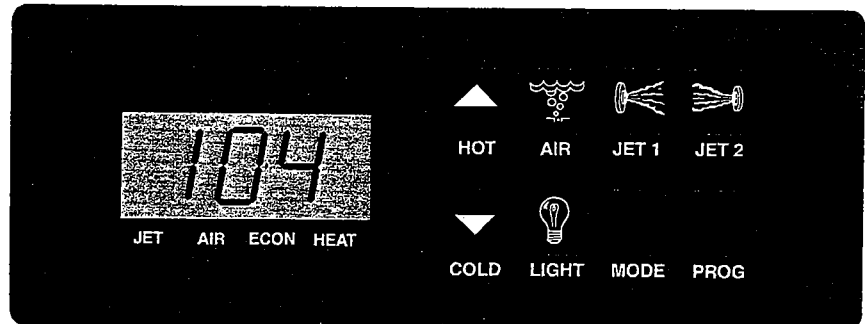


## TROUBLESHOOTING GUIDE

### BL-70 SPA-SIDE CONTROL SYSTEM



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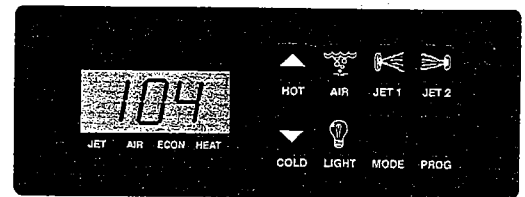
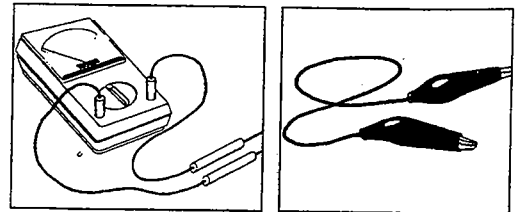
# INTRODUCTION

This Troubleshooting Guide has been designed for easy simple step-by-step problem solving. It is important to identify all of the possible causes of the problem before making a final diagnosis. What you see at first is usually a symptom of the problem, not necessarily the problem itself.

Read the whole troubleshooting procedure related to what you are testing prior to doing the test. This will help give you a clearer overall view and avoid a costly mis-diagnosis.

## TO PREPARE FOR THE SERVICE CALL:

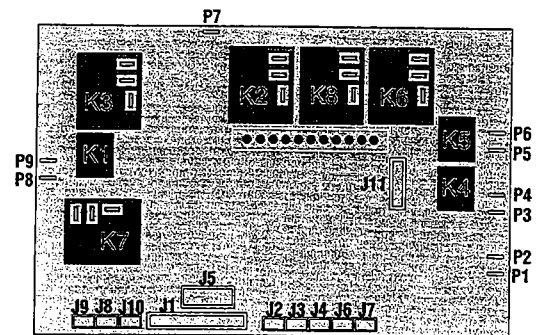
- Be sure you fully understand how the system operates. Read the information contained in IDENTIFYING THE PROBLEM page 3.
- Use standard testing devices, such as:
  - Volt OHM Meter (VOM)
  - 6 inch Test wire with alligator clips
  - Clamp-on ammeter
  - Accurate thermometer
- Take necessary test and replacement parts:
  - BL-70 Spa-side control panel (for testing / replacement)
  - BL-70 Relay circuit board (for testing / replacement)
  - Recommended replacement parts kit



BL-70 Spa-Side control panel

## RECOMMENDED REPLACEMENT PARTS:

- Pump motor
- Pump motor fuse, 20 amp - P/N 37-1030
- Light fuse, 3 amp - P/N 37-0121
- Transformer, 120V, 2 amp - P/N 37-1019
- Transformer fuse, 3 amp - P/N 37-0121
- Heater assembly - P/N 22-5019
- Pressure switch - P/N 34-0110TDI
- Temperature sensor - P/N 38-0400-SS-A
- Hi-limit sensor - P/N 38-0399-SS-A
- Spa light bulb - P/N 37-0101F



Relay circuit board

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# FLOW CHART

The Flow Chart below will assist you in the proper troubleshooting sequence. It also outlines the "most likely cause" other than equipment failure.

## CHECK CIRCUIT BREAKERS

### CHECK GFCI

If GFCI trips (erratic tripping) - Check for correct GFCI installation and Control trips the GFCI (page 12)

### CHECK RELAY CIRCUIT BOARD POWER

#### OK

#### NOT OK

Input power - P1 & P2

120/240 VAC

Check input wiring

Fuse - F1, F2 & F3

0 ohms

Replace fuse

## SPA WATER TEMPERATURE

40°F - 104°F

### SPA-SIDE CONTROL PANEL DISPLAY / TOUCH PADS / INDICATOR LIGHTS / RELAY CIRCUIT BOARD

With power ON - The Spa-side display should indicate the spa water temperature, if the heater is operating, the HEAT indicator light will be ON. If an error code is displayed on the Spa-side control refer to page 7, ERROR CODES and correct before proceeding.

PROCEDURE	STATUS SPA	SPA-SIDE CONTROL	RELAY CIRCUIT BOARD	ACTION IF NOT OK
Press JET 1 once	Low speed pump 1 ON	-	Filter T/S indicator light ON	Check for broken wire or loose connection at P2, J1 & K2
Press JET 1 again	High speed pump 1 ON	JET indicator light ON	Jet 1 T/S indicator light ON	Check for broken wire or loose connection at P2, J1 & K6
Press JET 2	High speed pump 2 ON	JET indicator light ON	Jet 2 T/S indicator light ON	Check for broken wire or loose connection at P7, J1 & K3
Press AIR	Air jets ON	AIR indicator light ON	Air T/S indicator light ON	Check for broken wire or loose connection at P2, J1 & K7/K8
Press LIGHT	Spa light ON	LIGHT indicator ON	Light T/S indicator light ON	Check for broken wire or loose connection at P4, J1 & K4/K5 Check light bulb
Press and hold HOT until 104°F	-	104°F displayed	Heater T/S indicator light ON (if the heater is operating)	Check for broken wire or loose connection at J2, J3, J4, J9, J10

#### OK

Check temperature sensor, wiring & J2 receptacle connection

Check high limit sensor, wiring & J3 receptacle connection

Check pressure switch, wiring & J4 receptacle connection

Check components connected to the Control Module, wiring & receptacle connections

#### NOT OK

Repeat above with Test Spa-side control panel

#### OK

Replace Spa-side control panel

#### NOT OK

Repeat above with Test Relay circuit board

#### OK

Replace Relay circuit board

#### NOT OK

Repeat above with Test Control circuit board

# IDENTIFYING THE PROBLEM

To avoid mis-diagnosis and better understand how the system operates, read and familiarize yourself with the information contained in TROUBLESHOOTING INDICATOR LIGHTS, POWER UP SYSTEM CHECK and SPA-SIDE CONTROL OPERATION instructions.

The BL-70 incorporates a series of troubleshooting indicator lights that will assist you in rapidly identifying specific problem areas.

## TROUBLESHOOTING INDICATOR LIGHTS

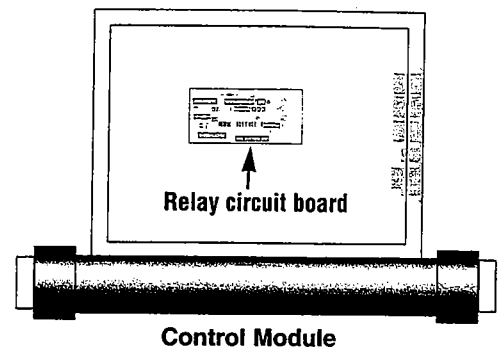
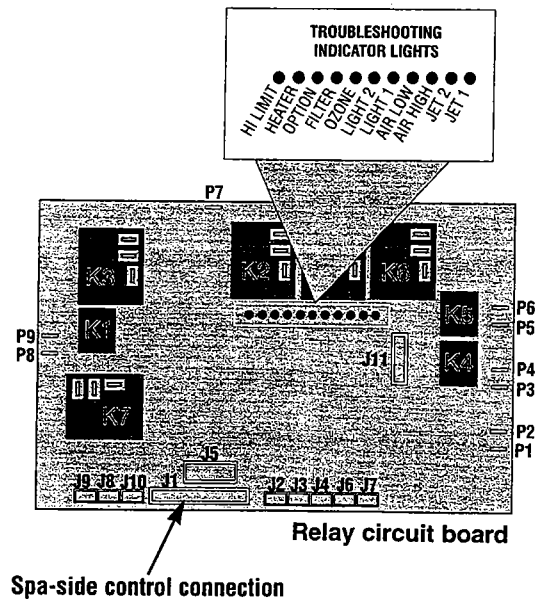
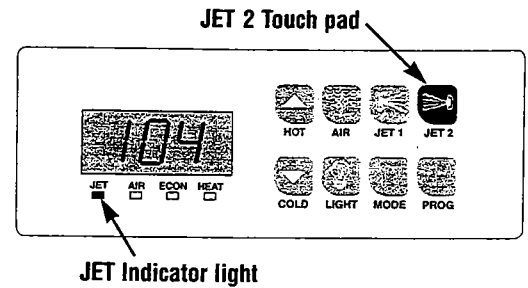
When attempting to isolate a specific problem, the troubleshooting indicator lights will provide an accurate means to determine if the problem is in the electronics or somewhere after the circuit board outputs.

