OWNERS INSTALLATION & OPERATION MANUAL

LENNOVATOR POOL/SPA CONTROL SYSTEM

LEN GORDON Genuine

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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 104EF (40EC) 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 98.6EF (37EC). 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 ±5EF (±3EC).

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 104EF (40EC). Water temperatures between 100EF (38EC) and 104EF (40EC) 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 100EF (38EC).

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

TABLE OF CONTENTS

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, a set point may be set via the RF remote control system. The dry contacts operate in accordance with the set point; i.e. if the set point is higher than the actual water temperature the relay contacts close and the external heater heats the water. If the set point is lower than the water temperature, the contacts open and the water cools.

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

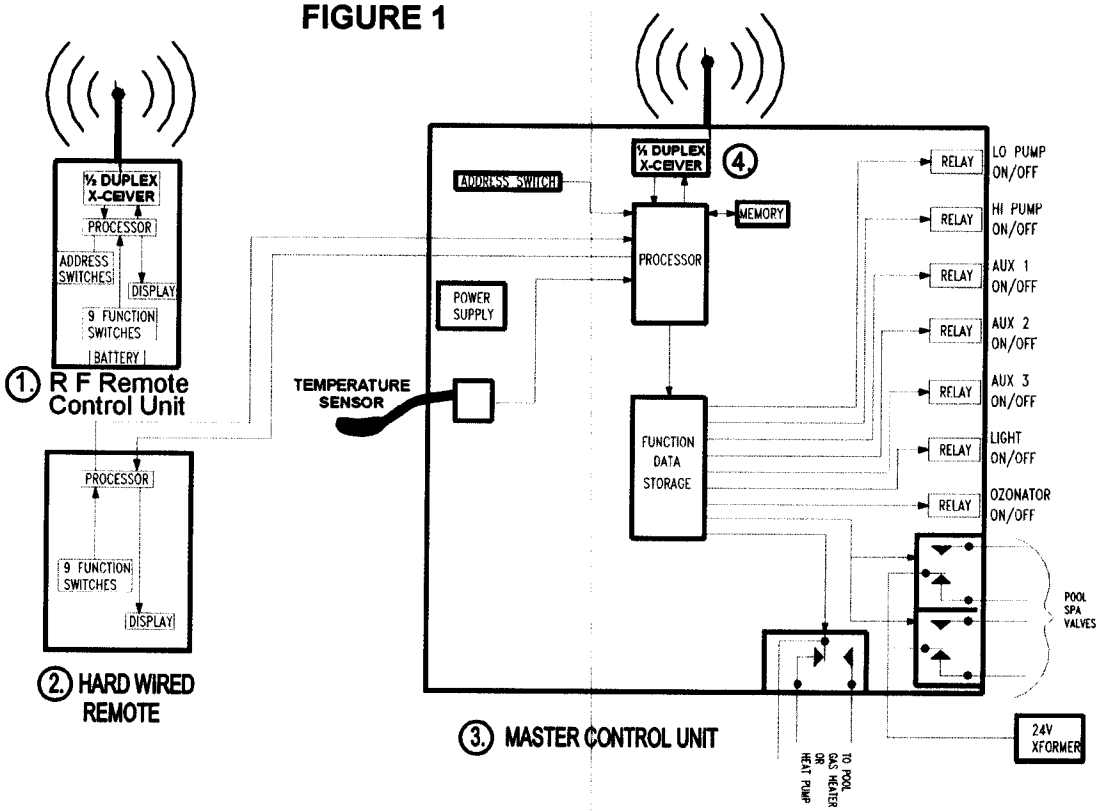
The Lennovator senses water temperature in the spa & pool mode, however, the associated *set point and contact circuits do not function in the pool mode*. The temperature control of the pool is external to the Lennovator and is not a part of its control system.

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



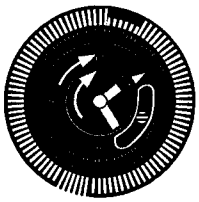
TO SET CLOCK, ROTATE OUTER DIAL SLIDE TRIPPERS TOWARDS OUTER RIM FOR "ON" TIMES. EACH TRIPPER REPRESENTS 15 MINUTES.

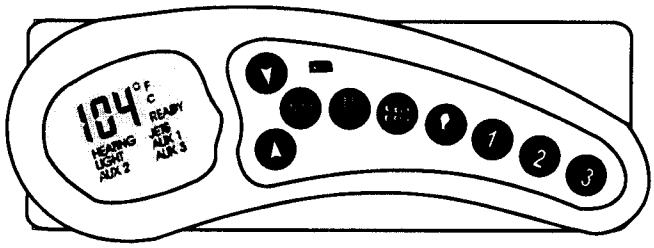
THREE WAY MANUAL SWITCH

AT CENTER POSITION, (AS SHOWN) FILTER PUMP IS CONTROLLED BY TIME CLOCK.

AT LOWER POSITION, FILTER PUMP STAYS "OFF".

