

TUBE HEATER TROUBLESHOOTING GUIDE

MODELS: HL Series Tube Heater

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.

Detroit Radiant Products Company

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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.
- Drill Bits 1-60, A-Z** - Drill Bits 1-60, A-Z, for measuring gas orifice size (DMS).
- Manuals** - HL Series Installation, Operation & Maintenance manuals (IOM's).

Theory of Operation

LO FIRE

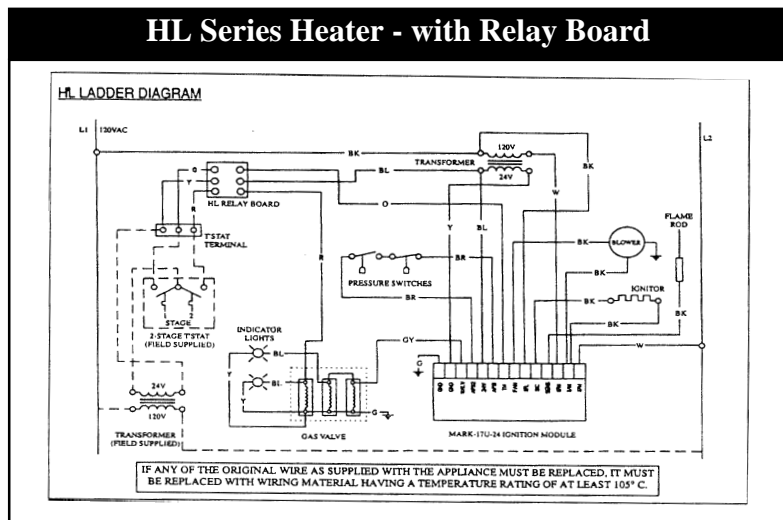
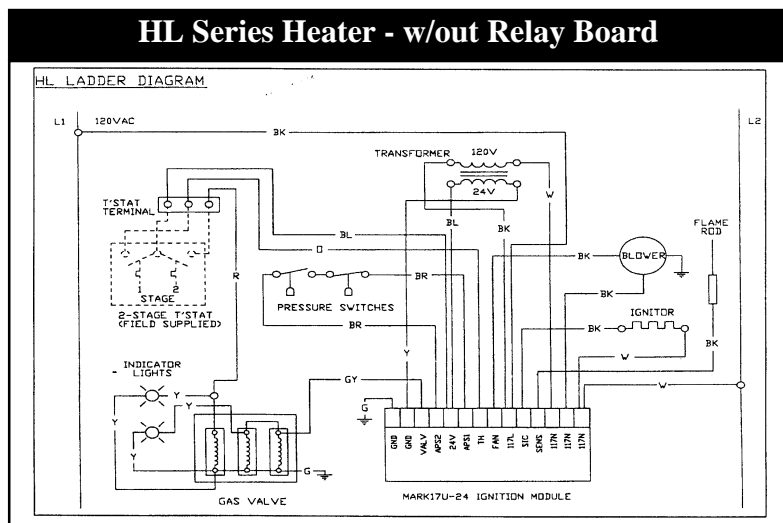
When the first stage of a two-stage thermostat calls for heat, a relay in the circuit control starts the fan. When the fan creates sufficient positive pressure in the burner control box, the normally open pressure switch closes, initiating the ignitor sequence. The glo-bar is powered and after 45 seconds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

Running Circuit

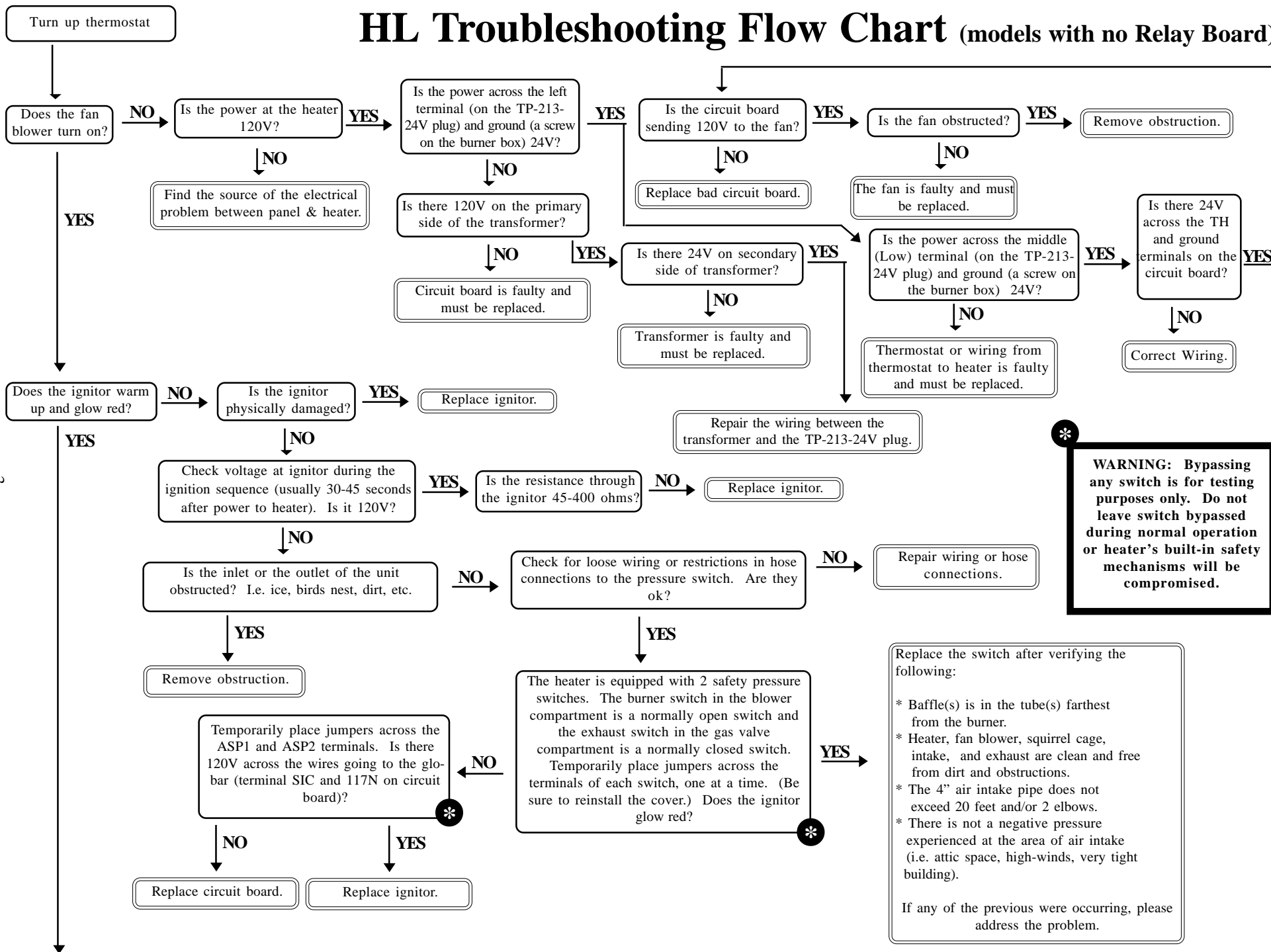
After ignition, the flame rod monitors the flame. As long as a flame is present, the valve is held open. If the flame is lost, the control acts to close the valve within one second, and a new trial sequence identical to that at start-up is initiated. If proof of flame is not established within 8.5 seconds, 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.