In example, if the secondary jet pump does not operate, press the JET 2 touch pad a few times while viewing the jet 2 Troubleshooting Indicator light and Spa-side control jet indicator light.

- If the Spa-side jet indicator light and the jet Troubleshooting light turns ON and OFF with each push of the JET touch pad, the Spa-side control and Relay circuit board is operating properly. The problem has been isolated to:
  - The pump motor
  - Pump fuse
  - Pump wiring
  - Pump relay on Relay circuit board defective (replace Relay circuit board)
- If the indicator lights do not illuminate, the problem has been isolated to:
  - Loose spa-side control connection J1 on Control circuit board
  - Defective spa-side control
  - Defective Relay circuit board
  - Loose connection at P1 or P2 on Control circuit board

The troubleshooting indicator lights are located on the relay circuit board, contained in the Control Module. Each of these lights are labeled to correspond with their output function as follows:

- L1 - Jet 1 (Jet pump 1)
- L2 - Jet 2 (Jet pump 2)
- L3 - Air high
- L9 - Air low
- L4 - Light 1
- L5 - Light 2
- L7 - Ozone
- L8 - Filter (pump low speed)
- L10 - Option
- L6 - Heater



# IDENTIFYING THE PROBLEM

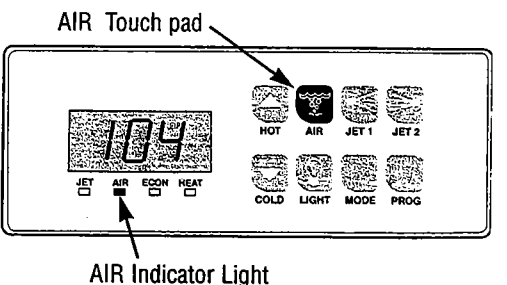
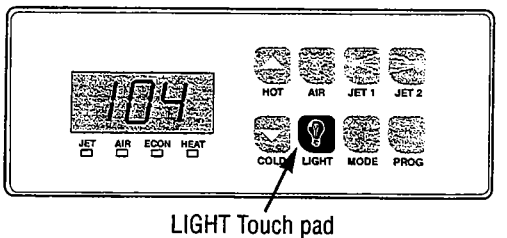
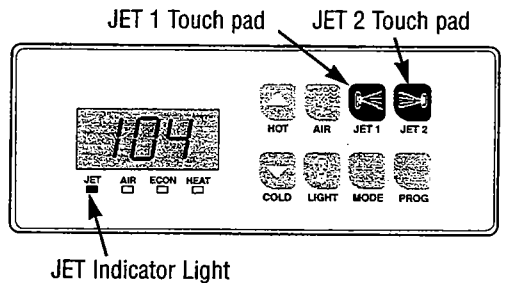
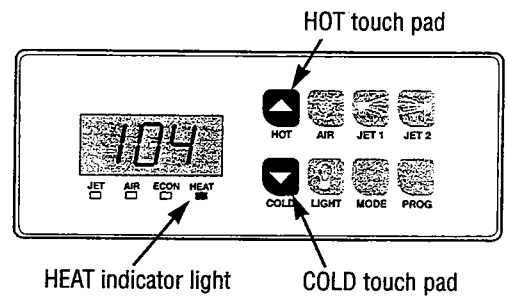
## POWER UP SYSTEM CHECK:

- When power is first applied to the unit, the Liquid Crystal Display (LCD) will show all spa-side display segments for approximately three seconds, followed by a display of the input voltage currently applied to the Control Module. The number "12" indicates 120Volts, number "24" indicates 240Volts. Confirm operation of all LCD segments and correct input voltage prior to proceeding.
- If there is not a service disconnect close to the spa, the Power Up System Check may be initiated by disconnecting and reconnecting the spa-side controller.

## SPA-SIDE CONTROL OPERATION

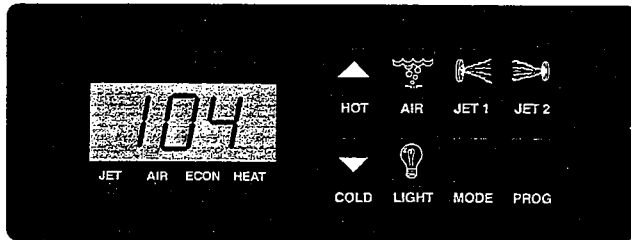
After power is applied to the spa and the Power Up System Check is complete, the LCD should indicate the current water temperature. If the heater is operating the Jet indicator light will illuminate.

- **TEMPERATURE SETTING.** - Press and release the HOT or COLD touch pad, the set water temperature will be displayed for approximately 4 seconds on the LCD.
  - Press HOT to increase set water temperature, press COLD to decrease set water temperature .
  - If the HOT or COLD touch pad is pressed and held down, the temperature setting will change slowly, then rapidly.
- **JET OPERATION - Single Pump:** Press and release the JET touch pad, the pump should operate in low speed. Press again and the pump should operate in high speed. Press again for OFF.
  - If the pump is operating in a programmed filter or heating cycle, the first press of the JET touch pad will activate the pump high speed.**Dual Pump:** Press JET 1 to turn jet pump 1 ON or OFF. Press JET 2 to turn jet pump 2 ON or OFF.
  - The JET indicator light should illuminate whenever the jets are operating in high speed.
  - The jets operate for a period of thirty minutes and then automatically turn OFF.
- **LIGHT OPERATION - Single Light:** Press and release the LIGHT touch pad, the light should turn ON. Press again for OFF.**Dual Light:** Press LIGHT once to turn ON the first light, press again to turn ON the second light, press a third time for first light OFF, press a fourth time for second light OFF.
  - The light(s) will operate for four hours, then automatically turn OFF.
- **AIR SYSTEM OPERATION - Single Speed:** Press AIR to turn the air system ON or OFF.**Dual Speed:** Press AIR once for high speed, press again for low speed, press again for OFF.
  - The AIR indicator light should illuminate whenever the air system is operating.
  - The air system will operate for 30 minutes, then automatically turn OFF.

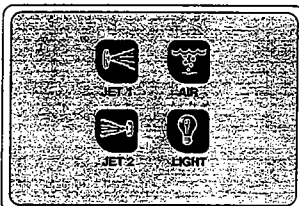


# SPA-SIDE CONTROL SYSTEM DESCRIPTION

The BL-70 spa control system consists of a Spa-side Control Panel, Remote Control (option) and a Control Module containing the system Relay circuit board.



Spa-side control panel



Remote control (option)

### Remote control (Option):

#### Touch pad controls

- JET - 1 Activates jet pump 1
- JET - 2 Activates jet pump 2
- AIR - Activates air system
- LIGHT - Turns spa light ON or OFF

### The Spa-side control panel contains the following components:

#### Liquid Crystal Display (LCD)

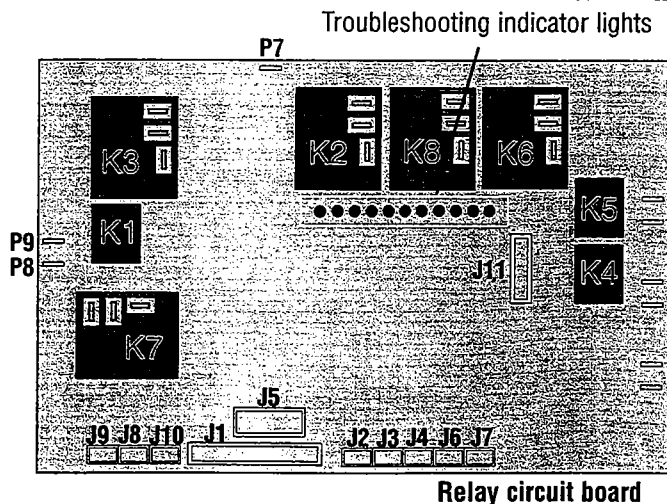
The LCD Indicates current and set temperature as well as system Error codes

