

OWNERS INSTALLATION & OPERATION MANUAL

LENNOVATOR POOL/SPA CONTROL SYSTEM



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IMPORTANT SAFETY INSTRUCTIONS

When installing and using this electrical equipment, basic safety precautions should always be followed, including:

READ AND FOLLOW ALL INSTRUCTIONS

WARNING - RISK OF CHILD DROWNING

Extreme caution must be exercised to prevent unauthorized access to the spa by children.

WARNING - To reduce the risk of injury, do not permit children to use the spa unless they are closely supervised at all times.

WARNING - RISK OF ELECTRICAL SHOCK

Control Module must be installed at least a minimum of 5 feet (1.5m) from the inside wall of spa, using non-metallic plumbing.

DANGER-RISK OF ELECTRICAL SHOCK

Do not permit any electrical appliance, such as a light, telephone, radio or television within 5 feet (1.5m) of the spa.

A bonding lug has been provided on the outside of the Control Module electrical control box. This lug permits the connection of a No. 8 AWG solid copper bonding conductor. Make this connection between the Control Module and all other electrical equipment and exposed metal within 5 feet (1.5m) of the Control Module.

WARNING - To reduce the risk of injury to persons within the spa, never remove, or alter in any way, the grates or covers on the suction fittings in the spa. Never operate the Control Module if the grates or covers on the suction fittings are broken or missing.

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

WARNING - The use of alcohol, drugs or medication can greatly increase the risk of fatal hyperthermia. Leave the spa immediately if nausea, dizziness or headache occur. Immediately cool the body by taking a cool shower or by applying cold towels or ice packs. If the symptoms persist, seek medical attention.

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

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

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

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

Obese persons and persons with a medical history of heart disease, low or high blood pressure, circulatory system problems or diabetes should consult a physician before using the spa.

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

Occasional users of the spa may not be aware of all the potential risks associated with spa usage. They should be made aware of these important safety instructions.

**SAVE THESE
INSTRUCTIONS**

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FCC COMPLIANCE

LIMITED WARRANTY

DESCRIPTION

REMOTE OPERATED SPA & POOL CONTROL

The Lennovator is a remote operated spa & pool control system. It assumes that an external gas heater or heat pump with temperature and hi-limit controls exists. The external heater and associated safety circuits are not part of the Lennovator System.

The Lennovator System supplies a set of dry contacts which may be connected to the external heat control. Since the Lennovator senses the water temperature, set points may be set via the RF remote control system. The dry contacts operate in accordance with the set points; i.e. if the set points are higher than the actual water temperature the relay contacts close and the external heater heats the water. If the set points are lower than the water temperature, the contacts open and the water cools.

The temperature set points and dry contact interface does not compromise the built in safety features of the external heater control system.

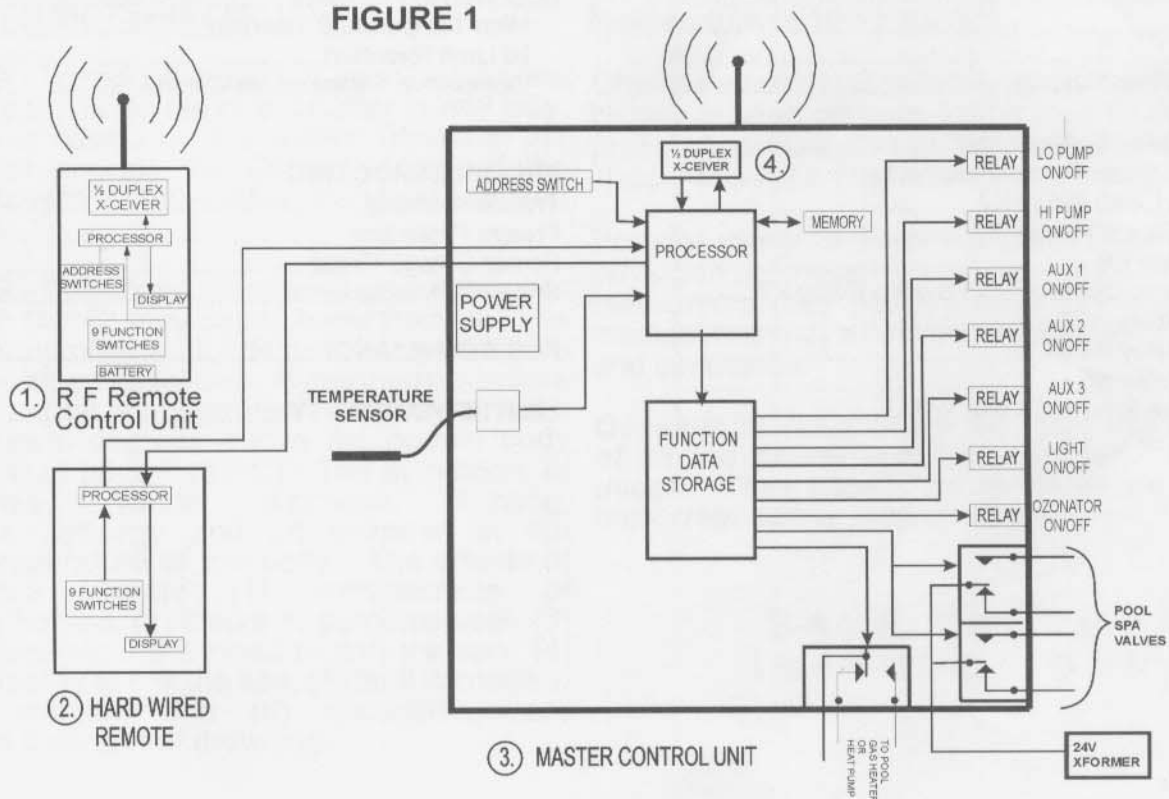
The Lennovator senses water temperature in the spa & pool mode. Independent and adjustable set points control the temperatures of the spa and the pool.

The Lennovator System also assumes there is only one pumping system for both the pool and spa. When the spa mode is activated via the RF remote control, a set of contacts are available to operate the pool/spa valve, i.e. the valves are activated such that the water is pumped to the spa. If the pool mode is activated via the RF remote control, the contacts are reversed and the valves are activated such that the water is pumped to the pool. The Lennovator also has a hard wired control which may be used during maintenance to create the same functions.

This unit consists of 4 sub-units (See Figure 1):

1. RF Remote Control Unit
2. Hard Wired Remote Control Unit
3. Master Control Unit
4. Transceiver

FIGURE 1



The Lennovator System operates pool and spa functions upon command from several controls. The main enclosure, or **master control unit** interprets the data from the controls and turns the spa/pool functions on and off.

FILTRATION TIMER

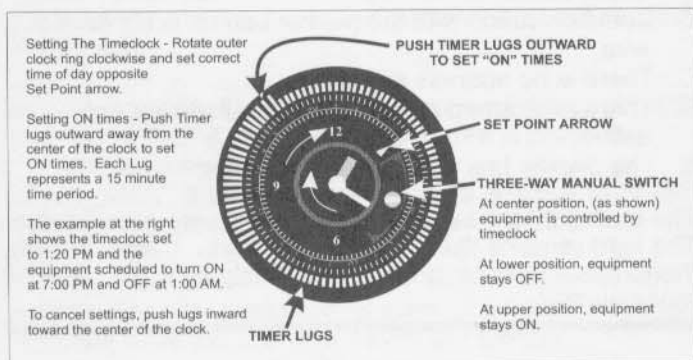


FIGURE 2

Lennovator systems include a 24 hour filtration timeclock, which controls the pool/spa pump.

A second timeclock kit (for a pool cleaner or other system) is available and may be ordered separately.

HANDHELD RF REMOTE CONTROL UNIT

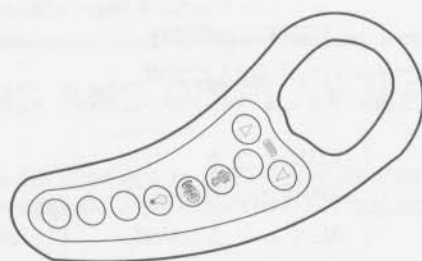


FIGURE 3

This unit is a hand held battery operated device which contains a key pad, LCD display, an RF transceiver unit and associated electronics. This sub unit is used to operate the master control unit and to receive and display temperature and status data.