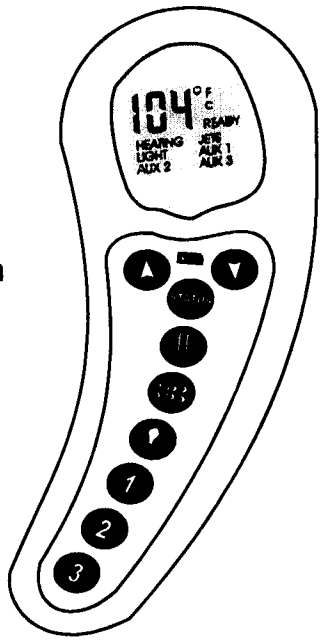
AT UPPER POSITION, FILTER PUMP STAYS "ON".





Lennovator Combo Control Module Standard-Single Timer System includes a 24 hour filtration timer and all circuitry and components required to operate the pool/spa system equipment.

Handheld Radio Frequency Remote provides control of pool or spa operating mode, spa water temperature and pool and/or spa light. Controls spa/pool up to 300 feet from Lennovator.



REMOTE OPERATED CONTROL FUNCTIONS

1. RF REMOTE CONTROL UNIT (Figure 2)

This unit is a hand held battery operated device which contains a key pad, LCD display with a 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.

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

2. HARD WIRED REMOTE CONTROL UNIT (Figure 2A, page 4)

The hard wired remote unit will be referred to as the maintenance panel. The operation of the hard wired unit 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 the status switch. The light remains illuminated for 4 hours. If after 4 hours there has been no activity, the back light will turn off automatically.

3. MASTER CONTROL UNIT

This unit operates portable spa or pool/spa functions upon command from the remote control unit. It interprets the data from the remote control unit via a transceiver, and turns the spa/pool functions on and off. The master control unit also has an external time clock to operate the filter pump automatically. It also sends temperature and status data back to the remote control unit upon request from the remote control unit.

4.TRANSCEIVER

There are two identical transceivers. One of these will be mounted piggy back on the printed circuit board in the 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.

5. LCD DISPLAY

The LCD Display is custom designed. It has a 2 1/2 digit screen segment display and 9 Icons.

DISPLAY MESSAGES

The display shows the following messages:
"SP" - Spa mode, heat function active
"PO" - Pool mode, heat function inactive
The temperature set point; Actual water temperature
"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 120ºF
"IP" - Insufficient Power
"FP" - Freeze Point
Temperature flashing on and off - Warning, water temperature high (109º-120ºF)

ICONS

A. **READY** - Heat function active, water temperature is at temperature set point, heater off
B. **HEATING** - Heat function active, 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. ºF - Water temperature displayed in degrees Fahrenheit
I. **WAIT** - Master control unit busy, will not accept new command - Icon flashes at one second intervals

6. KEYPAD (See Figure 2)

The keypad has nine switches which are used to perform the following functions:

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 112ºF), it can be reset by depressing the up and down switches together (providing the water temperature has cooled down below 108ºF).

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.

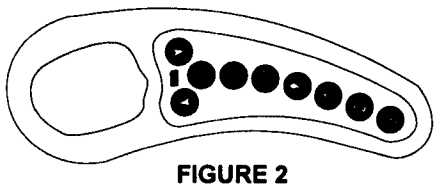


FIGURE 2

REMOTE OPERATED CONTROL FUNCTIONS

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 command is initiated which will clear the safety hi-limit emergency shut down providing the water temperature is below 108ºF.

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.

HEAT SWITCH 

When configured for inground pool/spa the pool/spa valves will rotate to spa function when in heat mode and remain there until heat mode is turned off.

The heat switch sends a heat command to the master control unit which toggles the heat mode on or off. When heat mode is on, 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 operating.

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 

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 

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 

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.

7. ADDRESS SWITCH

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.

POWER

The Handheld Radio Frequency Remote is powered by an alkaline 9 volt battery. The life of the battery will vary depending upon usage. The eighth position of the switch must be off for the battery saver time out mode (sleep) to work.

SLEEP CIRCUIT

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

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. Heat Command
D. Status Command
E. Jets Command
F. Light
G. Power on Conditioning
H. AUX-1
I. AUX-2
J. AUX-3

A. *WATER TEMPERATURE*

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

B. *TEMPERATURE SET POINT*

To set a desired temperature, simply press up or down arrows until the desired temperature appears on the display. Maximum 104EF.

C. *HEAT COMMAND*

When a "HEAT" command is received from the remote control unit, the processor will do the following:

1. Turn the filter pump on,
2. Activate the pool/spa valves to activate the spa,
3. Turn on the "HEAT ENABLE" command to the relay logic,
4. Compare water temperature with temperature set point,
5. If the water temperature is lower than the temperature set point, it will turn on the heat command to the 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.

6. When in the heat mode, the processor will periodically monitor the water temperature against the temperature set point and turn the heating command on or off to the relay logic (with a 1E Hysteresis) as required to maintain correct water temperature.

7. When a heat command is received while in heat mode, the processor will go out of heat mode turning off heat enable command and heating command (if on) to the relay logic. It will then send back a status message to the remote control clearing the heating or ready icon. The pump will stay on for 2.5 minutes (fireman's switch).