#### Indicator lights

- JET light illuminates when jets are ON
- AIR light illuminates when air system is ON
- ECON light illuminates when in economy mode
- HEAT light illuminates when heater is operating

#### Touch pad controls

- HOT - Increases temperature setting
- AIR - Activates the air system
- JET 1 - Activates jet pump 1
- JET 2 - Activates jet pump 2
- COLD - Decreases temperature setting
- LIGHT - Turns spa light(s) ON and OFF
- MODE - Selects economy or standard operation
- PROG - Set, review or change filtration cycles



Relay circuit board

### The Relay circuit board contains the following components:

#### Relays

- K1 Ozone
- K2 Filter
- K3 Jet 2
- K4 Light 1
- K5 Light 2
- K6 Jet 1
- K7 Air low
- K8 Air high

#### Fuses (Not mounted on Relay Circuit board)

- F1 Transformer (3 amps)
- F2 Spa Light (3 amps)
- F3 Pump fuse (30 amps)

### Connection ports

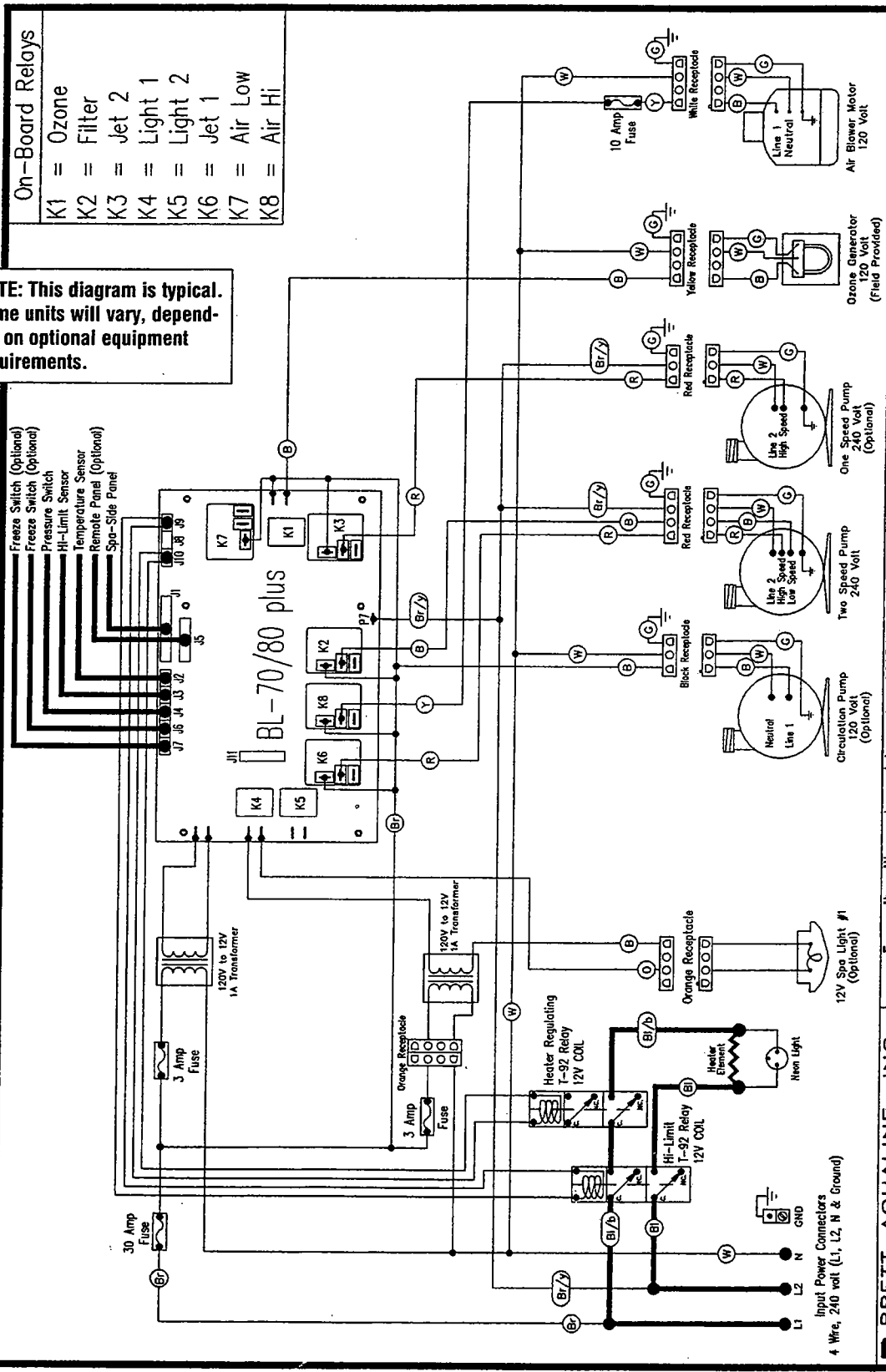
- P1 12 VAC input
- P2 12 VAC input
- P3 Spa light 1
- P4 Spa light 1
- P5 Spa light 2
- P6 Spa light 2
- P7 240V sense (line 2)
- P8 Ozone
- P9 Ozone
- J1 Spa-side control panel
- J2 Temperature sensor
- J3 High limit sensor
- J4 Pressure switch (flow)
- J5 Remote control (option)
- J6 Freeze switch (option)
- J7 Freeze switch (option)
- J8 Not used
- J9 Hi-limit relay coil
- J10 Heater regulating relay coil
- J11 Not used

### Troubleshooting indicator lights

- L1 Jet 1
- L2 Jet 2
- L3 Air high
- L4 Light 1
- L5 Light 2
- L6 Heater
- L7 Ozone
- L8 Filter (pump low speed)
- L9 Air low
- L10 Option
- L11 Hi-limit (normally ON)

# SYSTEM WIRING SCHEMATIC

**NOTE: This diagram is typical. Some units will vary, depending on optional equipment requirements.**



**On-Board Relays**

K1 =	Ozone
K2 =	Filter
K3 =	Jet 2
K4 =	Light 1
K5 =	Light 2
K6 =	Jet 1
K7 =	Air Low
K8 =	Air Hi

**BRETT AQUALINE, INC.**  
 HUNTINGTON BEACH, CA (714) 891-7211  
 Catalog Code: ANY  
 Certification: -  
 Series: 14, 15, 16, 17, 19, 24 or 29  
 Input Power: 6  
 Heater: 1, 2, 3 or 5  
 Internal Controls: D1  
 Spa Light: AX or Y  
 Additional Pump: S  
 Drawing ID: 0044  
 Date: 12-7-95  
 Rev: 4  
 Drawn by: THM  
 Wire Color Code:  
 B - Black  
 G - Green  
 Br - Brown  
 Bl - Blue  
 R - Red  
 V - Violet  
 O - Orange  
 Cr - Gray  
 Y - Yellow  
 W - White

Notes: For units with up to serial number 96034  
 Air Blower: 02 or 5  
 Heater: 1, 2, 3 or 5  
 Electronic Controls Note: 1. Pump & air blower may not be provided by Brett Aqualine

# ERROR CODES

## SPA-SIDE ERROR CODES:

The BL-70 incorporates a variety of diagnostic and protection features. In the event of a system error, one of the error codes listed below may be displayed on the Spa-side control LCD.



### OVERHEAT

The spa water temperature has exceeded 118°F (48°C), causing the the heater to automatically shut off.

Check the spa and correct:

- Dirty filter cartridge
- Closed plumbing valve
- Plumbing obstruction
- Low water level
- Loose wire or Temperature sensor disconnected. Check J2 and J3 on the Control circuit board
- Temperature sensor not properly installed (refer to page 17 WATER TEMPERATURE TO HOT OR SPA OVERHEATS)

### To Reset Heater:

When the water temperature is below 104°F (40°C), press either HOT or COLD touch pad to reset the heater.



### FREEZE PROTECTION

The spa water temperature has dropped below 40°F (4°C). An automatic protection circuit has activated the pump(s) and heater - protecting the spa from freeze damage.

- This is a normal spa function and does not require service
- The pump(s) and heater will operate until the water temperature reaches 43°F (6°C).

