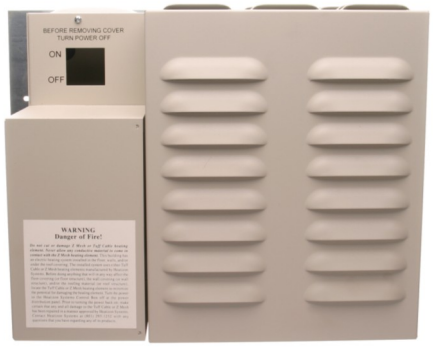
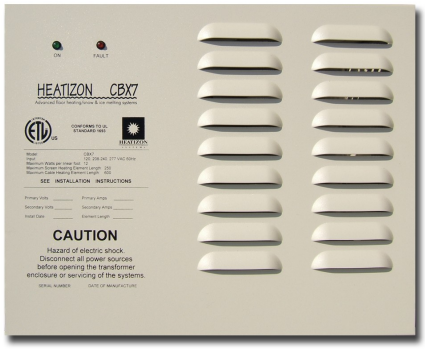
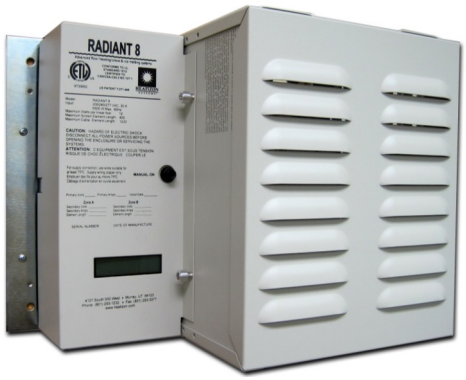
TROUBLE-SHOOTING PROCEDURES



TROUBLE-SHOOTING PROCEDURES FOR CBX6 OR CBX23 SERIES SYSTEMS PAGE 9-2 TO 9-6



TROUBLE-SHOOTING PROCEDURES FOR CBX7 SYSTEM PAGE 9-2 AND 9-7



TROUBLE-SHOOTING PROCEDURES FOR RADIANT 8 SERIES SYSTEMS PAGE 9-2, 9-8 TO 9-9

WARNING: HIGH VOLTAGE PRESENT! TROUBLE- SHOOTING PROCEDURES AND MEASUREMENTS MUST BE PERFORMED WITH THE SYSTEM ENERGIZED AND THE COVERS REMOVED. ALWAYS MAKE CERTAIN THAT THE PERSON PERFORMING THESE PROCEDURES IS FAMILIAR WITH SAFE PRACTICES REQUIRED FOR WORKING WITH HIGH VOLTAGE EQUIPMENT. A QUALIFIED TECHNICIAN OR ELECTRICIAN SHOULD PERFORM THE FOLLOWING PROCEDURES!

NOTE: Always turn power off prior to removing or reinstalling covers.

NOTE: Never install or reinstall the Control Board with the primary power in the "ON" position.

NOTE: Prior to trouble-shooting the system, check for obvious problems such as loose connections, cut or broken wires, etc. Check the jumpers on the printed circuit board for proper settings.

STATUS INDICATOR LIGHTS—WHAT DO THEY MEAN?

- The **CBX6 and CBX23** series Control Units are equipped with a status indicator LED on most activation devices and the Control Unit itself. This indicator monitors whether the unit is heating or not heating and gives other vital diagnostic information.

Indication	Status
-On -Solid	System heating - normal heating mode
-Off	System not heating - no call for heat
-Slow Blink	Under/Over Current
-2 Blinks - Pause	Transformer over temperature
-3 Blinks - Pause	Arcing or Shorting of Heating Element
-Rapid Blink	SCR Failure--Actions required when a diagnostic signal is given by the status indicator are listed in the troubleshooting section below.

- The **CBX7** series Control Units are equipped with a status indicator LED on most activation devices and the Control Unit itself.

-Green LED On	System heating—normal heating mode
-Green LED Off	System not heating—no call for heat
-Red LED On	SCR Failure

- The **Radiant 8** is equipped with a digital display, and as a result it does not have status indicator lights.

TROUBLESHOOTING PROCEDURES FOR CBX6/CBX23

The following procedures cover most problems that can be encountered when installing or servicing Heatizon Systems products with CBX6 and CBX23 Series Control Units. If your Heatizon Systems product cannot be repaired using the following procedures, contact Heatizon Systems for further assistance.

