LM8 - Low Maintenance System
Installation and Operation Manual

BALBOA water group

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Important Notices

INTELLECTUAL PROPERTY ADVISEMENT

All Intellectual property, as defined below, owned by or which is otherwise the property of Balboa Water Group or its respective suppliers relating to the Balboa Water Group LM8 Low Maintenance System, including but not limited to, accessories, parts, or software relating there to (the "LM8 - Low Maintenance System"), is proprietary to Balboa Water Group and protected under federal laws, state laws, and international treaty provisions. Intellectual Property includes, but is not limited to, inventions (patentable or unpatentable), patents, trade secrets, copyrights, software, computer programs, and related documentation, and other works of authorship. You may not infringe or otherwise violate the rights secured by the Intellectual Property. Moreover, you agree that you will not (and will not attempt to) modify, prepare derivative works of, reverse engineer, decompile, disassemble, or otherwise attempt to create source code from the software. No title to or ownership in the Intellectual Property is transferred to you. All applicable rights of the Intellectual Property shall remain with Balboa Water Group and its suppliers.

END USER WARNING

This Installation Manual is provided solely to aid qualified spa service technicians in installing spas with control systems manufactured by Balboa Water Group. Balboa controls have absolutely no end user serviceable parts. Balboa Water Group does not authorize attempts by the spa owner/user to repair or service any Balboa products. Non-qualified users should never open or remove covers, as this will expose dangerous voltage points and other dangerous risks. Please contact your dealer or authorized repair center for service.

GFCI COMPLIANCE

- It is required by code to install a Ground Fault Circuit Interrupter (GFCI) in the supply power for a spa. This device will trip the breaker if there is an unsafe electrical condition caused by a malfunctioning component or even the slightest short to ground.
- Note: Connect the control system only to a circuit protected by a Class A GFCI mounted at least 5' (1.52M) from the inside walls of the spa/hot tub and in line of sight from the equipment compartment.
- Refer to NEC (National Electrical Code), 2005 Edition, Article 680 for more information.

WARNINGS: DANGER! RISK OF ELECTRIC SHOCK!

- All electrical work must be performed by a qualified electrician and must conform to all national, state, and local codes.
- Before making any electrical connections, make certain that the Main Power breaker from the house breaker box has been turned off.
- Do not attempt service of this control system. Contact your dealer or service organization for assistance.
- Do not permit any electric appliance, such as a light, telephone, radio, or television within 5' (1.5m) of a pool or spa.
- Follow all owner's manual power connection instructions.
- Installation must be performed by a licensed electrician and all grounding connections must be properly installed.
- No user serviceable parts.
- Water temperature in excess of 38˚C may be injurious to your health.
- Disconnect the electrical power before servicing.
- Keep access door closed.

CAUTION

- Test the ground fault circuit interrupter before each use of the spa.
- Read the instruction manual.
- Adequate drainage must be provided if the equipment is to be installed in a pit.
- To ensure continued protection against shock hazard, use only identical replacement parts when servicing.

WARNING

- Water temperature in excess of 38˚C may be injurious to your health.
- Disconnect the electrical power before servicing.
- Keep the pack enclosure closed unless being serviced by a qualified serviced technician.

Introduction to the LM8 System

Thank you for choosing Balboa Water Group's LM8 - Low Maintenance System. The LM8 system incorporates the following features and benefits.

ADVANCED TECHNOLOGY

- Equipment and features controlled from topside panel
- Heater management system eliminates unreliable flow and pressure switches
- Logic and control functions for entire spa
- Audio module with FM tuner in a single chip and 100W of music power without excessive heat
- LED module with various dimming LED programs - including LEDs with music
- Artficial intelligence touch panel
- Self-testing diagnostics
- Self-monitoring
- Informative end user messages

USER FRIENDLY

- Touch screen is only required customer interface
- Error codes replaced with useful information - like actual flow rate
- Automatic control of over heating, cold plumbing, and stale water in pumps
- Special features include vacation, inverted display, economy mode, 12/24 hr time, degrees in F or C
- Multiple languages, child lockout, status screen and configuration check screen

RELIABLE DESIGN

- Redundant connections (topside, sensors, transformer, LEDs)
- Redundant, gold plated, card edge connectors
- Higher rated part spec's (relays, capacitors, resistors, transformer)
- Extended factory testing of all control functions and special features
- UL, CSA, CE

BUILT-IN TECH SUPPORT

- Continuous self testing (motors, heater, sensors, modules)
- Green/yellow/red status on topside shows replacement needs for any spa component
- Immediate identification of miswiring or failed components

SIMPLE, INEXPENSIVE REPLACEMENTS

- Major control functions separated into modules, which can be replaced without opening pack
- Module replacement costs less than replacing fully populated main boards

THEORY OF OPERATION

- Artificial Intelligence is used to turn the heater on just when the water temperature drops 1 degree F (not 48 times per day). The off time is constantly adjusted, based on nearness to target. Benefits are energy savings and less wearing of pump.
- Since there is no sensor in the water, the water temperature is reported only after the pump is run for at least 30 seconds and the rate of temperature change is zero.
- A flow test is run before each heater usage. With the pump off, the heater is tested for 6 seconds. Then the rate of cooling is measured when the pump is turned back on. Gallons/minute can be calculated.
- To protect against loss of flow, the heater is turned off anytime the temperature in the heater increases by a rate of more than 2 degrees/minute. This takes only seconds, and is therefore safer than other systems.
- An overheat condition does not display an error message. Instead, the heater will be locked off (until power is reset) and the high temperature that was reached will be displayed on the Status Screen for technician review.

CONTROL SYSTEM OVERVIEW

- Fully Integrated and Self Contained
- Modular Functions
- Built-in Self Test
- Advanced Heater Management System
- High Reliability/Low Maintenance Design
- Touch Screen Top Side
- Five Issued/Pending Patents in the design

Description of Components

3 CONTROL MODULES

The **Red Control Module** manages all Logic Functions:

1. Keeps time of day
2. Reports water temperature
3. Saves settings in flash memory
4. Translates messages from Topside and activates Relay Board
5. Times out Pumps and Light and Audio
6. Safely maintains Heater Function
7. Monitors Sensor Health
8. Backup Processor also watches for Heater or Sensor problems

The **Yellow LED Module** provides colors and intensity selected at Topside

The **Green Audio Module** tunes FM from Topside Commands and delivers 100W of Music.

