a period of 30 to 60 minutes.

If the Equipment Module is provided with *two* pumps, press and release the JET button twice in rapid succession to turn the second pump ON or OFF. The second pump will operate for a period of 60 minutes.

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(6) ACC button (Air Blower)

After pushing the SPA Button, press and release the ACC button to activate the air blower. Press and release the ACC button again to turn the air blower OFF. The air blower will operate for a period of 30 to 60 minutes.

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(7) LIGHT button

Press and release the LIGHT button to activate the spa light. Press and release the LIGHT button again to turn the spa light OFF.

(Air buttons or air operated spa-side controller, continued)

### SECOND PUMP BUTTON (Not shown)

Press and release this button to turn the second pump **ON** or **OFF** for additional hydrotherapy jet action.

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### (3) BLOWER BUTTON

Press and release this button to turn the air blower **ON** or **OFF**. When the air blower is **ON** bubbles of air will come from the air holes in the air channel located in the floor and/or seats of the spa. If a spa-side controller is provided, the BLOWER indicator will light.

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### (4) LIGHT BUTTON

Press and release this button to turn the spa light **ON** or **OFF**.

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### (1) SPA-SIDE CONTROLLER THERMOSTAT

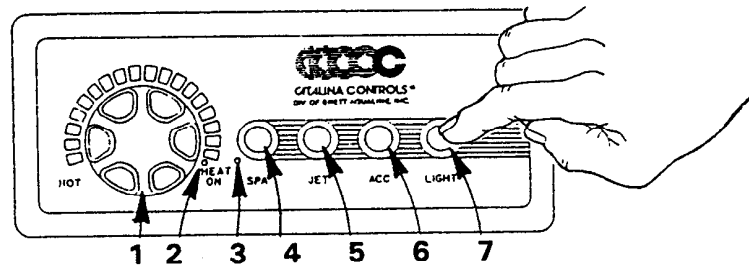
The temperature of the water within the spa is controlled by the setting of the THERMOSTAT. Any time that the heater is **ON**, the HEATER indicator will light. When the desired temperature is reached the READY indicator will light and the heater will turn **OFF**. See additional comments under SPA WATER TEMPERATURE SETTING.

NOTE: In addition to the thermostat in the spa-side controller, the Equipment Module may also have a thermostat. When using the spa-side controller thermostat, the Equipment Module thermostat must be in the **LOW** or **OFF** position.

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## ELECTRONIC SPA-SIDE CONTROL

- 1 THERMOSTAT
- 2 HEAT ON indicator
- 3 SPA indicator
- 4 SPA button
- 5 JET button
- 6 ACC button (Air Blower)
- 7 LIGHT button



### (1) THERMOSTAT

The temperature of the water within the spa is controlled by the setting of the THERMOSTAT. The heater may be activated by turning the THERMOSTAT knob *counterclockwise*. The **LOW** speed of the two-speed pump will operate and the heater will operate until the desired water temperature is reached.

- If the Equipment Module is connected to a 120 volt electrical service the heater *will not* operate when the **HIGH** speed of the two-speed pump *or* the air blower is operating.
- If the Equipment Module is equipped with an optional heating timer, the heating timer will control the operation of the heater when the SPA button is **OFF**. See "HEATING TIMER OPERATING INSTRUCTIONS" provided with the heating timer for additional information.

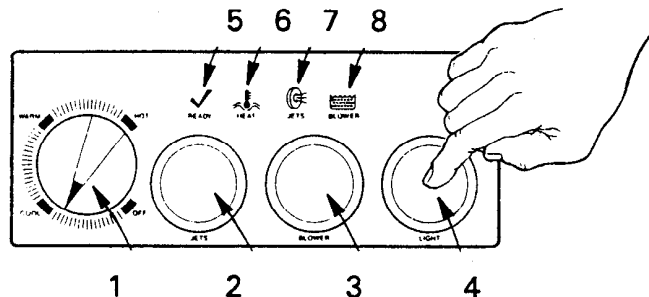
# OPERATING INSTRUCTIONS

The spa may have one or more individual air buttons; *or*, an air button operated spa-side controller, similar to the one shown below; *or*, an electronic spa-side control. The following sections describe the operation of these various controls.

**CAUTION:** Never allow the HIGH speed of the two-speed pump to operate continuously for periods of more than one hour. In the event that the HIGH speed of the two-speed pump is operated for several hours, the temperature of the spa water may increase due to heat from the pump itself. This increase in temperature may result in damage to the spa, spa plumbing, and Equipment Module.

## AIR BUTTONS *or* AIR OPERATED SPA-SIDE CONTROLLER

- 1 THERMOSTAT
- 2 PUMP button
- 3 BLOWER button
- 4 LIGHT button
- 5 READY indicator
- 6 HEAT indicator
- 7 JETS indicator
- 8 BLOWER indicator



NOTE: Button positions may be different from those shown.

### (2) PUMP BUTTON

#### EQUIPMENT MODULES WITH TWO-FUNCTION SWITCHING

- F-1 The LOW speed of the two-speed pump will operate and the heater will operate as determined by the thermostat setting.
- F-2 The HIGH speed of the two-speed pump operates for maximum hydrotherapy jet action. If a spa-side controller is provided, the JETS indicator will light. The electric water heater will not operate if the Equipment Module is connected to a 120 volt electrical service.

#### EQUIPMENT MODULES WITH FOUR-FUNCTION SWITCHING

- F-1 The LOW speed of the two-speed pump will operate and the heater will operate as determined by the thermostat setting.
- F-2 \* The HIGH speed of the two-speed pump operates for maximum hydrotherapy jet action. The air blower will operate and bubbles of air will come from the air holes in the air channel located in the floor and/or seats of the spa. If a spa-side controller is provided, the JETS indicator and BLOWER indicator will light.
- F-3 \* The HIGH speed of the two-speed pump continues to operate. The air blower and the BLOWER indicator light will turn OFF.
- F-4 \* The air blower and the LOW speed of the two-speed pump operates. If a spa-side controller is provided, the BLOWER indicator will light.