This RF Remote is powered by an alkaline 9 volt battery. The life of the battery will vary depending upon usage.

The RF Remote's sleep circuit is designed to turn off its battery power if there has been no action from the key pad for about 40 seconds. The status switch must be depressed to wake it up.

The filtration timer provides the ultimate in operating efficiency and economy. The pool/spa water can be filtered once daily or several times a day, to maintain a sparkling clear, clean condition with proper sanitizer distribution.

One single-speed pump system: When the timer reaches an ON time, the pump will turn on.

Two single-speed pump system: When the timer reaches an ON time, the primary pump will turn on.

One 2-speed pump system: When the timer reaches an ON time, the pump will operate in low speed.

For an initial setting, follow "Setting the Timeclock" instructions (See Figure 2) and try 6 to 8 consecutive hours a day, or set various ON times spaced around the timer. Wait a few days and adjust as necessary to maintain sparkling clear water with a minimum of ON times.

There is an 8 digit switch inside the battery compartment, from which an address word is derived. This address must match the 8 digit switch in the master control unit. They must match in order for the master control unit to respond to the command. The eighth position of the switch must be off for the battery saver time out mode (sleep) to work.

Two identical transceivers are used in the Lennovator system. One of these will be mounted piggy back on the printed circuit board in the RF remote control unit. The other will be mounted piggy back on the master control printed circuit board. The transceiver is in compliance with FCC CFR 47 Part 2 and FCC CFR 47 Part 15 with data rates up to 5 kilobits. The method of modulation and coding can be pulse position, spread spectrum or frequency hopping. Different RF frequencies and the various modulation and coding methods are available as range and interference free options. Areas that have little RF interference may use the pulse position RF transceiver. The spread spectrum or frequency hopping modulation and decoding method will be used in areas of high RF interference and where the transceiver pair requires an increased range.

Note: *The remote control unit is water resistant, not water proof. Do not submerge in water.*

CONTROLS (Continued)

HARD WIRED CONTROL UNIT (Maintenance panel)

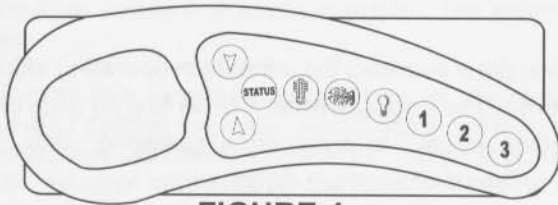


FIGURE 4

The hard wired control unit will be referred to as the maintenance panel.

The operation of the maintenance panel is identical to the RF remote unit except:

- A. Power is derived from the master control printed circuit board,
- B. Communication with the master control is via hard wire,
- C. There is no address switch,
- D. There is no sleep mode - display will always be active,
- E. The display has back lighting features.

The back light will be energized by depressing any switch. The light remains illuminated for 4 hours. If after 4 hours there has been no activity, the back light will turn off automatically.

CONTROL SWITCH FUNCTIONS

Both the RF Remote and the maintenance panel have nine-switch keypads which are used to perform the identified functions. See the next section for detailed descriptions.

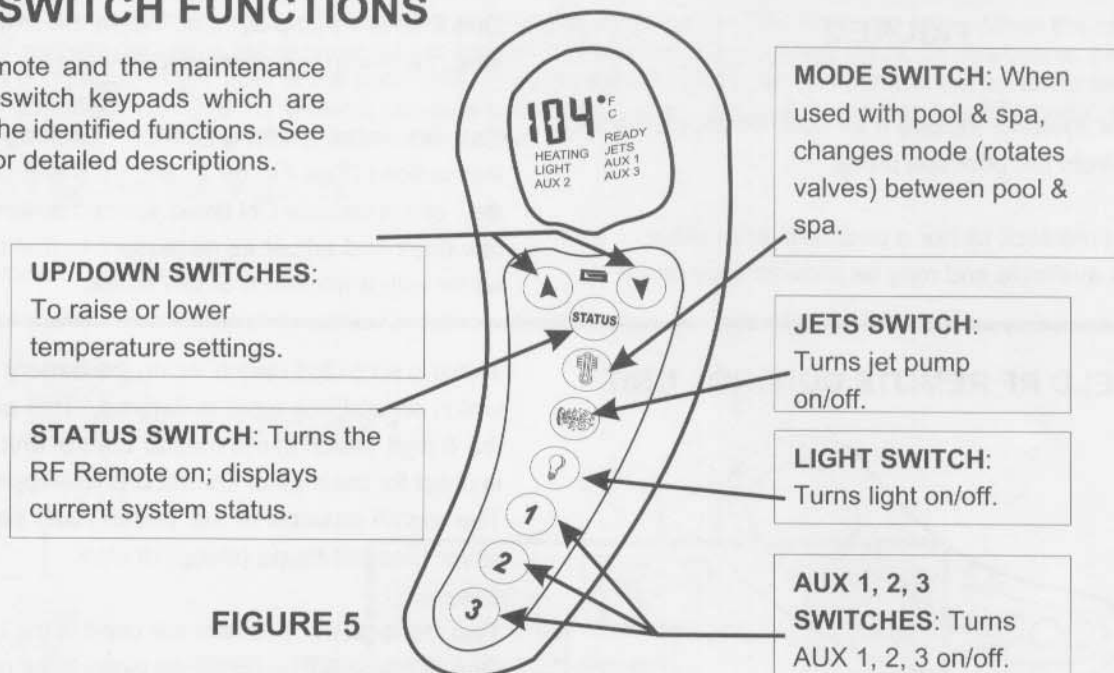


FIGURE 5

CONTROL FUNCTIONS, DETAILED

UP SWITCH



The up switch raises the temperature set point. Also if the water safety hi-limit circuit has been tripped (water temperature went over 112°F), it can be reset by depressing the up and down switches together (providing the water temperature has cooled down below 108°F).

When the up switch is held depressed, the transceiver will continue to transmit the command and receive the updated temperature set point on the display. (It will update in two or three second intervals). When the desired temperature set point is observed the up switch should be released.

DOWN SWITCH



The down switch operates the same as the up switch with the exception that it lowers the temperature set point. If the up and down switches are depressed together, a reset safety hi-limit emergency shut down providing the water temperature is below 108°F.

STATUS SWITCH



The status switch performs two functions:

- A. Turns on main power (VCC) if in sleep mode (RF Remote Control Unit only)
- B. Requests temperature and status information from the master control unit.

CONTROL FUNCTIONS, DETAILED (Continued)

MODE SWITCH



Selects either pool or spa mode. "PO" or "SP" will be displayed to identify the active mode. When configured for in ground pool/spa, the pool/spa valves will rotate to spa function when in spa mode and remain there until pool mode is selected.

In either mode, one of two status icons will be displayed:

- A. "HEATING" if the water temperature is below the temperature set point, or
- B. "READY" if the water temperature is equal to or above the temperature set point.

NOTE: "WAIT" will be *blinking* On/Off while valves are turning. The filter pump and jet pump (if on) will turn off for 30 seconds while the spa/pool valves are turning.

JETS SWITCH



The "JETS" switch sends a jets command to the master control unit which toggles the jets function on or off. When the jets function is on, the jets icon will be displayed. The jets function is on a 30 minute timer and will automatically turn off at the end of 30 minutes.

LIGHT SWITCH



The "LIGHT" switch sends a light command to the master control unit which toggles the light function on or off. When the light function is on, the light icon will be displayed. The light function is on a 4 hour timer and will turn off automatically after 4 hours.

AUX-1

1

The "AUX-1" switch sends an AUX-1 command to the master control unit which toggles the AUX-1 function on or off. When the AUX-1 function is on, the AUX-1 icon will be displayed. AUX-1 function will normally control the blower motor. The AUX-1 function is on a 30 minute timer and will turn off automatically after 30 minutes.

AUX-2

2

The "AUX-2" switch sends an AUX-2 command to the master control unit which toggles the AUX-2 function on or off. When the AUX-2 function is on, the AUX-2 icon will be displayed. The AUX-2 function is on a 4 hour timer and will turn off automatically after 4 hours.