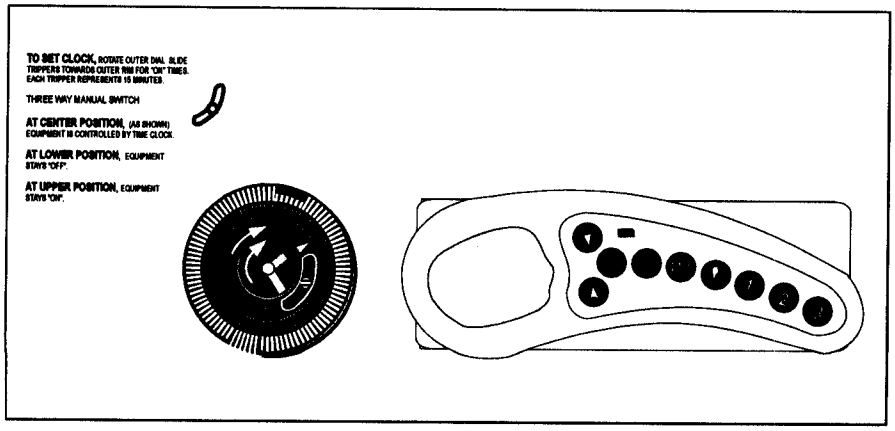
If the water temperature goes below 35EF, the processor will automatically go into heat mode until the temperature reaches 40EF to prevent damage in freezing weather. (Filter pump and heater only)

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.

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.

2. RELAYS AND RELAY CONTROL LOGIC

The "RELAY LOGIC" controls the built in relays.

A. *LO PUMP (FILTER PUMP) RELAY K-1*

This relay is operated from two sources:

1. Turns on when the "HEAT" command from the processor is present 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 K-2*

"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 still in heat mode, the hi pump will go off and lo pump will turn on.

2. If the heater is on and the heat mode is turned off, 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 K-3*

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 K-6*

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 K-7*

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

F. *HEATER RELAY K-12*

This is the external heat command relay.

G. *AUX-2 RELAY K-4*

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 K-5*

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

I. *POOL VALVE RELAY K-9 AND K-11*

This relay turns on when the "HEAT ENABLE" command is present. Pool valves operate on 24 VAC so both K-11 and K-9 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.

MASTER CONTROL UNIT FEATURES

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 300 feet nominal.

SUMMARY OF TIME DEVICE FUNCTIONS

Device/RelayFunction/Time

Spa/Pool Valves K-9 AND K-11
The filter pump and jet pump (if on) will turn off for 30 seconds while spa/pool valves are opening.

Lo Pump K-1
Activated when heater is on. If heater is on and pool mode is selected, lo pump will stay on 2.5 minutes before spa/pool valve is activated (fireman's switch).

Jets (Hi Pump) K-2
Jets function is on a 30 minute timer. If heater is on and pool mode is selected, hi pump will stay on 2.5 minutes before spa/pool valve is activated (fireman's switch).

Light K-6
Light function is on a 4 hour timer.

AUX-1 K-3 (usually blower)
AUX-1 function is on a 30 minute timer.

AUX-2 K-4
AUX-2 function is on a 4 hour timer.

AUX-3 K-5
AUX-3 function is on a 4 hour timer.

RF Remote Sleep
Sleep circuit is activated if there is no keypad function within 40 seconds. The eighth position of the switch must be off for the battery saver time out mode (sleep) to work.

Back Light (hard wire remote)
Back light function is on a 4 hour timer.

Wait Icon
Flashes at 1 second intervals.

Remote Mechanical Filtration Timer
This mechanical timer will override any "off" function of the low pump if a filtration cycle is programmed "on".

FILTRATION TIMER OPERATION

FILTRATION TIMER OPERATION

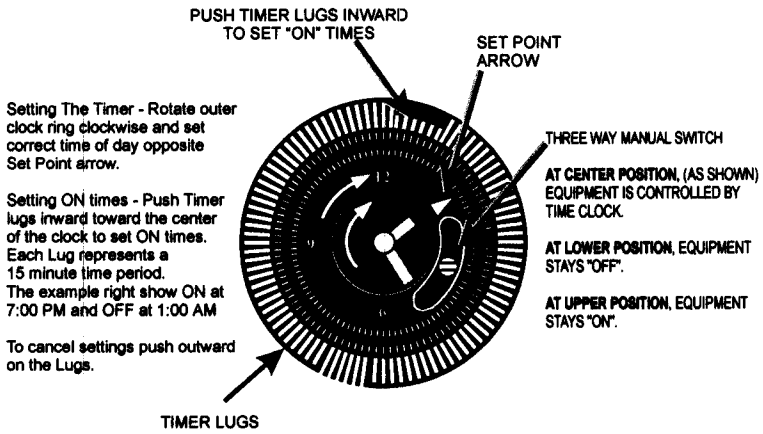
Lennovator single timer systems include a 24 hour filtration timeclock, which controls the pool/spa pump.

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 Timer" instructions 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.



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 3 and 3A)

J6 - if the Lennovator 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 Lennovator configuration, the water pressure switch is part of the heater assembly. For Lennovator 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 temperature. If extended, the sensor lead should be less than 30 feet, #22AWG. The temperature sensor plugs into J5, pins 1 and 2 on the master Lennovator card **(See Figures 3 and 3A).**

Figure 4 (page 9) is a representative temperature sensor installation into a pool/spa system.