If the "Fr" error code is displayed and the water temperature is well above 43°F (6°C):

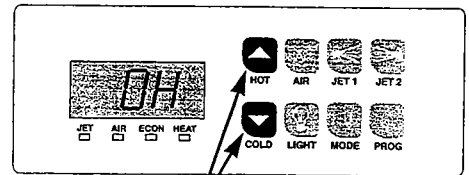
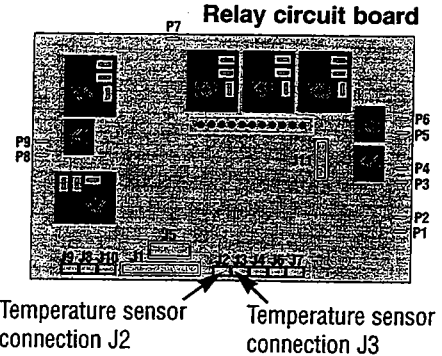
- Temperature sensor or optional freeze sensor may be improperly installed (refer to page 17 WATER TEMPERATURE TO HOT or SPA OVERHEATS)



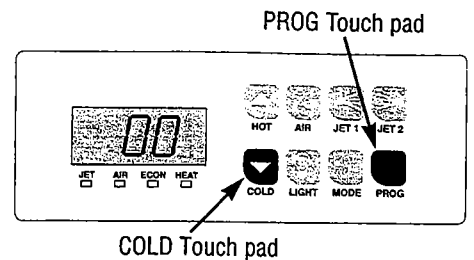
### FILTRATION CYCLE

A timed filtration cycle is in progress.

- This is a normal operating message and does not require service.
- To turn OFF the filtration cycle, press the PROG touch pad twice, then press the COLD (down) touch pad until the the LCD displays "00"



Press HOT or COLD to reset heater

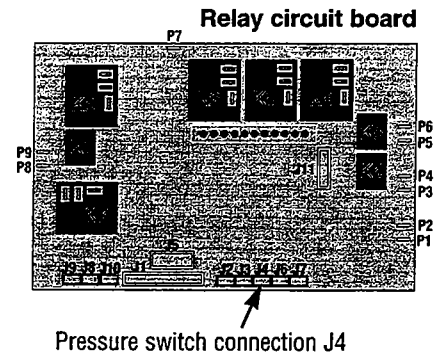




## FLOW

The Pressure Switch is not measuring adequate water flow to permit heater operation.

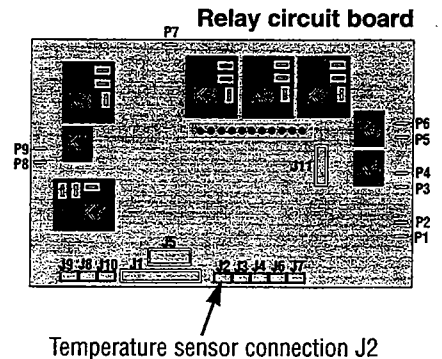
- Check the spa and correct:
- Dirty filter cartridge
  - Closed plumbing valve
  - Plumbing obstruction
  - Low water level
  - Pump not primed
  - Loose wire or Pressure switch disconnected.  
Check J4 on the Relay circuit board
  - Pressure switch out of adjustment or defective
  - Defective pump
  - Factory program settings incorrect (see page 10)



## SHORTED WATER TEMPERATURE SENSOR

The water temperature-regulating sensor is out of calibration or shorted.

- To check the sensor, remove the sensor plug (J2) from the Relay circuit board and measure the resistance between the plug's center terminal wire and the black wire. Compare results with TEMPERATURE vs RESISTANCE table page 22.



## OPEN WATER TEMPERATURE SENSOR

The water temperature regulating sensor is out of calibration or disconnected (open).

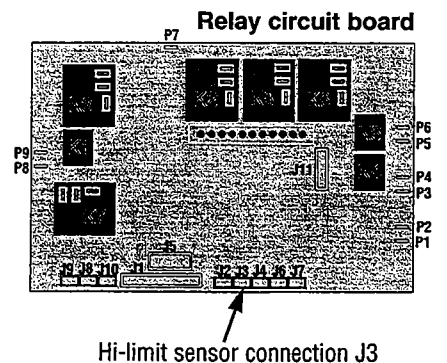
- Check the sensor connection J2 to the Control circuit board for loose connection.
- If the sensor connection is good, check the sensor - if out of specification, replace the sensor assembly.
- To check the sensor, remove the sensor plug (J2) from the Relay circuit board and measure the resistance between the plug's center terminal wire and the black wire. Compare results with TEMPERATURE vs RESISTANCE table page 22.



## SHORTED HI-LIMIT TEMPERATURE SENSOR

The water temperature high-limit sensor is out of calibration or shorted.

- To check the sensor, remove the sensor plug (J3) from the Control circuit board and measure the resistance between the plug's center terminal wire and the black wire. Compare results with TEMPERATURE vs RESISTANCE table page 22.



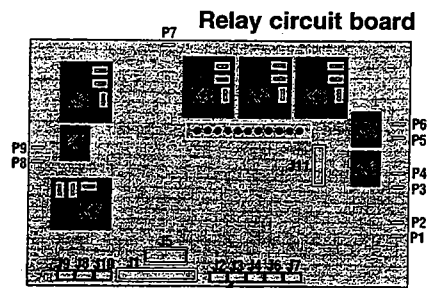
# ERROR CODES



## OPEN HI-LIMIT TEMPERATURE SENSOR

The water temperature high-limit sensor is out of calibration or disconnected (open).

- Check the high limit sensor connection J3 to the Relay circuit board for loose connection.
- If the sensor connection is good, check the sensor - if out of specification, replace the sensor assembly.
- To check the sensor, remove the sensor plug (J3) from the Control circuit board and measure the resistance between the plug's center terminal wire and the black wire. Compare results with TEMPERATURE vs RESISTANCE table page 22.



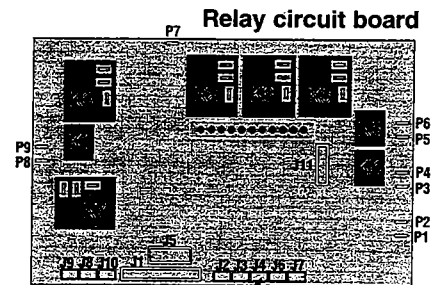
Hi-limit sensor connection J3



## SHORTED FLOW SWITCH

The pressure switch is shorted (closed) indicating water flow when the pump is not operating.

- Check for short in pressure switch wiring (to J4).
- If the pressure switch wiring is good, adjust or replace pressure switch.



Pressure switch connection J4



## IMPROPER ELECTRICAL CONNECTION

An improper electrical connection has been detected.

- Immediately turn OFF power to the spa. In most cases, this error is caused by a "HOT" line being connected to the input power "NEUTRAL" line (white wire).
- Correct input power wiring and reapply power to the spa.

**If the system fails to function after the wiring has been corrected:**

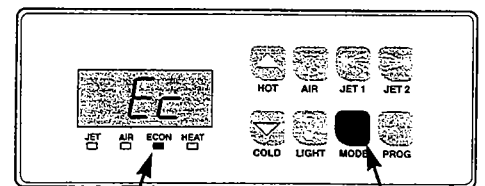
- Check the transformer fuse (F1).
- If the fuse is good, check voltage at P1 and P2, if 12 VAC is not present replace the transformer.



## ECONOMY MODE - Not all models

The spa is currently operating in the economy mode.

- This a normal operating message and does not require service.
- To change the mode to "standard operation" press and release the MODE touch pad.
- Economy mode may be displayed by either the "ECON indicator light" on the spa-side control, or "Ec" on the LCD.



ECON Indicator light

MODE Touch pad



## OZONE GENERATOR - Not all models

The ozone generator is currently operating.

- This is a normal operating message and does not require service.

# PROGRAMMING THE SPA-SIDE CONTROL

## THE FOLLOWING INSTRUCTIONS ARE FOR QUALIFIED FACTORY OR FIELD SERVICE TECHNICIANS ONLY.

There are 15 options listed below. Each option is set to ON or OFF depending on the specific control system. The first digit or letter displayed on the LCD is the option designator. The second letter is "F" for OFF or "O" for ON.

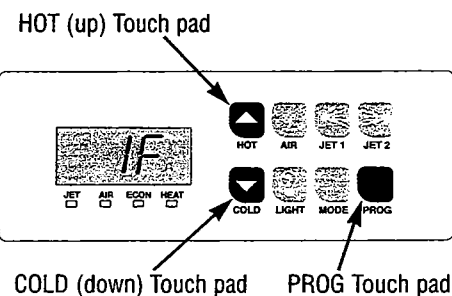
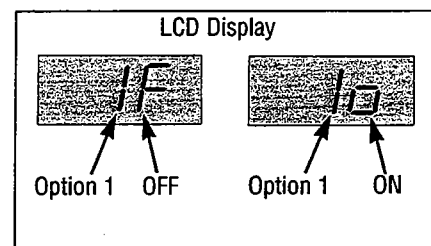
Anytime during the programming if a touch pad is not pressed for several seconds, the program changes will be saved and the control will return to normal operation.

