



SPA

ELECTRONIC CONTROL SYSTEM

TROUBLESHOOTING GUIDE

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## PREFACE

This manual is provided to aid the qualified service technician in troubleshooting and correcting problems found in spas equipped with electronic control systems.

This manual is divided into two sections: Platinum Plus Digital Systems and Premier Digital Systems.

### **Tools required:**

- Voltmeter
- Ammeter
- Ohmmeter
- Screwdrivers (Phillips head, flat head)
- Precision thermometer - digital fever type

### **System components required:**

- System transformer, 120 or 240 VAC (varies per system)
- System sensor set
- System panel (Platinum and Premier digital)
- System control board (correct type for system being worked on.)
- Interlock/flow wires
- Fuses (3, 10, and 30 Amps)

**DANGER:** SHOCK HAZARD. DO NOT PROCEED IF UNQUALIFIED IN WORKING WITH HIGH VOLTAGE.

## I. PLATINUM PLUS DIGITAL CONTROL SYSTEM

Highly advanced microprocessor technology has been combined with solid-state electronic switches to produce the world's finest, high quality state-of-the-art digital control system. The Platinum Plus digital control system is technologically sophisticated, yet easy to understand, use and troubleshoot.

The control panel is passive with no control intelligence. It activates functions at the touch of a button. Each function will echo from the control board to the LCD in a corresponding manner. The panel will also display error messages which enable the service technician to easily troubleshoot the system.

The control board is the heart of the system. A typical control board has the following output capabilities:

### 120/240 VAC System

**Two-speed pump**  
120 VAC, 60 Hz, 2/ .25 HP

**Blower**  
120 VAC, 60 Hz, 1 HP

**Heater**  
120 VAC, 60 Hz, 1.25 kW  
240 VAC, 60 Hz, 5.5 kW

**Light**  
12 W, 60 Hz, 1 A

### 240 VAC System

**Two one-speed pumps**  
240 VAC, 60 Hz, 1 HP\*

**Blower**  
120 VAC, 60 Hz, 1 HP

**Heater**  
240 VAC, 60 Hz, 6 kW

**Light**  
12 W, 60 Hz, 1 A

**Ozonator**  
O<sub>3</sub> Generator, 120 VAC

\*The Quantum™ Plus and Tirage™ Plus Spas are equipped with one 1 HP and one 3 HP pump.

In addition to these outputs, the board receives input from the spa water temperature sensor, high-limit sensor, interlock, and pressure switch.

The temperature sensor is located in the filter/skimmer well. Its function is to regulate the set temperature and shut down the system if the temperature rises above 112° F.

The high-limit sensor is located in the heater well. Its function is to detect both freeze and high-limit conditions. If the sensor reads a temperature below 40° F, the system will automatically turn on all pumps to circulate the water. If the sensor reads a temperature above 118° F, the high-limit relays are opened and the spa is shut down.

**IMPORTANT!** THIS TROUBLESHOOTING GUIDE IS FOR A 120/240 VAC CONVERTIBLE SYSTEM. FOR 240 VAC DEDICATED SYSTEMS, REPLACE THE WORDING "120 VAC" WITH "240 VAC" WHERE APPROPRIATE.

**IMPORTANT!** Before performing any service on the spa, discuss the problem with the spa owner so that you can understand the nature of the problem. Make a visual inspection of the spa to get an understanding of what condition it is in and if anything looks out of the ordinary. If any part appears to be damaged, loose, or missing, make necessary repairs before proceeding.

#### A. CONTROL SYSTEM CHECK

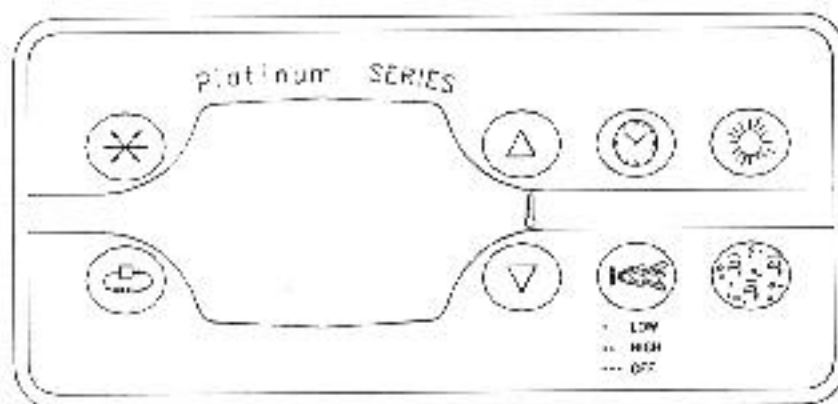


Figure 1. Platinum Plus Digital Control Panel

## 1. Control Panel

**Problem: The panel buttons do not function.**

- a. If any of the panel buttons do not function and there is no fault message or lock symbol displayed, unplug the panel connector and replace it with the appropriate test panel. If the problem button functions correctly on the test panel, then replace the panel.
- b. If the problem button does not operate on the test panel, then replace the control board.

**Problem: The panel is not illuminated.**

If both light bulbs in the panel are out, check the light cable to see if it is cut. If not, replace the lamp with a 1 W, 80 mA, 14 V bulb Part # F414000.

