THESE HEATERS MUST BE INSTALLED AND SERVICED BY TRAINED GAS INSTALLATION AND SERVICE PERSONNEL ONLY. READ AND UNDERSTAND ALL INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THE DETROIT RADIANT PRODUCTS COMPANY HEATER. FAILURE TO COMPLY WITH THESE WARNINGS AND INSTRUCTIONS, AND THOSE ON THE HEATER, COULD RESULT IN PERSONAL INJURY, DEATH, FIRE, ASPHYXIATION AND/OR PROPERTY DAMAGE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

CAUTION! Heater may be hot. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Note presence of flammable gas and electrical shock hazard.

WARNING! Extinguish open flame while servicing heaters. Test for gas leaks with soap and water solution only. Wear safety glasses while servicing unit.

FOR YOUR SAFETY!

IF YOU SMELL GAS:
1. Open windows.
2. Do not touch electrical switches.
3. Extinguish any open flame.
4. Immediately call your gas supplier.

SHUTDOWN INSTRUCTIONS!

1. Open electrical circuit.
2. Rotate heater’s manual gas valve knob to “OFF” position.

Approval Standards and Certifications

Detroit Radiant Products units comply with or are certified by the following Organizations or Standards:
- American National Standards (ANSI Z83.6)
- Occupational Safety and Health Act (OSHA)
- American Gas Association (AGA)
- International Approval Services (IAS)

IMPORTANT: Any alteration of the system or of the factory-authorized components specified either in this manual or by Detroit Radiant Products Company voids all certification and warranties.
Tools Recommended to Troubleshoot Heaters

-Digital Multimeter - Used for troubleshooting & testing electrical circuits.  
(Part 1A783 from Grainger)

-Flame Rectification Meter - Used for testing rectification of flame with the digital multimeter. 
(Channel Products)

-Digital Manometer Kit - Used for taking gas pressure, digitally.  
(Part 100281-21 from Dwyer Instruments)

-Liquid Manometer Kit - Used for taking gas pressure, via a liquid manometer. 
(Part 115010-00 from Dwyer Instruments)

-Digital Hygro-Thermometer (Amprobe #TH-2) - Reads temperature from -10 to 50°C and relative humidity from 5-95%.  
(Part 1P124 from Grainger)

-Incline Manometer - Used for measuring pressure inside burner box. Provides data for pressure switch.  
(Cat# 172 from Dwyer Instruments)

-1/4” Nut Driver - Can be used to remove screws holding top on.  
(Part 5X509 from Grainger)

-Pliers 8” - Tool for burner box access.  
(Part 6C183 from Grainger)

-Pipe Wrench 8” - Can be used to disassemble gas train assembly.  
(Part 4A497 from Grainger)

-Ratcheting Box Wrench - Can be used to remove orifice and bolts. (size 7/16” and 3/8”)  
(Part 1AMW9 from Grainger)

-6” Steel Rule - Used for measuring air orifice size.  
(Part 6C289 from Grainger)

-Terminals 1/4” Female - Extra female spade terminals.

-Barb Fitting - Fitting to take gas pressure at the valve.

-Vinyl Tubing - Tubing for pressure measurements. (size 5/16” x 3’)

-Jumpers/Connectors - Used to jump out the pressure switches.

-Self Tapping Screws - Extra Screws.


-Manuals - HL Series Installation, Operation & Maintenance manuals (IOM’s).
Theory of Operation

**LO FIRE**

When the first stage of a two-stage thermostat calls for heat, a relay in the circuit control starts the fan. When the fan creates sufficient positive pressure in the burner control box, the normally open pressure switch closes, initiating the ignitor sequence. The glo-bar is powered and after 45 seconds the main valve opens. Power to the glo-bar is shut off during the last three seconds of the ignition trial.

**Running Circuit**

After ignition, the flame rod monitors the flame. As long as a flame is present, the valve is held open. If the flame is lost, the control acts to close the valve within one second, and a new trial sequence identical to that at start-up is initiated. If proof of flame is not established within 8.5 seconds, the unit will lock out. If lockout occurs, the control can reset by briefly interrupting the power source.

**HI FIRE**

The second stage can be energized at any time during the operation causing the heater to operate in the high fire mode. This is accomplished by a solenoid, which pushes down on the regulator increasing the manifold pressure and therefore the BTU/H input of the heater.
After ignitor is warmed up, does gas valve open?

YES

Test for 24V at valve during valve opening period (usually 30-45 seconds after power to the heater). Is there 24V to valve for 8 seconds?

NO

Possibly, the circuit board and/or wiring harness is faulty. These should be replaced.

YES

NO

Check to make sure gas pressure is within minimum and maximum inputs, as indicated on AGA burner rating label. Is gas pressure OK?

NO

Correct problem.

YES

Replace gas valve.

Does the burner light?

NO

Is the gas cock in the ON position?

YES

Check to make sure gas pressure is within minimum and maximum inputs, as indicated on AGA burner rating label. Is gas pressure OK?

NO

Correct problem.

YES

Make sure gas lines were purged of air.

Does the burner stay on?

NO

Does the burner stay on for approx. 8 seconds and then shut off?

YES

Is the heater properly grounded? Is the heater’s polarity correct?

NO

Certain models have a separate glo-bar ignitor and flame rod sensor located next to the glo-bar. Other models have a glo-bar ignitor only, which acts as both an ignitor and flame sensor. Does model in question have glo-bar ignitor only?

YES

Consult factory for proper parts.

NO

With voltmeter, check DC voltage at flame rod. Is it greater than 30 Volts DC?

NO

YES

Sensing rod is faulty or flame is weak. Check to make sure heater is operating at proper gas pressure as indicated on AGA burner rating label and then replace sensing rod if needed.

