

Ji 2000 Troubleshooting

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This is the Troubleshooting Manual for the Ji2000 electronic controller. Use it as a tool to solve problems with the Ji2000 Control System. 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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Ji 2000 Troubleshooting

Controller

Operation:

When a button is pressed on the Ji 2000 Controller, a momentary signal is sent to the Power Center PCB (printed circuit board) through a specific wire for that button. After receiving the signal, the Power Center PCB sends a signal back to the Controller PCB through a different wire to light the LED. For example, when the Spa button is pressed at the Controller, the yellow wire carries the signal to the Power Center PCB, which then sends a signal back to the Controller via the white wire. This in turn lights the LED above the Spa button. If an LED at the Controller lights after the button is pressed, the signal reached the Power Center PCB and returned to the Controller.

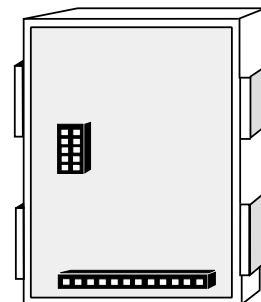
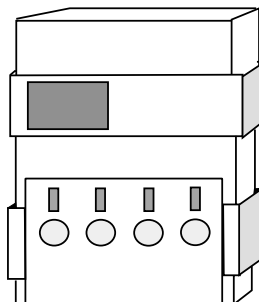
All temperature readout is performed at the Controller; the Power Center PCB terminal bar simply serves as a connection point for the Water Temperature Sensor wires. If the temperature readout is excessively high (120 to 130° F) or low (002 to 005° F), refer to the Sensor section of this Troubleshooting Guide.

The set of six DIP switches on the Controller PCB is for adjusting the temperature readout to compensate for cable length between the Power Center and the Controller. At least one DIP switch must be on at all times.

Since the Water Temperature Sensor is a Resistive Temperature Detector (RTD), the longer the cable length the higher the resistance, and the shorter the cable, the less resistance. DIP switch 5 is set to the ON position at the factory; this setting will make the temperature readout accurate for any length of cable between 51 feet and 175 feet; for cable lengths less than 50 feet, greater than 176 feet, or inaccurate, refer to the Sensor Section of this Troubleshooting Guide.

Controller Button Operation:

Controller Buttons from left	Standard Operation	Optional Operation
1	Spa	Spa and Heater Enable
2	Heater Enable	Auxiliary 3
3	Auxiliary 1	Auxiliary 1
4	Auxiliary 2	Auxiliary 2



Specifications:

Input Voltage : 12 VDC
 Button Signal: Momentary

Part Numbers:

Controller Complete - 4596 R
 Controller PCB - 4595 R

Ji 2000 Troubleshooting

Power Center PCB

Operation:

All the logic circuitry is contained on the Power Center PCB. For example, when the Spa button is pressed at the Controller, a signal is sent down the yellow wire to the Power Center PCB. The PCB then activates the filter pump circuit, the JVA/ heater switching relay and the heater on/cool down relay, which locks out the pool cleaner circuit. Finally, a signal is sent back to the Controller to light the LED above the Spa button.

Since the Ji 2000 only requires a momentary signal to activate circuits, the Power Center PCB can operate with just a Controller, a Radio Remote, a Spa Side Switch, all three, or any combination of the three.

Whenever the filter pump circuit is turned on, then turned off, either from the filter pump time clock, cleaner time clock, spa time clock, freeze protection or Spa button, the filter pump will continue to run for approximately 7 minutes, but the heater will be deactivated. This is caused by the heater cool down circuit. When the Ji 2000 is in the cool down cycle, moving the Filter Pump Override switch from Auto to Off then back to Auto will cancel the delay for that one time.

Override Switches: Normal Operation - *Auto*

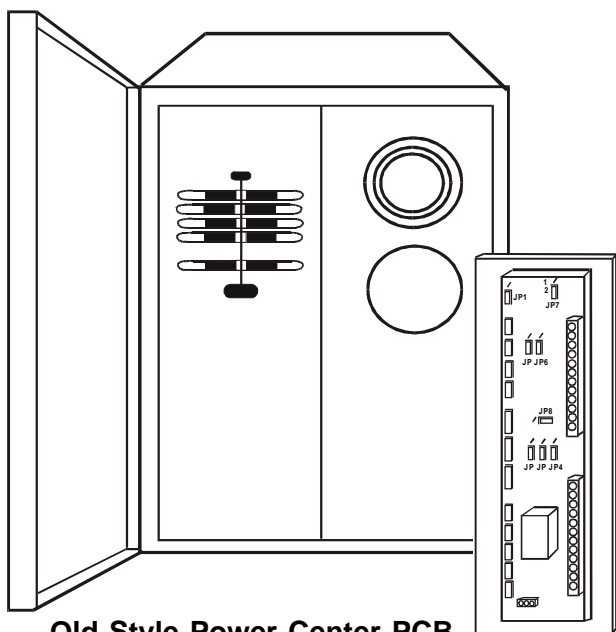
- *Filter Pump/Cancel Delay* - Operates the filter pump; also used to cancel the heater cool down delay.
- *Aux 1* - Operates equipment wired to auxiliary 1 relay
- *Aux 2* - Operates equipment wired to auxiliary 2 relay
- *Cleaner/Aux 3* - Operates cleaner booster pump, or if jumpers JP 2, 3, 4 and 8 have been moved, operates equipment wired to auxiliary 3 relay.
- *Heater Selector Switch* - In the Spa position, the heater will only heat when the Spa is circulating. Turned to Off, the heater will not heat. In the Pool/Spa position, the heater will heat both the pool and spa.