## 2. Spa Light

**Problem: The light symbol appears on the display, but the spa light does not operate.**

- a. Turn the power OFF and measure the continuity of the 3A fuse (F4) located on the circuit board.
  1. If it shows continuity, then the wire connected to the light is bad, or the bulb has burned out.
  2. If the meter does not show continuity, then replace the 3A fuse. If the fuse keeps blowing, then there is something wrong with the light bulb itself.

## 3. Blower

**Problem: The blower symbol appears on the display but the blower does not activate.**

- a. Turn the power off and measure the continuity of the 10A blower fuse with an ohmmeter.
  1. If it does not show continuity, then replace the fuse. If the fuse keeps blowing, then there is probably something wrong with the blower motor.

- b. If the meter shows continuity, then measure the voltage between terminal J4 - 6 on the circuit board and finger 5.

1. If it measures 120 VAC, then either the wiring to the blower is disconnected or the blower itself is bad.

2. If it does not measure 120 VAC then replace the circuit board.

#### 4. Pumps

**Problem: The pump low symbol appears on the display but the pump low does not activate.**

- a. Probe the black and white wires for pump 1 on J4-3 and 5 with a voltmeter (see Fig. 2). The meter should read 120 VAC or 230 VAC for units with 2 pumps.
  1. If it does, then either the pump is bad or the wire to the pump is disconnected.
  2. If the voltmeter does not read 120 VAC, then replace the control board.

**Problem: The pump high symbol appears on the display, but the pump high does not activate.**

- a. Probe the red and white wires of J4-4 and 3 of pump 1. The meter should register 120 VAC.
  1. If it does, either there is an open wire to the pump or the pump itself is bad.
  2. If the meter does not read 120 VAC, then replace the control board.

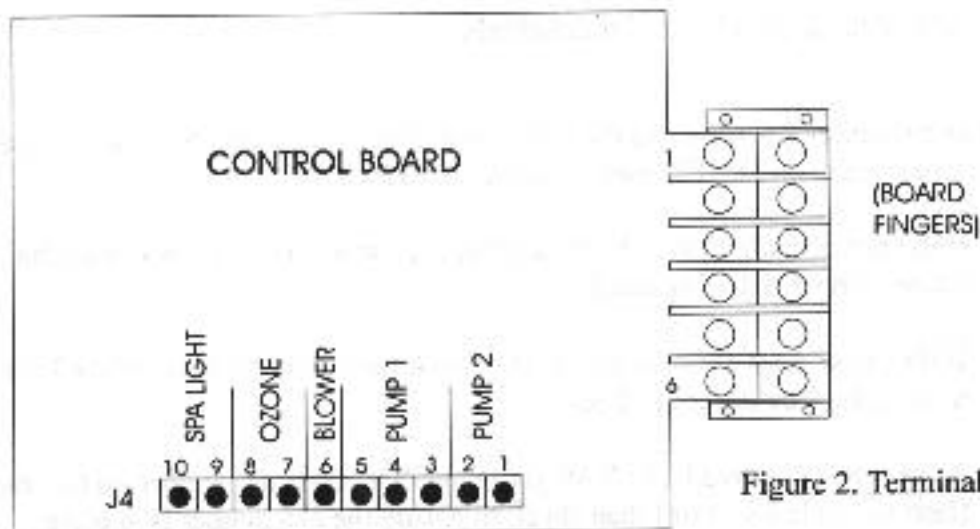


Figure 2. Terminal Block

For systems with a second pump

**Problem:** The pump high symbol appears on the display but the pump2 does not activate.

1. Probe terminals J4-1 (pump2-hi) and board finger 5. The voltmeter should register 240 VAC. If it does not read 240 VAC, then replace the control board. If the meter reads 240 VAC, then either pump 2 is bad or the wire to the pump is disconnected.

#### 5. Heater

**Problem:** "HEAT" is indicated on the display, but the spa will not heat.

- a. Probe input voltage of fingers 1 and 4 of the control board with a voltmeter (see Fig. 2).
- b. If the input voltage to the heater is 120 VAC or 240 VAC, then probing fingers 1 and 3 should register 120 VAC or 240 VAC respectively.
  1. If the voltmeter shows 120 VAC or 240 VAC, then the heater element is bad or the wire to the heater element is disconnected.
  2. If the voltmeter does not read 120 VAC or 240 VAC, then replace the control board.

#### 6. Ozone Generator

The ozone generator is enabled and "O<sub>3</sub>" appears on the display during the filter cycle only. If, however, any pump, blower, or light button is pressed, the ozone generator will be disabled for 1 hour.

**Problem:** The ozone generator will not operate.

- a. When the pump low is on and the unit is in a filter cycle, measure between ozone black and white on J4. The meter should read 120 VAC.
  1. If the meter reads 120 VAC, then either the ozone generator is bad or the ozone wires are disconnected.
  2. If the meter does not read 120 VAC, check the circuit breaker. If the breaker is okay, replace the control board.
  3. If the meter does read 120 VAC on J4 but "O<sub>3</sub>" does not appear on the display (next to mode selection) then check to ensure the J16 jumper is in place.

