



AquaLink[®] RS

TROUBLESHOOTING MANUAL

AquaLink® RS Troubleshooting

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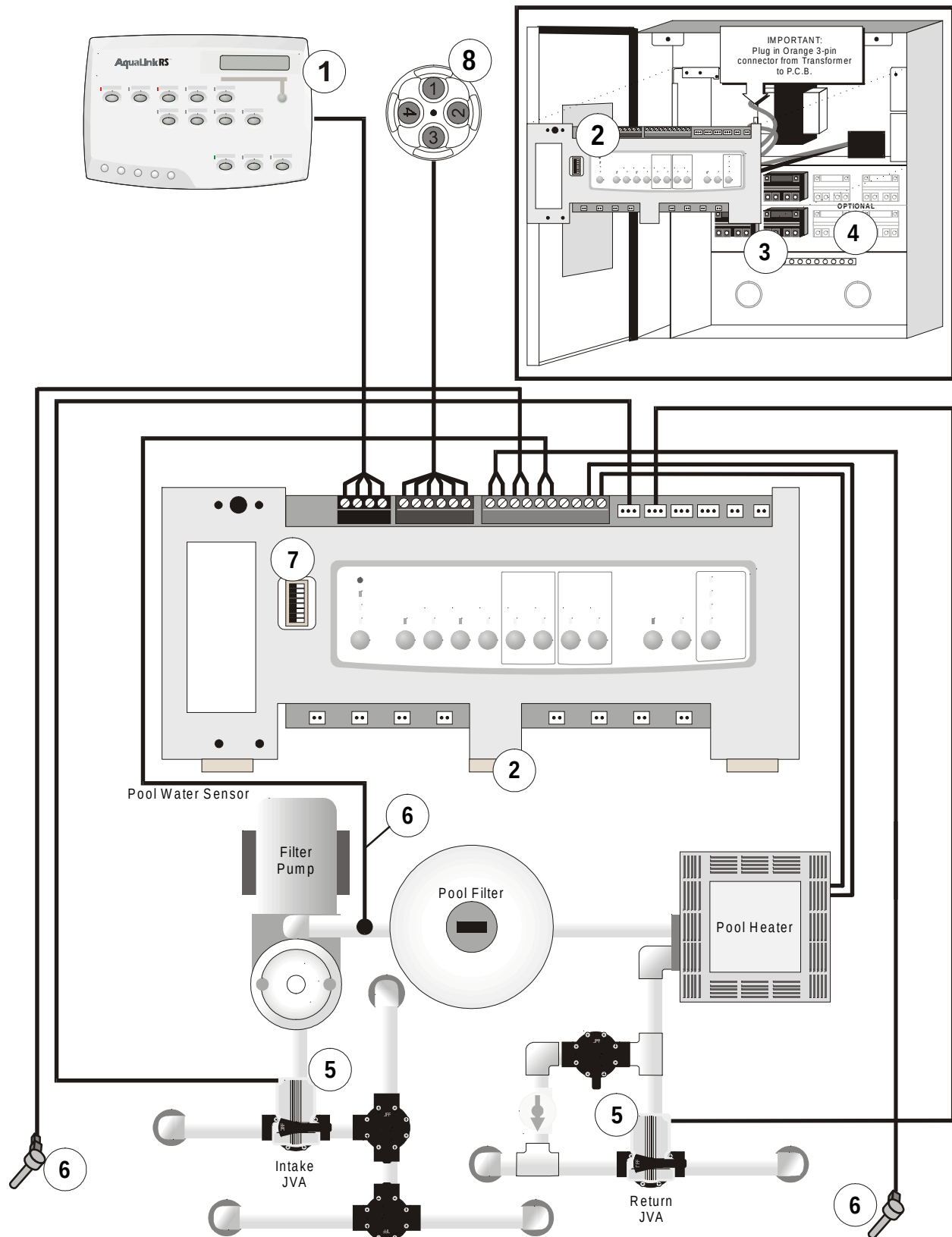
This is the Troubleshooting Manual for the AquaLink RS line of electronic controllers. Use it as a tool to solve problems with the AquaLink RS Control Systems. Please follow all local, state and national codes when installing or servicing electronic equipment, and please refer to all warning decals and notices before proceeding with any troubleshooting.

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AquaLink® RS Troubleshooting

Equipment Layout



AquaLink® RS Troubleshooting

1 Controller

Operation:

The Indoor Controller serves as a means of entering and viewing information for equipment settings. All programs, labels, etc., are held in a memory chip on the Power Center Printed Circuit Board. Power is not required to maintain programs, etc. - they will be held indefinitely.

The Controller is supplied 10 VDC from the power center via the outside two wires (red and green) of the 4 conductor cable. The inner two wires (yellow and black) provide the communication link between the Controller PCB and Power Center PCB.

If either of the communication wires are broken ("open circuit"), but the power supply wires are connected, the display screen will indicate a break in communication by displaying the controller part number and the version letter of the Micro Controller (e.g., 6543 REV B01 or 6700 REV C).

Pressing the Reset button, located on the left side of the Indoor Controller, will momentarily display the software part numbers and revision letters for both the Controller's Micro-controller chip and the Power Center's PPD chip. The Reset button also resets the Micro-controller, but does not remove any programming, AUX labels, etc. (see chart on Page 16 for list of Part Numbers).

Time/Date Backup: Supplied by 9-volt battery located at Power Center

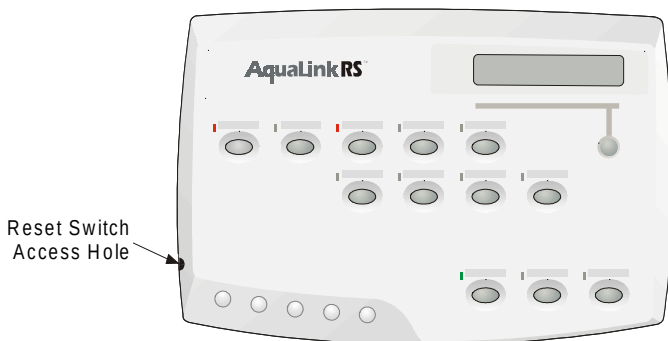
Programming and Memory Backup: Stored in EEPROM on Power Center PCB, stored indefinitely, even with no power to unit.

Controller Specifications:

Supply Voltage: 10 VDC

Operating Voltage: 5 VDC

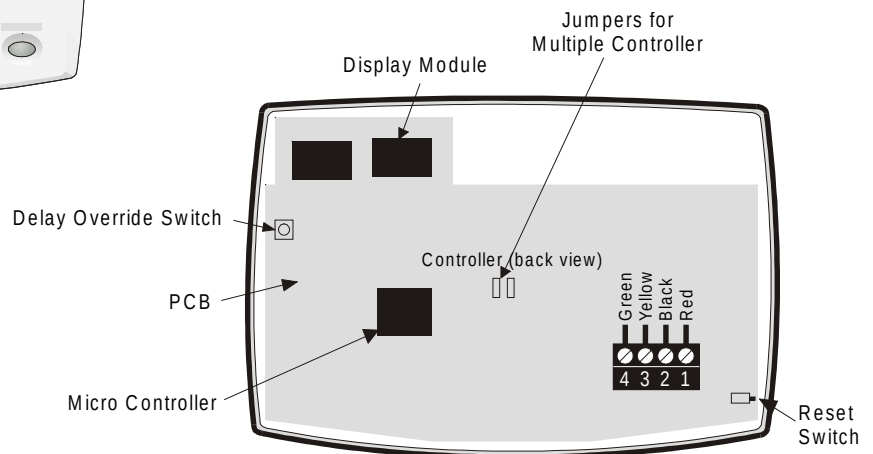
Circuit Activation: Serial Communication



Controller

NOTE: A Jandy Service Controller (P.N. 7057) can be attached out at the Power Center, to review and/or change programs and equipment settings.

Chart of Multiple Controllers Jumper Settings					
Controller 1	<table><tr><td>☐</td><td>W2</td></tr><tr><td>☐</td><td>W1</td></tr></table>	☐	W2	☐	W1
☐	W2				
☐	W1				
Controller 2	<table><tr><td>☐</td><td>W2</td></tr><tr><td>☐</td><td>W1</td></tr></table>	☐	W2	☐	W1
☐	W2				
☐	W1				
Controller 3	<table><tr><td>☐</td><td>W2</td></tr><tr><td>☐</td><td>W1</td></tr></table>	☐	W2	☐	W1
☐	W2				
☐	W1				
Controller 4	<table><tr><td>☐</td><td>W2</td></tr><tr><td>☐</td><td>W1</td></tr></table>	☐	W2	☐	W1
☐	W2				
☐	W1				



Back View of Controller

AquaLink® RS Troubleshooting

② Power Center

Power Center Operation:

The Power Center PCB is the true brain of the system. The micro-controller on the PCB is constantly sending signals through the communication wires to the Controller and polling the system to determine which circuits should be on and which should be off. When an equipment button, such as Auxiliary 1, is pressed, impulses are sent via the communication wires (yellow and black) between Power Center micro-controller and the Indoor Controller micro-controller. If all impulses received at the Power Center micro-controller are consistent, the system then looks at the DIP Switch settings to determine if an option for this circuit has been set. If the DIP Switch settings do not indicate a delay is needed, signals are sent back to the Controller to turn on the appropriate LED and display the ON message. At the same time, a signal is sent to one of the two Driver Chips on the Power Center PCB.

The Driver Chips can be thought of as a series of small relays. When one of the Driver Chips receives a signal, it closes a contact which passes 24 VDC to the appropriate relay coil socket, in this case AUX 1. Each relay driver chip activates a specific set of relay coil sockets (see the chart below). If a Driver Chip fails, it is usually caused by either shorted relay coil wires, a shorted relay coil, or a relay not designed for the 24 VDC coil voltage (i.e., 24 VAC rather than 24 VDC).