The Relay Board switches 240V to Motors and Heater

Touch Screen Topside

Control Modules

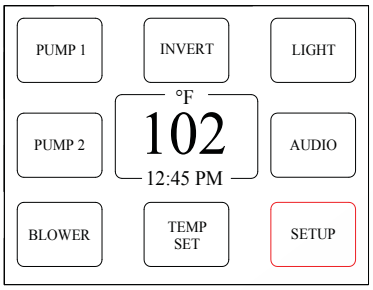
Household Breaker Set-up & Wiring Installation

IMPORTANT BREAKER INSTALLATION INFORMATION

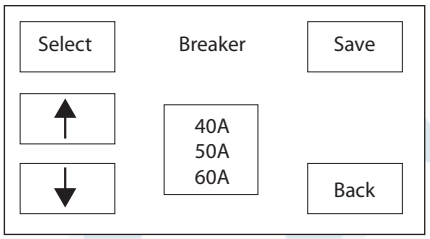
The LM8 spa pack contains a set-up to accommodate several sizes of household breakers. It will also regulate which components on the spa can come on together to stay within the breaker setting. The heater is turned off whenever the current rules are required for any particular breaker setting.

To access the breaker setup:

Press and hold the SET UP button on the main menu screen. It will turn green. After approximately 15 seconds the display will switch to a breaker menu.



Main Menu Screen



Breaker Menu Screen

To change the breaker setting:

Use the UP AND DOWN ARROWS to scroll through the available breaker settings. 60A is the factory default. Press SELECT button to choose the desired setting.

To save any breaker setting changes:

Press the SAVE button

To go back to the Main Menu Screen:

Press the BACK button.

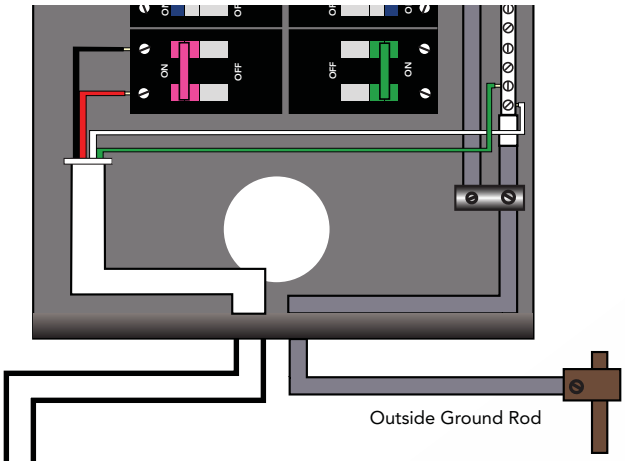
Note: Consider using the 60A breaker setting, and then wire the spa accordingly.

WIRING INSTALLATION

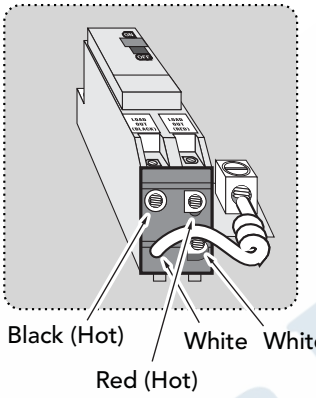
1. The LM8 Spa requires a dedicated 50A circuit with a GFCI. The service cable must be 4-wire, 6 AWG.
2. **Turn off the circuit breaker before proceeding.**
3. **Always remove the colored card modules before opening the pack enclosure.**
4. Remove the pack lid after removing the 6 lid screws.
5. Connect one 220v service wire (**usually** black) to L1, the neutral wire (**usually** white) to neutral, and the other 220v service wire (**usually** red) to L2. If there is any doubt, verify lines with a voltmeter.
6. The green wire (safety ground) is brought into the enclosure with the other wires, but it must then be routed back through the hole provided in the enclosure and connected securely to the grounding bar.
7. Verify that the transformer connectors are plugged in and everything else is in place inside the pack, then turn on the circuit breaker and verify that the green led (D22) on the top edge of the board is on. (This verifies the power connections). Turn the breaker back off and replace the pack lid, using 2 screws.
8. Carefully insert the red, yellow, and green modules according to the colors on the pack lid. Note that a slight up and down movement will help you find the proper seating of the connectors. Do not use excessive force if the connectors do not seat easily. Too much force can damage the circuit board and/or module.
9. Turn on the circuit breaker. Observe that a self-test procedure will immediately verify the condition of all motors, heaters, sensors, and the red module. If any button on the topside is red, it means that component is defective, or unplugged. Other possible issues will result in a pop-up status screen, which can be analyzed to determine any other problems. *Do not press* any buttons on the topside control while the system is in self-test mode. This test usually takes only a few seconds.
10. Be aware that each time before the heater is allowed to operate, the pump and heater will be turned on and off to verify that the spa has flowing water. This process may take up to 2 minutes. During this time, the pump cannot be operated manually.
11. If a "Com Error" is seen, recheck the seating of the red module.

Wiring Installation Diagram

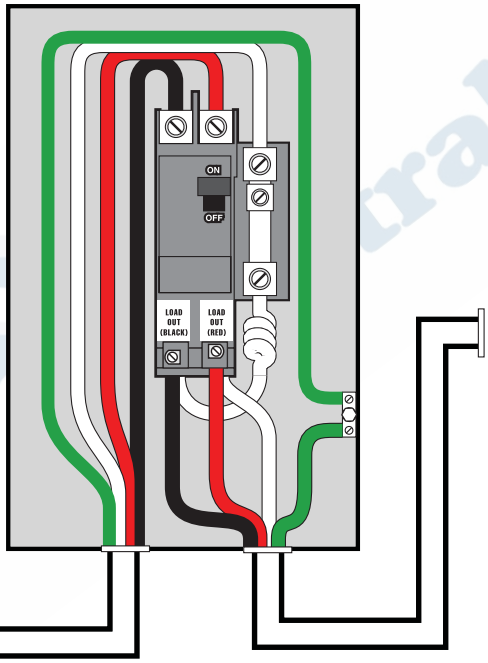
House Breaker Box



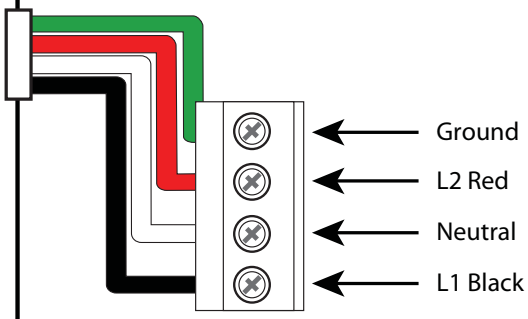
Bottom view of G.F.C.I



G.F.C.I Breaker Box



LM8 Supply Connection *



Green = Ground
Red (L2) = 220V
White = Neutral
Black (L1) = 220V

Note: These are typical color connections.
Verify with a voltmeter if in doubt.