## 7. Panel Display Messages

Message	Meaning
---------	---------

a. "Pd"	Battery backup
---------	----------------

Power has been cut off to the spa, and it is using its 15 minute battery backup to preserve its settings. The control panel will be disabled until power returns to the unit.

b. "OH"	Overheat protection (Spa is deactivated.)
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**Note:** Overheating may occur if the low-speed pump is set to operate for extended periods of time. If this happens, remove the spa cover and allow the water to cool to below 110° F first, then touch any button on the panel to reset the system. If the water is still hotter than the set temperature, press the blower button to cool the spa.

1. If the outlet ball valve is closed, the system will go to an overheat condition. Open the closed valve and plug in a test sensor set without installing the sensors in their locations. Press the mode button to reset the spa. The water will circulate and cool the heating element. Place the original sensors back in the spa. Press any button on the control panel to reset the spa.
2. If a malfunction occurs and the spa water reaches 112° F, the system will completely shut down. Unplug the sensor connector J2 (temp/high-limit) and replace it with a test sensor set. Press any button on the control panel to reset the spa.

- a. If the problem does not repeat, then replace the temp/high-limit sensor.

- b. If the problem repeats, then replace the control board.

c. "FLO"	Flow switch
----------	-------------

1. The display shows "FLO" alternately with the temperature.

The software has detected an error at the pressure switch. Make sure the ball valves are open. If the ball valve on the inlet side is closed, opening it should solve the problem. If the ball valve on the inlet side is open, do the following:

- a. Check the water level to see if it is low. Refill the spa if necessary.
- b. Remove the filter cartridge. If the spa operates normally, then the cartridge is dirty. Clean or replace if necessary.
- c. Check the suction cover to see if it is blocked or clogged. If it is, clean it.
- d. Check the pump to see if it is operating normally.
- e. Check the flow wire for cuts.

If all of these items are working properly, then replace the pressure switch and clean out the area where the pressure switch is located with a metal brush.

2. The display continually shows "FLO."

The software has detected an error at the pressure switch. Make sure the ball valves are open. If the ball valves are closed, opening them may remove the error message from the display and the spa should operate normally. If the spa does not operate normally, do the following:

- a. Replace the pressure switch and clean out the area where the pressure switch is located with a metal brush.
- b. If the problem continues, then replace the control board.

d. "COOL"                      Temperature set back

If the spa water is more than 20° F cooler than the set temperature point, the heater will automatically activate to provide freeze protection. This is a normal spa function; no corrective action is necessary.

e. "ICE"                      Freeze protection

When the high-limit sensor reads below 40° F at the heater element, the system is at freeze condition. It will then automatically activate all pumps to circulate the water. This is a normal spa function; no corrective action is necessary.

- f. "Sn1"                      Open sensor (Spa is deactivated.)

The high limit temperature sensor is non-functional. Unplug the sensor connector of J2 (temp/high-limit) and replace it with a test sensor set. Press any button on the panel to reset the system.

1. If the problem does not repeat, then replace the high-limit sensor.
2. If the problem continues, then replace the control board.

- g. "Sn3"                      Open sensor (Spa is deactivated.)

The water temperature sensor is non-functional. Unplug the sensor connector of J2 (temp/high-limit) and replace it with a test sensor set. Press any button on the panel to reset the system.

1. If the problem does not repeat, then replace the water temperature sensor.
2. If the problem continues, then replace the control board.

## B. FILTER SETTINGS

If the filter settings have just been changed, it takes 24 hours for the filter cycle to reflect the changes. You may cycle the time clock forward 24 hours to put the new filter cycles immediately into effect.

## II. PREMIER DIGITAL CONTROL SYSTEM

A typical control board has the following output capabilities:

### 120/240 VAC System

#### **Two-speed pump**

120 VAC, 60 Hz, 2/25 HP

#### **Blower**

120 VAC, 60 Hz, 1 HP

#### **Heater**

120 VAC, 60 Hz, 1.25 kW

240 VAC, 60 Hz, 5.5 kW

#### **Light**

12 W, 60 Hz, 1 A

### 240 VAC System

#### **Two one speed-pumps**

240 VAC, 60 Hz, 1 HP

#### **Blower**

120 VAC, 60 Hz, 1 HP

#### **Heater**

240 VAC, 60 Hz, 6 kW

120 VAC, 60 Hz, 30 A general  
purpose or resistive, 800 VA pilot  
duty (gas heater)

#### **Light**

12 W, 60 Hz, 1 A

**DANGER: SHOCK HAZARD. DO NOT PROCEED IF UNQUALIFIED IN WORKING WITH HIGH VOLTAGE.**

### A. CONTROL SYSTEM CHECK

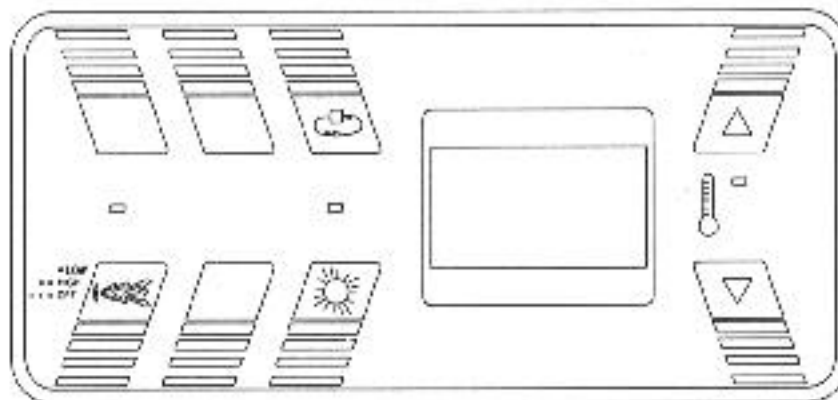


Figure 3. Premier Digital Control Panel

## 1. Control Panel

**Problem:** The panel buttons do not function.

If any of the panel buttons do not function, unplug the panel connector (J1) on the control board and replace it with an appropriate test panel.

- a. If the problem button functions correctly on the test panel, then replace the panel.
- b. If the problem button does not operate on the test panel, then replace the control board.

## 2. Spa Light

**Problem:** The light LED is on, but the spa light does not operate.

- a. Probe positions 9 and 10 of J4 with a voltmeter (see Fig.2). The meter should register approximately 14 VAC.
  1. If it does, either the spa light bulb is burned out or the wires to the light bulb are disconnected (open).
  2. If it doesn't, turn OFF the main power to the spa. Set the voltmeter to ohms and check the continuity of the 3 Amp fuse located next to the J5 (fan/battery) connector.
    - a. If the voltmeter does not show continuity, then replace the 3 Amp fuse and turn on the main power to the spa.
    - b. If the voltmeter shows continuity, then replace the control board.

## 3. Blower

**Problem:** The blower LED is on, but the blower does not activate.

1. Turn the power off and measure the continuity of the 10A blower fuse with an ohmmeter.
  - a. If it does not show continuity, then replace the fuse. If the fuse keeps blowing, then there is probably something wrong with the blower motor.

- b. If the meter shows continuity, then measure the voltage between terminal J4 - 6 on the circuit board and finger 5.
  1. If it measures 120 VAC, then either the wiring to the blower is disconnected or the blower itself is bad.
  2. If it does not measure 120 VAC then replace the circuit board.

#### 4. Pumps

**Problem: Pump low does not operate.**

- a. If the red jets LED is on but the spa pump is not on, then probe the white and black pump wires on J4 with a voltmeter. The voltmeter should register 120 VAC.
  1. If it does, then there is either something wrong with the pump or the wire to the pump is disconnected.
  2. If the voltmeter does not register 120 VAC, then replace the control board.
- b. If the red jets LED does not turn on, then replace the control board.

**Problem: Pump high does not operate.**

- a. Press the jets button to pump high setting and probe the red and white pump wires on J4. The voltmeter should register 120 VAC.
  1. If it does, then the pump is bad or the wires to the pump are disconnected.
  2. If it does not register 120 VAC, then replace the control board.

For systems with a second pump

**Problem: The pump2 does not turn on.**

1. Probe terminals J4-1 (pump2-hi) and board finger 5. The voltmeter should register 240 VAC.
  - a. If it does not read 240 VAC, then replace the control board.
  - b. If the meter reads 240 VAC, then either pump2 is bad or the wire to the pump is disconnected.
5. Heater

**Problem: The spa will not heat.**

- a. Check the spa panel to see if it is in Standard "Stan" mode. If it is in Economy mode, "Econ" will be flashing. (If the spa panel is not in Standard mode, press the panel's "E" mode button to change it back to Standard mode.) Check probe input fingers 1 and 4 of the control board with a voltmeter. This should read 120 VAC or 240 VAC.
  - b. If the red heater LED is on, then check probe fingers 1 and 3 on the control board (see Fig. 2) with a voltmeter. The meter should read 120 VAC or 240 VAC.
    1. If it does, then either the heating element is bad or the wire to the heater is disconnected.
    2. If it does not, then replace the control board.
7. Fault Messages

	Message	Meaning
a.	"OH"	Overheat protection (Spa is deactivated.)

Note: Overheating may occur if the low-speed pump is set to operate for extended periods of time. If this happens, remove the spa cover and allow the water to cool to below 110° F first, then touch any button to reset the system. If the water is still hotter than the set temperature, press the blower button to cool the spa.

1. If the outlet ball valve is closed, the system will go to an overheat condition. Open the closed valve and plug in a test sensor set without installing the sensors in their locations. Press any button to reset the spa. The water will circulate and cool the heating element. Place the original sensors back in the spa. Press any button to reset the spa.
  2. If a malfunction occurs and the spa water reaches 112° F, the system will completely shut down. Unplug the sensor connector J2 (temp/high-limit) and replace it with a test sensor set. Push any button to reset the spa.
    - a. If the problem does not repeat, then replace the temp/high-limit sensor.
    - b. If the problem repeats, then replace the control board.
- b. "FLO"                      Flow switch

1. The display shows "FLO" alternately with the temperature.

The software has detected an error at the pressure switch. Make sure the ball valves are open. If the ball valve on the inlet side is closed, opening it should solve the problem. If the ball valve on the inlet side is open, do the following:

- a. Check the water level to see if it is low. Refill the spa if necessary.
- b. Remove the filter cartridge. If the spa operates normally, then the cartridge is dirty. Clean or replace if necessary.
- c. Check the suction cover to see if it is blocked or clogged. If it is, clean it.
- d. Check the pump to see if it is operating normally.
- e. Check the flow wire for cuts.