The Reset button, located in the upper left hand corner of the Power Center Bezel, when pressed, resets the Power Center micro-controller and changes time and date to the default settings (i.e., 1:00 P.M. 01/31/96 WED). Pressing this button will not remove any programming, AUX labels, etc.

Driver Chip in U9 socket activates:	Driver Chip in U10 socket activates:
Relay Socket for Filter Pump	Relay Socket for Electric Heater
Relay Socket for Auxiliaries 1 through 7	Solar Booster Pump Socket
Relay Socket for Spare Auxiliary	All JVA Relay Coils
	Low Voltage Heater Relay Coil

Memory:

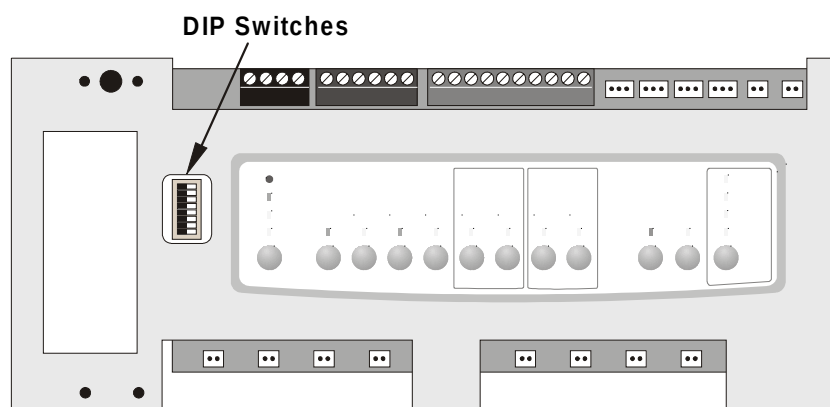
All programming, labeling, temperature settings, etc., are stored within a EEPROM (Electronically Erasable Programmable Read Only Memory) chip. This chip is located on the PCB and will retain all settings indefinitely, even if power is lost for an extended period. To remove information from the system, either press the Cancel button to remove individual items, or the Clear Memory item from the Menu, to reset all items to their default settings. The battery attached to the PCB is only needed to keep the clock running during a power outage, so when power is restored, time and date will be correct.

Specifications:

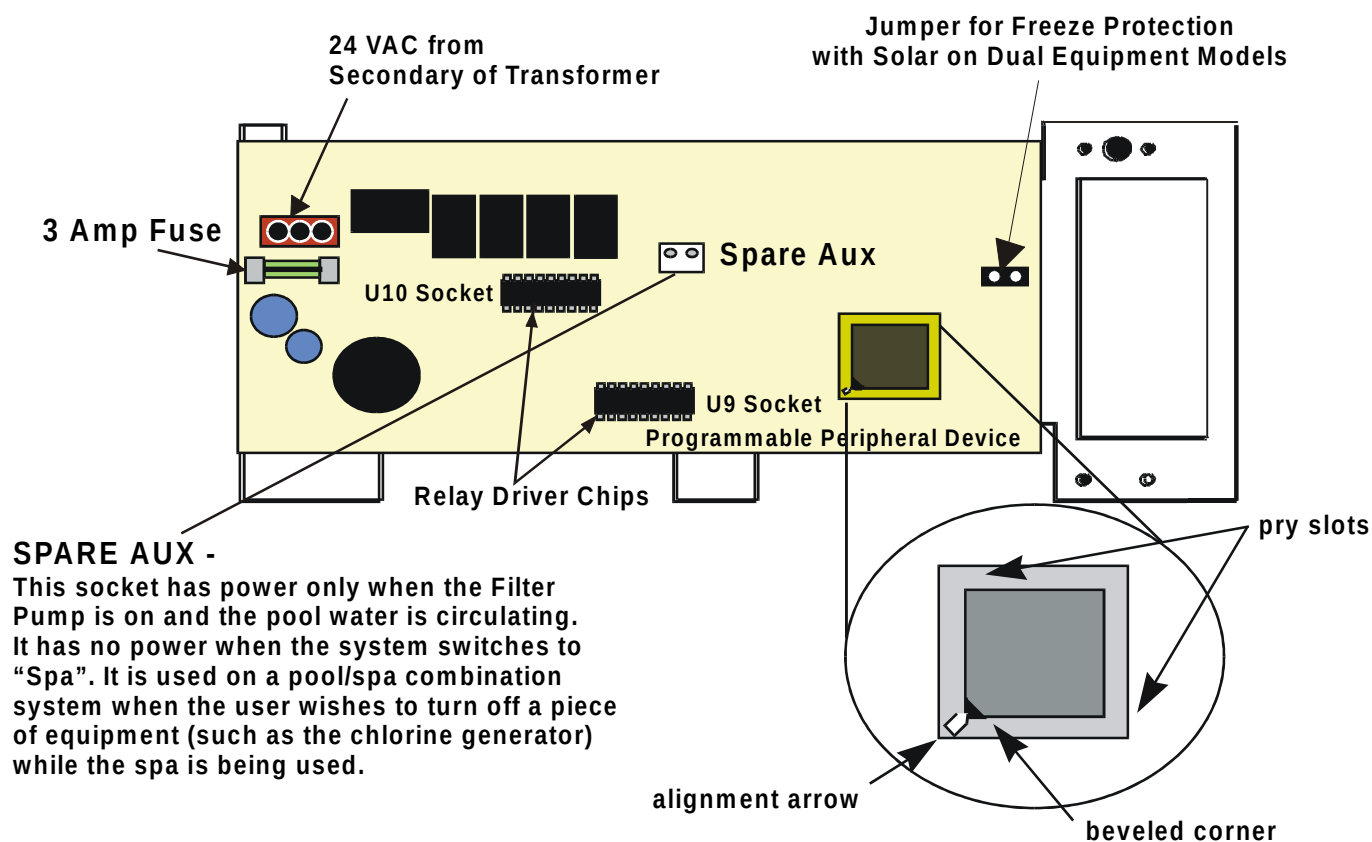
Supply Voltage: 24 VAC (from secondary of transformer)
Operating Voltage: 5 VDC
Circuit Activation: Serial Communication
Time / Date backup: Supplied by 9 Volt battery at Power Center
Memory backup: EEPROM on Power Center PCB

AquaLink® RS Troubleshooting

② Power Center (continued)



Bezel and Power Center Board



Back View Of Power Center Board

AquaLink® RS Troubleshooting

③ Standard Relays

Operation:

A Standard Relay's coil is supplied 24 VDC from the Power Center PCB via one of the two driver chips. When 24 VDC is received by the relay's coil wires, it closes the contacts that complete the circuit to turn on the equipment (i.e., power supplied to Line 1 goes out Load 1 to the equipment).

Standard Relays may be wire to activate a 110 VAC circuit (e.g., Line 1/Load 1) or a 220 VAC circuit (e.g., Line 1/Load 1 and Line 2/Load 2).

NOTE: If a relay's coil wires are shorted, or an AC relay coil is plugged into a relay socket, when that circuit is activated, it will damage one of the two relay Driver Chips (Part No. 3814) on the Power Center PCB. (These chips can be replaced/see Page 4).

Specification:

Maximum Contact Ratings:

3 hp at 220 VAC

1 1/2 hp at 110 VAC

25 amps - Inductive

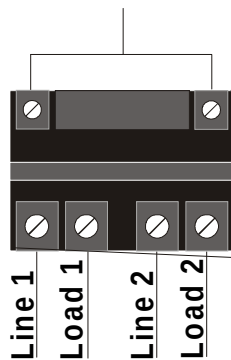
1500 watts - Incandescent

Relay Coil: 24 VDC

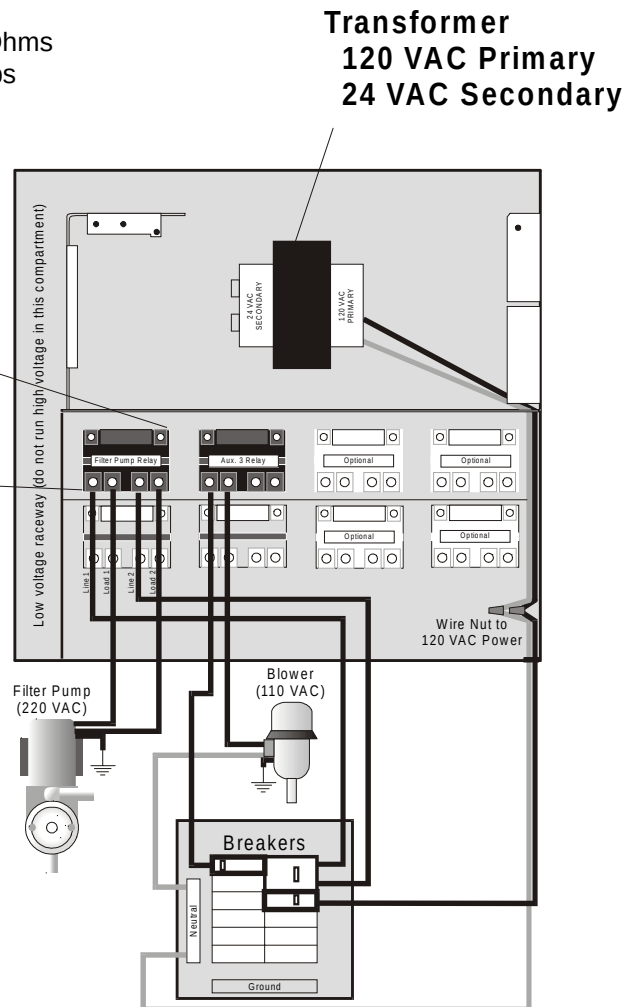
Resistance across coil: 0.300K Ohms

Amperage draw of coil: 0.10 Amps

Relay Coil (24 VDC)



Relay



Wiring for a Standard Relay

AquaLink® RS Troubleshooting

④ Two Speed Relay

Operation:

The Two Speed Relay operates in conjunction with a Standard Relay to operate a two speed pump/motor.