HL Troubleshooting Flow Chart (models with no Relay Board)

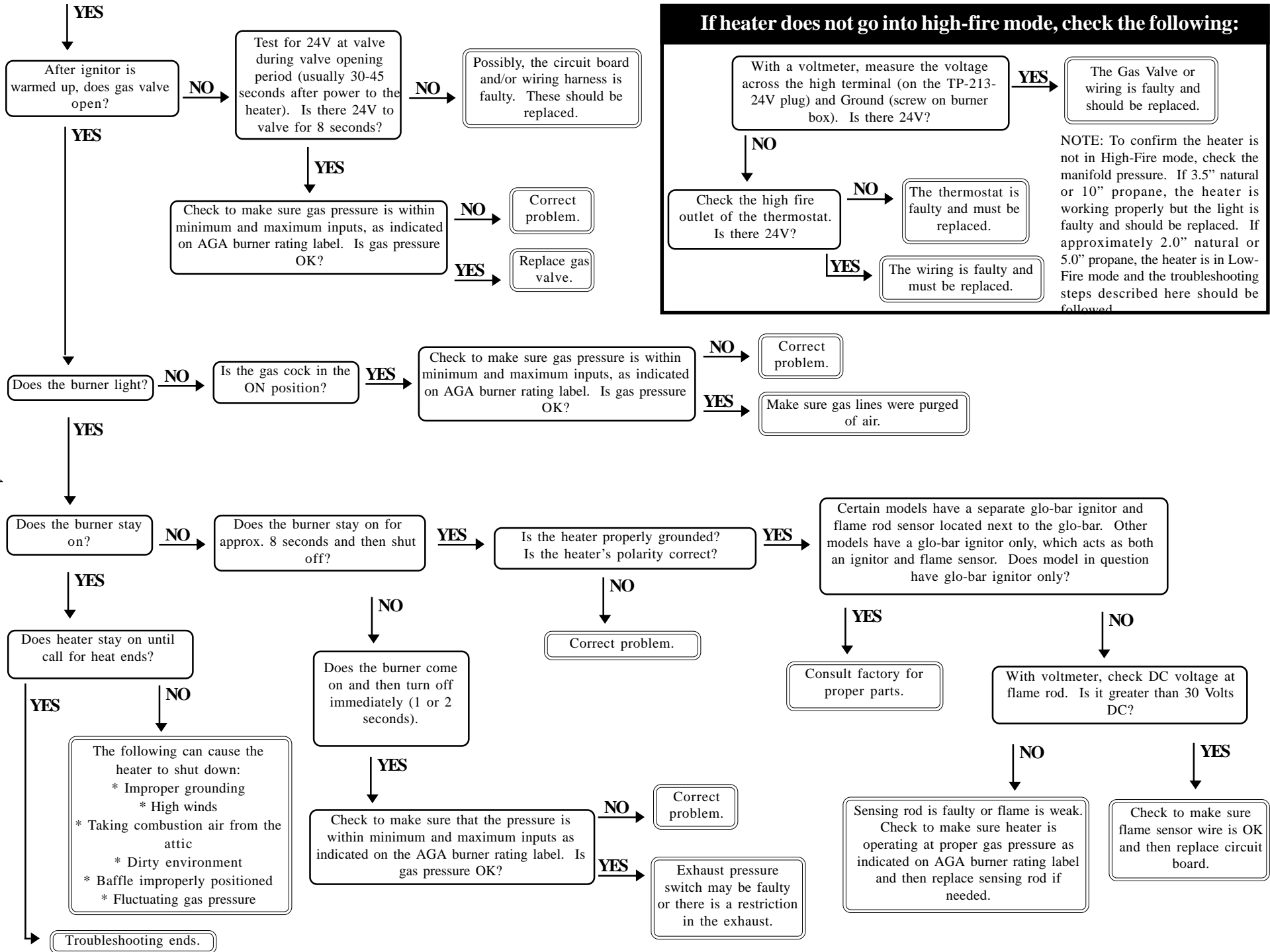


*** WARNING: Bypassing any switch is for testing purposes only. Do not leave switch bypassed during normal operation or heater's built-in safety mechanisms will be compromised.**