If all of these items are working properly, then replace the pressure switch and clean out the area where the pressure switch is located with a metal brush.

2. The display continually shows "FLO."

The software has detected an error at the pressure switch. Make sure the ball valves are open. If the ball valves are closed, opening them may remove the error message from the display and the spa should operate normally. If the spa does not operate normally, do the following:

- a. Replace the pressure switch and clean out the area where the pressure switch is located with a metal brush.
- b. If the problem continues, then replace the control board.
- c. "COOL"            Temperature set back

If the spa water is more than 20° F cooler than the set temperature point, the heater will automatically activate to provide freeze protection. This is a normal spa function; no corrective action is necessary.

- d. "ICE"            Freeze protection

When the high-limit sensor is below 40° F at the heater element, the system is at freeze condition. It will then automatically activate the pump low to circulate the water. This is a normal spa function; no corrective action is necessary.

- e. "Sn1"            Open sensor (Spa is deactivated.)

The high-limit temperature sensor is non-functional. Unplug the sensor connector of J2 (temp/high-limit) and replace it with a test sensor set. Press the "cool" pad to reset the system.

1. If the problem does not repeat, then replace the high-limit sensor.
2. If the problem continues, then replace the control board.

- f. "Sn3"                      Open sensor (Spa is deactivated.)

The water temperature sensor is non-functional. Unplug the sensor connector of J2 (temp/high-limit) and replace it with a test sensor set. Press the "cool" pad to reset.

1. If the problem does not repeat, then replace the water temperature sensor.
2. If the problem continues, then replace the control board.

## B. FILTER SETTINGS

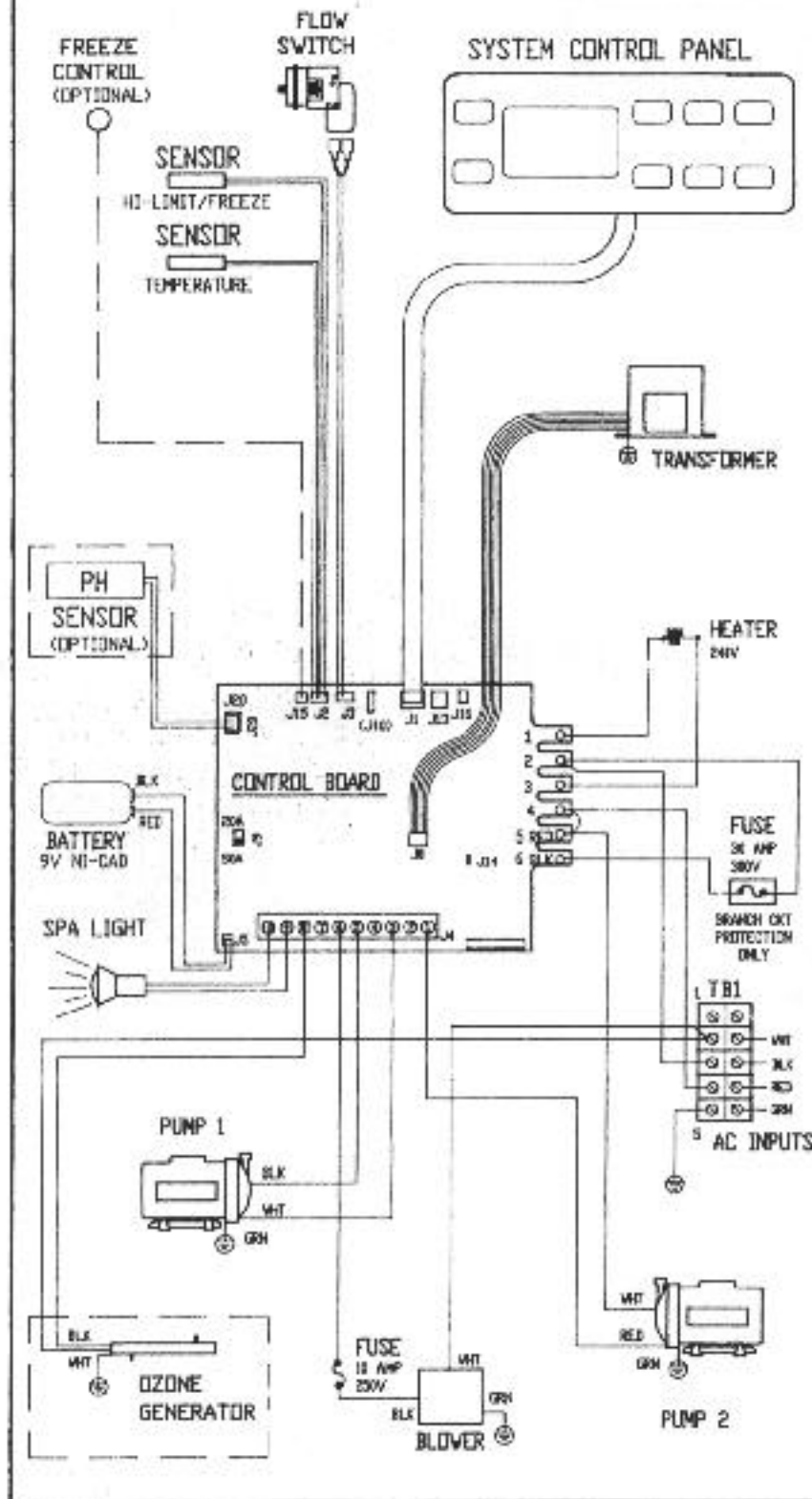
Filter select jumper (models F108 and F109 only): This jumper denotes the duration of the filter cycle. Setting A is 2 hours, setting B is 5 hours. The first filtration cycle begins 1 minute after the system is powered up. The second filter cycle starts 12 hours after the first cycle begins. The blower turns on for 30 seconds at the start of each cycle. The ozone generator is enabled and the pump low runs continuously.

