STANDARD TROUBLESHOOTING APPROACH
S.T.A. MANUAL 2014+
LED SERIES
The following symbol is placed throughout this manual for your protection. Always use extreme caution whenever performing repairs to electrical control system components of any kind!

DANGER: Electrical Shock Hazard Exists!
High Voltage Present on Circuit Board. Use Extreme Caution while Servicing Circuit Board.
# Table of Contents

## 1.0 Standard Troubleshooting Approach (S.T.A.)

1. Why a Standard Troubleshooting Approach? .................................................................................................................. 1
2. How to Use the S.T.A. ......................................................................................................................................................... 1
3. Professional Customer Service ........................................................................................................................................ 1
4. Before Leaving the Shop .................................................................................................................................................... 1
5. Fixing the Hot Tub ........................................................................................................................................................... 1
6. Before Calling Technical Support ................................................................................................................................ 1
7. Before Leaving the Customer ............................................................................................................................................ 1
8. Satisfying the Customer .................................................................................................................................................... 2

## 2.0 Electro Static Discharge (E.S.D.)

1. E.S.D. - What is it? What does it do? .......................................................................................................................... 3
2. Avoiding E.S.D. Damage ................................................................................................................................................... 3
3. What About Wrist Straps and Special Mats? .................................................................................................................. 3
4. Must Wrist Straps and Mats be Used When Replacing A Circuit Board? ........................................................................ 3

## 3.0 Main Control Panel Functions

1. J-300 Control Panel (2014+) ............................................................................................................................................. 4

## 4.0 Control Panel Functions

1. Setting Water Temperature .................................................................................................................................................. 5
2. Activate Jet Pumps ............................................................................................................................................................... 5
3. Light On/Off Button ............................................................................................................................................................ 5
4. Light Mode Button .............................................................................................................................................................. 5
5. Jets ...................................................................................................................................................................................... 6
6. Selecting Desired Massage Action ..................................................................................................................................... 6
7. Waterfall Feature ............................................................................................................................................................... 6
8. Air Controls ........................................................................................................................................................................ 6

## 5.0 Standard Programming Functions

1. Menu Programs Button .......................................................................................................................................................... 7
2. Primary Filtration Program .................................................................................................................................................. 8
3. Change Filter Timer Program .......................................................................................................................................... 9
4. Secondary Filtration Program .......................................................................................................................................... 9
5. CLEARARRAY Program ................................................................................................................................................... 10
6. Economy Mode ................................................................................................................................................................. 10
7. Lock Mode .......................................................................................................................................................................... 11
8. Top Menu Lock ................................................................................................................................................................. 11

## 6.0 Understanding Circuit Board Pin Assignments

1. Circuit Board Jumpers (All North American 60Hz 2-Pump Models) ............................................................................. 12
2. Circuit Board Jumpers (All Export 50 Hz 2-Pump Models) ............................................................................................ 12
3. Circuit Board Jumpers (All North American 60 Hz 1-Pump Models) ........................................................................ 12
4. Circuit Board Jumpers (All Export 50 Hz 1-Pump Models) ............................................................................................ 13

## 7.0 Troubleshooting Using The Control Panel

1. Control Panel Displays ....................................................................................................................................................... 14
2. Control Panel Default Display ........................................................................................................................................... 14
3. Control Panel Status and Error Messages ....................................................................................................................... 14
4. Testing Flow ....................................................................................................................................................................... 16
8.0 Troubleshooting without The Control Panel

8.1A No Heat or Not Enough Heat (All Models) ................................................. 17
8.1B No Heat or Not Enough Heat (All Models) ............................................. 18
8.1C No Heat or Not Enough Heat (All Models) ............................................. 19
8.1D No Heat or Not Enough Heat (All Models) ............................................. 20
8.1E No Heat or Not Enough Heat (All Models) ............................................. 21
8.2 Intermittent Heating .................................................................................. 22
8.3 Nothing Works ......................................................................................... 22
8.4 Hot Tub Doesn’t Come On for Filter Cycle ................................................. 23
8.5 House Breaker Trips .................................................................................. 23
8.6A J-300 Collection DCU Unit ...................................................................... 24
8.6C Hot Tub Light Will Not Come On ............................................................. 25
8.7 No Jets ........................................................................................................ 26
8.8 Ozonator Not Working (Optional) ............................................................. 27
8.9 CLEARAY Not Working ............................................................................ 28
8.10 Weak or SURGING Jets ........................................................................... 29
8.11 Jets Pump Runs and Quits During Jet Mode ................................................ 30
8.12 Circulation Pump Not Working ................................................................. 31
8.13 Troubleshooting A Thermal Pump Cutout ................................................ 32
8.14 Pump 1 Hums and Will Not Start .............................................................. 32
8.15 SERVICE BULLETIN: 2014 J-300 Summer Logic Upgrade (July 29, 2014) 33
8.16 MicroChip Replacement Procedure ......................................................... 34
8.17 48 Frame Jet Pump Change ..................................................................... 35

APPENDIX ......................................................................................................... 36
A1 Checking Voltage to Hot Tub ..................................................................... 37
A2 Checking Current Consumption of Devices ................................................. 38
A3 Checking Voltages to Devices ..................................................................... 39
A4 Testing Flow Switch .................................................................................... 40
A5 About Fuses ............................................................................................... 40
A6 The Watchdog " - - - " ................................................................................. 41
A7 Understanding Sanitizers ........................................................................... 41
A8 Understanding pH ...................................................................................... 42
A9 North American 60 Hz 120V/240V Convertible 1-Pump Models .................. 43
A10 North American 60 Hz 240V 2-Pumps Models .......................................... 44
A11 Export 50 Hz 230V 1-Pump Models .......................................................... 45
A12 Export 50 Hz 230V 1- or 2-Pump Models .................................................. 46
A13 Load Box Connection Diagrams A - D (North American 60 Hz) ................. 47
A14 Temperature Sensor/Hi-Limit Sensor Resistance Chart .............................. 49
A15 Flow Switch Illustration ........................................................................... 50
A16 Sensor Harness Diagram ........................................................................... 50
A17 Transformer Test ....................................................................................... 51
A18 Troubleshooting The Optional Stereo System ............................................ 52
A20 Glossary of Terms ..................................................................................... 54
A21 Troubleshooting Data Collection Form ..................................................... 55
1.0 Standard Troubleshooting Approach (S.T.A.)

1.1 Why a Standard Troubleshooting Approach?
Service prices are basically set by local industry and geographic region. Stiff competition in the service industry has made it difficult to raise the price of a service contract; or charge more for time and materials than the competitive shop down the street. If your service business is to be profitable you must control the overall cost of service. The total cost of service is made up of many individual cost factors, but three in particular are more important than the rest combined:

1. Time of Repair - How long it takes to find and fix a problem.
2. Time Between Failures - How often you are called to repair any one particular hot tub? How many times are you called back to fix the same problem on the same hot tub?
3. Parts Usage - Except in rare circumstances, only one part fails. How many parts do you replace before you find the bad one?

This S.T.A. manual has been designed to help you control the overall cost of service by focusing on the three important aspects of your job outlined above. The S.T.A. will help you fix your customer’s hot tub quickly, fix it well, and use fewer parts.

1.2 How to Use the S.T.A.
The S.T.A. was developed by the Technical Support Department and is designed to be the communications link between you and your customers. If you call for help on any symptom covered in this book, you will be told to do what the S.T.A. recommends, therefore, you will save time by calling technical support after you have done what the S.T.A. tells you to do.

1.3 Professional Customer Service
Doing your job in a way that keeps cost of service low and profit margin high also creates customer satisfaction. That’s being a professional!

1.4 Before Leaving the Shop
Phone the customer(s), personally if possible, and ask what problem(s) should be corrected. This may not tell you what work must be done or what part(s) must be replaced, but it will tell you what you must fix after you arrive.

1.5 Fixing the Hot Tub
Use the S.T.A. to see how the Technical Support Department would approach the customer’s complaint. Try to fix the problem following the S.T.A. Use your experience and other information to help you answer any “Whys” or “Hows.” The S.T.A. is designed to keep unnecessary part replacement to a minimum. Least expensive, most likely, and easily changed parts are always swapped first. Some parts, like control panels and temperature sensors do not require complete installation to be temporarily swapped out for testing purposes. You should carry such spares as “Tools.”

1.6 Before Calling Technical Support
Make sure you have followed the S.T.A. and filled out a “Troubleshooting Data Collection Form” (refer to example on page 55). Have the S.T.A. manual and the Troubleshooting Data Worksheet near the telephone. Technical Support can help you best if these two things become the communications tools for the phone call.

1.7 Before Leaving the Customer
Even if you didn’t have to fill out a Troubleshooting Data Collection Form, please do so. If this is a warranty repair, the information will be needed when your office fills out the “Warranty reimbursement form.” In any case, it will help you spot trouble before it happens. Pumps burn up if voltage at the hot tub is too low. Circuit breakers trip if heaters and motors draw too much current (Amps). Wires overheat and connections burn if wire size is too small or push-on connectors are loose. Call backs cause cost of service to increase!
1.8 Satisfying the Customer

Most customers do not care what work you have done or what parts you have replaced, but they always care whether or not their problem goes away. When you are done, show them that their problem is gone. If they ask how you did it, take a few minutes to explain. Show them the bad part(s) and explain or show why it is bad.

- **Develop** the habit of examining the hot tub’s you service. Compliment customers on the things they are doing right. Tell them how their care and attention can stop trouble before it starts.

- Mention if you noticed any adverse conditions, especially in hot tub’s under warranty or contract, that could lead to failure. Can the customer correct the problem? Would they like you to correct it? Can you recommend someone? Would they like an estimate?

- Think of yourself and the customer as a “team” trying to keep the product up and running as cost-effective and time-efficient as possible. That’s good for the customer, and it is good for your business.
2.0 Electro Static Discharge (E.S.D.)

2.1 E.S.D. - What is it? What does it do?
Static electricity is always being generated around us, even at those times of the year when we no longer get zapped after walking across a rug and touching something.

Like all state-of-the-art circuit boards, the hot tubs circuit board can be damaged by unnoticed static electricity. Damaged is the key word. Sometimes a board which has been subjected to E.S.D. will fail immediately upon being put back into service.

- If the hot tub runs only a few days, the customer thinks you provided poor service.
- If the hot tub runs only a few months, the customer thinks the circuit board is a low quality product.
- The customer loses use of the hot tub. You lose money because you must go back to make it right. Jacuzzi loses its reputation for quality.

2.2 Avoiding E.S.D. Damage
We can't prevent static charges from building up within our bodies as we go about our jobs, so we must do three things to protect circuit boards from getting zapped:

1. Never transport or ship circuit boards - Good boards or bad boards - except in static protective bags.
2. Never remove the board from the static protective bag unless you are ready to install it in the hot tub.
3. After removing the bad board from the hot tub, A) lay it on the ground, B) remove the replacement board from the static protective bag, C) lay the replacement board on the ground, D) place the bad board in the bag from which you removed the replacement board, E) return bad board(s) in undamaged sealed static protective bags.

2.3 What About Wrist Straps and Special Mats?
The purpose of these devices is to keep the technician, the work surface, and the circuit board at the same electrical potential, and to drain into ground any static charges which might build up. Proper use of the wrist strap and special mat guarantees maximum protection against E.S.D. damage.

2.4 Must Wrist Straps and Mats be Used When Replacing A Circuit Board?
No, if you keep the spare board in the protective bag during transport and you observe a few simple techniques during replacement.

The possibility of E.S.D. damage to the circuit board during replacement will be minimal because of the hot tub's design and the way you normally work on it. Touching the grounding lug or heater will drain all built-up static charges from your body much like a wrist strap would. Laying the bad board on the ground will tend to keep it neutral. Touching a finger to the grounding lug or heater immediately before removing the good board from the bag will drain any charges built up by the rustling of your clothes. Laying the good board on the ground after removing it from the bag will tend to keep it neutral. Another quick touch of the grounding lug or heater before picking up the bad board will again drain built up charges. Slipping the bad board into the protective bag will allow it to be transported safely. Another quick touch of the grounding lug or heater before picking up the good board will again drain any charges built up by the rustling of your clothes. In the process of installing the replacement board, you and the board will be grounded to the load box, grounding lug, or heater, draining off charges you may build up during installation.
3.0  Main Control Panel Functions

3.1  J-300 Control Panel (2014+)

Display shown for example purposes only, actual water temperature display will vary.