*** Also, see page "120V & 240V Wiring with Heater Options"**

Startup Procedure & Programming

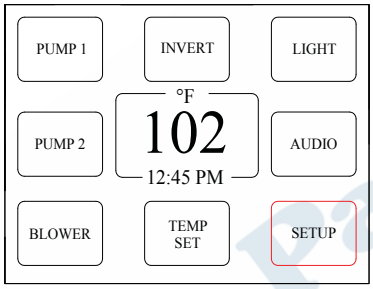
STARTUP PROCEDURE

1. Go to the topside control panel and look at the display. The spa will go through a startup self-test sequence and a flow test, which together will last for a couple of minutes. During this time, refrain from pushing any buttons on the touch screen. During this period the temperature will be displayed as "0" and the time will be 12:00pm. Once the self-test is complete, the current water temperature will be displayed and heating will begin based on the default set point of 100F (38C).
   Note: Pump 1 will be running at low speed continuously until the filter time and/or the time is set. Default filtering start time is 12pm with a 2 hour run time.
   Caution: If any errors appear during the start up period, refer to the troubleshooting section of the manual.

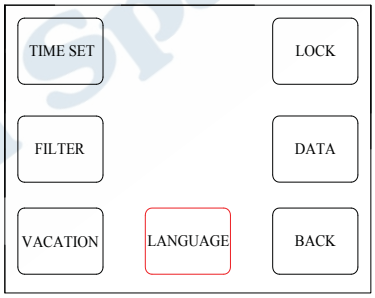
2. You should hear the 2-speed pump turn on at low speed, see water moving through the jets, and see the Pump 1 button illuminated yellow on the control panel. Press the Pump 1 button again. You should hear the 2-speed pump turn on high speed, and see the Pump 1 button illuminated green.
3. If the water is running smoothly through the lines, open the seat(s) manifold air control valve and you should see an increase in jet pressure. Check and adjust the water and airflow of every jet if necessary.
4. Press the Pump 1 button a third time to turn off the 2-speed pump.
   Note: This pump remains on if filtration or heat is needed.
5. For a two pump spa, press the Pump 2 button. You should hear the pump turn on and see water flowing through the jets. Also, the Pump 2 button will illuminate green. Press the Pump 2 button again to turn off the pump.
6. For the blower (if applicable), press the Blower button. You should hear the pump turn on and see bubbles in the jets. Also, the Blower button will illuminate green. Press the Blower button again to turn off the blower.

LANGUAGE SELECTION

To choose your language, select "SETUP" from the main menu screen.

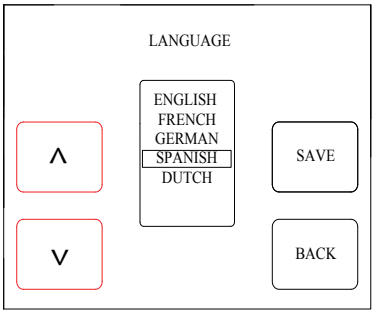


Main Menu Screen



Setup Menu Screen

Next, select the "LANGUAGE" button to access the language selection screen.

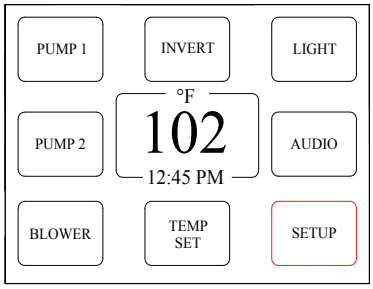


Language Selection Screen

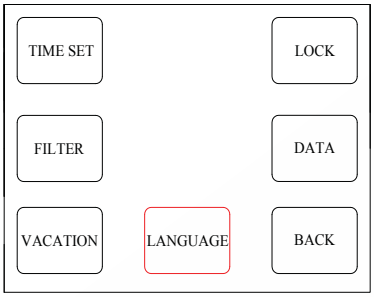
On the language selection screen, choose your language by cycling through the "UP" and "DOWN" buttons. Once your language has been selected, press the "SAVE" button. To return to the setup menu, select the "BACK" button. To return to the main menu screen, select the "BACK" button once again.

SETTING THE TIME

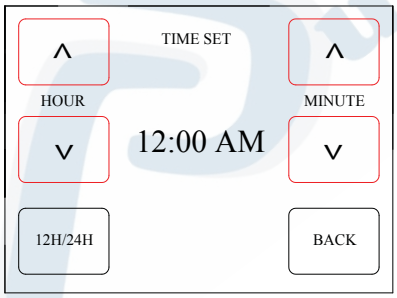
To set the local time on your spa, select "SETUP" from the main menu screen to access the setup menu screen.



Main Menu Screen



Setup Menu Screen



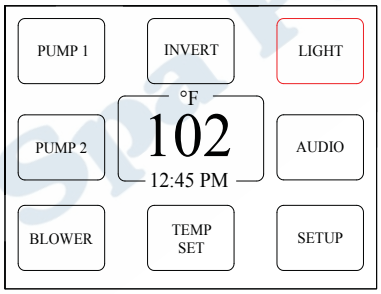
Time Selection Screen

To set the hour, use the "UP" and "DOWN" HOUR buttons. To set the minute, use the "UP" and "DOWN" MINUTE buttons. To choose either standard time or military time, select the "12H/24H" button. To return to the setup menu and save the time setting, select the "BACK" button. Note: In the case of a power failure, the time will return to the 12pm default.

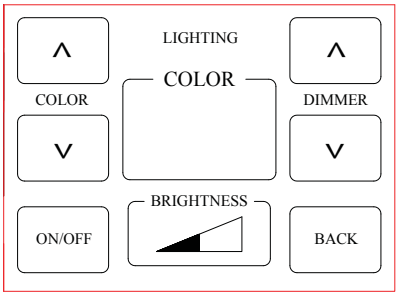
LED LIGHTING

If your spa is not equipped with perimeter lighting, selecting the "LIGHT" button on the main menu screen to toggle on and off the spa lighting. The "LIGHT" button will turn green when the lights are on.

If your spa is equipped with perimeter lighting, select the "LIGHT" button from the main menu screen to access the lighting menu screen.



Main Menu Screen



Lighting Menu Screen

To turn the spa lighting on or off, select the "ON/OFF" button.

