iWave PE5 Series

Pool/Spa Combination Systems
Pool Systems
Spa Systems

PE45343RC
PE45343RCT1
PE45343RCT3

INTERMATIC®
Providing a brighter solution.™

Installation and User Guide

Version 4-13-06

Important Safety Instructions

All electrical work must be performed by a licensed electrician and conform to all national, state, and local codes. When installing and using this electrical equipment, basic safety precautions should always be followed, including the following:

DANGER: To reduce the risk of injury, do not remove the suction fittings of your spa or hot tub. Never operate a spa or hot tub if the suction fittings are broken or missing. Never replace a suction fitting with one rated less than the flow rate marked on the equipment assembly.

WARNING: Prolonged immersion in hot water may induce hyperthermia. Hyperthermia occurs when the internal temperature of the body reaches a level several degrees above the normal body temperature of 98.6°F. 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 danger; 2) failure to perceive heat; 3) failure to recognize the need to exit spa; 4) physical inability to exit spa; 5) fetal damage in pregnant women; 6) unconsciousness resulting in a danger of drowning.

WARNING: To Reduce the Risk of Injury —

- The water in a 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 young children and when spa use exceeds 10 minutes.
- 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 temperatures to 100°F (38°C).
- Before entering a spa or hot tub, the user should measure the water temperature with an accurate thermometer since the tolerance of water temperature-regulating devices varies.
- The use of alcohol, drugs, or medication before or during spa or hot tub use may lad to unconsciousness with the possibility of drowning.
- Obese persons and person with history of heart disease, low or high blood pressure, circulatory system problems, or diabetes should consult a physician before using a spa.
- Persons using medication should consult a physician before using a spa or hot tub since some medication may induce drowsiness while other medication may affect heart rate, blood pressure, and circulation.

WARNING: Risk of electric shock – Install the control center at least five (5) feet (152.4cm) from the inside wall of the pool and/or hot tub using non-metallic plumbing. Canadian installations must be at least three (3) meters from the water.

- Children should not use spas or hot tubs without adult supervision.
- Do not use spas or hot tubs unless all suction guards are installed to prevent body and hair entrapment.
- People using medications and/or having an adverse medical history should consult a physician before using a spa or hot tub.
- People with infectious diseases should not use a spa or hot tub.
- To avoid injury, exercise care when entering or exiting the spa or hot tub.
- Do not use drugs or alcohol before or during the use of a spa or hot tub to avoid unconsciousness and possible drowning
- Pregnant or possibly pregnant women should consult a physician before using a spa or hot tub.
- Water temperature in excess of 100°F (38°C) may be injurious to your health.
- Before entering a spa or hot tub measure the water temperature with an accurate thermometer.
- Do nut use a spa or hot tub immediately following strenuous exercise.
- Prolonged immersion in a spa or hot tub may be injurious to your health.
- Do not permit any electric appliance (such as a light, telephone, radio, or television) within 5 feet (1.5m) of a spa or hot tub.
- The use of alcohol, drugs or medication can greatly increase the risk of fatal hyperthermia in hot tubs and spas.
- Water temperature in excess of 100°F (38°C) may be hazardous to your health.

WARNING: A terminal bar marked “GROUND” is provided with the control center. To reduce the risk of electrical shock, connect this terminal bar to the grounding terminal of your electric service or supply panel with a continuous copper conductor having green insulation and one that is equivalent in size to the circuit conductors supplying this equipment, nut no smaller than no. 12 AWG (3.3mm). In addition, a second wire connector should be bonded with a no. 8 AWG (4.115mm) copper wire to any metal ladders, water pipes, or other metal within five (5) feet (1.52m) of the tub.

WARNING: A ground-fault circuit-interrupter must be provided if this device is used to control underwater lighting fixtures. The conductors on the load side of the ground-fault circuit-interrupter shall not occupy conduit, boxes or enclosures containing other conductors unless the additional conductors are also protected by a ground-fault circuit-interrupter. Refer to local codes for complete details.

Contents

Section 1:

System Overview

The Intermatic I-Wave Pool/Spa PE5 Wireless Control System brings wireless control to a new level of simplicity and affordability. What makes the system distinctive is that it is:

- **Easy to Use** — with simple, push button controls and a clear, easy-to-read display panel
- **Everything You Need** — providing, in its standard configuration, the functionality and control called for in nearly every installation.
- **Modular** — components snap in and out of the enclosure as needed to simplify installation and repair, and to make customization simple for the installer. No need for the technician to spend hours troubleshooting a circuit board…just snap in a replacement.
- **Dependable** — with Z-Wave® technology that lets you plug inexpensive repeaters into an electrical outlet to relay signals in any part of the site with dead spots. Z-Wave® technology eliminates intermittent signal problems experienced with many other systems.
- **Cost Efficiency** — a superior system, easier to install and maintain, with better dependability, and at a cost that's competitive with any other system available.

The standard configuration for the I-Wave Pool/Spa PE5 Wireless Control System configuration is shown in Figure 1-1. You can order individual components for a custom configuration or system as indicated.

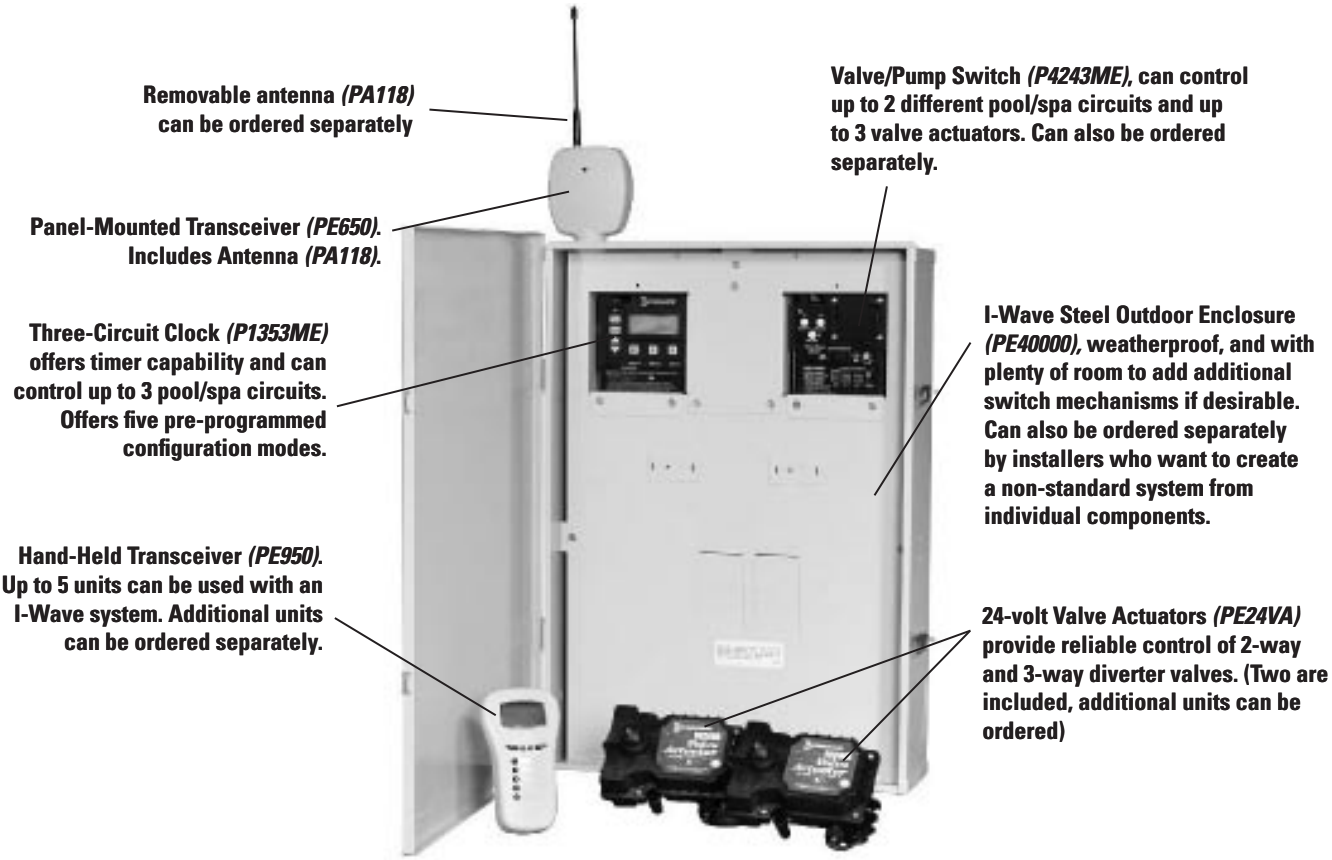


Figure 1-1

The standard system is shipped with snap-in mechanisms in place inside the enclosure, the panel-mounted transceiver attached to the top of the enclosure, with antenna to be attached. Components are already interconnected and are ready for wiring. System model numbers are designed to make sure the installation meets local code as follows:

- **PE45343RC** — the basic radio-controlled system.
- **PE45343RCT1** — a special version with a 100 watt transformer for 12-Volt underwater lighting, where required by local code. The 100-watt transformer *(PA117)* can also be ordered separately for installation into standard model *PE45343RC*.
- **PE45343RCT3** — a special version with a 300 watt transformer for 12-Volt underwater lighting, where required by local code. The 300-watt transformer *(PA116)* can also be ordered separately for installation into standard model *PE45343RC*.

You can order most system components individually to assemble a custom I-Wave system as desired.

Additional Detail on Key Components

Three-Circuit Clock *(P1353ME)*

Designed for aftermarket and retrofit applications, the P1353ME has the ability to program up to three different circuits. Choose between six pre-programmed modes of operation, which include single speed pump or 2-speed pump/cleaner pump combinations. In addition, programmed modes that include auxiliaries can control pumps up to 3 HP as well as underwater, garden, and/or fountain lighting. Countdown and Override features allow cycle interruptions when pool/spa service is required. All timing and protection, associated with filter pump/cleaner pump combinations and two-speed pumps, has already been integrated into the software. This mechanism can also be installed into almost any Intermatic enclosure.

- 120 or 208-240 Volt Input Voltage
- Memory Back-Up
- Heater Protection (Fireman Switch)
- LCD Readout
- Shipping Weight — 3 lbs. (1.4 kg)
- Agency Approval — CSA/C-US

CONTACT RATINGS – EACH CIRCUIT, ALL MODES

- 20A Resistive, 120/240 VAC., 50/60 Hz
- 20A FLA@120 VAC, 96A LRA@120 VAC, 50/60 Hz
- 17A FLA@240 VAC, 80A LRA@120 VAC, 50/60 Hz
- 5 Amps Tungsten, 120/240 VAC, 50/60 Hz
- 5 Amps Ballast, 120/240 VAC, 50/60 Hz

Valve/Pump Switch *(P4243ME)*

Designed for aftermarket and retrofit applications, the P4243ME is most suited for controlling up to two different circuits associated with pool/spa combinations but can also be used to control all the equipment typically needed in connection with water features, water gardening, solar heating, and other similar applications. This unit snaps into almost any Intermatic enclosure and features two 3HP double pole relays, one of which can be controlled by an external timer, 24 volt supply for up to three valve actuators, automatic HIGH/LOW water temperature selector, heater connection circuit, and push button control for each load with indicator lights on the face of the control. In addition, the unit has connections for a hard-wired or wireless remote and a master switch controller.

- 120 or 208-240 Volt Input Voltage
- Controls up to three valve actuators
- Switches heater thermostat
- Remote control capabilities
- Shipping Weight — 3 lbs. (1.4 kg)
- Agency Approval — CSA/C-US

CONTACT RATINGS – EACH CIRCUIT

- 17A Resistive, 120/240 VAC., 50/60 Hz
- 1.5 HP @ 120 VAC., 50/60 Hz
- 3.0 HP @ 240 VAC., 50/60 Hz
- 10 Amp Tungsten, 120/240 VAC, 50/60 Hz

24-Volt Valve Actuator *(PE24VA)*

Designed with quality in mind, Intermatic's 24-volt valve actuators provide reliable control of 2-way and 3-way diverter valves for pool/spa combinations and water features. The water flow can be altered for specific applications through the adjustable cam, which rotates diverter valves to multiple degree settings. The cam settings can be easily adjusted by simply removing the lid. These valve actuators are compatible with all pool/spa valves currently offered in the industry and will retrofit into all pool/spa control systems.

- 24VAC Input Voltage
- Automates compatible diverter valves for pool/spa combos
- Adjustable cam rotates diverter valves to multiple degree settings
- Designed to operate most 2-way and 3-way diverter valves
- Shipping Weight - 3 lbs. (1.4 kg)
- Agency Approval - CSA/C-US

Panel-Mounted Transceiver *(PE650)* Includes Antenna *(PA118)*

The main function of the Panel-Mounted Transceiver is to take commands from the Wireless Hand-Held Transceiver (*PE950)* and hand them off to two mechanisms (*P1353ME* and/or *P4243ME*) in the I-Wave Enclosure box. This unit can control:

- One *P1353ME* unit and one *P4243ME* unit
- One or two *P1353ME* units
- One or two *P4243ME* units

In cases where the two devices are too far apart for direct communication, a Transceiver Repeater Module *(HA04C)* will relay commands between the two devices. Shown here with its removable antenna *(PA118)*.

Wireless Hand-Held Transceiver *(PE950)*

The main function of the Wireless Hand-Held Transceiver is to transmit user commands to the Panel-Mounted Transceiver (*PE650)* and display the status of the equipment. The device can control up to five loads, typically:

- The three loads in the Three-Circuit Clock
- The two relays in the Valve/Pump Switch, usually water temperature controls for pool/spa
- The actuators that switch between pool and spa

The unit floats if thrown in the pool or spa, is water-submersible, shock resistant, and requires three (3) AA batteries. Expected battery life is about one year in typical use.

The Wireless Hand-Held Transceiver (*PE950)* can only communicate with the Panel-Mounted Transceiver (*PE650)* and Transceiver Repeater Module (*HA04C)*, and is compatible with no other hardware. In addition, when the components of a specific system are linked together into a network, communication with another neighboring system cannot occur. Up to five PE950 units can be used in a single installation.

35-ft. Antenna Extension Cable Assembly *(PA121)*

When a structure impedes transmission between the Panel-Mounted Transceiver and Hand-held Transceiver(s), you can use the 35-ft. Antenna Extension Cable Assembly *(PA121)* to relocate the antenna from the Panel-Mounted Transceiver to the area of operation, ensuring that communication between the Hand-Held unit and the control center is successful.

OMRON Relay Assembly *(143T145A)*

There are two OMRON Relay Assemblies (*143T145A*) in the Valve/Pump Switch Mechanism (*P4243ME)* which switch either 120V or 240V loads. These relays are replaceable and can be ordered separately.

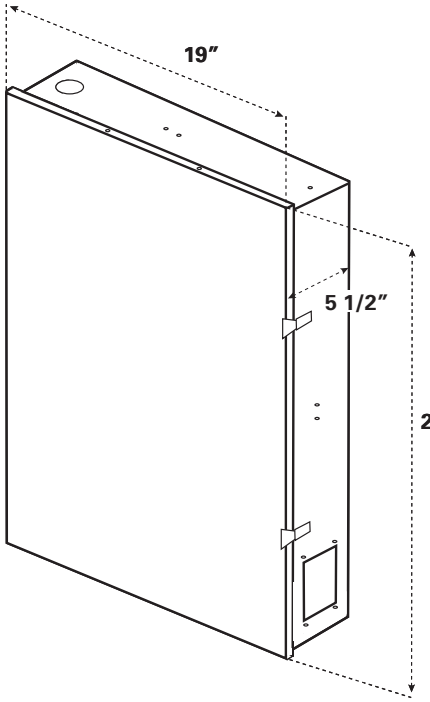
CONTACT RATINGS – EACH CIRCUIT

- 17A Resistive, 120/240 VAC., 50/60 Hz
- 1.5 HP @ 120 VAC., 50/60 Hz
- 3.0 HP @ 240 VAC., 50/60 Hz
- 10 Amp Tungsten, 120/240 VAC, 50/60 Hz

Water Temperature Sensor *(PA122)*

The Intermatic Water Sensor (*PA122*) monitors both pool and spa water temperature, depending on the position of the diverter valves. Installation is necessary for the thermostatic control to work. The sensor can be ordered separately.

Steel Outdoor Enclosure Includes P1353ME *(PE45300)*



Suitable listed breakers (purchase locally)						
	CIRCUIT BREAKER					FILLER PLATE
MFR	SINGLE	DOUBLE	TWIN	QUAD	GFCB	
Cutler-Hammer	BR	BR	BRD	BRD	GFCB	BRFP
Murray	MP-T	MP-T	MH-T	MH-T	MP-GT	LX100FP
Siemens	QP	QP	QT	QT	QPF	QF3
Square-D	HOM	HOM	HOMT	HOMT	HOMT	HOMFP
Thomas & Betts	TB	TB	TBBD	TBBD	GFB	FP-1C-TB

Optional — Transceiver Repeater Module *(HA04C)*

The Transceiver Repeater Modules *(HA04C)* ensure that no problems in reception occur between the Hand-Held Controller(s) (*PE950)* and the Panel-Mounted Transceiver (*PE650)*. Reception is affected by distance (about 100 feet, direct line of sight) and by physical obstacles (like brick walls or structures). However, by plugging in a Transceiver Repeater Module where necessary, long distances or physical obstructions can be overcome.

Optional — Three-Button Wired Remote Control *(133PE1484A)*

The Three-Button Wired Remote Control *(133PE1484A)* plugs into either the Three-Circuit Clock *(P1353ME)* or Valve/Pump Switch *(P4243ME)*.

When installed as part of a system, it replaces the wireless method of controlling the three circuits within the mechanism. For more information, refer to *Installing a Wired Remote Connection* in Section 4. The Three-Button Wired Remote Control must be installed where a third mechanism is needed in the enclosure box, since the Wireless Hand-Held Transceiver (*PE950)* can only control two mechanisms.

Optional — Freeze (Air Temperature) Sensor *(178PA28A)*

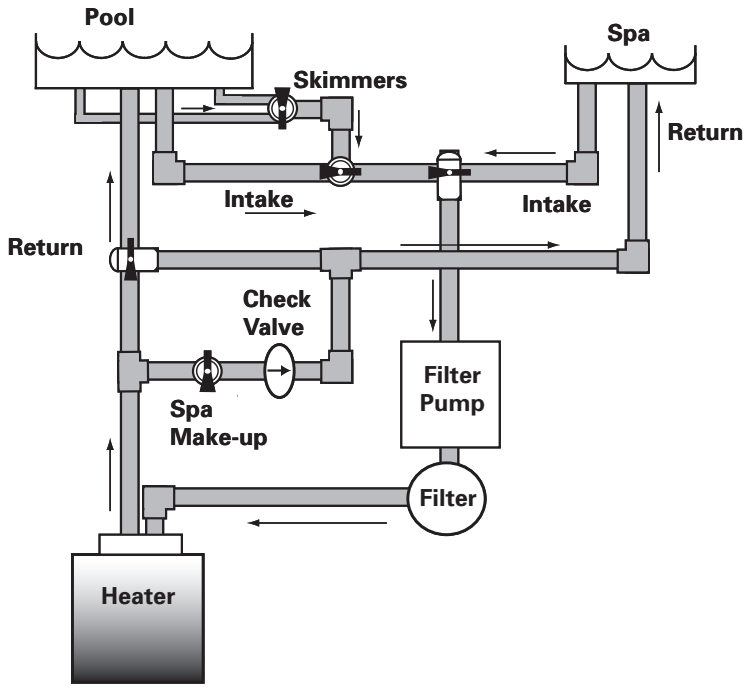
Add the Intermatic Freeze or Air Temperature Sensor (*178PA28A*) to installations where below-freezing outdoor temperatures are a concern. Programming information to incorporate the sensor is provided on page 35.

Section 2:

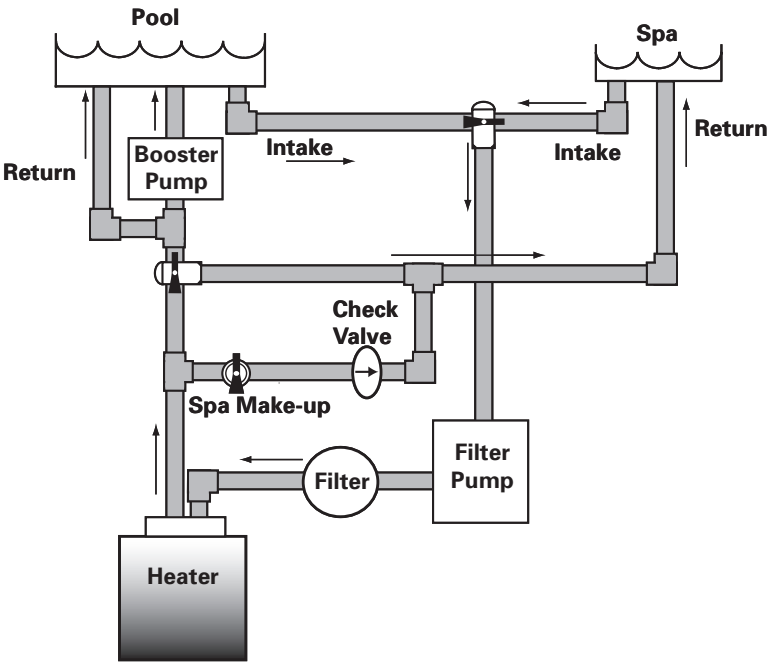
Plumbing Examples

The following diagrams show several plumbing and wiring examples of installations for pool and spa that share a single filter pump, filter, and heater. If you are installing a pool only or spa only, these diagrams will not apply.