### To change or set the desired programming:

- Press and release the PROG touch pad, the display will show the filtration time.
- Press and release the PROG touch pad again, the display will show the current filter start/stop time.
- Press and hold the PROG touch pad for ten seconds, until the display shows either **1F** (OFF) or **1O** (ON). This is the current setting of option number 1.
- To change the current setting, press and release HOT (up) or COLD (down) touch pad.

### To advance to the next option:

- Press and release the PROG touch pad and set the option to ON or OFF, or if there are no changes desired, press PROG again to advance to the next option.



OPTION	SET TO ON	SET TO OFF
1	Two jet pumps	One jet pump
2	Two speed air blower	One speed air blower
3	Two spa lights	One spa light
4	Heat w/jets (gas pack)	Auto voltage conversion
5	Long pump delay (gas pack)	Standard delay (electric)
6	Centigrade temperature display	Fahrenheit temperature display
7	Max. set temperature 108°F	Max. set temperature 104°F
8	Air line purge enabled	Air line purge disabled
9	Air blower touch pad disabled	Air blower touch pad enabled
A	Continuous filtration option	Normal filtration operation
B	Option relay is 2nd jet high speed	No 2nd jet high speed option
C	Option relay is jet pump 3	No jet pump 3 option
D	Clean up cycle enabled	Clean up cycle disabled
E	Wave/3rd jet pump option	Wave disabled
F	Max filtration 24 hours per day	Max filtration 12 hours per day
G	Jet is single speed	Jet is dual speed
H	Dual heater	Normal, single heater
I	Single filtration cycle per day	Two filtration cycles per day
J	Second pump is two speed	Second pump is single speed

NOTE: For standard two-speed pump systems, options A and D should be set to OFF

# TROUBLESHOOTING SPECIFIC PROBLEMS

## NOTHING OPERATES:

- Check circuit breaker supplying power to the spa.
- Check spa-side control connection, J1 on the Relay circuit board.

## Turn power ON and check for correct input power supply:

- Check input power supply at Relay circuit board terminals P1 and P2. Correct voltage is between 10 and 15 VAC.
- Check for correct voltage at spa. On 240V systems be sure to check for 240V, NOT just 120V to neutral.

## If the correct input power is not measured:

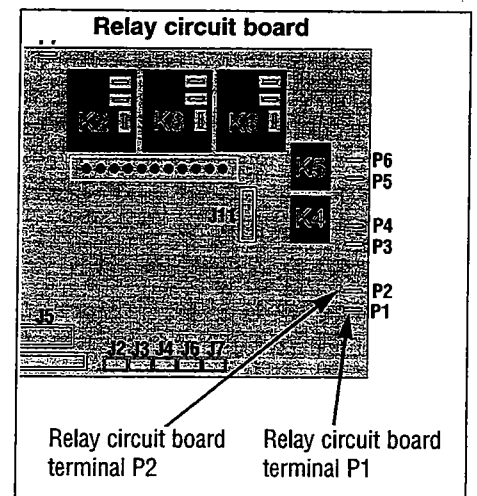
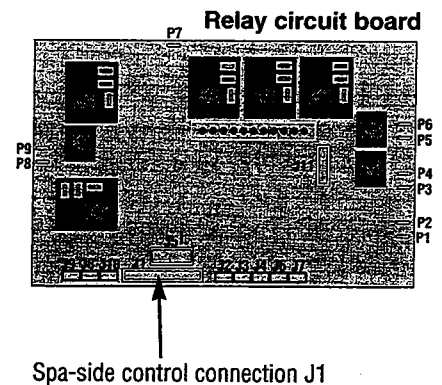
- Correct the problem before proceeding.

## Check 30 Amp fuse F3:

- With the power OFF, use a OHM meter to check continuity of the fuse (located inside the Control Module). If OPEN (infinite resistance) replace fuse.

## Check 3 amp Relay circuit board transformer fuse F1:

- With the power OFF, use a OHM meter to check continuity of the fuse (located on the wire leading to the Relay circuit board transformer). If OPEN (infinite resistance) replace fuse.
- If the fuse is good, connect a test transformer to P1 and P2 on the Relay circuit board and determine if the transformer is defective.
- If the test transformer does not correct the problem, replace the Relay circuit board.



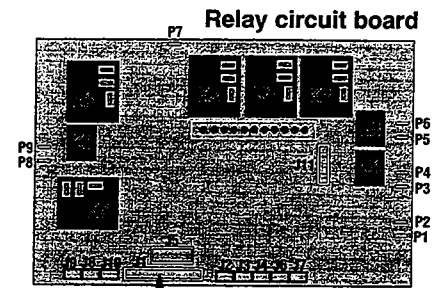
# TROUBLESHOOTING SPECIFIC PROBLEMS

## ERRATIC OPERATION:

Plug a Test Spa-Side Control into the spa-side receptacle J1 located on the Control circuit board:

- If the test spa-side control operates correctly, replace the spa-side control panel.
- If the test spa-side control does NOT correct the erratic operation, replace the Relay circuit Board.

NOTE: In some cases of erratic operation, electrical interference can interfere with the operation of the spa control system. Typically, this interference is caused by "noisy" electronic devices, such as fluorescent light ballast (used in ozone generators). In rare cases a noise suppressor or "across the line" filter may be required to resolve this type of problem. Contact the factory for more information.



Spa-side control connection J1

## ERRATIC OPERATION IN A COLD CLIMATE

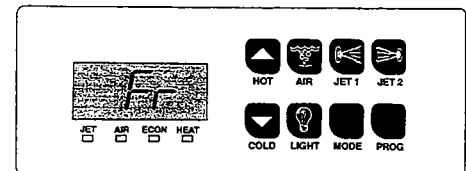
In areas where freeze conditions may exist:

- The spa pump and heater will be activated automatically if the system detects a freeze condition (spa water temperature 40°F or lower). The LCD will display "Fr", this often times is mis-diagnosed as "erratic operation". This is a normal control function and does not require service.

## CONTROL TRIPS GFCI

Ground Fault Circuit Interrupter tripping is most often caused by a faulty heater. However, it may also be caused by one of the other components connected to the spa-side control system:

- Focus your search by identifying when the GFCI trips.  
Example: A GFCI that only trips when the heater is operating, indicates a faulty heater.
- To identify which component is responsible for GFCI tripping, disconnect each component one at a time. Attempt to reset the GFCI, if the GFCI resets, the component that is disconnected is faulty.
- 240V installations with a load neutral connection, verify that the GFCI breaker (if provided) has a load neutral connection and that the neutral wire from the spa is connected to the load neutral connection NOT the neutral buss bar.



## DISPLAY STUCK ON 12 OR 24 AND NOTHING WORKS

- If an optional Remote control panel is attached, disconnect Remote. If this corrects the problem, replace the Remote control panel.
- Connect a Test Spa-side control. If this corrects the problem, replace the Spa-side control.

# TROUBLESHOOTING SPECIFIC PROBLEMS

## JETS WILL NOT OPERATE - (pump high speed)

**SINGLE PUMP** - Press the JET touch pad twice (once for low speed, press again for high speed)

**DUAL PUMP** - Press the JET 1 touch pad twice to operate jet pump 1 in high speed. - Press JET 2 touch pad to operate jet pump 2:

- The JET indicator light on the spa-side control and the jet 1 (or jet 2) Troubleshooting Indicator light on the Relay circuit board should be ON.
- If the JET indicator light and jet 1 (or jet 2) Troubleshooting light is ON the problem is not the spa-side control.

### If the Spa-side control and Relay circuit board check out:

- With the power OFF, use a OHM meter to check continuity of the 30 amp fuse (located inside the Control Module). If OPEN (infinite resistance) replace fuse.
- Remove the pump motor wiring cover and use a voltmeter to check for correct voltage (120 or 240 VAC) at the high speed wire termination (usually a red wire).
- If correct voltage is not present, check the wiring from the motor to the Relay circuit board P2 for loose or broken connections.
- If the connections are good, replace the Relay circuit board.

### If correct voltage is present at the pump high speed wire termination:

- Replace the pump.