\* The electric water heater will not operate if the Equipment Module is connected to a 120 volt electrical service.

## INITIAL START-UP

1. Turn the thermostat(s) located in either the Equipment Module, or spa-side control, or both to the **OFF** position.
2. Open all valves, if equipped, in the water inlet and/or water outlet to allow water to flow into the Equipment Module.
3. Fill the spa with water to within 6" to 8" of the top of the spa, or as otherwise directed by the manufacturer of the spa.

**CAUTION:** The Equipment Module must never be operated without water in the spa, serious damage to the heater and/or pump may result.

4. Check all plumbing connections for leaks.
5. With the thermostat(s) in the **OFF** position, apply power to the Equipment Module.
6. Move the system power switch **UP** to the **ON** position and close the equipment area door. The pump and/or the air blower will operate as described under OPERATING INSTRUCTIONS.

**NOTE:** If the Equipment Module is equipped with a Ground Fault Circuit Interrupter, it may be necessary to press and release the red GFCI **RESET** button.

**IMPORTANT NOTE:** It is most important that the pump be operated in high speed for several minutes to assure that all air has been removed from the system before the heater is allowed to operate. *Only* after full water flow has been established should the thermostat be turned up. See OPERATING INSTRUCTIONS.

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## SPA WATER TEMPERATURE SETTING

- The temperature of the water in the spa is controlled by the setting of the thermostat. The thermostat may be located on the front of the Equipment Module, or mounted on the lip of the spa, or both.
- When the Equipment Module is operating, the thermostat will control the heater. Initially, adjust the Thermostat knob to the center of the **HOT** range. This setting will cause the water temperature to rise to 95° to 100°F (35° to 38°C). Do not expect to feel hot water coming from the jets!

**NOTE:** If the Equipment Module is equipped with an optional heating timer or Tri-Timer, the timer will control the operation of the heater. See **TIMER OPERATING INSTRUCTIONS**.

- The length of time it takes the water to reach desired temperature depends upon several factors: water temperature at start, ambient air temperature, spa gallonage, relative humidity, type and insulative qualities of a cover and constancy of electric power applied.
- An insulative cover should be kept on the spa at all times that it is not in use. Also, remember that prolonged use of the Air Blower and hydrotherapy jets when using the spa will have a significant cooling effect on the water.
- If the Equipment Module is provided with an optional spa-side control incorporating a thermostat, the thermostat in the Equipment Module *must always* be in the **COLD** or **OFF** position for the spa-side thermostat to control the spa water temperature.

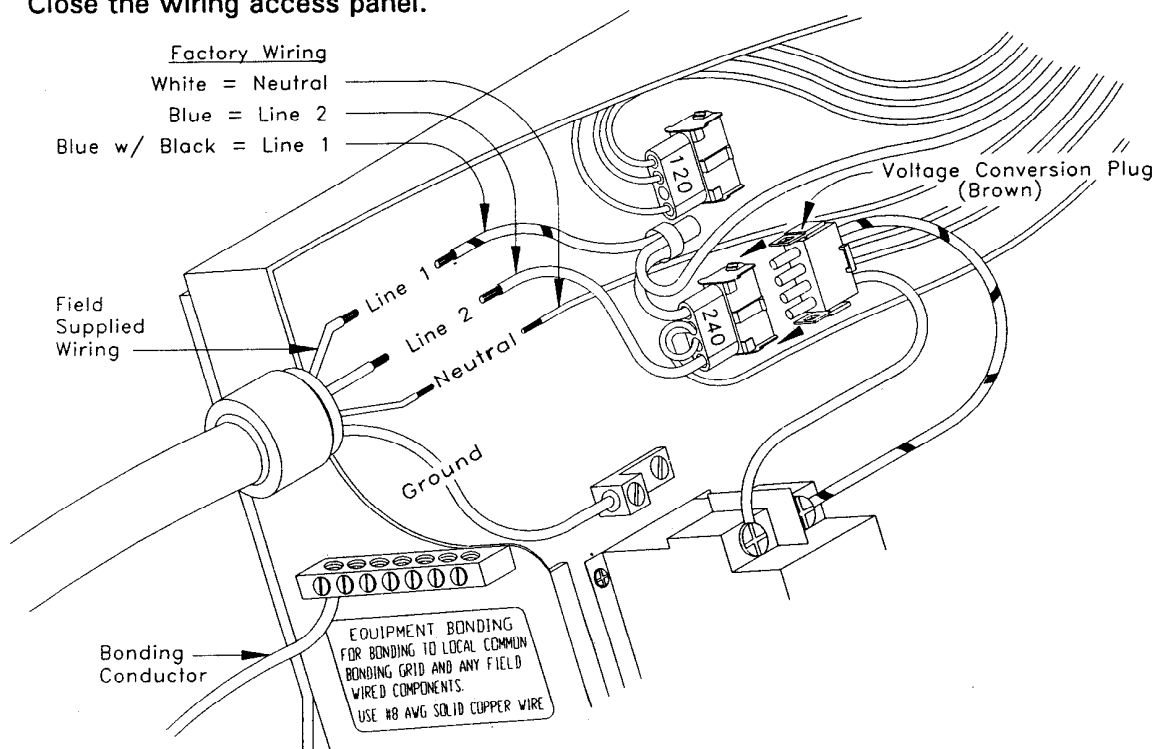
# 240 VOLT INSTALLATION

(PERMANENTLY CONNECTED UNITS)

**IMPORTANT NOTE:** The following procedure does *not* apply to Equipment Modules with catalog numbers beginning with 26-Z01, 26-Z41, 26-Z51, or 26-Z91.