Problem: **The system shuts off every 30 minutes for one minute.**
Solution: It is normal for the Control Unit to shut the system off every 30 minutes to perform a diagnostic test of the system's safety features.

Problem: **There is no power to control unit (no LED indication on control board)**
Solution:

1. Test for input power.
2. Check panel circuit breaker, reset or turn on as necessary.
3. Check controller circuit breaker, reset or turn on as necessary.
4. If power is measured at the input but the Control Board indicates no power is pre sent, the problem could be within the Control Unit itself. Contact Heatizon for technical assistance.

Problem: **The system is "Hard starting" or a breaker trips when the thermostat is activated.**
Under normal conditions the controller incrementally powers up the transformer during the first one second of operation. Failure of the controller to do this properly will result in a "hard start." Hard starting is characterized by a noticeable "bang" or shaking in the transformer and/or conduits upon start-up).
Solution:

1. Check for proper wiring of the transformer primary for the supply voltage you are using. Improper wiring of the primary will possibly trip circuit breaker. Improper primary wiring can also damage the transformer if allowed to run for any length of time.
2. Check for continuity of the heating element. Heating element may be damaged, broken or shorted out to something metal or electrically conductive.

Problem: **The Control Unit has power, but the system will not activate**
Solution:

1. LED indicators #D24 and #D25 on the Control Board should be lit when system is energized (but not activated). Check voltage select jumpers on control board, (JP12 - JP13 - JP14). Jumper settings must be set for the supply voltage. Control Board will not operate properly if voltage is set incorrectly and **will be damaged if set for a value lower than the supply voltage.**
2. Test the Control Unit by jumpering Red and White terminals for the activation device, Control Unit should start. If system starts, fault is in the activation device or Thermostat Wire.
3. Check the installation and wiring of the Activation Device. To test Activation Device, connect an ohm meter to the Thermostat Wire terminals (the "R" & "W" terminals) of the Control Unit. The ohm meter should read continuity when the device is adjusted to call for heat, and should read open when the device is set for no heat. Repair or replace Activation Device or Thermostat Wire as necessary.
4. Check to see if LED #D23 ("Overtemp") is illuminated. Check connection and placement of thermistor on the Control Board. If thermistor is missing or not in stalled properly, system will not operate.

Problem: **System starts when power is turned on, but will not turn off via activation device.**

Solution: Remove red or white wire from Control Unit at activation terminals. If Control Unit shuts off, test activation device as described above.

Problem: **System starts, but won't stay running; LED's #D24 through #D27 won't change status when potentiometer is adjusted.**

Solution:

1. Check that the torroid (for single-sided transformers) or both torroids (for dual sided transformers) are properly installed over one (or both) of the Cold Leads and plugged into the proper connector(s) in the Control Unit.

2. Attach clamp-on amp meter around a Cold Lead and activate the system. Check for the presence of current in the secondary circuit during the 5-second period prior to system shut down (current should be 40 to 100 amps). If there is no cur rent present in the secondary, check the Transformer for voltage on the taps you are connected to 1.6 to 66 VAC depending on Transformer size). The presence of voltage on the Transformer taps but no current on the Cold Leads indicates no continuity in the heating element or Cold Lead. To check for continuity in the heating element and Cold Lead, remove one of the Cold Leads from the Trans former and place an ohm meter across the Cold Leads. Normal resistance should be less than 1 ohm.

3. If there is current present and the unit will not adjust, check for a feedback volt age using a voltage meter connected to TP3 and TP4 while system is running. Normal volts should be approximately 3 to 4 volts. If none is detected, replace the torroid.

4. CBX23 and CBX23T Control Units are a special case. If a CBX23 Control unit will not adjust, the problem could be the result of improperly installed dual torroids. To solve this, check the feedback voltage at test points TP3 and TP4. If there is current and the voltage at TP3 and TP4 is zero, turn power off, remove one of the two torroids from its cold lead, reverse direction and reinstall torroid back on the Cold Lead.

Problem: **System starts, but will not stay running. LED # D21 (undercurrent) or #D22 (overcurrent) turns on and status LED blinks slowly.**

Solution:

1. Check that the torroid (for single-sided transformers) or both torroids (for dual sided transformers) are properly installed over one (or both) of the Cold Leads and plugged into the proper connector(s) in the Control Unit.