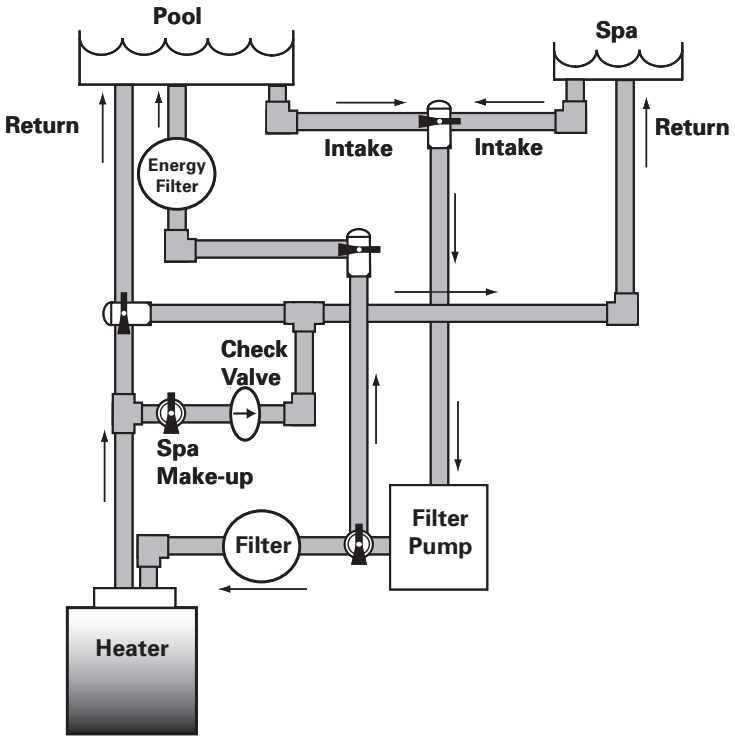
For Pool and Spa Combo Installations



For Booster Pump Pool Cleaner Installations



For Non-Booster Pump Pool Cleaner Installations



Section 3:

Control Center Installation

Mounting the Control Center

Special code requirements apply to your I-Wave Control System. To ensure safe installation, please follow all applicable national state, and local codes when installing the Control Center.

Locate your Control Center near the pool/spa equipment pad at least five feet or more away from either the pool or spa equipment and at least five feet off the ground.

Mounting brackets have been provided to assist you in your installation.

NOTE: The Control Center is not to be considered as suitable for use as Service Equipment. Therefore, it is required to have the appropriate means of disconnection, circuit isolation, and/or branch circuit protection installed at the Main Power Panel.

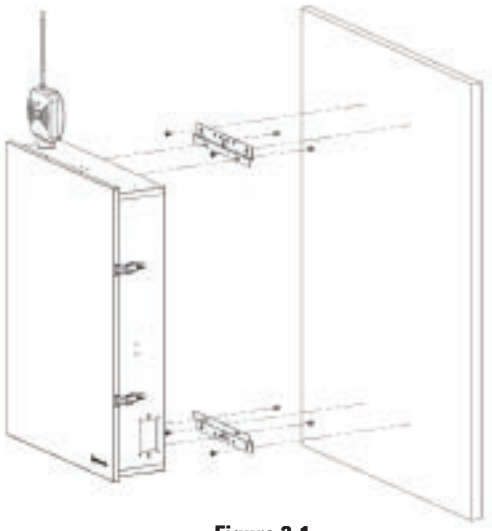


Figure 3-1

Wiring the System Power

Run wire from the Main Power Panel to your Control Center and connect the leads to the Control Center Breaker Base. See detail in Figure 3-2 at the right.

The breaker base of your Control Center is capable of handling up to 125 amps. You must comply with the applicable local codes and use the proper gauge wiring from your Main Power panel to your control center breaker base. The proper gauge wire will be determined by the length of wire required and the 125 Max Amp rating.

WARNING: Potentially high voltages in the Control Center can create dangerous electrical hazards, possibly causing death, serious injury, or property damage. Turn off the Main Power to the Control Center to disconnect or service the I-Wave Control Center.

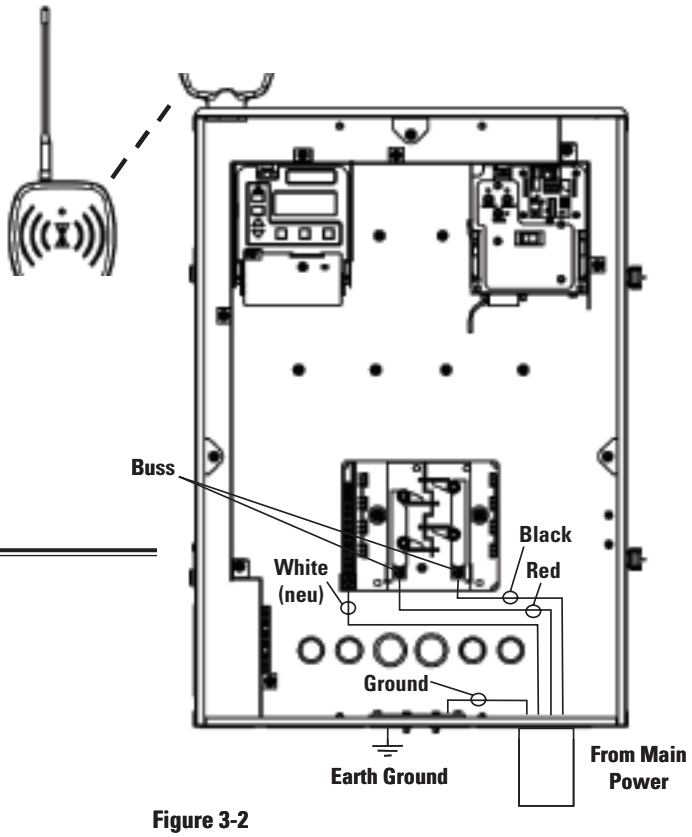


Figure 3-2

Bonding the Control Center

Some state local codes require bonding the control center to the bonding grid. If this is required, install a bonding lug *(156T11047A)* to the Control Center enclosure and connect a #8 solid copper core wire, to an approved earth ground, (i.e. approved ground stake, or conducting metal water pipe buried to a sufficient depth, etc.). See detail in Figure 3-3 at the right.

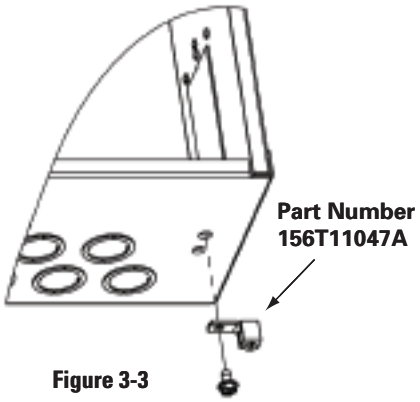


Figure 3-3

Wiring the Individual Equipment

Each piece of pool or spa equipment requires its own high voltage relay and associated circuit breaker branch protection. Each circuit breaker should be sized according to your load and the appropriate local codes.

The I-Wave Control System consists of two Intermatic snap-in mechanisms:

- P1353ME — with three timed circuits each comprised of three SPST relays
- P4243ME — with two on-demand circuits comprised of two DPST relays

Even though the three circuit clock can easily handle on-demand circuits, any equipment that requires programmed ON/OFF times should be wired to the three-circuit P1353ME mechanism (i.e., filter pumps, booster pumps, etc.). On-demand equipment (i.e., blowers, lights, etc.) should be wired to the P4243ME valve-controller mechanism. This practice will maximize your control capabilities.

All circuits are independent contacts. Therefore you can mix and match 120-Volt and 240-Volt loads within each mechanism. Refer to the following illustrations for sample wiring diagrams.

If Wiring 120-Volt Loads:

- For safety purposes, the factory default setting for the source voltage of a *P1353ME* mechanism is for 240 Volts.
- For 120-Volt installations, be sure you set the Source Voltage Selection Jumper on the back of the Three-Circuit Clock mechanism *(P1353ME)* for 120 Volts before you begin wiring.
- For more information, see *Identifying Connections and Selecting Proper Input Voltage* on page 26.

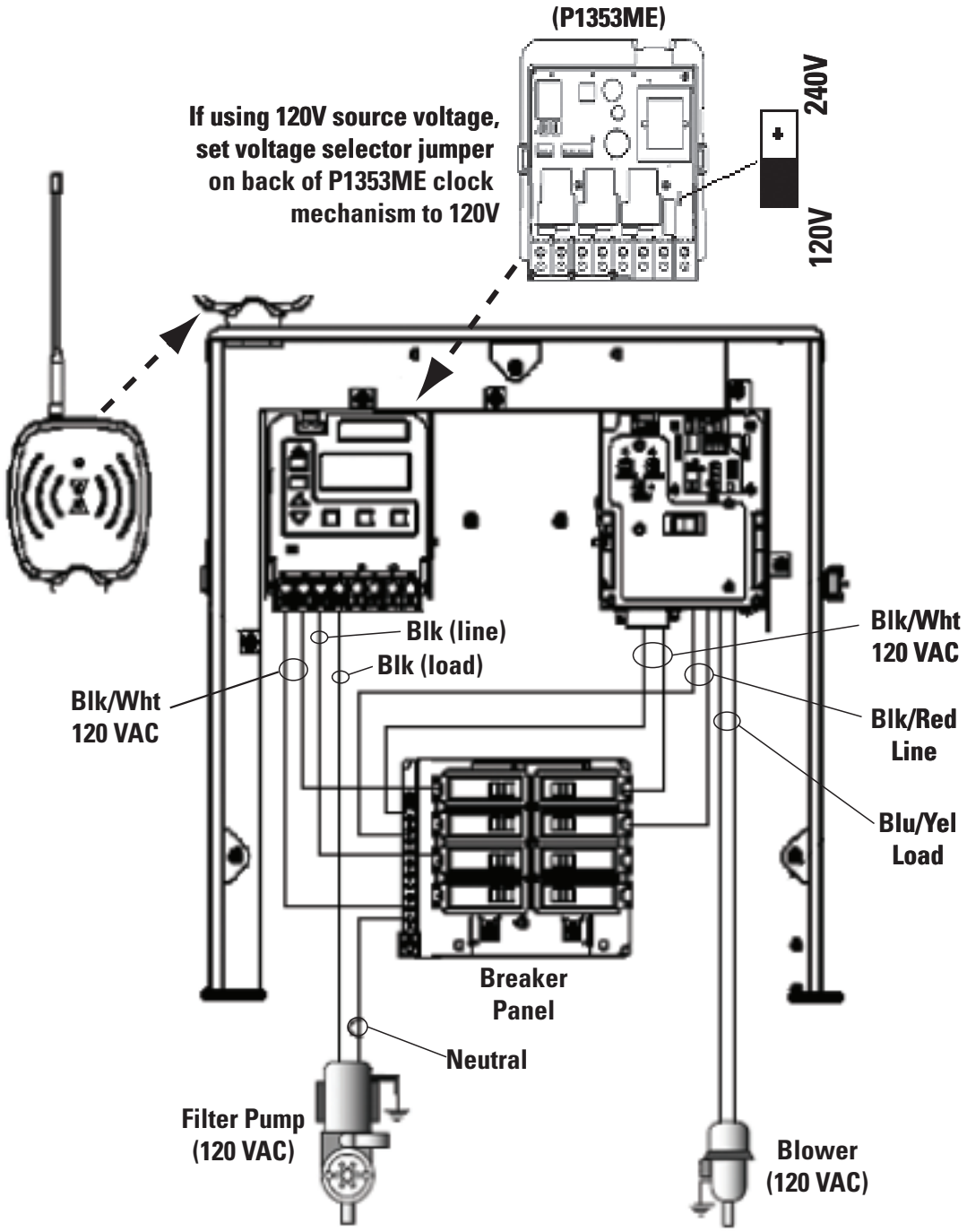


Figure 3-4

If Wiring 240-Volt Loads:

- For safety purposes, the factory default setting for the source voltage of a *P1353ME* mechanism is for 240 Volts.
- The Source Voltage Selection Jumper on the back of the Three-Circuit Clock mechanism *(P1353ME)* will already be correctly set, ready for you to begin wiring.
- For more information, see *Identifying Connections and Selecting Proper Input Voltage* on page 26.

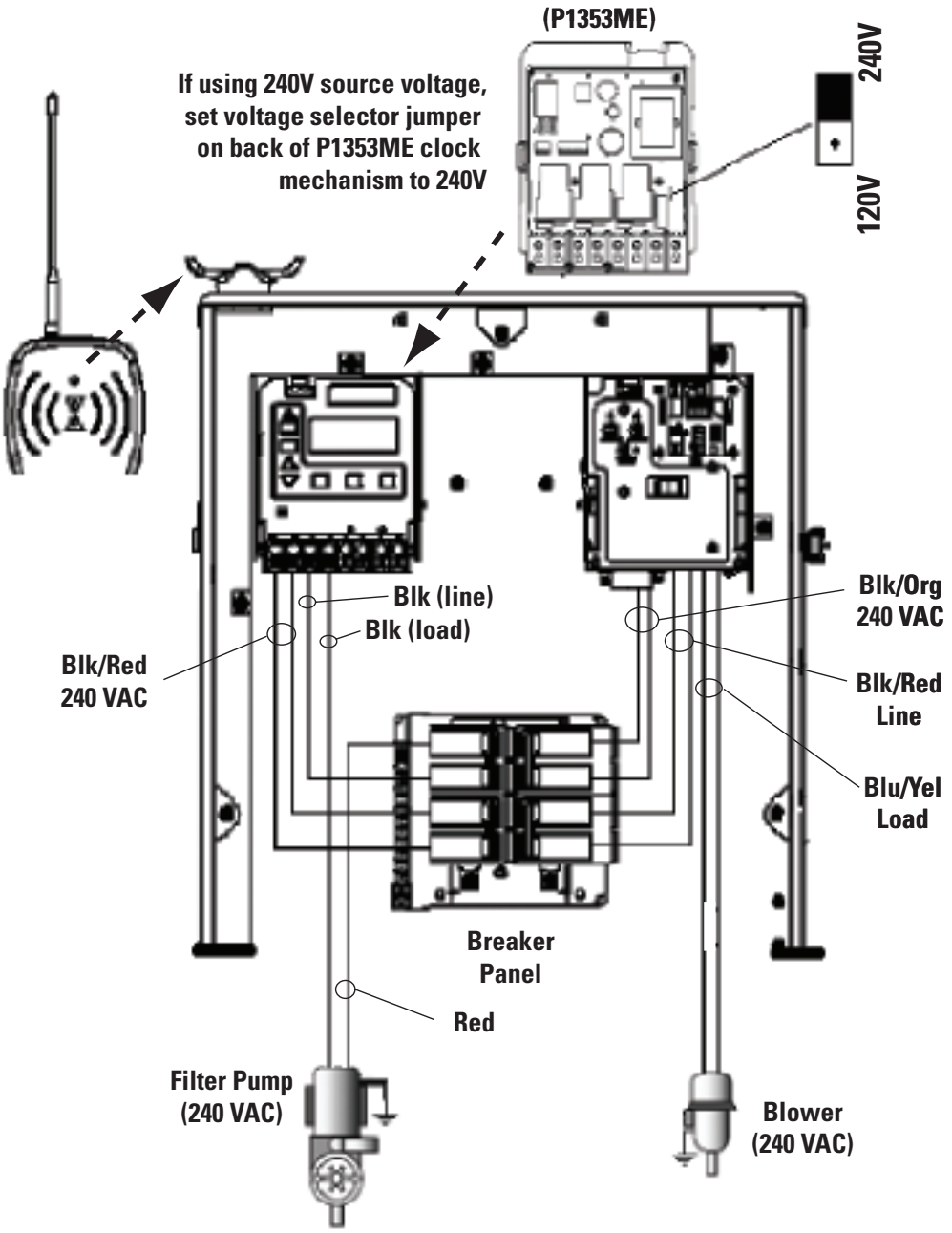


Figure 3-5

If Wiring Combination 120- and 240-Volt Loads:

- For combination 120- and 240-Volt loads, change the factory default setting of the Source Voltage Selection Jumper on the back of the Three-Circuit Clock mechanism *(P1353ME)* from its factory default setting to 120 Volts.
- For more information, see *Identifying Connections and Selecting Proper Input Voltage* on page 26.

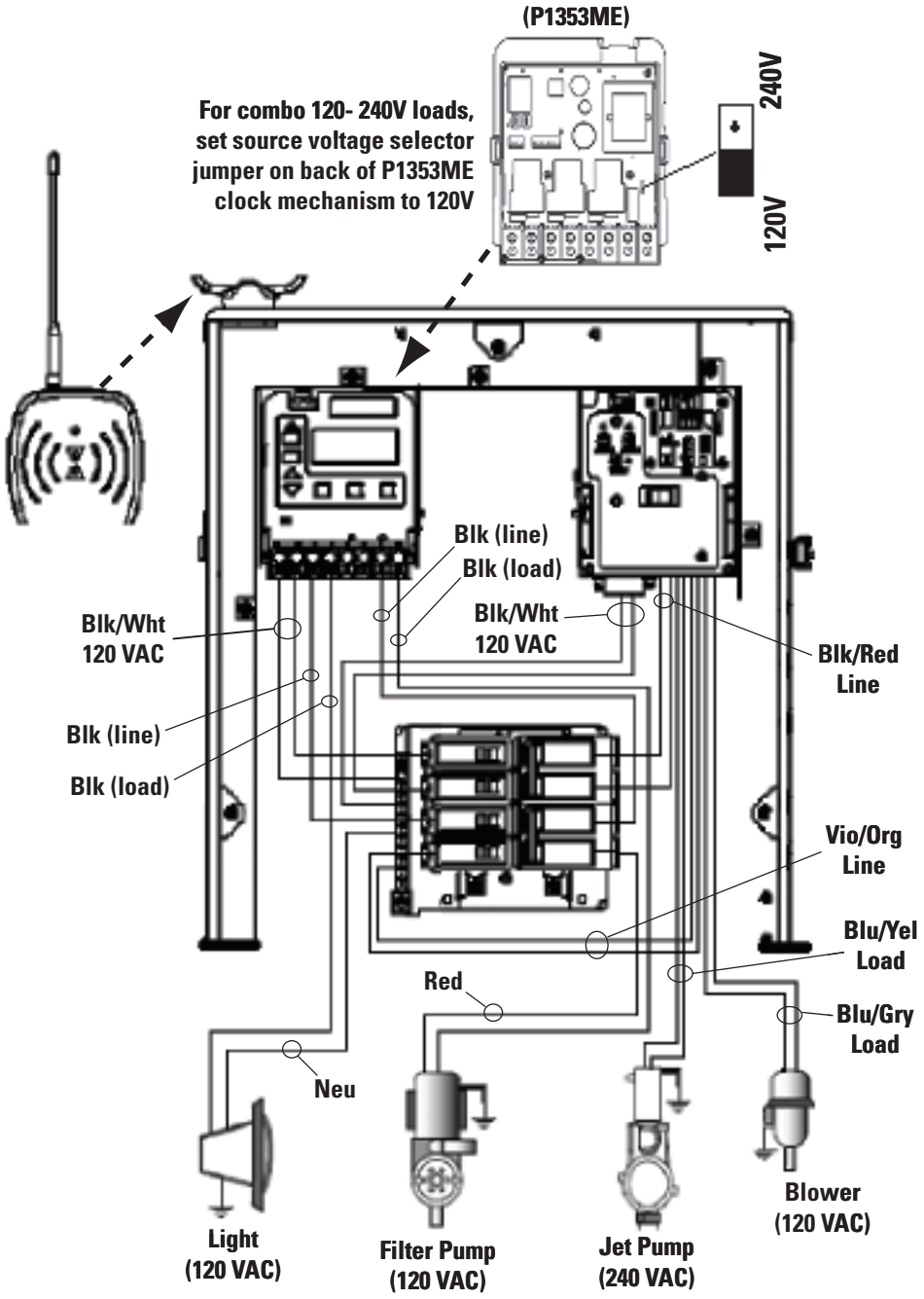


Figure 3-6

Wiring Underwater Lights

CAUTION: A Ground Fault Circuit Interrupter (GFCI) must be provided for high voltage pool/spa lights. Do not use a GFCI circuit breaker.