To change the color of the lighting, cycle through the "UP" and "DOWN" COLOR buttons until the desired color is achieved.

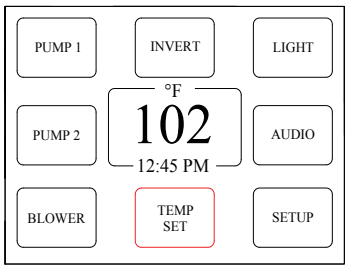
To adjust the brightness of the lighting, cycle through the "UP" and "DOWN" DIMMER buttons until the desired brightness is achieved.

To return to the main menu screen, select the "BACK" button.

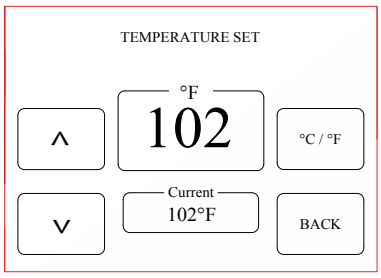
Programming (cont.)

TEMPERATURE SELECTION

To adjust the water temperature of your spa, select the "TEMP SET" button on the main menu screen to access the temperature setting screen.



Main Menu Screen



Temperature Selection Screen

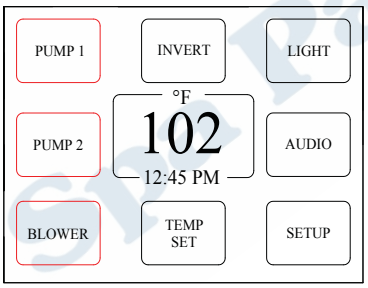
To have your temperature display be in Celsius or Fahrenheit, select the "°C/°F" button.

To adjust the water temperature of your spa, cycle through the "UP" and "DOWN" arrows to select the desired temperature. To return to the main menu, select the "BACK" button.

Water temperature is maintained to +/- 1 degree of the set point. When the water reaches the set point plus one degree the heater will shut off; and when the water drops to 1 degree below the set point, the heater will turn back on. Whenever there is a need for heat, the system will conduct a FLOW TEST prior to turning the heater on. **This test runs approximately 1 minute, during which this time no pumps can be controlled from the touch screen menu.** If the test is successful, the heating pump will turn on, if it has not been running already, and the Sunburst logo will be displayed beside the temperature readout on the main menu screen indicating the heater is on.

PUMP/BLOWER SETTINGS

The pump and blower settings on the spa can be adjusted on the main menu screen by pressing either "PUMP 1", "PUMP 2", or the "BLOWER" button, depending on which you desire to be adjusted. (Certain buttons will not show depending on spa model.)



Main Menu Screen

The settings for Pump 1 are: LOW, HIGH, and OFF. To adjust the settings, select the "PUMP 1" button. For LOW, press the button once. For HIGH, press the button a second time. For OFF, press the button a third time. During the LOW setting, the button will glow yellow. During the HIGH setting, the button will glow green. When the pump is OFF, the button will glow white. If there is an issue with the pump, the button will glow red. (Please refer to troubleshooting.)

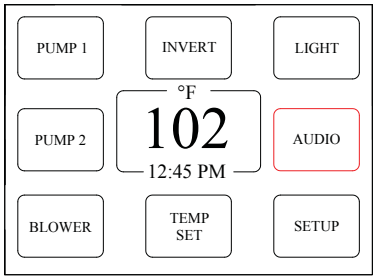
Note: If system is in a period of filtration, the pump will run at LOW speed and will not be able to be changed until filtration is complete.

The settings for Pump 2 are: ON and OFF. To turn pump 2 on or off, select the "PUMP 2" button. For ON, the button will glow green. For OFF, the button will glow white. If there is a problem with the pump, the button will glow red. (Please refer to troubleshooting.)

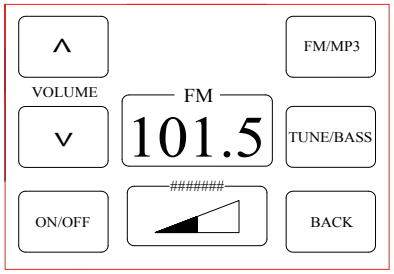
The settings for the Blower are: ON and OFF. To turn the blower on or off, select the "BLOWER" button. For ON, the button will glow green. For OFF, the button will glow white. If there is a problem with the pump, the button will glow red. (Please refer to troubleshooting.)

AUDIO

To adjust audio settings, select the "AUDIO" button from the main menu screen to access the audio screen.



Main Menu Screen



Audio Menu Screen

To turn the stereo on or off, select the "ON/OFF" button.

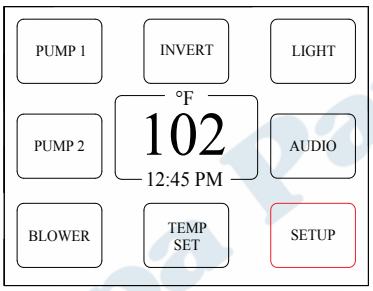
To choose your audio source (FM radio or MP3 player), toggle the "FM/MP3" button.

To adjust the station or bass, press the "TUNE/BASS" button until the desired component is selected, and then cycle through the "UP" and "DOWN" arrow buttons to adjust the selected component. The arrows will revert to volume adjust if no buttons are press for 10 seconds, which at that point the title for the arrows will be displayed as "Volume"

To connect an MP3 player, make sure the volume on the MP3 player is set at 30%. If the MP3 volume is set too high the speakers may not function properly due to acoustic overdrive. If overdrive occurs, the sound coming through the speaker will sound distorted and the speaker will shut down. The speakers will need to cool down and will function properly thereafter. Adjust the MP3 volume prior to turning on the speakers again. Connect the MP3 player to the spa by plugging the cord attached to the spa into the MP3 player's headphone connection.

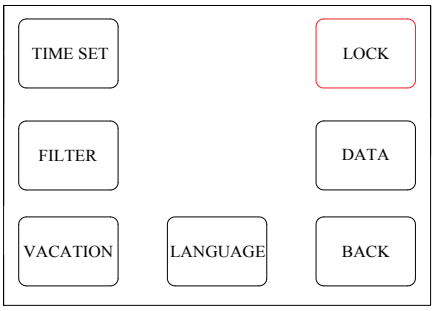
LOCKING THE DISPLAY SCREEN

Locking the display screen deactivates all of the buttons on the display, so that nothing is unintentionally hit. To lock the display screen, press "SETUP" from the main menu screen.