The Standard Relay is the On/Off relay and the Two Speed Relay is the switching relay. Activating the relay coil for the Standard Relay will complete the contact circuit between Line 1 and the motor common, and Line 2 and the Two Speed Relay's Common. If the Two Speed Relay's coil wires are deactivated, its contacts make connection between its Common terminal and its Normally Closed terminal and the motor runs at High Speed. When the Two Speed Relay coil is activated, its contact makes connection between its Common contact and Normally Open contact, and the motor switches to Low Speed.

If the Two Speed Motor is the filtration pump, plug the relay coil wires for the Standard Relay into the Filter Pump Relay socket. Next, plug the Two Speed Relay's coil wires into Auxiliary 2. Finally, turn on DIP switch 2 to set circuitry to two speed operation.

NOTE: Turn off power to system before moving DIP switches.

Specifications:

Maximum Contact Ratings:

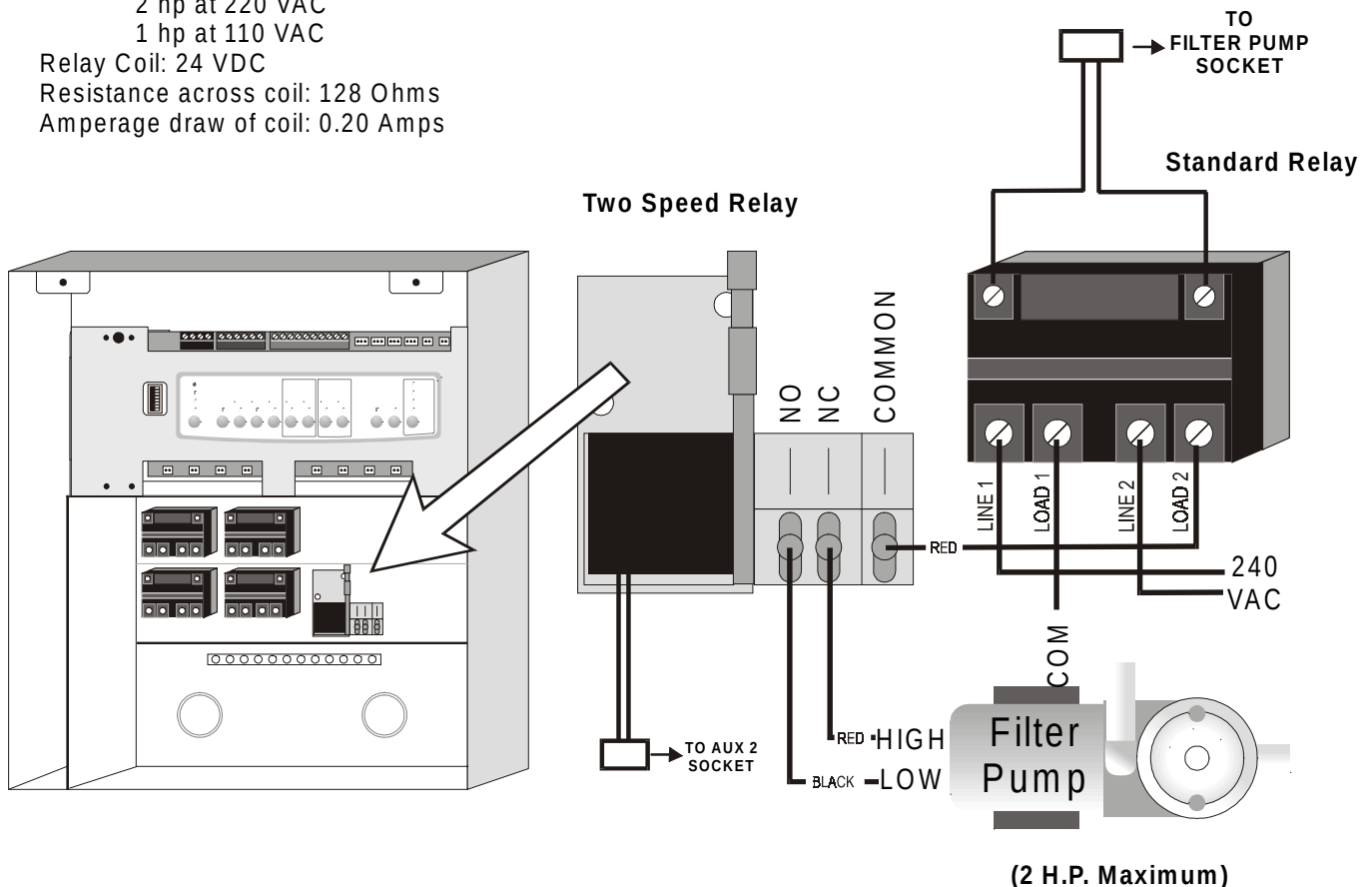
2 hp at 220 VAC

1 hp at 110 VAC

Relay Coil: 24 VDC

Resistance across coil: 128 Ohms

Amperage draw of coil: 0.20 Amps



Wiring for a Two Speed Relay

AquaLink® RS Troubleshooting

④ Light Dimming Relay

Operation:

The Controller signals the Light dimming Relay to turn 'fully on', 'partially dimmed', or 'completely off' by sending a specific number of pulses in a set period of time to the Light Dimming Relay. The circuitry of the Light Dimming Relay (which requires 120 VAC to operate) then interprets the number and timing of pulses to determine whether the light should be on, off, or dimmed.

The circuitry of the Light Dimming Relay is driven by the 120 VAC power from the circuit breaker for the light. Unlike a Standard Relay, which receives a constant 24 VDC to its coil to hold the relay contacts closed (and which opens when that voltage is removed), the Light Dimming Relay receives only signal pulses on the relay coil wires, and it is the circuitry on the relay that actually turns on, off, and dims the light. Therefore, if the light is full on or dimmed, unplugging the relay coil wires to the Light Dimming Relay will not turn off the light. The light will remain on as long as 120 VAC is supplied to the relay.

The Light Dimmer will operate slightly differently when activated from the Controller, Power Center or Spa Side Switch.

From the Controller - When the auxiliary, which has been assigned to light dimming is pressed or programmed on, the light will turn on to the brightness last set by pressing Back or Forward Buttons. Once on, the brightness may be changed by pressing the Back or Forward Buttons. To turn it off, press the auxiliary button again.

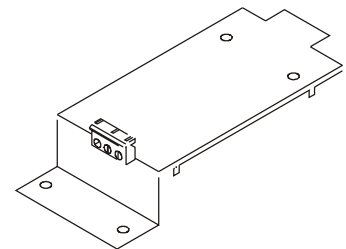
From the Power Center override switch - Pressing the appropriate auxiliary button will turn the light on to the brightness last set at the Controller or Spa Side Switch.

From the Spa Side Switch - If a button on the Spa Side Switch has been programmed to control a Light Dimmer auxiliary, the first press of this button will turn the light on to full brightness, each additional press will dim the light in 25% increments until the light is off.

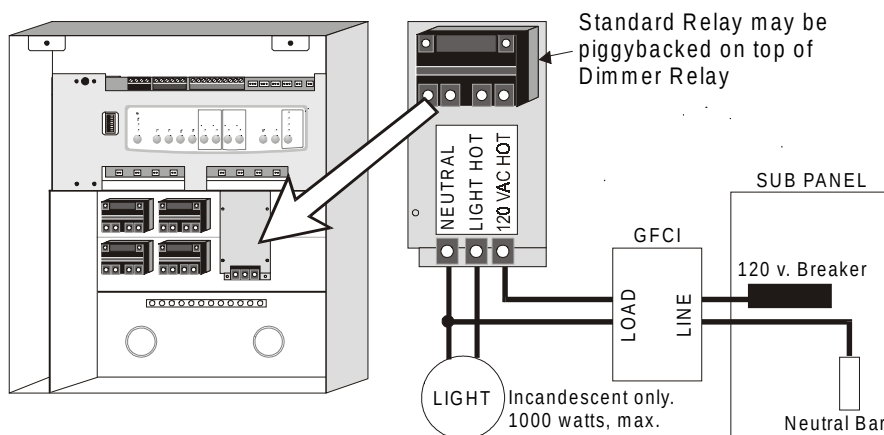
Note: Besides needing a Light Dimming Relay installed, the auxiliary to operate the light dimming circuit must be assigned at the Controller using the Menu button and moving to the SETUP Menu.

