

# CIRCUIT BOARD REPLACEMENT

**Required Tools:** Needle-nosed pliers, Phillips and slotted screwdrivers, heat-sink compound and a digital voltmeter.

**WARNING:** To avoid electrical shock, make sure that all power to the heater is OFF before attempting to remove the old circuit board and while installing the new circuit board.

1. Turn off power to the heater. Confirm that power is OFF with a *voltmeter*. Even if the status light (or LED) on the circuit board is off, there may be multiple breakers powering your SEISCO.
2. Label the incoming power wires to make their replacement easier. With a *slotted screwdriver*, loosen the screws L1 and L2 and remove the power wires from the screw lugs on the right hand side of the circuit board. (Fig. 1)
3. Using a pair of *needle-nose pliers*, gently wiggle and disconnect all of the control wires from the spades on the circuit board. (Be sure to pull on the metal connectors and not the wires)
4. SH Model boards and some replacement boards have a blue jumper at top left labeled “disable”. This jumper must be left in place on the replacement board (even if the original did not have one) for proper operation.
5. Using a *Phillips screwdriver*, unscrew the TRIACs from the heat sink to the right of the board. Retain the screws as they will be needed for the new board. (Fig. 1)
6. Using a *Phillips screwdriver*, remove the four mounting screws from the board. Be prepared to support the board as you remove the screws. Avoid the white heat sink compound as it is difficult to remove from your clothing. (Fig 2)
7. If the old board had power jumpers installed, transfer the jumpers to the replacement board. Gently crimp any loose connections with the needle nosed pliers for good contact and reconnect. (Fig. 3)
8. Inspect and clean the surface of the heat sinks to ensure they are clean and flat and without imperfection, oxidation or pitting. Clean with alcohol or sand gently to restore surface. Replace as necessary to ensure good contact with the TRIAC.
9. Prepare the replacement board by spreading a thin layer of heat sink compound covering the entire back of each TRIAC. This is critical to proper heat transfer and longevity of the replacement board. (Fig. 4)
10. Hand-tighten at least two mounting screws to the circuit board.
11. Install a screw through each TRIAC into the heat sink being sure they are flush against the heat sink and being careful to properly align the threads. If you feel any resistance, back the screw out and try again. If you lose a screw, contact SEISCO for a replacement, DO NOT SUBSTITUTE.
12. After the TRIACs are snug, tighten the mounting screws. Mounting screws should be merely snug, avoid over tightening.
13. Replace the main power wires into the power lugs and tighten. If the wires are stranded, make sure all strands are captured in the lug to avoid short circuits. (Fig.1)
14. Replace all control wires removed in step 3. Gently crimp any loose connections with the needle nosed pliers for good contact and reconnect (refer to schematic inside the unit cover and labeling on board to assist in reconnection).
15. Follow the brown wire from the circuit board to the High Limit Switch at the top left of the SEISCO. Pressing the center red button with the tip of a pen or your finger sets it. When set the button will feel loose in its housing, this is normal. (Fig.5)
16. Finally, we recommend performing the circuit board matching procedure. (It is required for older boards with red and green temperature sensor wires – optional for newer boards with white wires) Follow procedure on the reverse side of this page.

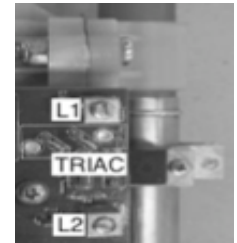


Fig.1: Power Lug and TRIACs



Fig.2: Mounting Screws

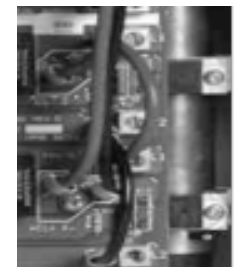


Fig. 3: Power Jumpers



Fig.4: Heat Sink Compound



Fig.5: High Limit Switch

## CIRCUIT BOARD MATCHING PROCEDURE

This procedure enables the temperature sensors to be properly matched to the microprocessor. This process is required after replacing a circuit board and may be necessary after adjusting or replacing temperature sensors, temperature sensor wires or resetting the high limit switch.