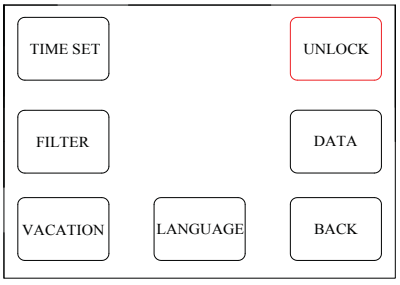
Main Menu Screen

Next, select the "LOCK" button on the setup menu screen. NOTE: The screen will instantly lock and go to a screen saver. To unlock the screen, select the "SETUP" button from the main menu screen.



Setup Menu Screen

Next, select the "UNLOCK" button on the setup menu screen. To go back to the main menu, select the "BACK" button.

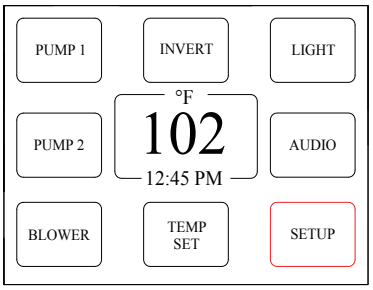


"Locked" Setup Menu Screen

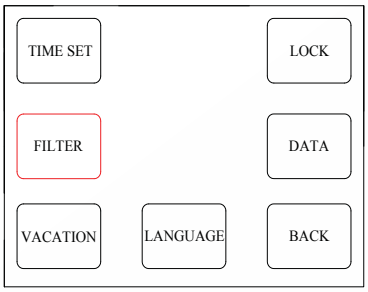
Programming (cont.)

FILTRATION SETTINGS

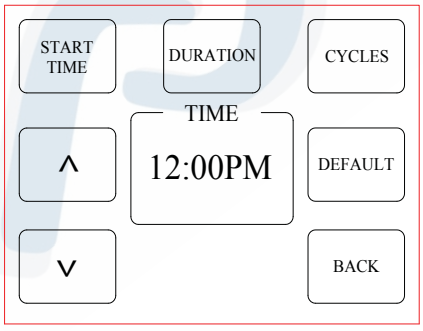
To adjust the filtration settings, select the "SETUP" button on the main menu screen, and then select the "FILTER" button on the setup menu screen.



Main Menu Screen



Setup Menu Screen



Filtration Settings Screen

The filtration cycles, duration, and start time can be adjusted from this screen. The "CYCLES" button allows you to adjust how many filtration cycles the spa does in a 24 hour period. The "DURATION" button allows you to adjust the length of each cycle. The "START TIME" button allows you to adjust what time your spa will begin the filtration cycles.

To adjust the number of filtration cycles, select the "CYCLES" button, then cycle through the "UP" and "DOWN" buttons until the desired number is achieved.

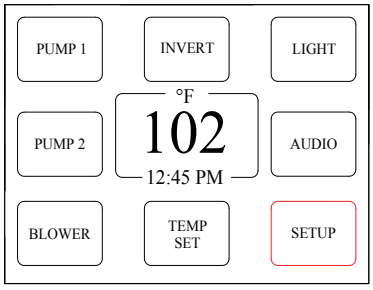
To adjust the duration of the filtration settings, select the "DURATION" button, then cycle through the "UP" and "DOWN" buttons until the desired number is achieved.

To adjust the start time of the filtration, select the "START TIME" button, then cycle through the "UP" and "DOWN" buttons until the desired time is achieved.

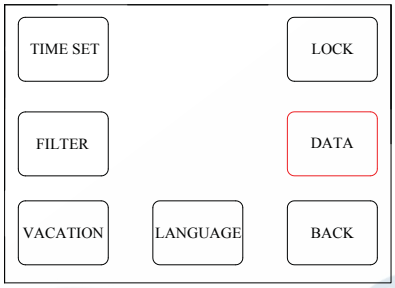
To revert to the default filtration settings, select the "DEFAULT" button.

CONFIGURATION CHECK/STATUS SCREEN

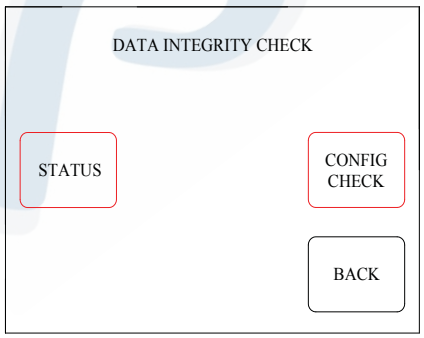
To access the Data Integrity Check Screen select the "SETUP" button on the main menu screen, then select the "DATA" button on the setup menu screen.



Main Menu Screen



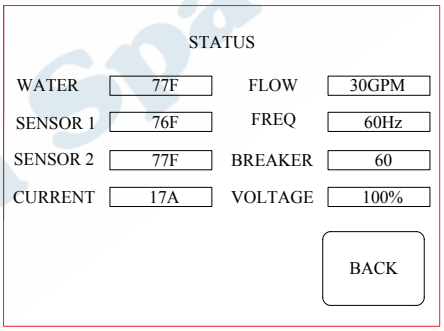
Setup Menu Screen



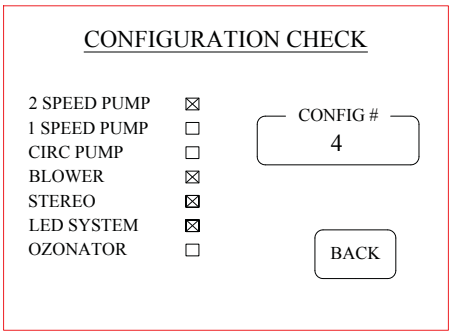
Data Integrity Check Screen

To access the Spa Status screen, select the "STATUS" button on the Data Integrity Check Screen. This screen displays information on the spa water temperature, flow rate, frequency, current, and voltage.

To access the Configuration Check screen, select the "CONFIG CHECK" button on the Data Integrity Check Screen. This screen displays the components configuration installed in the spa. To return to the main menu, press "BACK" to return to the Data Integrity Check Screen and then press "BACK" once again to return to the main menu screen.



Status Screen

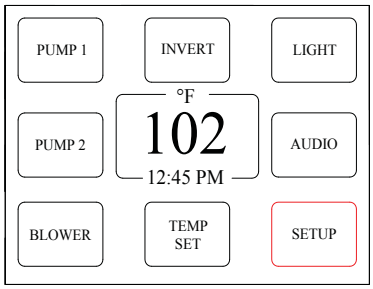


Configuration Check Screen

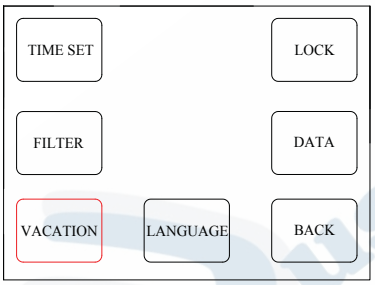
Programming (cont.)