NO

Check to make sure flame sensor wire is OK and then replace circuit board.

YES

YES

NO

The following can cause the heater to shut down:

* Improper grounding
* High winds
* Taking combustion air from the attic
* Dirty environment
* Baffle improperly positioned
* Fluctuating gas pressure

Troubleshooting ends.
HL Troubleshooting Flow Chart  (models with Relay Board)

**Turn up thermostat**

- **Does the fan blower turn on?**
  - **NO**
    - **Is the power at the heater 120V?**
      - **YES**
        - Find the source of the electrical problem between panel & heater.
      - **NO**
        - **Is there 120V on the Primary Side of the internal transformer?**
          - **NO**
            - **As the blue wire comes from the internal transformer, is there 120V on the primary side?**
              - **NO**
                - **The relay board is faulty and must be replaced.**
              - **YES**
                - **The internal transformer is faulty and must be replaced.**
          - **YES**
            - **Is there 24V to the thermostat?**
              - **YES**
                - **The circuit board is faulty and must be replaced.**
              - **NO**
                - **Find source of electrical problem between transformer and thermostat.**

- **YES**
  - **Does the ignitor warm up and glow red?**
    - **NO**
      - **Is the ignitor physically damaged?**
        - **YES**
          - Replace ignitor.
        - **NO**
          - **Is there 24V to the thermostat?**
            - **YES**
              - **The thermostat or wiring is faulty and should be replaced or repaired.**
            - **NO**
              - **Is there 24V on the Secondary Side of the external transformer?**
                - **NO**
                  - **The fan is faulty and must be replaced.**
                - **YES**
                  - **Remove obstruction.**

  - **YES**
    - **Check voltage at ignitor during the ignition sequence (usually 30-45 seconds after power to heater). Is it 120V?**
      - **NO**
        - **Is the resistance through the ignitor 45-400 ohms?**
          - **YES**
            - **Replace ignitor.**
          - **NO**
            - **Check for loose wiring or restrictions in hose connections to the pressure switch. Are they ok?**
              - **NO**
                - **Repair wiring or hose connections.**
              - **YES**
                - **The heater is equipped with 2 safety pressure switches. The burner switch in the blower compartment is a normally open switch and the exhaust switch in the gas valve compartment is a normally closed switch. Temporarily place jumpers across the terminals of each switch, one at a time. (Be sure to reinstall the cover.) Does the ignitor glow red?**
                  - **YES**
                    - **Replace the switch after verifying the following:**
                      - * Baffle(s) is in the tube(s) farthest from the burner.
                      - * Heater, fan blower, squirrel cage, intake, and exhaust are clean and free from dirt and obstructions.
                      - * The 4” air intake pipe does not exceed 20 feet and/or 2 elbows.
                      - * There is not a negative pressure experienced at the area of air intake (i.e. attic space, high-winds, very tight building).

    - **NO**
      - **Temporarily place jumpers across the ASP1 and ASP2 terminals. Is there 120V across the wires going to the globe (terminals SIC and 117N on circuit board)?**
        - **YES**
          - **Replace circuit board.**
        - **NO**
          - **Replace ignitor.**

- **WARNING:** Bypassing any switch is for testing purposes only. Do not leave switch bypassed during normal operation or heater’s built-in safety mechanisms will be compromised.

- **Remove obstruction.**
After ignitor is warmed up, does gas valve open?

**NO**
- Test for 24V at valve during valve opening period (usually 30-45 seconds after power to the heater). Is there 24V to valve for 8 seconds?
  - **NO**
    - Possibly, the circuit board and/or wiring harness is faulty. These should be replaced.
  - **YES**
    - Check to make sure gas pressure is within minimum and maximum inputs, as indicated on AGA burner rating label. Is gas pressure OK?
      - **NO**
        - Correct problem.
      - **YES**
        - Replace gas valve.

**YES**
- Does the burner light?
  - **NO**
    - Is the gas cock in the ON position?
      - **YES**
        - Correct problem.
      - **NO**
        - Make sure gas lines were purged of air.

**YES**
- Is the gas cock in the ON position?
  - **NO**
    - Does the burner stay on for approx. 8 seconds and then shut off?
      - **YES**
        - Is the heater properly grounded? Is the heater’s polarity correct?
          - **YES**
            - Consult factory for proper parts.
          - **NO**
            - With voltmeter, check DC voltage at flame rod. Is it greater than 30 Volts DC?

**NO**
- Does the burner stay on for approx. 8 seconds and then shut off?
  - **YES**
    - Does the burner come on and then turn off immediately (1 or 2 seconds).
      - **YES**
        - Check to make sure that the pressure is within minimum and maximum inputs as indicated on the AGA burner rating label. Is gas pressure OK?
          - **YES**
            - Exhaust pressure switch may be faulty or there is a restriction in the exhaust.
          - **NO**
            - Sensing rod is faulty or flame is weak. Check to make sure heater is operating at proper gas pressure as indicated on AGA burner rating label and then replace sensing rod if needed.

- **NO**
  - Certain models have a separate glo-bar ignitor and flame rod sensor located next to the glo-bar. Other models have a glo-bar ignitor only, which acts as both an ignitor and flame sensor. Does model in question have glo-bar ignitor only?
    - **NO**
      - The relay board is faulty and must be replaced.
    - **YES**
      - Measure the voltage across the red wire on the relay board and GND on the circuit board. Is there 24V?

If heater does not go into high-fire mode, check the following:

**YES**
- On the outside of the heater, check for 24V across COM and HIGH on the TP-213-24V plug. Is there 24V?
  - **NO**
    - Repair or replace faulty wiring or thermostat.
  - **YES**
    - The valve is faulty and must be replaced.