High-Voltage Underwater Lights

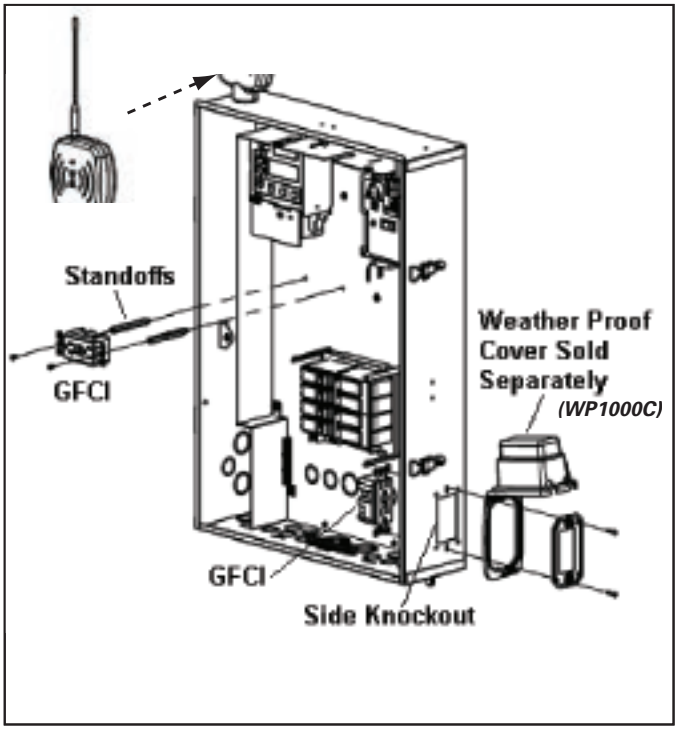


Figure 3-7

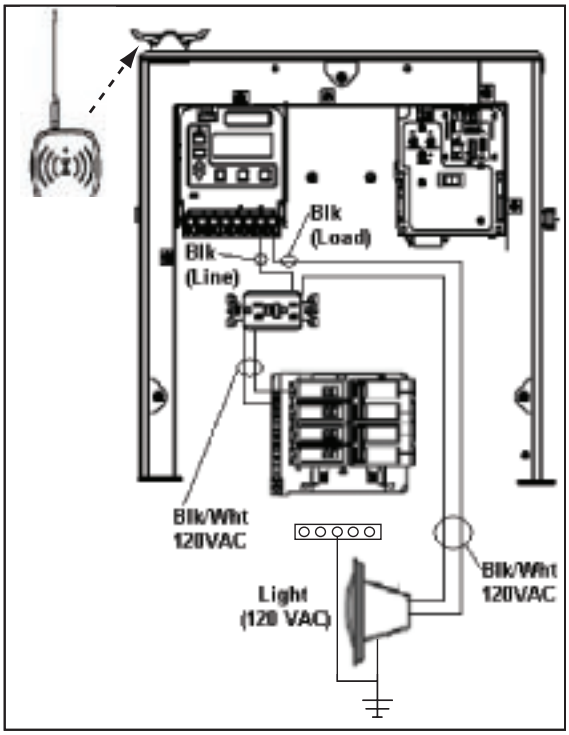


Figure 3-8

The I-Wave PE5 Control Center comes equipped with two décor knockouts on the dead front and one side knockout for installation of GFCI receptacles. (See Figure 3-7).

NOTE: If using the décor knockouts to install a GFCI, you must use the standoffs provided with the Control Center to mount your GFCI.

1. Install a GFCI receptacle and connect the neutral and hot wire, from the circuit breaker, to the LINE side of the GFCI. (See Figure 3-8).
2. Connect the neutral (white) from the light to the GFCI.
3. Connect the hot (black) as follows:
   a. From the LOAD side of the GFCI to the line side of the clock,
   b. From the light to the LOAD side of the clock. (See Figure 3-8.)
4. Connect the ground (green) from the light to the grounding bar inside the Control Center.

Low-Voltage Underwater Lights

CAUTION: Your I-Wave Control Center is equipped with a Low Voltage Raceway. <u>You must use this raceway for all low voltage wiring</u>. You cannot mix high and low voltages in the high voltage compartment.

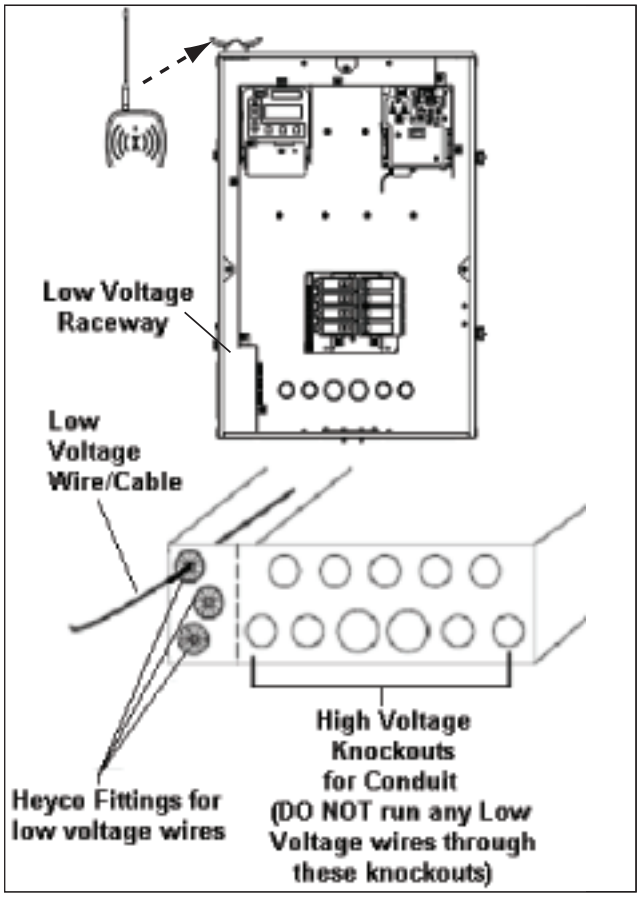


Figure 3-9

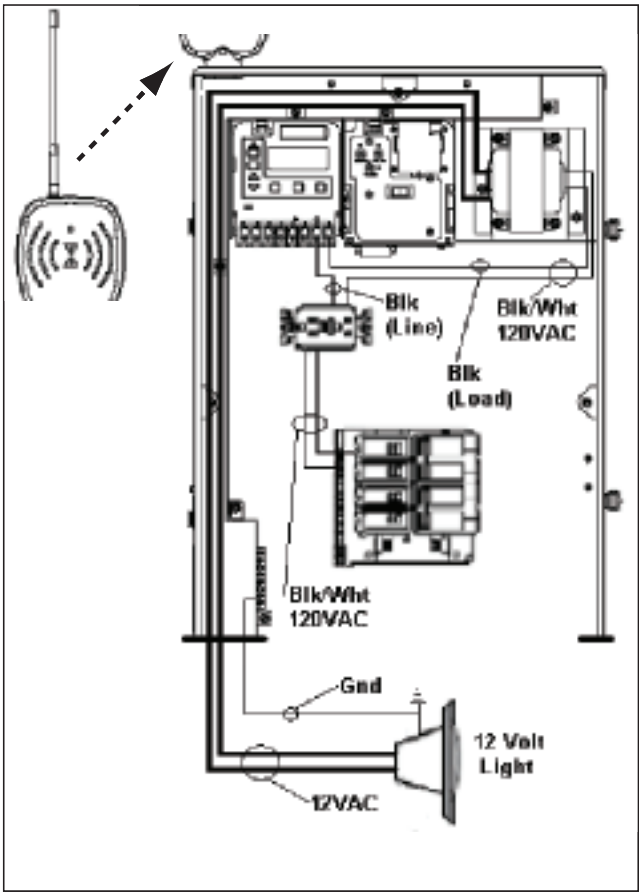


Figure 3-10

NOTE: If you require a low voltage transformer, you should order system model *PE45343RCT1* (with a 100 watt transformer) or *PE45343RCT3* (with a 300-watt transformer). Alternatively, you can order a 300-watt *PA124* or 100-watt *PA123* 12V transformer kit to mount in the standard system model *PE45343RC*. *(*See Figure 3-10.)

1. If required by local code, install a GFCI receptacle and connect the neutral and hot wire, from the circuit breaker, to the LINE side of the GFCI. (See Figure 3-10.)
2. Connect the light to the secondary side of the transformer.
3. Connect the neutral (white) on the primary side of the transformer to the load side of the GFCI.
4. Connect the hot (black) as follows:
   a. To the LOAD side of clock,
   b. Then out the LINE side of the clock to the LOAD side of the GFCI. (See Figure 3-10.)
5. Connect the ground (green) from the light to the grounding bar inside the Control Center.

Low-Voltage Wiring

CAUTION: Your I-Wave Control Center is equipped with a Low Voltage Raceway. <u>You must use this raceway for all low voltage wiring</u>, including the 12 Volt wires from the transformer. You cannot mix high and low voltages in the high voltage compartment.

Water Temperature Sensor

The I-Wave Control System comes equipped with a Water Temperature Sensor. This sensor is needed to monitor and maintain both the pool and spa water temperature depending on the position of the diverter valves. It needs to be installed in order for the thermostat control to work. Power needs to be disconnected when connecting the temp sensor. ***Only an Intermatic Sensor will work with this controller.*** Follow the directions below to install and mount your water temperature sensor. Refer to page 46 for programming instructions.

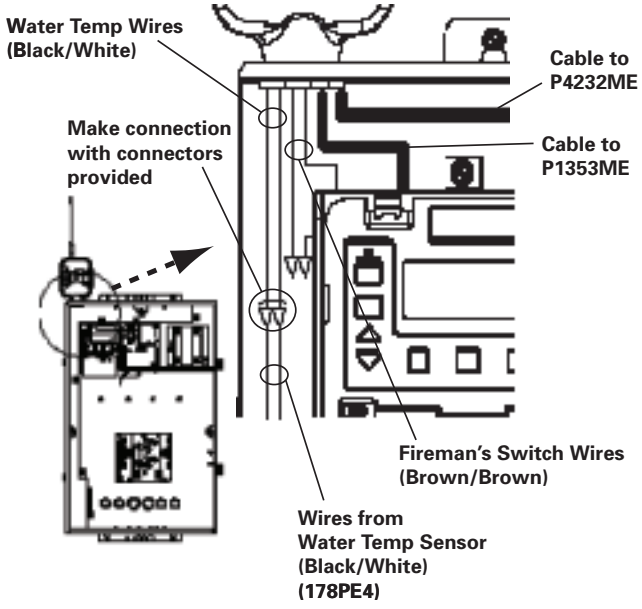


Figure 3-11

1. Drill a 3/8″ hole in the pipe between the filter pump and filter and install the Water Temperature Sensor with hose clamp (not provided). Ensure the O-ring is in place.
2. Run the wire to the Control Center, through the low voltage raceway. Connect both wires to the Panel-Mounted Receiver. (See Figure 3-11.)

Freeze Sensor

The I-Wave Control System uses an optional Freeze Sensor *(178PA28A)* for measuring air temperature and implementing the Freeze Protection Circuit—necessary for the freeze protection circuit and programming to work. Power must be disconnected when connecting the Freeze Sensor. ***Only an Intermatic Freeze Sensor will work with this controller.*** Refer to page 35 for programming information, and page 10 for ordering information.

1. Install the Freeze Sensor outside the Control Center, preferably onto a piece of conduit at or near your equipment pad. Use the clip provided with the sensor. Do not install in direct sunlight or around motors or other heat sources.
2. Run the wire to the Control Center through the low voltage raceway. Connect Freeze Sensor directly to the back of the three-circuit clock mechanism. (See Figure 3-12.) Refer to page 26 for connection information.

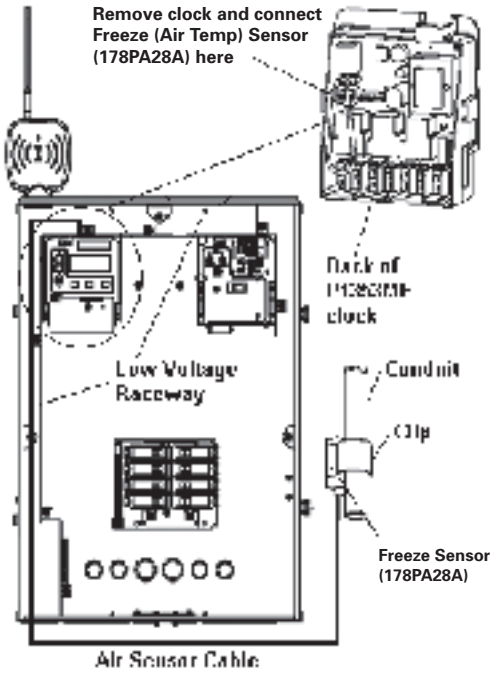


Figure 3-12

Motorized Valve Actuator Connection and Synchronizing

The I-Wave Control System is capable of controlling up to three Motorized Valve Actuators. Two Intermatic Motorized Valve Actuators *(PE24VA)* are included with your I-Wave system. Refer to page 8 for information to order additional actuators.

The actuators must be installed to automatically rotate your valves between pool and spa plumbing. Power must be disconnected when connecting the actuator connectors to your I-Wave Control Center. Refer to the directions below prior to installing your PE24VA actuators. Refer to Figure 3-13 for detail.

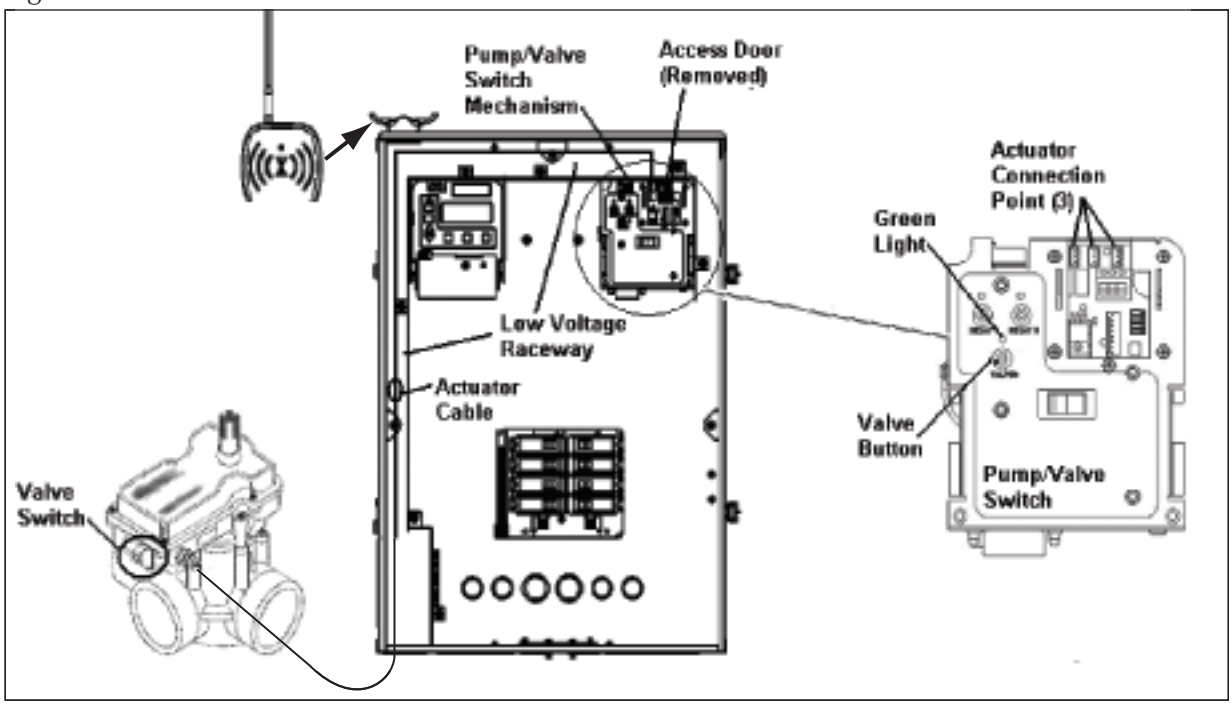


Figure 3-13

1. Remove power from the I-Wave control center.
2. Attach the valve actuators *(PE24VA)* to the water valves. (See instructions included.)
3. Run the actuator cable to the Control Center, and through the low voltage raceway.
4. Remove the access door to the Pump/Valve Switch mechanism.
5. Insert the three-pin connector of the motorized valve actuator to any of the three available connectors on the Pump/Valve Switch mechanism circuit board.
6. Apply power to the I-Wave Control Center and synchronize the actuators as follows:
   - **a.** Use the Valve button located on your Pump/Valve switch to illuminate the green light above the Valve button. This indicates that the switch is in SPA mode.
   - **b.** Use the switch located on your motorized valve actuator to ensure the valves are in the SPA position.
   - **c.** If either of the Actuators is positioned backwards, flip the switch on the back to reverse position.
   - **d.** Verify that the Actuators are correctly synchronized with your installation.

Fireman Switch Connection

The I-Wave Control System is capable of controlling most heaters or heat pumps, using thermostatic circuitry of 24 VAC @ 2A or less, in the market today. Locate your heater in the following pages and follow the instructions for proper installation with your I-Wave Control Center.

Connection to the Three-Circuit Clock

Connect the Fireman switch to the Intermatic Fireman Switch wires (tagged), located in the low-voltage raceway of the Intermatic panel. (See Figure 3-14.)

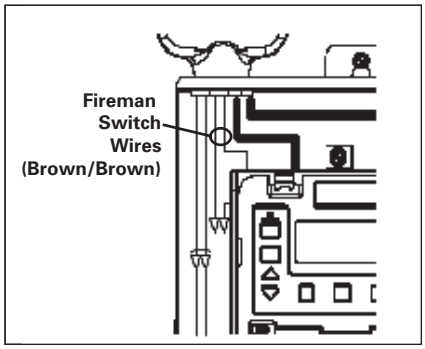


Figure 3-14

Connection for Teledyne Laars Heater

1. Connect two #14 gauge wires, designed for use in hot environments, to the two black wires, marked heater connection, on the panel-mounted receiver.
2. Connect the other ends of the #14 gauge wires from Step 1 to the Fireman's Switch terminal bar in place of the factory installed wire loop.
3. Do not disconnect high limit or pressure switches.
4. Turn the heater thermostat(s) to maximum setting.
5. Turn the heater switch to the ON position. For dual thermostat heaters turn switch to Spa position.

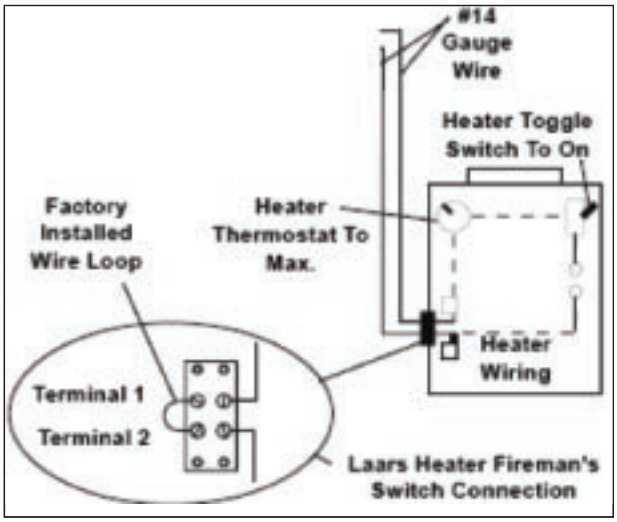


Figure 3-15

Connection for Raypak Heaters

The following connection procedure is for the two wire-one function configuration Raypak heater.

1. Connect two #14 gauge wires, designed for use in hot environments, to the two black wires on the panel-mounted receiver.
2. Connect one end of either #14 gauge wires from Step 1 to both the orange/black and black/orange wires on the Raypak heater.
3. Connect the remaining #14 gauge wire from Step 1 to the yellow/black wire on the Raypak heater.

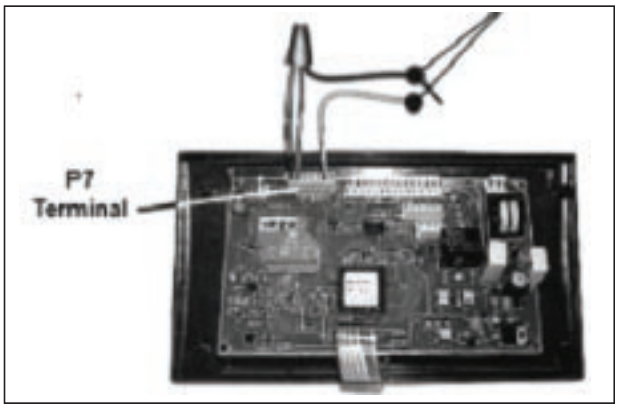


Figure 3-16

Connection for Hayward Heaters

1. Remove heater service door on your Hayward Heater.
2. Remove factory-installed wire connector between two (2) red wires labeled “CONNECTION FOR FIELD INSTALLED CONTROL SWITCH.” (See Figure 3-17.)
3. Connect two #14 gauge wires, designed for use in hot environments, to the two red wires. (See Figure 3-18.)
4. Wire the other end to the two black wires, marked heater connection, on the panel-mounted receiver in your I-Wave Control Center.
5. Do not disconnect high limit or pressure switches.
6. Turn the heater thermostat(s) to maximum setting.
7. Turn the thermostat selector switch to the ON, HIGH, or SPA position.

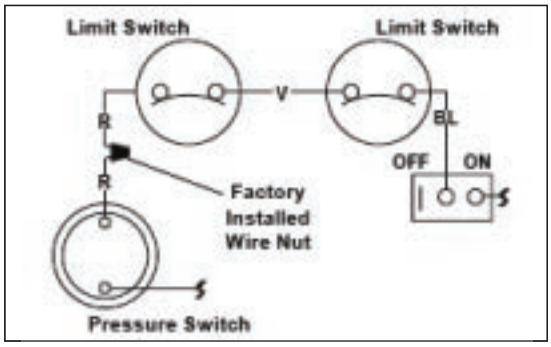


Figure 3-17 — Wiring Before Modification

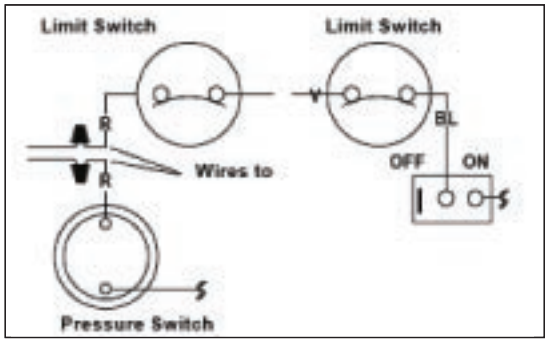


Figure 3-18 — Wiring with [what??]