## C. OPTIONAL FEATURES

An ozone generator may be purchased with a connection kit for installation on Premier Spas. J1 (filter select) may be changed by putting the jumper in "A" for two 2-hour filter/ozone cycles, or, "B" for two 5-hour filter/ozone cycles.

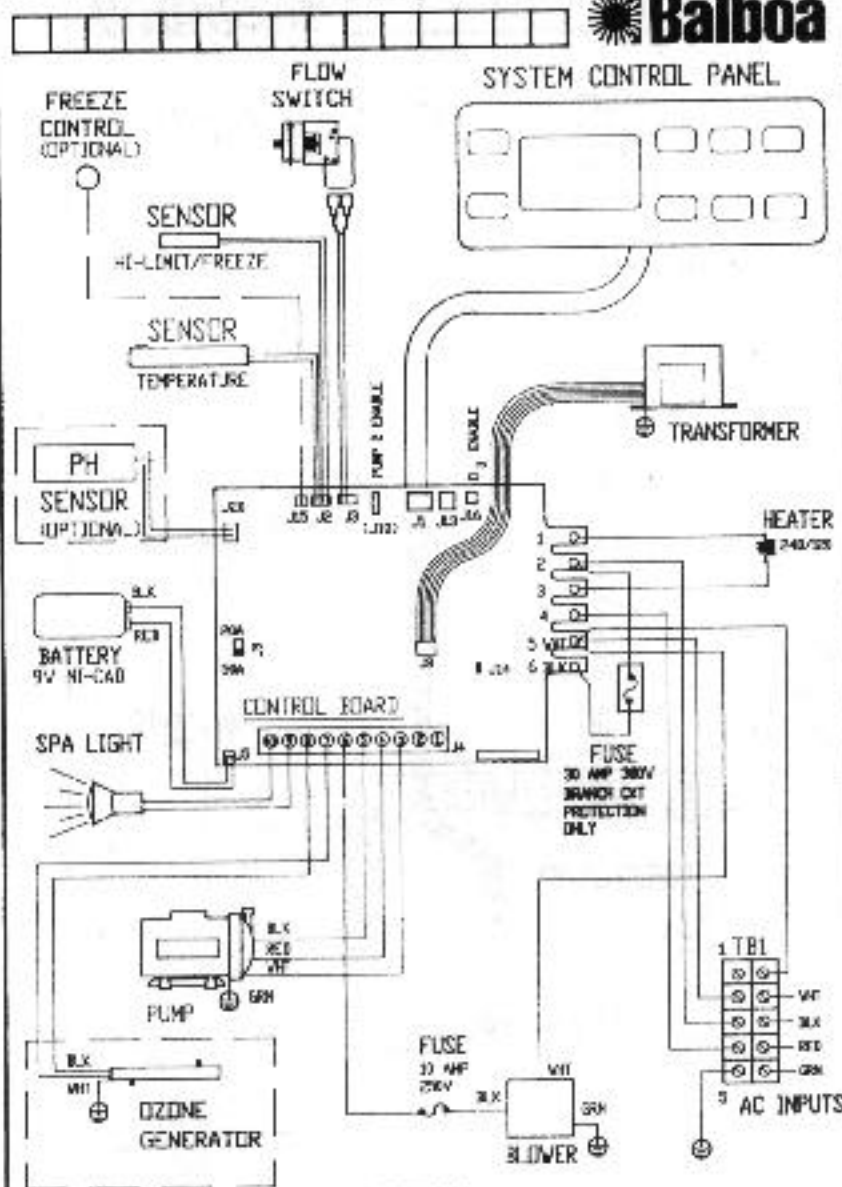
# F106 SYSTEM WIRING DIAGRAM

08/94

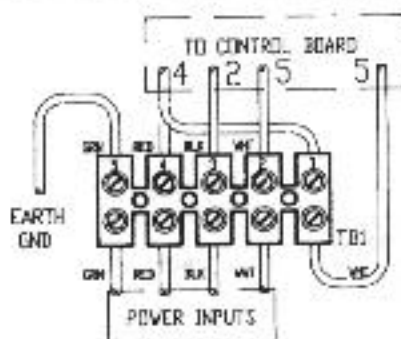


# F107 SYSTEM WIRING DIAGRAM

08/94