Heater Operation:

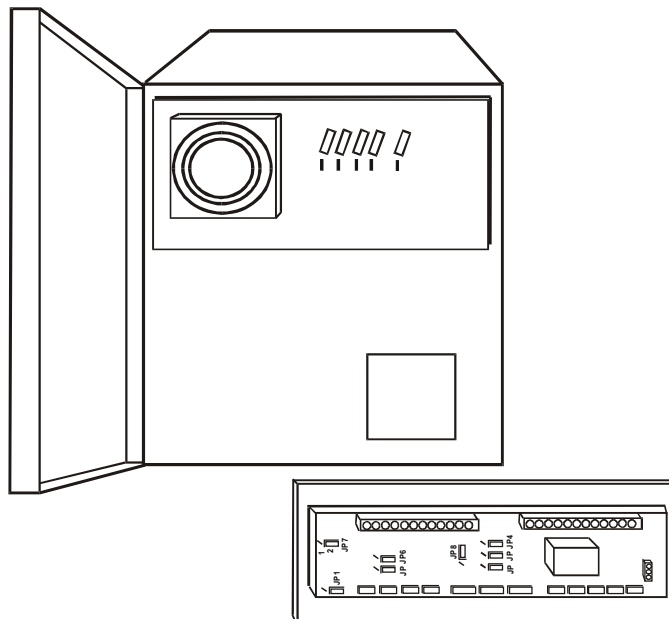
- **Heating the Spa:**
The Heater Selector Switch on the Ji 2000 must be in either the Spa Only or Spa/Pool position. Press the Spa button, then press the Heater Enable button. (If jumpers JP 2, 3 and 4 have been moved, it's not necessary to press the Heater Enable button.)
- **Heating the Pool:**
The Heater Selector Switch must be in the Spa/Pool position.
Press Heater Enable button.
(If jumpers JP 2, 3 and 4 have been moved, it's not necessary to press the Heater Enable button.)
The filter pump must be turned on from the time clock.

Ji 2000 Troubleshooting

Power Center PCB (Continued)



Old Style Power Center PCB



New Style Power Center PCB

There are eight (8) jumpers on the Power Center PCB. Each is connected between two of the three circuit pins. Factory setting is with each jumper connected between pins 2 and 3. An optional change is to move the jumper(s) to pins 1 and 2. **Never move jumpers with power on.** The Chart below indicates what the jumpers do.

Power Center PCB Jumpers

Jumper	Factory Setting, Pins 2 and 3	Optional Setting, Pins 1 and 2
JP 1	Filter pump turns on when optional freeze sensor activates.	Filter pump and Aux 1 turn on when optional freeze sensor activates.
JP 2, JP 3, and JP 4	Second button on the Controller enables the heater.	Heater enable combined with the circulation. Second button on Controller activates the electric heater (P2) socket.
JP 5 and JP 6	Fourth button (Aux 2) on the Controller operates independently of the Spa circuit.	Fourth button on Controller activates the Spa circuit. Do not move these jumpers. This is for use with a Ji 600, so the pool cleaner can be operated from the Controller.
JP 7	Heater cool down in effect.	Heater cool down eliminated.
JP 8	Second button on the Controller enables the heater.	Move this jumper in conjunction with JP 2, 3 and 4 so equipment operated from second button of the Controller will have an override switch. Plug relay coil wires for auxiliary equipment into P5 rather than P2.

Specifications:

Input Voltage : 24 VAC
Output Voltage: 12 VDC

Part No:

Power Center PCB - 4395

Ji 2000 Troubleshooting

Common Ji 2000 Problems

Filter Pump Does Not Turn Off

Whether or not a heater is connected to the system, as long as jumper JP 7 is covering pins 2 and 3, the system will go into a cool down cycle for approximately 7 minutes whenever the filter pump is turned on and then off. The cool down cycle will start when the Spa button is turned off or the filter pump time clock reaches the shut off time.