Connection for Pentair Heater

1. Remove heater service door on your Pentair Heater.
2. Separate the black wires (common) from each other. (See Figure 3-19.)
3. Connect two #14 gauge wires, designed for use in hot environments, to the two black wires, marked heater connection, on the panel-mounted receiver in the I-Wave Control Center and attach the other end to the two black wires on the heater. (See Figure 3-20.)
4. Do not disconnect high limit or pressure switches.
5. Turn the heater thermostat(s) to maximum setting.
6. Turn the heater toggle switch on.

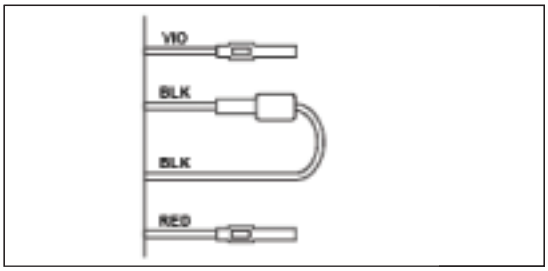


Figure 3-19 — Wiring Before Modification

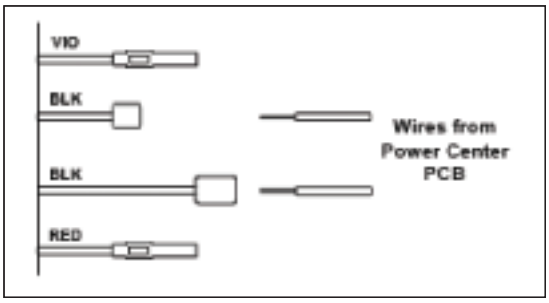


Figure 3-20 — Wiring with AquaLink RS

Connection for Sta-Rite Heaters

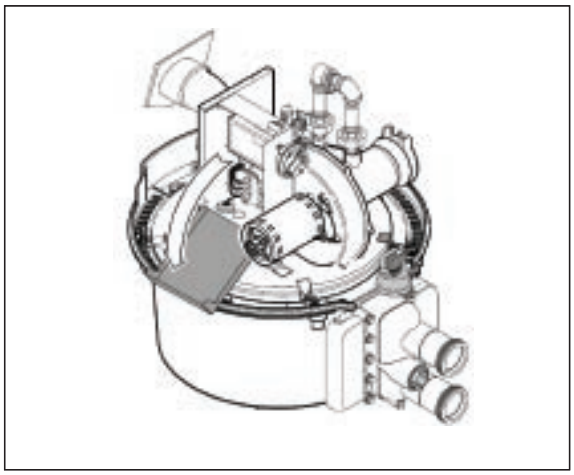


Figure 3-21

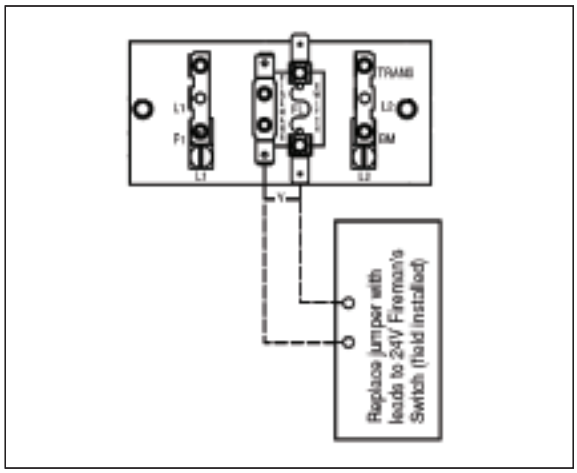


Figure 3-22

1. Turn off power to heater at main circuit breaker panel.
2. Unbolt and remove the upper jacket halves (Refer to heater owners manual).
3. Open control box cover. (See Figure 3-21.)
4. Remove the factory-installed jumper between the Fireman's Switch terminals. (See Figure 3-22.)
5. Connect two #14 gauge wires, designed for use in hot environments, to the two black wires, marked heater connection, on the panel-mounted receiver in the I-Wave Control Center and attach the other end to the two spade terminals at the heater. You can also cut the yellow jumper wire and wire connect the black wires to each yellow wire. (See Figure 3-23.)
6. Route the wires out through the knockout on the bottom of the Control Box.
7. Do not disconnect high limit or pressure switches.
8. Turn the heater on and maximize the temperature setting.

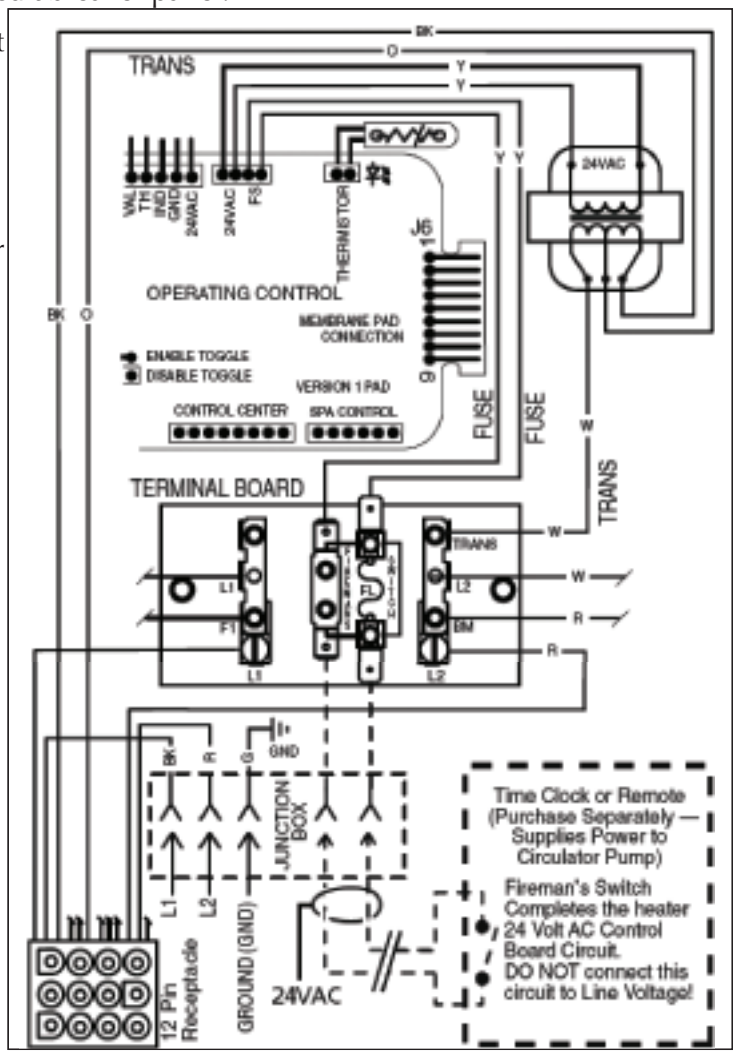


Figure 3-23

Section 4:

Programming the Three-Circuit Clock Mechanism

Overview of Three Circuit Clock Control Panel

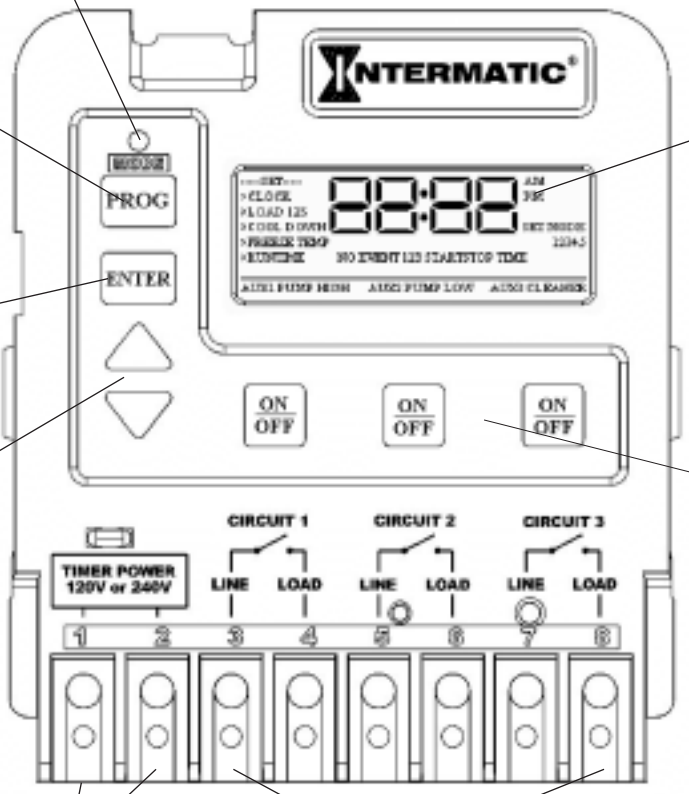
The Intermatic Three-Circuit Clock Control Panel is easy to program and capable of automatically switching loads on three circuits according to a preset 24-hour daily schedule, and providing control over a variety of different applications. **Figure 4-1 shows the front of the mechanism.**

MODE BUTTON—With a small tool, press and hold this button down for 5 seconds. Using the Up and Down arrow keys, you can select the appropriate preprogrammed mode that matches your particular pool or spa equipment pad configuration. Hit the ENTER key when finished.

PROGRAM BUTTON—used to enter programming mode and access different programming features.

ENTER BUTTON—used to save programming changes to memory and exit programming mode.

ARROW BUTTONS—used to increase or decrease programming parameters when in programming mode.



DISPLAY—Indicates time of day and programming settings during programming mode.

ON/OFF BUTTONS—Turn on and off circuit functions.

Figure 4-1

TIMER POWER—the two terminals where you wire 120V or 240V to power the multipurpose control. Be sure the jumper on the back, matches the source voltage. See page 26.

CIRCUITS 1, 2, & 3—These six terminals are where you wire the equipment source voltage and equipment load lines. You can have different source voltages for each circuit, depending on your equipment requirements.

NOTE: The three-circuit clock breaks only <u>one leg</u> to the load. Wire the other leg directly from the line to the load. (Refer to the illustration on the clock, above the terminals.)

Identifying Connections and Selecting Proper Input Voltage

Figure 4-2 below shows the reverse side of the Three-Circuit Clock Control Panel. Detailed connection information is provided below the diagram.

CAUTION: If the Source Voltage Selector Jumper is in the wrong position, the F1 fuse will blow and you may damage the circuit board, voiding the warranty.

1. **Before making any connections: Set the Source Voltage Selector Jumper.** The factory default position for this jumper is the 240 Volt position.
2. If the input voltage for the clock is 120 Volts, change this jumper to the 120 Volt position.

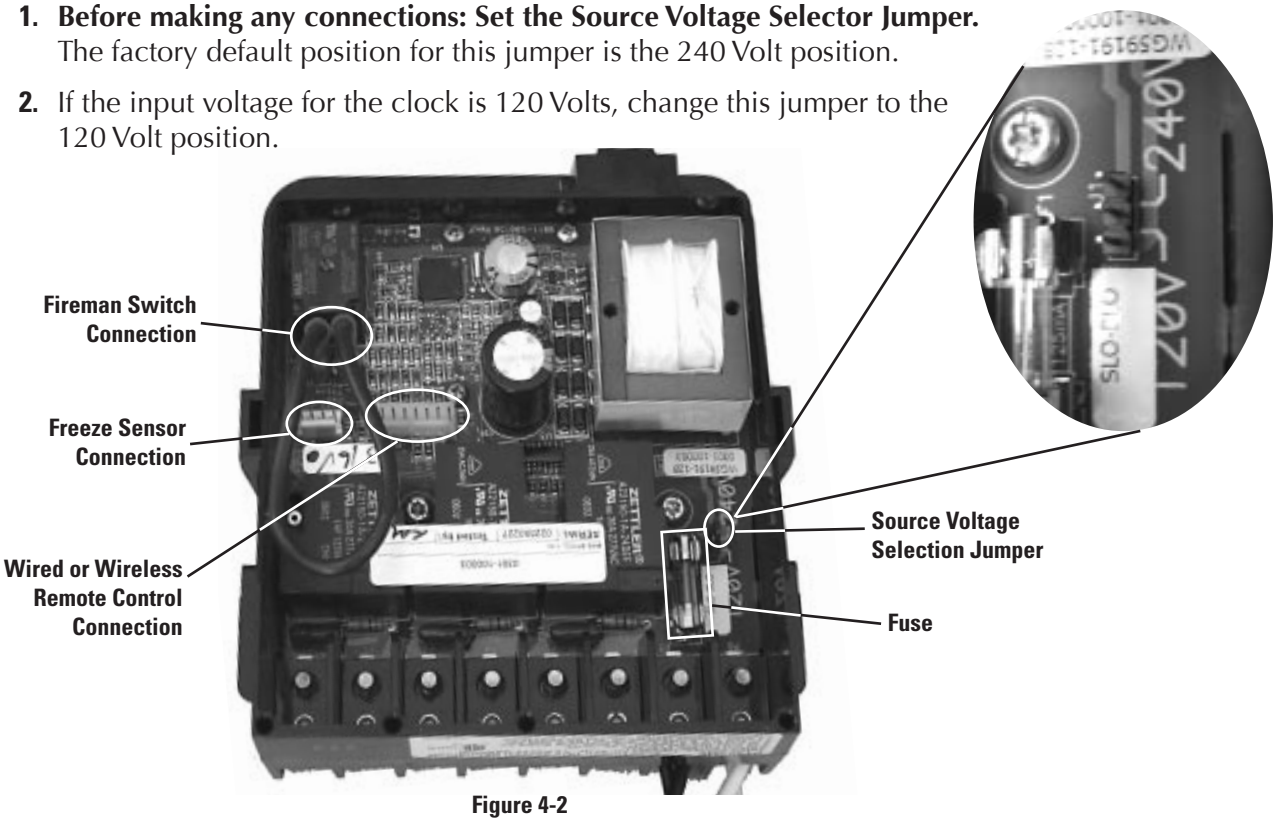


Figure 4-2

Connection Detail

- **Freeze Sensor Connection** — For the Intermatic Freeze Sensor *(178PA28A)*, which is necessary for the freeze protection circuit and programming to work. Disconnect power when connecting the freeze sensor. Only an Intermatic sensor can be used. Refer to page 35 for programming information.
- **Firemen Switch Connection** — For the firemen switch wires that connect to the Pool/Spa heater. If installing with a Wireless Remote Control, use the two brown wires coming from the panel-mounted receiver to create the circuit between this switch and the heater. Connectors should be ¼" female spade connectors crimped to insulated-type wire. This connection is a simple SPST contact, and switches the supplied heater voltage. It does not supply voltage to the heater thermostat. In non-wireless installations, clip the "loop" supplied, then connect with wire nut connectors. Refer to page 34 for programming information.
- **Remote Control Connection** — Connects the Intermatic Remote Control *(133PE1484A)*, which allows you to remotely turn ON or OFF all three available circuits. It also has status lights that indicate when a load is ON, OFF or delayed. If using the Three-Button Wired Remote Control *(133PE1484A)*, it connects here as well. Refer to page 38 for additional information.

Circuit Ratings

CLOCK SOURCE VOLTAGE — 120/240VAC, 50/60 Hz

POWER CONSUMPTION — 6.0 Watts Max

CIRCUIT CONTACT CONFIGURATION — SPST

CIRCUIT SWITCH RATINGS ALL MODES:

- 20A Resistive, 120/240 VAC, 50/60 Hz
- 20A FLA@120 VAC, 96A LRA@120 VAC, 50/60 Hz
- 17A FLA@240 VAC, 80A LRA@240 VAC, 50/60 Hz
- 5 Amps Tungsten, 120/240 VAC, 50/60 Hz
- 5 Amps Ballast, 120/240 VAC, 50/60 Hz

EVENTS PER CIRCUIT — 3 On/Off Events Per Circuit

INTERNAL BATTERY POWER:

- 40-year retention for all programmed settings
- Up to 24 hours

Mode Selection/Definition

IMPORTANT NOTE—There are six modes to choose from, depending on your pool or spa equipment pad configuration. Each mode has specific programming, timing, and lockout features that are designed to work with specific types of pool or spa equipment. Mode setting is generally done only once and usually during the initial installation. It is purposely difficult to enter the mode-changing program and should only be done by a Qualified Installer. Be sure you fully understand each mode definitions and installation, prior to selecting the proper mode.

Mode 1 — (Aux1, Aux2, Aux3)

Each of the three single pole circuits are defined generically, and can control any load within each of its individual circuit ratings. All three circuits act independent of each other.

NOTE: This drawing illustrates that only one leg is broken, with the other leg going directly to load, whether 120V or 240V.

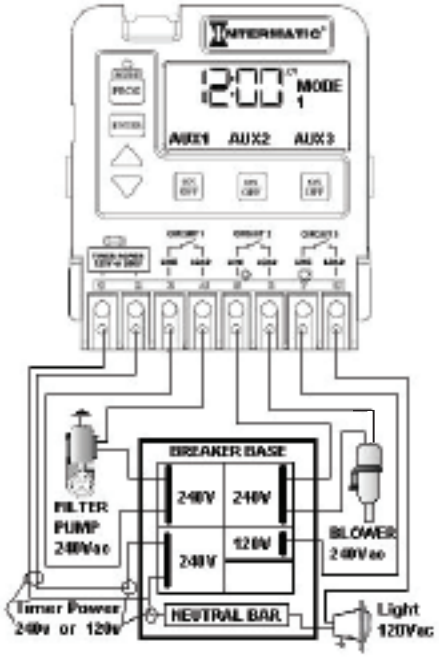


Figure 4-3

Mode 2 — (Pump High, Pump Low, Aux3)

Circuit one and two are dedicated single pole outputs for a two-speed pump load. Circuits one and two will never be ON at the same time, consistent with a two-speed pump application. Circuit three is single pole circuit for a generic load, and independent of circuits one and two.

NOTE: This drawing illustrates that only one leg is broken, with the other leg going directly to load, whether 120V or 240V.

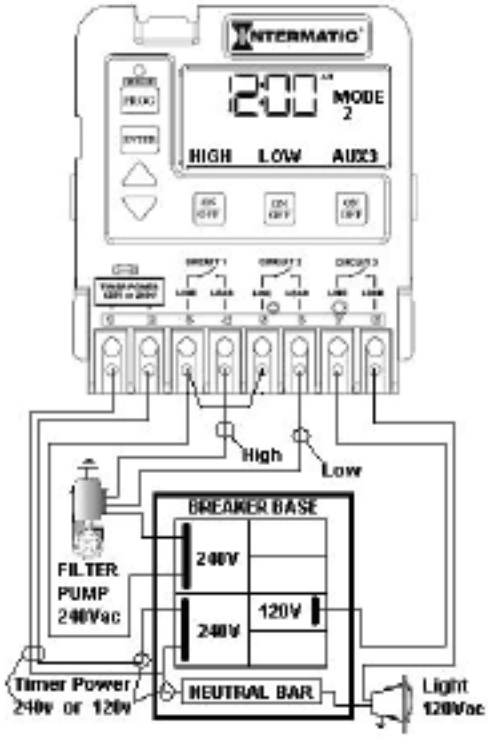


Figure 4-4

Mode 3 — (Pump, Aux2, Cleaner Pump)

Circuit one and three are dedicated single pole outputs for a single speed pump working with a pressure side cleaner pump. Circuit three will never come on unless circuit one is on for at least one minute, consistent with a pressure side cleaner pump. Circuit two is a single pole circuit for a generic load, independent of circuits one and three.

NOTE: This drawing illustrates that only one leg is broken, with the other leg going directly to load, whether 120V or 240V.

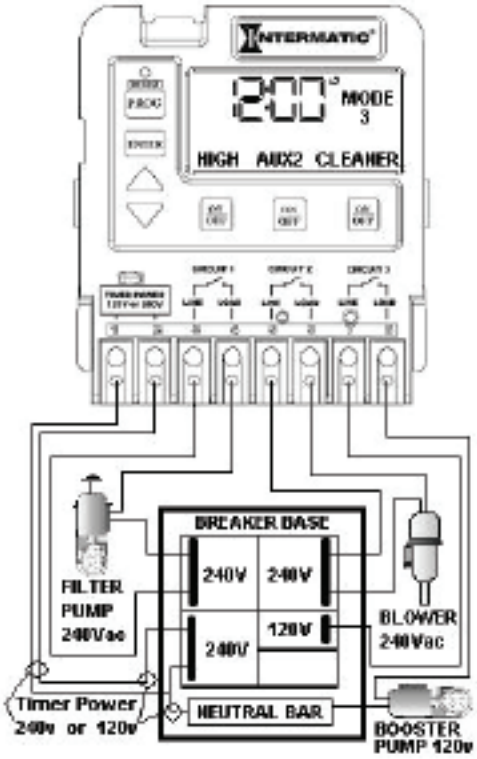


Figure 4-5

Mode 4 — (Pump High, Pump Low, Cleaner Pump)

Circuit one and two are dedicated single pole outputs for a two-speed pump load. Circuits one and two will never be ON at the same time, consistent with a two-speed pump application. Circuit three is also a dedicated single pole output for a pressure side cleaner pump. Circuit three will never come on unless circuit one is on for at least one minute, consistent with a pressure side cleaner pump.

NOTE: This drawing illustrates that only one leg is broken, with the other leg going directly to load, whether 120V or 240V.