AUX-3

3

The "AUX-3" switch sends an AUX-3 command to the master control unit which toggles the AUX-3 function on or off. When the AUX-3 function is on, the AUX-3 icon will be displayed. The AUX-3 function will not be used in the portable spa configuration. The AUX-3 function is on a 4 hour timer and will turn off automatically after 4 hours.

ICONS AND DISPLAY MESSAGES

Both the RF Remote and the maintenance panel have a custom designed LCD. Each includes 9 icons and a 2-1/2 digit display.

ICONS

- A. **READY** - Water temperature is at or above temperature set point, heater off
- B. **HEATING** - Water temperature is below temperature set point, heater on
- C. **JETS** - Jet pump is on; if two speed pump, Hi speed on
- D. **LIGHT** - Pool or spa light on
- E. **AUX-1** - AUX-1 on, normally connected to a blower motor
- F. **AUX-2** - AUX-2 on
- G. **AUX-3** - AUX-3 on
- H. **°F** - Water temperature displayed in degrees Fahrenheit
- I. **WAIT** - Valve turning or fireman's timeout - Icon flashes at one second intervals

DISPLAY MESSAGES

The display shows the following messages:

- "**SP**" - Spa mode
- "**PO**" - Pool mode
- "**NC**" - No Communication with master control unit
- "**- .**" - Data is being sent to master control unit
- "**OP**" - Temperature sensor failure - Open
- "**SH**" - Temperature sensor failure - Shorted
- "**OH**" - Warning, water temperature over 120°F
- "**IP**" - Insufficient Power
- "**FP**" - Freeze Point

Temperature: set point and actual water temp.

Temperature flashing on and off - Warning, water temperature high (109°-120°F)

MASTER CONTROL UNIT FEATURES

The Master Control Unit is made up of four basic blocks:

1. Processor
2. Relays & Relay Control Logic
3. Power Supply
4. Transceiver

1. PROCESSOR

The processor controls all of the master control unit functions except the time clock. The Processor is a microchip P1C16C73. The processor's tasks are

- A. Water Temperature
- B. Temperature Set Point
- C. Heater Operation
- D. Status Command
- E. Jets Command
- F. Light
- G. AUX-1
- H. AUX-2
- I. AUX-3
- J. Power on Conditioning

A. WATER TEMPERATURE

If the water temperature exceeds 109°F but is less than 120°F, a warning is sent to the remote unit and is indicated by the water temperature flashing on and off. If the water temperature exceeds 120°F, it will send a message to the remote unit which will be displayed as "OH" and shut down all functions.

B. TEMPERATURE SET POINTS

To set a desired temperature, simply press up or down arrows until the desired temperature appears on the display. In spa mode, the maximum temperature setting is 104°F. In pool mode, 90°F.

C. HEATER OPERATION

The Lennox operates the heater in both the spa and pool mode and tries to maintain the water temperature to the associated set points. To prevent excessive heater cycling, the Lennox will allow a $\pm 1^\circ$ F water temperature variance (hysteresis) about the set point temperature. In the spa mode, the water temperature will be continuously monitored and the heater will be cycle d to maintain the spa temperature set point. In the pool mode, the Lennox operates the heater to maintain the pool temperature set point, only during the filtration cycles set by the mechanical timeclock.

In either pool or spa mode, if the water temperature is lower than the corresponding temperature set point, it will turn on the heater relay logic and send back a status message to the remote control which will include data to turn on the "Heating" icon or if the water temperature is equal to or higher than the temperature set point, it will send a status message back which will include data to turn on the "Ready" icon. The heating and ready icons should never be on at the same time.

If the user change modes (pool/spa) while the heater is running, the processor will turn off heater. It will then send back a status message to the remote control clearing the heating icon. The pump will stay on for 2.5 minutes (fireman's switch), before allowing the valve to rotate. The "wait" icon will flash during this time.

If the water temperature goes below 35°F, the processor will automatically turn on the heater and filter pump until the temperature reaches 40°F to prevent damage in freezing weather.

D. STATUS COMMAND

When a "STATUS" command is received from the remote control the processor will send a status message back which will always contain information to turn on or off the status icons, as required; heat on or off and temperature set point followed by actual water temperature, for approximately two seconds each.

E. JETS COMMAND

When "JETS" command is received from the remote control unit the processor will turn on the jets command to the relay logic and return a status message to the remote control unit. Another jets command from the remote control unit will turn off the jets command to the relay logic. If in jets mode for 30 minutes and no jets command was received from the remote control, the processor will automatically turn off the jets command to the relay logic.

F. LIGHT

The "LIGHT" command will be handled the same as the "JETS" command except it will have a 4 hour time out.

G. AUX-1

The AUX-1 will be normally used to operate a blower motor. This command will be handled the same as the "JETS" command and has a 30 minute timeout.

H. AUX-2

The "AUX-2" command will be handled the same as the "LIGHT" command and has a 4 hour timeout.

I. AUX-3

The "AUX-3" command will be handled the same as the "LIGHT" command and has a 4 hour timeout.

J. POWER ON CONDITIONING

When power is applied to the processor, it will retrieve the last settings and return to the last operating condition prior to power off.

MASTER CONTROL UNIT FEATURES (Continued)

2. RELAYS AND RELAY CONTROL LOGIC

The "RELAY LOGIC" controls the built in relays.

A. LO PUMP (FILTER PUMP) RELAY K1

This relay is operated from two sources:

1. Turns on whenever the processor has turned on the heater because it has determined that heat is required and the "JETS" command from the processor is off.
2. Turns on from the remote time clock if the "JETS" command is not present.

This relay will open for 30 seconds when switching from pool to spa and from spa to pool. This is to take pressure off pool/spa valves while they are changing. This relay will remain closed for 2.5 minutes (fireman's switch) after the pump is turned off providing the heater was on. This will allow the heater to cool down before turning off the water flowing through it. Any time the "JETS" command is turned on, "LO PUMP" will turn off and will come back on when the "JETS" command is turned off, providing any of the three conditions are met.

B. HI PUMP (JETS) RELAY K2

"HI PUMP" relay will turn on any time it receives the "JETS" command from the processor. When the jets off command is received, the hi pump will turn off when the following conditions are met:

1. If heat is still required, the hi pump will go off and the lo pump will turn on.
2. If the heater is on and the mode is switched from pool to spa, or spa to pool, the hi pump will go off and lo pump will turn on for 2.5 minutes (fireman's switch) before shutting off. If the time clock is activated, lo pump will go off for 30 seconds and back on again. Hi pump will time out and shut down automatically in 30 seconds.

C. AUX-1 (BLOWER) RELAY K3

This relay can be turned on or off at any time by generating an "AUX-1" command. Aux-1 will time out and shut down automatically in 30 minutes.

D. LIGHT RELAY K6

This relay is turned on when the "LIGHT" command is present from the processor. The light will time out and turn off automatically in 4 hours.

E. OZONATOR OR OPTIONAL POOL SWEEP RELAY K7

This relay is energized if hi or lo pump is on.

F. HEATER RELAY K12

This is the external heater relay.

G. AUX-2 RELAY K4

This relay will be turned on when the "AUX-2" command is present. Aux-2 will time out and shut down automatically in 4 hours.

H. AUX-3 RELAY K5

This relay will be turned on when the "AUX-3" command is present.

I. POOL VALVE RELAY K9 AND K11

This relay turns on when the spa mode is selected. Pool valves operate on 24 VAC so both K11 and K9 contacts are set up to operate from an external 24 VAC transformer. These relays are used in pool/spa applications. The pumps are turned off for 30 seconds while the valve is turning.

3. POWER SUPPLY

The power supply is powered by a 40 VA 25.2 volt CT Class 2 transformer. It provides 24, 12 and 5 VDC to power the logic board. A separate transformer is used to power the external spa/pool valves for the Lennovator. The Lennovator power supply and time clock are configured for 240 VAC input only.

4. TRANSCEIVER

The transceivers are mounted on a separate printed circuit board. It is soldered onto the RF remote control unit and plugged into the master control printed circuit board. It operates in the 900 MHZ band with a range of 150 feet in ideal conditions.