## CONVERSION DIAGRAM 120V TO 240V



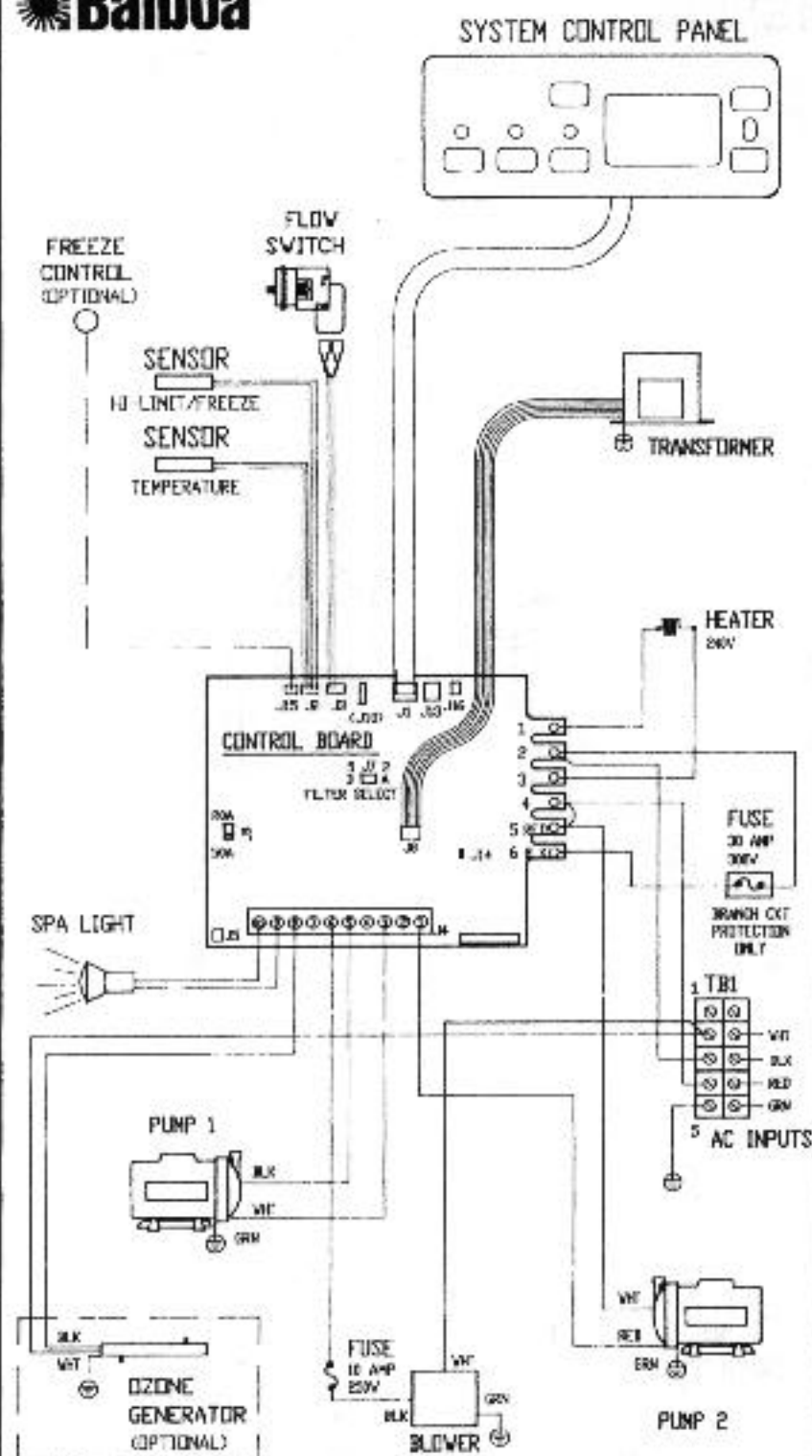
(SHOWN WIRED FOR 240 VAC)

## CONVERSION INSTRUCTIONS

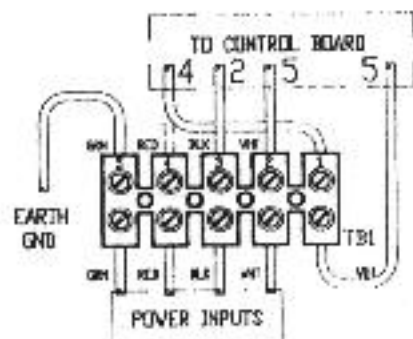
1. CONVERSION MUST BE PERFORMED BY A QUALIFIED LICENSED ELECTRICAL HANDSOME ONLY.
2. DISCONNECT FROM POWER AND REMOVE COVER.
3. MOVE RED WIRE (TER-3) TO (TER-4) AS INDICATED BY DASHED LINES.
4. MOVE THE HEATER AMP SELECTOR KNOB ON THE CONTROL BOARD FROM 20A TO 50A POSITION.