2. Verify secondary voltage and amperage is the same as those taken when heating element was originally installed. If they are the same, return the Control Unit to Heatizon Systems. If they are different, then call Heatizon Systems Technical Support Department at (801) 293-1232.

3. Open heating element. Test for continuity as described in previous section.

WARNING. An out of adjustment potentiometer may be caused by shorted or damaged heating ele-ment or Cold Lead which may result in a danger of fire and risk to property or life. Shorted or dam-aged heating element or Cold Lead must be repaired prior to energizing the Control Unit and/or any adjustment to the potentiometer.

Problem: **System starts and runs, but Transformer is operating at greater than 200ºF.**
Solution: Check thermistor for proper location and connection.

Problem: **System may start and run, but shuts down after a period of time. LED # 23 (overtemp) lights and status indicator flashes a pattern of two blinks and a pause. This is transformer overtemp fault.**
Solution:

1. Check to see if the Transformer is operating at a temperature less than 200ºF. If it is operating at less than 200ºF, then:

2. Check Cold Lead operating amperage. If higher than original Amperage measured when the Control Unit was originally installed, see Trouble Shooting Guide, "System starts, but won't stay running."

3. Check for restricted air flow to the transformer. Correct as necessary.

4. Check for air temperature where the Control Unit is mounted. Make certain it is 72ºF or less. Correct as necessary.

5. Check that thermistor is properly installed on the controller, (if thermistor is missing or not installed properly system will not operate).

Problem: **System may or may not start, but shuts down and status LED blinks three times then pauses, LED #D21 & D22 will light. This is an arcing or shorting fault**.
Solution:

1. Turn primary power off. Check for loose connections at the transformer. Correct as necessary.

2. Check for loose connections at the Control Unit, (power input and transformer primary). Correct as necessary.

3. If Control Unit connections are found to be good, the problem could be in the Cold Leads or heating element, or the connections between them at the transition plate or butt splice. Check for poor solder or crimp connections. Repair as necessary.

4. Check for anything that could be shorting between adjacent runs of heating element or cold leads, such as nails that pass through the heating element into air ducts below the floor, metal carpet strips or thresholds, a frayed wire from the screen element, a foil candy wrapper, etc. Correct as necessary.

5. An erratic power source may also cause an erroneous arcing detection in the system. Check for defective panel circuit breakers or loose connections at these breakers. Correct as necessary. If primary power to the breaker panel is the source of the problem, contact your electrician or your power company for technical assistance.

Problem: **System shuts down immediately upon call for heat, status LED flashes rapidly. This indicates SCR has failed.**
Solution: Turn the power to the Control Unit OFF. Contact Heatizon Systems.

Problem: **System will stay in adjustment. After running a given period of time, an Over current or undercurrent fault occurs. (Note: Make certain that the Tuff Cable or ZMesh heating element has not been shorted to electrically conductive material, or cut or otherwise damaged and not repaired.)**

Solution:

1. Check jumpers on control board for proper over/under current tolerance settings. If the system is using Tuff Cable heating element or ZMesh in an outdoor application, set it for 10% tolerance on over current and 20% tolerance on undercurrent (JP5, JP7, JP9 and JP11). If the system is using ZMesh screen element for indoor applications, set it for 5% tolerance on over current and 10% tolerance on under current (JP4, JP6, JP8, and JP10). These adjustments are made on the Control Board.

2. Check for poor connections, burnt or damaged heating element. Correct as necessary.

Problem: **Television Screen or Computer Monitor interference occurs only when Heatizon System is on.**

Solution:

1. Change the distance from the Heatizon heating element and the television or computer monitor, and/or change the location of the television or computer monitor in the room.

2. Turn the Heatizon system thermostat to the off position when watching the affected television or when using the affected computer monitor.

3. Replace the affected television or computer monitor with one that utilizes Plasma Display Panel or Liquid Crystal Display technology.

Note: Prior to returning anything to Heatizon Systems, 4137 South 500 West, Murray, UT 84123, call (801) 293-1232 for a Return Materials Authorization form.

TROUBLESHOOTING PROCEDURES FOR CBX7

The following procedures cover most problems that can be encountered when installing or servicing Heatizon Systems products with CBX7 Series Control Units. If your Heatizon Systems product cannot be repaired using the following procedures, contact Heatizon Systems for further assistance.