The following instructions are for the conversion of the Equipment Module from a 120 volt cord-and-plug connected unit, to a 240 volt permanently connected unit; or connection of an Equipment Module designed to operate at 240 volts.

1. Open the Equipment Module wiring access panel to allow access to the input power wiring and voltage conversion plug. When converting from cord connected to permanently connected, disconnect the conductors of the power supply cord from the input power wiring, then completely remove the power supply cord from the Equipment Module and discard.
2. Connect input power wiring as shown below. When connected to 240 volts, the Equipment Module requires a three wire electrical service, plus ground (Line 1, Line 2, Neutral, and Ground), and requires a minimum supply conductor ampacity of 50 amperes and a circuit breaker size of 50 amperes. **NOTE:** If a second, additional jet pump motor is connected to the Equipment Module, the minimum supply conductor ampacity will be 62.5 and the circuit breaker size will be 60 amperes. **Failure to connect a neutral line will cause the Equipment Module to malfunction and may void the Equipment Module warranty.**
3. Equipment Modules designed to operate at either 120 volts or 240 volts will have a voltage conversion plug, located inside the Equipment Module. The voltage conversion plug must be removed from the 120 volt receptacle and plugged into the 240 volt receptacle, as shown below. To disconnect plug, squeeze locks on side of plug and pull straight out.
4. Close the wiring access panel.



240 VOLT WIRING AND VOLTAGE CONVERSION DIAGRAM

# 120 VOLT INSTALLATION

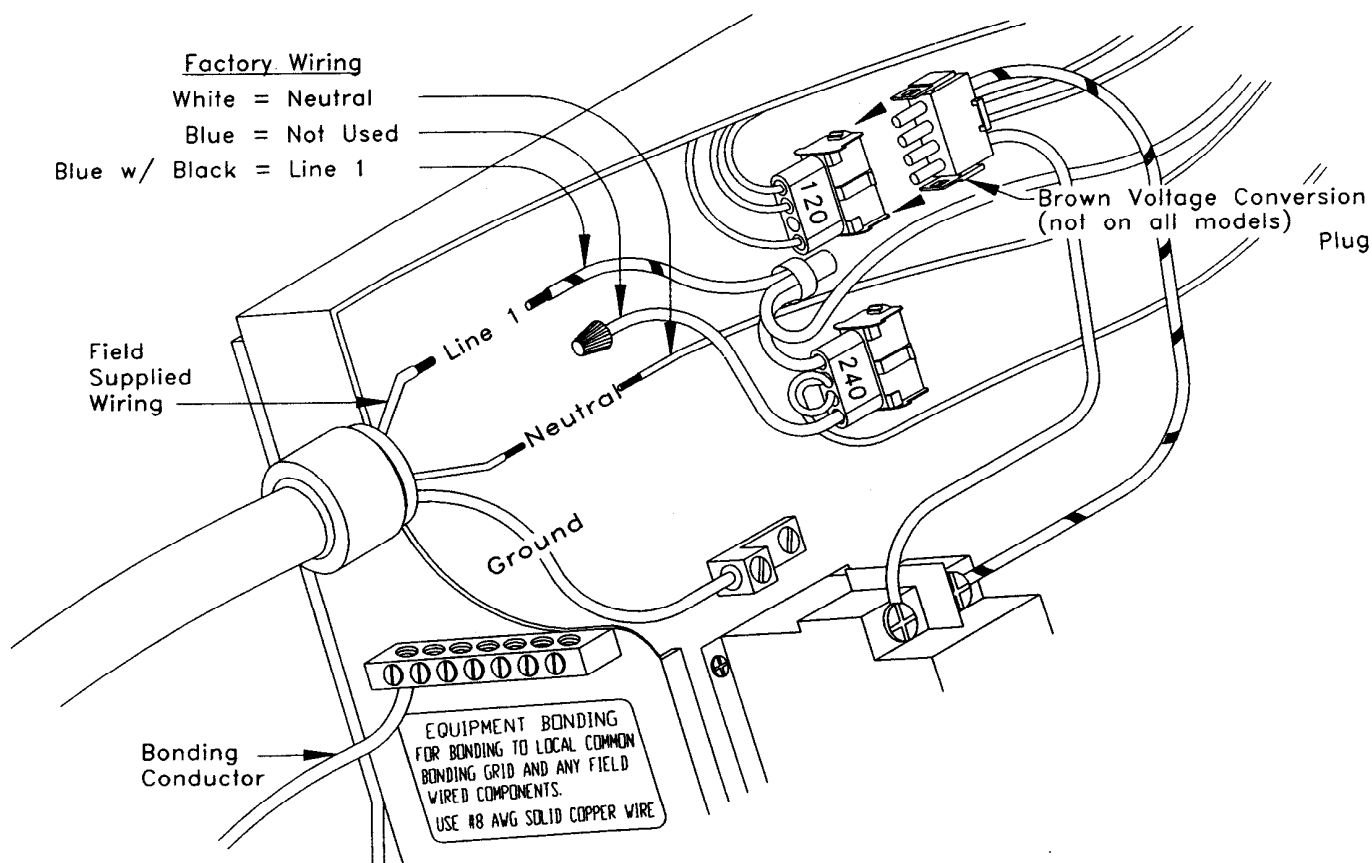
(PERMANENTLY CONNECTED UNITS)

The following instructions are for the conversion of the Equipment Module from a 120 volt cord-and-plug connected unit to a 120 volt permanently connected unit.

1. Open the Equipment Module wiring access panel to allow access to the input power wiring and voltage conversion plugs.
2. Disconnect the conductors of the power supply cord from the input power wiring, then completely remove the power supply cord from the Equipment Module and discard.
3. Connect input power wiring as shown below. When connected to 120 volts, the Equipment Module requires a two wire electrical service, plus ground (Line 1, Neutral, and Ground), and must be connected using a minimum supply conductor ampacity of 20 amperes and a minimum circuit breaker size of 20 amperes
4. Make sure that the voltage conversion plug, located inside the Equipment Module, is connected to the 120 volt receptacle, as shown below. To disconnect plug, squeeze locks on side of plug and pull straight out.