Specification:

Maximum Contact Ratings : 1000 watts incandescent
Operating Voltage: 120 VAC
Relay Coil : 24 VDC



Light Dimming Relay



Wiring for Light Dimming Relay

AquaLink® RS Troubleshooting

⑤ Jandy Valve Actuators

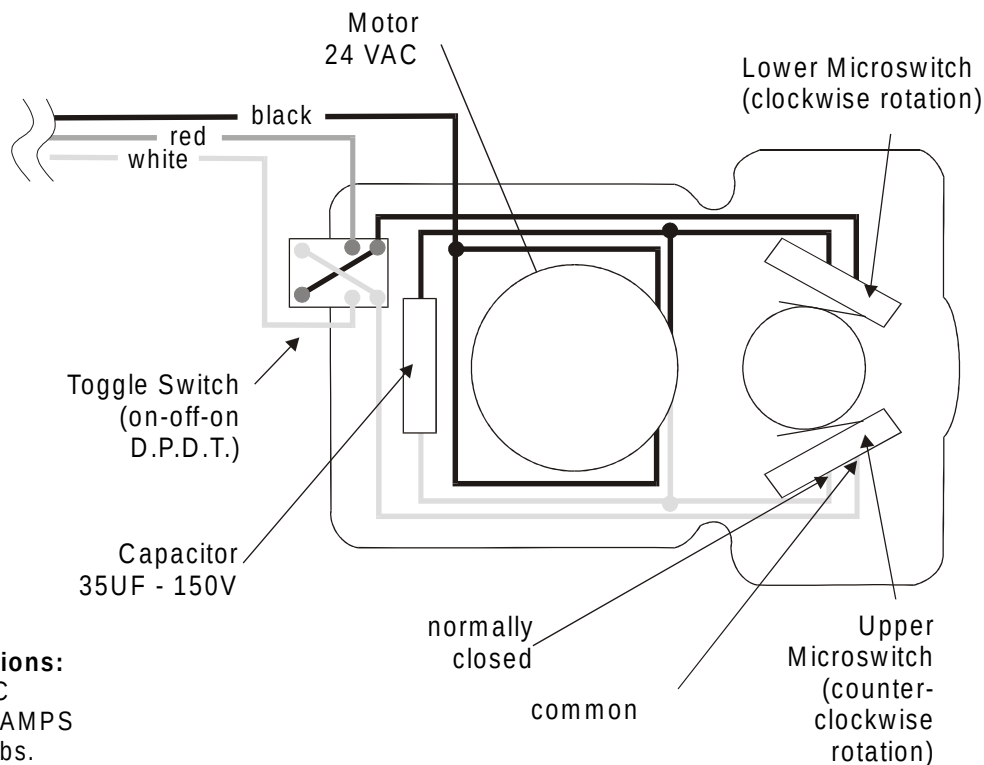
Operation:

One leg of a 24 VAC transformer secondary supplies voltage to the common terminal of a SPDT (single-pole, double-throw) relay. The NC (normally closed) terminal of that relay is connected to the red wire of the JVA cord, and the NO (normally open) terminal is connected to the white wire of the JVA cord. The completion of the circuit is through the black (common) wire of the JVA cord.

When the coil of the SPDT relay is de-energized, voltage is supplied from one leg of the transformer secondary to the common terminal of the relay and then down the red wire of the JVA cord to the toggle switch at the rear of the JVA. The toggle switch then routes the voltage to either the lower microswitch (toggle in AUTO 1 position), the upper microswitch (toggle in AUTO 2 position), or to neither microswitch (toggle in OFF position). If the voltage is routed to the lower microswitch, and that microswitch is closed, the voltage passes through the motor to the black wire and then back to the other leg of the transformer secondary to complete the circuit. The motor will then rotate clockwise, turning the gear train (and ultimately the output shaft) until the lower cam comes in contact with the lower microswitch, which opens the circuit and stops the motor. If the voltage is routed to the upper microswitch, the motor rotates in the opposite direction until the upper cam lobe comes into contact with the upper microswitch, which stops the rotation.

If the coil of the SPDT relay is energized, the voltage travels through the white wire to the toggle switch, which as above, routes it either to the lower microswitch for clockwise rotation or upper microswitch for counterclockwise rotation, with the voltage traveling back the black wire to complete the circuit.

The capacitor, which is wired in parallel with the motor, keeps the motor rotating in the correct direction and insures the JVA rotates with the proper torque.



JVA Specifications:

Voltage: 24 VAC
Amperage: 1.0 AMPS
Torque: 180 in/lbs.
Rotation Time: 34 sec. for 180 degrees
Motor Type: Synchronous - Bidirectional

AquaLink® RS Troubleshooting

⑥ Sensor

Sensor

There is only one AquaLink RS temperature sensor. It is used for reading water, air and solar temperatures. The sensor is described as a 10K RTD (10,000 Ohms - Resistive Temperature Detector) sensor, although the actual resistance will vary with temperature. Below is a chart which shows how resistance changes as temperature changes.

Sensor Resistance Range Chart:

At this temperature (degrees F)	Resistance should be (Ohms - X 1000)
50 F	19.9 K Ohms (19,900 Ohms)
60 F	15.3 K Ohms
71 F	11.6 K Ohms
80 F	9.3 K Ohms
90 F	7.3 K Ohms
100 F	5.8 K Ohms
104 F	5.3 K Ohms

When measuring resistance across the sensor leads you must remove the sensor from the circuit. Either disconnect both wires from the terminal bar or remove the terminal bar from the PCB. Then, to test the Sensor, "0" out your meter and take reading across the sensor.



**10K Ohm
Sensor**

If a sensor fails, the Controller display will scroll on that sensor "Shorted" (i.e., little or no resistance), or "Open" (i.e., no continuity).

NOTE: Temperature sensors from other Jandy Control Models cannot be used with the AquaLink RS.

AquaLink® RS Troubleshooting

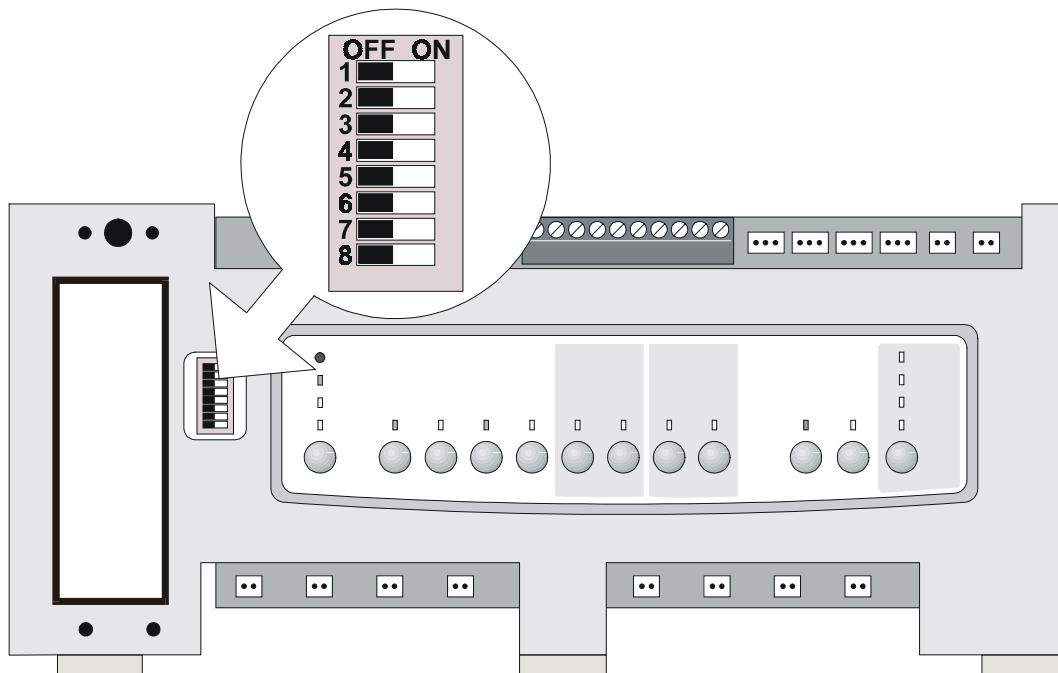
⑦ DIP Switches

All DIP Switches are located on the left side of the Power Center Bezel. To change a setting, turn off power, then move the appropriate switch from left (off) to right (on).

Caution: Always turn off all circuits and then turn off power before moving DIP switches. If AUX 1, 2, or 3 were programmed to operate automatically, clear the programs before turning on the appropriate clip switch.

DIP Switch Settings:

DIP Switch #	Off	On
1	Aux 1= any equipment	Aux 1 = Pool Cleaner (Pressure Side Cleaner)
2	Aux 2 = any equipment	Aux 2 = Low Speed of a two speed pump (filter pump becomes high speed)
3	Aux 3 = any equipment	Aux 3 = Spa Spillover effect
4	Heater Cool Down circuit operates	Heater Cool Down circuit is disabled
5	Normal operation	Factory adjustment for calibration - when this switch is on heater safety delays are eliminated and solar temperature is displayed. Don't leave this switch in the ON position
6	Normal operation	Sharing one heater on Dual Equipment Models
7	Normal operation	Allows Cleaner JVA to be assigned to operate from an auxiliary; allows air sensor to become Solar Sensor with Dual Equipment models
8	After thermostat setting has been reached, heater will remain off for 3 minutes	After thermostat setting has been reached, heater will remain off for 5 minutes (used for heat pumps)

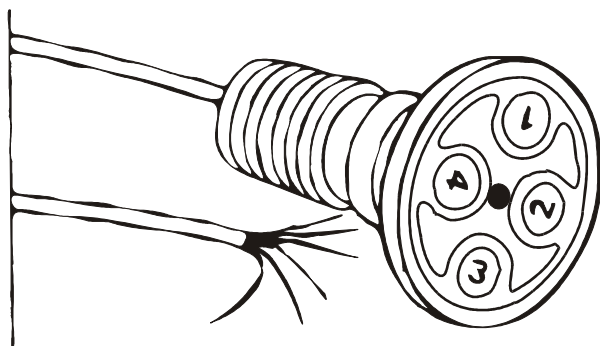


AquaLink® RS Troubleshooting

⑧ Spa Side Switch

Spa Side Switch buttons send a momentary signal to the Power Center PCB. Each button sends a signal down one wire with the circuit completed through the common wire. The operation of each button may be tested by disconnecting the Spa Side Switch from the PCB and with a meter set to continuity measure between each button wire and the common (black) wire, while holding the button down.

If any button on the Spa Side Switch is held down for more than 5 seconds, the AquaLink RS's microprocessor considers this a shorted button and will ignore its signal. When the button is released or repaired, and a "shorted circuit" no longer exists, the microprocessor will again recognize all buttons. The LED in the center of the switch will be on solid when the spa is on, flashing fast when heating, and flashing slowly when in cool down mode.