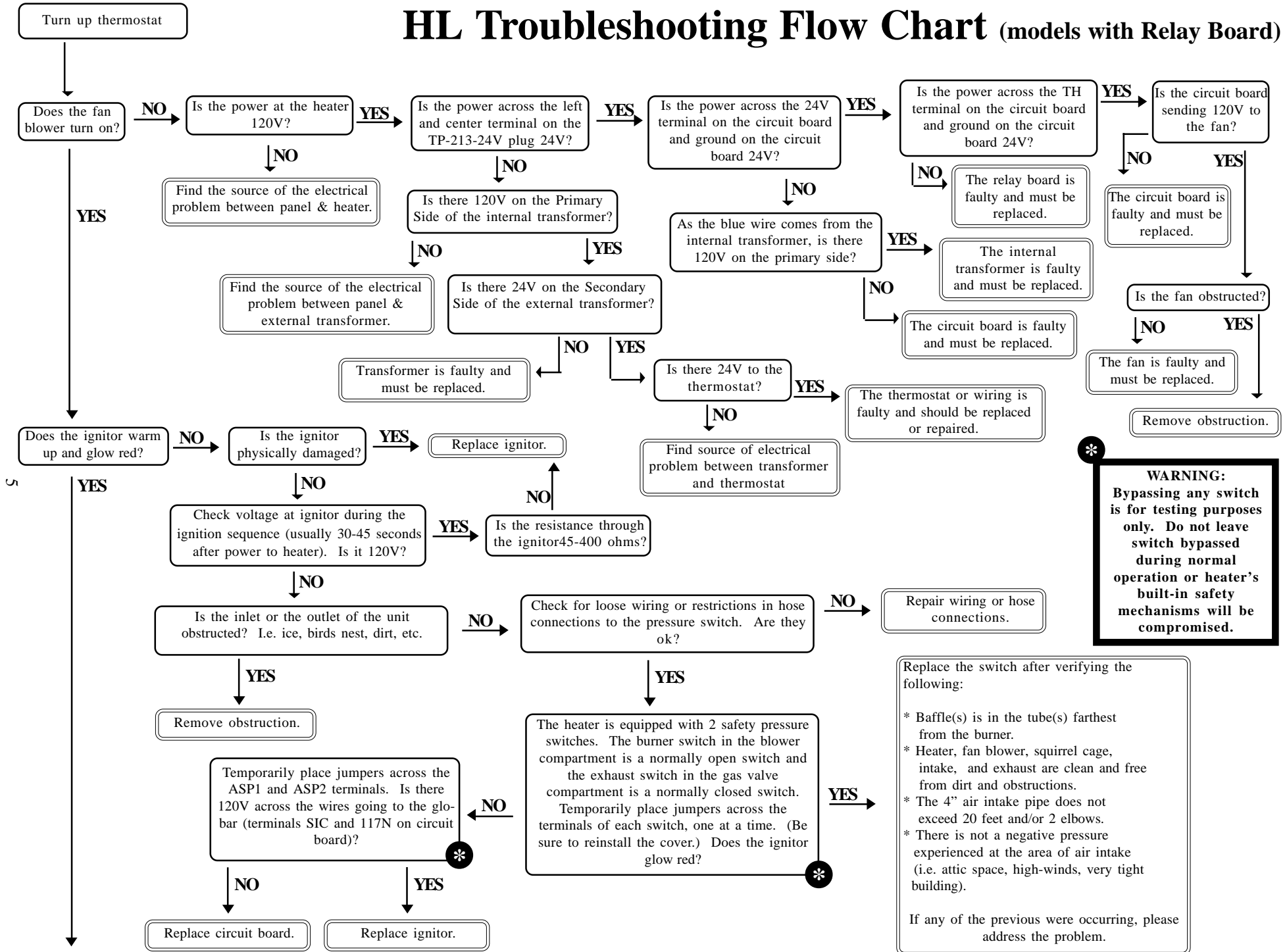
Replace the switch after verifying the following:

- * 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).

If any of the previous were occurring, please address the problem.



HL Troubleshooting Flow Chart (models with Relay Board)