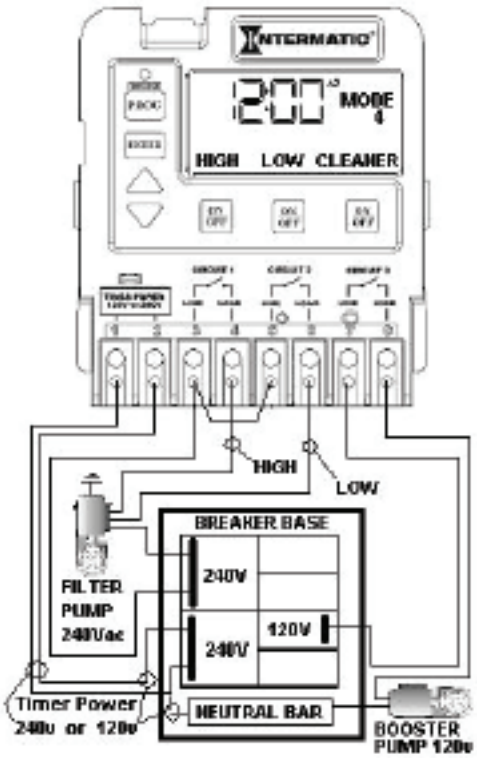


Figure 4-6

Mode 5 — (Pump, Pump, Aux3)

Circuit one and two are now coupled together making up one circuit capable of switching the power source to one pump. The On/Off button for circuit one now controls both circuit one and two simultaneously. The On/Off button for circuit two is disabled. Circuit three remains a single pole circuit for a generic load, and is independent of circuits one and two.

NOTE: This drawing illustrates that only one leg is broken, with the other leg going directly to load, whether 120V or 240V.

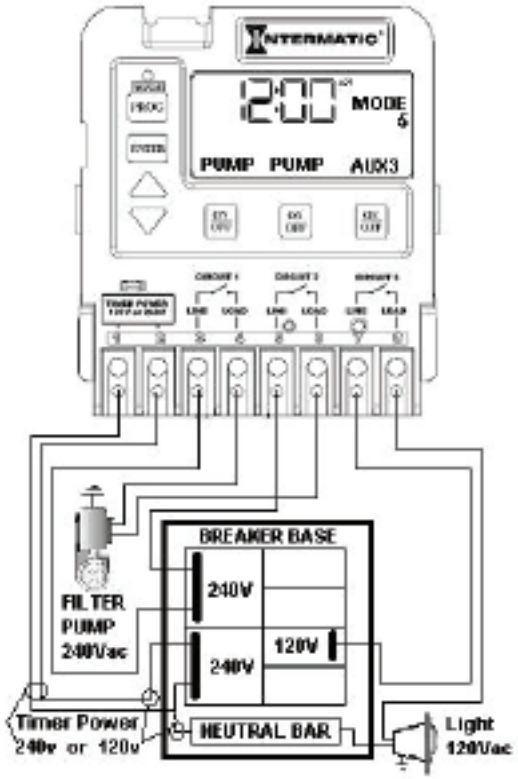


Figure 4-7

Mode 6 — (Aux1, Aux2, Aux3)

Identical to Mode 1, in which each of the three single pole circuits are defined generically and can control any load within each of its individual circuit ratings, with all three circuits act independent of each other.

However, with Mode 6, the fireman switch closes only when Circuit 1 (the filter pump) is manually turned on — not when the clock turns it on. This mode is useful when you have Circuit 1 connected to a circulation pump in the spa. When the spa is not in use, the clock circulates the water to filter it, but does not turn on the heater. When the spa is in use, the heat is also turned on by manually switching Circuit 1.

NOTE: This drawing illustrates that only one leg is broken, with the other leg going directly to load, whether 120V or 240V.

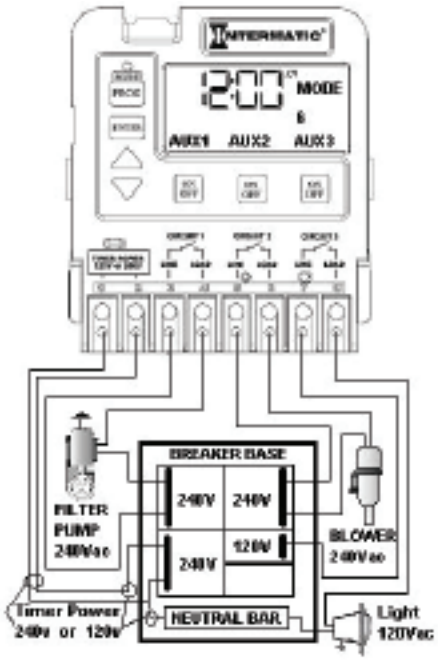


Figure 4-8

Setting Mode

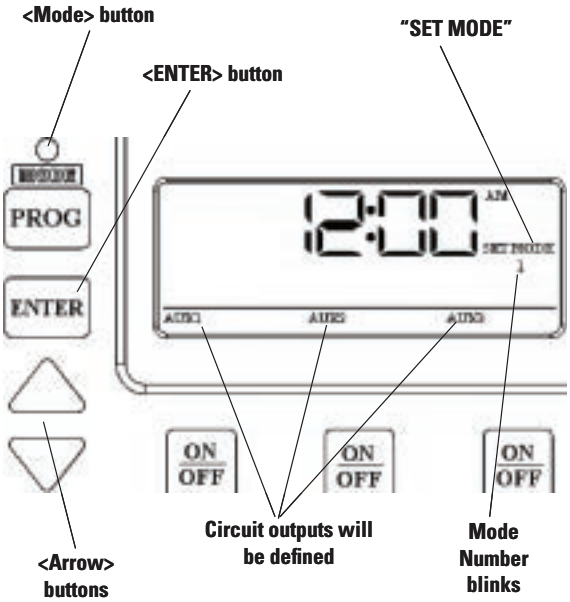
Overview

Determine the mode that would be best for your installation, then select it using the instructions provided below.

Procedure

NOTE: If you don't press a button within 60 seconds while setting **Mode**, the control will save current settings and return to normal operating mode.

1. With a small pointed tool (i.e., pen, pencil, screwdriver, etc.), press and hold the **<MODE> button** for about 5 seconds until the display shows **SET MODE** and the **Mode Number** blinks.
2. Use the **<Arrow> buttons** to cycle through all five available modes. Each **circuit output will be defined** on the display as you cycle through the available modes.
3. Once the desired mode number is displayed, press and release the **<ENTER> button**. This saves the mode number to memory and exits SET MODE programming.



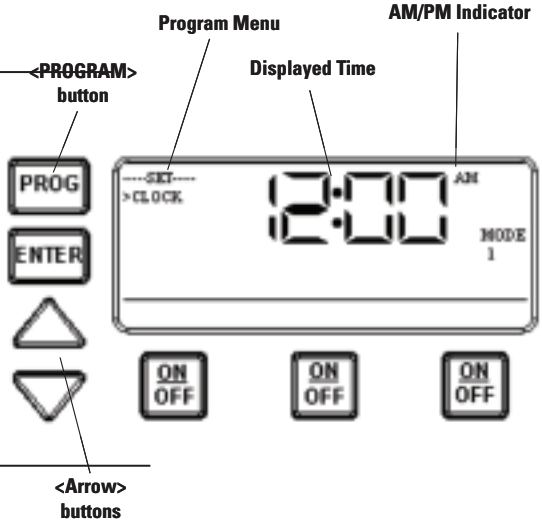
Setting Time of Day

Overview

This procedure makes sure that timer-controlled actions will occur at the right time.

Procedure

NOTE: If you don't press a button within 60 seconds while setting **Time of Day**, the control will save current settings and return to normal operating mode.



1. Press and release the **<PROGRAM> button**. The **displayed time** will start to blink, and the **program menu** will display Set Clock.
2. Use the **<Arrow> buttons** to change the time.

   NOTE: Check the AM and PM indicator to make sure your setting is correct.
3. When the time is set, you have two choices:
   - Press and release the **<ENTER>** button to save and exit programming.
   - Press and release the **<PROGRAM>** button to save and go on to the next programming feature.

Setting the On/Off Times for Each Circuit

Overview

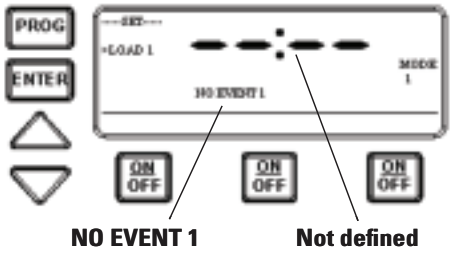
You can set up to *three* separate ON/OFF times per load or circuit, and you can set specific times for them to turn on and off, i.e., you want the filter pump to run from noon till 4:00 P.M., or you want lights on from 7:00 P.M., off at 11:00 P.M., then on again at 6:00 A.M. and off at 8:00 A.M.

Procedure

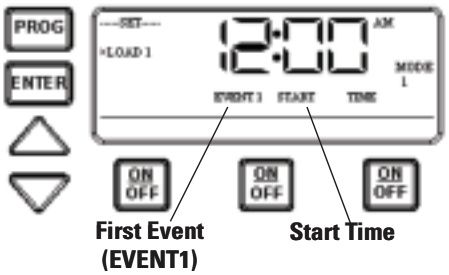
PROGRAMMING TIP: You can use the **<ENTER>** button to review all the events for each circuit. You can use the **<PROGRAM>** button to advance through each circuit and on to the next programming feature.

1. If you pressed and released the program key from the previous procedure, the screen display should look like the illustration at the right. [If not, press and release the <PROGRAM> button ***twice***.]

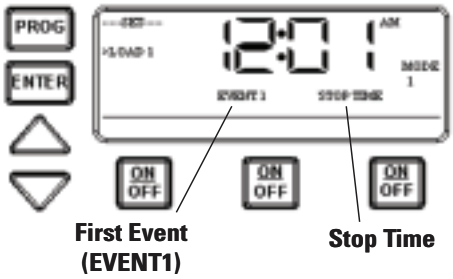
   Note that the display indicates that the first event of circuit one has not been defined **(NO EVENT1)**.



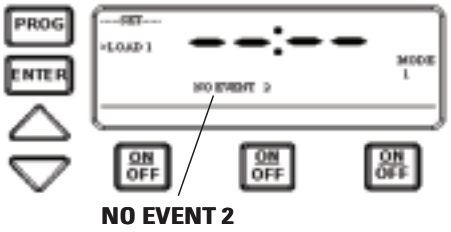
2. Use the <Arrow> buttons to define the **Start** time for the **first event (EVENT1)** for circuit one. The screen displays:



3. Once you are satisfied with the start time, press and release the <ENTER> button, saving the start time. The display will prompt for the **Stop time** for the **first event (EVENT1)** for circuit one. The screen displays:



4. Use the <Arrow> buttons to define the **Stop** time for the first event (EVENT1) for circuit one. Press and release the <ENTER> button when complete. The program will now advance to the second event (EVENT2) for circuit one, as shown below. Note that the display indicates that the second event of circuit one **has not been defined (NO EVENT2)**.



5. Repeat Steps 2 thru 4 to set a second event for circuit #1, and for subsequent events you wish to set up.

Notes on Setting ON/OFF Times for Each Mode

General Note

- The ON/OFF buttons were provided for service operations, and for circumstances where instantaneous response is required. If the intent is to turn equipment on and off everyday at the same time, programming individual events will make sure these functions take place.
- All circuits will respond to a programmed off time. Therefore, when a circuit is turned on with the ON/OFF button, it automatically turns itself off at the end of the next programmed event.
- If there are no events programmed, the circuit stays on until the ON/OFF button is pressed again.
- If the ON/OFF button is pressed while the corresponding circuit is on, it turns the circuit off and supersedes any program in progress. The priority is always given to the last manual operation.

Notes on Setting ON/OFF Times for Each Mode *(cont'd)*

Mode 1 — (Aux1, Aux2, Aux3)

All three of the available circuits act independently, and up to three individual on/off times can be set for each circuit independently.

Mode 2 — (Pump High, Pump Low, Aux 3)

In this mode circuits 1 & 2 are connect to a two speed pump, and Aux 3 is connected independent of circuits 1 & 2. In the event that you program high and low speed to be on at the same time or if their independent ON times overlap, high speed will always take precedence.

> **Example:** *Low speed is programmed to come ON at noon and run until 6 PM. High speed is programmed to come on at 2 PM and turn off at 4 PM. In this case the pump will come ON at noon in low speed, go to high speed at 2 PM, and back to low speed at 4 PM, and shut off at 6 PM.*

All manual ON operations for circuits 1 & 2 override all programmed ON times. Therefore, any desired low and high-speed run combinations need to be programmed as separate events and cannot controlled by combining the manual ON/OFF button with a scheduled event. The last speed started manually has priority over all prior automatic and manual operations.

> **Example:** *You would like to run the pump in high speed for 6 hours and low speed for the remainder of the time. Program a 6-hour event for high speed, and an 18-hour event for low speed. Do not turn the low speed on manually, and program a 6-hour event for high speed. The high speed will not occur.*

Mode 3 — (Filter Pump, Aux2, Cleaner Pump)

The cleaner pump cannot turn on unless the filter pump has been on for at least 30 seconds. Therefore, for any ON/OFF time programmed for the cleaner pump, the filter pump will come on first, followed 30 seconds later by the cleaner pump. Both the cleaner and filter pump will turn off according to the programmed off time. When programming an event for the cleaner pump, it is not necessary to program a separate event for the filter pump, as it will automatically turn on when the cleaner pump turns on at its next scheduled on time.

Mode 4 – (Pump High, Pump Low, Cleaner Pump)

Mode 4 is a combination of Modes 2 and 3, so refer above to Modes 2 and 3 for programming specifics. Note that if the cleaner pump is programmed to come ON, the control will turn ON the filter pump to high speed 30 seconds prior to turning the cleaner pump ON, even if the filter pump is currently on in low speed.

Mode 5 – (Aux1, Aux3)

Both of the available circuits act independently, similar to Mode 1. Therefore you can set up to three individual ON/OFF times for each circuit and they will act independently.

Mode 6 — (Aux1, Aux2, Aux3)

All three of the available circuits act independently, and up to three individual on/off times can be set for each circuit independently. When the clock turns ON Circuit #1 due to a scheduled ON time, the heater will not come on. The heater will come ON only when Circuit #1 is turned ON manually.

Setting the Heater's Cool Down Time (optional)

Overview

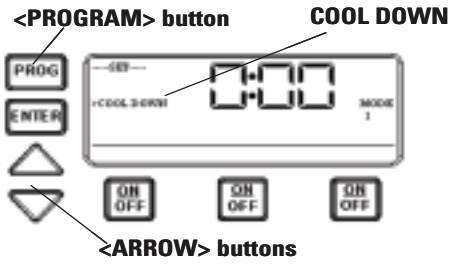
The heater's cool down time is a time defined by the programmer. This time is defined as the additional time the pump will run, over and beyond the desired pump OFF time, to make sure the heater is cooled down before shutting off.

If the heater were to stay on after the pump had shut off, the water in the pipe could boil, damaging the system. Refer to heater manufacturer for specific time.

If a cool down time is programmed, the cool down cycle will occur in all cases, even if the user turns off the pump. To override the cool down time, press and release the **ON/OFF** key a second time during the cool down cycle. The cool down feature only applies to Circuit #1, in all modes.

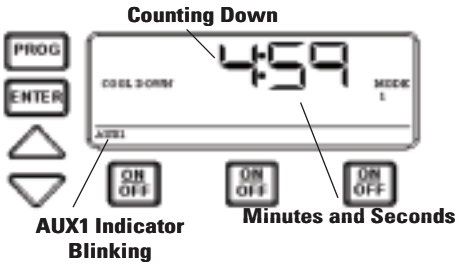
Procedure

1. Use the **<PROGRAM>** button to advance to the **COOL DOWN** setting, as shown. The default cool down time is zero.
2. Use the **<ARROW>** buttons to modify the cool down time. The programming range is from zero to fifteen minutes and no seconds.
3. When you've set the cool down time, press the <ENTER> button to save and exit, or the **<PROGRAM>** button to save and advance to the next programming feature.



The display will look like the example shown at the right when the Heater's Cool Down Time feature is activated. In this example, the cool down time was set for 5 minutes, and is in the process of **counting down** to zero, showing **minutes and seconds**.

The **AUX1** indicator is blinking, indicating that the Cool Down feature is activated for Circuit #1. The Cool Down feature only affects Circuit #1. When the countdown display reaches zero, Circuit #1 will open and the time display will change back to the time of day.



NOTE: You can override the Cool Down feature during countdown by pressing and releasing the ON/OFF button associated with Circuit #1. This will end the cool down cycle and immediately power off Circuit #1.

Setting Freeze Temperature (optional)

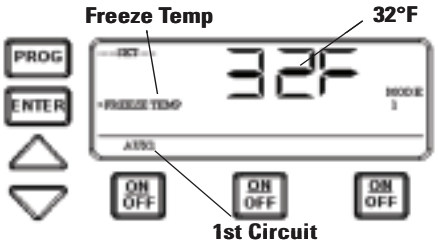
Overview

Freeze temperature programming will not appear unless the optional Intermatic Freeze Sensor (*178PA28A*) has been installed. This is the only freeze sensor that will work with the P1353ME Mechanism.

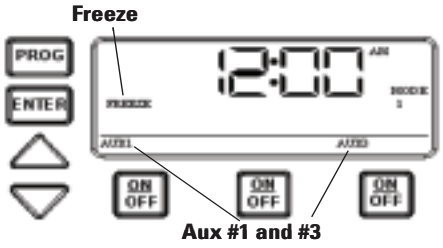
Power must be disconnected when connecting the 178PA28A sensor.

If Intermatic Freeze Sensor (*178PA28A*) has been installed, use the following procedure to program freeze temperature.

Procedure



1. Use the <PROGRAM> button to advance to the **Freeze Temp** setting, as shown. The **1st Circuit** and **32°F** are the factory default settings.
2. Use the <ARROW> buttons to modify the desired freeze temperature trip point. The programming range is 32° through 44°F.
3. After you have set the desired trip temperature, push and release the desired ON/OFF button to indicate which circuits should come ON when the trip temperature is reached.
4. When programming is complete, , press the <ENTER> button to save and exit, or the <PROGRAM> button to save and advance to the next programming feature.



The display will look like the example shown at the right when the Freeze Control feature is activated. In this example, the freeze sensor was connected, enabling the Freeze Control feature. Circuits #1 and #3 were programmed to come on during a **Freeze** condition.

AUX1 and **AUX3** will blink, indicating that the control has activated these two circuits due to a freeze condition.

NOTE: You can override the circuits during a freeze condition by pressing and releasing the corresponding ON/OFF buttons. This will turn the devices OFF. The override will only last one hour, so if the freeze condition still exists after one hour, Circuits #1 and #3 will come back on.

NOTE: Freeze protection stays enabled until the outside air temperature exceeds the programmed freeze temperature for more than one minute.

Section 5:

Programming the Valve/Pump Switch Mechanism

Overview of the Valve/Pump Switch Control Panel

Front View

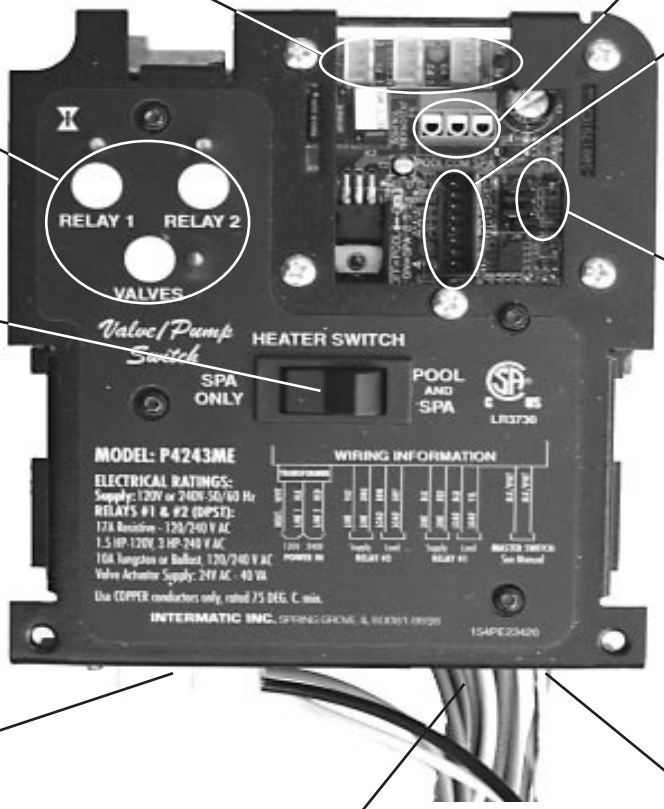
ACTUATOR CONNECTION — The Valve/Pump Switch mechanism supports up to three 24V valve actuators.

HEATER THERMOSTAT CONNECTOR — supports the three wires from the heaters thermostat. The wires should be marked Pool, Common, and Spa. The mechanism will switch the heater thermostat when the actuators change.

WIRED OR WIRELESS CONNECTOR will support either the wired remote control or the panel-mounted wireless transceiver.

SERVICE BUTTONS — allow you to operate the mechanism at the panel.

POOL/SPA THERMOSTAT SWITCH — allows you to switch between the pool and spa thermostat or just the spa only. In the spa only mode, the pool thermostat is disabled.