Spa Side Switch

Black	-	Common wire
Red	-	LED wire
Blue	-	Button 1 wire
Brown	-	Button 2 wire
White	-	Button 3 wire
Green	-	Button 4 wire

Troubleshooting Steps

Remove the Spa Side Switch (6 pin) terminal bar from the printed circuit board.
Set your meter to read continuity (or resistance).

- Ensure No Shorts
Measure between the black (common) wire and each of the button wires.
If there is continuity between any of the two (without depressing a button), the switch is shorted; replace it.
- Ensure Continuity
Do this same test again except this time have a helper hold down the button while you test for continuity. For example, measure between black and blue while helper holds down button 1

AquaLink® RS Troubleshooting

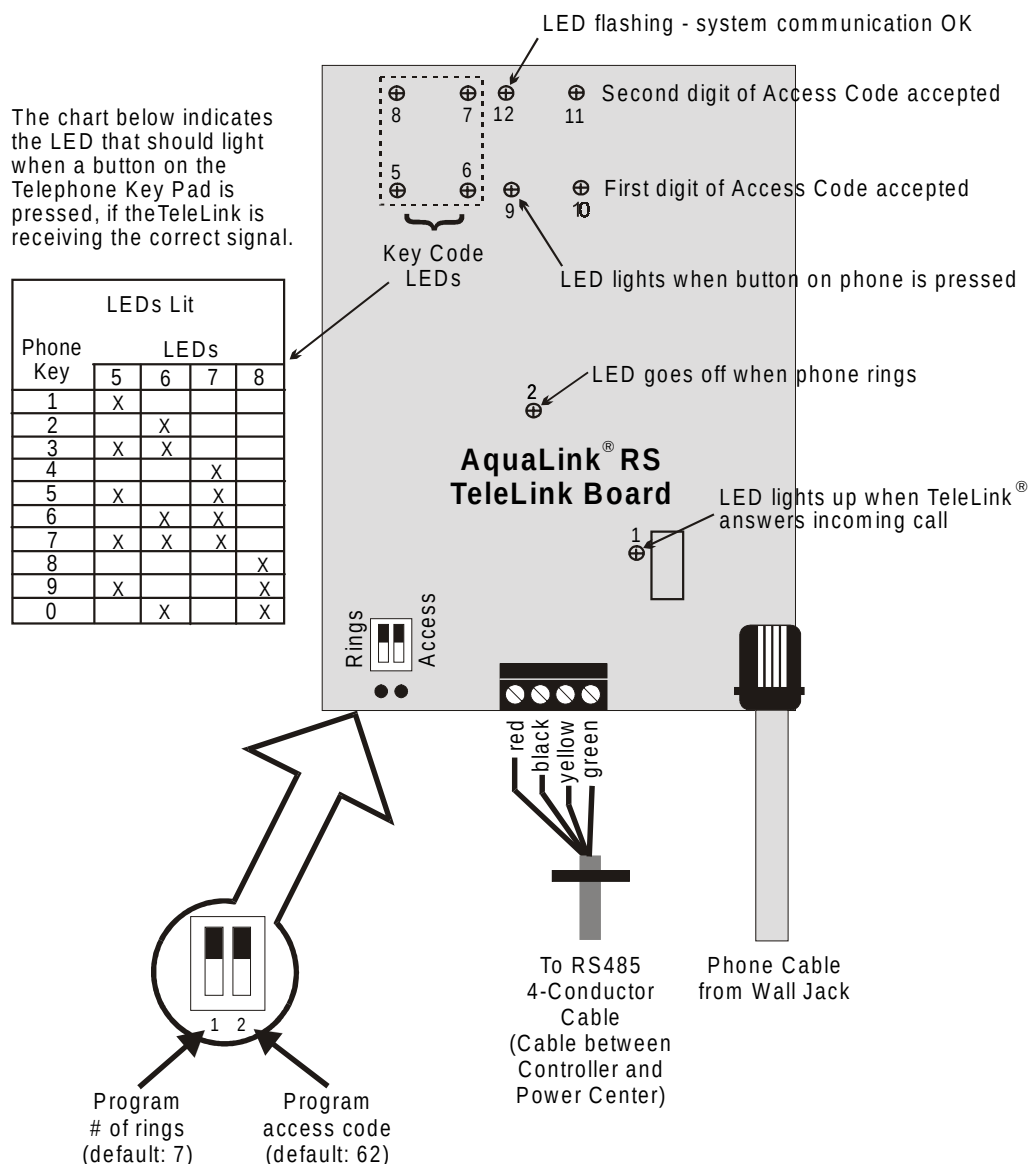
TeleLink

Operation

There are two DIP switches on the TeleLink printed circuit board. DIP switch 1 allows the number of rings before the TeleLink "picks up" to be set, and DIP switch 2 allows the access code to be changed from the factory default (62). To change either setting, turn on the DIP switch for the item you wish to change (its LED will light). Next, go to a touch-tone telephone on the same phone line, lift the receiver and press the button or buttons corresponding to the desired change (e.g., turn on DIP switch 2 and press telephone buttons 7 and 5 to change access code to 75). Finally, replace the receiver and turn off the DIP switch. The new setting will now be turned into a memory chip.

The TeleLink printed circuit board has a number of LEDs on it. These LEDs help to identify problems with either the telephone or the TeleLink (see diagram below). When the TeleLink is operating correctly, LED 2 will be on and LED 12 will be flashing. The four LEDs in the upper left hand corner (5, 6, 7 and 8) indicate whether the TeleLink is receiving the correct pulse when a button is pressed on the telephone key pad. For example, pressing button 4 on a telephone should light LED 7. Follow the chart to determine other button/LED operations.

The Diagnostics section of the AquaLink RS menu will indicate if the TeleLink is communicating.



NOTE: When the TeleLink is not being used, LED 2 will be on and LED 12 will flash if the TeleLink is operating correctly.

AquaLink® RS Troubleshooting

Glossary of Terms

EEPROM - Electronically Erasable Programmable Read Only Memory

JVA - Jandy Valve Actuator

PCB - Printed Circuit Board

PPD - Programmable Peripheral Device

RTD - Resistive Temperature Detector

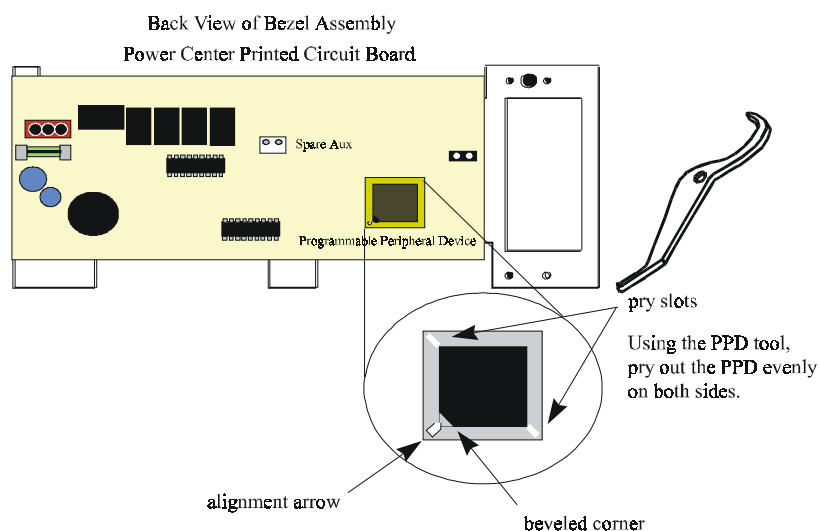
VAC - Volts Alternating Current

VDC - Volts Direct Current

AquaLink® RS Troubleshooting

Quick Check List

Symptom	Problem	Possible Solution
Power Center override switches operate when in Service or Time Out Mode, but the Controller is completely dead (no lights on, no display).	Mis-wired four conductor wire. Broken four conductor wire.	Check connection of the outside two wires (red and green) of the four conductor cable. If wired correctly, check the voltage between these two wires - voltage should be 10 VDC.
All LEDs are on at Controller and the part # and Rev. letter of the Controller software are displayed (either 6553 Rev. B01 or 6700 Rev. C). The override switches at the Power Center operate as they should.	Controller is not communicating with the Power Center PCB.	Check the two center wires (black and yellow) of the four conductor cable. Also check the installation of the PPD on the Power Center PCB; if it is not seated properly, the system will not communicate.
All LEDs are on at Controller and the part # and Rev. letter are displayed, but override switches at the Power Center do not operate at all.	1. Damaged or improperly installed PPD. 2. Damaged Power Center PCB.	1. Check alignment of the PPD. 2. If PPD is installed correctly, replace the Power Center PCB.
Some buttons do not operate from the Controller, nor from the Power Center override switches.	Wrong PPD chip installed at the Power Center PCB.	Check part number and revision letter by pressing the Reset button at the Controller. The second part number and Rev letter displayed is for the PPD indicating which model.
System locked up.	Microprocessor locked.	Turn off power to system. Disconnect battery and turn on power. Reconnect battery and reset time and date.