<table>
<thead>
<tr>
<th>Button</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>CLEARRAY Button: Manually activates the CLEARRAY system for a one-hour period.</td>
</tr>
<tr>
<td>B</td>
<td>CLEARRAY Indicator: Lit when the CLEARRAY system is on. Flashing when the UV bulb needs to be replaced.</td>
</tr>
<tr>
<td>C</td>
<td>Light Button: Turns waterfall, footwell, cup holders and backlit pillows on in unison. Press once for high intensity, a second time for medium intensity, a third time for low intensity, a fourth time to turn off. The displayed color is changed using the light mode button below.</td>
</tr>
<tr>
<td>D</td>
<td>Light Mode Button: Selects one of 4 color modes for waterfall, cup holders and backlit pillows.</td>
</tr>
<tr>
<td>E</td>
<td>Cooler Button: Decreases water temperature setpoint.</td>
</tr>
<tr>
<td>F</td>
<td>Warmer Button: Increases water temperature setpoint.</td>
</tr>
<tr>
<td>G</td>
<td>Jets 1 Button: Turns high-speed jets pump #1 on and off. Press once to turn on; a second time to turn off.</td>
</tr>
<tr>
<td>H</td>
<td>Jets 2 Button (J335 to J385): Turns high-speed jets pump #2 on and off. Press once to turn on; a second time to turn off.</td>
</tr>
<tr>
<td>I</td>
<td>Menu Button: Allows access to the programming menus.</td>
</tr>
<tr>
<td>J</td>
<td>Heat Indicator: Lit when heater is on.</td>
</tr>
<tr>
<td>K</td>
<td>LED Display: Can display current water temperature (default display), water temperature setpoint, selected filtration/heating mode, and error messages.</td>
</tr>
</tbody>
</table>

OPERATION DETAILS

• Temperature Adjustment: 65 to 104°F (18 to 40°C). Factory default setting is 100°F (38°C).
• CLEARRAY Operation: System runs for 1 hour (when manually activated), then automatically shuts off.
• Light Operation: All LED lights run for 2 hours, then automatically shut off.
• Jets 1/Jets 2 Button Operation: Jets run for 20 minutes when activated, then turn off automatically to conserve energy. Simply press either jets button to continue operation for an additional 20 minutes.
4.0 Control Panel Functions

4.1 Setting Water Temperature
Press either the Warmer ( ) or Cooler ( ) button to adjust the current temperature setting. The current set temperature reading will blink once to indicate that the system is ready to accept changes. Press the Warmer or Cooler button to adjust the temperature to a desired setting. Once the desired temperature is reached, do not press any buttons on the control panel for about 5 seconds. The new temperature setting will blink twice to indicate that the change has been made.

To access the overtemp feature that allows the spa to reach 106°F (41°C) follow the steps below.

![WARNING: RISK OF HYPERTHERMIA (OVER-HEATING) CAUSING SEVERE INJURY, BURNS, WELTS OR DEATH! Water temperature in excess of 104°F (40°C) may be injurious to your health.]

A. Press and hold the WARME( )r button then;
B. Press and hold the JETS 1 ( ) button at the same time for 2 seconds. You will see the temperature change to 105°F (40°C) on the LED display. Press the WARME( )r to raise the temperature to 106°F (41°C) To lower the temperature, press the COOLER ( ) button.
C. When the overtemp has been activated, the decimal point after the last digit will flash on and off every second as an indicator for being in the overtemp mode.

Note: Once the temperature goes below 104°F (40°C) and you would like to raise the temperature to 106°F (41°C) again, you will have to repeat the steps above.

4.2 Activate Jet Pumps
The JETS 1 button activates jets pump 1. The first press turns jets pump 1 on; the second press turns jets pump 1 off. The JETS 2 button activates jets pump 2 (if equipped). Turns jets pump 2 on; the second press turns jets pump 2 off. When manually activated, either pump will automatically turn off after 20 minutes.

4.3 Light On/Off Button
Pressing this button activates the waterfall light, footwell light, lighted cup holders, and backlit pillows lights in unison as follows: high - medium - low - off.

Note: Lights automatically turn off after 2 hours.

4.4 Light Mode Button
This button offers 4 light modes for your enjoyment. Press this button to select your favorite lighting effect as follows:

- **Solid Color Mode:** Selects one of 7 solid (high-intensity) colors of choice.
- **Freeze Color Blend Mode:** Selects or “freezes” your low speed blending color of choice.
- **Low-Speed Color Blend Mode:**
- **High-Speed Color Blend Mode:**
4.5 Jets
The water flow through individual jets in your spa can be adjusted or turned off by rotating the outside jet ring. Some jets offer an adjustable center nozzle that allows you to change the water discharge angle. Simply tilt the center nozzle in these jets to the desired angle to customize your personal massage. Other jets offer a spiral action that produces a surging stream of air and water that provides a vigorous massage.
**Note:** Always keep at least 6 adjustable jets open at all times to ensure proper filtration characteristics within the spa.

4.6 Selecting Desired Massage Action
All models incorporate a massage selector valve that allows you to customize the massage and performance by diverting water between various jet systems within the spa. Simply turn valve to positions A, B or C to divert water pressure to various jet groups.
**Note:** The valve is intended to operate in positions A (Combo), B, or C for optimum performance. It is considered normal for sound levels within the valve to increase between these positions due to the large amounts of water flowing through it. For optimum filtration benefits, always leave this valve in position A when the spa is covered and select positions B or C for maximum jet performance during spa use.

4.7 Waterfall Feature
The waterfall feature allows you to independently control it for a customized soothing effect. The waterfall is on when the circulation pump is on. The JETS 1 or CLEARRAY buttons will also activate the waterfall feature. Waterfall Operation Details:
A. Push thumb wheel on top of waterfall to the left (while in spa) to start or increase flow.
B. Push thumb wheel on top of waterfall to the right (while in spa) to slow or turn flow off.
**Note:** When the waterfall is in the OFF position, some water could still flow through.

4.8 Air Controls
Certain jet systems have their own “toggle” on/off air control. Each control introduces air into the water lines that supply specific jet groups. Simply press any air control button Jacuzzi logo side down to open or press the opposite side of button to close.
**Note:** To minimize heat loss, close all air controls (Jacuzzi logo up) when spa is not in use.
### 5.0 Standard Programming Functions

#### 5.1 Menu Programs Button

- Follow the steps below to access the programming menus.

<table>
<thead>
<tr>
<th>Menu button</th>
<th>LED display</th>
<th>Menu name</th>
<th>Menu Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press 📋 1x</td>
<td>PF</td>
<td>Primary Filtration Menu</td>
<td>Allows access to the programming menu for the primary filtration that uses the circulation pump. Although the spa has a default setting this feature is programmable. While in this menu, you can also program the Change Filter Timer.</td>
</tr>
<tr>
<td>Press 📋 2x</td>
<td>SF</td>
<td>Secondary Filtration Menu</td>
<td>Allows access to the programming menu for the secondary filtration that uses Jets Pump 1. These cycles are used to provide additional skimming. Although the spa has a default setting this feature is programmable.</td>
</tr>
<tr>
<td>Press 📋 3x</td>
<td>🗔️</td>
<td>CLEARRAY Menu</td>
<td>Allows access to the CLEARRAY® bulb replacement countdown timer. Your spa is equipped with the CLEARRAY system that uses a UV bulb to purify the water. This bulb must be replaced every year. By programming the countdown timer, a reminder is displayed on the topside when it is time to replace the bulb. The LED screen will flash between “blb” and the set temperature. Additionally, the CLEARRAY indicator light will blink. The timer needs to be reset in order to clear the message.</td>
</tr>
<tr>
<td>Press 📋 4x</td>
<td>ECO</td>
<td>Economy Menu</td>
<td>Allows access to the economy programming menu. The economy feature has either an “on” or “off” setting where the heater is allowed to activate for a maximum of 30 minutes at the end of each secondary filtration cycle.</td>
</tr>
<tr>
<td>Press 📋 5x</td>
<td>LOC</td>
<td>Lock Menu</td>
<td>Activates the locking modes to certain components, features or operations.</td>
</tr>
</tbody>
</table>
5.2 Primary Filtration Program

- Follow the steps below to access the program. Included within the Primary Filtration Menu, is the Change Filter feature.
- Two methods for setting the filter cycle start time are possible:
  1. Turn power on to the hot tub two minutes prior to the desired filter cycle start time, or
  2. Press and hold the WARMER, COOLER and JETS Pump 1 buttons at the same time, to reset the control panel and start the power-up sequence.

<table>
<thead>
<tr>
<th>Menu button</th>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>- or +</td>
<td>Press once</td>
<td>To access the Primary Filtration Menu. The LED will display “PF.”</td>
</tr>
<tr>
<td>- or +</td>
<td>Press continually</td>
<td>Scrolls through the menus as follows: PF0, PF1, PF2, PF3, PF4, PF5, PF6, PF7 or PF8</td>
</tr>
<tr>
<td>- or +</td>
<td>Press once</td>
<td>The new programmed cycle will blink twice on the display to confirm your selection</td>
</tr>
</tbody>
</table>

| PF0 | No filtration |
| PF1 | 4 hours of filtration per day |
| PF2 | 8 hours of filtration per day (default setting for J-335 to J-385) |
| PF3 | 12 hours of filtration per day |
| PF4 | 16 hours of filtration per day |
| PF5 | 20 hours of filtration per day |
| PF6 | 24 hours of filtration per day (default setting for J-315 and J-325) |
| PF7 | 2 hours of filtration – 4 times per day |
| PF8 | 3 hours of filtration – 4 times per day |

A. Cleanup “Blow-Out” Cycle
This cycle is activated once every 24 hours in either Standard or Economy mode. The Cleanup Cycle shall start before the first filtrations cycle. Pump 1 will activate for 1 minute and then shut off. Then Pump 2 will activate for 1 minute and then shut off.

B. For Models J335 to J385
Two minutes after power is applied to the spa, an automatic primary filtration cycles begins. The circulation pump is activated and set to run for 8 hours a day (factory default). The circulation pump draws water through the skimmer bag and one of two filter cartridges to effectively remove small debris in your spa. During the primary filtration cycle, the circulation pump and CLEARARRAY are activated. The factory default setting is PF2. This setting is programmable.

Note: The circulation pump also supplies heated water to the spa when the heater turns on. Any time the circulation pump runs outside of a programmed cycle (except for PF0 and PF6), that run time will reduce the length of the next cycle.

C. For Models J315 and J325
Your new spa includes a 24-hour primary filtration system, which filters the water continuously (factory default). The circulation pump draws water through the skimmer bag and one of the two filter cartridges to effectively remove small debris in your spa. The factory default setting is PF6. This set-
ning should not be altered. Running the circulation pump less than the factory recommended time will result in issues with water quality maintenance.

**Note:** The 24-hour primary filtration system also supplies heated water to the spa when the heater turns on.

### 5.3 Change Filter Timer Program

- Follow the steps below to access the Change Filter Timer.

<table>
<thead>
<tr>
<th>Menu button</th>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Press once</td>
<td>To access the Primary Filtration Menu. The LED will display “PF.”</td>
</tr>
<tr>
<td>– or +</td>
<td>Press continually</td>
<td>Scrolls through the menus as follows: <code>PF0</code>, <code>PF1</code>, <code>PF2</code>, <code>PF3</code>, <code>PF4</code>, <code>PF5</code>, <code>PF6</code>, <code>PF7</code>, <code>PF8</code>, <code>10</code></td>
</tr>
<tr>
<td></td>
<td>Press once</td>
<td>To access the Change Filter Timer. The display on the LED screen will blink once to indicate that the system is ready to accept changes.</td>
</tr>
<tr>
<td>– or +</td>
<td>Press continually</td>
<td>To add or subtract days in increments of 10 days. Range is from 0 to 180 days.</td>
</tr>
<tr>
<td></td>
<td>Press once</td>
<td>Once the number of days is selected, to confirm your selection.</td>
</tr>
<tr>
<td></td>
<td>When time expires</td>
<td>The LED screen will flash between 0 and <code>CF</code>.</td>
</tr>
</tbody>
</table>

### 5.4 Secondary Filtration Program

The jets pump 1 activates during the secondary filtration to provide additional skimming. The spa is programmed with a default setting of SF0 but can be programmed to any of the cycle settings listed below, Figure 5. These cycles schedule the jets pump 1 to run for a preset amount of time per day, in addition to normal operation.