**NO**
- Measure the voltage across the red wire on the relay board and GND on the circuit board. Is there 24V?
  - **YES**
    - The relay board is faulty and must be replaced.
  - **NO**
    - The following can cause the heater to shut down:
      - Improper grounding
      - High winds
      - Taking combustion air from the attic
      - Dirty environment
      - Baffle improperly positioned
      - Fluctuating gas pressure

**YES**
- Troubleshooting ends.
HL Series
Heater

- Exhaust Pressure Switch
- Flame Rod
- Glo-Bar Ignitor
- Glo-Bar Cover
- Transformer
- Circuit Board
- Relay Board (optional)
- Indicator Lights
- Gas Valve
- Burner
- Fan
- Burner Pressure Switch
- Transformer
<table>
<thead>
<tr>
<th>PICTURE 1</th>
<th>PICTURE 2</th>
<th>PICTURE 3</th>
</tr>
</thead>
</table>
| Burner Pressure Switch | 1) 125M-200M  
2) 100M & below | Circuit Board without Relay |

<table>
<thead>
<tr>
<th>PICTURE 4</th>
<th>PICTURE 5</th>
<th>PICTURE 6</th>
</tr>
</thead>
</table>
| Exhaust Pressure Switch | Fan | Gas Valve  
Manifold Tap w/ Barb fitting inserted |

<table>
<thead>
<tr>
<th>PICTURE 7</th>
<th>PICTURE 8</th>
<th>PICTURE 9</th>
</tr>
</thead>
</table>
| Glo-Bar & Flame Rod | Air Intake Collar & Orifice | Low & High Fire Indicator Lights  
Low Fire  
High Fire |

This symbol appears when directions indicate the presence of flammable gas.

⚠️ This symbol appears when directions indicate the presence an electrical shock hazard.
<table>
<thead>
<tr>
<th>SYMPTOM</th>
<th>EXPLANATION</th>
<th>SOLUTION</th>
</tr>
</thead>
</table>
| Thermostat closed, fan does not operate. | 1. Blown fuse.  
2. Loose or disconnected wire.  
3. Faulty transformer.  
4. Faulty thermostat.  
5. Faulty control board.  
2. Repair as required.  
3. Confirm voltage and replace as required.  
4. Confirm voltage and replace as required.  
5. Confirm voltage and replace as required.  
6. Lubricate, repair or replace. |
| Thermostat closed. Fan operates. No glo-bar energization. | 1. Loose or disconnected wire.  
2. Box lid or gasket not in place.  
3. Plugged pressure switch lines.  
4. Plugged inlet or restricted exhaust vent.  
5. Baffle location incorrect.  
6. Obstructed air-intake pipe & cap.  
7. Faulty pressure switches.  
8. Faulty circuit control.  
2. Put in place.  
3. Clean as necessary.  
4. Remove foreign matter.  
5. Reposition baffle.  
7. Replace only - do not adjust.  
8. Replace circuit control.  
9. Replace glo-bar. |
| Thermostat closed. Fan and glo-bar operate. After 45 seconds glo-bar shuts off. No ignition or low light. | 1. Loose or disconnected wire. | 1. Repair as required. |
2. Gas orifice is plugged.  
3. Faulty gas valve.  
4. Faulty circuit board.  
5. Inlet pressure too high - (max pressure = 14”). | 1. Turn on gas valves.  
2. Clean as necessary.  
3. Repair or replace.  
4. Confirm voltage and replace as required.  
5. Adjust pressure. |
2. No electrical ground.  
3. Faulty circuit control.  
4. Low gas pressure.  
5. Flame rod faulty.  
2. Connect electrical ground with junction box.  
3. Replace.  
4. Provide required gas pressure.  
5. Replace.  
6. Replace. |
2. Faulty gas valve or circuit board.  
3. Inlet pressure too high - (max pressure = 14”). | 1. Clean obstructions.  
2. Confirm voltage and replace as required.  
3. Adjust pressure. |
| Thermostat closed. Fan & glo-bar operate. Ignition occurs. Heater does not go into high-fire. | 1. Loose or disconnected wire.  
2. Manifold pressure is incorrect. | 1. Repair as required.  
2. Adjust pressure. |
| Thermostat closed. High-heat light is on. No heater operation. | 1. Heater is possibly in lockout. | 1. See steps 1-5 for troubleshooting. |

1. Blown fuse.  
2. Loose or disconnected wire.  
3. Faulty transformer.  
4. Faulty thermostat.  
5. Faulty circuit board.  
6. Faulty fan.  
7. Faulty relay board.  
8. Faulty glo-bar.  
10. Faulty pressure switch.

1. Loose or disconnected wire.  
2. Box lid or gasket not in place.  
3. Plugged pressure switch lines.  
4. Plugged inlet or restricted exhaust vent.  
5. Baffle location incorrect.  
6. Obstructed air-intake pipe & cap.  
7. Faulty pressure switches.  
8. Faulty circuit control.  

1. Gas valves turned off.  
2. Gas orifice is plugged.  
3. Faulty gas valve.  
4. Faulty circuit board.  
5. Inlet pressure too high - (max pressure = 14”).

1. Polarity reversed.  
2. No electrical ground.  
3. Faulty circuit control.  
4. Low gas pressure.  
5. Flame rod faulty.  
6. Faulty pressure switch.

1. Obstructed gas orifice.  
2. Faulty gas valve or circuit board.  
3. Inlet pressure too high - (max pressure = 14”).

1. Loose or disconnected wire.  
2. Manifold pressure is incorrect.  
3. Faulty glo-bar.

1. Gas valves turned off.  
2. Gas orifice is plugged.  
3. Faulty gas valve.  
4. Faulty circuit board.  
5. Inlet pressure too high - (max pressure = 14”).