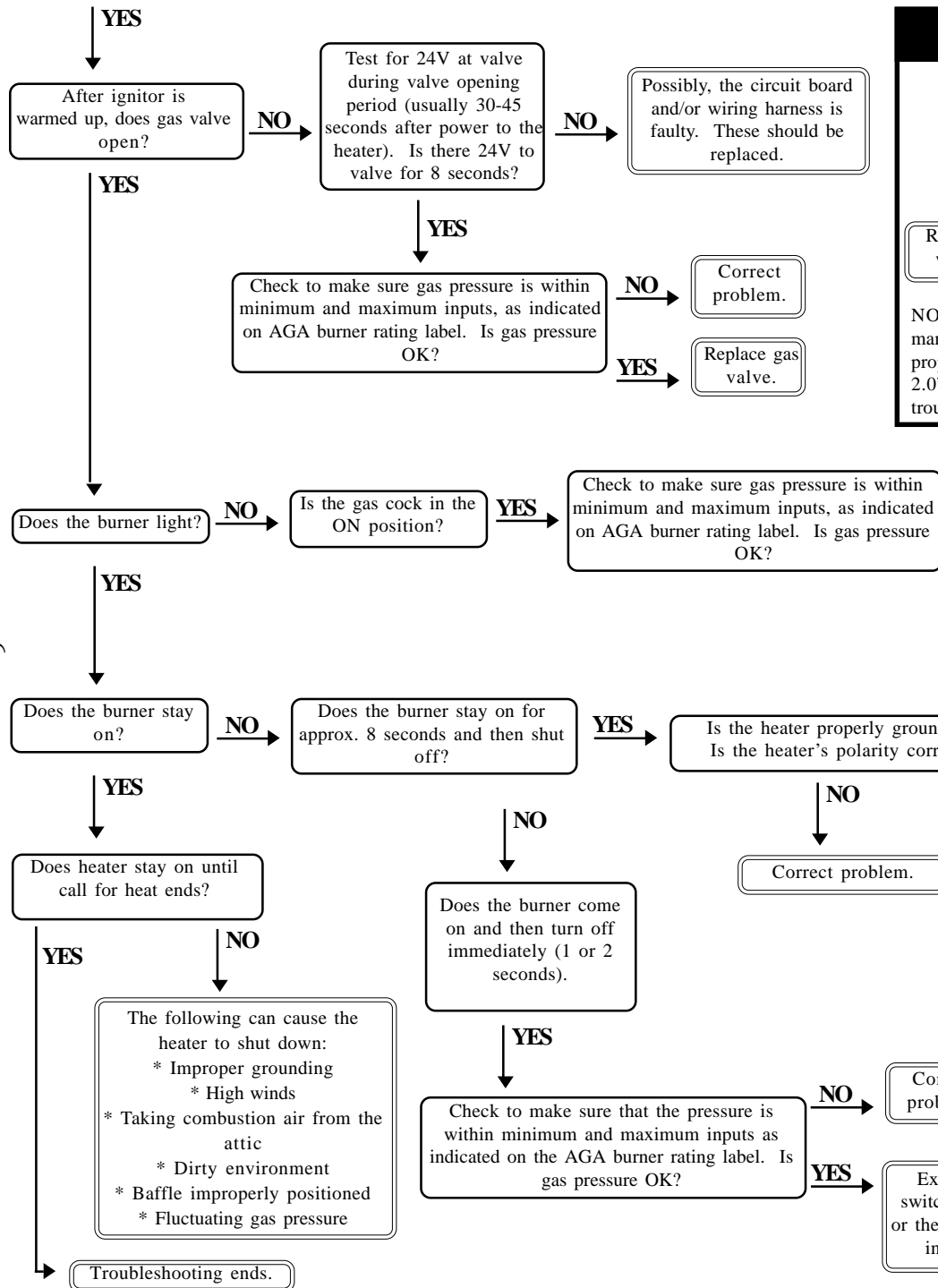


WARNING:
Bypassing any switch is for testing purposes only. Do not leave switch bypassed during normal operation or heater's built-in safety mechanisms will be compromised.

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).

If any of the previous were occurring, please address the problem.



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

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.

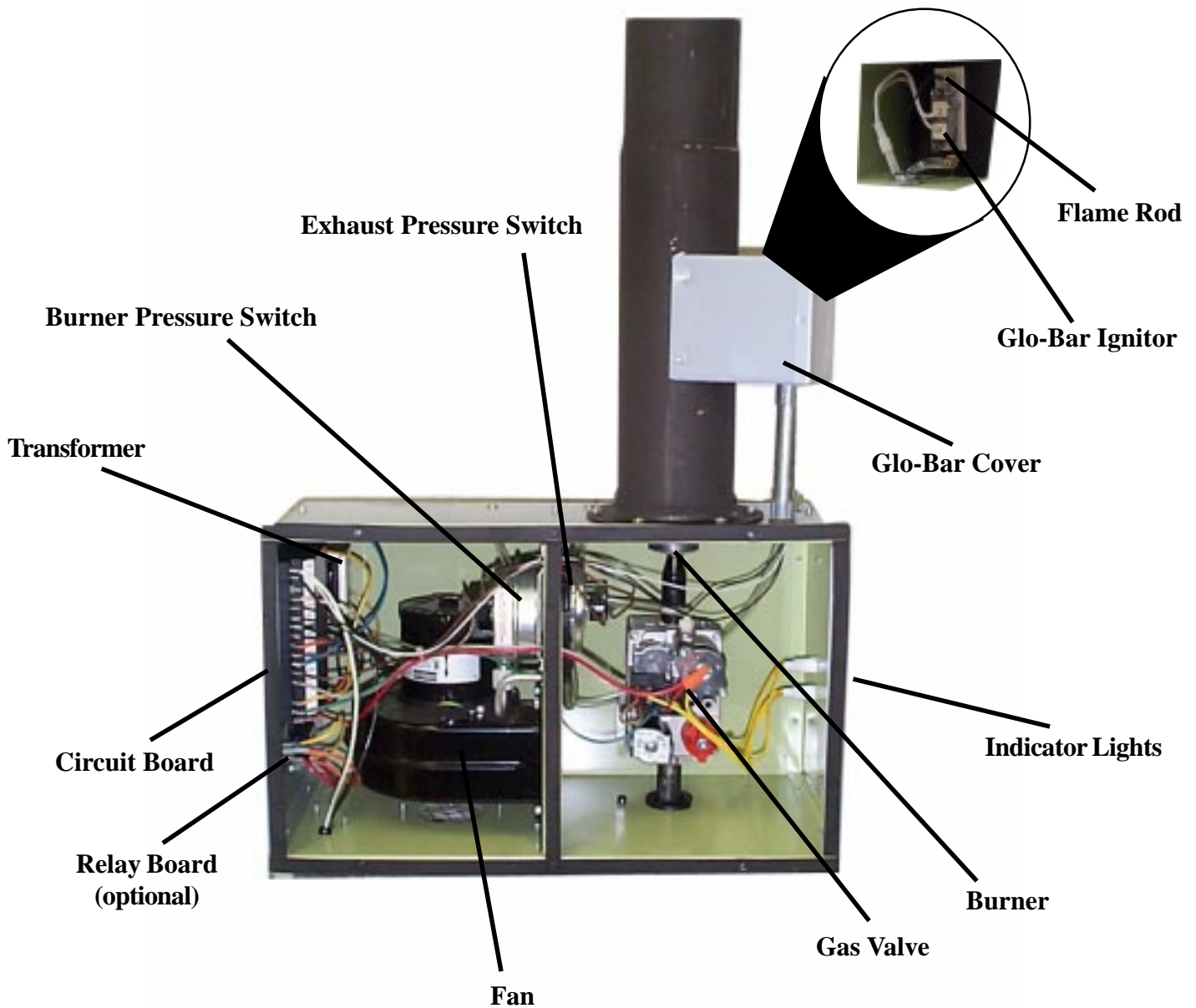
YES → Measure the voltage across the red wire on the relay board and GND on the circuit board. Is there 24V?