**Note:** During the secondary filtration the jets pump 1, circulation pump and CLEARRAY are activated.

- Follow the steps below to access the program.

<table>
<thead>
<tr>
<th>Menu button</th>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Press twice</td>
<td>To access the Secondary Filtration Menu. The LED will display “SF.”</td>
</tr>
<tr>
<td>+</td>
<td>Press once</td>
<td>Activates the system for changes. Last programmed cycle blinks once on the display.</td>
</tr>
<tr>
<td>– or +</td>
<td>Press continually</td>
<td>Scrolls through the menus as follows: <code>SF0</code>, <code>SF1</code>, <code>SF2</code> or <code>SF3</code></td>
</tr>
<tr>
<td></td>
<td>Press once</td>
<td>The new programmed cycle will blink twice on the display to confirm your selection.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>SF0</strong></th>
<th>No filtration</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>SF1</strong></td>
<td>10 minutes of filtration every 12 hrs</td>
</tr>
<tr>
<td><strong>SF2</strong></td>
<td>10 minutes of filtration every 8 hrs</td>
</tr>
<tr>
<td><strong>SF3</strong></td>
<td>10 minutes of filtration every 6 hrs</td>
</tr>
</tbody>
</table>
5.5 CLEARRAY Program

- To make changes to the CLEARRAY bulb replacement timer or to reset it, follow the steps below to access the program.

<table>
<thead>
<tr>
<th>Menu button</th>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>📅 Press 3x</td>
<td>To access the CLEARRAY Menu. The LED will display “U.”</td>
<td></td>
</tr>
<tr>
<td>+ Press once</td>
<td>Activates the system for changes. Either zero or the remaining number of days will display.</td>
<td></td>
</tr>
<tr>
<td>⏸️ Press once</td>
<td>To access the UV bulb replacement timer. The number of days on the display will blink once.</td>
<td></td>
</tr>
<tr>
<td>- or + Press</td>
<td>Increases or decreases the number of days in increments of 10 except for the last selection that is a 5-day increment.</td>
<td></td>
</tr>
<tr>
<td>⏸️ Press once</td>
<td>The new selection will blink twice on the display to confirm your selection.</td>
<td></td>
</tr>
</tbody>
</table>

5.6 Economy Mode

- Follow the steps below to access the program.
- In Economy mode, the heater only activates after a Secondary Filtration cycle has finished. The heater will run for a maximum of 30 minutes.
- The heater can turn off prior to the 30 minutes if the programmed water temperature is reached.
- The Secondary Filtration program determines the number of cycles (from 1 to 4) that the heater will be allowed to activate.

For example, if you have programmed the SF3 setting (10 minutes of filtration every 6 hours), then the heater will run, for a maximum of 30 minutes, after the end of each of the 10-minute secondary filtration cycle, for up to four times per day.

<table>
<thead>
<tr>
<th>Menu button</th>
<th>Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>📅 Press 4x</td>
<td>To access the Economy Mode Menu. The LED will display “ECO.”</td>
<td></td>
</tr>
<tr>
<td>+ Press once</td>
<td>Activates the system for changes. Current programmed mode blinks once on the display.</td>
<td></td>
</tr>
<tr>
<td>- or + Press</td>
<td>Toggles between: ECO, on, or OFF</td>
<td></td>
</tr>
<tr>
<td>⏸️ Press once</td>
<td>The new program will blink twice on the display to confirm your selection.</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>CYCLE</th>
<th>RUN TIME</th>
<th>HEATER RUN TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF0</td>
<td>No filtration</td>
<td>Maximum of a half hour per day</td>
</tr>
<tr>
<td>SF1</td>
<td>10 minutes of filtration every 12 hrs</td>
<td>Maximum of a half hour every 12 hrs (after secondary cycle ends)</td>
</tr>
<tr>
<td>SF2</td>
<td>10 minutes of filtration every 8 hrs</td>
<td>Maximum of a half hour every 8 hrs (after secondary cycle ends)</td>
</tr>
<tr>
<td>SF3</td>
<td>10 minutes of filtration every 6 hrs</td>
<td>Maximum of a half hour every 6 hrs (after secondary cycle ends)</td>
</tr>
</tbody>
</table>
5.7 Lock Mode

- Follow the steps below to access the program.
- The Lock menu gives you the option to lock specific features of the spa. There are three locking modes, L1, L2 and L3.

<table>
<thead>
<tr>
<th>Lock Mode</th>
<th>Normal operation</th>
</tr>
</thead>
<tbody>
<tr>
<td>OFF</td>
<td>The jets pumps and heater are deactivated. This mode can be used when replacing or cleaning the spa filters.</td>
</tr>
<tr>
<td>L1</td>
<td>The jets pumps, adjust temperature and CLEARRAY buttons are deactivated. This mode can be used to prevent unauthorized use of the spa.</td>
</tr>
<tr>
<td>L2</td>
<td>The temperature and CLEARRAY buttons are deactivated. This mode can be used to prevent unauthorized temperature adjustments.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Menu button Action</th>
<th>Result</th>
</tr>
</thead>
<tbody>
<tr>
<td>Press 5x</td>
<td>To access the Locking Modes. The LED will display “LOC.”</td>
</tr>
<tr>
<td>Press once</td>
<td>Activates the system for changes. Either OFF or the last lock mode will display.</td>
</tr>
<tr>
<td>Press +/-</td>
<td>Scrolls through the menus as follows: OFF, L1, L2, or L3.</td>
</tr>
<tr>
<td>Press once</td>
<td>The new selection will blink twice on the display to confirm your selection.</td>
</tr>
</tbody>
</table>

5.8 Top Menu Lock

- Follow the steps below to access the program.
- The Top Menu Lock gives you the option to lock the programming menus of the spa. You can lock the Menu access button. When the lock feature is activated, access to the Primary Filtration, Secondary Filtration, CLEARRAY, Economy and Lock programming menus is deactivated. The temperature setting feature, jets pumps operation and lighting features are still accessible.

<table>
<thead>
<tr>
<th>To lock the menu options</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Menu button</strong></td>
</tr>
<tr>
<td>📋 Press and hold for 10 seconds</td>
</tr>
</tbody>
</table>

When this feature is active. Any time the menu button is pressed the display will show “LOC.”

<table>
<thead>
<tr>
<th>To unlock the menu options</th>
</tr>
</thead>
<tbody>
<tr>
<td>📋 Press and hold for 10 seconds</td>
</tr>
</tbody>
</table>
6.0 Understanding Circuit Board Pin Assignments

6.1 Circuit Board Jumpers (All North American 60Hz 2-Pump Models)
All North American 2-pump circuit boards can be configured for either 40, 50A, or 60A operation. Refer to jumper pin table and circuit board diagram below for specific system details (factory jumper settings shown):

**Circuit Board #6600-293; Micro Chip 3.82+ (started July 15, 2014)**

- **Pins 1-2**: Jumper ON Enables 40A logic; heater will not operate while any pump is running.
- **Pins 1-2**: Jumper OFF Enables 50A logic; heater will operate while one pump is running. This is the factory default.
- **Pins 3-4**: Jumper ON Enables 2 Pump Operation
- **Pins 3-4**: Jumper OFF Not Used. (Enables 1 Pumps Operation)
- **Pins 5-6**: Jumper ON Enables 60A logic; (Remove JP1 1-2 Jumper). Allows the heater to operate when both pumps are on running.
- **Pins 5-6**: Jumper OFF Leave off for 40A or 50A Logic
- **Pins 7-8**: Jumper ON Enables Celsius (°C) temperature display
- **Pins 7-8**: Jumper OFF Enables Fahrenheit (°F) temperature display

6.2 Circuit Board Jumpers (All Export 50 Hz 2-Pump Models)
These circuit boards can be configured for 20A, 30A or 40A logic modes. Each mode affects overall energy consumption and heater performance.

- **Pins 1-2**: Jumper ON Enables 20A logic; heater will not operate while any jets pump is running. This is the factory default.
- **Pins 1-2**: Jumper OFF Enables 30A logic; heater will operate with one jets pump running.
- **Pins 3-4**: Jumper ON Enables 2 Pump Operation
- **Pins 3-4**: Jumper OFF Enables 1 Pump Operation
- **Pins 5-6**: Jumper ON 40A logic (Remove JP1 1-2 Jumper); allow heater to operate with both jets pumps running in high speed
- **Pins 5-6**: Jumper OFF Leave off for 20A or 30A logic setting
- **Pins 7-8**: Jumper ON Enables Celsius (°C) temperature display
- **Pins 7-8**: Jumper OFF Enables Fahrenheit (°F) temperature display

6.3 Circuit Board Jumpers (All North American 60 Hz 1-Pump Models)
All North American 1-pump circuit boards can be configured for either 120V/15A or 240V at 30A or 40A operation. Refer to jumper pin table and circuit board diagrams below for specific system details (factory jumper settings shown):

**Circuit Board #6600-295; Micro Chip 3.82+ (started July 15th 2014)**

- **Pins 1-2**: Jumper ON Enables 15A logic; forces heater off when pump is on high speed (3-wire 120 VAC operation only). This is the factory default.
- **Pins 1-2**: Jumper ON Enables 30A logic; forces heater off when pump is on high speed (4-wire 120/240 VAC operation only)
- **Pins 1-2**: Jumper OFF Enables 40A logic; allows the heater to operate when pump is on high speed (4-wire 120/240 VAC operation only)
- **Pins 3-4**: Jumper ON Not Used
- **Pins 3-4**: Jumper OFF Enables 1 Pump Operation
- **Pins 7-8**: Jumper ON Enables Celsius (°C) temperature display
- **Pins 7-8**: Jumper OFF Enables Fahrenheit (°F) temperature display
6.4 Circuit Board Jumpers (All Export 50 Hz 1-Pump Models)
These circuit boards can be configured for 20A or 30A logic. Each mode affects overall energy consumption and heater performance.

**Pins 1-2:** Jumper ON Enables 20A logic; forces heater off when jets pump 1 is running in high speed. This is the factory default.

**Pins 1-2:** Jumper OFF Enables 30A logic; allows heater to operate when jets pump 1 is running in high speed

**Pins 3-4:** Jumper ON Enables 2 Pump Operation (2-pump models only)
**Pins 3-4:** Jumper OFF Enables 1 Pump Operation

**Pins 5-6:** Jumper ON Not Used
**Pins 5-6:** Jumper OFF Not Used

**Pins 7-8:** Jumper ON Enables Celsius (°C) temperature display
**Pins 7-8:** Jumper OFF Enables Fahrenheit (°F) temperature display
7.0 Troubleshooting Using The Control Panel

7.1 Control Panel Displays
Complete operating instructions for the control panel can be found in the owner’s manual. The hot tubs self-diagnostic control system constantly monitors the hot tub for proper operation. When anything goes wrong, the control panel displays a message for the user which may result in a service call.

7.2 Control Panel Default Display
The control panel displays the following information during initial start-up:
1. Control panel displays current software microchip revision, then
2. Control panel displays “888” and all indicator LED’s are lit, permitting visual inspection of all display segments and indicator lights for proper operation.
3. After the initial start-up sequence ends actual water temperature is displayed. If the water temperature at this time is less than the factory default temperature setting of 100°F (38°C):

Approximately two minutes after initial start-up, the first filtration cycle begins to operate. The filtration cycle can be modified any time after the start-up sequence ends. You will be able to select a pre-programmed filter cycle and reset your temperature setpoint at this time. Press either COOLER or WARMER button once at this time to display the current temperature setpoint. You can change the setpoint by pressing either COOLER or WARMER button within 3 seconds. Each button press increases or decreases the temperature setpoint by one degree. Three seconds after the setpoint is set, the display defaults back to actual water temperature.