1. Polarity reversed.  
2. No electrical ground.  
3. Faulty circuit control.  
4. Low gas pressure.  
5. Flame rod faulty.  
6. Faulty pressure switch.
<table>
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<tr>
<th>SYMPTOM</th>
<th>EXPLANATION</th>
<th>SOLUTION</th>
</tr>
</thead>
<tbody>
<tr>
<td>Loss of heater efficiency.</td>
<td>1. Low gas pressure.</td>
<td>1. Provide required gas pressure.</td>
</tr>
<tr>
<td></td>
<td>2. Dirty or restricted orifice.</td>
<td>2. Remove and clean with a soft cloth.</td>
</tr>
<tr>
<td></td>
<td>3. Foreign matter inside burner assembly.</td>
<td>3. Clean as necessary.</td>
</tr>
<tr>
<td></td>
<td>4. Reflector is sooted and has lost its reflective ability.</td>
<td>4. Clean with aluminum cleaner and soft cloth.</td>
</tr>
<tr>
<td></td>
<td>5. Clogged fan blower.</td>
<td>5. Clean.</td>
</tr>
<tr>
<td>Radiant tube leaking burnt gases.</td>
<td>1. Loose tube connections.</td>
<td>1. Assure that tube is fully inserted into flared end and properly clamped.</td>
</tr>
<tr>
<td></td>
<td>2. Holes or cracks in radiant tubes.</td>
<td>2. Replace.</td>
</tr>
<tr>
<td></td>
<td>2. Light gauge flue stack used.</td>
<td>2. Minimum of 26 gauge vent pipe is required.</td>
</tr>
<tr>
<td></td>
<td>3. Contaminated combustion air.</td>
<td>3. Provide fresh air inlet duct.</td>
</tr>
<tr>
<td>Tube bowing.</td>
<td>1. Insufficient combustion air.</td>
<td>1. Provide 2 sq. in. of free air per 5000 BTU/H of input.</td>
</tr>
<tr>
<td></td>
<td>2. Contaminated combustion air.</td>
<td>2. Provide fresh air inlet duct.</td>
</tr>
<tr>
<td></td>
<td>3. Overfired.</td>
<td>3. Check gas pressure and orifice size.</td>
</tr>
<tr>
<td></td>
<td>4. Heater’s tubes are unable to expand.</td>
<td>4. Remount heater with 16” section of flex.</td>
</tr>
<tr>
<td>Tube corroding.</td>
<td>1. Contaminated combustion air.</td>
<td>1. Provide fresh air inlet duct.</td>
</tr>
<tr>
<td>Visual inspection of burner operation not possible.</td>
<td>1. Dirty or sooted sight glass.</td>
<td>1. Remove and clean or replace.</td>
</tr>
<tr>
<td></td>
<td>2. Unit mounted upside down.</td>
<td>2. Mount correctly.</td>
</tr>
<tr>
<td>Stack sooting.</td>
<td>1. Insufficient combustion air.</td>
<td>1. Provide 1 sq. in. of free air for every 5000 BTU/H of input.</td>
</tr>
<tr>
<td></td>
<td>2. Improper gas.</td>
<td>2. Correct with proper gas input.</td>
</tr>
<tr>
<td>Odor or fumes in space.</td>
<td>1. Vaporized solvents decomposing when contacting radiant tubes.</td>
<td>1. Address ventilation concerns.</td>
</tr>
<tr>
<td></td>
<td>2. Evaporation of oils/solvents at floor level.</td>
<td>2. Address ventilation concerns.</td>
</tr>
<tr>
<td></td>
<td>3. Fork lifts.</td>
<td>3. Address ventilation concerns/repair.</td>
</tr>
<tr>
<td></td>
<td>4. Loose tube connections.</td>
<td>4. Tighten tube clamps to 50-100 ft. lb.</td>
</tr>
<tr>
<td>“How To” Instructions</td>
<td>inlet pressure, manifold reading, proper polarity, positive ground, negative pressure, bypass pressure switches</td>
<td></td>
</tr>
</tbody>
</table>

**GENERAL TROUBLESHOOTING CHART**

Refer to HL Series Heaters *without* Indicator Lights

Refer to HL Series Heaters *with* Indicator Lights

Refer to all Heaters
1 - Thermostat Closed, Fan Does Not Operate

If the thermostat is closed (calling for heat) and heater does not operate, check the following:

1.1 Check the building’s main circuit breaker or fuse box. The problem may be a blown fuse or circuit.

1.2 At the 2x4 junction box, verify the heater is receiving 120V by using a voltmeter. If there is no power, the problem is in the wiring to the heater and it should be corrected. If power is coming to the heater, continue with step 1.3.

1.3 Confirm the heater is sending 24V to the thermostat by connecting a voltmeter across the 24V Terminal (Left Terminal on the TP-213-24V Plug) and ground (a screw on the burner box). If 24V is present, continue with step 1.4. If 24V is not present, there is a problem with the heater’s transformer or the wiring to it. The wiring must be repaired or the transformer replaced.

1.4 Verify that the thermostat is receiving 24V from the heater by connecting a voltmeter across the thermostat’s incoming power line (typically RH or R) and ground. If 24V is present, go on to step 1.5. If not, repair the wiring.

1.5 Using a voltmeter, measure the voltage across the LOW terminal (Middle Terminal on the TP-213-24V Plug) and ground (a screw on the burner box). If 24V is present, move on to step 1.6. If not, either the wiring from the thermostat to the heater needs repair or the thermostat needs to be replaced. (See steps 1.5.1 and 1.5.2)

1.5.1 - Confirm Blue (inside the heater) wire is connected and measuring 24V on Circuit Board.
1.5.2 - Confirm Orange (inside the heater) Low-Fire wire is connected and measuring 24V to TH Terminal.