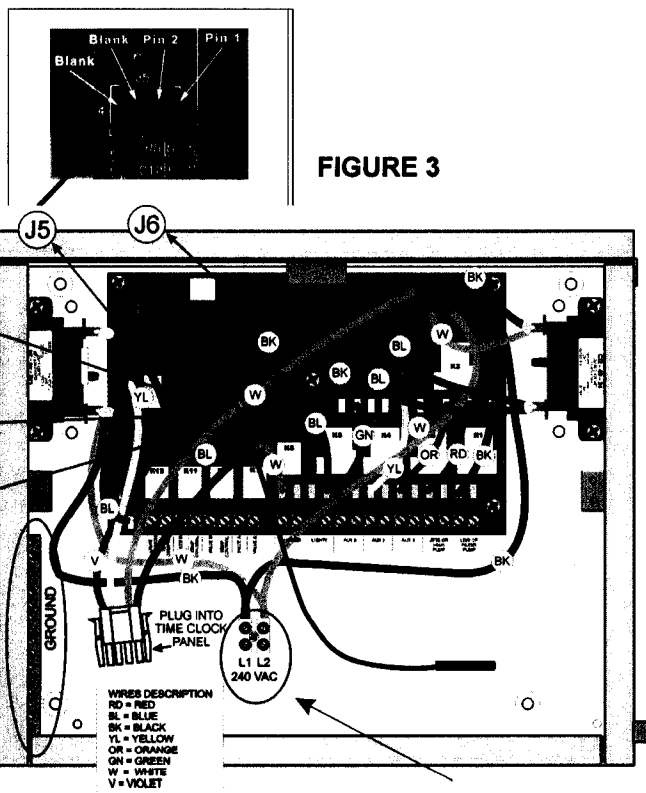
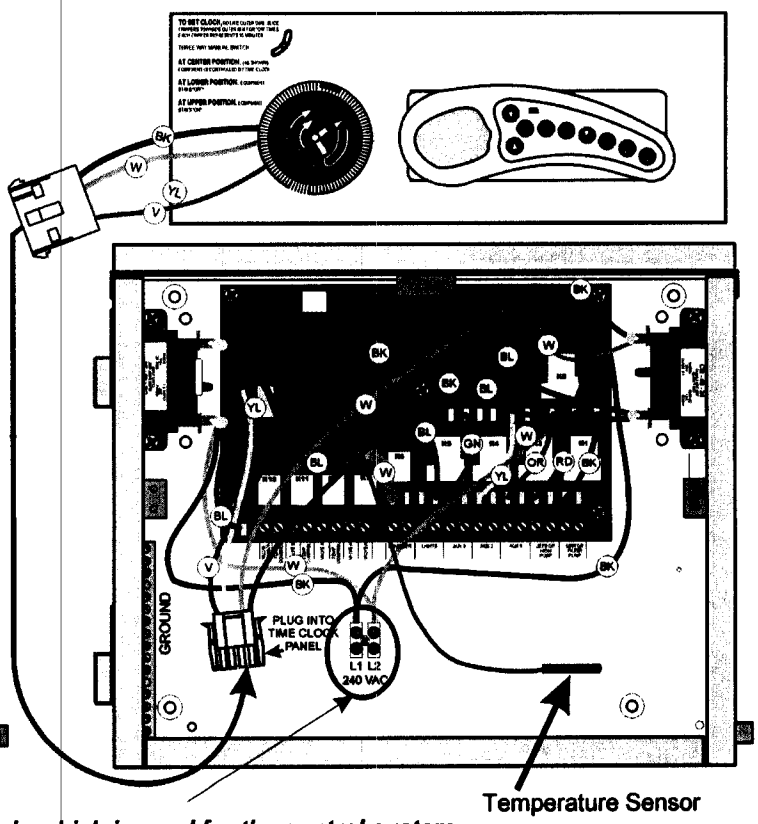


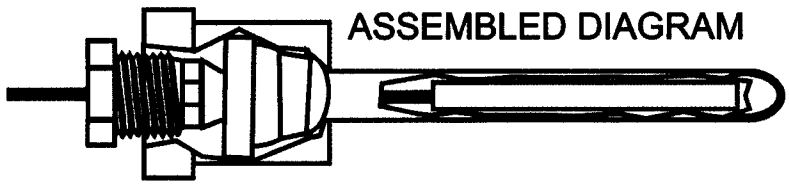
FIGURE 3

FIGURE 3A

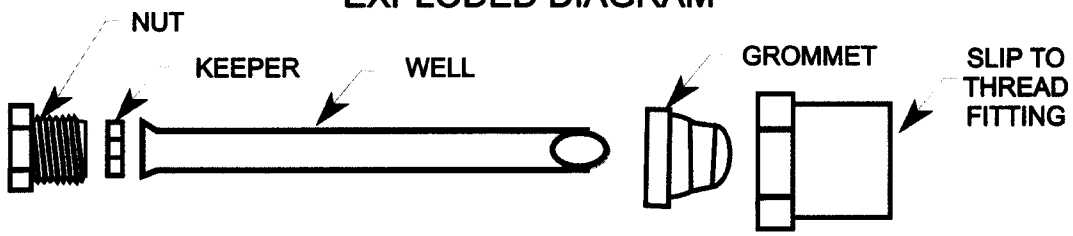


This is a 240V supply power only which is used for the control system.