VACATION SETTING

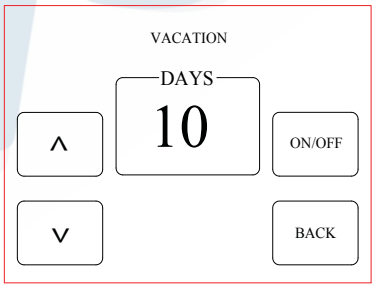
The vacation setting allows you to set your spa to a pre-determined lower energy state, while still performing necessary functions. This setting will allow you to determine how many days the spa will remain at that state. To choose the vacation setting, select the "SETUP" button on the main menu screen. On the setup menu screen, select the "VACATION" button.



Main Menu Screen



Setup Menu Screen



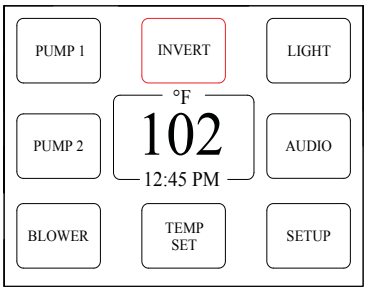
Vacation Settings Screen

To select the number of days to run the vacation setting, cycle through the "UP" and "DOWN" buttons until the desired number of days is achieved. To begin or end the vacation setting, select the "ON/OFF" button. To return to the setup screen select the BACK button, to return to the main menu screen select BACK button once again.

NOTE: The vacation setting will begin immediately once the "ON/OFF" button is pressed. Once the vacation setting time has expired, the spa will return to the settings previously set prior to activating. If you plan to use the spa soon after returning home, set the number of days to one less than you will be gone, so that the spa temperature will be back to normal by the time you plan to return.

INVERTING THE DISPLAY

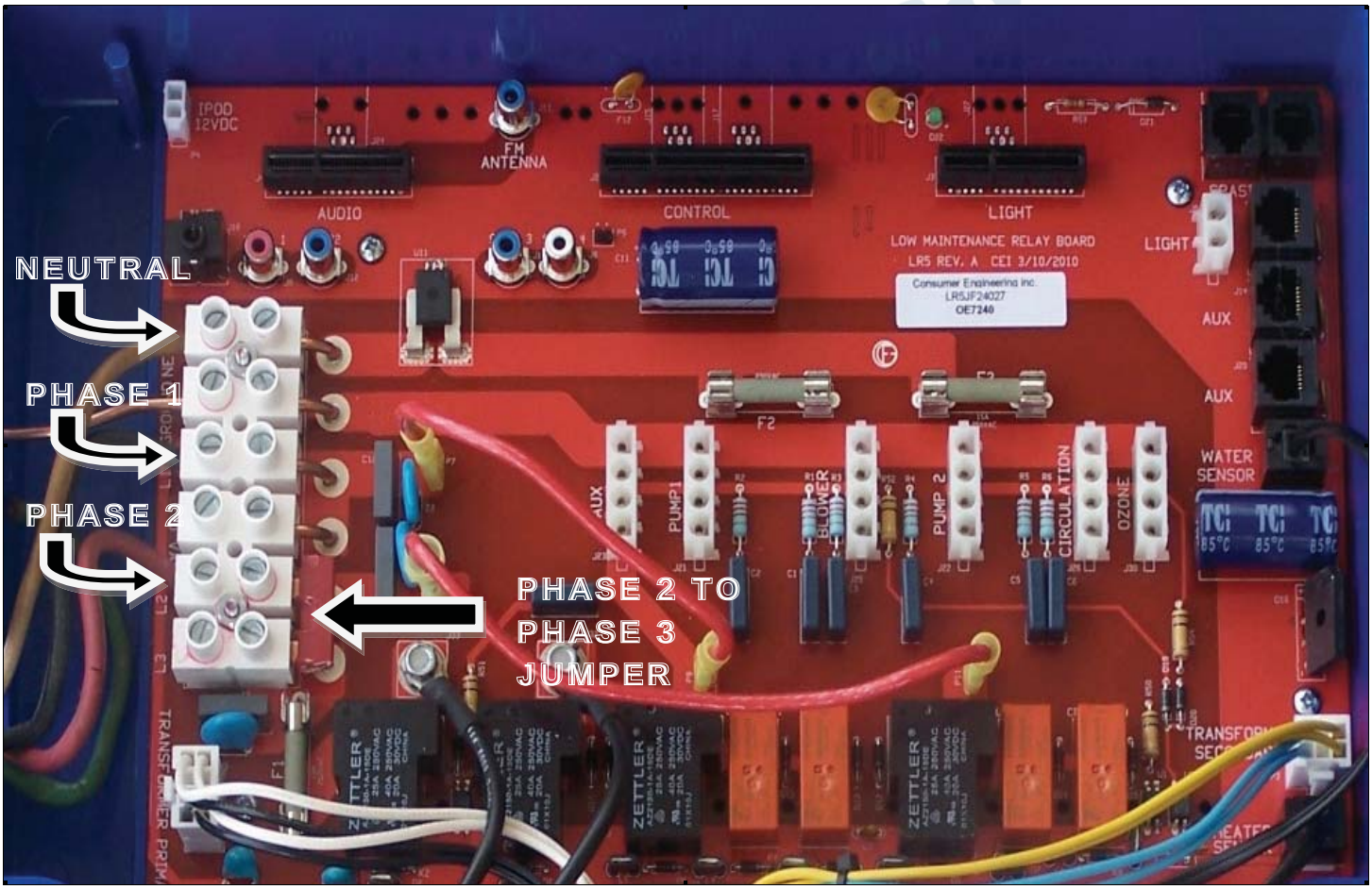
Inverting the display screen allows you to adjust the menus easily whether you are in or out of your spa. To invert the display, select the "INVERT" button on the main menu screen.