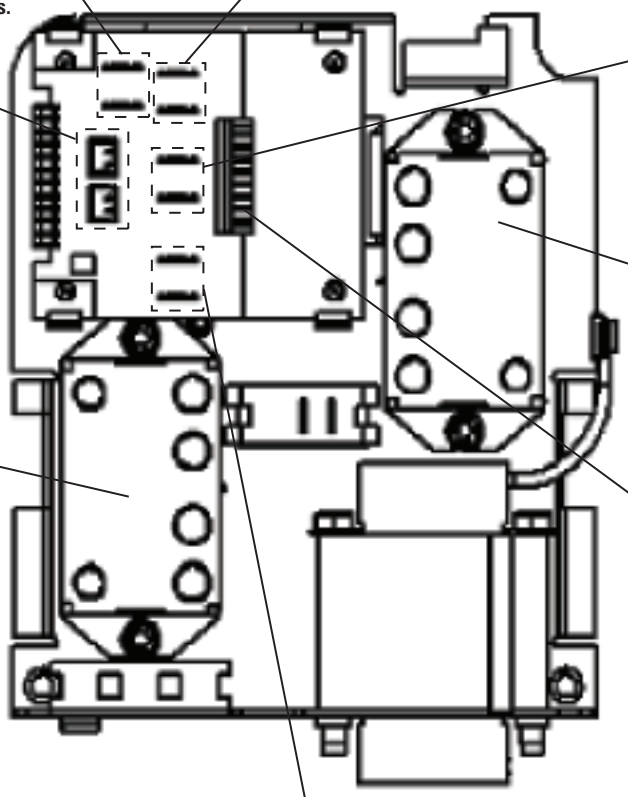
JUMPER BLOCK CONFIGURATION — used when a simple single-pole single through switch is going to be used in conjunction with the Sensor Line to control the Pool to Spa Mech. This is the most inexpensive way to achieve total pool/spa automation.

DUAL-VOLTAGE TRANSFORMER — is capable of being powered with either 120V or 240V.

SENSOR LINE — allows the mechanism to be controlled by a single pole sing throw switch (i.e. toggle switch, relay, wall switch, etc.). See page 38 for details.

CIRCUITS 1 & 2 — The pool to spa mechanism supports up to two auxiliary 3HP circuit loads. You can have different source voltages for each circuit, depending on your equipment requirements.

Rear View



24 VAC POWER-IN FOR PC BOARD — The secondary of the Valve/Pump Switch transformer supplies 24 VAC to the circuit board at these two pins.

HEATER SWITCH CONNECTION — The POOL/SPA & SPA ONLY switch, located on the face of the Valve/Pump Switch mechanism, interfaces with the PC board at this point.

OMRON CONNECTIONS — Each of the two Omron relay coils connect to the PC board at these points. Be careful not to switch the two connectors, as the relays will not match up with the front membrane pad on the mechanism

EXTERNAL TIMER PLUG IN — An external dry-contact timer connects at this point to control the ON/OFF state of Relay #1. See page 40.

OMRON RELAY #1 — This relay is a DPST relay capable of controlling up to a 3 H.P. load and 17 FLA @ 240 VAC. Can be ordered separately (145T145A). See page 9.

OMRON RELAY #2 — This relay is a DPST relay capable of controlling up to a 3 H.P. load and 17 FLA @ 240 VAC. Can be ordered separately (145T145A). See page 9.

CONTROL FACE PLUG IN — The front membrane control pad control pad plugs into the PC board at this point.

SENSOR LINE PLUG IN — This is where the two sensor lines connect to the PC board. The sensor line allows the mechanism to be controled by a single-pole, single-throw switch or master switch (i.e., a toggle switch, relay, wall switch, etc.). See page 38.

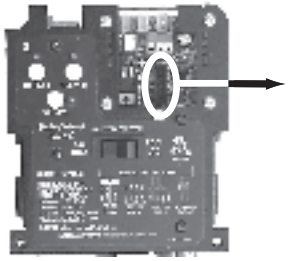
Installing the Three-Button Wired Remote Control

Three-Button Wired Remote Control *(133PE1484A)*

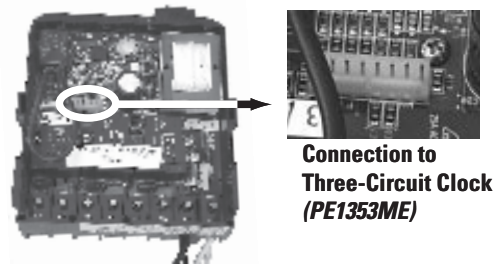
The Three-Button Wired Remote Control *(133PE1484A)* can be installed to plug into either the Three-Circuit Clock *(P1353ME)* or Valve/Pump Switch *(P4243ME)*.

When plugged into one of these mechanisms, it replaces the wireless method of controlling the three circuits within the mechanism. For example, if you plug the Three-Button Wired Remote Control into the Valve/Pump Switch, the two relays and the actuators will no longer be controllable using the Hand-Held Wireless Remote. The Three-Button Wired Remote Control ***must*** be installed where a third mechanism is needed in the enclosure box, since the Wireless Hand-Held Remote Transceiver can only control two mechanisms.

See illustrations below for connection detail.



Connection to Valve/Pump Switch *(PE4243ME)*



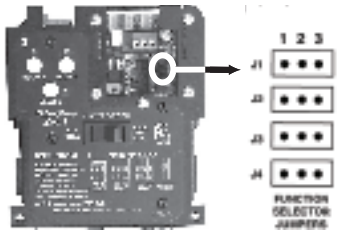
Connection to Three-Circuit Clock *(PE1353ME)*

Installing Other Wired Remote Connections (Master Switch)

You can install any ON/OFF switch to the sensor line to provide wired control of the two relays and the Pool/Spa actuators in the Valve/Pump Switch *(P4243ME)*, giving you dual control (master switch and wireless) control of these circuits.

In use, a wired remote switch toggles all circuits to their opposite state. This means that if Relays 1 and 2 are ON, and the actuator valve is in SPA, the wired remote switch will turn Relays 1 and 2 OFF, while switching the actuator valve to POOL. It does this by toggling Relays 1 and 2 and the actuator valve back and forth from their default state in order to return the system to its default setting after the owner has made temporary changes to the settings. For example, if using the phone while sitting in the spa, the owner may turn off the jets to reduce noise. The next time the Master Switch is used, the jets will revert to being ON when the system is in spa mode.

INSTALLATION ISSUE: If you want to change the default state for your installation and you manually press the switches on the Valve/Pump Switch control panel, your changes will be temporary with the wired remote switch (master switch) because it will return the circuits to their factory default setting when it is activated, eliminating your custom settings.



Therefore, if you want to make permanent changes to the factory defaults, you must use the jumper, as shown at the right. Then the wired remote switch's return to defaults will not delete your changes.

The jumper rows control the position of the relays as follows:

- J1 = Master Switch
  - Jumper on pins 1 and 2 sets the system default state to a LATCHING Sensor Line. ***This is the factory default state.***
  - Jumper on pins 2 and 3 sets the system default state to MOMENTARY Sensor Line.
- J2 = Relay #1
  - Jumper on pins 1 and 2 sets Relay #1 to OPEN = OFF.
  - Jumper on pins 2 and 3 sets Relay #1 to CLOSED = ON.
- J3 = Relay #2
  - Jumper on pins 1 and 2 sets Relay #2 to OPEN = OFF.
  - Jumper on pins 2 and 3 sets Relay #2 to CLOSED = ON.
- J4 = Not used — for future implementation

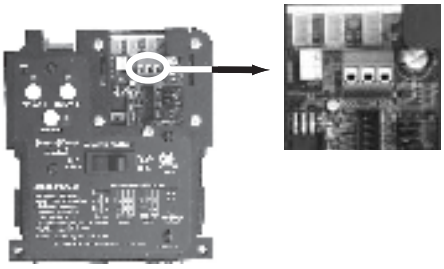
Connecting the Heater Switch to Control Temperatures

Overview

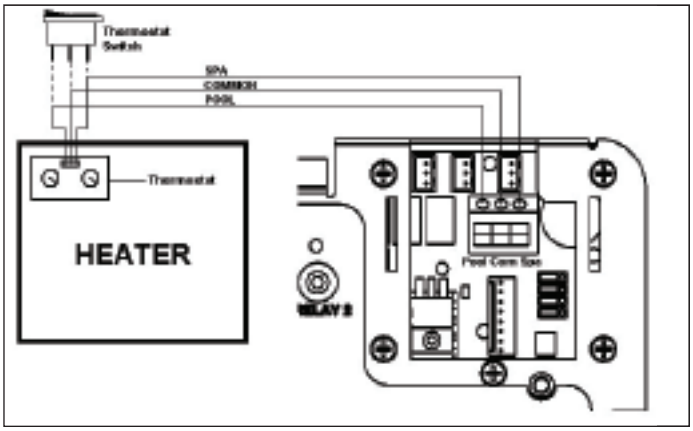
The primary means of controlling the heater is using the Hand-Held Controller. If there is no Hand-Held Controller in the system, the heater switch provides an alternate method.

This Switch can be also used in conjunction with the Hand-Held Controller to provide maximum temperature limits for the pool and spa. Control by this Switch is primary over the Hand-Held.

Procedure



1. Wire the heater thermostats to the blue connectors visible on the front of the Valve/Pump Switch, as shown.
2. Set limits on the heaters themselves, so that when the Switch powers the heaters, they will reach the temperatures you have set.
3. Make temperature adjustments at the heaters themselves.



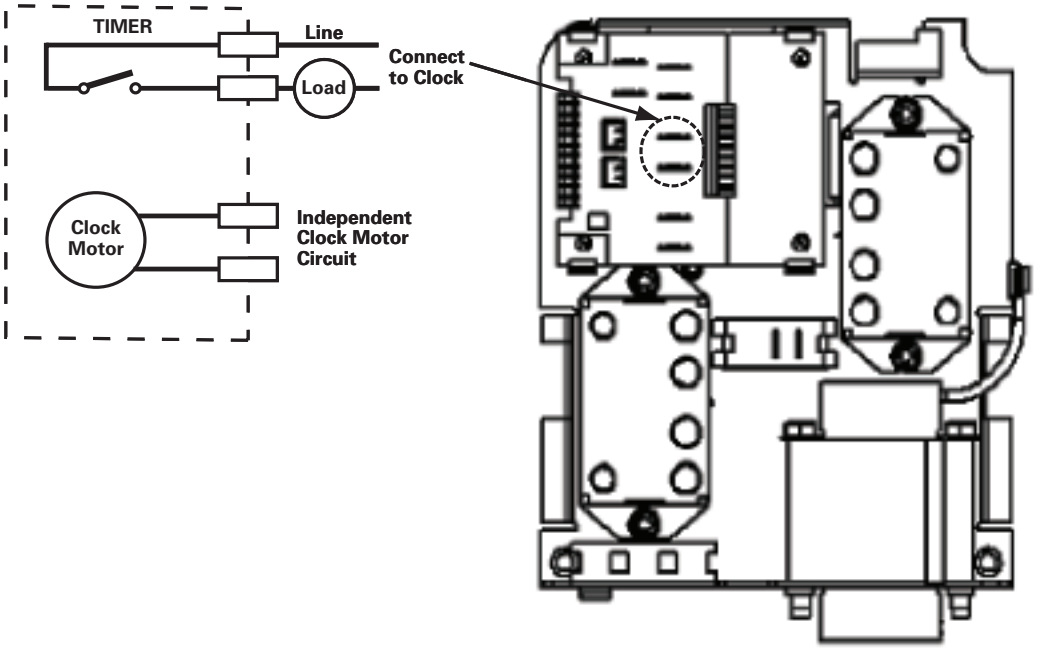
If Connecting an External Timer:

Overview

You can add an external timer to a circuit, providing timer control to the "on demand" circuit. External timers are available from Intermatic and are not included with the I-Wave system. When connected to the system, the external timer powers Relay 1 on and off according to its time settings.

Procedure

Connect your timer to Relay 1 on the back of the Valve/Pump Switch Mechanism, as shown in the circled area of the illustration at the right. An independent contact (Dry Contact) timer is required to be connected to the circuit board 1/4" spade terminals. ***Do not apply voltage to these terminals!***

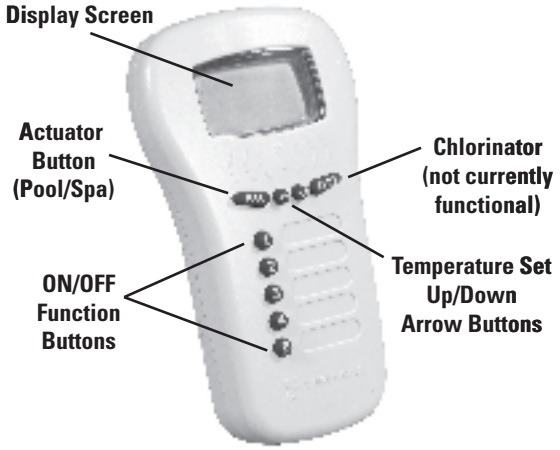


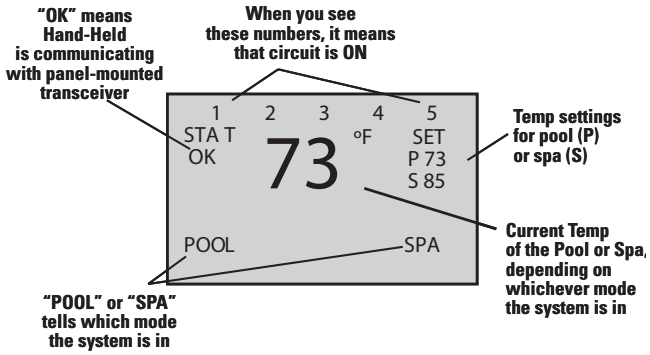
Section 6:

Programming the Hand-Held Remote Transceiver

Overview

The Hand-Held Remote Transceiver *(PE950)* is the focal point of user convenience. It's water-resistant, shock-resistant, and is easy to program for handy remote control of the functions at a specific pool-spa installation. An assortment of self-stick labels are provided to identify the equipment you program into the five control buttons. We suggest that you program the device first, then apply the appropriate label from the assortment supplied.





Detail on Hand-Held Remote Display Screen

Synchronizing the Hand-Held Remote Transceiver with the Panel-Mounted Receiver

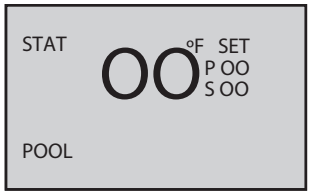
When you've finished physical installation and wiring and have **enabled power to the control center**, you need to synchronize the Hand-Held with the Panel-Mounted Transceiver. This is a two step process: first, delete any programming that might exist in the Hand-Held Remote and Receiver, then synchronize the two devices with each other.

Deleting Any Existing Programming

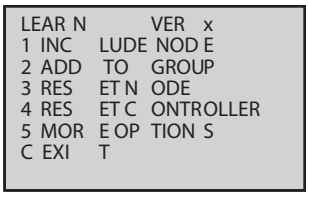
This procedure deletes any existing programming from the Remote and Receiver units so they are ready to be programmed into the network of this installation.

NOTE: If the word **FAILURE** instead of **SUCCESS** appears at the bottom of the screen during any of the following steps, repeat the programming procedure, then try replacing the batteries in the Hand-Held. If the problem persists, contact Intermatic Customer Service.

1. Press and release any button on the Hand-Held Remote to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 60 seconds.) The screen display on the Hand-Held should look generally like the example on the right, though it may display actual temperatures and settings.

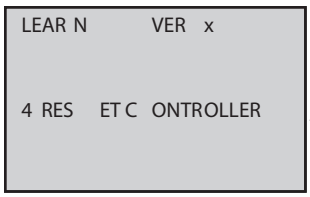


2. Press and hold the **<P/S>** and **<CHLR>** buttons at the same time for about 5 seconds. This will put the device in programming mode, as shown at the right.

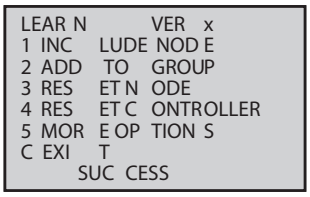


NOTE: If you pause in the programming procedure for 30 seconds or so, the screen automatically returns to Step 1.

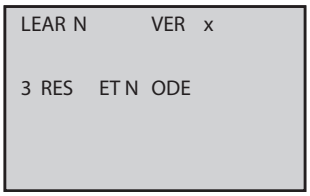
3. Press and release the **<4>** function button to select **RESET CONTROLLER**. The screen refreshes and displays only the line **4 RESET CONTROLLER**, then returns the full screen with the word **SUCCESS** at the bottom, as shown.



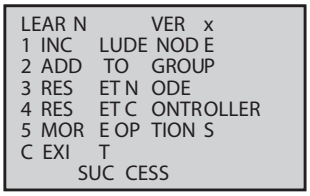
to



4. Now press and release the **<3>** function button on the Hand-Held Remote to select **RESET NODE**. The screen refreshes and displays only the line **3 RESET NODE**.



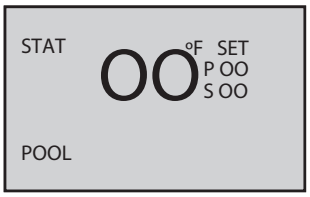
5. Press and release the black button on the base of the Panel-Mounted Transceiver. The display returns to the full screen with the word **SUCCESS** at the bottom, as shown.



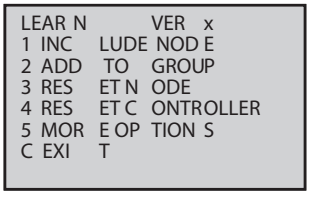
The two devices are now "clean" and are ready to be linked together within the network you have installed.

Linking the Hand-Held Remote to the Receiver

1. If necessary, press and release any button on the Hand-Held Remote to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 60 seconds.) The screen display on the Hand-Held should look generally like the example on the right, though it may display actual temperatures and settings.

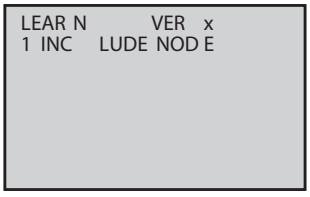


2. Press and hold the **<P/S>** and **<CHLR>** buttons at the same time for about 5 seconds. This will put the device in programming mode, as shown at the right.

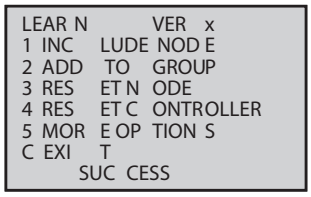


NOTE: If you pause in the programming procedure for 30 seconds or so, the screen automatically returns to Step 1.

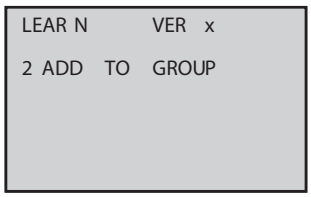
3. Press and release the **<1>** function button to select **INCLUDE NODE**. The screen refreshes and displays only the line **1 INCLUDE NODE**, as shown.



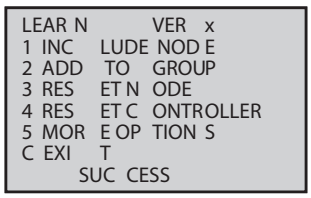
4. Push and release the black button on the base of the Panel-Mounted Transceiver. The screen returns to the full screen with the word **SUCCESS** at the bottom, as shown.



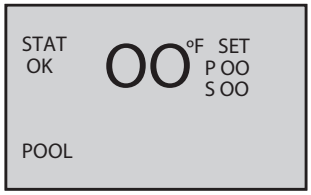
5. Press and release the **<2>** function button to select **ADD TO GROUP**. The screen refreshes and displays only the line **2 ADD TO GROUP**.



6. Push and release the black button on the base of the Panel-Mounted Transceiver. The screen returns to the full screen with the word **SUCCESS** at the bottom, as shown.



7. Press and release the **<CHLR>** button on the Hand-Held Remote to exit programming mode. On the left side of the screen, you will see the words **STAT OK**.



The two devices are now linked together within the network you have installed.

NOTE: If the two devices have not successfully reset or linked together — and you are seeing only the word **STAT** on the left side of the screen — it's likely that old programming still exists in either device. Carefully repeat the two procedures *Deleting Any Existing Programming* (on page 41) and *Linking the Hand-Held Remote to the Receiver* (on page 42). If the problem persists, contact Intermatic Customer Service.

Testing I-Wave Reception

At the heart of the I-Wave system is *Z-wave*™ wireless technology. Test reception by walking around the yard with the Hand-Held Remote and look on the screen to see if there are any areas where **STAT OK** changes to **STAT** (which means the Hand-Held and the Control Center are no longer communicating).

Signal reception between Hand-Held Controllers and the Control Center is affected by distance (about 100 feet, direct line of sight) and by physical obstacles (like brick, wire lash in walls, or steel structures).

If you identify any locations in the area of operation where communications problems occur — typically when a structure blocks the line of sight between the Hand-Held and the Control Center, install the 35-ft. Antenna Extension Cable *(PA121)* to relocate the antenna from the Panel-Mounted Transceiver into the area of operation.

Installing the 35-ft. Antenna Extension Cable *(PA121)*

Choose a location for the antenna within 35 feet of the Control Center that will be in direct line of sight from the area of operation — where the home owner will be using the Hand-Held Remote.

1. Unscrew the antenna from the top of the Panel-Mounted Transceiver.
2. Screw the male end of the 35-ft. Antenna Extension Cable into the top of the Panel-Mounted Transceiver.
3. Run the cable underground from the Control Center to the location that will provide a direct line of sight between the Hand-Held Remote and the area of operation.
4. Screw the antenna into the female end of the 35-ft. Antenna Extension Cable.
5. Securely mount the end of the cable with the antenna in the air.

Installing and Configuring Optional Repeaters

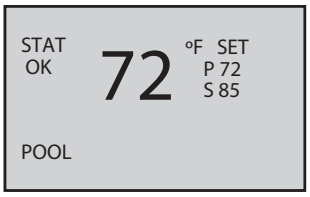
When you have installed the Antenna Extension Cable and are encountering further communications problems, typically if the home owner wants to be able to use the Hand-Held Remote from inside the house, order and install optional Transceiver Repeater Modules *(HA04C)* to the system, plugging them into 120 volt electric outlets where available.