Problem: **There is no power to the Control Unit (no LED indication on Control Board)**

Solution:

1. Test for input power.
2. Check circuit breaker, reset or turn on as necessary.
3. If equipped, verify that the power disconnect is in the ON position.
4. If power is measured at the input of the CBX7 and unit will not turn on, Contact Heatizon Systems at 801-293-1232 for technical assistance

Problem: **The system is "hard starting" or a breaker trips when the thermostat is activated**

The CBX7 has a soft start that will ramp the current on and off from zero to full current in about two seconds. The soft start eliminates high in rush current or power surge.

Solution:

1. Check for proper wiring of the transformer primary for the supply voltage you are using. Improper wiring of the primary may trip circuit breaker. Improper wiring of the primary can damage the transformer if allowed to run for any length of time.

2. If the activator is in the ON position when the power is applied to the CBX7 Control Unit, the unit will turn on with a hard start. Always have the activator in the OFF position before powering the unit.

Problem: **The Control Unit has power, but the system will not activate**

Solution:

1. If the activation device is ON, but the green LED is OFF and there are no amps present in element, check activator wiring from the activation device to the Control Unit for continuity.

2. If the activation device is ON, the green LED is ON, the red LED fault indicator is ON, but there are no amps present in element, system has an SCR short. To reset a fault, turn the activation device OFF and the power OFF at the distribution panel or disconnect, if one is installed, then turn the power back ON and then turn the activation device ON. If the fault recurs, the SCR has shorted and failed.

3. If the green LED is ON, red LED is OFF, and there are no amps present in the element and Cold Lead, check Cold Leads connected to the Transformer, check for open element and loose connections.

Problem: **System is ON, but unable to adjust Amps to an acceptable operating range**

Solution: Check the Transformer/Cold Lead connections Make certain that the Cold Leads are connected to the highest voltage Transformer tap that does not result in secondary amperage in excess of 96 Amps. Transformer should be set at the highest tap

Problem: **System is ON, but the green LED on cover will not light**

Solution: Check the interconnecting cable from the Power Board to the cover.

TROUBLESHOOTING PROCEDURES FOR RADIANT 8

The following procedures cover most of the problems that can be encountered when installing or servicing Heatizon Radiant 8 system.

Problem: **Display is not lit**

Solution:

1. Check that the input circuit breaker is on.

2. Check that the input terminals are tightly connected.

Problem: **Control Unit has power but will not activate**

Solution:

1. Check that the input power terminals and the terminals to the Transformer are tightly connected. Pushing the timer switch once will activate the Control Unit for 4 hours; each additional push of the timer switch will add 2 additional hours. The Control Unit may be activated by any of Heatizon's activation devices that can be connected to the activation terminals.

2. If the timer switch will not activate the Radiant 8, confirm that the wire running from the switch to the timer terminal block (TB1) is connected. The Radiant 8 can be tested by shorting the two terminals on the timer terminal blocks together (T1).

3. If Heatizon's activation device will not activate the Radiant 8, confirm that the wires at the activation terminal are marked "activation" on the display board. The activation device and wiring can be tested with a ohmmeter which is connected to the red and white wires on the t-stat cable. When the activation device is calling for heat there will be continuity between the red and white wires; when the device is off or the wire has been damaged or severed there will be no continuity between the red and white wires.

Problem: **Power is turned on and the display indicates a fault**

Solution:

1. Open/Shorted T Sensor 1: Thermister to the transformer is not connected or broken or severed.

2. Open T Sensor 2: Thermister to the load is not connected or the wire is damaged or severed.

Problem: **System starts but turns off and indicates a fault**

Solution:

1. Turn the power back on if a fault shut down the system. The fault will then be displayed until the Control Unit is reset. A red LED would also be activated and the green LED would be disabled to indicate a fault. Turn the power off and back on to reset the Radiant 8 Control Unit.

Fault indication

Problem: **Shorting and arcing**

Solution:

1. Shorting and arcing will occur when the incoming electrical current increases more than 20%. Check for an intermittent short on the element or at the transformer connection, or for a lost connection on the Transformer terminal connectors.

Problem: **Over Current Fault occurs at the first set up**

Solution:

1. Over current occurs when the current increases 5% on ZMesh for interior applications and 10% on Tuff Cable and ZMesh exterior applications. Check, that all data was entered correctly into the program. Make sure the Heating Element and Cold Lead lengths are entered correctly and that the Transformer is set for the correct input voltage. Check the load temperature that appears on the display and calibrate it to the temperature of the load.