7.3 Control Panel Status and Error Messages

CF Clean Filter (All Models)
The clean filter timer has expired. The spa filters need to be cleaned or replaced. The message will flash between “CF” and the water temperature. The countdown timer for the Change Filter feature needs to be reset. New filters can be purchased from a local Jacuzzi dealer.

SN1 Nonfunctional Hi-limit Sensor (All Models)
Open or shorted hi-limit sensor. Heater is deactivated. Refer to test steps 1-2 below:
1. Turn off main breaker to hot tub. Refer to appendix, page 49, for expected hi-limit sensor resistance/water temperature values.
2. Remove hi-limit sensor connector from circuit board test point 21. Refer to pages 43-46 for your circuit board configuration. Set ohmmeter to 100 kΩ - 200 kΩ range, then measure resistance across hi-limit sensor wires (refer to page 49). If sensor resistance tests OK (± 200 Ω), check sensor connections. If connections are OK, replace circuit board. If sensor resistance is incorrect, replace hi-limit sensor.

SN2 Nonfunctional Temperature Sensor (All Models)
Open or shorted temperature sensor. Heater is deactivated. Refer to test steps 1-2 below:
1. Turn off main breaker to hot tub. Refer to appendix, page 49, for expected hi-limit sensor resistance/water temperature values.
2. Remove temperature sensor connector from circuit board test point 21. Refer to pages 43-46 for your circuit board configuration. Set ohmmeter to 100 kΩ - 200 kΩ range, then measure resistance across temperature sensor wires (refer to page 49). If sensor resistance tests OK (± 200 Ω), check sensor connections. If connections are OK, replace circuit board. If sensor resistance is incorrect, replace temperature sensor.
FL1 & FL2 Water Flow Problem (All Models)

- **FL1**: flow switch not closed when circulation pump is running. Heater is deactivated. Proper water flow is inhibited or flow switch may be obstructed, misaligned, or defective. Refer to troubleshooting steps 1-5 below:

  1. Remove filter and allow air to bleed out of cartridge. Check filter for trapped air.
  2. Check for proper water level.
  3. Check for clogged filter cartridge.
  4. Check for sticking or damaged floating skimmer.
  5. If problem persists, refer to Section 7.4 (page 16) for flow switch testing instructions.

- **FL2**: flow switch switch closed when pump is not running. Heater is deactivated and pump may or may not turn on. Flow switch is defective. Refer to Section 7.4 (page 16) for switch testing instructions.

COL  Cool Condition (All Models)

If the water temperature drops 20°F (11°C) below the set temperature, the circulation pump and heater will activate to raise the water temperature within 15°F (8°C) of the set temperature. No corrective action is necessary. This condition is common during water changes and/or first time fill ups.

ICE  Freeze Condition (All Models)

Freeze Protection - A potential freeze condition has been detected. Water temperature is below 55°F (12.78°C). No action is required. Jets Pump 1, Jets Pump 2 and the circulation pump will activate for 10 minutes, then turn off. Then the circulation pump and the heater will activate for 10 minutes. The two cycles shall repeat until the water temperature reaches 65°F (18.33°C).

In extreme bitter cold weather 32°F (0°C) we recommend you program the circulation pump to run 24 hours.

OH  Overheat Condition (All Models)

Water temperature is above acceptable limits. **DO NOT ENTER HOT TUB WATER!** Water temperature has reached 116°F (47°C) and the low speed pump has activated to circulate water through the heater to cool it down for approximately 6 minutes. Refer to test steps 1-4 below:

1. Verify actual water temperature with an accurate thermometer. If actual water temperature is less than 110°F (44°C), proceed to steps 2-4.
2. Turn off main breaker to hot tub. Refer to appendix page 49 for expected hi-limit/temperature sensor resistance/water temperature values.
3. Remove hi-limit sensor connector from circuit board points 22. Verify that the heater is not excessively hot. Refer to pages 43-46 for your circuit board configuration. Set ohmmeter to 100-200 kΩ range, then measure resistance across sensor wires (refer to page 49). If resistance tests OK (± 200Ω), check wiring harness connections. If wiring harness connections test OK, replace circuit board. If sensor resistance is incorrect, replace hi-limit sensor.
4. Set ohmmeter to 100-200 kΩ range, then measure resistance across temperature sensor wires (refer to page 49). If resistance tests OK (± 200Ω), replace circuit board. If temperature sensor resistance is incorrect, replace sensor.
"- - -" **Watchdog (All Models)**

Water temperature has reached 118°F (48°C). **DO NOT ENTER HOT TUB WATER!**
The entire system is disabled. Refer to test steps 1-4 below:

1. Check hi-limit and temperature sensor resistance values. Both sensors should measure close in resistance to each other (e.g. one may be defective and way out of range). Refer to appendix page 49 for expected hi-limit/temperature sensor resistance/water temperature values. If either sensor is faulty, replace it and recheck system. If problem persists, proceed to steps 2.

2. Plug in new control panel. If problem persists, proceed to step 3. If problem corrects, replace panel.

3. Check voltage at transformer secondary. Refer to Section A29, page 51 for transformer testing instructions. If voltage is bad, replace transformer. If voltage is good, perform step 4.

4. Check circuit board transformer connections. If connections are loose or oxidized, repair connections and retest system. If problem persists, replace circuit board.

### 7.4 Testing Flow

**Testing the Flow Switch**

A. Verify flow switch directional arrow is pointing in the direction of flow away from the heater output. If switch orientation is incorrect, loosen or tighten switch no more than 1/2 turn, being careful not to bottom out switch in fitting. The switch’s flow arrow must be parallel to tee fitting as shown (Fig. 1). Test system operation. If condition corrects, skip steps B-C.

B. Remove switch from fitting making note of the number of turns (revolutions) it takes to do so. Visually inspect switch for debris interference or damage. If debris is present, remove debris, then install switch with the same number of turns as originally installed. Test system. If switch is damaged, replace switch and retest system. If condition corrects, skip step C.

C. Test switch operation with an ohmmeter (set to 1000-2000 Ω range) for continuity across switch terminals. Measure resistance across switch terminals for infinite resistance with the magnet arm not touching the switch body (Fig. 2), and for continuity (0 Ω) with the magnet arm touching the switch body (Fig. 2). If flow switch tests OK, check switch wiring harness. If wiring harness tests OK, replace circuit board.

D. Verify that low flow is not preventing the flow switch from closing.
8.0 Troubleshooting without The Control Panel

- **Diagnostic Tools for Sections 8.1A-8.1E:** Clamp-on ammeter, voltmeter, and ohmmeter
- **Suggested Spare Parts for Sections 8.1A-8.1E:** Circuit board, control panel, temperature sensor, thermal switch, flow switch, heater assembly.

8.1A No Heat or Not Enough Heat (All Models)

- **Symptoms:** Circulation pump is moving water, panel heat indicator is lit, **water is not getting hot**.
- **Configuration:** 2-pump system heaters will not operate with both jets pumps running, unless configured for 60A operation, or with either pump running if circuit board is configured for 40A operation. Refer to Sections 6.1-6.4, pages 12-13.

---

**Turn up temperature setpoint to initiate a heat call (verify that a valid Primary Filtration Cycle, PF1-PF8, is selected (see page 8). Is voltage present at the heater output? Test points 12 and 13. See pages 43-46.**

**Is voltage present at heater input? Test points 10 and 11. See pages 43-46.**

**Is there current draw? Refer to Section A2 (page 38) for expected heater current consumption values.**

**Check heater element with clamp-on ammeter around one of the heater element wires.**

**Is the heater’s current draw within ±10% of the listed value?**

**Current draw is proof that heater element is working. Make sure customer knows how to use control panel and heater. Ask about any possible error messages.**

---

**WARNING:** heater temperature may have exceeded 130°F (54°C). Inspect heater. Call technical support if visible damage is apparent.
8.1B No Heat or Not Enough Heat (All Models)

- **Symptoms:** Circulation pump (heating pump) not turning, panel heat indicator not lit, panel is **flashing FL2**.

**Standard Troubleshooting Approach**

1. Turn power off. Disconnect flow switch wire from board (Fig. 4). Turn power on. Does the FL2 error message go away?
   - No: Is wire shorted?
     - Yes: Replace wire.
     - No: Replace circuit board.
   - Yes: 1. Remove wires at board.
     2. Test flow switch with ohmmeter for continuity across switch wires (Fig. 5). Does meter read continuity (0 ohms)?
       - Yes: Remove flow switch and inspect for debris interference. Remove debris if present. Test switch for continuity (0Ω) when closed and for infinite Ω when open (Fig. 5). Does switch operate correctly?
         - Yes: Install switch making sure flow arrow points in direction of flow and switch doesn’t bottom out in fitting (Fig. 7). Retest system.
         - No: Replace flow switch.
       - No: Make sure wire is not shorted when installed on switch. For models where the wire is removable.
         - Replace wire.
8.1C No Heat or Not Enough Heat (All Models)

- **Symptoms**: Circulation pump (heating pump) not turning, panel heat indicator not lit, panel is **flashing FL1**.

**Standard Troubleshooting Approach**

1. Is there correct voltage coming to the hot tub at TB1? Test point 1 and 2. See page 43-46
   - No: Call an electrician.
   - Yes: Put hot tub in a valid Primary Filtration Cycle, PF1-PF8 (page 8). Set temperature high enough to initiate a heat call.

2. Is voltage from circuit board to circulation pump ok? Test point 14 and 15. (See page 43-46).
   - No: Replace circuit board.
   - Yes: Is connection ok from circuit board to pump?
     - No: Repair connection.
     - Yes: Replace pump.

**Note**: Refer to voltage and current charts on appendix pages 36-38 for expected voltage/current readings.

**DANGER**: Electrical Shock Hazard Exists!

High Voltage Present on Circuit Board. Use Extreme Caution while Servicing Circuit Board.
8.1D No Heat or Not Enough Heat (All Models)

- **Symptoms:** Circulation pump (heating pump) is turning, panel heat indicator not lit, panel is flashing FL1.

**Standard Troubleshooting Approach**

<table>
<thead>
<tr>
<th>Question</th>
<th>Yes</th>
<th>No</th>
<th>See Section 8.12 (pg. 31)</th>
<th>Replace circuit board.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Is the circulation pump (Heat Pump) moving water?</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Verify hot tub is in a primary filtration mode (page 8) then perform step below.</td>
<td>Yes</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Remove switch wires from board. Increase set temperature to initiate a heat call, then jumper flow switch wires together (Fig. 7). Does heat indicator appear and FL1 error message disappear?</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Test flow switch with ohmmeter for continuity (0Ω) across switch terminals (Fig. 9) Does meter read continuity (0Ω) with pump on?</td>
<td>Yes</td>
<td>No</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Clean connectors between flow cable and switch.</td>
<td></td>
<td>Yes</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Lightly scrape contact pins at point 22 with a razor blade or sandpaper to remove conformal coating or oxidation from contact surface.*

---

**DANGER:** Electrical Shock Hazard Exists! High Voltage Present on Circuit Board. Use Extreme Caution while Servicing Circuit Board.
8.1E No Heat or Not Enough Heat (All Models)

- **Symptoms:** Circulation pump (heating pump) is turning, panel heat indicator not lit, panel is **NOT flashing FL1**.

**Standard Troubleshooting Approach**

- Put hot tub in primary filtration mode (pg. 8).
- Set temperature high enough to initiated a heat call. Remove power to hot tub then plug in a spare control panel. Turn power on. Does indicator work now?
  - **Yes**: Replace control panel.
  - **No**: Jump out flow switch pins at board. Does heat indicator come on?
    - **No**: Replace circuit board.
    - **Yes**: Verify that flow switch padde is not bouncing and address possible restriction problems.
8.2 Intermittent Heating
As with all intermittent problems, routine measurements and display panel error messages are not trustworthy. The following procedure will eliminate the most probable causes. It is important to explain to the customer how difficult intermittent problems are to locate. You will be doing a series of things to eliminate the problem. Ask the customer to be patient and please cooperate by calling you back to inform you of the hot tub’s status until the problem is corrected. It might be a good idea to review this S.T.A. with the customer. It may help he or she understand why it might take several service calls to effect a repair.