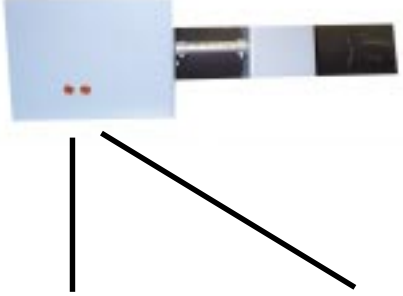
NO → The relay board is faulty and must be replaced.

YES → The valve is faulty and must be replaced.

NOTE: To confirm the heater is not in High-Fire mode, check the manifold pressure. If 3.5" natural or 10" propane, the heater is working properly but the light is faulty and should be replaced. If approximately 2.0" natural or 5.0" propane, the heater is in Low-Fire mode and the troubleshooting steps described here should be followed.

HL Series Heater



<p align="center">PICTURE 1</p>  <p align="center">Burner Pressure Switch</p>	<p align="center">PICTURE 2</p>  <p align="center">1) 125M-200M 2) 100M & below</p> <p align="center">Gas Burners</p>	<p align="center">PICTURE 3</p>  <p align="center">Circuit Board without Relay</p>  <p align="center">Circuit Board with Relay</p>
<p align="center">PICTURE 4</p>  <p align="center">Exhaust Pressure Switch</p>	<p align="center">PICTURE 5</p>  <p align="center">Fan</p>	<p align="center">PICTURE 6</p>  <p align="center">Manifold Tap w/ Barb fitting inserted</p> <p align="center">Gas Valve</p>
<p align="center">PICTURE 7</p>  <p align="center">Glo-Bar & Flame Rod</p>	<p align="center">PICTURE 8</p>  <p align="center">Air Intake Collar & Orifice</p>	<p align="center">PICTURE 9</p>  <p align="center">Low Fire High Fire</p> <p align="center">Low & High Fire Indicator Lights</p>



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



This symbol appears when directions indicate the presence an electrical shock hazard.