**NOTE: Step 4 does *not* apply to Equipment Modules with catalog numbers beginning with 26-Z01, 26-Z41, 26-Z51, or 26-Z91.**

5. Close the Equipment Module wiring access panel.



120 VOLT WIRING AND VOLTAGE CONVERSION DIAGRAM

# ELECTRICAL - GENERAL

All electrical connections to the Equipment Module must be accomplished by a qualified electrician in accordance with the National Electrical Code or the Canadian Electric Code and in accordance with any local electrical codes in effect at the time of installation. All electrical connections must be made in accordance with the wiring information contained in this manual, or on the back of the field wiring access panel of the Equipment Module.

The Equipment Module may be designed to operate at 120 volts, 240 volts, or may be "voltage convertible" operating at either 120 or 240 volts, 60 Hz (See data label, located on top of the Equipment Module, to determine the voltage requirements). Equipment Modules that are 120/240 "voltage convertible" will have a brown colored plug and *two* brown colored receptacles, located adjacent to the input power supply conductors. This plug must be connected to the appropriate receptacle prior to applying power to the Equipment Module for the first time. When the Equipment Module is connected to **120 volts**, the heater will provide approximately 1500 watts of heat when the pump is operating in LOW speed and the thermostat is calling for heat. When the Equipment Module is connected to **240 volts**, the heater will provide approximately 6000 watts of heat when the pump is operating in LOW or HIGH speed and the thermostat is calling for heat. Shown on the following page are instructions for connection to a 120 volt or 240 volt electrical service.

Connections must be made using copper conductors only. Field provided conductors and circuit breaker or fuses must be sized to accommodate the total amperage load of the Equipment Module. **WARNING:** Improper electrical connections or conductor sizing will cause the Equipment Module to operate improperly, create the potential for an electrical hazard, and may void the warranty. **CAUTION: Use only approved pressure-type wire splicing or connectors suitable for the size and type of wiring used.**

The electrical supply for this product must include a suitably rated switch or circuit breaker to open *ALL* ungrounded supply conductors to comply with Section 422-20 of the National Electrical Code, ANSI/NFPA 70. The disconnecting means must be within sight, and readily accessible to the user of the spa, but installed at least 5 feet (1.5m) from the spa. The electrical supply for permanently connected Equipment Modules must also include a suitably rated Ground-Fault Circuit-Interrupter (GFCI) to comply with Article 680-42 of the National Electrical Code, ANSI/NFPA 70.

Connect a No. 8 AWG (8.4mm<sup>2</sup>) solid copper bonding conductor between the Equipment Module bonding lug and all other electrical equipment and exposed metal in the vicinity, as may be needed to comply with local regulations.

**IMPORTANT NOTE:** If a second, additional pump motor is connected to the Equipment Module, the ampere rating of the second pump motor must be added to the total ampere rating of the Equipment Module.

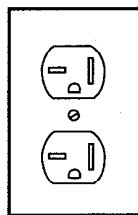
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## 120 VOLT INSTALLATION

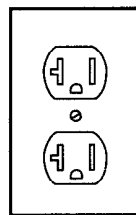
(CORD AND PLUG CONNECTED UNITS)

Equipment Modules provided with a factory installed power cord are to be plugged into a grounding type, 120 volt, 20 ampere receptacle, shown below. NO other electrical appliance or fixture should be used on this circuit.

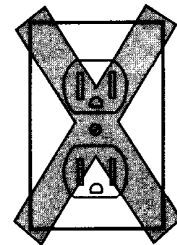
**WARNING:** The use of any other receptacle, or the connection of the plug to a 240 volt service may cause the Equipment Module to operate improperly, create the potential for an electrical hazard, and may void the warranty.



120 VOLT 20 AMPERE



120 VOLT 15 AMPERE



**NOTE:** Under **NO** circumstances should an extension cord be used. Use of an extension cord will seriously degrade the performance of the Equipment Module and can create an electrical hazard.

## INSTALLATION NOTES

- The Equipment Module must be protected by the skirting of a portable spa, or other weather-tight enclosure. The Equipment Module must never be installed in an open, unprotected area. All warranties are void if the equipment is not installed in accordance with these instructions.
- Install the spa to provide for adequate drainage of the Equipment Module compartment to prevent water from entering the electrical equipment area.
- Install the spa to permit safe access for servicing and routine maintenance of the Equipment Module.
- The two-speed pump of the Equipment Module is **NOT** a self-priming type and must be installed below the water level of the spa.
- Connections between the Equipment Module and spa are to be made with nonmetallic pipe only. The installation of shut-off valves is highly recommended.
- The outlet of the air blower should be connected only to the air channel of the spa. Connection of the air blower outlet to an air line associated with the spa jets may provide a path for high-pressure water to be forced back into the air blower resulting in destruction of the air blower and a potential for shock hazard. If this should occur, the warranty will be void.
- Due to the possibility of fumes from PVC solvent cement being ignited when the air blower is first turned on, it is recommended that the connection to the air blower be made **WITHOUT** solvent cement. If cementing is required, apply in very small amounts, and allow to dry for six hours before applying power to the air blower.
- A multi-terminal bonding connector, located on the side of the Equipment Module, is provided to permit connection of a bonding wire between this point and any accessible metal surfaces within 5 feet of the spa, as may be needed to comply with local requirements. The bonding wire connecting this bonding connector to the accessible metal surfaces must be a solid, No. 8 AWG (8.4 mm<sup>2</sup>) copper conductor. This bonding connector may also be used to bond any field wired components.
- The air blower on the Equipment Module, if so equipped, must be connected to an air-loop assembly (Figure 1, below) designed to assure that spa water cannot flow into the air blower motor. In addition to this air-loop assembly a ½-pound spring-loaded check valve may also be used.