1.6 On the inside of the heater, confirm that 120V is being sent to the Circuit Board by measuring the voltage between 117L and all 3 117N. If this measures more than 102V, go on to step 1.7. If not, correct the wiring.

1.7 Measure the voltage between the fan terminal and the 117N terminal (that the fan’s neutral wire is connected to) using a voltmeter. If 102V or higher is confirmed, the fan is faulty. If less than 102V is confirmed, the circuit board is faulty.

Refer to warnings on cover prior to servicing the unit. Bypass safety pressure switches for supervised troubleshooting purposes only. *Do not leave switches bypassed while the heater is unattended or for normal operations. Consult Detroit Radiant Products for further technical information.
1 - Thermostat Closed, Fan Does Not Operate

1.1(R)
Check the building’s main circuit breaker or fuse box. The problem may be a blown fuse or circuit.

1.2(R)
Verify the heater is receiving 120V by using a voltmeter. If there is no power, the problem is in the wiring to the heater and it should be corrected. If power is coming to the heater, continue with step 1.3.

1.3(R)
Using a voltmeter, confirm that the external transformer has 120V on the primary side. If it does, confirm that 24V is being delivered from the secondary side. If neither of these tests confirm, the transformer is faulty. Otherwise, go on to step 1.4.

1.4(R)
Verify that the thermostat is receiving 24V from the external transformer by measuring the voltage across the thermostat’s incoming power line (typically RH or R) and ground with a voltmeter. If 24V is present, go on to step 1.5. If not, correct the wiring between the transformer and thermostat.

1.5(R)
Using the voltmeter, measure the voltage across the LOW (middle terminal on TP-213-24V Plug) and COMMON (Left Terminal on the TP-213-24V Plug) on the outside of the heater. If 24V is present, go on to step 1.6(R). If 24V is not confirmed, correct the wiring between the thermostat and heater.

1.6(R)
On the inside of the heater, confirm that the primary side of the internal transformer is measuring 120V by connecting a voltmeter across the Black 117L and White 117N wires from the transformer. If 120V is confirmed, go on to step 1.7(R). If not, correct the wiring (if needed) or replace the circuit board.

1.7(R)
Using the voltmeter, check the secondary side of the internal transformer by measuring the voltage across the Blue (24V) and Yellow (GND). If 24V is present, go on to step 1.8(R). If not, replace the faulty transformer.

Refer to warnings on cover prior to servicing the unit. Bypass safety pressure switches for supervised troubleshooting purposes only. *Do not leave switches bypassed while the heater is unattended or for normal operations. Consult Detroit Radiant Products for further technical information.
FOR HEATERS CONTAINING HLRB RELAY BOARD

1 - Thermostat Closed, Fan Does Not Operate (cont)

1.8(R)
Using a voltmeter, check the switching side of the Relay Board by measuring the voltage across the Yellow and Orange wire terminals for Low Fire, and the Yellow and Red terminals for High Fire. (The measurement across the High Fire will total 0V unless the thermostat is calling for high fire.) If 24V is present across the Low Fire terminals, go on to step 1.9. If not, correct the wiring.

1.9(R)
Using a voltmeter, check the switched side of the relay board by measuring the voltage across the Orange terminal on the Relay Board and the Yellow or Green GND on the circuit board. If 24V is present, go on to step 1.9.5(R). If not, replace the Relay Board.

1.9.5(R)
Using a voltmeter, measure the voltage between the Fan terminal and the 117N terminal that the Fan’s Neutral wire is connected to (on the circuit board - follow the wire to the fan). If 102V or above is confirmed, the fan is faulty. If it measures below 102V, the circuit board is faulty.

2 - Thermostat Closed, Fan Operates, No Glo-Bar Energization
(This step is applicable for all models)

2.1
Locate any disconnected or loose wires and repair.

2.2
The normally open Burner Pressure Switch is located on the fan side of the heater (pg. 8, pic. 1). This switch must be closed before the glo-bar can be energized. *Bypass this switch (pg. 20, #6) to check for proper function. Once bypassed, reinstall the cover and test the heater. If it works, there is a problem with the burner pressure switch or what it is sensing, and you should continue with step 2.2.1. If bypassing this pressure switch does not make the heater work, continue with step 2.3.

2.2.1
Be sure lid is on correctly and gasket is intact.

2.2.2
Make sure the clear vinyl tube that bleeds pressure to the outside of the heater is clean and clear of obstructions.

2.2.3
Make sure the heater’s vent cap is in place and in good condition. Also, check for obstructions within the cap.

NOTE: Excessive winds may cause properly operating safety pressure switches to shut down the heater. Heaters ducted through (on either the intake or exhaust sides) the roof may be deprived of the air necessary to pressurize the burner box. This “chimney effect” will typically not allow the burner pressure switch to close. Heaters vented through a sidewall may see too much back-pressure, thus opening the exhaust pressure switch. In either case, the caps need to be shielded to lessen the effects of high winds.

2.2.4
Make sure the heater’s baffle is at the exhaust end of the emitter tube in a vertical position.
2 - Thermostat Closed, Fan Operates, No Glo-Bar Energization (cont)
(This step is applicable for all models)

2.2.5
The fan may not be accurately pressurizing the heater. Clean obstructions from the air-intake pipe and cap (pg. 8, pic. 8). Clean the squirrel cage. Oil the motor (SAE-20). Examine and clean the fan blades (pg. 8, pic. 5). Once the fan is completely clean, retry the heater, without bypassing the Burner Pressure Switch. If the glo-bar is still not energizing, continue with Step 2.2.6.