GENERAL TROUBLESHOOTING CHART

	SYMPTOM	EXPLANATION	SOLUTION
Page 11	Thermostat closed, fan does not operate.	<ol style="list-style-type: none"> Blown fuse. Loose or disconnected wire. Faulty transformer. Faulty thermostat. Faulty circuit board. Faulty fan. 	<ol style="list-style-type: none"> Replace. Repair as required. Confirm voltage and replace as required. Confirm voltage and replace as required. Confirm voltage and replace as required. Lubricate, repair or replace. <p style="text-align: right;">1</p>
Page 12-13	Thermostat closed. Fan does not operate.	<ol style="list-style-type: none"> Blown fuse. Loose or disconnected wire. Faulty transformer. Faulty thermostat. Faulty circuit board. Faulty relay board. Faulty fan. 	<ol style="list-style-type: none"> Replace. Repair as required. Confirm voltage and replace as required. Confirm voltage and replace as required. Confirm voltage and replace as required. Confirm voltage and replace as required. Lubricate, repair or replace. <p style="text-align: right;">1(r)</p>
Page 13-14	Thermostat Closed. Fan operates. No glo-bar energization.	<ol style="list-style-type: none"> Loose or disconnected wire. Box lid or gasket not in place. Plugged pressure switch lines. Plugged inlet or restricted exhaust vent. Baffle location incorrect. Obstructed air-intake pipe & cap. Faulty pressure switches. Faulty circuit control. Faulty glo-bar. 	<ol style="list-style-type: none"> Repair as required. Put in place. Clean as necessary. Remove foreign matter. Reposition baffle. Clean squirrel cage & fan blades. Oil motor. Replace only - do not adjust. Replace circuit control. Replace glo-bar. <p style="text-align: right;">2</p>
Page 14	Thermostat closed. Fan and glo-bar operate. After 45 seconds glo-bar shuts off. No ignition or low light.	<ol style="list-style-type: none"> Loose or disconnected wire. 	<ol style="list-style-type: none"> Repair as required. <p style="text-align: right;">3.1</p>
Page 15	Thermostat closed, fan & glo-bar operate. After 45 seconds glo-bar shuts off, valve light illuminates for 8 seconds. No ignition.	<ol style="list-style-type: none"> Gas valves turned off. Gas orifice isplugged. Faulty gas valve. Faulty circuit board. Inlet pressure too high - (max pressure = 14"). 	<ol style="list-style-type: none"> Turn on gas valves. Clean as necessary. Repair or replace. Confirm voltage and replace as required. Adjust pressure. <p style="text-align: right;">3.2</p>
Page 15	Thermostat closed. Fan and glo-bar operate. Ignition occurs. Burner cycles off and will not recycle. Fan lockout occurs & stops after 2 minutes.	<ol style="list-style-type: none"> Polarity reversed. No electrical ground. Faulty circuit control. Low gas pressure. Flame rod faulty. Faulty pressure switch. 	<ol style="list-style-type: none"> Correct polarity. Connect electrical ground with junction box. Replace. Provide required gas pressure. Replace. Replace. <p style="text-align: right;">4</p>
Page 16	Thermostat closed. Fan and glo-bar operate. Ignition occurs. Burner cycles off. Burner recycles.	<ol style="list-style-type: none"> Obstructed gas orifice. Faulty gas valve or circuit board. Inlet pressure too high - (max pressure = 14"). 	<ol style="list-style-type: none"> Clean obstructions. Confirm voltage and replace as required. Adjust pressure. <p style="text-align: right;">5.1</p>
Page 16	Thermostat closed. fan & glo-bar operate. Ignition occurs. Heater does not go into high-fire.	<ol style="list-style-type: none"> Loose or disconnected wire. Manifold pressure is incorrect. 	<ol style="list-style-type: none"> Repair as required. Adjust pressure. <p style="text-align: right;">5.2</p>
Page 17	Thermostat closed. High-heat light is on. No heater operation.	<ol style="list-style-type: none"> Heater is possibly in lockout. 	<ol style="list-style-type: none"> See steps 1-5 for troubleshooting. <p style="text-align: right;">5.3</p>

Refers to HL Series Heaters
without Indicator Lights

Refers to HL Series Heaters
with Indicator Lights

Refers to all Heaters

GENERAL TROUBLESHOOTING CHART

	SYMPTOM	EXPLANATION	SOLUTION
Page 17	Loss of heater efficiency.	<ol style="list-style-type: none"> 1. Low gas pressure. 2. Dirty or restricted orifice. 3. Foreign matter inside burner assembly. 4. Reflector is sooted and has lost its reflective ability. 5. Clogged fan blower. 	<ol style="list-style-type: none"> 1. Provide required gas pressure. 2. Remove and clean with a soft cloth. 3. Clean as necessary. 4. Clean with aluminum cleaner and soft cloth. 5. Clean. <p style="text-align: right;">6</p>
Page 18	Radiant tube leaking burnt gases.	<ol style="list-style-type: none"> 1. Loose tube connections. 2. Holes or cracks in radiant tubes. 	<ol style="list-style-type: none"> 1. Assure that tube is fully inserted into flared end and properly clamped. 2. Replace. <p style="text-align: right;">7</p>
Page 18	Condensation.	<ol style="list-style-type: none"> 1. Stack length too long. 2. Light gauge flue stack used. 3. Contaminated combustion air. 	<ol style="list-style-type: none"> 1. Shorten stack. 2. Minimum of 26 gauge vent pipe is required. 3. Provide fresh air inlet duct. <p style="text-align: right;">8</p>
Page 18	Tube bowing.	<ol style="list-style-type: none"> 1. Insufficient combustion air. 2. Contaminated combustion air. 3. Overfired. 4. Heater's tubes are unable to expand. 	<ol style="list-style-type: none"> 1. Provide 2 sq. in. of free air per 5000 BTU/H of input. 2. Provide fresh air inlet duct. 3. Check gas pressure and orifice size. 4. Remount heater with 16" section of flex. <p style="text-align: right;">9</p>
Page 18	Tube corroding.	<ol style="list-style-type: none"> 1. Contaminated combustion air. 	<ol style="list-style-type: none"> 1. Provide fresh air inlet duct. <p style="text-align: right;">10</p>
Page 19	Visual inspection of burner operation not possible.	<ol style="list-style-type: none"> 1. Dirty or sooted sight glass. 2. Unit mounted upside down. 	<ol style="list-style-type: none"> 1. Remove and clean or replace. 2. Mount correctly. <p style="text-align: right;">11</p>
Page 19	Stack sooting.	<ol style="list-style-type: none"> 1. Insufficient combustion air. 2. Improper gas. 	<ol style="list-style-type: none"> 1. Provide 1 sq. in. of free air for every 5000 BTU/H of input. 2. Correct with proper gas input. <p style="text-align: right;">12</p>
Page 19	Odor or fumes in space.	<ol style="list-style-type: none"> 1. Vaporized solvents decomposing when contacting radiant tubes. 2. Evaporation of oils/solvents at floor level. 3. Fork lifts. 4. Loose tube connections. 	<ol style="list-style-type: none"> 1. Address ventilation concerns. 2. Address ventilation concerns. 3. Address ventilation concerns/repair. 4. Tighten tube clamps to 50-100 ft. lb. <p style="text-align: right;">13</p>
Page 20	"How To" Instructions	inlet pressure, manifold reading, proper polarity, positive ground, negative pressure, bypass pressure switches	