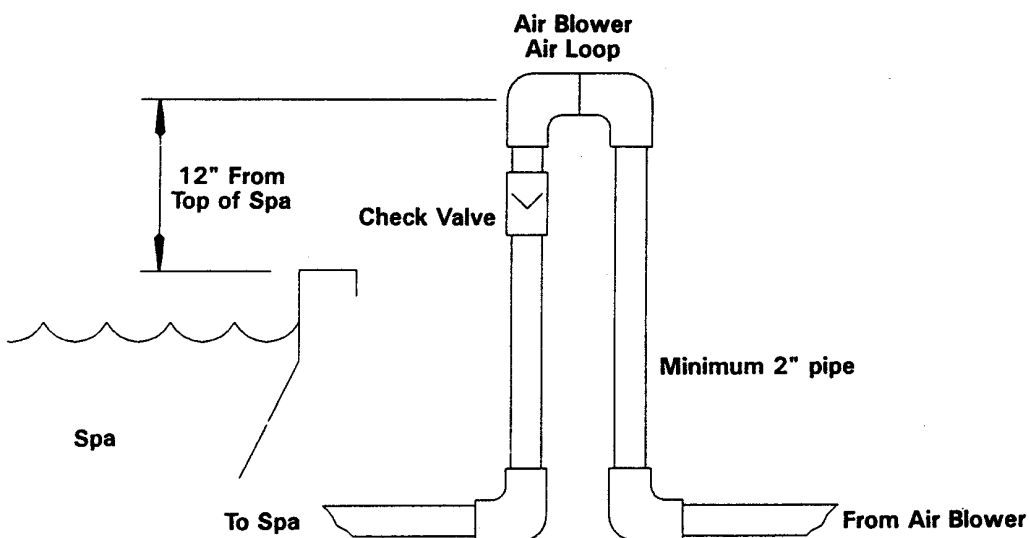
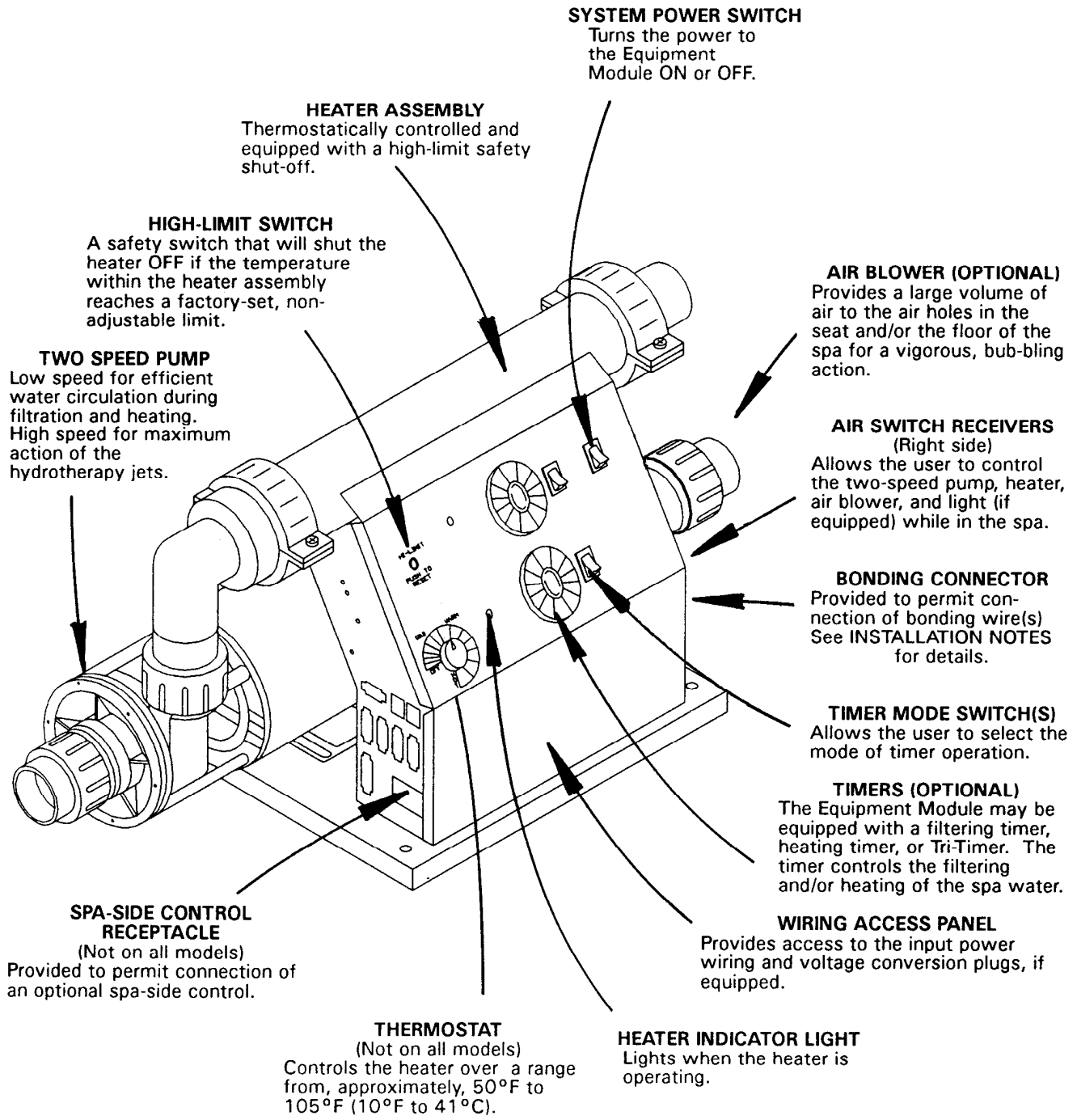


FIGURE 1



# MODEL EM-190



### SYSTEM POWER SWITCH

Turns the power to the Equipment Module ON or OFF.