2.2.6
If steps 2.2.1 - 2.2.4 were performed and the heater still will not properly function, the burner pressure switch is faulty and should be replaced.

2.3
The Exhaust Pressure Switch is located on the valve side of the heater (pg. 8, pic. 4). *Bypass this switch (pg. 20, #6). If the heater works with the exhaust pressure switch bypassed, the problem is with this switch or what it is sensing and you should continue with step 2.3.1. If bypassing this switch does not cause the heater to work, continue with step 2.4.

2.3.1
Be sure the lid is on properly and the gasket is in intact.

2.3.2
Check to make sure the clear vinyl tube that bleeds pressure to the outside of the heater is clean and clear of obstructions.

2.3.3
Clean any obstructions from the emitter tube, exhaust tube and vent cap.

2.3.4
Check to make sure the heater’s baffle is located properly. It should be found at the exhaust end of the emitter tube.

NOTE: Excessive winds may cause properly operating safety pressure switches to shut down the heater. Heaters ducted through (on either the intake or exhaust sides) the roof may be deprived of the air necessary to pressurize the burner box. This “chimney effect” will typically not allow the burner pressure switch to close. Heaters vented through a sidewall may see too much back-pressure, thus opening the exhaust pressure switch. In either case, the caps need to be shielded to lessen the effects of high winds.

2.3.5
If steps 2.3.1 - 2.3.4 were performed and the heater still won’t properly function, the exhaust pressure switch is faulty and should be replaced.

2.4
Confirm power to the glo-bar by contacting the voltmeter to SIC and the 117N (that the Glo-Bar is connected to). If it measures less than 102V, the circuit board must be replaced. If it confirms higher than 102V, the glo-bar must be replaced.

3.1 - Thermostat Closed, Fan & Glo-Bar Operate.
After 45 Seconds Glo-Bar Shuts Off, No Ignition or Low Light.
(This step is applicable for all models. Fan shuts off after 2 minutes - Lockout)

3.1.1
The wire between the Circuit Board and Gas Valve may be disconnected. Inspect and reconnect if necessary. If the valve wire is properly connected, the Circuit Board is faulty and must be replaced.

Refer to warnings on cover prior to servicing the unit. Bypass safety pressure switches for supervised troubleshooting purposes only.
*Do not leave switches bypassed while the heater is unattended or for normal operations.
Consult Detroit Radiant Products for further technical information
3.2 - Thermostat Closed, Fan & Glo-Bar Operate. After 45 Seconds Glo-Bar Shuts Off, Valve Light Illuminates for 8 Seconds. No Ignition.  
(This step is applicable for all models)

3.2.1
Be sure that the gas valves inside and outside of the heater are turned to the ON position. The Low Light will come on for 8 seconds before lockout.

3.2.2
Locate and confirm that the gas orifice is not plugged with dirt, spider webs or rust.

3.2.3
Turn off the gas to the heater and *bypass both the Burner & Exhaust Pressure Switches (pg. 20, #6). Test the voltage coming from the Circuit Board to the Gas Valve (pg. 8, pic. 6) by using a volt meter across VALV & Gnd. If there is 24 volts, the gas valve is faulty. If there is no voltage, the Circuit Board is faulty.

3.2.4
The inlet pressure entering the system may be too high. The maximum value for both natural and propane is 14” W.C.P. Correct this problem by either adjusting the building’s regulator down to 14” W.C.P. or by using step-down regulators in the building’s piping system. The Low Light will come on for 8 seconds before lockout.

NOTE: THE FAN WILL RUN FOR 2 MINUTES IN A POSTPURGE MODE BEFORE FULL LOCKOUT OCCURS.

NOTE: THE GAS VALVE IS ONLY RATED FOR 1/2 POUND (14 INCHES) OF PRESSURE. IF USING A HIGH-PRESSURE REGULATOR, BE SURE IT IS LOCKING UP PRIOR TO THE INLET PRESSURE EXCEEDING 1/2 POUND.


There are two possibilities:

1) The Burner cycles for 8 seconds and shuts off.

4.1
The polarity could be incorrect. Check the systems wiring (pg. 20, #3) (See installation-operation manual wiring diagram).

4.2
The heater senses flame through ground. Therefore, the unit might not be properly grounded. The wiring should be inspected (pg. 20, #4).

4.3
There may be loose connections somewhere within the heater, or, the Circuit Board may be faulty.

4.4
The gas pressure is too low. Check the manifold (section 6.1) pressure (pg. 8, pic. 6 & pg. 20, #2) for appropriate pressure.

4.5
The flame rod might be faulty (pg. 8, pic. 7). Check for visible damage.

NOTE: IF THE PROBLEM IS EITHER THE CIRCUIT BOARD OR THE FLAME ROD, ONE OR BOTH MIGHT NEED REPLACING.

2) The Burner cycles for more or less than 8 seconds and shuts off.

4.6
Follow steps 4.1 - 4.5.

4.7
The Exhaust Pressure Switch is located on the valve side of the heater (pg. 8, pic. 4). *Bypass this switch (pg. 20, #6). If the heater works with the exhaust pressure switch bypassed, the problem is with this switch or what it is sensing and you should continue with step 2.3.1 (located on page 13).

Refer to warnings on cover prior to servicing the unit. Bypass safety pressure switches for supervised troubleshooting purposes only. *Do not leave switches bypassed while the heater is unattended or for normal operations.