DRYWELL
ASSEMBLED DIAGRAM



EXPLODED DIAGRAM



APPLICATION DIAGRAM

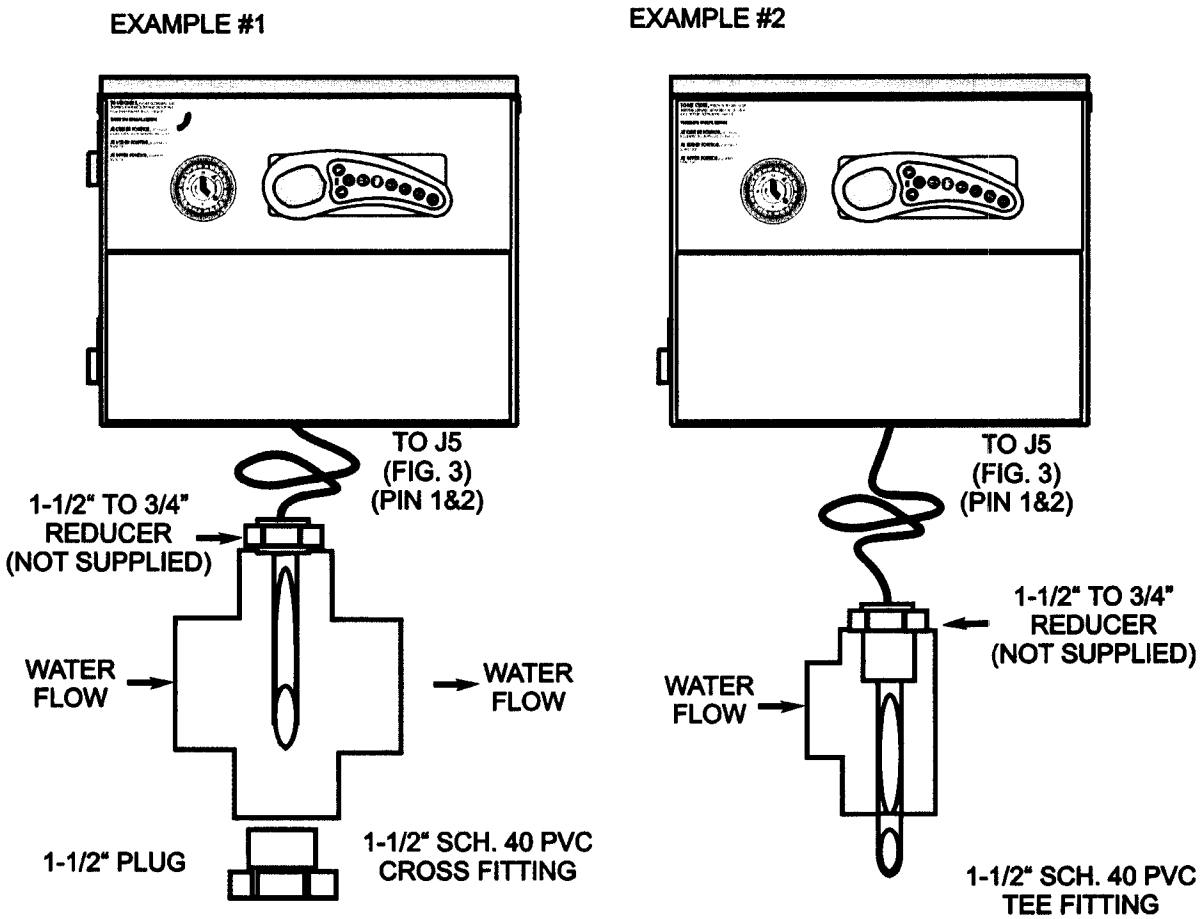


FIGURE 4

EXTERNAL GAS - FIXED HEATER INTERCONNECT

Examples of two typical installations of the Lennovator heat control wired to 2 and 3 wire external gas heaters are shown in Figure 6 (page 11). Refer to interconnection Figures 5 (A) and 5 (B) on page 12 and 5 (C) on page 13.

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

CHECK OUT AND START UP

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.

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 Lennovator to sub-panel and main panel.

CHECK HEATER

Check heater for high limit protection.

Check heater for pressure or flow switch protection.

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

CHECK CONTROL PANELS

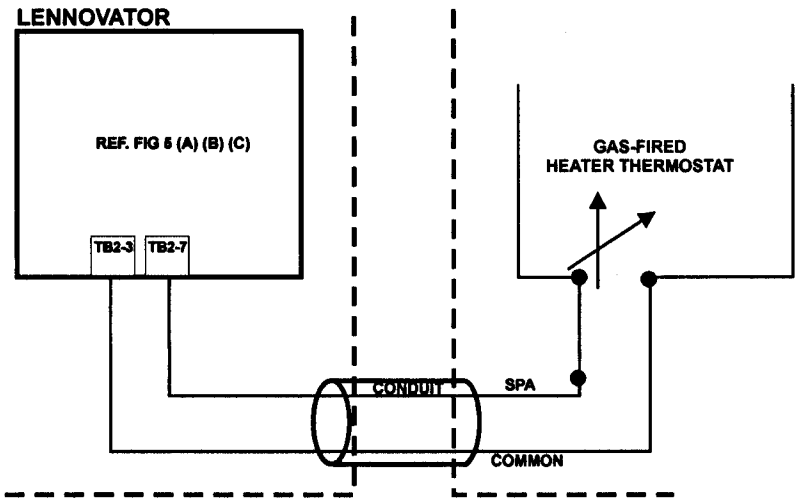
Make sure the remote control panel is accessible.