Suspects: circuit board, temperature sensor, control panel, wiring connections, and partial water flow obstructions.

Diagnostic Tools: Voltmeter, Ohmmeter

Suggested Spare Parts: Heater element, circuit board, temperature sensors, control panel

Standard Troubleshooting Approach
1. Check crimped wire connections to heater element. If burned, replace heater element wires. Verify heater element connections are good on circuit board. Check heater resistance, see current chart on page 38 for expected heater resistance values.
2. Check connections labeled “heater out” on circuit board (test points 12 and 13). Refer to pages 43-46 for your circuit board. If possible, clean and renew connections. If relay is physically burned at connections, replace circuit board.
3. Check flow switch for proper and consistent mechanical operation. Observe mechanical action of switch. Refer to page 16 for flow switch testing procedure.
4. Clean connections where panel plugs into board.
5. If all above items check out, ask the customer if the SN2 error has ever displayed. If the SN2 error message has displayed, replace temperature sensor.
6. Tell the customer what you have done, that you are not sure the problem has been fixed, and that you want to be called immediately if the problem returns. Explain what you will do if the problem returns. Check back with the customer in a few days if you haven’t been contacted.
7. If the customer calls back, call Technical Support.

Note: J300 Models use a “magnetic reed switch” type flow switch that can remain closed from debris interference. Removal of the flow switch for cleaning and inspection will correct most problems. Record the number of turns it takes to remove the switch from the fitting. After cleaning, use the same number of turns to reinstall the switch. DO NOT thread the switch farther than originally installed, or the paddle may stick on the bottom of the fitting. Also, make sure flow arrow is pointing in direction of flow away from heater output.

8.3 Nothing Works
Things to remember: when a system fails, there is probably one, and only one problem. Verify power to the hot tub by observing the control panels LED display. The control panel will usually display something as long as there is power to the hot tub. Check for error messages. Displayed error messages usually indicate the problem.

Diagnostic Tools: Voltmeter

Suggested Spare Parts: Fuses, control panel, circuit board

Nothing Works (Panel Indicators lit)
1. Plug in spare control panel. If it works, change panel.
2. Remove power from hot tub. Check connections on sensor harness and verify proper resistance of temperature and hi-limit sensors (page 50). Replace defective temperature or hi-limit sensor then test system.
3. Check transformer. See Section A24, page 51.
Nothing Works (Panel Dead)

1. **All Models** - Check for proper power to the hot tub on the main TB1 terminal block (page 36) as follows:
   - 120V Convertible North American Models: 120 VAC ±10% (3-wire).
   - 240V North American Models: 240 VAC ±10%.

2. Check for power at transformer secondary. Refer to appendix page 51. If power exists on transformer secondary, plug in spare control panel. Still nothing? Replace board.

3. If no power exists at transformer secondary, check for voltage at transformer primary. Refer to appendix page 51. If voltage exists on the primary but is missing on the secondary, replace transformer.

4. No power at the transformer primary indicates either an open 1.25 Amp fuse, 20/30 Amp main fuse, or a loose or disconnected wire. If voltage exists on the primary but is missing on the secondary, replace transformer. See Section A5 (page 40) for specific fuse details.

---

8.4 **Hot Tub Doesn't Come On for Filter Cycle**

Turn power to hot tub off and on to restart filter cycle program. Does filter cycle start approximately two minutes after power is applied?

- **If yes:** the hot tub is functioning properly. Refer to Sections 5.2-5.4 (page 8) for filter cycle setup details. Take time to explain filter cycle selection and operation to your customer. Make sure your customer understands filter cycles are selectable, not programmable.
- **If no:** Select appropriate filter cycle mode within two minutes after applying power. Refer to Sections 5.2-5.4 (page 8). If filter cycle starts approximately two minutes after setting, no corrective action is required. If filter cycle does not start two minutes after setting, replace circuit board.

8.5 **House Breaker Trips**

The hot tub's current draw will vary depending on how the circuit board is jumpered. Jumper options determine whether multiple functions can operate together.

If the house breaker trips, check the hot tub's current draw. If jumpers are properly set and current draw is within expected limits, the house breaker or wiring is defective and must be repaired/replaced. The hot tub's current draw at the breaker represents the sum of all enabled devices. Refer to appendix page 39.

If the hot tub's current draw is high, individual device current measurements must be made to determine which device is pulling excessive current. **Refer to appendix page 39.** Repair or replace the device which is drawing excessive current.

If the GFCI trips, try removing the heater, pump, ozonator (if installed), stereo power supply and circulation pump or pump 2 wires from the circuit board one at a time to find which device may be causing the GFCI to trip. For chronic GFCI tripping, call Technical Support.

---

*North American 60Hz Installations:*

As of January 1, 1994 the National Electric Code (NEC) requires a Ground Fault Circuit Interrupter on all hot tub installations in the U.S. A GFCI must be wired correctly or it will trip. Make sure the electrician has wired the GFCI according to the diagram on pages 47.
8.6A J-300 Collection DCU Unit

2014+ DCU Diagram

DCU wires splice into the yellow transformer wires.

To location J1 on the Board

To “Power” connection on the DCU Unit

Mini-Din Cable provides constant 12 VAC from yellow transformer wires

Red Wire 12vAC Constant Voltage
8.6C Hot Tub Light Will Not Come On

**Diagnostic Tools:** Voltmeter

**Suggested Spare Parts:** Circuit board, DCU, Lights

**Standard Troubleshooting Approach**
*(Light has a two hour time out)*

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![Flowchart Diagram](image)

---

*Note:* Before replacing DCU, perform the tasks described below in order to prevent shorting out the new DCU.

**Step 1:** Unplug all lights except footwell light.

**Step 2:** Verify footwell light works and goes through all color functions correctly.

**Step 3:** Plug in one light next to footwell light connection. Verify that all color functions work correctly and light does not flicker or have missing color LED’s. Unplug light and plug in another light in the same place and perform the same test as with the previous light. Continue to follow this procedure until all lights have been tested.

**Step 4:** Now replace DCU and any lights that were determined to perform incorrectly.
8.7 No Jets
This is a condition of constant zero water pressure. The first step in diagnosing the problem is to determine if the pump is actually turning. Once this determination is made, follow the appropriate portion of the S.T.A.

Diagnostic Tools: Voltmeter

Suggested Spare Parts: Control Panel, Circuit Board, Jets Pump 1

Pump Is Turning (Checking for A Flow Problem)
1. Make sure jets are open. (Jets can be individually turned off, in some cases.)
2. Is the filter clogged?
3. Is there an obstruction in the plumbing line?
4. Check for air lock (clear air lock by opening union on pump discharge).

Standard Troubleshooting Approach

Refer to pages 43-46 for testing points.

Press JETS Button to turn on jets pump.

Do you hear a relay click on the circuit board?

Yes

Is voltage from circuit board to main pump test point correct?

Check for 240 VAC (120 VAC for convertible J-315 and J-325 models) at recommended test points.

See table at right for a listing of recommended test points.

No

Replace circuit board.

No

Plug in spare control panel then press JETS Button.

Do you hear a relay click on the circuit board?

Yes

Replace control panel.

No

Replace circuit board.

Yes

Is connection between circuit board and pump OK?

No

Repair wiring.

Yes

Replace pump.

Recommended Test Points
All 1-Pump models
• High Speed Pump 1 - test point 6 and 7.

All two pump models
• High Speed Pump 1 - test point 6 and 7.
• High Speed Pump 2 - test point 8 and 9.

DANGER: Electrical Shock Hazard Exists!
High Voltage Present on Circuit Board. Use Extreme Caution while Servicing Circuit Board.
8.8 Ozonator Not Working (Optional)

Diagnostic Tools: Clamp-on Ammeter, Voltmeter

Suggested Spare Parts: Ozonator, Circuit Board, Control Panel

Standard Troubleshooting Approach

Refer to pages 43-46 for testing points.

Turn power to hot tub off and on. Wait approximately two minutes for filter cycle to begin and turn on the circulation pump and ozonator.

DO NOT press either JETS button at this time or ozonator will shut off! Is filter cycle 1 running?

Is 120 VAC* or 240 VAC present at circuit board ozone outputs? Test points 16 and 17, See pages 43-46.

*Convertible J-315 and J-325 models only.

Is there a faint buzzing sound coming from the ozonator’s internal high voltage arching chamber? Or is there current draw from the ozonator (≈ 0.1 Amp)? Check with clamp-on ammeter.

A faint buzzing sound and/or current draw is proof that the ozonator is working.

Read steps outlined above to ensure customer understands ozone logic.

DANGER: Electrical Shock Hazard Exists!
High Voltage Present on Circuit Board. Use Extreme Caution while Servicing Circuit Board.
8.9 CLEARRAY Not Working
Verify that the CLEARRAY system should be running before proceeding (no error message, not in summer logic.
Note: CLEARRAY turns off when either jets button is pressed and will remain off for 5 minutes after function ends.

Diagnostic Tools: Clamp-on Ammeter, Voltmeter

Suggested Spare Parts: CLEARRAY ballast, UV bulb, circuit board, control panel

Standard Troubleshooting Approach. Refer to pages 43-46 for testing points.

- Turn power to hot tub off and on. Wait approximately two minutes for filter cycle to begin and turn on the circulation pump and CLEARRAY.
  - Or you can press the CLEARRAY on demand button to activate the system.
  - DO NOT press either JETS button at this time or the CLEARRAY will shut off!

Is a primary filter cycle running?

- Is 120 VAC* or 240 VAC present at circuit board CLEARRAY outputs? Test points 16 and 17, See pages 43-46.
  - *Convertible J-315 and J-325 models only.

Is there current draw (0.4 Amp) on the CLEARRAY? Check with clamp-on ammeter.

Current draw is proof that CLEARRAY is working. Read steps outlined above to ensure customer understands the logic.

---

DANGER: Electrical Shock Hazard Exists! High Voltage Present on Circuit Board. Use Extreme Caution while Servicing Circuit Board.
8.10 Weak or Surging Jets
Weak or surging jets are usually caused by an insufficient water supply to the pump or a clogged or broken pump impeller. The water level may simply be low, or there may be an obstruction in the water flow path to the pump or in the pump’s impeller. Before making a service call, ask customer to verify all jets are open.

Suggested Spare Parts: Filter cartridge, Pump

Standard Troubleshooting Approach

1. Is the water level OK? No → Adjust the water level and retest. Yes →
2. Is the filter cartridge clogged or dirty? No → Is the filter cartridge installed correctly? No → Fix filter installation problem. Yes → Clean or replace filter cartridge.
3. Yes → Is the weir gate or skimmer operating correctly? No → Take pump housing apart. Is debris present in pump impeller? No → If pump suction line is clear, check for blockage in plumbing on the return side of pump. Call Technical Support for assistance in performing this verification step. Yes → Is the impeller broken? Yes → Remove debris or replace broken impeller and retest system. No → Is there debris or a loose foreign object between the filter and pump input? Yes → Remove debris or loose foreign object. No →
8.11 Jets Pump Runs and Quits During Jet Mode
This is usually a problem of pump overheating. The pump motor incorporates a thermal cutout switch that triggers when the motor gets too hot. There is no reset for this condition. When the motor cools, the thermal switch resets automatically. In some cases, a faulty circuit can also cause this problem.

Diagnostic Tools: Clamp-on Ammeter, Voltmeter

Suggested Spare Parts: Circuit Board, Jets Pump

Standard Troubleshooting Approach

Refer to pages 43-46 for testing points.

Press JETS button. Does motor make a "laboring" sound?

Yes

Is there sufficient voltage connected to hot tub. Check for 240 VAC ±10% (or 120 VAC ±10% for convertible J-315 and J-325 models) at TB1 test points 1 and 2.