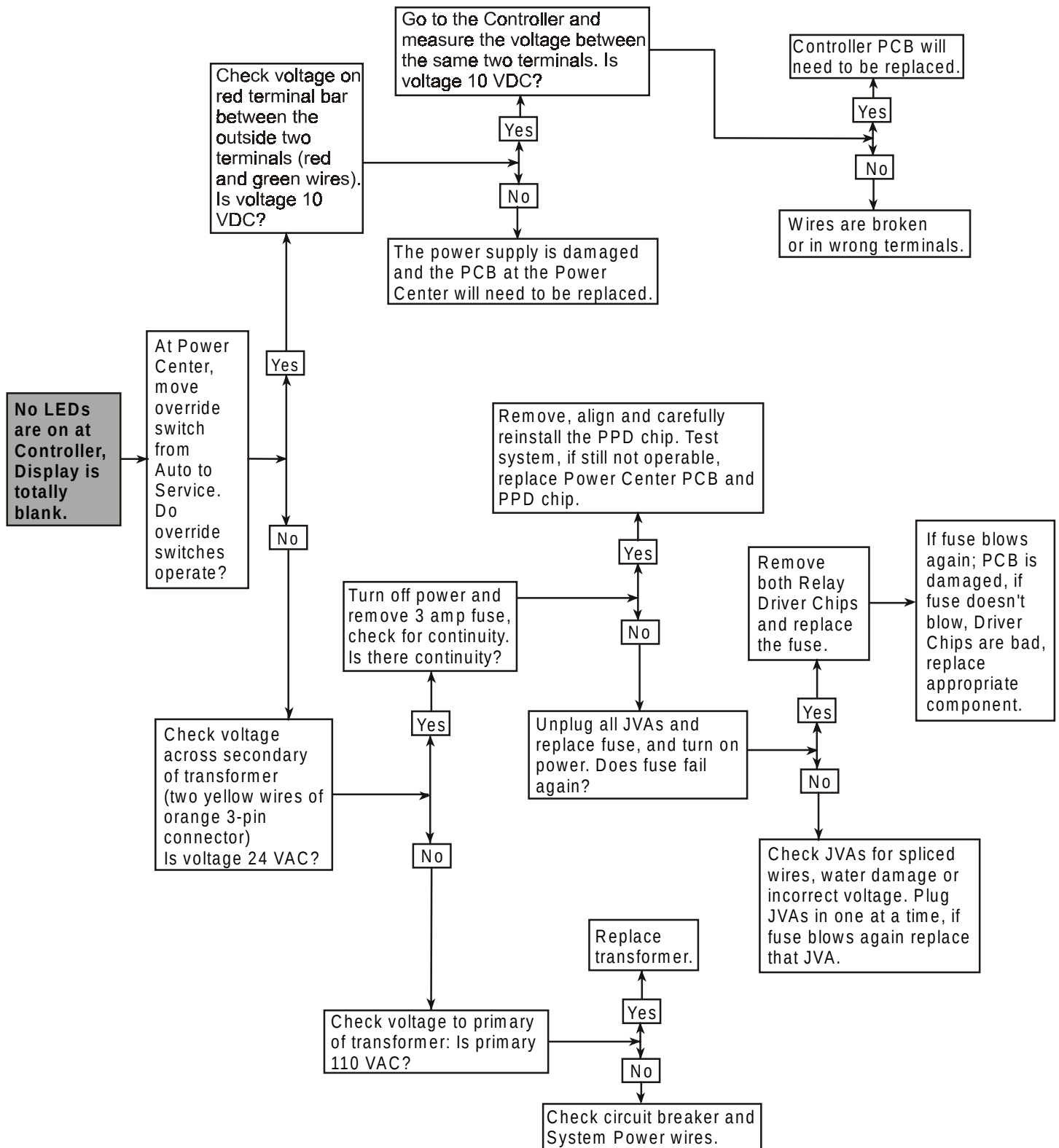
AquaLink® RS Troubleshooting

Quick Check List (continued)

Symptom	Problem	Possible Solution
System sometimes does not run programmed on and off times.	Power outage with dead battery.	At Controller, check battery level. With software level Rev. F or newer, battery status is located in Diagnostics section of System Setup Menu.
One button on the Spa Side Switch does not operate.	Check programming first. If the Spa Side Switch is programmed correctly, the button may be shorted.	Troubleshoot Spa Side Switch per Page 11 steps.
Pool cleaner booster pump turns on without the filter pump being on, and can run with the spa on.	System is not recognizing DIP switch 1 is on. NOTE: Before turning on any DIP switches, first turn off all equipment.	Turn off all equipment buttons, then turn off power to system. Finally turn off, then on, DIP switch 1. Turn on power and test system.
Cannot assign Cleaner JVA.	DIP switches not set correctly.	DIP switch 1 must be off, and DIP switch 7 must be on to assign the Cleaner JVA to an auxiliary.
Controller Model is Dual Equipment, message scrolls "Adjustable Freeze Sensor Not Installed."	Normal operation when a Dual Equipment model is controlling a solar system and an adjustable freeze sensor is not installed.	Either install the adjustable freeze sensor, or wait 24 hours and this message will go away.
System comes on at times that are not programmed.	Phantom programs.	At Controller, press Menu, then scroll to REVIEW. Make note of all programs, Spa Side Switch settings, labels, and temperature settings, then CLEAR MEMORY, reprogram and try system again.
Heater will not fire. Heater LED will not light in "Service Mode".	Water temperature sensor not installed or defective.	Check water temperature sensor.

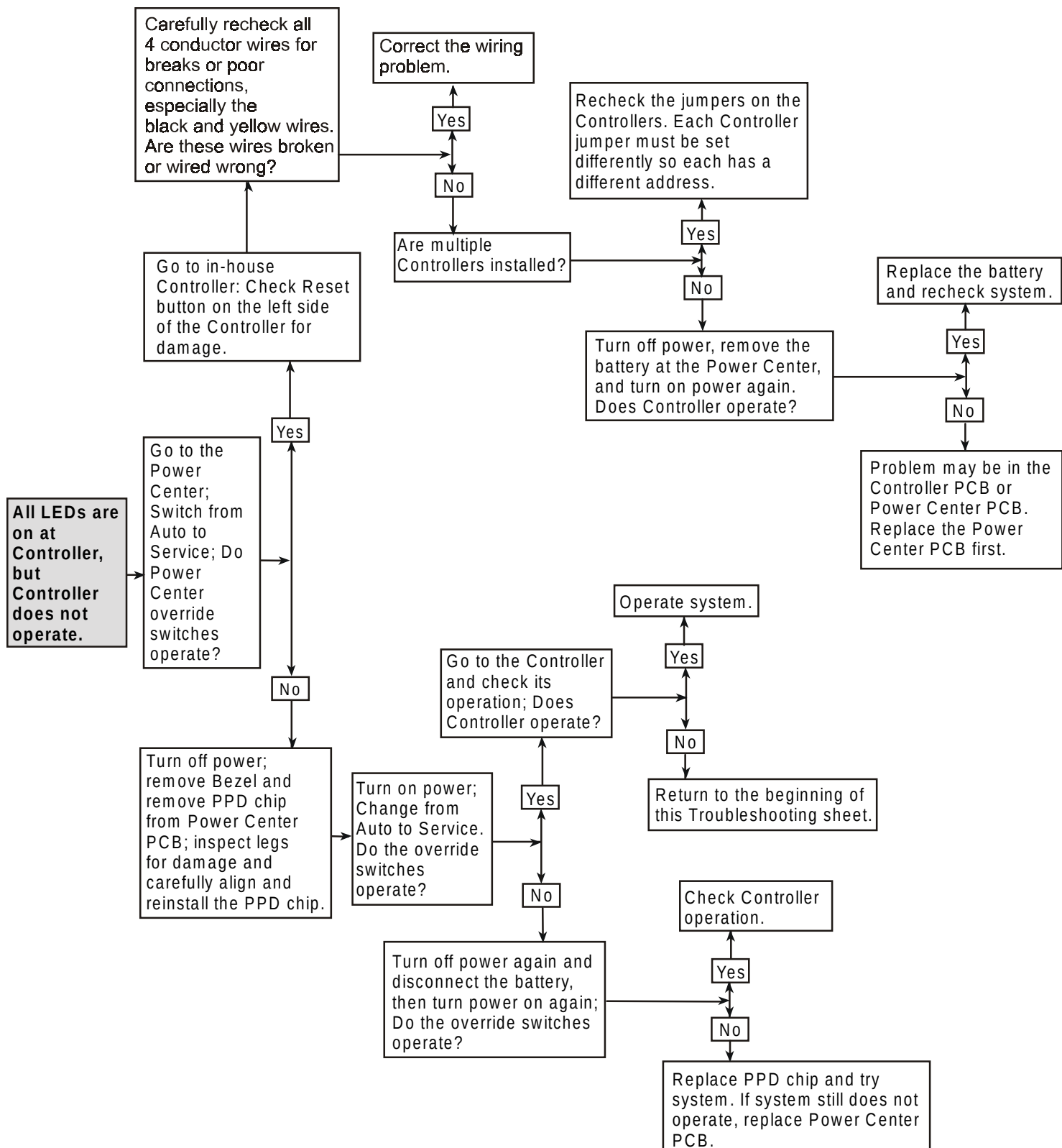
AquaLink® RS Troubleshooting

Controller Inoperable, Display Blank . . .