Main Menu Screen

Export Spa Pack Wiring (if applicable)

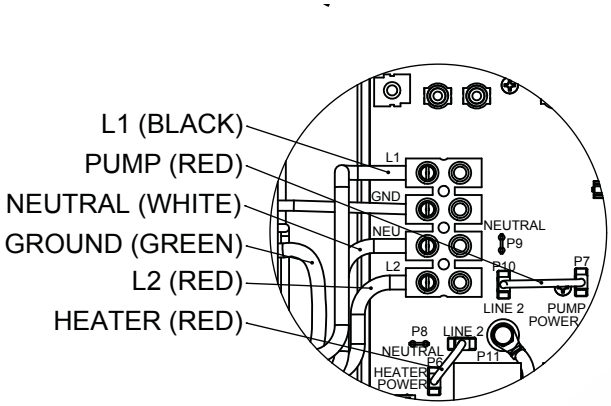
- **WARNING: DISCONNECT ELECTRICAL POWER BEFORE SERVICING**
- **SERVICE GROUND WIRE MUST BE ROUTED INTO THE SPA PACK ENCLOSURE AND ROUTED BACK OUT THROUGH HOLE PROVIDE AND MOUNTED TO GROUNDING BAR PROVIDED.**
- **DO NOT REMOVE OR RELOCATE JUMPERS ON RELAY BOARD.**
- **FOR SUPPLY CONNECTION, SELECT WIRE BASED ON 90 DEGREE C**
- **USE CLASS A GROUND FAULT CIRCUIT INTERRUPTER**
- **USE COPPER CONNECTORS ONLY**



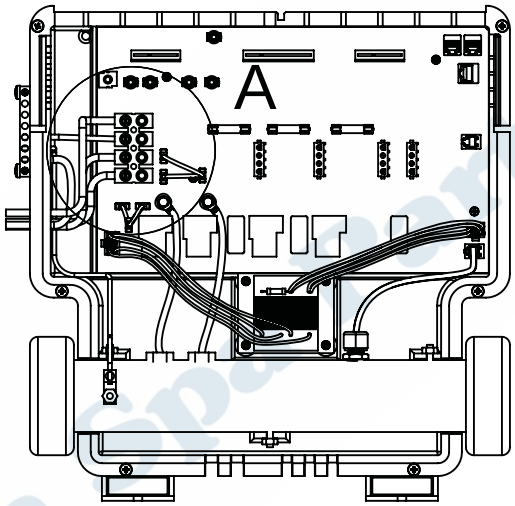
120V & 240V Wiring with Heater Options

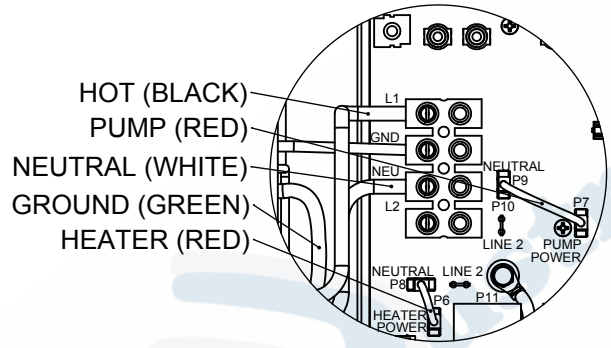
WARNING: DISCONNECT THE ELECTRIC POWER BEFORE SERVICING

AVERTISSEMENT : DÉBRANCHEZ L'ÉNERGIE ÉLECTRIQUE AVANT L'ENTRETIEN



240VAC WIRING FOR DETAIL A





120VAC WIRING FOR DETAIL A

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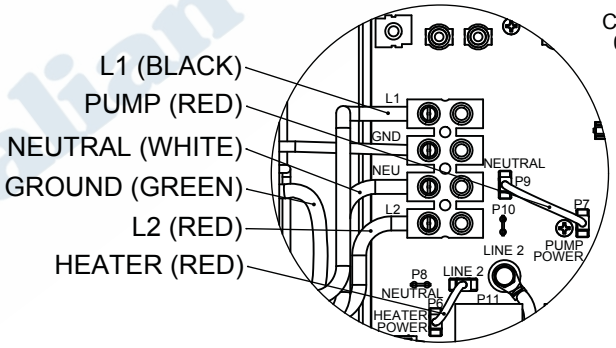

120VAC WIRING FOR DETAIL A
WITH 240VAC HEATER OPTION

FOR SUPPLY CONNECTION, SELECT WIRE BASED ON 90°C.

POUR le RACCORDEMENT, d'APPROVISIONNEMENT, FIL CHOISI BASÉ SUR 90°C.

USE COPPER CONNECTORS ONLY.

UTILISEZ LES CONNECTEURS DE CUIVRE SEULEMENT.

USE CLASS A GROUND FAULT CIRCUIT INTERRUPTER.

UTILISEZ LA CLASSE UN CIRCUIT DE AUTE DE TERRE INTERRUPTEUR.

Index

Troubleshooting

TROUBLESHOOTING

Troubleshooting of the spa control system is made easy by the built-in self-testing feature. As soon as power is available, and everything is properly connected, the self-test routine can isolate most spa problems immediately.

Regardless of the problem, the following routine should always be followed, step-by step, for quickest results.

1. If the spa has already been in operation skip to step 2, otherwise verify that electrical service is properly connected to the spa. Refer to the wiring diagram inside the enclosure cover and to the Installation Instruction for proper connections.
2. If the Top Side has a visible display, skip to step 10. If the display is dark, there may be a power problem. Verify that the circuit breaker is in the "on" position. If it is already on, place it in the "off" position and prepare to open the spa.
3. Remove the spa paneling that covers the pack area. Then remove all modules from the unopened pack and put them in a safe, dry place. Next, remove the six screws that hold the pack cover in place and put the cover aside.
4. Turn the breaker back on. Return to the spa and look for a green LED marked "D22". If the LED is on, skip to step 9.
5. Using a voltmeter, measure the incoming power between L1 and NEUTRAL. If the voltage is between 100V and 130V, the problem is in the pack, go to step 6. If the required voltage is not present, an electrician should be called to correct the service problem.
6. Loss of power in the pack can be due to only two things, (1) a disconnected or defective transformer, or (2) a defective relay board. If a spare transformer is available, it can be temporarily plugged into the relay board to verify the condition of the original transformer. (Turn off the circuit breaker before attempting this substitution.)
7. If substitution of the transformer didn't solve the problem, turn off the circuit breaker and replace the relay board, or entire pack.
8. Turn the breaker back on and observe the LED again. It should now be on, since all possible problems have been eliminated.
9. The easiest thing to verify next is the Top Side. Turn off the breaker and replace the cover with at least two screws. Plug back in the Control Module (red). (The other modules are not necessary for this test.) If the Top Side display is normal, proceed to step 13. "Normal" means that different screens can be selected and adjustments can be made.
10. If the topside is not normal, substitute topside should be tried. Turn off the breaker again, remove the Control Module, remove the cover, remove the original topside, plug in new topside, re-attach the cover with at least two screws, and, finally, re-install the Control Module.
11. Turn the circuit breaker back on and look for a normal display on the Top Side. If successful, go to step 12. If the display is still not normal, turn off the circuit breaker again and substitute a new Control Module. In the rare case that the display is still not normal, with the green transformer LED on and with a new Control Module, turn off the breaker and replace the relay board (or pack). The Top Side should now show a good display, since everything that could cause the problem has been replaced.
12. If a new topside is required, it must be configured to match the equipment in the spa. Start by holding the invert button down for 15 seconds, until a new display appears. Select "yes" when "re-set configuration setting?" appears. Follow the screens and then simply select the installed components in the spa and press the save button. Next you will see a Logo choice screen. Pick any Logo and press save again.
13. With a good display on the Top Side, it is time to let the self-test function do its job. Turn the breaker off, replace the cover and all three modules, and then turn the breaker back on. Observe that the Control Module will exercise all of the various motors and the heater, looking for defective motors, fuses, relay board, heater element, or connections. The display may have a message indicating a required action (like a bad fuse). Go to step 14. The display may also have a button that has turned red. That means the equipment controlled by that button is not drawing current and is, therefore, defective or unplugged. Actions are as follows:

    Red Pump Button – The pump controlled by that button is not drawing current. Check for proper pump connections on the relay board. Pump 1 uses a heavy cable with 4 wires. Pump 2 uses a heavy cable with 3 wires. The ozonator uses a smaller cable. Another reason for the pump to not draw current is because it has overheated. Turn off the circuit breaker for 30 minutes and see if the pump will run after it cools. If it does, look for insulation issues around the pump.

Red Audio Button – The Audio Module has a plug and play feature, so if the button is red, it is not in place or somehow not communicating with the Control Module. Turn off the circuit breaker and replace the Audio Module.

Red LEDS Button – The LED Module has a plug and play feature, so if the button is red, it is not in place or somehow not communicating with the Control Module. Turn off the circuit breaker and replace the LED Module.

14. Possible Messages are:
    "Replace Fuse" (Excessive current has been drawn by a motor or the ozonator.) Go to step 17.
    "Replace Control Module" (Internal problems found.) The red module must be replaced.
    "Comm Error" (The Topside is unable to communicate with Control Module.) Go to step 18.
    "Replace Relay Board" (A bad relay, current sensor, or jumper has been found.) Go to step 22.
15. If no messages are showing and no buttons are red, allow approximately 2 minutes for a flow test to be performed, and then proceed to test each function for normal operation from the topside. Note that anytime a button is pressed and a defect is seen by the self-test function, instead of green, the button will turn red. If a red button appears, the associated equipment may need to be replaced.
16. If the self-test function does not indicate any actions to take, the balance of the troubleshooting must be performed by careful observations and possible substitution as follows:
    A. TOP SIDE – If the touch screen does not change screens, or the display is not normal, the Top Side must be replaced. (First verify that the screen is not locked, by going to "setup" and then "unlock".)
    B. CONTROL MODULE – The Control Module is the brain for the entire spa. If it has been damaged, certain functions may not be performed correctly. A quick substitution will verify the need to replace it.
    C. LED MODULE - All of the LED function is in this module. Replacement will solve most LED problems, other than individual LED outage.
    D. AUDIO MODULE – Replacement of this module should resolve any audio problem, other than individual speaker problems (which can be isolated by swapping speaker wires).
    E. TEMPERATURE SENSOR – The sensor in the heater measures both water flow and water temperature. It has dual elements that monitor each other. The only time it would need replacement is if one of the elements becomes defective. This will be obvious because the temperature readings for Heater 1 and Heater 2 on the status screen will be different by more than 20F, which is a sign of trouble, since they are exposed to the same temperature in the heater.
17. Fuses can best be checked by hooking a voltmeter between L2 on the incoming power connector and the right hand side of each fuse. Any fuse that doesn't have around 230V on that side must be replaced. Replace with 30A to avoid incidental blowing. If the fuse blows again, look for a problem with the pump or the motor.
18. A message of "Comm Error" may be caused by improper seating of the red module. Before replacing the red module, turn off the circuit breaker and then remove the red module. Examine the circuit card inside the module for proper position. The edge of the card with the gold fingers should be about ¼ inch inside the edge of the module. Note that it is free to move slightly inside the module. If the card appears to be jammed out of position, due to excessive insertion force, an attempt to correct the problem may be attempted. If it looks undamaged, go to step 20.
19. Remove the black o-ring around the module. Observe the position of the white nylon guide hardware relative to the card's bottom side (no components). Insert a medium screwdriver into one of the small slots between the two halves of the module and twist the screwdriver to pop open the module. Reposition the card, snap the module back together, and replace the o-ring.
20. With the circuit breaker still off, replace the cover with 2 screws and re-install the red module. Note that a gentle up and down movement will help the card inside the module find its mating connector on the relay board. Now have an assistant turn on the circuit breaker while you watch for three flashes of red light from the card inside the module, near the back left side. If you don't see this light on power up, and the message is still present, the red module must be replaced.
21. If the flashing red light is seen, but the "Comm Error" message is still present, another topside should be tried. Do not remove the old topside yet. Just turn off the breaker, remove all modules, plug in another topside, replace the cover with 2 screws, install just the red

Troubleshooting (cont.)

module, and turn the breaker back on. If the message is still there, turn off the breaker and install a new relay board. (This should rarely be necessary.)

22. A message of "Replace Relay Board" will occur when there appears to be a failed component on the Relay Board. Before replacing the board, however, verify the incoming ac power. Use a voltmeter to measure 120V between Neutral and L1 and between Neutral and L2. Then look for 240V between L1 and L2. If these voltages are not present, within 10%, call a qualified electrician for wiring corrections.
23. If voltages are within range, verify that the 3 red jumpers are correctly installed on the board. All three should be connected to L2, or 240V. Verify that all crimps are tight.
24. If no other issues can be seen, the relay board must be replaced. Turn off the circuit breaker and proceed to unplug all pumps, transformer, heater sensor, topside, LEDs, speakers, mp3, and antenna. It might be helpful to make a sketch of actual connections before you start. The relay board is held by 4 screws, which can now be removed.

    Re-connect all components according to your sketch. Be careful not to connect anything to the "AUX" connector, which has constant power on its pins. Turn the breaker back on and observe the self-test routine. The spa should now be ready to use, since there is nothing else that could have caused the "Replace Relay Board" message.

BALBOA water group