Note: The Hand-Held Remote may display "NC" (no communication) caused by any line of site obstructions between the receiver and the main control. Due to any inherent conditions, a Remote Antenna Kit (sold separately) may be required to optimize the range of the transceiver.

Contact our Technical Service Department for more information. Refer to item #933150-000 when purchasing your Remote Antenna Kit.

INSTALLATION

INSTALLATION

Install equipment and Control Module where protected from direct exposure to the elements.

The Control Module is contained in a U.L. listed rainproof outdoor enclosure.

PANEL LAYOUT

The NEC (National Electrical Code) requires the following when you connect motor or accessory (Article 430 NEC):

1. Short circuit and ground fault-protection
2. Thermal overload.
3. Service disconnect within sight of equipment or current limiting protection.
4. Bond equipment to earth ground.

To meet these requirements, install a sub-panel at the equipment site with separate breakers for each load. Make sure the motor(s) on the equipment have built-in thermal protection. Use the grounding bar. Bond all equipment to the earth ground.

GROUNDING

Connect the grounding terminal in the Control Module to the grounding terminal on your electric service or supply panel. Use a continuous green insulated copper wire, equivalent in size to high voltage wires, no smaller than No. 12 AWG.

JUMPER OPTIONS J6, J7, J8, J10 (See Figures 6 and 6A)

J6 - if the Lennoxator is operated without the remote maintenance panel control, a jumper must be installed between pin 3 and 4.

J7 jumper is placed on the PC card if the heater is to be inhibited (turned off) when high pump or blower is in operation. This will be used for low power budget systems.

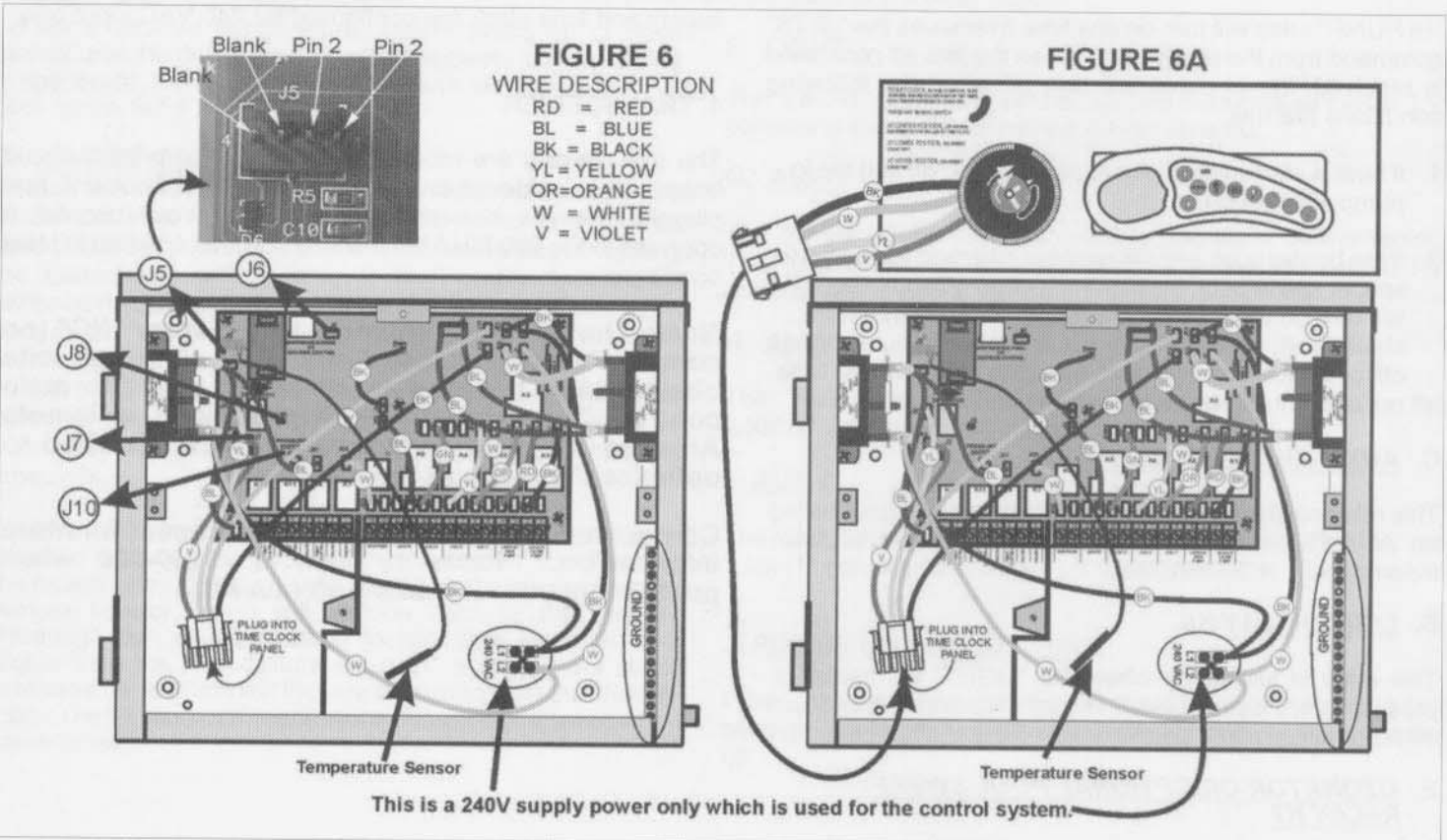
J8 jumper is placed on the PC card if a two speed (single motor) pump motor is installed. If two separate motors are used; (lo pump, hi pump) remove the jumper.

J10 is for an external water pressure switch. In Lennoxator configuration, the water pressure switch is part of the heater assembly. For Lennoxator configurations, place the jumper J10 on the PC card.

TEMPERATURE SENSOR

The temperature sensor senses system water temperature and activates the heater as necessary to maintain set point temperatures. If extended, the total length of the #22AWG sensor lead should be less than 30 feet. The temperature sensor plugs into J5, pins 1 and 2 on the master Lennoxator card (See Figures 6 and 6A).

Figure 7 (page 9) is a representative temperature sensor installation into a pool/spa system.



Temperature Sensor Installation Thermistor Assembly, 20' Lennovator

- A. The sensors mount directly onto rigid 1.5" or 2" PVC or ABS pipe by means of a hose clamp. Select a spot on the suction side of the pump within cord length of the control.
- B. Drill a 3/8" hole in the side of the pipe.
- C. Place the rubber washer over the heat sensing probe and insert the probe into the hole.
- D. Ensure the cord is in the slot of the WTS housing and install the clamp over the center of the top of the sensor to give it even pressure. Do not pinch the cord between pipe and clamp (see Figure 7).
- E. Tighten the clamp with a flat head screwdriver.

NOTE: To remove the clamp, slide the jaws sideways and apart from each other.