### If the jet troubleshooting indicator light fails to illuminate:

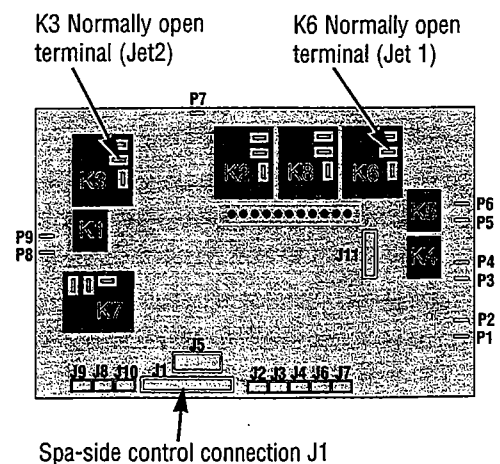
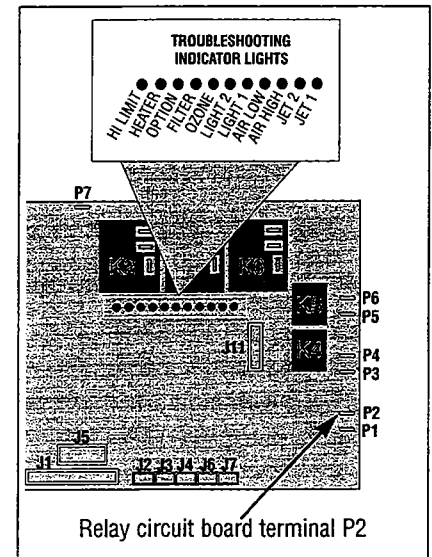
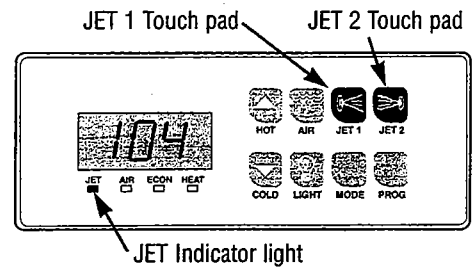
- Check for a broken wire or a loose spa-side control connection at J1 on the Relay circuit board.

### If the connections are good, and the JET indicator light on the spa-side control illuminates:

- With the JET indicator light ON, use a voltmeter to check power (120 or 240 VAC) at the jet 1 relay K6 normally open output terminal (or jet 2 relay K3 normally open output terminal).
- If the correct voltage is not present, replace the Relay circuit board.

### If the JET indicator light on the spa-side control fails to illuminate:

- Disconnect the spa-side control and connect a Test spa-side control to J1 on the Relay circuit board.
- If the Jets operate in high speed and the JET indicator light illuminates, replace the spa-side control.



# TROUBLESHOOTING SPECIFIC PROBLEMS

## PUMP LOW SPEED (FILTRATION) WILL NOT OPERATE

Press and release JET 1 touch pad:

- The filter troubleshooting indicator light on the Relay circuit board should be ON.
- If the filter troubleshooting indicator light is ON, the problem is not the spa-side control or the Relay circuit board.

If the Spa-side control and Relay circuit board check out:

- Remove the pump motor wiring cover and use a voltmeter to check for correct voltage (120 or 240 VAC) at the low speed wire termination (usually a black wire).
- If correct voltage is not present, check the wiring from the motor to the Relay circuit board terminal P2 for loose or broken connections.

If correct voltage is present at the pump low speed wire termination:

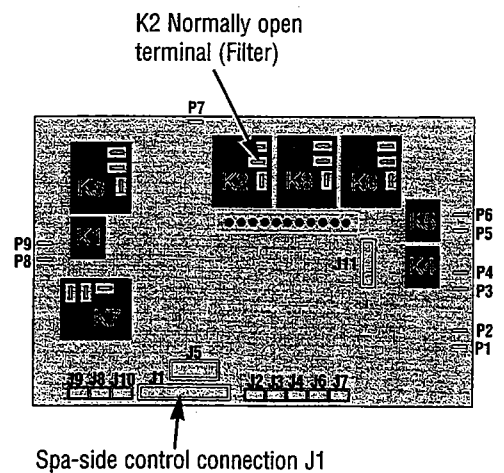
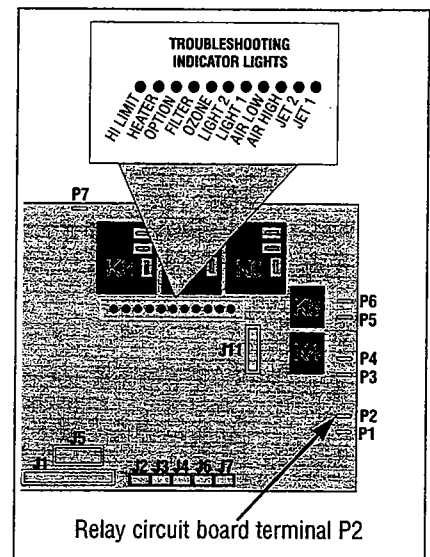
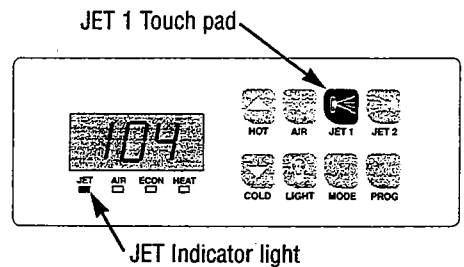
- Replace the pump.

If the filter troubleshooting Indicator Light fails to illuminate:

- Check for a loose spa-side control connection J1 on the Relay circuit board.

If the connections are good:

- Disconnect the spa-side control and connect a Test spa-side control to J1 on the Relay circuit board.
- Press and release the JET 1 touch pad. If the pump operates in low speed, and the jet troubleshooting indicator light illuminates, replace the spa-side control.
- With the filter troubleshooting indicator light ON, use a voltmeter to check power (120 or 240 VAC) at the filter relay K2 normally open output terminal.
- If the correct voltage is not present, replace the Relay circuit board.
- Check for correct factory program settings (see page 10).



# TROUBLESHOOTING SPECIFIC PROBLEMS

## FILTRATION CYCLE NOT WORKING PROPERLY

If the pump is operating in low speed but not filtering properly:

- Refer to the Owners Manual and check "Setting Filtration Cycles".
- Refer to page 14, PUMP LOW SPEED (FILTRATION) WILL NOT OPERATE.

## OZONE GENERATOR OUTPUT WILL NOT OPERATE

With the pump operating in low speed and the Filter and Ozone Troubleshooting indicator lights ON:

- Check for correct voltage at the ozone terminals P8 and P9.
- If correct voltage is not present, check the wiring from the ozone unit to the Relay circuit board for loose or broken connections.

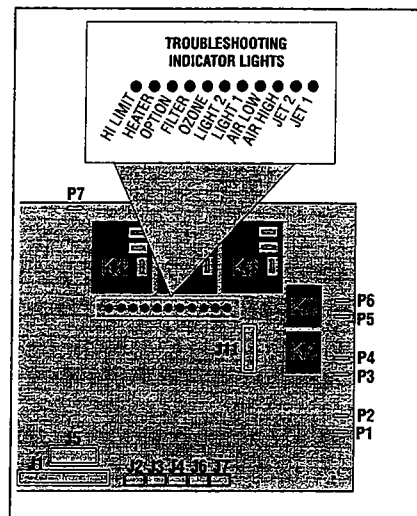
If the connections are good and correct voltage is not present:

- Replace the Relay circuit board.

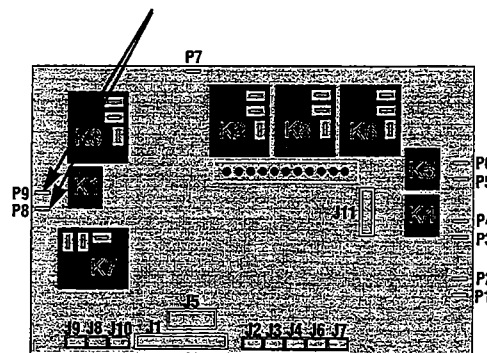
NOTE: On continuous filtration systems, the ozone generator is controlled by the filtration program. Make certain the ozone generator is operating in a filtration cycle.

If the connections are good and correct voltage is present at the ozone generator receptacle:

- Replace the ozone generator.



Ozone terminals P8 and P9



# TROUBLESHOOTING SPECIFIC PROBLEMS

## SPA LIGHT(S) WILL NOT OPERATE

Press and release the LIGHT touch pad :

- The light Troubleshooting Indicator(s) on the Relay circuit board should be ON.
- If the light Troubleshooting indicator(s) is ON the problem is not the Spa-side control or the Relay circuit board.

If the light troubleshooting indicator(s) fail to illuminate:

- Remove the spa light and use a voltmeter to check for correct voltage (12 VAC or 120 VAC) at the light socket termination.

If correct voltage is present at the light socket termination:

- Replace the bulb.