Consult Detroit Radiant Products for further technical information

5.1.1
Refer to steps 4.6 - 4.7.

5.1.2
Locate and confirm that the gas orifice is not plugged with dirt, spider webs or rust.

5.1.3
Bypass both the Burner & Exhaust Pressure Switches (pg. 20, #6) and then test the voltage coming from the Circuit Board to the Gas Valve (pg. 8, pic.6) using a volt meter. If there is 24 volts, the gas valve is faulty. If there is less than 22 volts or no voltage at all, the circuit board is faulty.

5.1.4
The inlet pressure entering the system may be too high. The maximum value for both natural and propane is 14” W.C.P. Correct this problem by either adjusting the building’s regulator down to 14” W.C.P. or by using step-down regulators in the building’s piping system.

NOTE: THE GAS VALVE IS ONLY RATED FOR 1/2 POUND (14 INCHES) OF PRESSURE. IF USING A HIGH-PRESSURE REGULATOR, BE SURE IT IS LOCKING UP PRIOR TO THE INLET PRESSURE EXCEEDING 1/2 POUND.

5.2 - Thermostat Closed. Fan & Glo-Bar Operate. Ignition Occurs. Heater Does Not Go into High-Fire (No High-Fire Light).

5.2.1
Locate any disconnected or loose wires and repair.

5.2.2
Confirm the manifold pressure (pg. 8, pic. 6 & pg. 20, #2). If the pressure measures 3.5” W.C.P. Natural or 10” W.C.P. Propane, the High-Fire Light is faulty and should be replaced. If the pressure measures approximately 2” W.C.P. Natural or 5” W.C.P. Propane, the heater is in Low-Fire mode and the following problems could be occurring:

   a) Wiring problem
   
   For Heaters with no Relay Board
   
   If 24V from GND to HIGH terminal (using a voltmeter) is confirmed on the heater, the Thermostat is good but there is a faulty valve that must be replaced. If 0V is confirmed, the thermostat or wiring is faulty and must be corrected or replaced.

   For Heaters with a Relay Board
   
   If 24V from COM to HIGH (using a voltmeter) is confirmed, then the thermostat is good. If 0V is confirmed, the thermostat faulty and must be replaced. To check the operation of the Relay Board, measure the voltage across the Red wire (on the relay board) and GND (on the circuit board). If 24V is confirmed, the Valve is faulty. If 0V is confirmed, the Relay Board is faulty.

Refer to warnings on cover prior to servicing the unit. Bypass safety pressure switches for supervised troubleshooting purposes only. *Do not leave switches bypassed while the heater is unattended or for normal operations.
Consult Detroit Radiant Products for further technical information.
5.3 - Thermostat Closed. High-Heat Light on.  
No Heater Operation

It is possible that the heater is in Lockout. See steps 1-5 for troubleshooting.

6 - Heater’s Efficiency is Lacking.

Usually, a heater lacking in efficiency has improper gas pressure, dirty parts or is a misapplication of the heater itself.

6.1  
If the manifold pressure is not high enough, (a minimum of 3.5” natural and 10” propane) the heater will not deliver the desired amount of heat. Check the Manifold Pressure (pg. 8, pic. 6 and pg. 20, #1 & #2).

6.2  
Locate and confirm the orifice is not plugged with dirt, spider webs or rust.

6.3  
Check the burner assembly to make sure it is clear of any obstructions.

6.4  
Be sure the reflector is in place and clean. Use a soft cloth and aluminum cleaner to clear the reflector.

6.5  
Be sure the fan is clean and able to supply the appropriate amount of air to the heater. Clean any obstructions from the air-intake pipe and cap. Clean the squirrel cage. Oil the motor (SAE-20). Examine and clean the fan blades.
7 - Radiant Tube Leaking Burnt Gas

Obstructions in the heater may cause too much heat in a specific point, leading to holes or cracks. These openings can cause burnt gas to leak out. If this problem is occurring, follow these steps:

Carefully inspect the length of all emitter tubes and clamps for any cracks, holes or loose connections. If any part of the tube has an opening, it must be replaced immediately. Also check for blockages in the exhaust and emitter tube.

8 - Condensation is Forming

If condensation is forming anywhere along the length of the emitter or exhaust pipe, check to make sure that it is not excessive in length. Be sure that the heater has the appropriate manifold pressure (see 6.1, 4.4). Confirm the use of adequate vent material (26 gauge minimum is required). Inspect the baffle location (it should be found at the exhaust end of the emitter tube), insulate vent materials, and seal leaks around vent openings. Chemicals burned through the combustion process can alter the exhaust by-products and temperature. See your heater’s manual for air-intake specifications.

9 - Emitter Tube is Bowing

Normal operation of the heater will often cause expansion of the emitter tube. If there is no room for this to occur, the tube will bow. If this is happening, follow steps 9.1 - 9.4.

9.1 Too little air will lead to shorter flame, causing it to burn hotter than normal. Be sure there is nothing blocking the air intake and that the fan is clean (pg. 8, pics. 5 & 8).

9.2 Contaminated combustion air could alter the flame characteristics, overheating the tube and causing it to bow. See your manual for air-intake specifications.

9.3 Too much gas may also overheat the tube and cause it to bow. Check the manifold (see 6.1) pressure (pg. 8, pic. 6).

9.4 If the heater is mounted so that it cannot expand lengthwise (ie. it is cemented into the wall at both ends), add a 16” section of flex on the inlet side of the heater and allow the exhaust to move freely through the wall.

10 - Tube is Corroding

The tube would corrode if the air entering the heating system was not clean. See your heater’s manual for combustion air intake instructions.

Refer to warnings on cover prior to servicing the unit. Bypass safety pressure switches for supervised troubleshooting purposes only. *Do not leave switches bypassed while the heater is unattended or for normal operations.