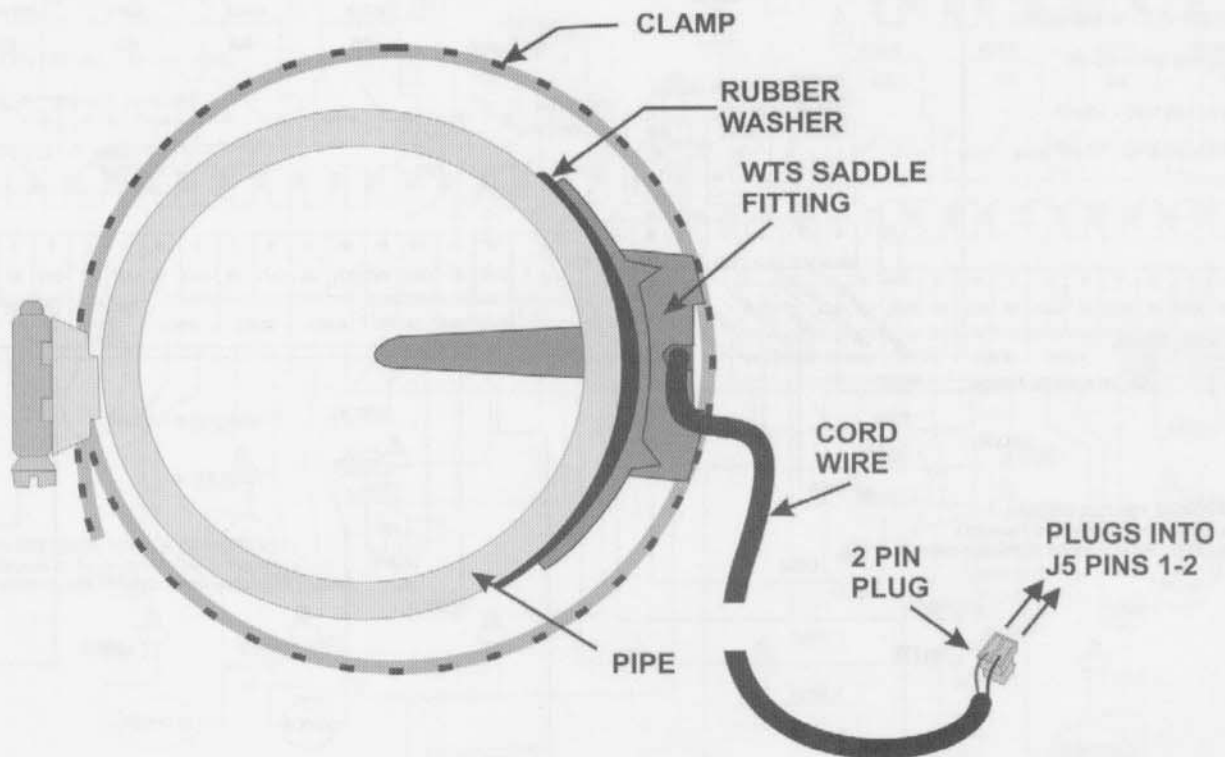
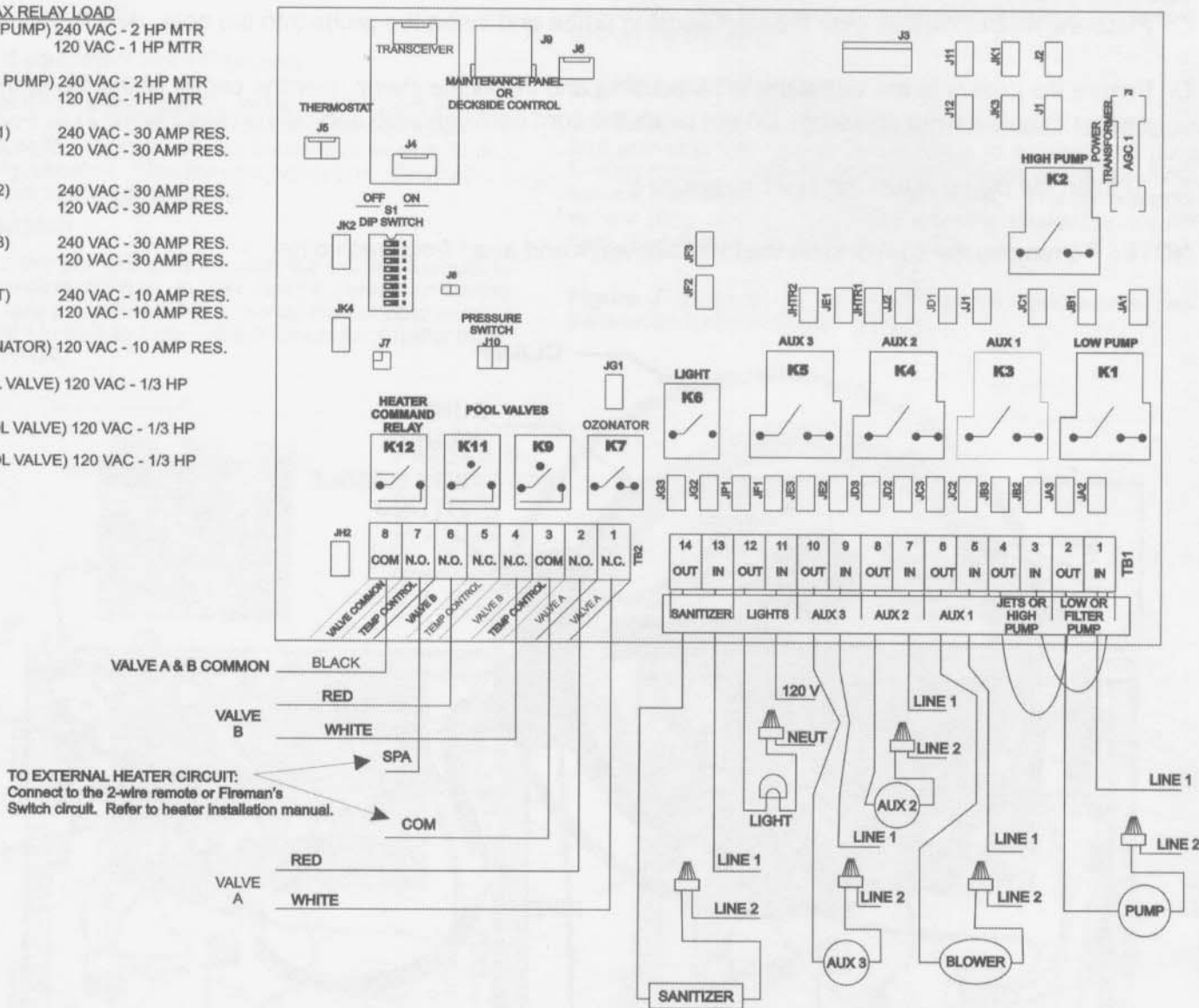


FIGURE 7

TYPICAL WIRING WITH ONE PUMP FOR FILTRATION AND JETS

FIGURE A

- MAX RELAY LOAD**
- K1 (LOW PUMP) 240 VAC - 2 HP MTR
120 VAC - 1 HP MTR
 - K2 (HIGH PUMP) 240 VAC - 2 HP MTR
120 VAC - 1HP MTR
 - K3 (AUX 1) 240 VAC - 30 AMP RES.
120 VAC - 30 AMP RES.
 - K4 (AUX 2) 240 VAC - 30 AMP RES.
120 VAC - 30 AMP RES.
 - K5 (AUX 3) 240 VAC - 30 AMP RES.
120 VAC - 30 AMP RES.
 - K6 (LIGHT) 240 VAC - 10 AMP RES.
120 VAC - 10 AMP RES.
 - K7 (OZONATOR) 120 VAC - 10 AMP RES.
 - K9 (POOL VALVE) 120 VAC - 1/3 HP
 - K11 (POOL VALVE) 120 VAC - 1/3 HP
 - K12 (POOL VALVE) 120 VAC - 1/3 HP