Yes

Check voltage with pump running. Is the voltage 240 VAC ±10% (or 120 VAC ±10% for convertible models) at test points 1 and 2.

No

Replace pump.

Yes

Is voltage from circuit board to pump correct after pump quits? Check for 240 VAC (120 VAC for convertible J-315 and J-325 models) at recommended test points. See table at right for a listing of recommended test points.

Yes

Pump has thermally shut down. See page 32.

No

Replace circuit board

No

Call an electrician to fix problem.

Recommended Test Points

All 1-Pump models
• High Speed Pump 1 - test point 6 and 7.

All two pump models
• High Speed Pump 1 - test point 6 and 7.
• High Speed Pump 2 - test point 8 and 9.

DANGER: Electrical Shock Hazard Exists!
High Voltage Present on Circuit Board. Use Extreme Caution while Servicing Circuit Board.
8.12 Circulation Pump Not Working

The circulation pump works as follows:
- 2014+ J335/J345/J355/J365/J375/J385 circ pump runs 8 hrs (default)
- 2014+ J315/J325 24 hrs (default)

**Note:** See Service Bulletin page 33

The circulation pump should be running unless “summer logic” is activated. Verify “summer logic” is not activated before starting.

The circulation pump is preset to run for a specific filter cycle, two minutes after power up. If the circulation pump is not running, turn power off to the spa then back on and wait two minutes for the cycle to begin. Or raise the temperature to initiate a heat call.

**Diagnostic Tools:** Clamp-on Ammeter, Voltmeter

**Suggested Spare Parts:** Circuit Board, Circulation Pump

**Standard Troubleshooting Approach**

Refer to pages 43-46 for testing points.

- Is 240 VAC (120 VAC for J-315 and J-325) present at pump output? Test Points 14 and 15.
  - **Yes**
  - **No**
    - Make sure circulation pump should be on. If pump should be on and there is no voltage at test points change circuit board.

- Is there current draw (0.5 Amp)? Check with clamp-on ammeter.
  - **Yes**
  - **No**
    - Check connection between circuit board and circulation pump. If connection is OK, replace pump.

Current draw is proof that circulation pump is working. Read steps above to make sure circulation pump should be on*

*Note:* If circulation pump is running but there is no flow, check for an excessively dirty filter, an air lock, blockage in the plumbing, debris in the pump, or a broken pump impeller.

**DANGER:** Electrical Shock Hazard Exists!
High Voltage Present on Circuit Board. Use Extreme Caution while Servicing Circuit Board.
8.13 Troubleshooting A Thermal Pump Cutout
1. Verify voltage to hot tub is 240 VAC ±10% (or 120 VAC ±10% for convertible models). An insufficient voltage supply can cause the motor to pull too much current and overheat. The situation must be corrected.
2. Check voltage to hot tub.
3. If voltage is OK, examine the environment in which the hot tub is installed. Hot sun, hot weather, and lack of breeze can cause heat build up in the equipment bay in addition to the normal heat produced by the pump. This can raise the temperature high enough to cause the pumps thermal cutout to trip. There are two possible solutions to thermal pump cutout problems which are not due to low line voltage. One is to change the filter cycle period so that it does not coincide with the hottest time of day and peak power consumption hours. Another is to ventilate the equipment bay. Call technical support for advice on this matter.
4. If there seems to be no overheating problem yet the motor keeps cutting out, the motor’s thermal switch may be bad. In this case the pump should be replaced.

8.14 Pump 1 Hums and Will Not Start
If the pump impeller is not “frozen”, this condition usually indicates a bad start capacitor. This component is inside the pump motor housing.

Diagnostic Tools: Voltmeter

Suggested Spare Parts: Pump, Capacitor, Circuit Board

Standard Troubleshooting Approach
Press JETS 1 button. Check voltage at the following circuit board test points 6 and 7.

North American 60 Hz Models:
All models (except J-315/J-325): 240 VAC ±10%
J-315/J-325: 120 VAC ±10%

Export 50 Hz Models:
All models; 230 VAC ±10%

All Models
If there is no voltage present at the recommended test points, replace circuit board. If voltage is present, the pump needs to be repaired or replaced. Try replacing the pump’s start capacitor. If the pump still doesn’t work, replace pump.
8.15 SERVICE BULLETIN: 2014 J-300 Summer Logic Upgrade (July 29, 2014)

We have recently discovered a glitch in the summer logic code of the 2014 J-300 software. The issue will result in the circulation pump turning off and on repeatedly at the summer logic threshold. For example, if the spa is set for 100°F and reaches 102°F (two degrees above the set temp), the pump will cycle off and on as long as the primary cycle is engaged and water temperature remains two degrees above the set temp.

To correct this issue, the microchip on the PC board will need to be changed. The revision for the new chip is **REV 3.82 part #6660-289**.

- This affects all 2014 J-300 model spas manufactured through 7/15/14.
- This issue poses no risk to the user, therefore there is no mandatory or immediate replacement process in place. However, we recommend updating any 2014 J-300 models that are currently in your inventory and replacing the chip when performing a service call for any other reason.
- Dealer inventory of service PC boards shipped prior to 7/15/14, 6600-293 & 295, should be checked and upgraded, as needed.
- Chip puller part #6000-190
- Chips will be available to ship 7/30/14.
- Complete instructions for chip replacement will be posted on the E-tech News Center by 7/25/14.
- Order the chips under warranty and submit the claim like any other warranty service claim. We will need the chips returned.
- We suggest replacing the chip at time of delivery. Field service calls will be paid at the normal rate, spas not registered that are in your inventory will be paid at a rate of $30.00.

Once the new chip is installed, the CLEARRAY bulb should also be checked for proper operation by verifying the green indicator light is lit on the CLEARRAY ballast.

If you have any questions please contact Technical Service at (866) 234-7727 ext. 71951
MicroChip Replacement Procedure

This instruction sheet outlines the procedure for replacing LED Circuit Board MicroChips.

**Required Materials**

A. Replacement MicroChip  
B. IC Chip Puller #6000-190

⚠️ **CAUTION:** To prevent static damage to the spa circuit board, always wear a grounded anti-static wrist strap or touch the metal grounding lug on the spa load box to drain static from your body before accessing the circuit board.

1. Remove power to spa.
2. Carefully remove the existing MicroChip from the circuit board using a commercial IC Chip Puller. Gently rock the chip from side-to-side when pulling upward to remove from socket as illustrated (Figures 1-3). Save the chip and return it to factory for warranty reimbursement.

3. The replacement MicroChip must be installed with the chip notch facing the socket notch on the circuit board as illustrated (Figure 4). To install the replacement MicroChip, align one row of pins to the circuit board socket holes as illustrated (Figure 5), then gently pivot the chip downward into the opposite row of socket holes as illustrated (Figure 6). Visually inspect all MicroChip pins to ensure they are all centered over their mating socket holes. Finally, press the chip downward (at the center) until all legs are firmly seated into the socket as illustrated (Figure 6).

4. Apply power to spa and verify proper operation. **Note:** The topside Control Panel will briefly display the new chip revision during the power-up sequence to confirm the replacement MicroChip is properly installed.
48-Frame Jet Pump Change

In July of 2014, the primary supplier for 48-frame jet pumps was changed. Our new pumps offer the same output, quality, and reliability standards as our older (OEM) 48-frame jet pumps.

Our new 48-frame jet pumps can retrofit most existing spas using this pump size with minor alignment adjustments. However, these jet pumps may not be compatible with all spas manufactured prior to July 2014 since they vary in size and shape from their older predecessors. As an example, the illustration (right) shows the size differences between our new 6500-092 jet pump and an older 6500-343 jet pump. This size variation can make installation challenging in some cases. For this reason, we will continue to offer a limited supply of older 48-frame jet pumps to service the few applications where our new pumps will not fit. Please note the price of our older 48-frame jet pumps will increase (to be announced).

We encourage all dealers and field service technicians to use our new 48-frame jet pumps when repairing spas using this pump size. The following table includes a compatibility cross-reference for our new 48-frame jet pumps and older 48-frame jet pumps.

Please inform your entire service staff of this important jet pump change. Your cooperation is greatly appreciated.

<table>
<thead>
<tr>
<th>New 48FR Jet Pumps</th>
<th>Pump Descriptions</th>
<th>Older 48FR Jet Pumps</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>6500-091</td>
<td>PUMP:2.5HP 1SP 230V 60H LX NB1</td>
<td>6500-341</td>
<td>N/A</td>
</tr>
<tr>
<td>6500-092</td>
<td>PUMP:2.5HP 2SP 230/60H LX NB1</td>
<td>6500-343</td>
<td>N/A</td>
</tr>
<tr>
<td>6500-094</td>
<td>PUMP:2HP 2SP 230V 60HZ LX NB1</td>
<td>6500-347</td>
<td>N/A</td>
</tr>
<tr>
<td>6500-095</td>
<td>PUMP:2.5HP 2SP 230V 60H LX NB2</td>
<td>6500-355</td>
<td>See Example (right) for dimensional variations between these pump models.</td>
</tr>
<tr>
<td>6500-096</td>
<td>PUMP:2HP 2SP 230V 60HZ LX NB2</td>
<td>6500-359</td>
<td>N/A</td>
</tr>
<tr>
<td>6500-845</td>
<td>PUMP:1.5HP 2SP 115V 60HZ LX 48</td>
<td>6500-345</td>
<td>For Tacoma models (only) the wet end must be rotated 90 degrees for proper installation.</td>
</tr>
</tbody>
</table>
APPENDIX
Checking Voltage to Hot Tub

Correct supply voltage wiring to the hot tub is essential for safe/proper operation. The first step in troubleshooting a new installation should be to take voltage readings at the terminal block TB1. Do not trust wire colors. Electricians make mistakes and electrons are color-blind. A low line voltage or incorrectly wired hot tub will result in either of the following symptoms: A) Strange or intermittent symptoms, B) Displays with indications that simply cannot be correct.

Many of the most perplexing problems in the past have been wiring errors and voltage drop problems. Human safety depends on proper hot tub grounding. It is essential that the voltage readings described below are as indicated. The ground connection must be heavy duty wiring.

- J-315, J-325 North American 60 Hz are convertible for either 120 VAC 3-wire operation or 240 VAC 4-wire operation. The 4-wire power configuration powers the heater with 240 VAC for increased performance while powering all other components with 120 VAC.
- All other models are North American 60 Hz are exclusively powered by 240 VAC.
- All Models Export 50 Hz are exclusively powered by 230 VAC ±10%, see Figure C below.

Verify All Convertible Models Power Connections as Follows:

North American Models (120 VAC/60 Hz, Fig. A)
- Hot to Neutral: Measure across test points 1 and 2 with voltmeter for 120 VAC.
- Hot to Ground Test: Measure across test points 2 to 23 for 120 VAC.

North American Models (240 VAC/60 Hz, Fig. B)
- Hot to Neutral: Measure across test points 1 and 2 with voltmeter for 120 VAC; then across test points 1 and 24 for 120 VAC.
- Hot to Ground: Measure across test points 2 and 23 for 120 VAC; then across test points 24 and 23 for 120 VAC.
- Hot to Hot: Measure across test points 2 and 24 for 240 VAC.

DANGER: Electrical Shock Hazard Exists!
High Voltage Present on Circuit Board. Use Extreme Caution while Servicing Circuit Board.
Verify All 240 VAC Models power connections are as follows:

North American 240 VAC/60 Hz, Fig. D:
- Hot to Hot: Measure across test points 1 and 2 for 240 VAC.
- Hot to Ground: Measure across test points 1 and 23 for 120 VAC; then across 2 and 23 for 120 VAC.