If correct voltage is not present:

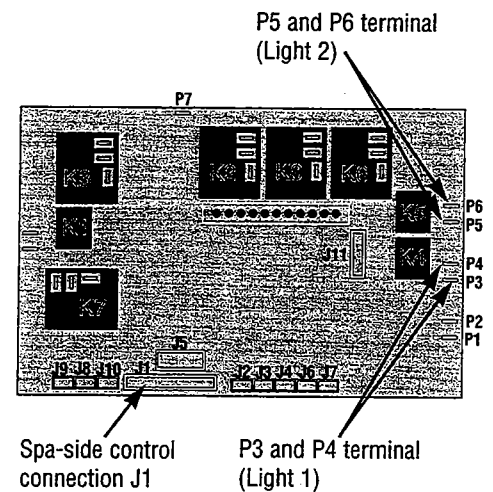
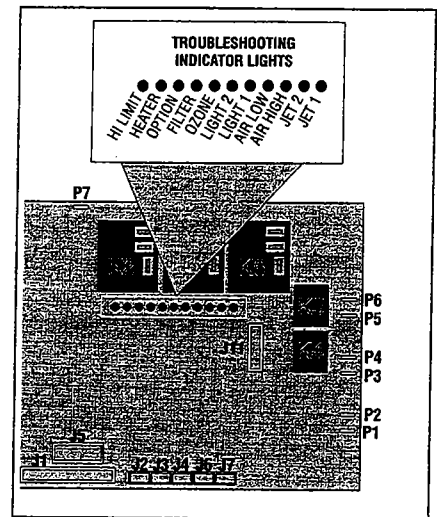
- Check the wiring from the Relay circuit board (P3 and P4 light 1 and P5 and P6 light 2) for loose or broken connections
- Check for a loose spa-side control connection J1 on the Control circuit board.

If the connections are good:

- Connect a Test Relay circuit board, if the light works, and the light Troubleshooting indicator(s) illuminate, replace the Relay circuit board.
- Disconnect the spa-side control and connect a Test spa-side control to J1 on the Control circuit board.
- Press and release the LIGHT touch pad. If the light operates , and the light Troubleshooting indicator(s) illuminate, replace the spa-side control.

Dual light system:

- Refer to page 10, SPA-SIDE PROGRAMMING and make certain the "Two light" option is set to ON.



# TROUBLESHOOTING SPECIFIC PROBLEMS

## WATER TEMPERATURE TOO HOT OR SPA OVERHEATS

### Check the location of the water temperature sensor:

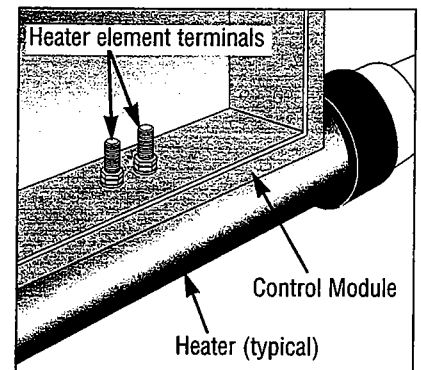
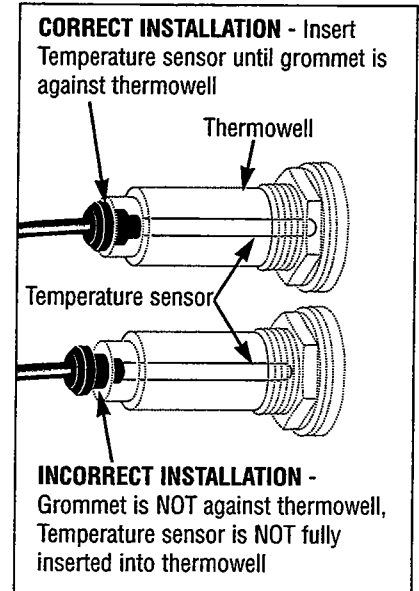
- Make certain the sensor is fully inserted into the thermowell.
- The thermowell should be installed in the wall of the spa approximately 12 inches below the minimum water level.

### Measure the water temperature with an accurate thermometer:

- If the temperature is several degrees or more higher than the temperature displayed on the spa-side control, check the temperature sensor. Refer to TEMPERATURE vs RESISTANCE table page 22 to evaluate the temperature sensor.
- If the temperature sensor checks out, replace the Relay circuit board.

### Turn the set temperature down to 40°F:

- Measure the voltage across the heater element terminals. If either 120V or 240V is present, replace the Relay circuit board.
- Check filtration program. A well insulated spa may overheat due to frictional pump heat. It may be necessary to reduce hours of filtration.



# TROUBLESHOOTING SPECIFIC PROBLEMS

## HEATER WILL NOT OPERATE

Note: If the spa is connected to 120VAC, the heater will not operate when the jet pump or air blower is operating. Make sure the JETS and AIR are OFF on 120V systems when checking for a defective heater.

### If an error code is displayed on the spa-side control panel:

- If *EO*, *E1*, *E2*, *E3*, *E4* or *FL* is displayed on the spa-side panel, an error exists that is preventing the heater from operating. Refer to **ERROR CODES** page 7.

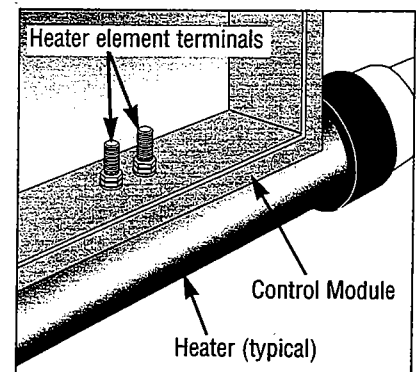
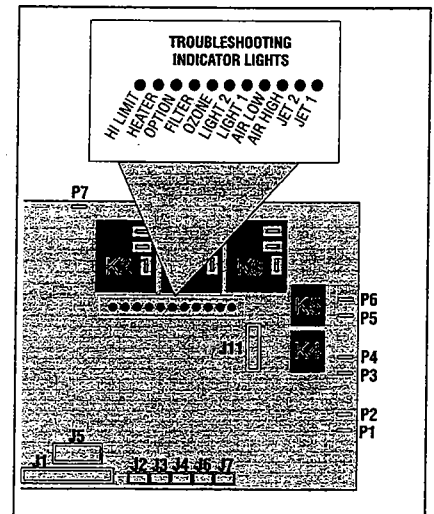
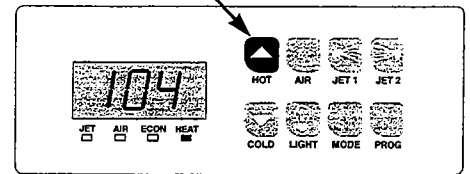
### Press and hold the **HOT** touch pad until the spa-side control displays 104°F:

- The heater Troubleshooting indicator Light on the Relay circuit board should illuminate after a few seconds.

### With the heater Troubleshooting indicator light ON, measure voltage across the heater element terminals:

- If no voltage is present, replace the Relay circuit board.
- If either 120V or 240V is present, turn the power OFF and measure the resistance across the heater element terminals. A reading of approximately 10 ohms is normal. If the element resistance is infinite (open), replace the heater.

HOT Touch pad

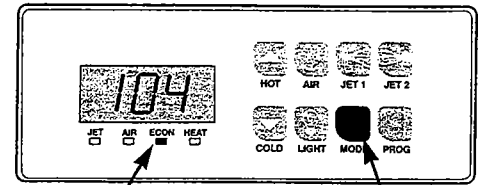


# TROUBLESHOOTING SPECIFIC PROBLEMS

## SPA WILL NOT MAINTAIN SET WATER TEMPERATURE

If the heater is operating but the spa water does not reach set temperature:

- Increase filtration time in order to provide adequate heater operating time.
- When operating in the ECON (economy) mode, the heater will only operate during filtration cycles or when the pump is operating. The ECON indicator light illuminates when in economy mode and is OFF when in standard mode.
- It may be necessary to change the operating mode to standard operation. To change, press MODE touch pad.
- The spa must be covered with a thermal spa cover when not in use, or substantial heat loss will occur.



ECON Indicator light

MODE Touch pad

# TROUBLESHOOTING SPECIFIC PROBLEMS

## AIR BLOWER WILL NOT OPERATE

Press and release the AIR touch pad :

- The AIR indicator light on the spa-side control and the air Troubleshooting Indicator(s) (Air high / Air low) on the Relay circuit board should be ON.
- If the AIR indicator light on the spa-side control and the air Troubleshooting indicator(s) are ON the problem is not the Spa-side control or the Relay circuit board.