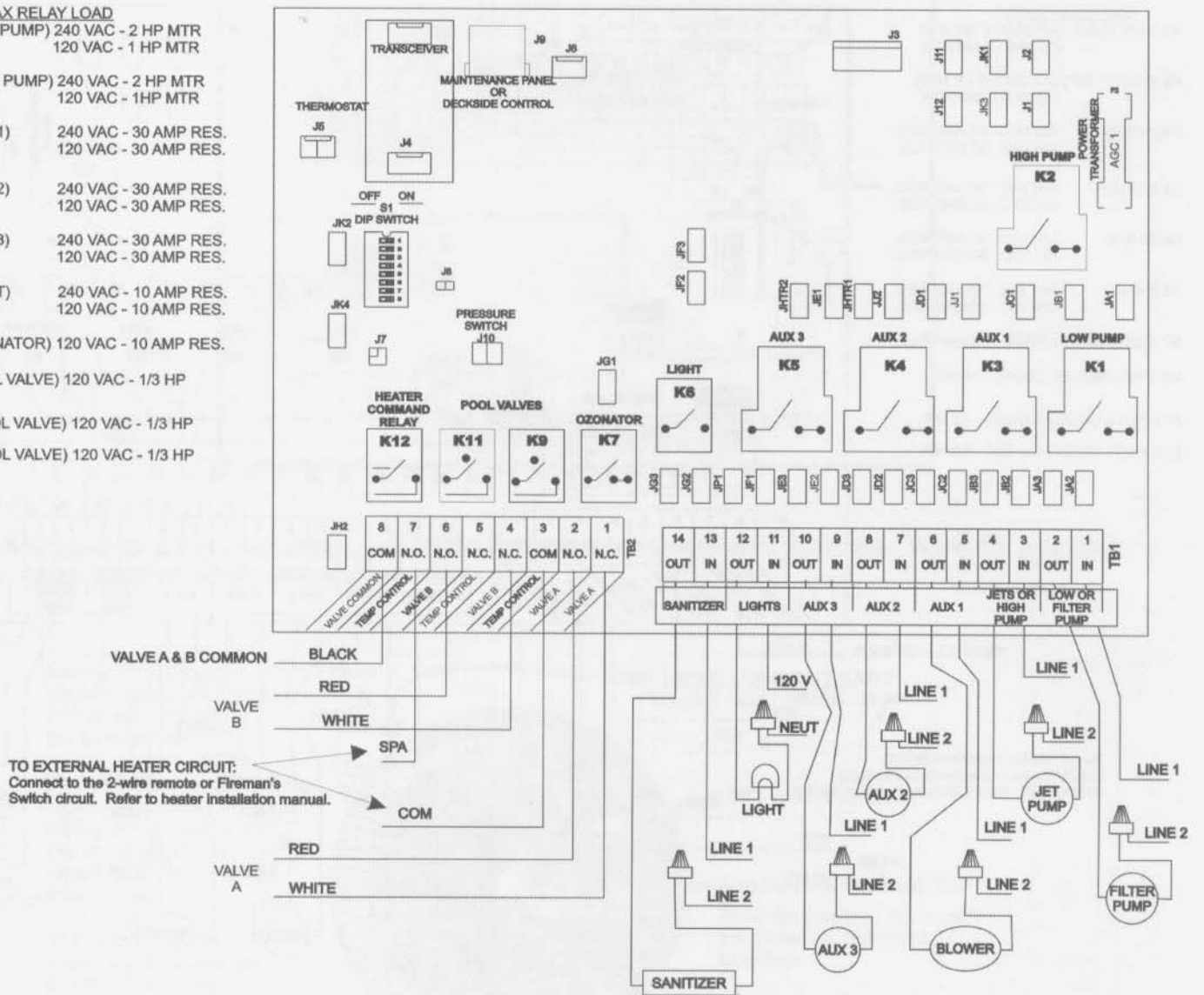


TYPICAL WIRING WITH SEPARATE FILTER PUMP AND JET PUMP MOTOR

FIGURE B

MAX RELAY LOAD

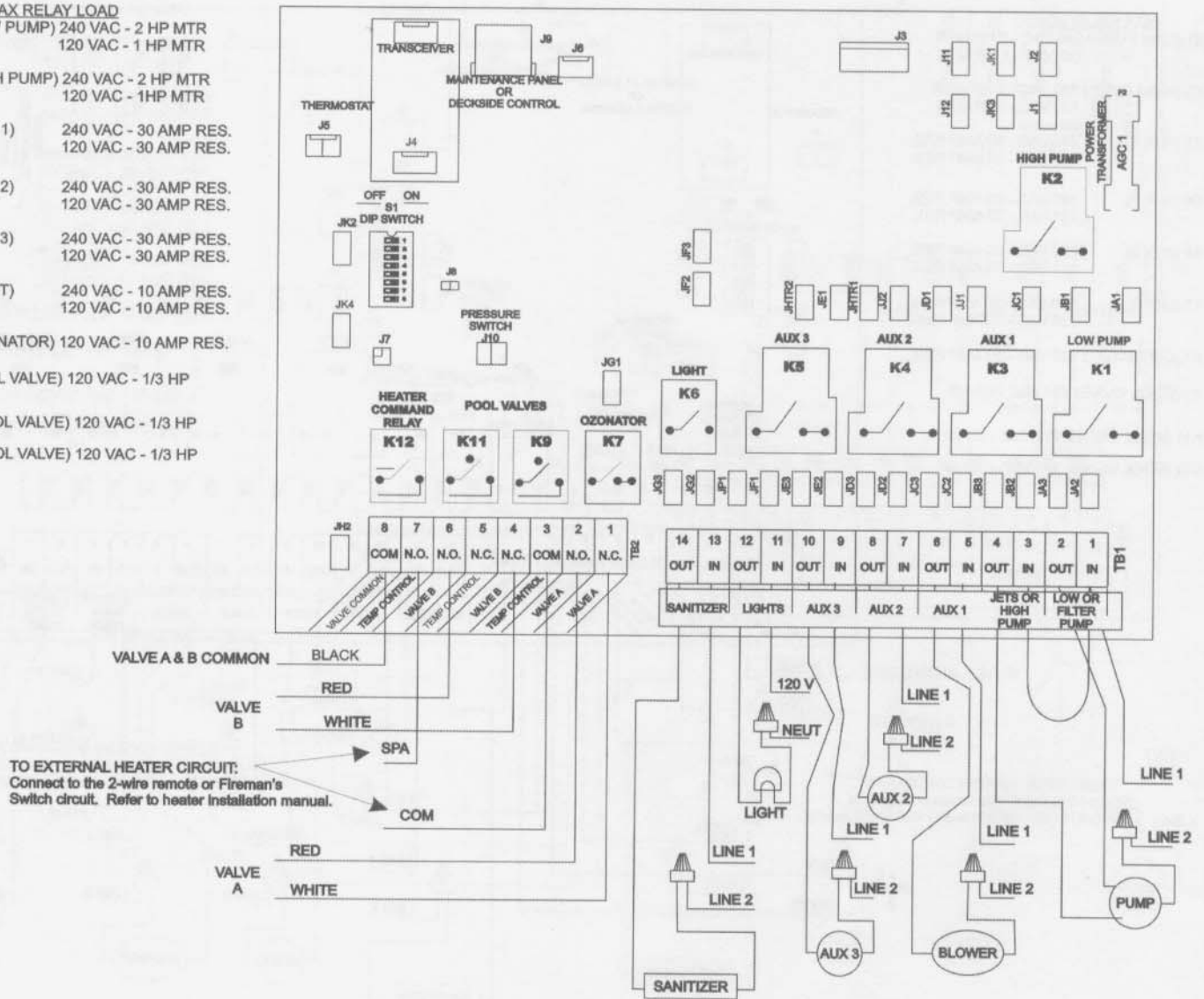
- K1 (LOW PUMP) 240 VAC - 2 HP MTR
120 VAC - 1 HP MTR
- K2 (HIGH PUMP) 240 VAC - 2 HP MTR
120 VAC - 1HP MTR
- K3 (AUX 1) 240 VAC - 30 AMP RES.
120 VAC - 30 AMP RES.
- K4 (AUX 2) 240 VAC - 30 AMP RES.
120 VAC - 30 AMP RES.
- K5 (AUX 3) 240 VAC - 30 AMP RES.
120 VAC - 30 AMP RES.
- K6 (LIGHT) 240 VAC - 10 AMP RES.
120 VAC - 10 AMP RES.
- K7 (OZONATOR) 120 VAC - 10 AMP RES.
- K9 (POOL VALVE) 120 VAC - 1/3 HP
- K11 (POOL VALVE) 120 VAC - 1/3 HP
- K12 (POOL VALVE) 120 VAC - 1/3 HP