WIRING DIAGRAMS

LENNOVATOR HEATER INTERCONNECT

Examples of two installations are shown below. For specific details on connecting to the gas-fired heater, refer to the installation instructions provided by heater manufacturer.

TYPICAL GAS-FIRED HEATER WITH 2 WIRE REMOTE CONNECTION (SINGLE THERMOSTAT-PARALLEL CONNECTION)

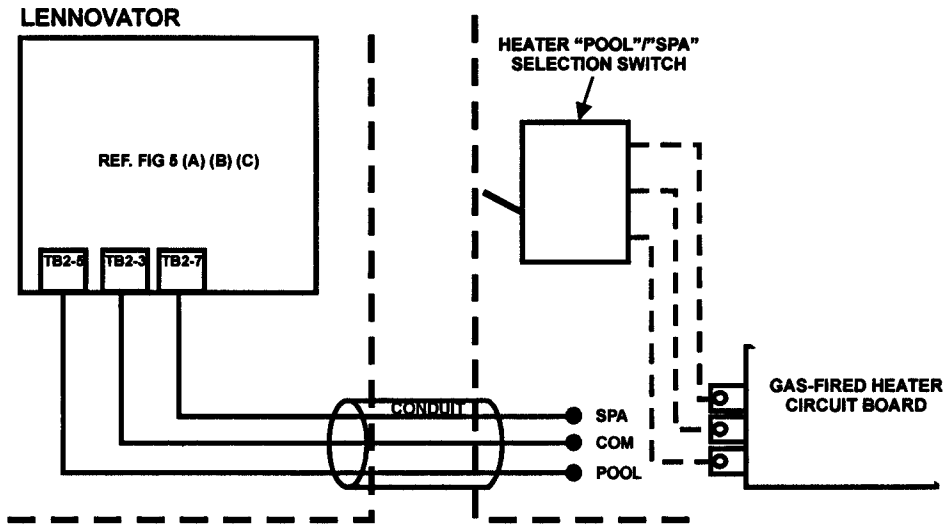


1 Connect wires to **LENNOVATOR** as shown

2 Set thermostat in gas-fired heater to the desired POOL water temperature

3 Set the **LENNOVATOR** temperature set point to the desired spa water temperature.

TYPICAL GAS-FIRED HEATER WITH 3 WIRE REMOTE CONNECTION (DUAL THERMOSTAT-SERIES CONNECTION)