Repeaters can relay signals to bridge between a dead spot and the Control Center.

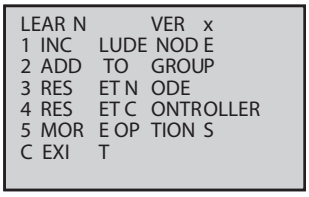
Transceiver Repeater Module (HA04C)

NOTE: The relay between Repeaters and the rest of the system causes a delay in response time. Wait a few seconds for commands you enter on the Hand-Held Remote to register.

1. Plug a Transceiver Repeater Module *(HA04C)* into any electrical outlet that is located where you have determined a reception problem can be solved.
2. If necessary, press and release any button on the Hand-Held Remote to wake it from sleep. Because you are at a location in between the control center and the problem area, the screen display on the Hand-Held will look generally like the example on the right.

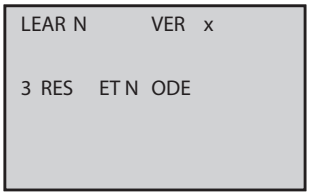


3. Press and hold the **<P/S>** and **<CHLR>** buttons at the same time for about 5 seconds. This will put the device in programming mode, as shown at the right.

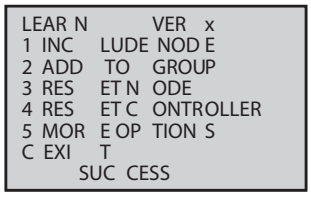


NOTE: If you pause in the programming procedure for 30 seconds, the screen automatically returns to Step 2.

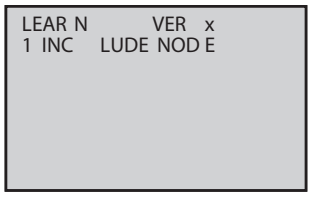
4. Press and release the **<3>** function button to select **RESET NODE**. The screen refreshes and displays only the line **3 RESET NODE**, as shown.



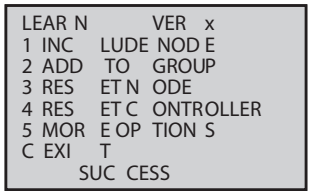
5. Push and release the black button on the Repeater. The word **SUCCESS** appears at the bottom of the Hand-Held's screen as shown.



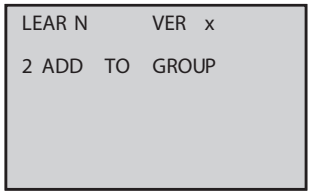
4. Press and release the **<1>** function button to select **INCLUDE NODE**. The screen refreshes and displays only the line **1 INCLUDE NODE**, as shown.



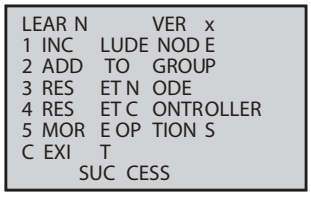
5. Push and release the black button on the Repeater. The word **SUCCESS** appears at the bottom of the Hand-Held's screen as shown.



6. Press and release the **<2>** function button on the Hand-Held to select **ADD TO GROUP**. The screen refreshes and displays only the line **2 ADD TO GROUP.**



7. Push and release the black button on the base of the Panel-Mounted Transceiver. The screen returns to the full screen with the word **SUCCESS** at the bottom, as shown.



8. Press and release the **<CHLR>** button on the Hand-Held Remote to exit programming mode. When you now carry the Hand-Held Remote in the problem area, you will now see the words **STAT OK** on the left side of the screen.

The repeater is now part of the network. You can add more repeaters as necessary.

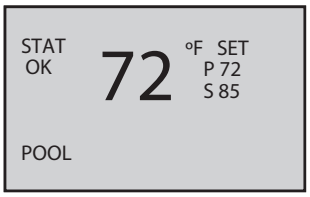
REMEMBER: When you have one or more repeaters installed in a network, you increase the response time: the time between when you press a button on the Hand-Held Remote and when the reaction takes place.

Everyday Use of the Hand-Held Remote Transceiver

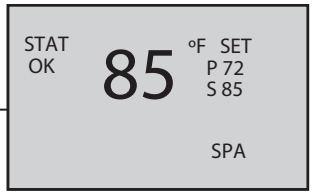
The complete everyday functionality of the pool/spa system you have installed can be conveniently controlled using the Hand-Held Remote.

Changing between Pool and Spa

The Valve Actuator *(PE24VA)* that you have installed in the system directs water either to the pool or the spa. To use the hand-Held Controller to control this valve:



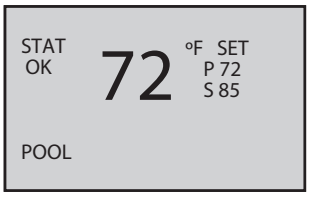
1. Press and release any button on the Hand-Held Remote to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 60 seconds.) The screen display on the Hand-Held should look generally like the example on the right.
2. Note on the Hand-Held Remote Screen the current mode for the system:
   - POOL on the left side of the screen indicates the pool temperature setting (shown in the example).
   - SPA on the right side of the screen indicates the spa temperature setting.
3. Press and release the **<P/S>** button. The system will change to the opposite mode from its current setting.
4. Note the change on the Hand-Held Remote Screen. In the example at the right, the mode is now changed to Spa, and the temperature shown is the water temperature of the Spa.



NOTE: The large temperature display shown on the Hand-Held Remote Screen reflects the current water temperature of the Pool or Spa, depending on which mode is active.

Setting Pool and Spa Temperatures

If connected and linked, the Hand-Held Remote controls the independent water temperatures of both the pool and spa.



1. View the current temperature on the right side of the Hand-Held Remote Screen under the word SET.
   - **P** = current pool water set temperature
   - **S** = current spa water set temperature
2. Press and release the **<P/S>** button if necessary to change the system between Pool and Spa mode. Depending on which mode is selected, the word POOL (lower left) or SPA (lower right) appears on the screen
3. Press the **<UP>** or **<DOWN>** arrow buttons to raise or lower the setting to the desired temperature. You can hold the button down and the value will automatically change.
4. Release the arrow button when the setting reaches the temperature you want. After a few seconds, the display returns to the current temperature of the pool or spa, depending on which mode you select.

Operating Programmed Functions

Depending on how you have wired the system, the five function buttons on the Hand-Held Remote control the five circuits in the Control Center. You should apply the appropriate label to the five buttons — describing the appropriate equipment according to your installation — from the assortment of labels supplied.

- Buttons **<1>**, **<2>**, and **<3>** control circuits **1**, **2**, and **3** on the Three-Circuit Clock Mechanism *(P1353ME)* that is installed on the left side of the Control Center.
- Buttons **<4>** and **<5>** control **Relay 1** and **Relay 2** on the Valve/Pump Switch Control *(P4243ME)* that is installed on the right side of the Control Center.

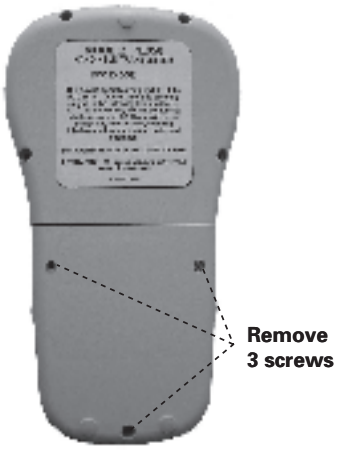
When you press any of these buttons, the appropriate circuit toggles ON or OFF. In addition, when the circuit is ON, the Hand-Held Controller's display shows the circuit number along the top of the screen.

Changing Batteries

The Hand-Held Remote Transceiver requires three (3) AA batteries. Battery life is about one year in typical use.

To change batteries:

1. Use a small Phillips screwdriver to remove the three screws on the back of the unit, as indicated.



2. Place three new batteries in the unit, making sure to observe "**+**" and "**–**" polarity.

Manually Turning Equipment On and Off

At the Control Center

For service purposes, the five circuits and the pool/spa actuators can be operated manually at the Control Center.

Simply press any of the circuit buttons on either the Three-Circuit Clock or the Valve/Pump Switch mechanisms to toggle between ON and OFF.

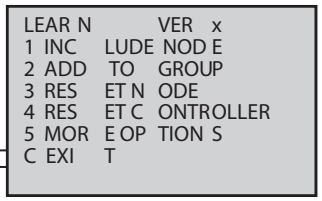
Any manual OFF/ON controlling will be reflected on the screen of the Hand-Held Controller.

Advanced Features

Configuring Two or More Hand-Held Remote Transceivers

Many installations will find it convenient to use two Hand-Held Remote Transceivers. Once you have linked one Hand-Held to the Control Center, it's easy to add a additional units.

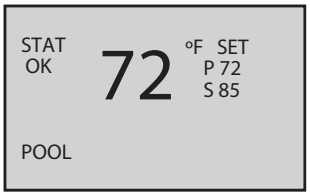
NOTES: The first Hand-Held you link to the Control Center is considered the PRIMARY controller and all other units are SECONDARY. You can tell the status of a controller from the **VER** (version) code at the top of the display: the letter "**P**" = **PRIMARY**; the letter "**S**" = **SECONDARY**.



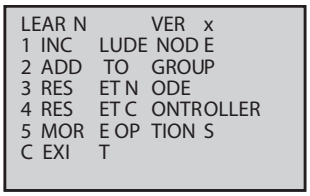
The PRIMARY controller must be used to "introduce" or link any additional (SECONDARY) Hand-Held units to the Control Center.

If the PRIMARY controller must be replaced (due to loss, damage, etc.,), you must reprogram from scratch to create a new PRIMARY controller, then reprogram any additional controllers as SECONDARY controllers.

1. Press and release any button on the Hand-Held Remote to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 60 seconds.) The screen display on the Hand-Held should look generally like the example on the right.

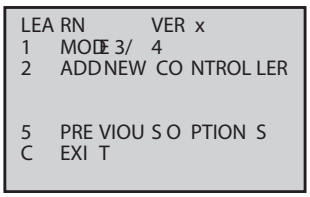


2. On both Hand-Held units, press and hold the **<P/S>** and **<CHLR>** buttons at the same time for about 5 seconds to put them into programming mode, as shown at the right.

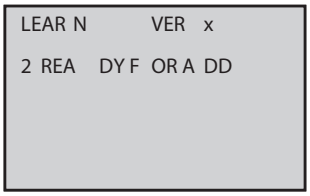


3. On the NEW Hand-Held you are adding to the network:

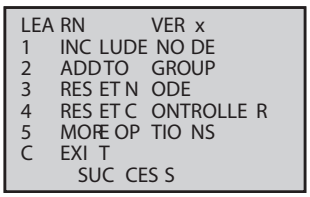
a. Press and release the **<5>** button to select **MORE OPTIONS**. A new screen will appear, as shown at the right.



b. Press and release the **<2>** button on the new screen to select **READY TO ADD**. The screen refreshes and displays only the line **2 READY TO ADD**.



4. Promptly, on the EXISTING or PRIMARY Hand-Held that is already part of the network, press and release the **<1>** button to select **INCLUDE NODE**. After a few seconds, the word **SUCCESS** should appear on the screens of both units.



5. Press and release the **<CHLR>** button on both Hand-Held Controllers to exit programming mode. The left side of the screen of both Controllers will say **STAT OK**, indicating that the procedure has been successful.

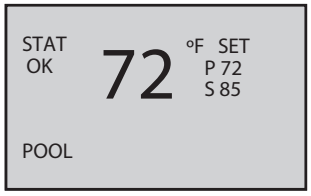
Programming to Protect a Pool Cleaner Pump

When you installed and wired the system, you may have included a cleaner pump along with a spa (Mode 3) or with a two-speed filter pump (Mode 4).

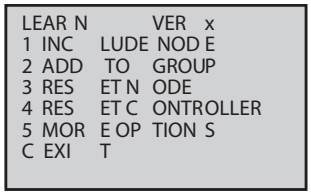
You will want to make sure this pump is never powered on when the system is in spa mode.

The system can accommodate these two scenarios.

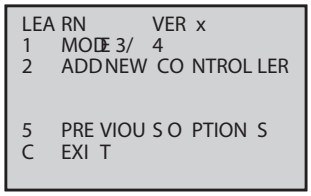
1. Press and release any button on the Hand-Held Remote to wake it from sleep. (The unit goes to sleep to conserve battery life when it has been idle for 30 seconds.)



2. Press and hold the **<P/S>** and **<CHLR>** buttons at the same time for about 5 seconds. This will put the device in programming mode, as shown at the right.



3. Press and release the **<5>** button to select **MORE OPTIONS**. A new screen will appear, as shown at the right.



4. Press and release the **<1>** button on the new screen to select **MODE 3/4 ON**.

NOTE: This button toggles between ON and OFF.

That's all there is to it. When Mode 3/4 is set to **ON**:

- The system will automatically turn the cleaner pump **OFF** any time the spa mode is activated, protecting the cleaner pump.
- If you switch to pool mode or to the high-speed pump mode, the system waits 30 seconds before powering **ON** the cleaner pump, making sure there is enough water in the system.

Using Two Hand-Held Controllers to Operate the System

When two or more Hand-Held Controllers are being used to operate a system, each will synchronize itself to the other according to whatever function the other controller has activated.

For example, if you press the **<1>** button on one controller, the following will happen:

- **Circuit 1** at the control center will toggle on or off, depending on its current state.
- The number **1** will appear along the top of the Hand-Held Controller's screen.
- Then, a few seconds later, the number **1** will also appear along the top of the second Hand-Held Controller's screen.

The owner can add up to five Hand-Held Controllers to a system.

Section 7:

Checking Out and Troubleshooting the System

After you have completed installation and programming, make sure the system is working OK by completing the procedures listed below. Later on, if problems develop in using the system, going over these same procedures will help you troubleshoot the problem.

Check time of day setting

What to do	*If it doesn't work*	*Reference/Procedure*
Verify that display on Three-Circuit Clock Mechanism *(P1353ME)* is showing correct time of day.	Verify that power is ON to the panel.	**1.** Turn the main circuit breaker that feeds the panel to the ON position. **2.** Use a voltmeter to verify that voltage is present at the buss terminals. See page 13.
	Verify that the breaker is turned on for the clock.	Use a voltmeter to verify that voltage is present at the breaker and Timer Power terminals. See pages 15-17, and 25.
	Verify power is wired to the three-circuit clock.	Check that the proper wires and voltage are connected to terminals 1 & 2 on the three-circuit clock. See pages 15-17, and 25.
	Verify the voltage select jumper, on the back of the clock, is in the proper position.	**1.** Remove the mechanism. **2.** Verify that the voltage jumper is in the correct position for the input voltage. See page 15-17, and 26.
	Verify that the F1 Fuse is not blown.	**1.** Remove the mechanism. **2.** Use an ohmmeter to verify that the fuse on the back is not blown open. See page 26. **3.** If the fuse is bad, replace fuse.
	Follow instructions for setting the correct time.	See page 31.
	Replace Clock if unsuccessful.	Replace the *P1353ME* mechanism. See page 7 for ordering information.

Check circuits on the Three-Circuit Clock Mechanism *(P1353ME)*

What to do	*If it doesn't work*	*Reference/Procedure*
Run this procedure for each circuit on the mechanism: **1.** Press the Circuit #1 ON/OFF button on the face of the mechanism. **2.** Wake up the Hand-Held Receiver by pushing any button. Verify the Hand-Held Receiver shows circuit #1 has powered ON. The number 1 will illuminate on the screen indicating circuit #1 has turned ON. **3.** Verify the wired load that corresponds with the circuit pushed activates properly. (e.g., pump, light, etc.) **4.** Turn Circuit #1 OFF using the ON/OFF button on the Hand-Held Remote Transceiver. **5.** Verify the Hand-Held Receiver shows circuit #1 has powered OFF. The number 1 will disappear on the screen indicating circuit #1 has turned OFF. If you can't complete this procedure successfully, follow the steps in the next column to troubleshoot.	Verify the Hand-Held Remote Transceiver is working.	See *"Verify the Hand-Held Remote Transceiver is working properly"* troubleshooting on page 56. ***NOTE:*** *You must push any button on the Hand-Held Remote Transceiver to wake it from its sleep state. Failure to do so will result in no display!*
	Verify that power is ON to the panel.	**1.** Turn the main circuit breaker that feeds the panel to the ON position. **2.** Use a voltmeter to verify that voltage is present at the buss terminals. See page 13.
	Verify that the breaker is turned ON for each wired load.	Use a voltmeter to verify that voltage is present at the breaker and Timer Power Circuit terminals. See pages 15-17, and 25.
	Verify that the input voltage jumper, on the back of the mechanism, is in the correct position.	**1.** Remove the mechanism. **2.** Verify that the voltage jumper is in the correct position for the input voltage. See pages 15-17, and 26.
	Verify that the F1 Fuse is not blown.	**1.** Remove the mechanism. **2.** Use an ohmmeter to verify that the fuse on the back is not blown open. See page 26. **3.** If the fuse is bad, replace fuse.
	Verify that the wiring is correct to the load.	Retrace your wiring and verify that all lines and loads are wired properly. See pages 15-19 and 27-30. ***NOTE:*** *Remember this mechanism breaks only one side to the load. Make sure you fully understand how to wire this mechanism prior to hooking up Line and Load wires.*
	Verify that you have set the correct Mode for the installation.	See pages 25 and 27-30.
	Verify that the relay associated with the circuit is closing when turned on.	**1.** Remove all power except power to the Three-Circuit Clock mechanism. **2.** Remove the line and load of the suspect circuit, from the Three-Circuit Clock. **3.** Put one probe of an ohmmeter on the LINE side of the circuit. **4.** Put the other probe on the LOAD side of the circuit. **5.** Push the ON/OFF button to the ON position and check if the contacts short. **6.** If not, replace the mechanism.

What to do	*If it doesn't work*	*Reference/Procedure*
	Verify that the mechanism works independently of the Panel-Mounted Transceiver.	**1.** Remove power from the system by turning off the main breaker. **2.** Disconnect the Panel-Mounted Transceiver from the back of the mechanism. **3.** Verify all line and load wires are connect properly. See item 6 above. **4.** Reapply power. Does the mechanism work now? **5.** If not, repeat Reference/Procedures 1, 2, 3, 4, & 5. If yes, reconnect Panel-Mounted Transceiver and try the wireless control again. **6.** If unit still doesn't work, proceed to the next item.
	Verify that the Hand-Held Remote Transceiver is linked up to the Panel-Mounted Transceiver.	**1.** Check that the display panel on the Hand-Held Remote Transceiver says **STAT OK**, not just **STAT**. **2.** If not, reprogram the Hand-Held Remote Transceiver. See pages 41-43. **3.** Replace the Hand-Held Remote Transceiver if unable to successfully program. **4.** Replace the Panel-Mounted Transceiver if still not able to establish communication with the replacement Hand-Held Remote Transceiver.
	Verify that the other two circuits work properly.	If all three circuits fail to work properly, replace the *P1353ME* mechanism. See page 7 for ordering information.

Check circuits on the Valve/Pump Switch Mechanism *(P4243ME)*

What to do	*If it doesn't work*	*Reference/Procedure*
Run this procedure for each circuit on the mechanism. **1.** Press the Relay #1 ON/OFF button on the face of the mechanism. **2.** Wake up the Hand-Held Receiver by pushing any button. Verify the Hand-Held Receiver shows circuit #4 has powered ON. The number 4 will illuminate on the screen indicating circuit #4 has turned ON. **3.** Verify the wired load that corresponds with the circuit pushed activates properly. (e.g., pump, light, etc.) **4.** Turn Relay #1 OFF using the ON/OFF button on the Hand-Held Remote Transceiver. **5.** Verify the Hand-Held Receiver shows circuit #1 has powered OFF. The number 4 will disappear on the screen indicating circuit #1 has turned OFF. **6.** Repeat steps 1 thru 4 for Relay #2 (number 5 on the Hand-Held Remote Transceiver). If you can't complete this procedure successfully, follow the steps in the next column to troubleshoot.	Verify that the Hand-Held Remote Transceiver is working.	See *"Verify the Hand-Held Remote Transceiver is working properly"* troubleshooting on page 56. ***NOTE:*** *You must push any button on the Hand-Held Remote Transceiver to wake it from its sleep state. Failure to do so will result in no display!*
	Verify that power is ON to the panel.	**1.** Turn the main circuit breaker that feeds the panel to the ON position. **2.** Use a voltmeter to verify that voltage is present at the buss terminals. See page 13.
	Verify that the breaker is turned ON for each wired load.	Use a voltmeter to verify that voltage is present at the breaker associated with the loads.
	Verify that the primary of the transformer is wired to proper voltage.	Check that the proper wires on the primary of the transformer are wired to the proper voltage. See pages 15-17.
	Verify that the wiring is correct to the load.	Retrace your wiring and verify that all lines and loads are wired properly. See pages 15-19 and 27-30.
	Verify that the mechanism works independently of the Panel-Mounted Transceiver.	**1.** Remove power from the system by turning off the main breaker. **2.** Disconnect the Panel-Mounted Transceiver from the back of the mechanism. **3.** Verify all line and load wires are connect properly. See item 6 above. **4.** Reapply power. Does the mechanism work now? **5.** If not, repeat Reference/Procedures 1, 2, 3, 4, & 5. If yes, reconnect Panel-Mounted Transceiver and try the wireless control again. **6.** If unit still does not work, proceed to the next item.
	Verify that the relay associated with the load is closing when turned ON.	**1.** Remove all power except power to the Pump/Valve Switch mechanism. **2.** Remove the line and load of the suspect circuit, from the Pump/Valve Switch. **3.** Put one probe of an ohmmeter on the LINE side of the circuit. **4.** Put the other probe on the LOAD side of the circuit. **5.** Push the ON/OFF button to the ON position and check if the contacts short. **6.** If not, proceed to the next item.
	Verify that the wiring is connected to the internal relays.	**1.** Remove all power from the system. **2.** Remove the Pump/Valve Switch Mechanism and examine the wires going to the two Omron relays. Compare the wire locations to the wire identifiers on the front pad of the Pump/Valve Switch. Are they connected to the correct terminals on the relay?
	Verify that the control pad is connected to the circuit board.	Check that the ribbon cable from the Control Face is connected to the circuit board. See page 37 to identify the Control Face Plug In.
	Verify that each relay coil wire is connected to the circuit board.	Verify the coil wires from each of the Omron relays are connected to the circuit board. See page 37 to identify the Omron connections.