TYPICAL WIRING WITH 2 SPEED PUMP MOTOR

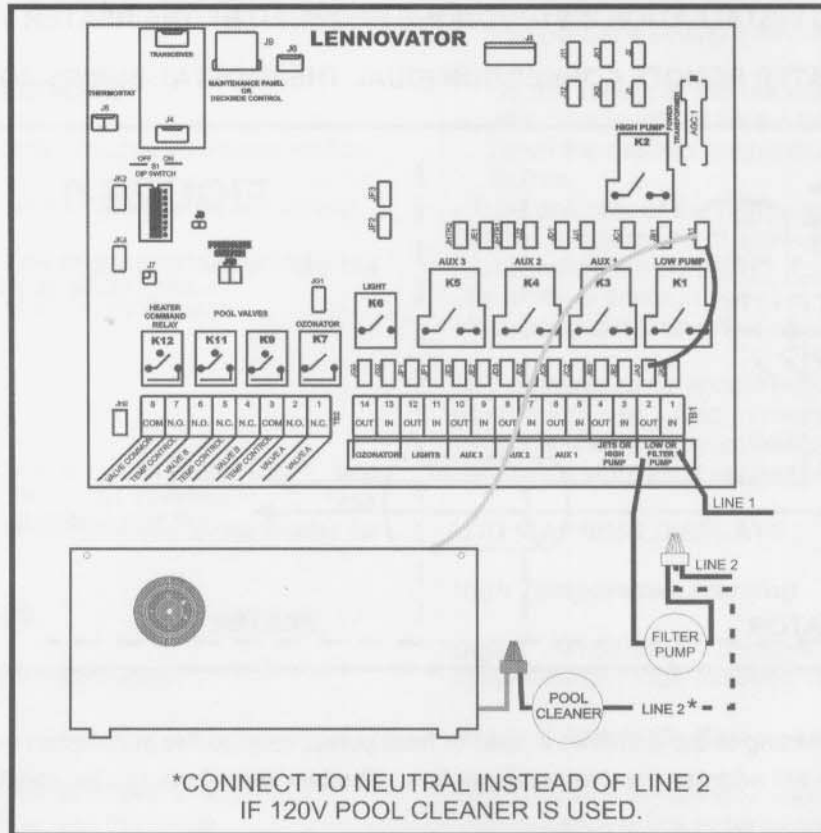
FIGURE C

- MAX RELAY LOAD**
- K1 (LOW PUMP) 240 VAC - 2 HP MTR
120 VAC - 1 HP MTR
 - K2 (HIGH PUMP) 240 VAC - 2 HP MTR
120 VAC - 1HP MTR
 - K3 (AUX 1) 240 VAC - 30 AMP RES.
120 VAC - 30 AMP RES.
 - K4 (AUX 2) 240 VAC - 30 AMP RES.
120 VAC - 30 AMP RES.
 - K5 (AUX 3) 240 VAC - 30 AMP RES.
120 VAC - 30 AMP RES.
 - K6 (LIGHT) 240 VAC - 10 AMP RES.
120 VAC - 10 AMP RES.
 - K7 (OZONATOR) 120 VAC - 10 AMP RES.
 - K9 (POOL VALVE) 120 VAC - 1/3 HP
 - K11 (POOL VALVE) 120 VAC - 1/3 HP
 - K12 (POOL VALVE) 120 VAC - 1/3 HP



FOR MODELS WITH DUAL TIME CLOCKS

WIRING FOR A 240V POOL CLEANER



TIME CLOCK OPERATION

This kit includes a 24 hour time clock, which controls the pool cleaner or other added equipment. When the time clock reaches an ON time, the added equipment will turn on.

Setting The Timeclock - Rotate outer clock ring clockwise and set correct time of day opposite Set Point arrow.

Setting ON times - Push Timer lugs outward away from the center of the clock to set ON times. Each Lug represents a 15 minute time period.

The example at the right shows the timeclock set to 1:20 PM and the equipment scheduled to turn ON at 7:00 PM and OFF at 1:00 AM.

To cancel settings, push lugs inward toward the center of the clock.

PUSH TIMER LUGS OUTWARD TO SET "ON" TIMES

SET POINT ARROW

THREE-WAY MANUAL SWITCH

At center position, (as shown) equipment is controlled by timeclock

At lower position, equipment stays OFF.

At upper position, equipment stays ON.

TIMER LUGS

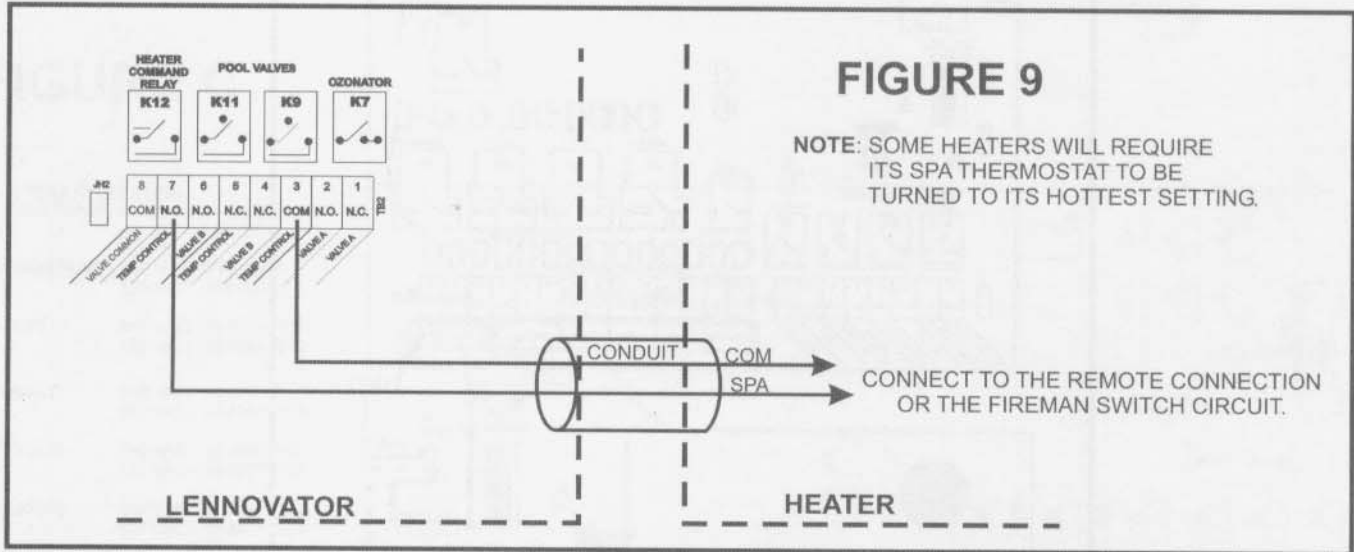
INSTALLATION (Continued)

EXTERNAL GAS - FIRED HEATER INTERCONNECT

An example of a typical installation of the Lennovator heat control wired to external gas heaters is shown in Figure 9. Refer to interconnection Figures A (pg 10), B (pg 11) and C (pg 12).

IN ALL CASES REFER TO INSTALLATION INSTRUCTIONS PROVIDED BY THE HEATER MANUFACTURER.

TYPICAL GAS-FIRED HEATER REMOTE CONNECTION (DUAL THERMOSTAT-SERIES CONNECTION)



For specific details on connecting to the gas-fired heater or heat pump, refer to the installation instructions provided by heater manufacturer, which will address the 2-wire connection. The two wires from heater should be wired to Lennovator terminals 3 & 7.

CHECK OUT AND START UP

NOTES AND GENERAL ELECTRICAL

The Lennovator Control Module is rain proof and does not have to be protected by a weather-tight enclosure.

Install the equipment to permit safe access for servicing and routine maintenance of the Lennovator Control Module.

All electrical connections to the Lennovator Control Module must be accomplished by a qualified electrician in accordance with the National Electrical Code or the Canadian Electric Code and in accordance with any local electrical codes in effect at the time of installation.

All electrical connections must be made in accordance with the wiring information contained in this manual, or on the back of the field wiring access panel of the Lennovator Control Module.

WARNING: Improper electrical connections or conductor sizing may cause the Lennovator Control Module to operate improperly, create the potential for electrical hazard and may void the warranty.

The electrical supply for permanently connected Lennovator Control Modules (hardwired for 120V and 240V operation) must include a suitably rated switch or circuit breaker to open all ungrounded supply conductors to comply with Section 440-52 of the National Electrical Code, ANSI/NFPA70. The disconnecting means must be within sight and readily accessible to the user of the equipment. The electrical supply for permanently connected Lennovator Control Modules must also include a suitably rated Ground Fault Circuit Interrupter (GFCI) to comply with Article 680-42 of the National Electrical Code, ANSI/NFPA70.