Refers to HL Series Heaters
without Indicator Lights

Refers to HL Series Heaters
with Indicator Lights

Refers to all Heaters

FOR HEATERS WITHOUT HLRB RELAY BOARD

1 - Thermostat Closed, Fan Does Not Operate

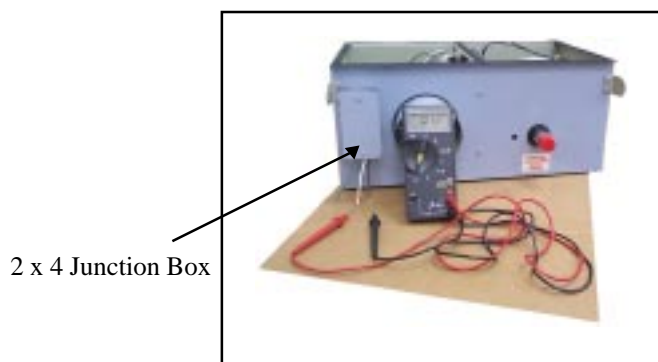
If the thermostat is closed (calling for heat) and heater does not operate, check the following:

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

FOR HEATERS CONTAINING HLRB RELAY BOARD

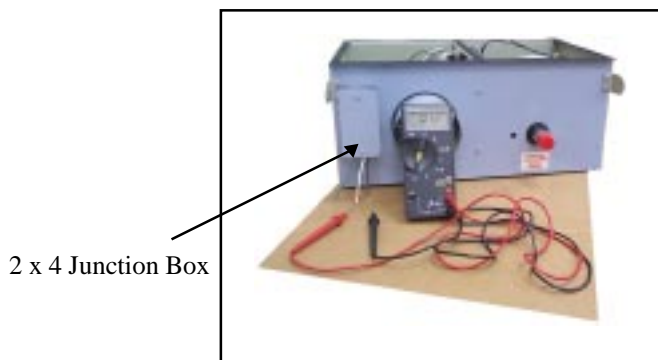
1 - Thermostat Closed, Fan Does Not Operate

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.



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

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.

4 - Thermostat Closed. Fan & Glo-Bar Operate. Ignition Occurs. Burner Cycles Off & will not Recycle. Fan Lockout occurs and stops after 2 minutes.

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 - Thermostat Closed. Fan & Glo-Bar Operate. Ignition Occurs. Burner Cycles Off. Burner Recycles.

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.



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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.



*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*

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:

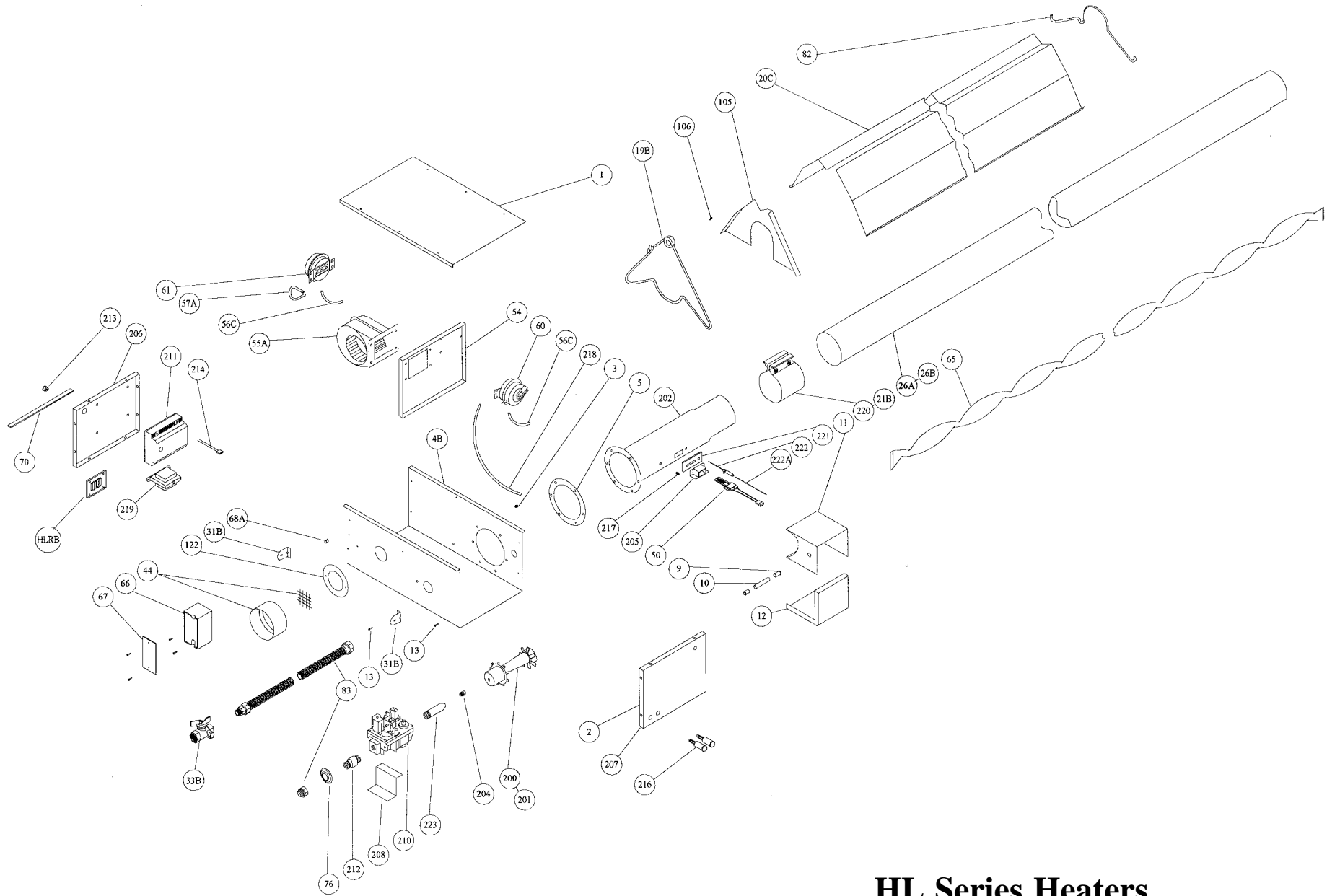
- ♦ Turn power off.
- ♦ Disconnect both black wires attached to the safety switches with a 1/4" female spade.
- ♦ Attach them to each other using alligator clips or electrical tape.
- ♦ Be sure this connection touches nothing else, especially metal.
- ♦ Turn power back on (***Do not leave switches bypassed during normal heater operation.***)