1 Remove pool/spa selection switch and connect wires to **LENNOVATOR** as shown

2 Set POOL thermostat to desired pool water temperature.

3 Turn SPA thermostat all the way up to "HOT". **LENNOVATOR** will control spa temperature

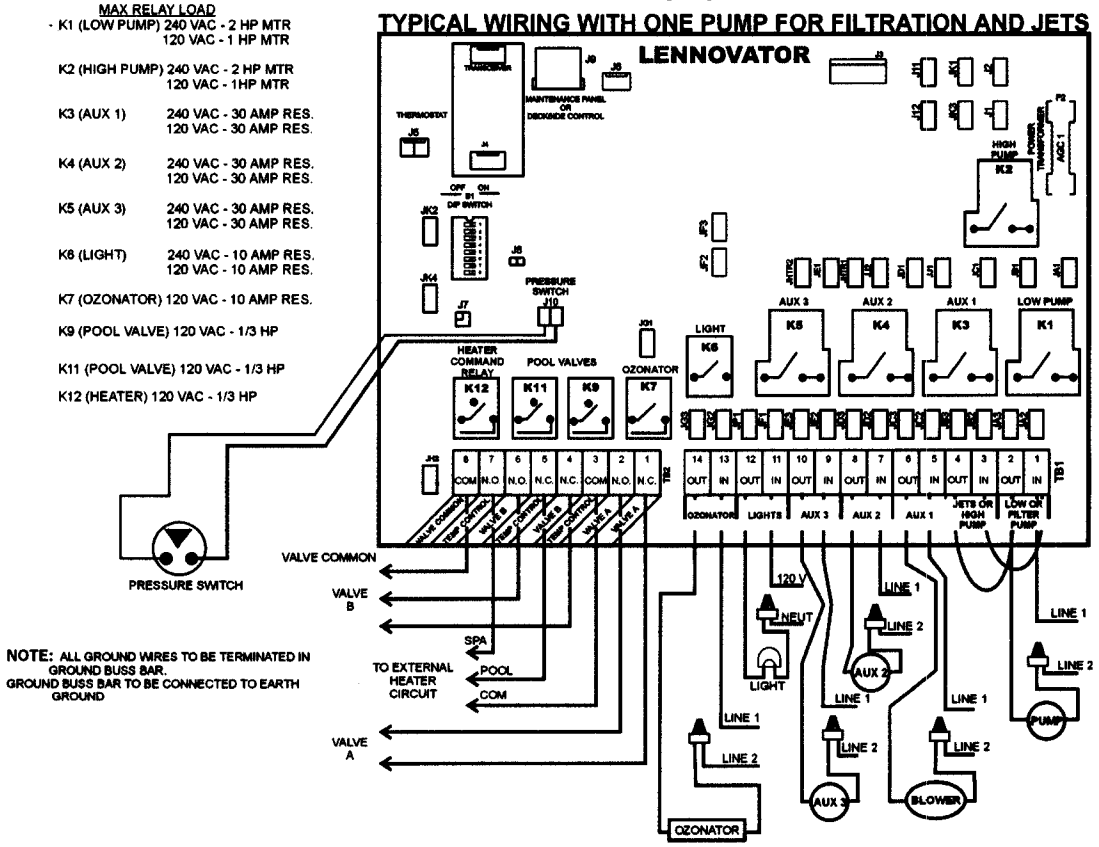
FIGURE 6

FIGURE 5 (A)

TYPICAL WIRING WITH ONE PUMP FOR FILTRATION AND JETS

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 (HEATER) 120 VAC - 1/3 HP



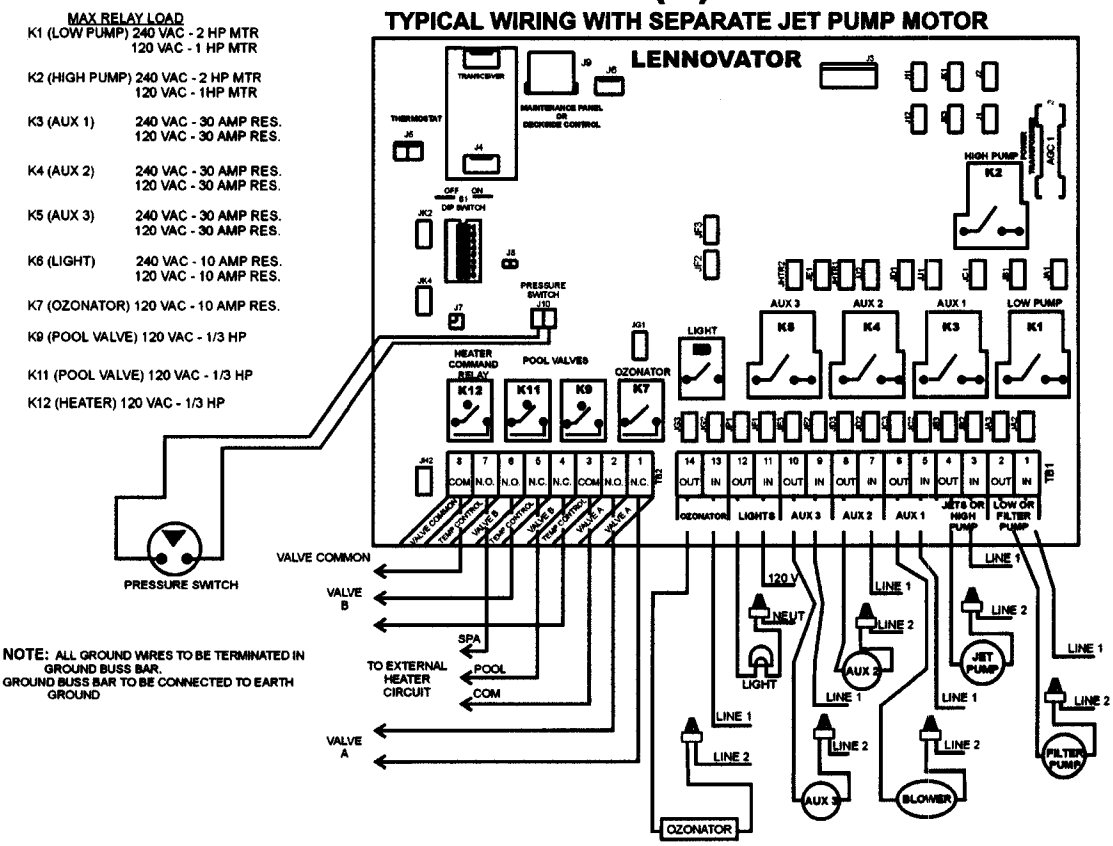
NOTE: ALL GROUND WIRES TO BE TERMINATED IN GROUND BUSS BAR.
GROUND BUSS BAR TO BE CONNECTED TO EARTH GROUND

FIGURE 5 (B)