Pool Will Not Heat

In order to heat the pool, the heater button on the Ji 2000 must be enabled, the Heater Selector Switch on the Ji 2000 Power Center must be in the Spa/Pool position and the filter pump must be turned on by the filter pump time clock. The filter pump time clock must activate the filter pump because the heater cool down relay is tied to the time clock circuit, and the relay will only close when the time clock circuit is engaged.

Controller Locked Up

When two or more signals are received at the Power Center at the same time, the control logic can be confused. This problem is registered at the Controller as a lock up where one or more LEDs are on but the control buttons do not function. The most common cause of this problem is water in the Spa Side Switch. Troubleshoot by turning off power, disconnecting the Spa Side Switch and turning power back on. If the problem persists, the next step is to replace the Power Center PCB, not the Controller PCB.

Equipment Turns On/Off at Random

Prior to a complete malfunction of the Spa Side Switch, the user may experience the random turning on and off of various pieces of equipment controlled by the Ji 2000. To determine if the Spa Side Switch is the culprit, disconnect it from the Power Center PCB. If the problem persists, replace the Power Center PCB.

Ji 2000 Troubleshooting

Water Temperature Sensor - Part No. 4019

The Water Temperature Sensor (WTS) senses a fluctuation in water temperature as a change in resistance. Contained within the WTS are two 1K resistive temperature detectors (RTDs). You may connect either part of the wires (yellow/green or red/black) but not both pairs.

All temperature calibration and display is done at the Controller. Even though the red and black sensor wires are connected at the Power Center PCB, the PCB has nothing to do with temperature display other than providing a connection point and two solder traces to the blue/black pair of the Nine Pair Cable which runs to the Controller. When the resistance of the sensor reaches the Controller, it is directed through one or more calibration resistors (determined by the positioning of the CAL DIP switches). The setting of the DIP switches determines how much or how little additional resistance is added to the sensor resistance. The accumulative resistance is then converted into a digital number and displayed as the actual temperature.

Temperature degrees F	Resistance K Ohms	Temperature degrees F	Resistance K Ohms
40	0.8905	75	9.993
45	0.9051	80	1.008
50	0.9192	85	1.024
55	0.9339	90	1.039
60	0.9487	95	1.054
65	0.9637	100	1.070
70	0.9782	105	1.086

Specifications:

Two 1K RTDs (Resistive Temperature Detectors)

Part No. 4019 (Yellow/green and red/black wires)

Resistance Range: 0.91K at 50° F to

1.08K at 100° F

Open Circuit - 120 to 130° F (Displayed on Controller LED)

Shorted Circuit - 002 to 005° F (Displayed on Controller LED)

Blue/Black Wires to Controller - Water Temperature Display

Ji 2000 Troubleshooting

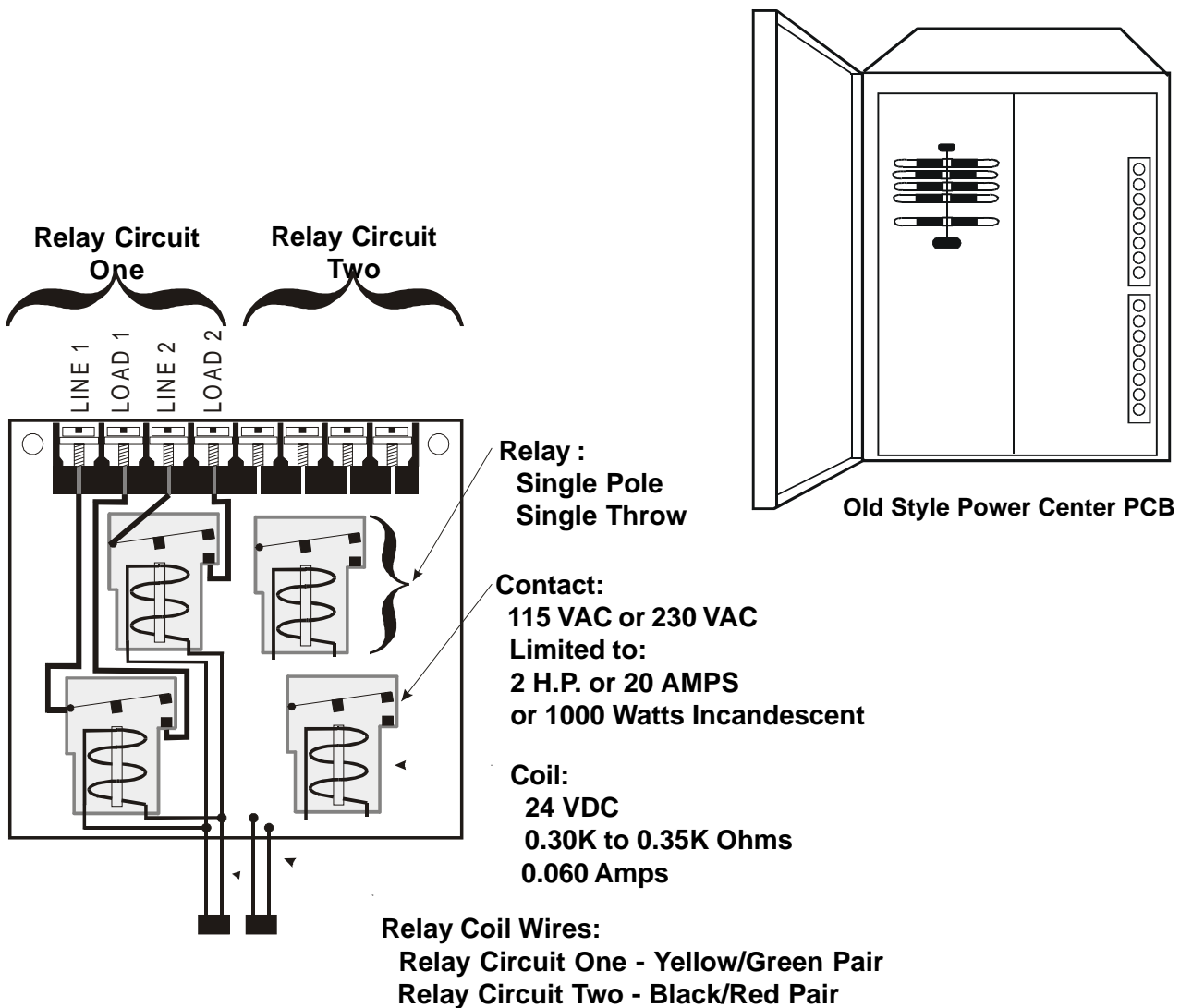
Standard Relay Module - Old Style, Part No. 3652