A2 Checking Current Consumption of Devices

This table lists current draw for most major hot tub components:

<table>
<thead>
<tr>
<th>J300 Collection (North American 60 Hz)</th>
<th>J300 Models (Export 50 Hz)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Device</strong></td>
<td><strong>Current Consumption ±10%</strong></td>
</tr>
<tr>
<td>Pump 1 High Speed only (J-315/J-325 only)</td>
<td>9.0A-11.0A</td>
</tr>
<tr>
<td>Pump 2 (High speed only)</td>
<td>9.0A-11.0A</td>
</tr>
<tr>
<td>Heater 1 kW/4 kW (Convertible Models Only)</td>
<td>7.0A-9.0A (120 VAC)</td>
</tr>
<tr>
<td></td>
<td>16.7A (240 VAC)</td>
</tr>
<tr>
<td>Heater 5.5 kW</td>
<td>19.5A-23.5A (240 VAC)</td>
</tr>
<tr>
<td>Circulation Pump</td>
<td>0.5A-1.0A</td>
</tr>
<tr>
<td>CLEARRAY (Standard)</td>
<td>0.4A</td>
</tr>
<tr>
<td>Ozone Generator (Opt)</td>
<td>0.1A</td>
</tr>
</tbody>
</table>
A3 Checking Voltages to Devices
Device voltages are often measured at the circuit board to determine whether the board or device is bad. If the circuit board delivers voltage when device operation is called, the circuit board is probably good and the problem lies with the device or the wiring to the device. The following voltage chart shows operating voltages for all major hot tub components. Voltage is considered good if within ±10% of the listed value. Refer to appendix pages 43-46 for your specific circuit boards test point locations.

<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Device</td>
<td>Test Points</td>
<td>Voltage ±10%</td>
</tr>
<tr>
<td>Pump 1 (High Speed)</td>
<td>6 and 7</td>
<td>240 VAC</td>
</tr>
<tr>
<td>Pump 2 (High Speed)</td>
<td>8 and 9</td>
<td>240 VAC</td>
</tr>
<tr>
<td>Circulation pump</td>
<td>14 and 15</td>
<td>240 VAC</td>
</tr>
<tr>
<td>Water heater</td>
<td>12 and 13</td>
<td>240 VAC</td>
</tr>
<tr>
<td>CLEARARRAY</td>
<td>16 and 17</td>
<td>240 VAC</td>
</tr>
<tr>
<td>Ozone generator (optional)</td>
<td>1 and 5</td>
<td>240 VAC</td>
</tr>
</tbody>
</table>

| J-315/J-325 Models |  |
|---|---|---|
| Device | Test Points | Voltage ±10% |
| Pump 1 (High Speed) | 5 and 7 | 240 VAC |
| Circulation pump | 14 and 15 | 240 VAC |
| Water heater | 12 and 13 | 240 VAC |
| CLEARARRAY | 16 and 17 | 240 VAC |
| Ozone generator (optional) | 1 and 5 | 240 VAC |

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Device</td>
<td>Test Points</td>
<td>Voltage ±10%</td>
</tr>
<tr>
<td>Pump 1 (High Speed)</td>
<td>5 and 7</td>
<td>230 VAC</td>
</tr>
<tr>
<td>Pump 2 (High Speed)</td>
<td>8 and 9</td>
<td>230 VAC</td>
</tr>
<tr>
<td>Circulation pump</td>
<td>14 and 15</td>
<td>230 VAC</td>
</tr>
<tr>
<td>Water heater</td>
<td>12 and 13</td>
<td>230 VAC</td>
</tr>
<tr>
<td>CLEARARRAY</td>
<td>16 and 17</td>
<td>230 VAC</td>
</tr>
<tr>
<td>Ozone generator</td>
<td>1 and 5</td>
<td>230 VAC</td>
</tr>
</tbody>
</table>

| J-315/J-325 1-pump Models (Export 50 Hz) |  |
|---|---|---|
| Device | Test Points | Voltage ±10% |
| Pump 1 (High Speed) | 5 and 7 | 230 VAC |
| Circulation pump | 14 and 15 | 230 VAC |
| Water heater | 12 and 13 | 230 VAC |
| CLEARARRAY | 16 and 17 | 230 VAC |
| Ozone generator | 1 and 5 | 230 VAC |
A4 Testing Flow Switch
When the “FL1 or FL2” message appears, it means the flow switch contacts have failed to close when the pump was turned on, or failed to open when the pump was turned off. This could be caused by an excessively dirty filter, an obstruction in the flow path or by a bad switch. The first thing to look for is an excessively dirty filter or an obvious obstruction, remembering (while not likely) that it is possible for a small object to work its way into the plumbing where it will not be obvious. After verifying no obvious blockage exists, the flow switch can be tested. Refer to page 16 for switch testing instructions.

A5 About Fuses
When current passes through a conductor the conductor heats up. If the conductor is a heavy piece of wire or a strip of metal, it will pass large currents and generate very little heat. If a wire is fine, or a strip of metal is thin, it will heat up at lower current levels. Fuses rely on this principle to protect circuits from massive current flows by simply melting if their current rating is exceeded. By selecting different alloys for the fuse element, fuses can be made to have their current rating exceeded for a short period of time. Such slow-blow fuses are excellent for protecting motor circuits where start-up currents (surge currents) are higher than running currents.

<table>
<thead>
<tr>
<th>Fuse</th>
<th>Part Number</th>
<th>1-Pump Models J-315/J-325, Models</th>
<th>2-Pump Models</th>
<th>1-Pump Export Models</th>
<th>2-Pump Export Models</th>
</tr>
</thead>
<tbody>
<tr>
<td>Main Power, 20A</td>
<td>6660-106</td>
<td>X</td>
<td></td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>Main Power, 30A</td>
<td>6660-105</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Transformer, 1.5A</td>
<td>6760-120</td>
<td>X</td>
<td>X</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

Testing Fuses
A good fuse should read continuity (0 Ω); a blown fuse will read no continuity (infinite ohms). See Figures 6 and 7 for testing methods.

CAUTION: Make sure replacement fuses are exactly those listed above. Never test a fuse for continuity while installed in the fuse holder.

![Figure 6](image1)
![Figure 7](image2)
A6 The Watchdog “- - -”
Three horizontal dashes with no other control panel indicators illuminated is a result of the watchdog circuitry detecting a potential destructive condition within the hot tub.

There are many conditions that can cause a watchdog error message. Except for a runaway heat condition, most are caused by a faulty circuit board, bad hi-limit sensor, or temperature sensor. On rare occasions a control panel or a bad transformer will cause Watchdog. Confirm this by using a test panel and testing transformer connections on the circuit board, refer to appendix page 51.

1. Turn power to hot tub off. Verify proper resistance of hi-limit and temperature sensor (page 49). Replace defective temperature or hi-limit sensor then retest system. If watchdog error goes away, skip steps 2-4.
2. If the heater is not overly hot to touch and the watchdog displays an immediate dashed line error, the circuit board is probably bad. Check transformer primary and secondary voltages (page 51) before changing the circuit board.
3. See if the temperature in the heater has reached 118°F (48°C). If the heater got too hot, check for flow restrictions or a sticking weir gate and correct the problem.
4. If you cannot produce the watchdog error and the hi-limit and temperature sensors check out OK, tell the customer to call you if watchdog display reappears.

A7 Understanding Sanitizers
A. CLEARAY
Our water purification system will begin disinfecting your water instantly. CLEARAY Water Purification System is exclusive technology utilizing natural ultraviolet technology to sanitize your water, disinfecting bacteria, viruses, and algae in portable hot tubs. The ultraviolet light otherwise known as UV-C or germicidal light inactivates the microorganisms by disrupting the DNA so that it cannot reproduce and is considered lifeless. The ballast is the power supply for the purification system; it has two LED indicator lights the green indicating incoming power flow and the red indicating the system is properly working. CLEARAY is standard for all models.

• As the water is filtered, it passes through the CLEARAY unit, and is exposed to UV light that sanitizes the water.
• The combination of the CLEARAY system and a residual sanitizer work in conjunction to keep your water clear and clean.

B. Ozone
Oxygen is an element, and like other gaseous elements, normally exists as a pair of atoms bonded together to make a whole molecule. Chemists therefore use the symbol O2 to speak of “oxygen molecules” rather than oxygen atoms.

In the presence of an electric discharge like lightning, three molecules of O2 can combine to form O3 known as ozone. While oxygen has no smell, ozone has a very pronounced smell in large concentrations. In small quantities, it causes the pleasant “fresh air” smell that laundry has when dried on a outdoor clothesline. Some clothing dryer manufacturers have installed an ultraviolet lamp inside their machines to give clothes that “fresh-as-all-outdoors” smell.

The technician must understand three things about ozone:
1. Ozone (O3) breaks down quickly into plain oxygen (O2).
2. Ozone kills germs.
3. Ozone is a strong oxidizer.

Because ozone breaks down quickly into oxygen (O2), a residual sanitizer must be used. There are two choices, chlorine or bromine. While chlorine is oxidized by ozone just as quickly as bromine, residual bromine compounds are a much better disinfectant than residual chlorine compounds. Hence ozone and bromine team up much better to do the overall job than ozone and chlorine.
Understanding pH

Keeping hot tub water clean and clear involves a very complex set of chemical reactions. Most importantly, the hot tub must be sanitized. Bacteria, algae, and other single-cell life forms that may find their way into the hot tub must be killed. Three chemical elements, chlorine, bromine, and ozone are all good sanitizing agents. When any of these elements come into contact with bacteria or algae, these single-cell organisms die. Therefore, to keep the water germ free, we must simply keep a residual of the sanitizing agent in the water.

Making germs dead is only half the objective, however. The dead cells of the bacteria and algae we have killed, and the organic “stuff” (dandruff, perspiration, dead skin cells, etc.) that our bodies deposit in the hot tub, will make the water cloudy and uninviting as they decompose. These microscopic contaminants must be “burned out” or oxidized. These oxidation reactions occur simultaneously with reactions known as reduction reactions. The balance of these chemical reactions is quite critical and can occur properly only if pH levels are maintained from 7.2 to 7.8 pH (Ideal 7.4 to 7.6). If the pH is out of range, the sanitizing agent itself will be oxidized or reduced and in effect be “used up” before it has a chance to do its job.

pH is critical for maximum disinfection, sanitizing, and cleaning results with the least amount of chemical addition. Make sure your customer understands the importance of regular water test intervals and the proper use of chemicals. Both are necessary to ensure maximum water quality and to maintain a healthy and fun hot tub environment.
North American 60 Hz 120V/240V Convertible 1-Pump Models

- Board is shown with 2013+ DCU with minidin connectors.
- This is a generic diagram actual connections and components may vary.
A10 North American 60 Hz 240V 2-Pumps Models

- Board is shown with 2013+ DCU with minidin connectors.
- This is a generic diagram actual connections and components may vary.
Board is shown with 2013+ DCU with miniDIN connectors.
This is a generic diagram; actual connections and components may vary.
A12 Export 50 Hz 230V 1- or 2-Pump Models

- Board is shown with 2013+ DCU with minidin connectors.
- This is a generic diagram actual connections and components may vary.
A13 Load Box Connection Diagrams A - D (North American 60 Hz)

**A**

2-Pole Circuit Breaker with 2-Wire Grounded Load Connection
(3 Wires to Hot Tub, 2-Hot, 1-Ground)

- **240 VAC**
  - White
  - Red
  - Black

- **Main Service Panel with GFCI**
  - Red Pigtail
  - Neutral Bus
  - Ground

- **TB1 2-Pole GFCI Breaker**
  - Red
  - Black
  - Green

- **Red Pigtail**
- **Ground**
- **No Load Neutral Wire**

**Note:** service disconnect not shown in this diagram.

**B**

2-Pole Circuit Breaker with 3-Wire Grounded Load Connection
(4 Wires to Hot Tub, 2-Hot, 1-Neutral, 1-Ground)

- **240 VAC/120 VAC**
  - White
  - Red
  - Black

- **Main Service Panel with GFCI**
  - Red Pigtail
  - Neutral Bus
  - Ground

- **Red Pigtail**
  - Neutral Bus
  - Ground
  - **Load Neutral Lug on Breaker**

**Note:** service disconnect not shown in this diagram.

---

**Load Neutral Wire Diagrams are provided for North American 60 Hz systems.**

- **A** shows a 2-Pole Circuit Breaker with 2-Wire Grounded Load Connection.
- **B** shows a 2-Pole Circuit Breaker with 3-Wire Grounded Load Connection.