TYPICAL WIRING WITH SEPARATE JET PUMP MOTOR

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 (HEATER) 120 VAC - 1/3 HP



NOTE: ALL GROUND WIRES TO BE TERMINATED IN GROUND BUSS BAR.
GROUND BUSS BAR TO BE CONNECTED TO EARTH GROUND

WIRING DIAGRAMS

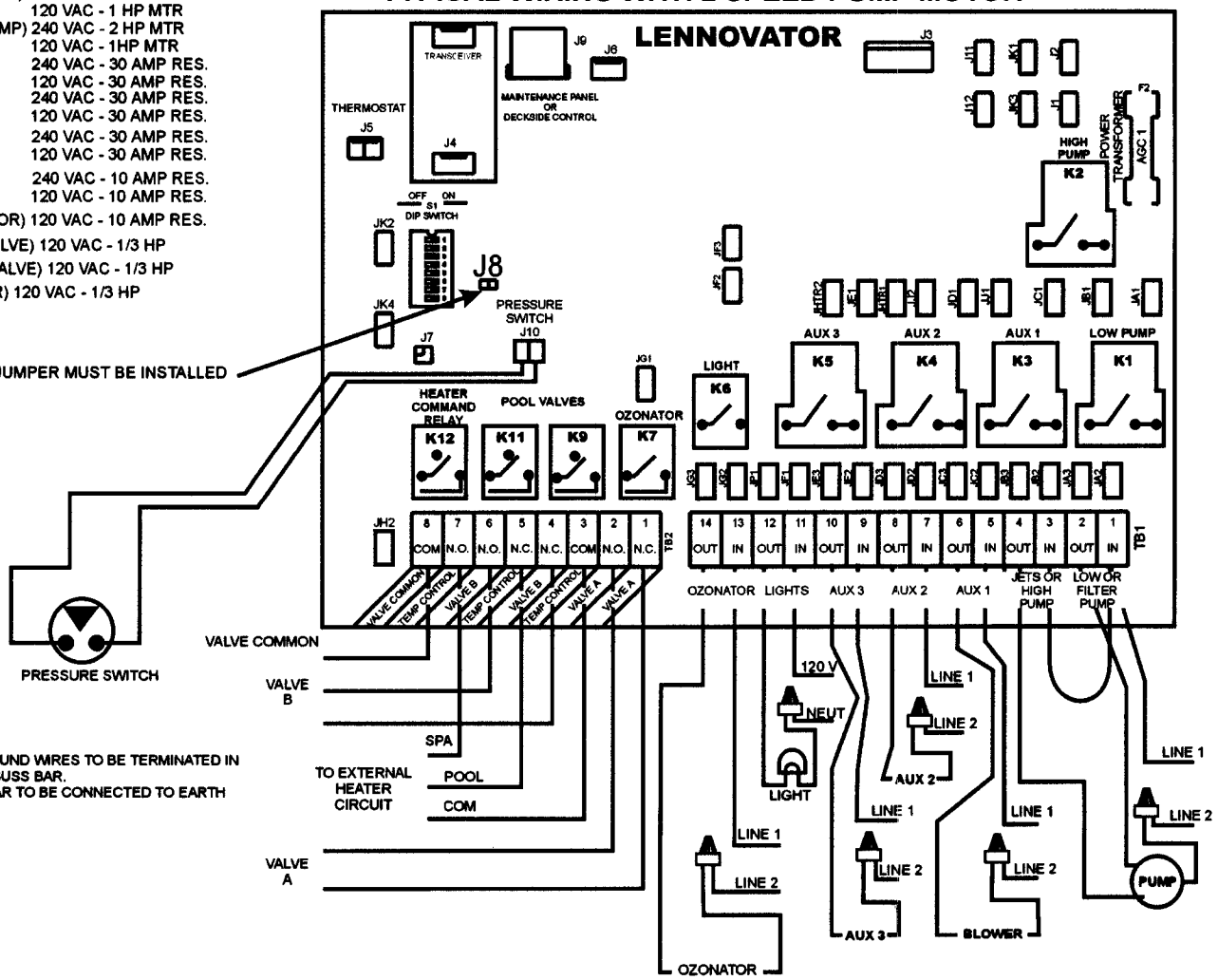
FIGURE 5 (C)

TYPICAL WIRING WITH 2 SPEED PUMP MOTOR

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 (HEATER) 120 VAC - 1/3 HP

NOTE: J8 JUMPER MUST BE INSTALLED



NOTE: ALL GROUND WIRES TO BE TERMINATED IN GROUND BUSS BAR.
GROUND BUSS BAR TO BE CONNECTED TO EARTH GROUND

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 104EF) 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 104EF

7. Turn power ON.

SPA WATER TEMPERATURE SETTING

- The spa water temperature is controlled by the maintenance control or the wireless remote control. To set the spa water temperature, 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 109EF and 120EF.

Hi Limit Reached - Equipment Shut Off

System will automatically shut-off the heater in the spa mode whenever the water temperature reaches 120EF. 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 120EF, 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.

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

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

Freeze Protection If the spa temperature drops to approximately 42EF, 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
LAS VEGAS, NV

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.

LIMITED WARRANTY

NEW PRODUCTS: One year from the date of manufacture
REPLACEMENT PARTS/REPAIRS: 90 days from date of purchase

Allied Innovations, LLC warrants new Len Gordon 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 Dept at (702) 361-0600, by fax (702) 361-0613 or e-mail technical@lengordon.com from 8 am to 5 pm, Monday - Friday. Visit us on the world wide web at www.gordon-aqualine.com.

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