### HEATER ASSEMBLY

Thermostatically controlled and equipped with a high-limit safety shut-off.

### HIGH-LIMIT SWITCH

A safety switch that will shut the heater OFF if the temperature within the heater assembly reaches a factory-set, non-adjustable limit.

### TWO SPEED PUMP

Low speed for efficient water circulation during filtration and heating. High speed for maximum action of the hydrotherapy jets.

### AIR BLOWER (OPTIONAL)

Provides a large volume of air to the air holes in the seat and/or the floor of the spa for a vigorous, bubbling action.

### AIR SWITCH RECEIVERS (Right side)

Allows the user to control the two-speed pump, heater, air blower, and light (if equipped) while in the spa.

### BONDING CONNECTOR

Provided to permit connection of bonding wire(s). See INSTALLATION NOTES for details.

### TIMER MODE SWITCH(S)

Allows the user to select the mode of timer operation.

### TIMERS (OPTIONAL)

The Equipment Module may be equipped with a filtering timer, heating timer, or Tri-Timer. The timer controls the filtering and/or heating of the spa water.

### SPA-SIDE CONTROL RECEPTACLE

(Not on all models)  
Provided to permit connection of an optional spa-side control.

### WIRING ACCESS PANEL

Provides access to the input power wiring and voltage conversion plugs, if equipped.

### THERMOSTAT

(Not on all models)  
Controls the heater over a range from, approximately, 50°F to 105°F (10°C to 41°C).

### HEATER INDICATOR LIGHT

Lights when the heater is operating.

# INTRODUCTION

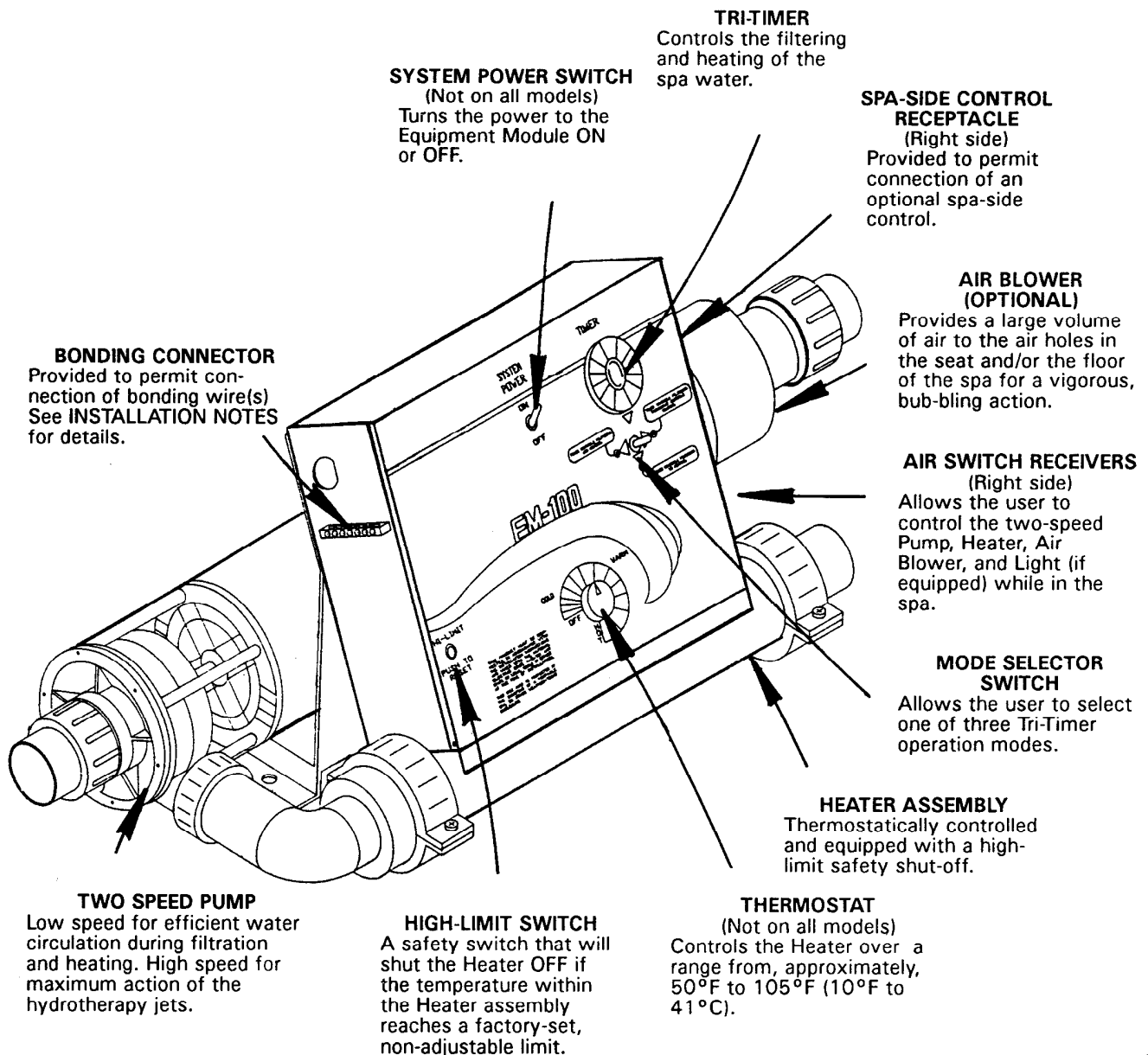
Brett Aqualine Equipment Modules are designed expressly for portable spa applications. These state-of-the-art units incorporate the finest components available, assembled in a manner intended to provide maximum enjoyment, ease of operation and years of trouble-free experience.