HL SERIES PARTS LISTING

KEY	TP#	ITEM	KEY	TP#	ITEM
	TP-1	CONTROL BOX COVER		TP-76	RUBBER GROMMET
	TP-4B	DX/HL CONTROL BOX		TP-82	REFLECTOR CENTER SUPPORT
	TP-5	FLANGE GASKET		TP-83	STAINLESS STEEL FLEX CONNECTOR
	TP-9	CONDUIT COUPLING		TP-101	SUB TP-223
	TP-10	CONDUIT 4" X 1/2"		TP-104	SUB TP-223
	TP-11	GLO-BAR IGNITOR BOX		TP-105	REFLECTOR END CAP
	TP-12	GLO-BAR IGNITOR BOX COVER		TP-106	REFLECTOR CLIP
	TP-14	SIGHT GLASS GASKET		TP-108	5' AL-TI TUBE, PAINTED W. ONE CLAMP
	TP-15	SIGHT GLASS		TP-111	5' ALUM. TUBE, PAINTED W/1 CLAMP
	TP-16	SIGHT GLASS WASHER		TP-112	5' REFLECTOR
	TP-19B	WIRE HANGER		TP-122	GASKET FOR AIR ORIFICE & AIR COLLAR
	TP-20C	120" REFLECTOR		TP-200	BURNER (50 MBTU/H TO 100 MBTU/H)
	TP-21B	TUBE CLAMP		TP-200A	BURNER (50 TO 100 MBTU/H LP GAS)
	TP-26A	10 FT. RADIANT TUBE STRAIGHT		TP-201	BURNER (125 MBTU/H TO 200 MBTU/H)
	TP-26B	10 FT. RADIANT TUBE STRAIGHT (AL-TI)		TP-202	16" BURNER TUBE W/ FLANGE
	TP-31B	CONTROL BOX BRACKET		TP-204	GAS ORIFICE - CONSULT FACTORY
	TP-33B	1/2" GAS COCK		TP-205	GLO-BAR HOLDER
	TP-44	AIR ORIFICE W/SCREEN (CONSULT FACTORY)		TP-206	HL END PANEL - LEFT
	TP-50	GLO-BAR IGNITOR		TP-207	HL END PANEL - RIGHT
	TP-54	BURNER BOX DIVIDER		TP-208	"Z" MOUNTING BRACKET
	TP-55A	FAN BLOWER		TP-210	36E96-224 TWO STAGE GAS VALVE-NAT ASSY
	TP-56C	1/4" ATMOSPHERIC TUBE (VINYL)		TP-210P	36E96-226 TWO STAGE GAS VALVE-LP ASSY
	TP-57A	1/4" PRESSURE TUBE		TP-211	MARK 17X-24 CIRCUIT BOARD
	TP-60F	EXHT PRESSURE SWITCH - 50 TO 150 MBTU/H		TP-211A	MARK 17U-24 CIRCUIT BOARD (REMOTE SENSE)
	TP60G	EXHT PRESSURE SWITCH - 175 & 200 MBTU/H		TP-212	1/2" X 3" PIPE NIPPLE
	TP-61B	BURNER PRESSURE SWITCH - 50 - 100 MBTU/H		TP-213	THERMOSTAT TERMINAL STRIP
	TP-61C	BURNER PRESSURE SWITCH - 200 MBTU/H		TP-214	GLO-BAR WIRING HARNESS
	TP-61D	BURNER PRESSURE SWITCH - 150 & 175 MBTU/H		TP-216	INDICATOR LIGHT
	TP-65A	66" HEAT DIFFUSER (BAFFLE)		TP-217	PRESSURE BARB FITTING
	TP-65B	99" HEAT DIFFUSER (BAFFLE)		TP-218	EXHAUST PRESSURE TUBE (VINYL)
	TP-65C	132" HEAT DIFFUSER (BAFFLE)		TP-219	40VA TRANSFORMER
	TP-65D	166" HEAT DIFFUSER (BAFFLE)		TP-220	STAIN. STL. TUBE CLAMP (175 & 200 MBTU/H)
	TP-66	2" X 4" OUTLET BOX		TP-221	GLO-BAR HOLDER GASKET
	TP-67	2" X 4" OUTLET BOX COVER		TP-222	FLAME ROD
	TP-68A	STRAIN RELIEF BUSHING		TP-222A	FLAME ROD WIRE
	TP-70	CONTROL BOX COVER GASKET (PER FOOT**)		TP-223	GAS MANIFOLD

** 6' TOTAL NEEDED TO COVER OUTER EDGES OF A BURNER BOX.

HLRB OPTIONAL RELAY BOARD - SEE ACCESSORY GUIDE



HL Series Heaters