CHECK OUT AND START UP (Continued)

These installation instructions are provided as guidelines for use and interpretation by knowledgeable installers. Wire size, number of circuits, size of circuit breakers, etc. must be selected for the particular system being installed. Refer to Appliance Data Label to determine specific electrical requirements.

CHECK ALL WIRE CONNECTIONS

Check all high voltage terminals for tight/secure connection.

Check all low voltage terminals for tight/secure connection.

Check the grounding wire for proper connection from the Lennoxator to sub-panel and main panel

CHECK HEATER

Check heater for high limit protection.

Check heater for pressure or flow switch protection.

Check the connection of control terminals to the heater for proper connection.

CHECK CONTROL PANELS

Make sure the remote panel is accessible.

INITIAL START UP

1. Open all valves in the water inlet and/or water outlet to allow water to flow into the pump.
2. Fill the pool and spa with water following the manufacturers instructions.
3. Check all plumbing connections for leaks.

ONCE THE POOL AND SPA ARE FILLED WITH WATER (BETWEEN 40°F AND 104°F) COMMENCE START UP PROCEDURES

You must successfully complete all of the steps in this procedure. If you encounter a problem, check and repair your installation immediately and begin the procedure again.

4. Turn power OFF.
5. Turn timer(s) OFF.
6. Verify water temperature is between 40 and 104°F
7. Turn power ON.

WATER TEMPERATURE SETTING

The water temperatures are controlled by the maintenance panel or the wireless remote control. To set the water temperatures, refer to the Temperature setting instructions.

Do not expect to feel hot water coming from the jets. The length of time it takes for the spa water to reach the desired temperature depends on several factors:

- Type and size of the heater system
- Water temperature at start-up
- Ambient air temperature
- Quantity of water in spa
- Insulating qualities of the spa cover and enclosure

An insulating cover should be kept on the spa at all times when not in use. Also, remember that prolonged use of the air system and hydrotherapy jets when using the spa will have a significant cooling effect on the spa water.

LCD WARNING DISPLAYS

High Temperature Warning

Digital temperature displays will flash when water temperatures range between 109°F and 120°F.

Hi Limit Reached - Equipment Shut Off

System will automatically shut-off the heater in the spa mode whenever the water temperature reaches 120°F. In the event that the water reaches this preset hi limit, the warning message "OH" (Over Heat) will replace the digital temperature display. As the water cools to below 120°F, the "OH" warning will be replaced by an alternating display that shows the actual spa water temperature and "HL"(Heater Lockout). Flashing temperature and "HL" display continues until the hi limit is manually reset. Manual reset is accomplished by depressing the temperature up and down buttons simultaneously.

Inoperative Temperature Control

In the event that the temperature control system fails, one of two warning messages will appear on the LCD display:

"OP" - Temperature sensor has failed in the open position.

"SH" - Temperature sensor has failed due to electrical short circuit.

SPA SHOULD NOT BE USED UNTIL THE SYSTEM HAS BEEN INSPECTED AND REPAIRED

TROUBLESHOOTING

TROUBLESHOOTING

Freeze Protection If the temperature sensor detects a water temperature of approximately 35°F, an automatic freeze protection circuit will activate the circulation pump and heater, protecting the system from freeze damage.

Power Outage Reset The system will always turn OFF following a power outage. Example: if the power fails when the spa light and pump are ON, they will reset to OFF. When the power is restored, they will remain OFF unless the freeze protection control, continuous pump, thermostat control or filtration timer call for pump circulation. After a power outage the filtration timer may need to be reset.

Spa Filter Maintenance Before performing filter maintenance, always make certain the circuit breaker for the circulation pump is OFF.

What To Do Before You Call Your Dealer Or Service Company:

PROBLEM:

Your spa or a specific function will not turn OFF

Your spa or a specific function will not turn ON

1. Check the position of the filtration timer. Make certain that the time clock is not calling for pump operation.
2. Check the circuit breakers feeding the Control Module. Turn these breakers OFF, then ON again to reset.
3. Check the main panel circuit breakers. Are any of these tripped? If so, reset them.
4. If your home uses a fuse box instead of circuit breakers, check for blown fuses and replace as necessary. Make certain all fuses are screwed in tightly.

If your breakers/fuses continue to blow, call a service company.

5. Check the system with the hardwired control unit.
6. Check the batteries in the remote unit.

IF THE PROBLEM PERSISTS AFTER FOLLOWING THE PRECEDING STEPS, CALL YOUR LOCAL SERVICE COMPANY

FCC RULES PART 15

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

Reorient or relocate the receiving antenna, increase the separation between the equipment and receiver, connect the equipment into an outlet on a circuit different from that to which the receiver is connected, and/or consult the dealer or an experienced radio/TV technician for help.

Any changes made by the user not approved by Allied Innovations, LLC can void the user's authority to operate the equipment.

ALLIED INNOVATIONS LLC



A LEN GORDON
PRODUCT

FCC ID: QLSLNVTRBAS102

This device complies with Part 15 of the FCC Rules. Operation of this device is subject to the following two conditions:

- (1) This device may not cause harmful interference
- (2) This device must accept any interference received, including interference that may cause undesired operation.

621100-3

AI 09/02

LIMITED WARRANTY

Allied Innovations, LLC warrants its products to be free from defects in workmanship and material under normal use and conditions for a period of **one (1) year from the date of original manufacture**. Replacement parts/repairs are warranted to be free from defects in workmanship and materials under normal use and conditions for a period of **90 days from the date of purchase**. Should repair be required by reason of any defect in workmanship or material during the warranty period, Allied Innovations, LLC will repair, or at their discretion, replace this product without charge, subject to verification of the defect, upon delivery of the product to:

**ALLIED INNOVATIONS, LLC
Attn: Technical Service
7215 Bermuda Road
Las Vegas, NV 89119**

If the repair is required after the expiration date of the warranty period, Allied Innovations, LLC will repair this product and bill for any necessary labor, replacement parts, shipping and handling.

This warranty is void if the unit: 1) is not installed in accordance with the instructions; 2) is connected to improper voltage; 3) is subjected to improper water chemistry; 4) is mechanically or electrically altered in any way; 5) is subjected to water or immersion (excluding electric heating elements); 6) relay or switch contacts show evidence of short circuiting; 7) has been visibly damaged by accident, misuse or which has been damaged by wind, rain, lightning, freezing, or other cause or 8) serial number or manufacture date has been altered, effaced or removed. Pump seals, pump motors, o-rings, gaskets, and air blower brushes are covered only during the first year of the warranty period.

All products returned as defective are subject to evaluation labor charges. There is a charge for replacement parts and labor if defective unit is returned for any of the reasons listed above. Allied Innovations, LLC shall not be liable for any inconvenience, loss of time, or incidental expenses incurred. Allied Innovations, LLC shall not be liable for any labor charges associated with the removal or re-installation of any products returned as defective.

This warranty extends only to normal residential (non-commercial) usage by the original retail purchaser within the continental United States, including Alaska and Hawaii. This is the only warranty expressed or implied by Allied Innovations, LLC. Warranties implied under state law, including any implied warranty of merchantability or fitness for a particular purpose, shall be limited to one year from the date of manufacture.

TO OBTAIN WARRANTY SERVICE

The original retail purchaser should first contact the dealer where the product was purchased. Allied Innovations, LLC will not accept products shipped freight collect. Proof of Purchase that shows the model, catalog and serial number(s) must be packaged with returned products

TO EXPEDITE THE RETURN:

- 1) Mark "REPAIR" on the outside of box and return to Allied Innovations, LLC prepaid.
- 2) Pack the unit in a well padded, heavy corrugated box.
- 3) Include a short description of the problem, as well as company name, contact name, telephone number and street address where the unit is to be returned.

Some states do not allow the exclusion or limitation of incidental or consequential damages, therefore the above limitation may not apply to you.

TECHNICAL INQUIRIES

For information regarding control operation, copies of control instruction sheets, wiring diagrams, or installation assistance, contact our Technical Service Department from 7 am to 5 pm Monday through Friday at (800) 237-9937 or (702) 361-0600, by fax (702) 361-0613 or e-mail technical@lengordon.com. Visit us at our website at www.AlliedInnovations.com.