Consult Detroit Radiant Products for further technical information.
11 - Visual Inspection of Burner Operation not Possible

From the ground, the burner inspection window should be visible. If it is not, the heater may be mounted upside down. Confirm proper mounting and remount if necessary.

12 - Stack Sooting

Soot accumulation can be caused by the following:

12.1  
If the air entering the system is not clean (see 6 & 8), soot will form.

12.2  
Soot will form if there is not enough air entering the system. The air intake orifice and pipe must be clean and clear of any obstructions (see 2.2.3) (pg. 8 pic. 8).

12.3  
Too much gas entering the system will cause soot to form. Check the manifold (section 6.1) pressure (pg. 8, pic. 6 and pg. 20, #2) for the appropriate pressure.

12.4  
Check the atmospheric vents on both pressure switches to be sure they are clean and clear. (see 2.3.2).

12.5  
Be sure there is no excessive back pressure on the system. (Example - high winds, bird nest, snow, etc.)

12.6  
Be sure the gas valve vent is not disconnected or melted. If this is the case, please repair due to its effect on the manifold pressure.

13 - Odor or Fumes Present in Space

Odors present in the space being heated may be caused by a variety of products being used, stored or processed in the space. These are usually cleaning solvents or sealers which are high in hydrocarbons (ie. parts cleaners, transmission cleaners and floor sealers). In addition, propane burning forklifts can also add odors and carbon monoxide to the space.

To cut down on these odors, a clean work environment has to be maintained. If it is necessary that these solvents remain in the space, proper ventilation is required.

**NOTE:** If the heater is pulling intake air from the space, its integrity can be compromised by the presence of these solvents, causing the same problems found in sections 8-12 of this guide.

Refer to warnings on cover prior to servicing the unit. Bypass safety pressure switches for supervised troubleshooting purposes only. *Do not leave switches bypassed while the heater is unattended or for normal operations.

Consult Detroit Radiant Products for further technical information.
HOW TO...

1 - Take an Inlet Pressure Reading: (Always take the inlet pressure before taking the manifold pressure)
   ♦ Follow the same procedures as taking a **Manifold Pressure Reading** (Step 2 below) except use the inlet tap on the gas valve or the gas cock, located on the outside of the heater.

2 - Take a Manifold Pressure Reading:
   ♦ Turn gas and power to the heater off.
   ♦ Remove lid.
   ♦ Locate outlet tap on gas valve (pg. 8, pic. 6).
   ♦ Remove tap using a 3/16” allen wrench.
   ♦ Insert a 1/8” pipe-thread barb fitting and run a hose to the outside of the burner box using the 5/16” capped hole next to the gas valve line opening, or, the 3/8” hole next to the conduit going to the glo-bar box (newer models only).
   ♦ Connect tube to a Manometer or Magnahelic.
   ♦ Reinstall lid.
   ♦ Fire heater.
   ♦ The reading on the Manometer or Magnahelic is the manifold pressure.

3 - Check for Proper Polarity:
   ♦ Turn off power to the heater.
   ♦ Remove the cover of the 2x4 junction box on the outside of the heater - if applicable.
   ♦ Locate the three wires inside - black, white & green.
   ♦ Using a voltmeter, touch the black wire with one probe and the green wire with the other - confirm 120V.
   ♦ Using a voltmeter, touch the white wire with one probe and the green wire with the other - confirm 0.0V.
   ♦ If the previous step confirmed 120V, the polarity is reversed and must be corrected in the conduit upstream from the heater.

4 - Test for Positive Ground:
   ♦ Be sure that the ground (green) wire goes all the way back to the circuit panel.
   ♦ If it does not, a qualified electrician must rerun this line.

5 - Test for Negative Pressure:
   The building has a negative pressure if any of the following is occurring:
   ♦ Building’s door(s) shut very quickly with a loud bang.
   ♦ Building’s door(s) are difficult to open - as if they are suctioned shut.
   ♦ The heater is fired and then turned off. The lid is removed and hot gases come back into the heater box.
   ♦ An incline manometer is set up with one hose outside of the building and one inside. It’s reading confirms a negative inside pressure.

6 - Bypassing a Switch:
   ♦ Turn power off.
   ♦ Disconnect both black wires attached to the safety switches with a 1/4” female spade.
   ♦ Attach them to each other using alligator clips or electrical tape.
   ♦ Be sure this connection touches nothing else, especially metal.
   ♦ Turn power back on (**Do not leave switches bypassed during normal heater operation**).
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**KEY**
- TP-1: CONTROL BOX COVER
- TP-4B: D-HL CONTROL BOX
- TP-5: FLANGE GASKET
- TP-9: CONDUIT 4” X 1/2”
- TP-11: GLO-BAR IGNITOR BOX COVER
- TP-12: GLO-BAR IGNITOR BOX GASKET
- TP-13: WIDE HANGER
- TP-18: REFLECTOR CLIP
- TP-20: TUBE CLAMP
- TP-28: BLADE CLAMP
- TP-33: REAR CLAMP
- TP-38: CONTROL BOX BRACKET
- TP-44: GLO-BAR IGNITOR
- TP-50: FAN BLOWER
- TP-55: 1/4 ATMOSPHERIC TUBE (VINYL)
- TP-60: EXIT PRESSURE SWITCH
- TP-65: BURNER PRESSURE SWITCH
- TP-70: 606 HEAT DIFFUSER
- TP-75: 126 HEAT DIFFUSER
- TP-80: 12 X 4 OUTLET BOX COVER
- TP-85: STRAIN RELIEF BUSHING
- TP-90: TOTAL NEED TO COVER OUTER EDGES OF A BURNER BOX.
HL Series Heaters