Operation:

Each Standard Relay Module contains two relay circuits. Relay modules are located in the high voltage compartment of the Power Center and are each connected to the Power Center PCB via two sets of coil wires.

The yellow/green coil wires control Relay Circuit One, and the red/black coil wires control Relay Circuit Two. Each relay circuit is comprised of two single pole, single-throw relays which will “make” or “break” two lines simultaneously (see diagram below).

Sending 24 VDC to the yellow/green coil wires will engage both relays of Relay Circuit One. When engaged, any power connected to LINES of Relay One will be transferred to the LOADS (i.e., Line 1 to Load 1 and Line 2 to Load 2). **NOTE:** Wiring for Relay Circuit Two is not shown. Relay Circuit Two is wired exactly as Relay Circuit One, and functions in the same way.



Ji 2000 Troubleshooting

Standard Relay Module - New Style, Part No. 6581

Operation:

A Standard Relay's coil is supplied 24 VDC from the Power Center PCB via the driver chip. 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 wired 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 the relay Driver Chip on the Power Center PCB. (Damage to this chip requires replacement of the PCB).

Specifications:

Maximum Contact Ratings:

3 hp at 220 VAC

1½ at 110 VAC

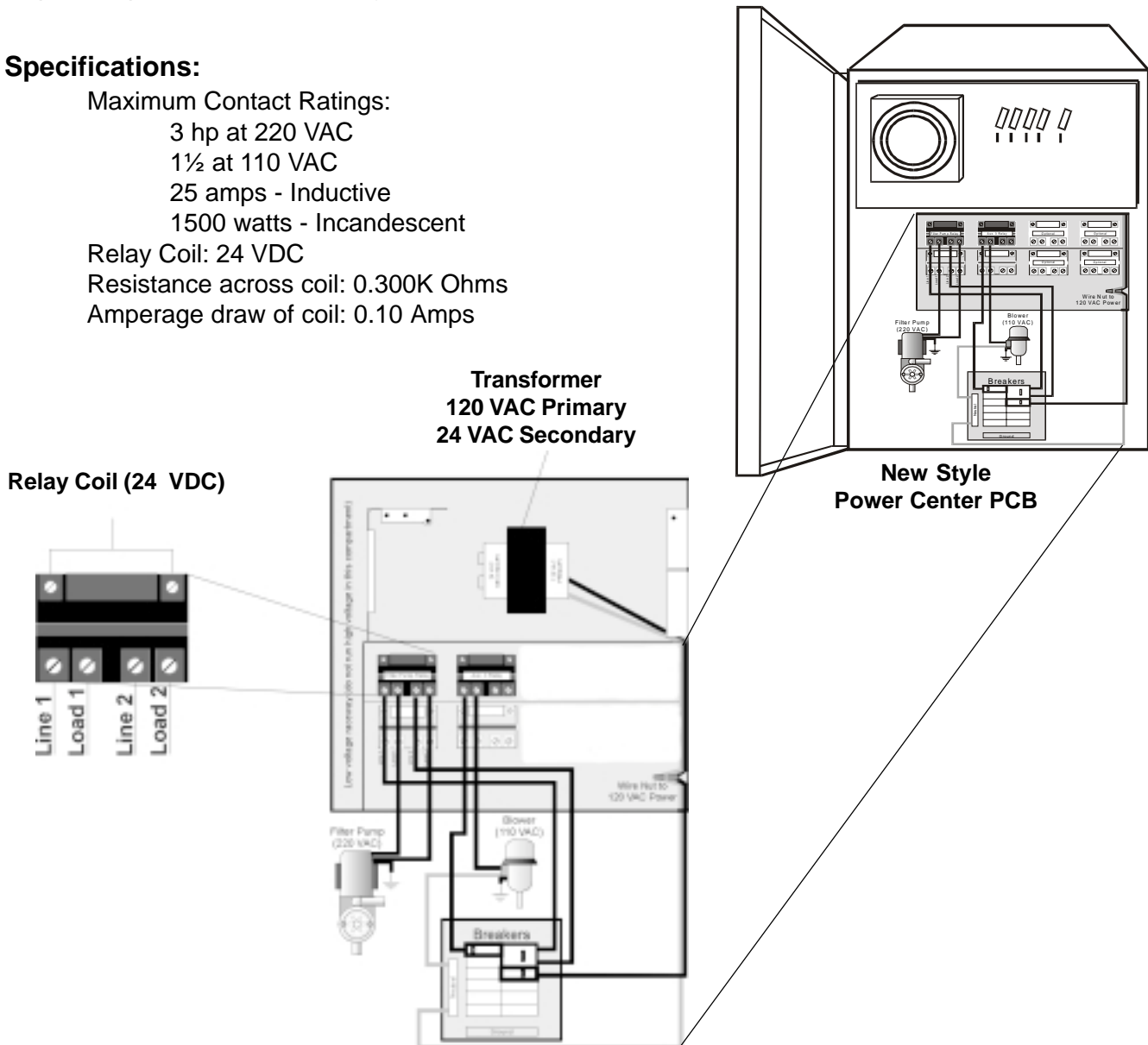
25 amps - Inductive

1500 watts - Incandescent

Relay Coil: 24 VDC

Resistance across coil: 0.300K Ohms

Amperage draw of coil: 0.10 Amps



Wiring for a Standard Relay

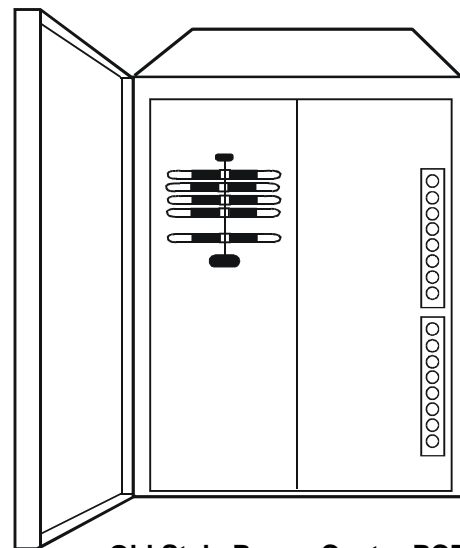
Ji 2000 Troubleshooting

Two Speed Relay Module - Old Style, Part No. 4663

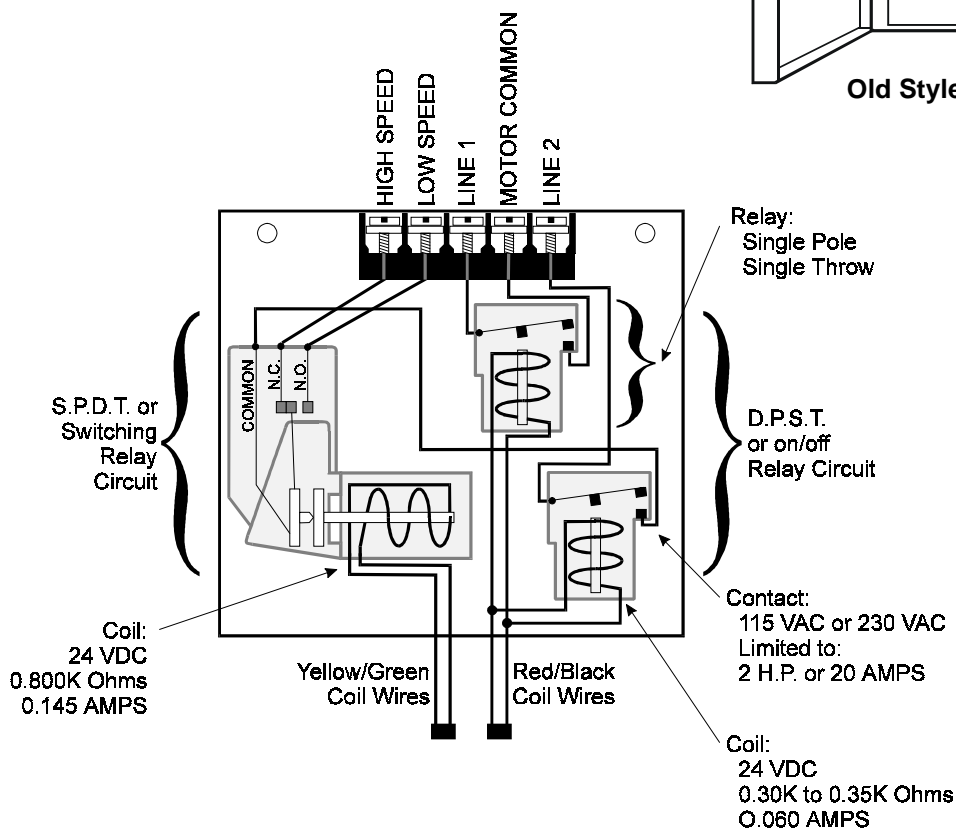
Operation:

The red/black coil wires should be plugged into the filter pump (P1) socket on the Power Center PCB. This relay activates first. When activated, it makes the connection from LINE 1 to MOTOR COMMON, and at the same time allows the power at LINE 2 to go to the COM terminal of the SPDT (single pole, double-throw) relay of the module. Power sent to the COM terminal of this relay is transferred to the N.C. (normally closed) terminal and hence to the HIGH SPEED wire connection.

The yellow/green coil wires should be plugged into one of the auxiliary sockets on the Power Center PCB.



Old Style Power Center PCB



Ji 2000 Troubleshooting

Two Speed Relay Module - New Style, Part No. 6796

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.

Specifications:

Maximum Contact Ratings:

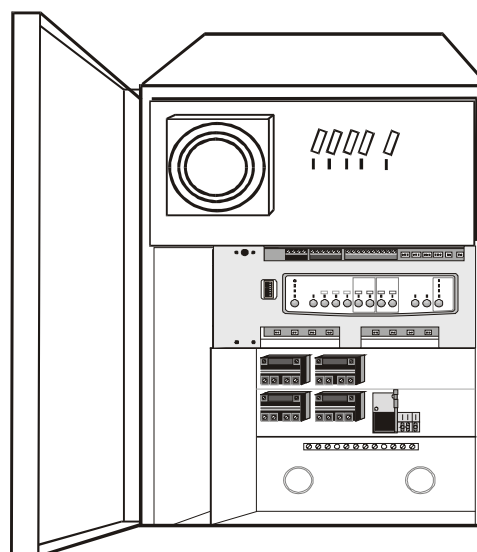
2 hp at 220 VAC

1 hp at 110 VAC

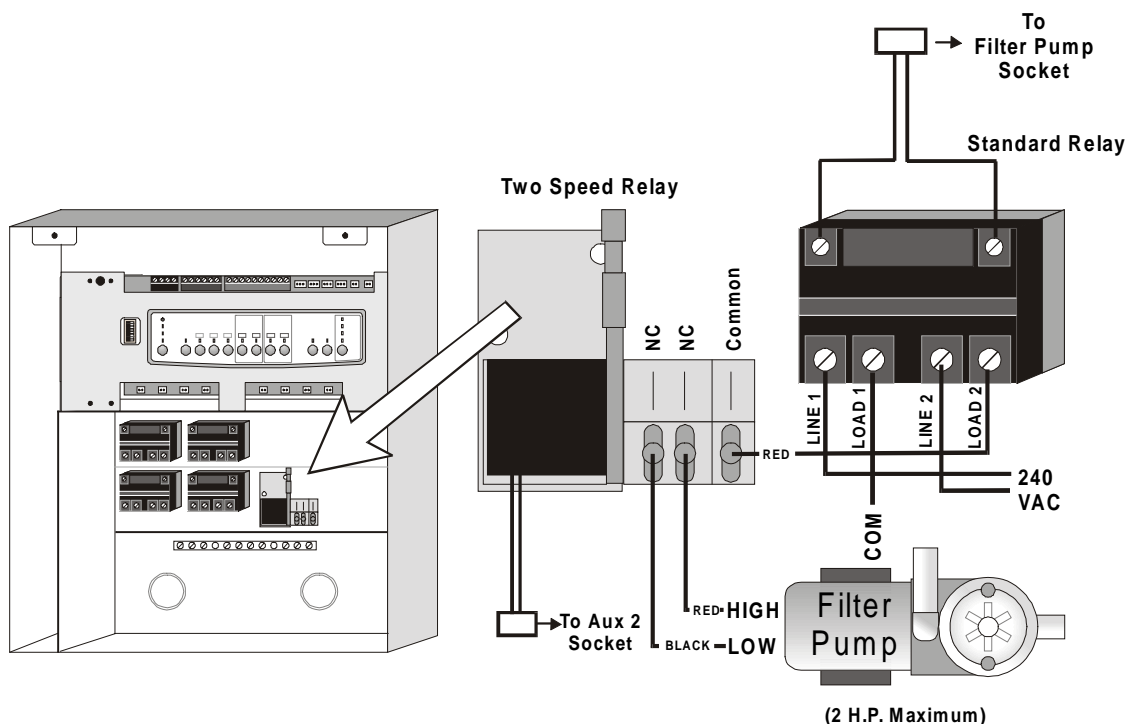
Relay Coil: 24 VDC

Resistance across coil: 0.800K Ohms

Amperage draw of coil: 0.145 Amps



New Style Power Center PCB



Wiring for a Two Speed Relay

Ji 2000 Troubleshooting

JVA 2440 Valve Actuator - Part No. 4424

Operation:

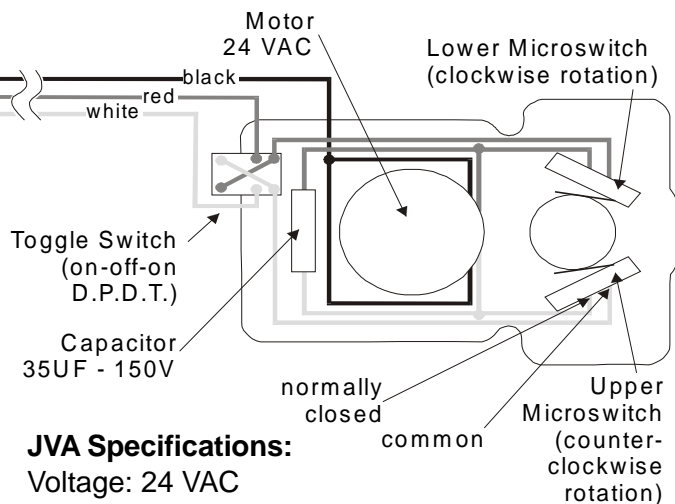
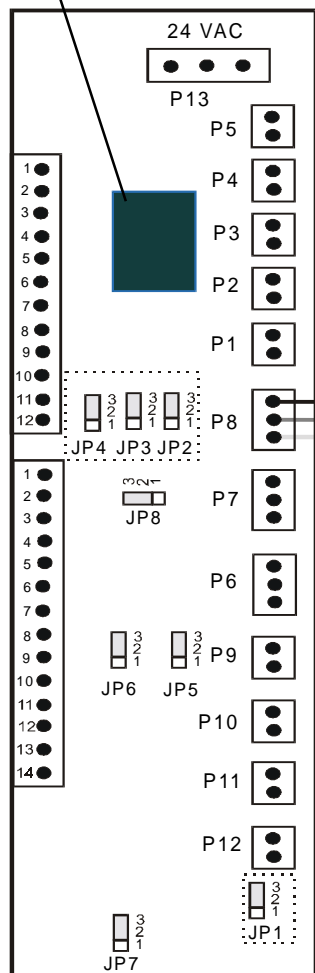
One leg of the 24 VAC transformer secondary supplies voltage to the three terminal of a 4 PDT (four-pole, double-throw) relay. The NC (normally closed) terminals of that relay are connected to the red wires of the JVA cords, and the NO (normally open) terminals are connected to the white wires of the JVA cords. The completion of the circuit is through the black (common) wires of the JVA cords.

When the coil of the 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 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 reaches the proper torque.

Four-Pole Double-Throw Relay



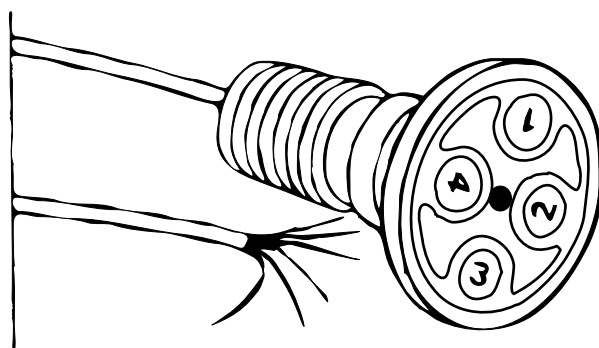
JVA Specifications:

- Voltage: 24 VAC
- Amperage: 0.75 AMPS
- Torque: 180 in/lbs.
- Rotation Time: 34 sec. for 180 degrees
- Motor Type: Synchronous - Bidirectional

Ji 2000 Troubleshooting

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.