Problem: **Over Current Fault occurs after the system has been setup and run for some time**

Solution:

1. Check for shorts between elements runs or across the element, shorts between Trans former and ground, or an increase in the Transformer voltage.

Problem: **Under Current Fault**

Solution:

1. Under current occurs when the current decreases more than10% on ZMesh interior applications, or 20% on Tuff cable and ZMesh exterior applications . If an under current fault occurs on the first set up: Check that all data has been entered correctly into the program. Make sure the Heating Element and Cold Lead lengths are entered correctly and that the transformer is set for the correct input voltage. Check the load temperature that appears on the display and calibrate it to the temperature of the load.

2. An Under Current Fault indicates an increase in resistance on the Heating Element or a drop in Transformer voltage. This usually means the Heating Element has been damaged, cut or broken and has developed an excessively hot spot. Check for a hot spot on the Heating Element, bad connections from the Cold Leads and the transformer or from the Cold Lead to the Heating Element.

Problem: **SCR Fault**

Solution:

1. The SCR self-tests periodically by the Radiant 8 programming. If the SCR fails and will not turn off, the SCR fault will occur.If an SCR fault occurs try resetting the Radiant 8 by turning the power off and back on. If the SCR fault occurs again contact Heatizon Systems.

Problem: **Ground Fault**

Solution:

1. Use of the Ground Fault feature is optional. If selected and a fault occurs, check resistance between ground and the Transformer secondary. The resistance should be greater than 7000 ohms.

HEATIZON SYSTEMS

LOCATING A SHORT IN ZMESH HEATING ELEMENT

A short means that contact has been made between the heating element and ground and/or some electrically conductive material, such as valley metal, flashing, drip edge, door thresholds, metal lathe etc. If you suspect you may have a short, DO NOT OPERATE ANY HEATIZON SYSTEMS PRODUCT.

Always check for continuity between ZMesh Heating Element and ground, and between ZMesh Heating Element and any electrically conductive material including metal. If continuity to ground and/or any electrically conductive material is present then the ZMesh Heating Element has one or more shorts. The following procedure may be helpful in locating the general area where the short(s) are located, but it must be performed with extreme caution because of the risk of fire!

NOTE: Radiant 8 Control Units produce a DC Voltage signal whether on or off. It is important to disconnect the ground fault terminals on all Radiant 8 Control Units on the particular project when diagnosing a short with a voltage test. It is best to use a manual voltage switching meter rather than an automatic voltage sensing meter to detect only AC voltage during the testing procedure.

SHORT LOCATION PROCEDURE

Conducting this procedure will cause the area(s) where the short(s) is located to get extremely hot. Do not leave the primary power to the ZMesh Heating Element on for extended periods of time. Always carefully watch for hot spots in all areas where ZMesh Heating Element is present. If a hot spot and/or smoke is observed, immediately turn the primary power off, expose the area where the hot spot and/or smoke are observed, and make certain the any risk of fire is eliminated.

1. Connect the end of one Cold Lead to Tap #1 (the lowest voltage tap) of the Transformer, and the end of the other Cold Lead to the Common Tap of the Transformer.

2. Connect the 240VAC primary leads of the Transformer to a 120VAC primary power supply.

3. Read and record the secondary voltage across the Cold Leads.

4. Divide the number of feet of installed ZMesh Heating Element into the recorded secondary voltage. The result will be the volts per foot across the ZMesh.

   EXAMPLE:

   15VAC/250 Feet of ZMesh) = .06VAC per Foot

5. Measure the voltage from each Cold Lead to ground and/or the electrically conductive material to which the ZMesh heating element is shorted. Divide the measured voltage by the volts per foot determined in Step 4 above. The result is the approximate number of feet the short is away from the point where the ZMesh connects to the Cold Lead.

   EXAMPLE:

   One Cold Lead = 5VAC
   Other Cold Lead = 10VAC
   5VAC/0.06VAC Per Foot = approximately 83.3 feet from one end of the ZMesh;
   10VAC/0.06VAC Per Foot = approximately 166.6 feet from the other end of the ZMesh

6. To locate the short, connect one lead from a voltmeter to ground and/or the electrically conductive material and probe the ZMesh heating element with the other voltmeter lead. Probe along the length of the ZMesh heating element runs and record the voltage reading. Keep probing, moving the direction that the volts are decreasing. When the voltage reads “Zero,” that is where the short is located.