# F108 SYSTEM WIRING DIAGRAM

08/94



## 11/94

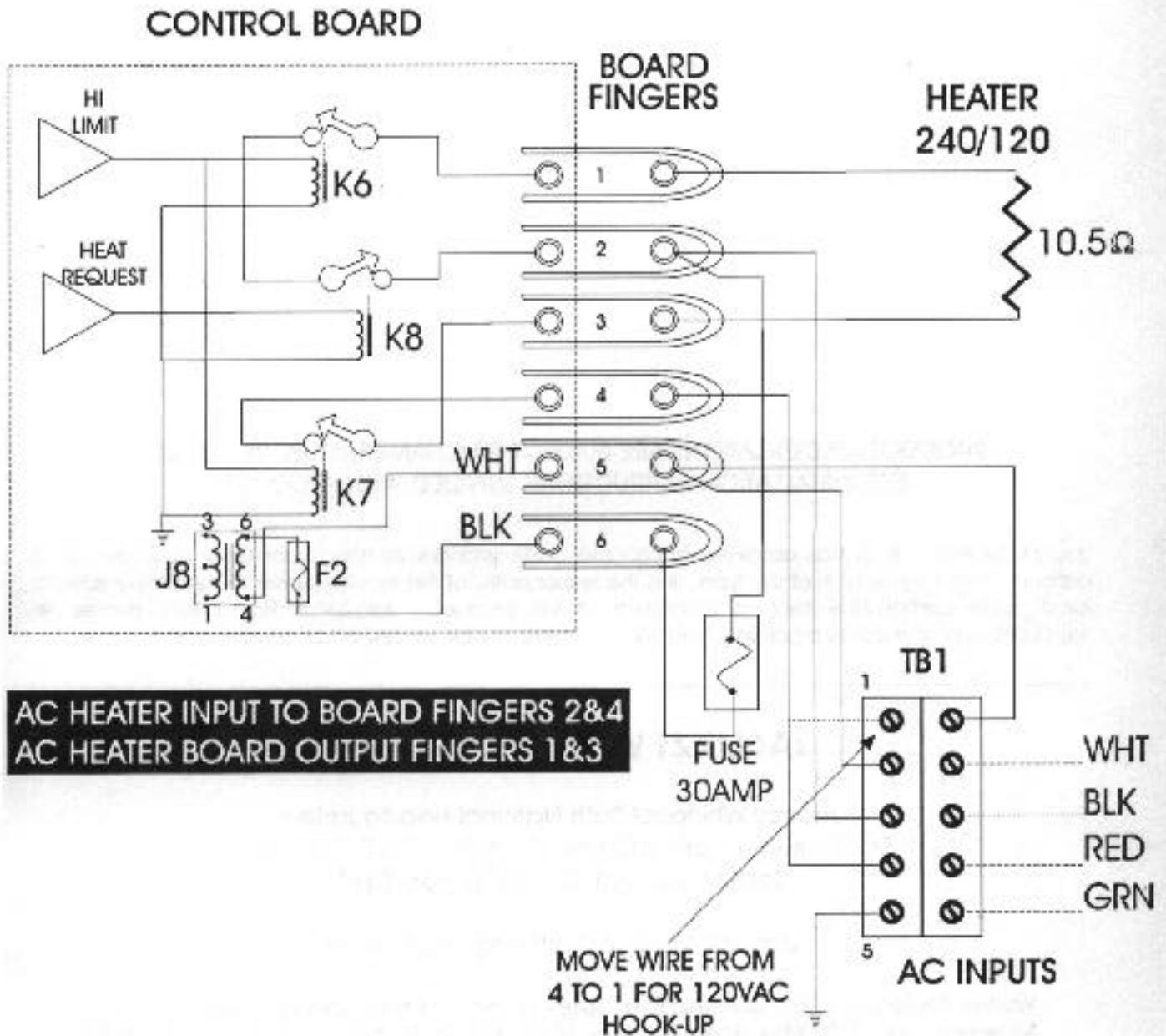


(SHOWN WIRED FOR 240 VAC)

CONVERSION INSTRUCTIONS:

1. CONVERSION MUST BE PERFORMED BY A QUALIFIED, LICENSED ELECTRICAL TECHNICIAN ONLY.
2. DISCONNECT FROM POWER AND REMOVE COIL.
3. MOVE PWR WIRE (TER-2) TO (TER-4) AS INDICATED BY DASHED LINES.
4. MOVE THE HEATER WIRE SELECTION (TER) ON THE CONTROL, AWAY FROM (SW) TO (SW POSITION).

# HEATER CIRCUIT



**PRODUCT SPECIFICATIONS ARE SUBJECT TO CHANGE WITHOUT NOTICE.  
USE INSTALLATION INSTRUCTIONS SUPPLIED WITH PRODUCT.**

Jacuzzi Whirlpool Bath has obtained applicable code (standards) listings generally available on a national basis for products of this type. It is the responsibility of the installer/owner to determine specific local code compliance prior to installation of the product. Jacuzzi Whirlpool Bath makes no representation or warranty regarding, and will not be responsible for any code compliance.

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## **JACUZZI WHIRLPOOL BATH**

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**Service Support: Call (510) 938-7411**

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