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 from the terminal bar.

Set your meter to read continuity (or resistance Ω).

- Insure No Shorts
Measure between the black (common) wire and each of the button wires.
If there is continuity between any of the two wires (without depressing a button), the switch is shorted; replace it.
- Insure 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 the black and blue wires while your helper holds down button 1.

Ji 2000 Troubleshooting

Time Clocks

Grasslin and Intermatic Time Clocks

Front View

Front View

Back View

Back View

Grasslin Time Clock

Intermatic Time Clock

Part # 4634 (24 hr. Time Clock Kit)
Part # 4635 (7 day Time Clock Kit)

Part #5073 (24 hr. Time Clock Kit)

Grasslin

- White tabs - 24 hour clock
 - each tab = 15 minutes
 - pull towards you for ON times

- Blue tabs - 7 day clock
 - each tab = 2 hrs
 - pull toward you for ON times

- SPDT - Connect low voltage leads between the common and normally open terminals

Intermatic

- Red tabs - 24 hour clock
 - each tab = 30 minutes
 - pull towards you for ON times

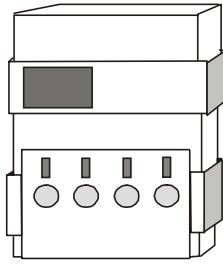
- Blue tabs - 7 day clock
 - each tab = 4 hrs
 - pull toward you for ON times

- SPDT - Connect low voltage leads to low voltage terminals

Ji 2000 Troubleshooting

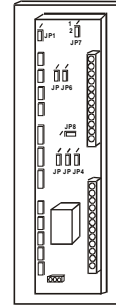
Parts Page

Controller



Controller Complete - Part #4596R
PCB only - Part # 4595R

PCB

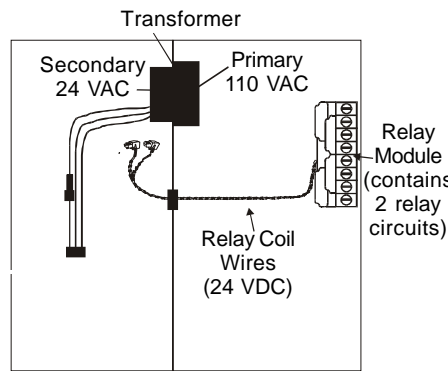


PCB - Part #4395

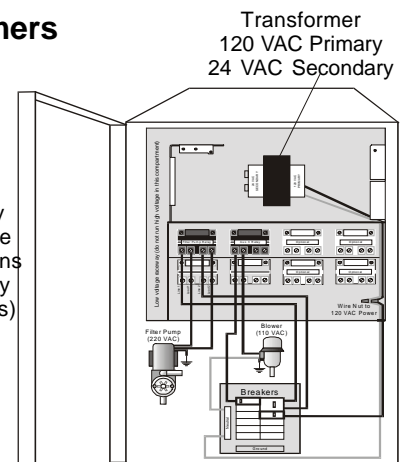
Time Clocks

Grasslin 24 hr Kit - Part #4634
7 day Kit - Part #4635
Intermatic 24 hr Kit - Part #5073

Transformers

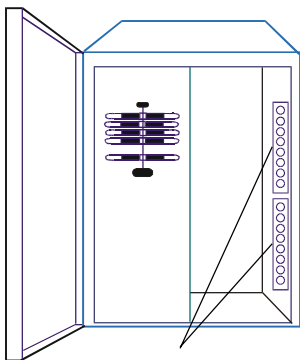


Transformer Old Style Part #4347

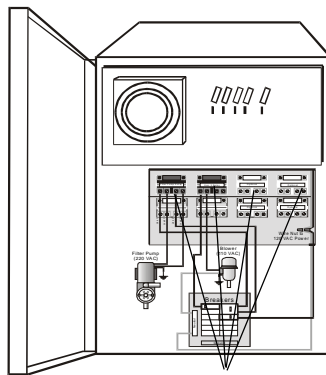


Transformer New Style Part #6612

Relays

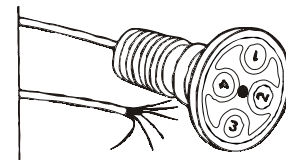


Old Style Relays
Standard 2 H.P. - Part #3652
Two Speed - Part #4663



New Style Relays
Standard 3 H.P. - Part #6581
Two Speed - Part #6791

Spa Side Switch



100' White - #7441 Black - #7442
150' White - #7443 Black - #7444

Water Temperature Sensor



Part #4019



Mat #0494

For Technical Service, call 707-776-8200, ex. 260



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