---

**Diagram Elements:**
- **Color Coded Wires:**
  - Red
  - Black
  - White
  - Green

**Electrical Connections:**
- **2-Pole GFCI Breaker**
- **Load Neutral Lug on Breaker**

**System Characteristics:**
- **2-Pole Circuit Breaker**
- **2-Wire Load Connection**
- **3-Wire Load Connection**

---

**Diagram Details:**
- **Main Service Panel with GFCI**
- **Hot Tub Load Box**
- **TB1 2-Pole GFCI Breaker**
- **TB2**

---

**Key Notes:**
- **Red Pigtail**
- **Neutral Bus**
- **Ground**
- **Load Neutral Wire**

---

**System Specifications:**
- **240 VAC/120 VAC**
- **Hot Tub**
- **Load Box**
Main Panel with Secondary GFCI Shut-Off Box Using a 2-Pole GFCI Breaker with 2-Wire Grounded Connection
(3 Wires to Hot Tub, 2-Hot, 1-Ground)

*GFCI Sub Panel commonly used when recommended GFCI does not install in Main Panel.

Main Panel with Secondary GFCI Shut-Off Box Using a 2-Pole GFCI Breaker with 3-Wire Grounded Connection
(4 Wires to Hot Tub, 2-Hot, 1-Neutral, 1-Ground)

*GFCI Sub Panel commonly used when recommended GFCI does not install in Main Panel.
<table>
<thead>
<tr>
<th>Fahrenheit (°F)</th>
<th>Celsius (°C)</th>
<th>Ohms (Ω)</th>
</tr>
</thead>
<tbody>
<tr>
<td>59.0</td>
<td>.15</td>
<td>48840</td>
</tr>
<tr>
<td>60.8</td>
<td>.16</td>
<td>46200</td>
</tr>
<tr>
<td>62.6</td>
<td>.17</td>
<td>44610</td>
</tr>
<tr>
<td>64.4</td>
<td>.18</td>
<td>42630</td>
</tr>
<tr>
<td>66.2</td>
<td>.19</td>
<td>40770</td>
</tr>
<tr>
<td>68.0</td>
<td>.20</td>
<td>39000</td>
</tr>
<tr>
<td>69.8</td>
<td>.21</td>
<td>37290</td>
</tr>
<tr>
<td>71.6</td>
<td>.22</td>
<td>35400</td>
</tr>
<tr>
<td>73.4</td>
<td>.23</td>
<td>34170</td>
</tr>
<tr>
<td>75.2</td>
<td>.24</td>
<td>32700</td>
</tr>
<tr>
<td>77.0</td>
<td>.25</td>
<td>30000</td>
</tr>
<tr>
<td>78.8</td>
<td>.26</td>
<td>28740</td>
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<tr>
<td>80.6</td>
<td>.27</td>
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<td>82.4</td>
<td>.28</td>
<td>26400</td>
</tr>
<tr>
<td>84.2</td>
<td>.29</td>
<td>25311</td>
</tr>
<tr>
<td>86.0</td>
<td>.30</td>
<td>24270</td>
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<tr>
<td>87.8</td>
<td>.31</td>
<td>23280</td>
</tr>
<tr>
<td>89.0</td>
<td>.32</td>
<td>22329</td>
</tr>
<tr>
<td>91.4</td>
<td>.33</td>
<td>21429</td>
</tr>
<tr>
<td>93.2</td>
<td>.34</td>
<td>20541</td>
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<tr>
<td>95.0</td>
<td>.35</td>
<td>19740</td>
</tr>
<tr>
<td>96.8</td>
<td>.36</td>
<td>18960</td>
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<tr>
<td>98.6</td>
<td>.37</td>
<td>18210</td>
</tr>
<tr>
<td>100.4</td>
<td>.38</td>
<td>17490</td>
</tr>
<tr>
<td>102.2</td>
<td>.39</td>
<td>12000</td>
</tr>
<tr>
<td>104.0</td>
<td>.40</td>
<td>16149</td>
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<tr>
<td>105.8</td>
<td>.41</td>
<td>15519</td>
</tr>
<tr>
<td>107.6</td>
<td>.42</td>
<td>14919</td>
</tr>
<tr>
<td>109.4</td>
<td>.43</td>
<td>14349</td>
</tr>
<tr>
<td>111.2</td>
<td>.44</td>
<td>13800</td>
</tr>
<tr>
<td>113.0</td>
<td>.45</td>
<td>13281</td>
</tr>
</tbody>
</table>
A15 Flow Switch Illustration

Flow Switch #6560-852
- J315, J-325 Models
Connection: This flow switch style has spade connectors at top for easy cable removal for electronic troubleshooting.

Flow Switch #2560-040
- 2014+ J300 (except J-315 and J-325)
Connection: This flow switch style has cable with curled finger connectors that can be removed from plug for electronic troubleshooting.

A16 Sensor Harness Diagram

J2 Connector (Cable Side)
Shown while Plugged into Circuit Board

J3 Connector (Cable Side)
Shown while Plugged into Circuit Board

To remove a sensor/switch wire from the either J2 or J3 connectors, insert the end of a paper clip into the slot corresponding with the wire to be removed. This will depress the tine on the pin allowing the wire to be pulled from the harness.

IMPORTANT!
When reinstalling the sensor/switch, make sure the tine on the pin is lifted so the sensor wire will lock into the connector body.
A17 Transformer Test
To Test Transformer:
1. Leave transformer connector J4 plugged into the circuit board.
2. Set your Voltmeter to the 500 VAC range.
3. Place Voltmeter probes directly into backside (wire side) of J4 connector and test as follows:

<table>
<thead>
<tr>
<th>North American 60 Hz</th>
<th>Connector J4</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-315/J-325 (120 VAC or 240 VAC Powered*)</td>
<td>Black to White</td>
<td>120 VAC*</td>
</tr>
<tr>
<td></td>
<td>Yellow to Yellow</td>
<td>12-14 VAC*</td>
</tr>
</tbody>
</table>

*Special instructions for all 120 VAC/240 VAC convertible power models.

120 VAC Power Configuration: Convertible models include a factory installed 10 foot GFCI cord rated at 15A/120 VAC. To use cord the hot tub must be installed within 10 feet of a dedicated, grounded type electrical outlet. Do not use an extension cord of any type! If the hot tub is more than 10 feet from an outlet, it must be hard wired to a single pole 15 amp GFCI breaker. Refer to pages 43-46 for specific circuit board configurations.

240 VAC Power Configuration: Convertible models can be hard wired for 4-wire 120 VAC/240 VAC power. This configuration powers the heater with 240 VAC while powering both pumps and ozone with 120 VAC. An external 30 or 40 amp dual pole GFCI breaker is required. Refer to pages 43-46 for specific circuit board configurations.

<table>
<thead>
<tr>
<th>North American 60 Hz</th>
<th>Connector J4</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>J-335, J-345, J-355, J-365, J375, J385 (240 VAC Powered)</td>
<td>Black to Red</td>
<td>240 VAC</td>
</tr>
<tr>
<td></td>
<td>Yellow to Yellow</td>
<td>12-14 VAC</td>
</tr>
</tbody>
</table>

All Export 50 Hz Models

<table>
<thead>
<tr>
<th>230 VAC Powered</th>
<th>Connector J4</th>
<th>Voltage</th>
</tr>
</thead>
<tbody>
<tr>
<td>230 VAC Powered</td>
<td>Black to Black</td>
<td>230 VAC</td>
</tr>
<tr>
<td></td>
<td>Yellow to Yellow</td>
<td>12-14 VAC</td>
</tr>
</tbody>
</table>
A18 Troubleshooting The Optional Stereo System
The optional Stereo System provides a stereo receiver with high quality hot tub engineered speakers for superior sound quality. If the stereo deck does not turn on, refer to the following test procedure.

I. BLUEWAVE stereo diagram (follow the testing procedures for the Aquatic stereo)

<table>
<thead>
<tr>
<th></th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>BLUEWAVE stereo with connections</td>
</tr>
<tr>
<td>B</td>
<td>Control Panel connection</td>
</tr>
<tr>
<td>C</td>
<td>Antenna connection on stereo</td>
</tr>
<tr>
<td>D</td>
<td>Stereo harness (connects to wiring harness “E”)</td>
</tr>
<tr>
<td>E</td>
<td>Spa wiring harness (connects spa components to stereo)</td>
</tr>
<tr>
<td>F</td>
<td>Spa harness speaker connectors</td>
</tr>
<tr>
<td>G</td>
<td>Subwoofer connector (connects to spa wiring harness)</td>
</tr>
<tr>
<td>H</td>
<td>Spade connectors (connect to the power supply)</td>
</tr>
<tr>
<td>I</td>
<td>Power supply (located in equipment bay)</td>
</tr>
<tr>
<td>J</td>
<td>TB1 terminal (located in control box)</td>
</tr>
<tr>
<td>K</td>
<td>Spa speakers (connect to wiring harness)</td>
</tr>
<tr>
<td>L</td>
<td>Stereo antenna</td>
</tr>
<tr>
<td>M</td>
<td>Crossovers for the speakers</td>
</tr>
</tbody>
</table>
A. Testing the fuses
1. Turn power to the spa OFF.
2. Locate the red fuse wire on the stereo wiring harness (D), Figure K.
3. Open the black casing that encloses the fuse and remove the 15A fuse.
4. Set your meter to test for continuity.
5. Test across the fuse.
   A. A reading of “1” indicates a bad fuse. Replace the fuse and retest.
   B. A reading of “0” indicates a good fuse. Proceed to testing the 10A fuse.

B. Testing the power supply
1. Turn power to the spa OFF.
2. Disconnect the spade connectors between the power supply (I) and the spa wiring harness (H).
3. Turn power to the spa back ON.
4. Set your meter to 20 VDC.
5. Test across the spade connectors for the power supply (I) for 12-15 VDC, Figure M.
6. If voltage is good then the stereo unit is bad. If voltage is bad then the power supply is bad.
A20 Glossary of Terms

Circuit Board: Printed circuit board assembly that distributes voltage to selected components.

Control Panel: Component that allows user to access functions provided by the circuit board.

Ammeter: Device which measures electrical current conducted through a wire or electrical device.

Micro Chip: Chip on circuit board that stores hot tub software.

Flow Switch: Switch that informs circuit board there is sufficient water movement to activate heater. This switch identifies water flow.

Hi-limit Sensor/Disk: Sensor that monitors water temperature inside heater.

Jumper: Device on circuit board that mechanically connects (bridges) two points together.

Ohmmeter: Device that measures the resistance in ohms (Ω) of a component or temperature sensitive device (e.g. temperature sensor, heater element etc).

CD Ozonator: A device that produces ozone gas by passing air through a corona discharge (high voltage arc) chamber. Introduce ozone 24 hours a day until a JETS button is pressed. Both filter cycle and ozone production is canceled after a JETS button is pressed and then turn back on approximately 5 minutes after jets turn off.

Pin Assignments: Locations identified by numbers on circuit board.

Sensor Connector: Plug in connector containing the temperature sensor and hi-limit sensor device connections.

Summer Logic: Deactivates Circulation Pump, CLEARRAY and/or optional ozone generator when hot tub water reaches 2°F (1°C) above the set temperature. Hot tub water must be 95°F (35°C) or higher for summer logic to activate.

Temperature Sensor: Sensor that monitors hot tub water temperature.

Transformer: Device that converts primary high voltage AC signal to a secondary low voltage AC signal.

Voltage Meter: Device that measures AC or DC voltage potentials across components or from a specific test point to ground.
## Troubleshooting Data Collection Form

**Customer Name**
_________________________________________________________

**Address**
_________________________________________  **Phone** ( ) ____________

### Before troubleshooting, collect the following:

1. Model # of Hot Tub ____________________________
2. Serial Number _________________________________
3. Operating Voltage _____  Input Voltage______

### Before calling Technical Support, collect the following:

4. Low Speed Pump Amps _____________
5. Pump with Heater Amps _______________
6. High Speed Pump Amps _____ Pump #2 Amps ____
7. High Speed Pump + Heater Amps_______
8. Circuit Board Rev. _______ Eprom Rev. _____________

**Technical Support (866) 234-7727**