If the AIR troubleshooting indicator(s) fail to illuminate:

- With the AIR indicator ON, use a volt meter to check for correct voltage (120V or 240V) at the AIR relay output (normally OPEN terminal) on the Relay circuit board (K7 Air low and K8 Air high).

If correct voltage is present at the air blower receptacle:

- Replace the air blower.

If correct voltage is not present:

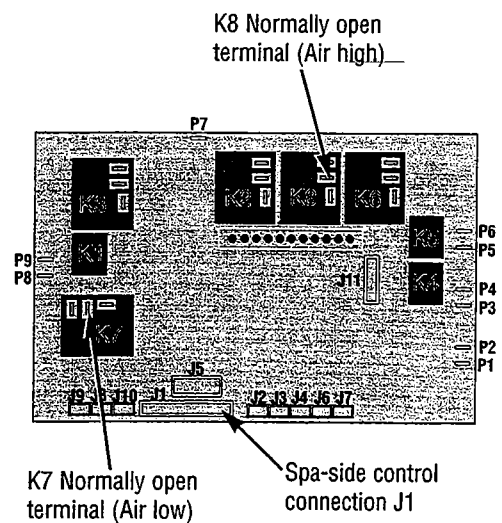
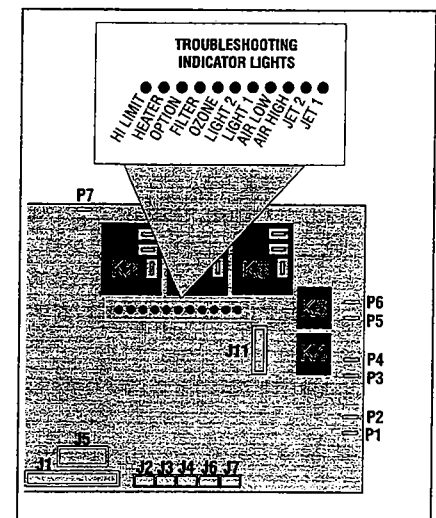
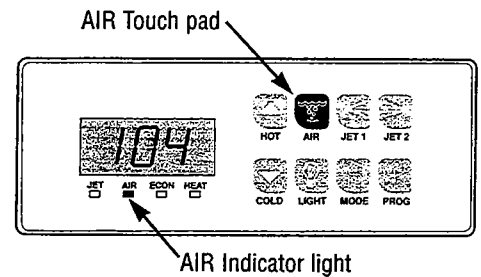
- Check for loose or broken connections from the air blower to the Relay circuit board.
- Check for a loose spa-side control connection J1 on the Control circuit board.

If the connections are good:

- Connect a Test Relay circuit board, if the air blower works, and the air Troubleshooting indicator(s) illuminate, replace the Relay circuit board.
- Disconnect the spa-side control and connect a Test spa-side control to J1 on the Control circuit board.
- Press and release the AIR touch pad. If the air blower operates , and the air Troubleshooting indicator(s) illuminate, replace the spa-side control.

Two speed air blower system:

- Refer to page 10, SPA-SIDE PROGRAMMING and make certain the "Two speed air blower" option is set to ON.



# TROUBLESHOOTING SPECIFIC PROBLEMS

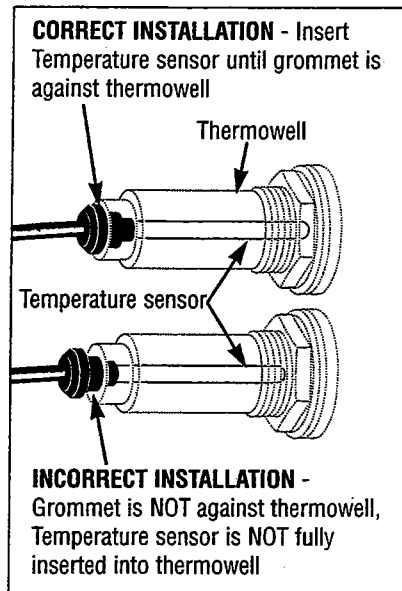
## DISPLAY INDICATES INCORRECT WATER TEMPERATURE

### Check the location of the water temperature sensor:

- Make certain the sensor is fully inserted into the thermowell.
- The thermowell should be installed in the wall of the spa approximately 12 inches below the minimum water level.

### Measure the water temperature with an accurate thermometer:

- If the temperature is several degrees or more higher than the temperature displayed on the spa-side control, check the temperature sensor. Refer to TEMPERATURE vs RESISTANCE table page 22 to evaluate the temperature sensor.
- If the temperature sensor checks out, replace the Relay circuit board.



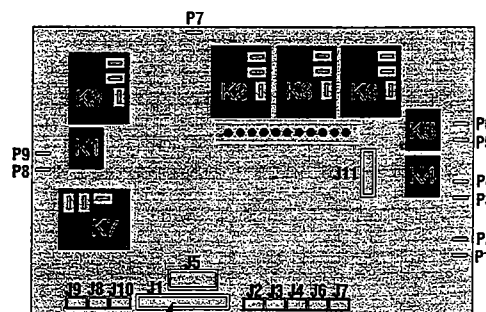
## LIQUID CRYSTAL DISPLAY (LCD) DOES NOT WORK

### If the Spa-side touch pads and LCD display fail to illuminate:

- Check for a loose connection at J1 on the Relay circuit board.
- Check for proper voltage at P1 and P2 (10 - 15 VAC). If correct voltage is not present, check fuse (F1) and transformer.

### If the connection is good:

- Disconnect the spa-side control and connect a Test spa-side control to J1 on the Control circuit board.
- If the Spa-side touch pads and LCD display illuminate, replace the spa-side control.



Spa-side control connection J1

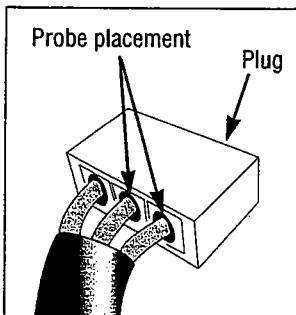
# TEMPERATURE vs RESISTANCE TABLE

TEMP. (degrees F)	THERM. KOHM	TEMP. (degrees F)	THERM. KOHM	TEMP (degrees F)	THERM. KOHM
32	32.7	56	16.9	80	9.25
33	31.8	57	16.5	81	9.03
34	30.9	58	16.0	82	8.82
35	30.0	59	15.6	83	8.61
36	29.2	60	15.2	84	8.41
37	28.4	61	14.8	85	8.22
38	27.6	62	14.5	86	8.03
39	26.8	63	14.1	87	7.84
40	26.1	64	13.7	88	7.66
41	25.4	65	13.4	89	7.48
42	24.7	66	13.1	90	7.31
43	24.0	67	12.7	91	7.14
44	23.3	68	12.4	92	6.98
45	22.7	69	12.1	93	6.82
46	22.1	70	11.8	94	6.67
47	21.5	71	11.5	95	6.52
48	20.9	72	11.2	96	6.37
49	20.4	73	11.0	97	6.23
50	19.8	74	10.7	98	6.09
51	19.3	75	10.4	99	5.96
52	18.8	76	10.2	100	5.83
53	18.3	77	9.95	101	5.70
54	17.8	78	9.71	102	5.57
55	17.3	79	9.48	103	5.45
				104	5.33
				105	5.22

## TEMPERATURE SENSOR AND HIGH LIMIT SENSOR CHECKOUT PROCEDURE

The temperature sensor and high limit sensor utilize a thermistor which changes resistance as a function of temperature. In order to troubleshoot the thermistor, you must know what the resistance should be at a given temperature.

Use a standard VOM (Volt/Ohm Meter) set to read R x 10,000:



□ Disconnect the sensor from J2 (temperature sensor) or J3 (high limit sensor) on the Control circuit board. Attach a 3 pin base to the sensor plug to provide male contact points for resistance reading, or insert probe tips into the back of plug until contact is made.

- Using the VOM, record the resistance reading of the temperature sensor (by attaching the VOM probes to the leads that correspond with the wire connections on the temperature sensor).
- Use an accurate thermometer and check the spa water temperature. The acceptable range is 2°F above and 2°F below the actual spa water temperature. See the example below.
- Refer to the Temperature vs Resistance Table above and compare the spa water temperature to determine if the resistance readings are within the acceptable range.

Example: Temperature vs Resistance range		
	92	6.98
- 2°F	→ 93	6.82
	94	6.67
Water temp.	→ 95	6.52
	96	6.37
+ 2°F	→ 97	6.23
	98	6.09

↑  
Acceptable  
resistance  
range  
↓



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