Please take a few minutes to read this manual; familiarize yourself with the operation of the equipment and become aware of the many superior features designed to make the ownership of your spa a thoroughly enjoyable experience.

## PRODUCT FEATURES

### MODELS EM-100, EM-104, and EM-105

*NOTE: Models EM-104 and EM-105 differ from model EM-100, shown below, in that the front panel is reversed top-to-bottom, and the heater assembly is on the top of the unit - not on the bottom, as shown.*



9. **WARNING** - The Equipment Module may be equipped with a Ground-Fault Circuit-Interrupter (GFCI), mounted on the front of the electrical control box or in the input power supply cord. This GFCI protects against electric shock hazard by sensing electric fault conditions and interrupting the electric power applied to the Equipment Module.

Before each use of the spa the GFCI, if provided, should be tested in the following manner: Turn electric power to Equipment Module **ON**. Push the **TEST** button. The **RESET** button should pop outward, indicating that the GFCI is functioning properly. Push the **RESET** button all the way in, restoring electrical power to the Equipment module.

If the **RESET** button does not pop outward when the **TEST** button is pushed, a loss of GFCI protection is indicated. Should this occur, immediately disconnect electrical power from the Equipment Module, and discontinue use of the spa until a qualified technician has identified and corrected the problem.

10. Prolonged immersion in water hotter than 104°F (40°C) may cause hyperthermia. The causes, symptoms, and effects of hyperthermia may be described as follows: Hyperthermia occurs when the internal temperature of the body reaches a level several degrees above the normal body temperature of 98.6°F (37°C). The symptoms of hyperthermia include dizziness, fainting, drowsiness, lethargy, and an increase in the internal temperature of the body. The effects of hyperthermia include (1) unawareness of impending hazard, (2) failure to perceive heat, (3) failure to recognize the need to exit the spa, (4) physical inability to exit the spa, (5) fetal damage in pregnant women, and (6) unconsciousness resulting in a danger of drowning. **WARNING** - The use of alcohol, drugs, or medication can greatly increase the risk of fatal hyperthermia.

Leave the spa immediately if nausea, dizziness, or headaches occur. Immediately cool the body by taking a cool shower or by applying cold towels or ice packs. If the symptoms persist, seek medical attention.

11. **WARNING** - To reduce the risk of injury:

Before entering the spa the user should measure the water temperature with an accurate thermometer, since the tolerance of water temperature-regulating devices may vary as much as ±5°F (3°C).

The use of alcohol, drugs, or medication before or during use of the spa may lead to unconsciousness with the possibility of drowning.

The water in the spa should never exceed 104°F (40°C). Water temperatures between 100°F (38°C) and 104°F (40°C) are considered safe for a healthy adult. Lower water temperatures are recommended for extended use (exceeding 10 minutes) and for young children.

Since excessive water temperatures have a high potential for causing fetal damage during the early months of pregnancy, pregnant or possibly pregnant women should limit spa water temperature to 100°F (38°C).

Persons suffering from obesity or with a medical history of heart disease, low or high blood pressure, circulatory system problems, or diabetes should consult a physician before using the spa.

Persons using medication should consult a physician before using the spa since some medication may induce drowsiness while other medication may affect heart rate, blood pressure, and circulation.

Because *occasional* users of the spa may not be aware of all of the potential risk associated with spa usage, they should be made aware of these Important Safety Instructions.

**SAVE THESE INSTRUCTIONS**

# IMPORTANT SAFETY INSTRUCTIONS

When installing and using this Equipment Module, basic safety precautions should always be followed, including and following:

## READ AND FOLLOW ALL INSTRUCTIONS

### INSTALLATION CONSIDERATIONS

1. A bonding lug has been provided on the outside of the Equipment Module electrical control box. This lug permits the connection of a No. 8 AWG (8.4mm<sup>2</sup>) solid copper bonding conductor between the Equipment Module and all other electrical equipment and exposed metal in the vicinity, as may be needed to comply with local regulations.
2. The Equipment Module must be installed to provide for adequate drainage, and to prevent water from entering the electrical equipment area. When installing the spa and/or Equipment Module indoors, the floors and structures beneath the spa and/or Equipment Module must be protected against water run-off.
3. The electrical supply for permanently connected Equipment Modules ("Hardwired" for 120 or 240 volt operation) must include a suitably rated switch or circuit breaker to open all ungrounded supply conductors to comply with Section 422-20 of the National Electrical Code, ANSI/NFPA 70. The disconnecting means must be within sight and readily accessible to the user of the spa, but installed at least 5 feet (1.5m) from the spa. The electrical supply for permanently connected Equipment Modules must also include a suitably rated Ground-Fault Circuit-Interrupter (GFCI) to comply with Article 680-42 of the National Electrical Code, ANSI/NFPA 70.
4. **DANGER** - Risk of injury. (Applies to cord and plug connected Equipment Modules only).

Do **NOT** use an extension cord. The Equipment Module must be located close enough to the electrical outlet that an extension cord shall not be required. Use of an extension cord will seriously degrade Equipment Module performance, and can create a serious electrical hazard.

Never bury the power cord.

To reduce the risk of electric shock, replace a frayed or damaged power cord immediately.

Connect **ONLY** to a grounded, grounding type receptacle rated at 120 volts, 20 amperes. Never, for any reason, modify the attachment plug to fit other than a grounded, 120 volt, 20 ampere receptacle.