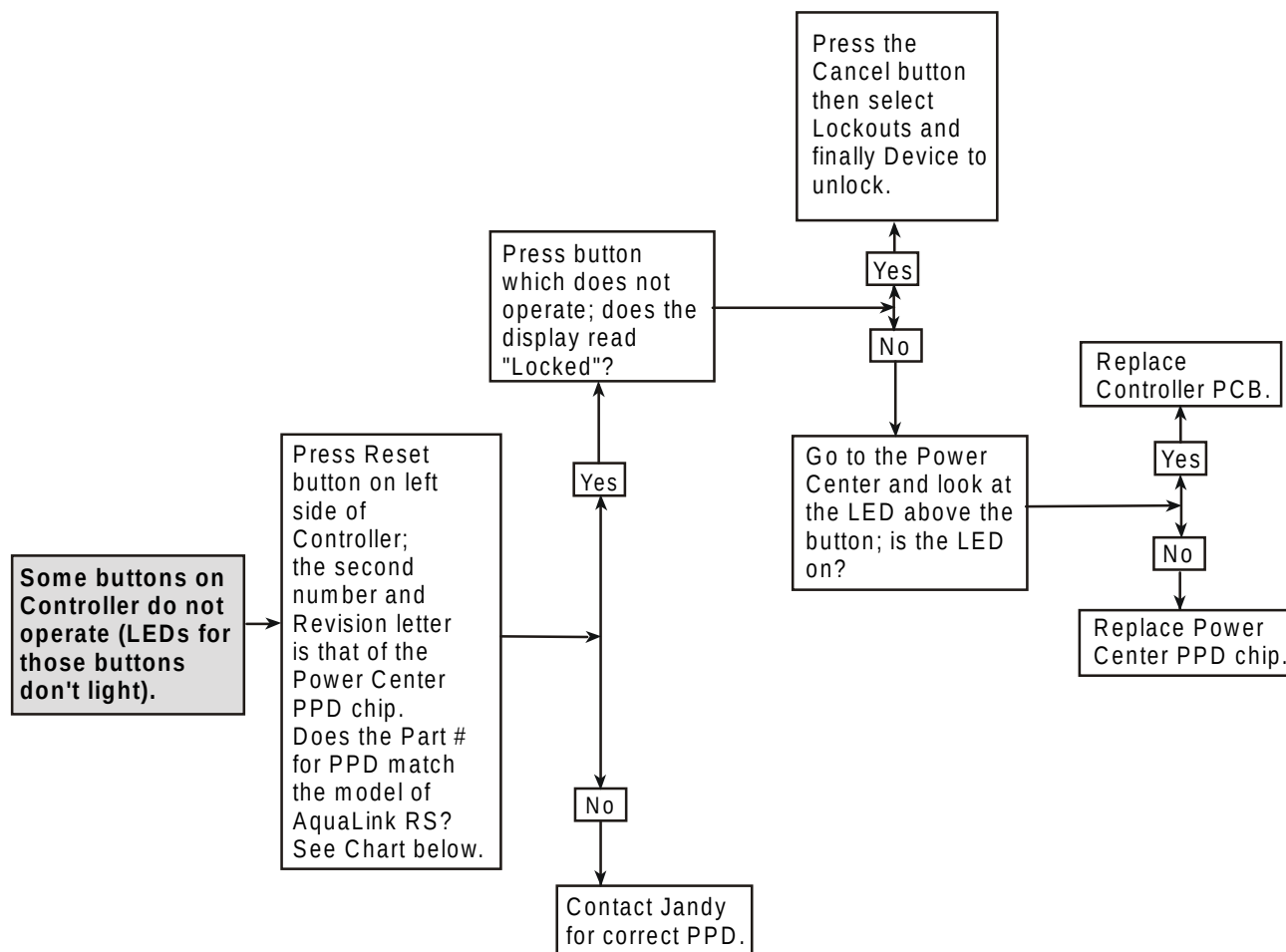
AquaLink® RS Troubleshooting

All Lights Lit on Controller . . .



AquaLink® RS Troubleshooting

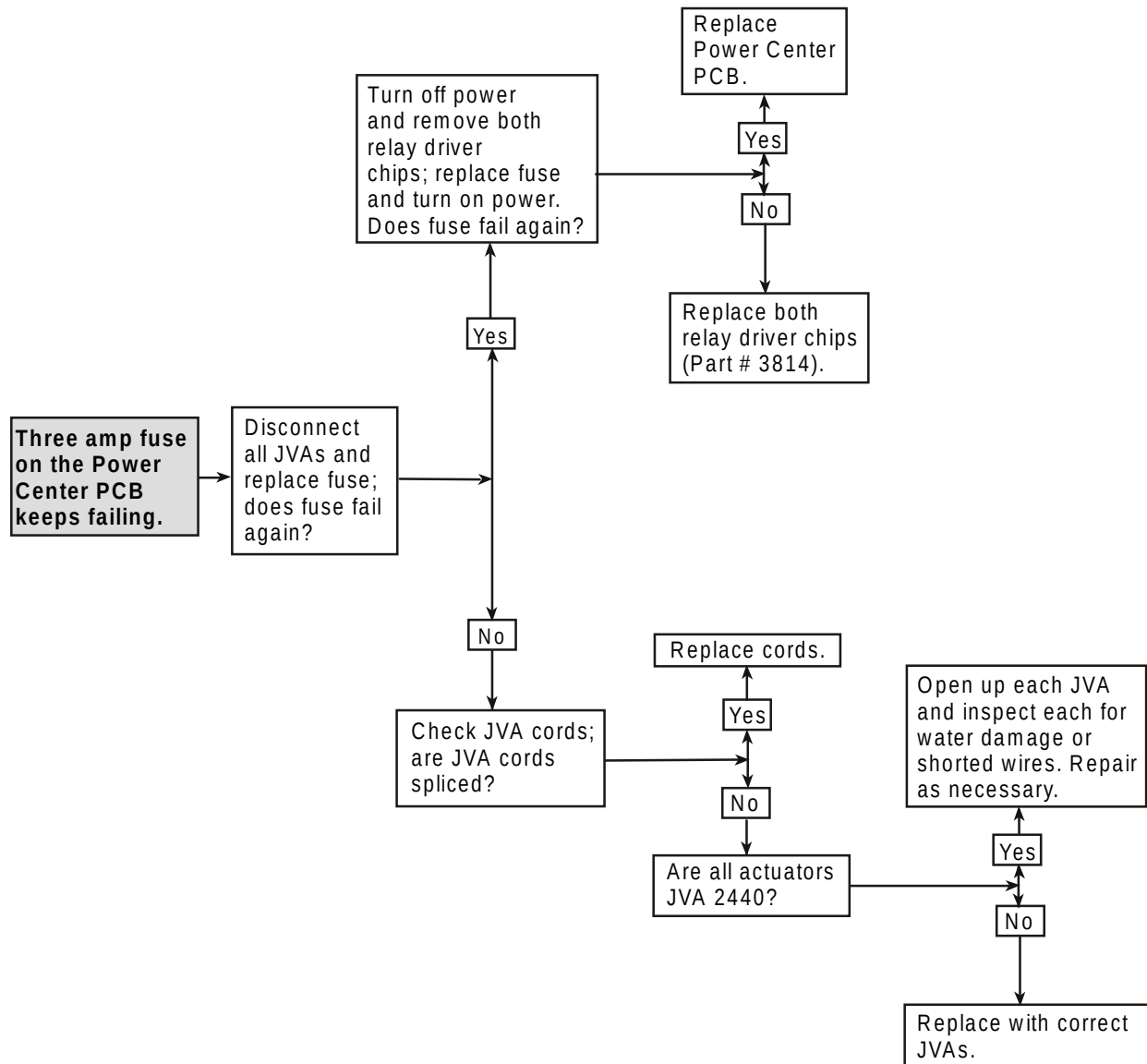
Some Controller Buttons Do Not Operate . . .



Model	Description	Part No. of PPD Chips
AquaLink RS16 P & S	Pool and Spa combination	7202
AquaLink RS12 P & S	Pool and Spa combination	7201
AquaLink RS8 P & S	Pool and Spa combination	6520
AquaLink RS6 P & S	Pool and Spa combination	6521
AquaLink RS4 P & S	Pool and Spa combination	6522
AquaLink RS16 P or S	Pool or Spa only system	7215
AquaLink RS12 P or S	Pool or Spa only system	7214
AquaLink RS8 P or S	Pool or Spa only system	6523
AquaLink RS6 P or S	Pool or Spa only system	6524
AquaLink RS4 P or S	Pool or Spa only system	6525
AquaLink RS2/14 Dual	Separate Equipment System	7217
AquaLink RS2/10 Dual	Separate Equipment System	7216
AquaLink RS2/6 Dual	Separate Equipment System	6526