What to do	If it doesn't work	Reference/Procedure
	Verify that 24 VAC power is connected and present at the circuit board.	Verify the yellow wires from the secondary of the transformer are connected to the circuit board. See page 37 to identify the 24 VAC Power-In connections.
	Verify that the Hand-Held Remote Transceiver is linked up to the Panel-Mounted Transceiver.	**1.** Check that the display panel on the Hand-Held Remote Transceiver says **STAT OK**, not just **STAT**. **2.** If not, reprogram the Hand-Held Remote Transceiver. See pages 41-43. **3.** Replace the Hand-Held Remote Transceiver if unable to successfully program. **4.** Replace the Panel-Mounted Transceiver if still not able to establish communication with the replacement Hand-Held Remote Transceiver.
	Verify that the other two circuits work properly.	If all three circuits fail to work properly, replace the *P4243ME* mechanism. See page 8 for ordering information.

Check that actuator valves correctly switch between pool and spa

What to do	If it doesn't work	Reference/Procedure
1. Press the VALVES ON/OFF button on the face of the mechanism so that the green light below the VALVE button is illuminated. **2.** Wake up the Hand-Held Remote Transceiver by pushing any button. Verify the Hand-Held Receiver shows "Spa" on the LCD screen. **3.** Verify the Actuators and Valves are in the SPA position. **4.** Press the VALVES ON/OFF button on the face of the mechanism so that the green light below the VALVE button goes off. **5.** Verify the Hand-Held Remote Transceiver shows "Pool" on the LCD screen and the Actuators and Valves are in the POOL position. If you can't complete this procedure successfully, follow the steps in the next column to troubleshoot.	Verify that the Hand-Held Remote Transceiver is working.	See *"Verify the Hand-Held Remote Transceiver is working properly"* troubleshooting on page 56. ***NOTE:*** *You must push any button on the Hand-Held Remote Transceiver to wake it from its sleep state. Failure to do so will result in no display!*
	Verify that power is ON to the panel.	**1.** Turn the main circuit breaker that feeds the panel to the ON position. **2.** Use a voltmeter to verify that voltage is present at the buss terminals. See page 13.
	Verify that the primary of the transformer is wired to the proper voltage.	Check that the proper wires on the primary of the transformer are wired to the proper voltage. See pages 15-17.
	Verify that the actuator cable is plugged into the Pump/Valve Switch.	Retrace your wiring and verify that each actuator is plugged in properly. See pages 21 and 36.
	Verify that the actuator shaft is engaged in the valve it controls.	**1.** Tighten the screw located on the top of the actuator. **2.** Turn the handle until actuator engages. If the actuator is not engaged, the handle will turn and then engage. If the actuator is engaged, the handle will not turn. **3.** Proceed to item 6 if actuator is already engaged.
	Verify that the ON/OFF switch on the actuator is powered ON.	The Intermatic actuator has an ON/OFF switch located on the back of the actuator. Make sure this switch is in the AUTO ON 1 or AUTO ON 2 position, depending on your plumbing configuration.

What to do	*If it doesn't work*	*Reference/Procedure*
	Verify that the mechanism works independently of the Panel-Mounted Transceiver.	**1.** Remove power from the system by turning off the main breaker. **2.** Disconnect the Panel-Mounted Transceiver from the front of the mechanism. **3.** Verify that the actuator cable is connected properly. See item 4 above. **4.** Reapply power. Does the mechanism work now? **5.** If no, repeat Reference/Procedures 2, 3, 4, 5, & 6. If yes, reconnect the Panel-Mounted Transceiver and try the wireless control again. **6.** If unit still does not work, proceed to item 8.
	Verify that the Control Pad is connected to the circuit board.	Verify ribbon cable from the Control Face is connected to the circuit board. See page 37 to identify the Control Face Plug In.
	Verify that the 24 Vac power is connected and present at the circuit board.	Check that the yellow wires from the secondary of the transformer are connected to the circuit board. See page 37 to identify the 24 VAC Power-In connections.
	Verify that the Hand-Held Remote Transceiver is linked up to the Panel-Mounted Transceiver.	**1.** Check that the display panel on the Hand-Held Remote Transceiver says **STAT OK**, not just **STAT**. **2.** If not, reprogram the Hand-Held Remote Transceiver. See pages 41-43. **3.** Replace the Remote if unable to successfully program. **4.** Replace the Panel-Mounted Transceiver if still not able to establish communication with the replacement Hand-Held Remote Transceiver.
	Verify that the other two circuits work properly.	If all three circuits fail to work properly, replace the *P4243ME* mechanism. See page 8 for ordering information.

Verify that the Hand-Held Remote Transceiver is working properly

What to do	*If it doesn't work*	*Reference/Procedure*
1. Wake up the Hand-Held Remote Transceiver by pressing any button. **2.** On the right hand side of the display there should be a **P** and **S** indicating the pool and spa set temperatures. Use the arrow keys to increase or decrease these set points. The display will change back in five seconds. **3.** Pushing the **<CHLR>** button should change the display to "CHLORINATOR NOT AVAILABLE". This display will change back in five seconds. **4.** Holding down the **<P/S>** and **<CHLR>** buttons simultaneously for five seconds should enter you into the programming screen. Use the number keys to navigate these menus. Press the **<CHLR>** button to exit the programming screen. If you can't complete this procedure successfully, follow the steps in the next column to troubleshoot.	Verify that batteries are installed properly and fully charged.	**1.** The Hand-Held Remote Transceiver takes 3 AAA batteries. Make sure the batteries are installed and are properly aligned according to the polarity markings in the battery compartment. **2.** Do not mix fully charged batteries with partially charged batteries in the Hand-Held Remote Transceiver. **3.** Do not use rechargeable batteries in the Hand-Held Remote Transceiver. **4.** If the **Low Bat** indicator is visible in the display, the Hand-Held Remote Transceiver will function intermittently. Replace batteries immediately.
	Verify that the Hand-Held Remote Transceiver has successfully awakened from its sleep state.	**1.** Push and release any button on the Hand-Held Remote Transceiver to wake it from its sleep state. Failure to awaken means there will be nothing visible on the display! **2.** If the Hand-Held Remote Transceiver is awake and none of its buttons are pressed, it should go back into its sleep state after one minute.
	Verify that the Hand-Held Remote Transceiver is successfully linked up to the Panel-Mounted Transceiver.	**1.** Check that the display panel on the Hand-Held Remote Transceiver says **STAT OK**, not just **STAT**. **2.** If not, reprogram the Hand-Held Remote Transceiver. See pages 41-43. **3.** Replace the Hand-Held Remote Transceiver if unable to successfully program. **4.** Replace the Panel-Mounted Transceiver if still not able to establish communication with the replacement Hand-Held Remote Transceiver.

Verify that the Hand-Held Remote is controlling pool and spa temperature

What to do	*If it doesn't work*	*Reference/Procedure*
1. Wake up the Hand-Held Remote Transceiver by pressing any button. **2.** Depending on how your suction and discharge valves are turned, the display should show the actual water temperature of either the pool or spa. **3.** On the right hand side of the display there should be a **P** and **S** indicating the pool and spa set temperatures. Press the **<ARROW>** buttons to adjust the set point so that it is higher then the actual water temperature. **4.** Verify that the word **HEATING** appears at the bottom of the display. This indicates that the heater should be heating, if it is working properly and the system is wired and plumbed properly. **5.** Verify that the heater is actually heating. **6.** Press the **<ARROW>** buttons to lower the set temperature below the actual water temperature. **7.** Verify that the word **HEATING** goes out at the bottom of the display. This indicates that the heater should not be heating, if the heater is working properly and the system is wired and plumbed properly. **8.** Verify that heater has stopped heating. If you can't complete these procedures successfully, follow the steps in the next column to troubleshoot.	Verify that filter pump is turned ON and running.	Turn ON the circuit that controls the filter pump. Verify that the filter pump is running and that there is adequate flow through the heater.
	Verify that power is turned ON to the heater.	Verify that the heater circuit breaker is ON and the heater actually has power.
	Verify that the heater thermostat at the Heater is turned up fully for both pool and spa settings.	All thermostats on the heater must be set to their maximum setting.
	Verify that the Pool and Spa Set point on the Hand-Held Remote Transceiver is set higher than the actual water temperature shown on its display.	**1.** On the right hand side of the display there should be a **P** and **S** indicating the pool and spa set temperatures. Press and release the **<ARROW>** buttons to adjust the set point so that it is higher then the actual water temperature. **2.** Verify that the word **HEATING** appears at the bottom of the display. This indicates that the heater should be heating, if it is working properly and the system is wired and plumbed properly.
	Verify that the Fireman switch wires from the Panel-Mounted Transceiver are connected properly to the heater.	Identify your heater and retrace your wiring to verify all lines are connected properly. See pages 22-24.
	Verify heater works independently of the control system.	**1.** Remove all wires from the control to the heater and hook up the heater system as a stand-alone unit. **2.** Verify that the heater works with its own thermostat.
	Results of troubleshooting:	**1.** If the heater does not work independently of the control, repair the heater. **2.** If the heater does work independently of the control, replace the Panel-Mounted Transceiver. See page 8 for ordering information.

Check for successful wireless reception all around the yard

What to do	*If it doesn't work*	*Reference/Procedure*
1. Wake up the Hand-Held Remote Transceiver by pressing any button. **2.** Identify and walk to the areas where you intend to use the Hand-Held Remote Transceiver, and make sure you see **STAT OK** in the upper left corner of the display at all times in these areas. **3.** If the word **OK** disappears and the display reads only **STAT**, follow the procedures in the next column.	Verify that the Hand-Held Remote is working properly.	See *"Verify the Hand-Held Remote Transceiver is working properly"* troubleshooting on page 56.
	Verify that the Hand-Held Remote Transceiver is successfully communicating with the Panel-Mounted Transceiver.	**1.** Stand next to the control box with the Hand-Held Remote Transceiver. **2.** Verify that the unit works by locating and following the "What to do" procedures detailed in *"Check circuits on the Three-Circuit Clock Mechanism (P1353ME)"* on page 51.
	Install Transceiver Repeater Modules *(HA04C)* where necessary to improve or broaden range.	**1.** Locate a 120 Volt outlet someplace between the Panel-Mounted Transceiver and the area the Hand-Held Remote Transceiver lost communication. **2.** Install a Transceiver Repeater Module *(HA04C)* in this outlet and program the Repeater Module by following the instructions on page 44 thru 45. **3.** See page 10 for Transceiver Repeater Module ordering information.
	Install the Intermatic 35-ft. Antenna Extension Cable Assembly *(PA121)* to improve or broaden range.	**1.** If a 120 Volt outlet is not strategically located or the Transceiver Repeater Module doesn't work, you may have to remote the antenna on the Panel-Mounted Transceiver located on the top of the enclosure. ***NOTE:*** *Only an Intermatic 35-ft. Antenna Extension Cable Assembly (PA121) will work with the I-Wave Control. Ordering information is located on page 11.* **2.** Remove the antenna located at the top of the Panel-Mounted Transceiver by turning the antenna counter clockwise. **3.** Install the female end of the cable where the antenna was previously connected. **4.** Install the antenna on the other end of the cable. **5.** Route the cable to a location where the antenna will be in the direct Line of Sight of the area where the Hand-Held Remote Transceiver will be most frequently used. **6.** Mount the cable and antenna with the mounting kit that comes with the Intermatic 35-ft. Antenna Extension Cable Assembly *(PA121)*. **7.** Repeat the "What to do" procedure to verify that your installation was successful.

Check that Protection for the Pool Cleaner Pump is Working (if installed)

What to do	*If it doesn't work*	*Reference/Procedure*
1. Make sure all equipment is OFF but power is present at the panel. **2.** Make sure the water valves are in the Pool position and the VALVE light on the control is OFF. **3.** Push Circuit #1 ON to turn on the filter pump. **4.** Push Circuit #3 ON to turn on the cleaner pump. The cleaner pump should start in approximately 30 seconds, depending on how long the filter pump has been running. **5.** Push the VALVE button on the control to change the valves over to the SPA. The cleaner pump should turn off within 5 seconds of pushing the VALVE button. **6.** Wake up the Hand-Held Remote Transceiver by pressing any button. **7.** Push button #3 to turn on the cleaner pump. The cleaner pump should NOT come on because the valves are in the spa position. **8.** Push the **<P/S>** button on the Hand-Held Remote Transceiver to change the valves back to the pool position. **9.** Push button #3 to turn on the cleaner pump. The cleaner pump should now come on. **10.** Push the **<P/S>** button on the Hand-Held Remote Transceiver as to change the valves back to the spa position. **11.** The cleaner should shut off automatically. If you can't complete this procedure successfully, follow the steps in the next column to troubleshoot.	Verify that the Three-Circuit Clock and Pump/Valve switch are working properly.	**1.** Review the *What to do* suggestions for the "*Check circuits on the Three-Circuit Clock Mechanism (P1353ME)"* troubleshooting information on page 51. **2.** Review the *What to do* suggestions for the "*Check circuits on the Valve/Pump Mechanism (P4243ME)"* troubleshooting information on page 53.
	Verify that the cleaner pump is wired to circuit #3 of the Three Circuit Clock.	Review the wiring diagram on pages 28 or 29.
	Verify that the Three Circuit Clock is set to either Mode 3 or 4 depending on your filter pump configuration (e.g. single speed or two speed).	Review Mode settings on pages 28-30 and 32-33.
	Verify that Mode 3/4 protection has been turned ON, on the Hand-Held Remote Transceiver.	Review "*Programming to Protect a Pool Cleaner Pump"* on page 49.
		If unit doesn't work after satisfying the four items above, replace the Panel-Mounted Transceiver first, and then the Hand-Held Remote Transceiver.

Check that the Fireman's Switch is Working (if installed)

What to do	*If it doesn't work*	*Reference/Procedure*
1. Make sure all equipment is OFF but power is present at the panel. **2.** Make sure the water valves are in the Pool position and the VALVE light on the control is OFF. **3.** Push Circuit #1 ON to turn on the Filter Pump. **4.** Wake up the Hand-Held Remote Transceiver by pressing any button. The display should show the actual water temperature of the pool. **5.** On the right hand side of the display is a **P** and an **S** indicating the pool and spa set temperatures. Use the arrow keys to adjust the pool set point so that the final set point is higher then the actual water temperature. **6.** At the bottom of the display, the word **HEATING** should come on. This indicates that the heater should be heating, presuming that the heater is working properly and the system is wired and plumbed properly. **7.** Verify that the heater is actually heating. **8.** Push Circuit #1 OFF to turn off the Filter Pump. The heater should shut off but the Filter pump should continue to run while the display on the Three-circuit Clock starts to count down from its programmed setting. **9.** When the clock's programmed setting reaches zero, the Filter pump should shut off. If you can't complete this procedure successfully, follow the steps in the next column to troubleshoot.	Verify that the Three-Circuit Clock and Pump/Valve switch are working properly.	**1.** Review the *What to do* suggestions for the *"Check circuits on the Three-Circuit Clock Mechanism (P1353ME)"* troubleshooting information on page 51. **2.** Review the *What to do* suggestions for the "*Check circuits on the Valve/Pump Mechanism (P4243ME)"* troubleshooting information on page 53.
	Verify heater and wireless system are working properly together.	Review *What to do* suggestions for the "*Verify that the Hand-Held Remote Transceiver is controlling pool and spa temperature"* troubleshooting information on page 57.
	Verify a Fireman's Switch delay time has been programmed in the Three Circuit Clock.	Review "*Setting the Heaters Cool Down Time"* on page 34.
		If unit doesn't work after satisfying the three items above, replace the Three Circuit Clock *(P1353ME)*. See page 7 for ordering details.

Check that the freeze sensor is working (if installed)

What to do	*If it doesn't work*	*Reference/Procedure*
1. Make sure all equipment is OFF but power is at the panel. **2.** For testing purposes only, change the set point for the freeze sensor to 40°F and make sure Circuit #1 has been selected to come ON. See page 35. **3.** Place the freeze sensor in a cup of ice. **4.** Wait for the temperature of the sensor to drop below the 40°F set point. **5.** Verify that Circuit #1 has come ON. If you can't complete this procedure successfully, follow the steps in the next column to troubleshoot.	Verify that the Three-Circuit Clock and Pump/Valve switch are working properly.	**1.** Review the *What to do* suggestions for the *"Check circuits on the Three-Circuit Clock Mechanism (P1353ME)"* troubleshooting information on page 51. **2.** Review the *What to do* suggestions for the *"Check circuits on the Valve/Pump Mechanism (P4243ME)"* troubleshooting information on page 53.
	Verify that the freeze sensor is installed and plugged into the proper port on the Three-Circuit Clock.	**1.** Review page 26 to identify where to plug in the freeze sensor. **2.** Only an Intermatic Freeze Sensor *(178PA28A)* will work with this unit. See page 10 for ordering information.
	Verify you programmed a freeze temperature and selected the loads you would like to come on during a freeze situation.	Review page 35 for programming instructions concerning the freeze set point and circuit selection.
	If unit doesn't work after satisfying steps 1 thru 3, replace the Freeze Sensor *(178PA28A)*, and then the Three-Circuit Clock *(P1353ME)*.	• Freeze Sensor *(178PA28A)*: see page 10 for ordering information. • Three-Circuit Clock *(P1353ME)*: see page 7 for ordering information.

Check that the Three-Button Wired Remote is working (if installed)

What to do	*If it doesn't work*	*Reference/Procedure*
1. Press each of the three buttons on the Wired Remote Control. **2.** Verify that the equipment controlled by those circuits activates properly. **3.** Verify that the lights come on for the three circuits.	If any of the circuits don't work, check your wiring for that circuit.	

Check that the external timer is working (if installed)

What to do	*If it doesn't work*	*Reference/Procedure*
1. Set the external timer to five minutes ahead of the current correct time. **2.** Wait to see that the equipment comes on when the five minutes is up.		

Section 9:

Warranty

ONE YEAR LIMITED WARRANTY

If, within one (1) year from the date of purchase, this product fails due to defect in material or workmanship, Intermatic Incorporated will repair or replace it, as its sole option, free of charge. This warranty is extended to the original household purchaser only and is not transferable. This warranty does not apply to: (a) damage to units caused by accident, dropping, or abuse in handling, acts of God, or any negligent use; (b) units which have been subject to unauthorized repair, opened, taken apart, or otherwise modified; (c) units not used in accordance with instructions; (d) damages exceeding the cost of the product; (e) sealed lamps and/or lamp bulbs, LEDs, and batteries; (f) the finish on any portion of the product, such as surface and/or weathering, as this is considered normal wear and tear; (g) transit damage, initial installation costs, removal costs, or reinstallation costs.

INTERMATIC INCORPORATED WILL NOT BE LIABLE FOR INCIDENTAL OR CONSEQUENTIAL DAMAGES. SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL DAMAGES, SO THE ABOVE LIMITATION OR EXCLUSION MAY NOT APPLY TO YOU. THIS WARRANTY IS IN LIEU OF ALL OTHER EXPRESS OR IMPLIED WARRANTIES. ALL IMPLIED WARRANTIES, INCLUDING THE WARRANTY OF MERCHANTABILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE, ARE HEREBY MODIFIED TO EXIST ONLY AS CONTAINED IN THIS LIMITED WARRANTY, AND SHALL BE OF THE SAME DURATION AS THE WARRANTY PERIOD STATE ABOVE. SOME STATES DO NOT ALLOW LIMITATIONS ON THE DURATION OF AN IMPLIED WARRANTY, SO THE ABOVE LIMITATION MAY NOT APPLY TO YOU.

This warranty service is available by either (a) returning the product to the dealer from whom the unit was purchased, or (b) mailing the product, along with proof of purchase, postage prepaid, to the authorized service center listed below. This warranty is made by: Intermatic Incorporated/ After Sales Service/7777 Winn Rd., Spring Grove, IL 60081-7000 <http://intermatic.com>. Please be sure to wrap the product securely to avoid shipping damage.

Because of our commitment to continuing research and improvements, Intermatic Incorporated reserves the right to make changes, without notice, in the specifications and material contained herein, and shall not be responsible for any damages, direct or consequential, caused by reliance on the material presented.

WARRANTY REGISTRATION

Owner's Name_____ **Signature**_____

Street Address_____ **Date of Purchase** _____

City_____ **State**_____ **Zip** _____ **Phone** _____

Authorized Dealer _____ **Sales Rep** _____

City_____ **State**_____ **Zip** _____ **Phone** _____

How did you hear about our product? (Please check all that apply.)

___Pool Store Employee ___Pool Builder ___Pool Service ___Direct Mail Ad ___In-Store Display

___Friend/Relative ___Magazine ___Newspaper ___Radio ___TV ___Catalog ___Other: _____

To activate your warranty, please return this portion to:

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Installation Notes

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