### OPERATING PRECAUTIONS

5. **DANGER - RISK OF ELECTRIC SHOCK.** Do not permit any electrical appliance, such as a light, telephone, radio, or television, within 5 feet of the spa.
6. Be sure that water always flows freely from the hydrotherapy jets within the spa. Any blockage or restriction of this water flow by persons or objects may damage system components, create an electrical shock hazard, and/or cause water damage to the surrounding area. To avoid damage to the pump and heater, the Equipment Module must never be operated unless the spa is filled with water.
7. **DANGER** - To reduce the risk of injury to persons within the spa, never remove, or alter in any way, the grates or covers on the suction fittings in the spa. Never operate the Equipment Module if the grates or covers on the suction fittings are broken or missing.
8. **WARNING - RISK OF CHILD DROWNING.** Extreme caution must be exercised to prevent unauthorized access to the spa by children. **WARNING** - To reduce the risk of injury, do not permit children to use the spa unless they are closely supervised at all times.

# IMPORTANT NOTICE

Equipment Module models EM-104 and EM-105 differ from model EM-100, described in this manual, in that the front panel is reversed top-to-bottom, and the heater assembly is on the top of the unit - not on the bottom as shown in the manual. Otherwise, all of the operating instructions and other information contained in this manual applies to models EM-104 and EM-105.

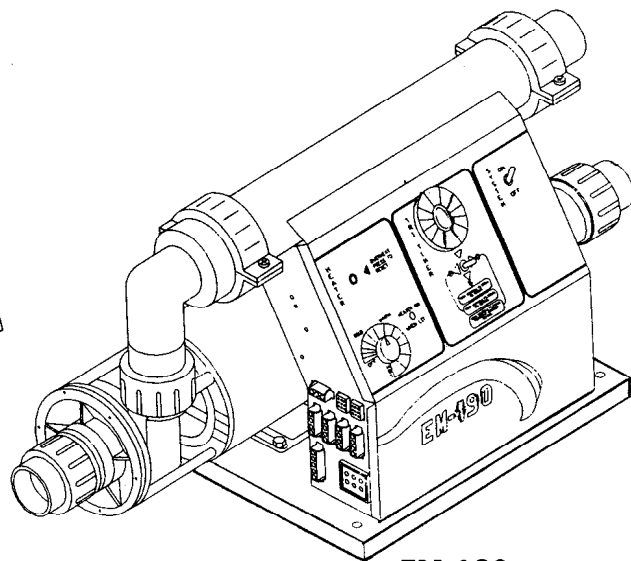
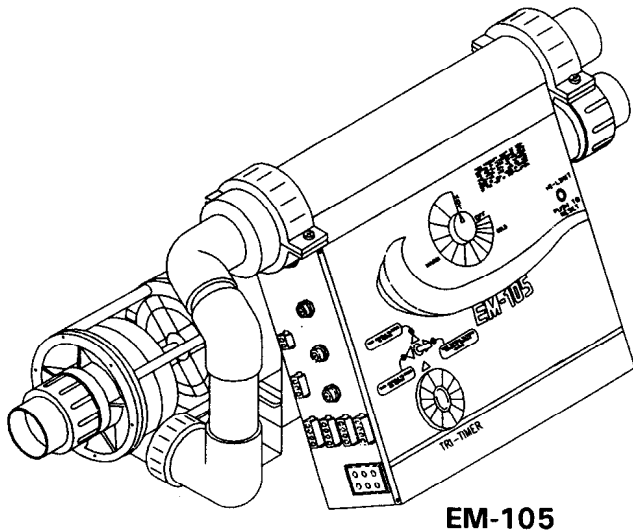
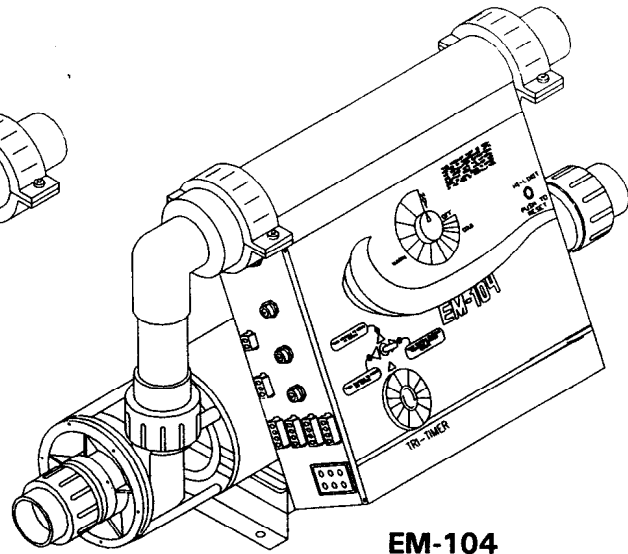
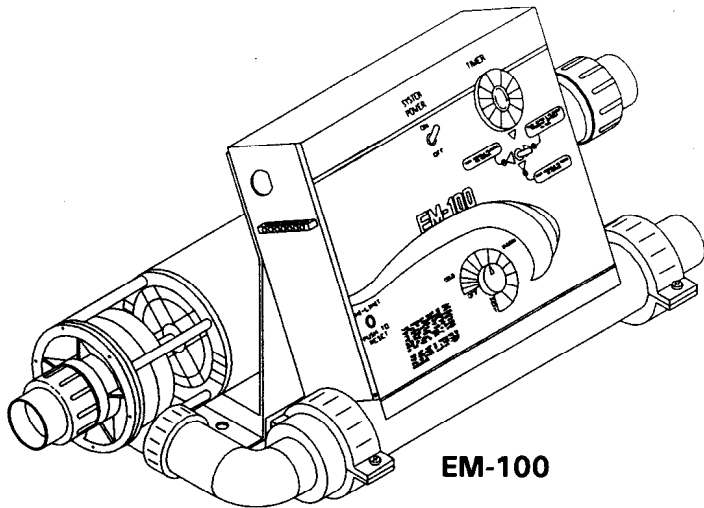
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# EQUIPMENT MODULE OWNERS MANUAL

MODELS EM-100, EM-104, EM-105, & EM-190



**B** BRETT  
AQUALINE

5822 Research Drive  
Huntington Beach, CA 92649-1348  
(714) 891-7211 FAX (714) 897-3284