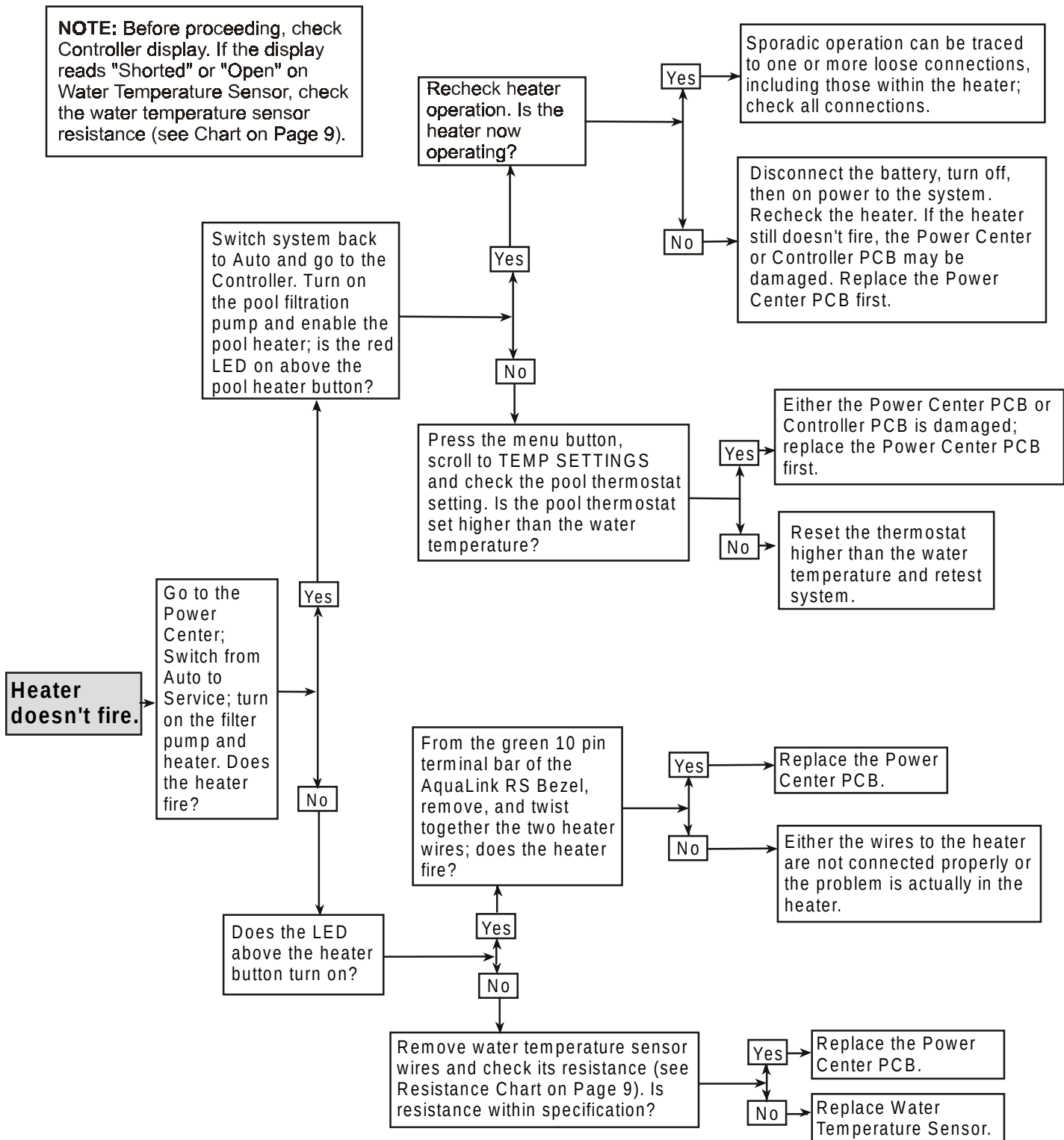
AquaLink® RS Troubleshooting

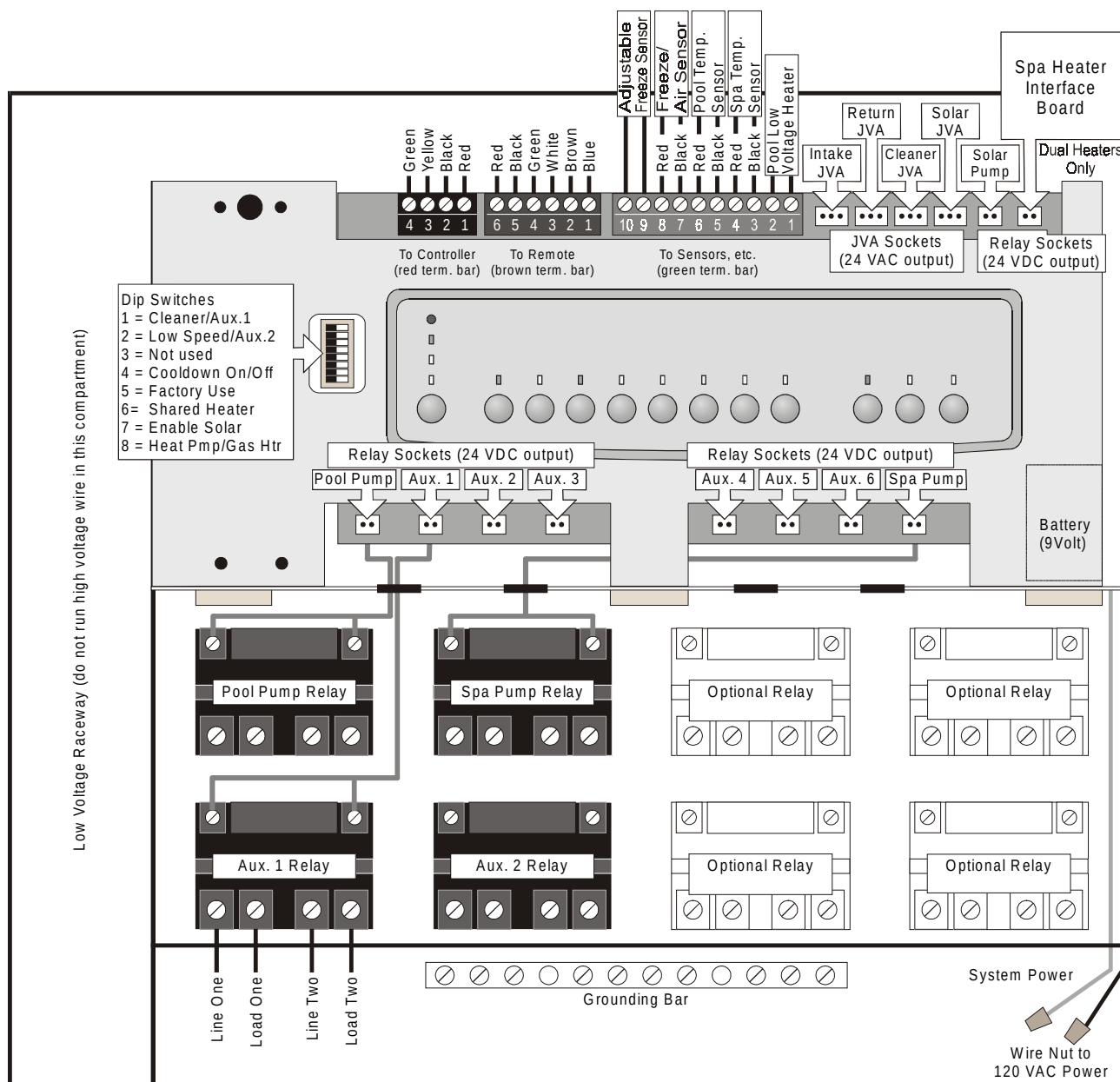
Three Amp Fuse Keeps Failing . . .



AquaLink® RS Troubleshooting

Heater Doesn't Fire...

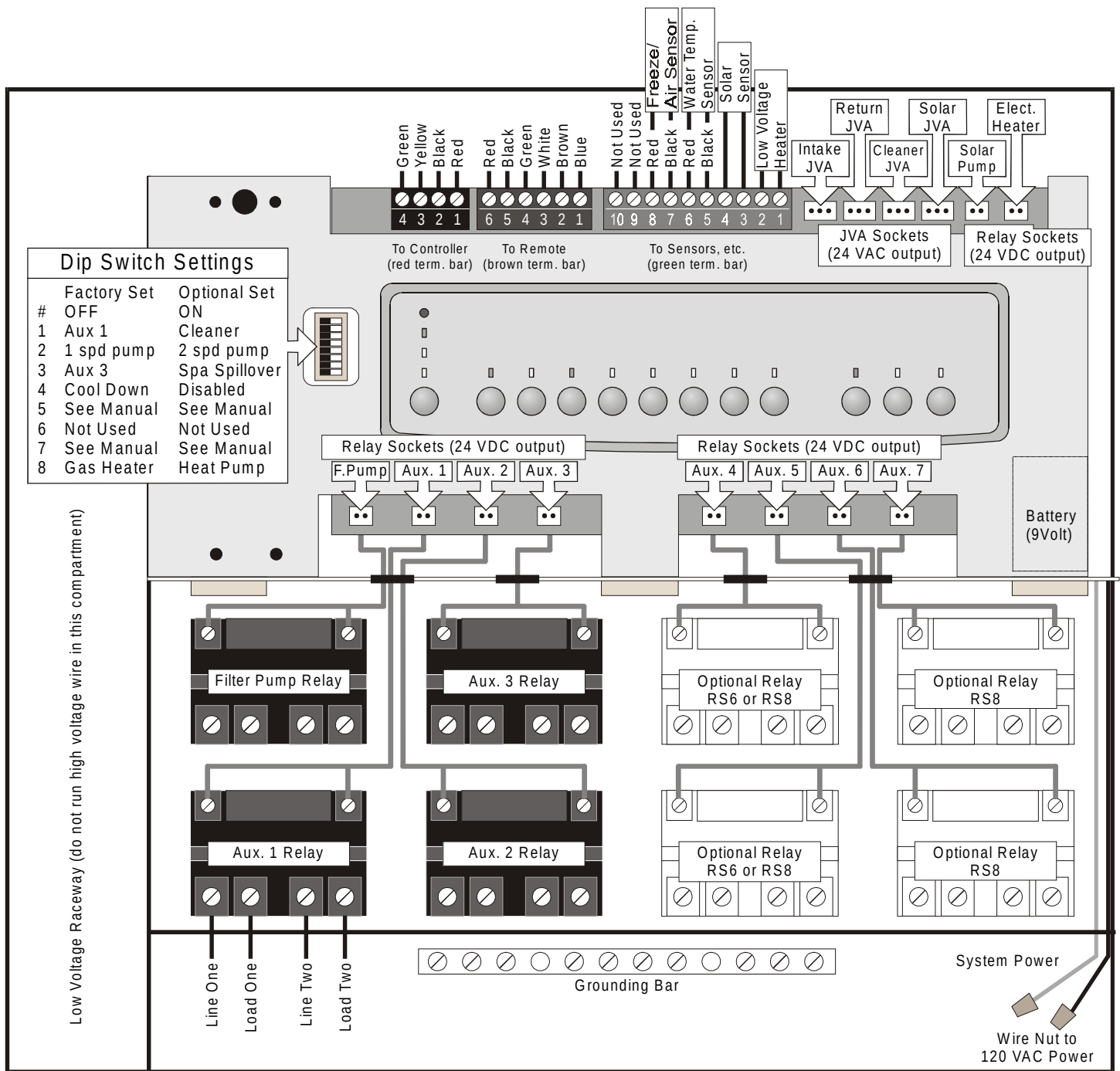




Wiring Diagram for AquaLink RS Dual Equipment RS2/6, 2/10, 2/14

For Tech. Service, Call 415-382-8220, ext. 260





Wiring Diagram for AquaLink RS Combos and Onlys RS4, 6, 8, 12, 16

For Tech. Service, Call 415-382-8220, ext. 260



TELEDYNE LAARS
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