1. Turn off power to the SEISCO at the circuit breaker panel.
2. Open a hot water faucet and let the water run until the water flows cold. Let water continue to run for a total of 3-5 minutes. (For this test to be completed correctly, water temperature must be constant throughout the test)
3. Locate the row of spade connections at the top, left hand corner of the circuit board on the SEISCO. The last pair of spade connections will have the word "Limit" above the connections with brown wires connected to the spades.
4. Follow the left brown wire to the limit switch located above the left hand corner of the circuit board.
5. Unplug the brown wire at the limit switch (not at the board).
6. Securely place the end of the wire away from the circuit board. *DO NOT LET THE WIRE TOUCH THE CIRCUIT BOARD.*
7. Restore power to the SEISCO at the circuit breaker panel.
8. After the beeping stops, find the blue button located on the circuit board approximately two inches below the blinking green and red status light.
9. Push and hold the blue button for approximately 8-10 seconds, then release. You should hear a short, low tone buzz. (If you do not hear the buzz, cycle the power and repeat\*).
10. Turn off power to the SEISCO at the circuit breaker panel.
11. Turn off the water at the faucet.
12. Reconnect the brown wire to the limit switch.
13. Restore power to the SEISCO. You will hear 2-4 beeps when the SEISCO powers up.
14. Listen for the unit to "click". This takes up to 45 seconds.
15. Turn on the hot water at a sink and test for water temperature.

\* If no confirmation tone is received after 3 or 4 attempts, check the temperature sensors and temperature sensor wires. A complete service guide is available for download at <http://seisco.info>

## DIAGNOSTIC CODES

Code	Description	Action
111	TH-IN Sensor	Turn off all the power to the heater. Cool down the heater by running the water for about 5 minutes. Check the resistance measurement for all temperature sensors.
112	TH 1	
113	TH 2	
114	TH 3	
115	TH 4	
117	Shorted Temp Sensor	Indicates sensor is shorted closed. Check wiring, replace as necessary
118	Open Temp sensor	Indicates sensor is open. Check wiring, replace as necessary
121	Disable Switch Open	Install jumper on SH boards (also some service replacement boards)
122	High Limit Switches	Turn off all power to the heater. Reset the switch by pushing in the button on the switch itself. Check the switch and brown wires for continuity. (Check Temperature sensors and run matching procedure before replacing Limit Switch)
123	Level Detects	Check that the heater is filled with water and that there is no air trapped inside,. Check operation of back flow preventer (or check-valve). If the heater is filled and there are no leaks, connect both level detect spades on the board to ground. If code is accompanied with a clicking sound that is present when water is running check the heating elements.
124	High Temperature Shutdown	The 124 code is triggered when the temperature of the water is more than 10 degrees higher than the set-point at TH-4 or THIN.
126	Moisture Detect	Immediately shut off all power to the heater. Check for water leaks. Completely dry circuit board before restoring power.
132	High Voltage	Voltages higher than 10% above the nominal rating should be corrected. Code will clear when voltage returns to nominal range.
133	Low Voltage	Low voltage may reduce heating capacity of the heater. Sustained voltages below 20% of the nominal rating may cause the heater to shut down. Code will clear when voltage returns to nominal range.
134	Element #1	Check elements. Check Temperature Sensors. Check Wiring and Breakers. Verify proper heater sizing, if necessary reduce unit temperature from maximum setting, and reduce flow rate with shut-off valve.
135	Element #2	
136	Element #3	
137	Element #4	
142	Data Reading Error	The heater needs to be reset. Turn off all breakers to the heater for 30 seconds. If it persists, test sensors and perform Matching Procedure. If code does not clear, replace circuit board.