TUBE HEATER TROUBLESHOOTING GUIDE

MODELS: DTH(S) 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.

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Table of Contents

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

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

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^{O}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 - DX, DX-2 or XTS Series Installation, Operation & Maintenance manuals (IOM's).

2. Theory of Operation

2.1 DTHS-2 Models: 40,000 BTU/H through 100,000 BTU/H

- **Starting Circuit (Figure 2.1)**

When voltage is applied to L1 and L2, a circuit is completed from L1 via the blower motor to L2. The blower fan is mounted in the control box and rated to supply sufficient air combustion.

Air pressure generated by the blower will cause the normally open burner pressure switch No. 1 to close. The burner pressure switch is factory preset to ensure that a minimum of 2/3 the normal rate of combustion air is passed into the combustion chamber. Any air flow restriction resulting in less than 2/3 normal rate will cause the pressure switch to open and shut down the entire system.

Current will pass through the burner pressure switch to the normally closed exhaust pressure switch No. 2. The exhaust pressure switch is factory preset to ensure that a minimum of 1/2 the normal rate will cause the pressure switch to open and shut down the entire system.

NOTE: Pressure switches are nonadjustable.

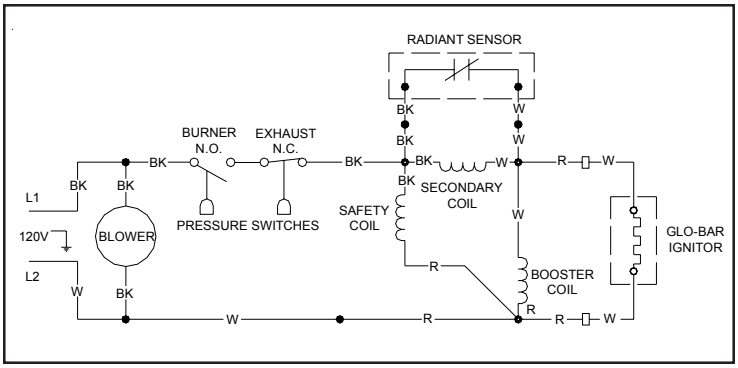
Another circuit is completed from L1 to the radiant sensor and glo-bar back to L2. Simultaneously, the safety and booster coils of the first of two redundant valves are energized through the contact of the radiant sensor. This causes the first valve to open and the glo-bar to heat up. No gas flows however, until the second redundant valve is energized and opened.

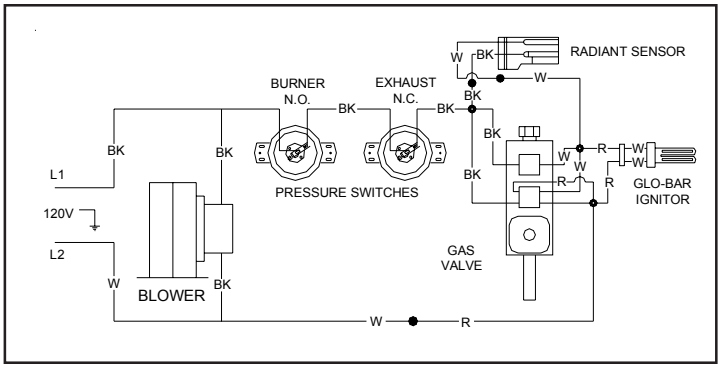
- **Running Circuit**

When the glo-bar reaches ignition temperature, the radiant sensor is heated and opens (maximum 60 seconds). The radiant sensor is a heat sensitive bimetal switch with a single throw contact that is normally in the closed position and calibrated to open when the glo-bar has attained ignition temperature.

The second redundant valve, now in series with the glo-bar, is energized and opened. Gas flows through the burner and is ignited by the glo-bar. The second coil remaining in series with the glo-bar causes the glo-bar to cool down. The radiant sensor is held open by radiant heat emitted from the gas flame. The booster coil of the first valve is now placed in series with the secondary coil, and very low current flows through the coil. The safety coil power is sufficient to hold only the first valve open. If a momentary power failure occurs, the first valve will shut down the gas supply to the burner. When power is restored, the safety coil alone does not have the power to pull the valve open, therefore, the radiant sensor cools down, the contacts close and the unit cycles (maximum 60 seconds).

Figure 2.1





Note: Warranty is void if wire nuts are removed.

Theory of Operation

2.2 DTHS-3 Models: 125,000 BTU/H and 150,000 BTU/H

- **Starting Circuit (Figure 2.2)**

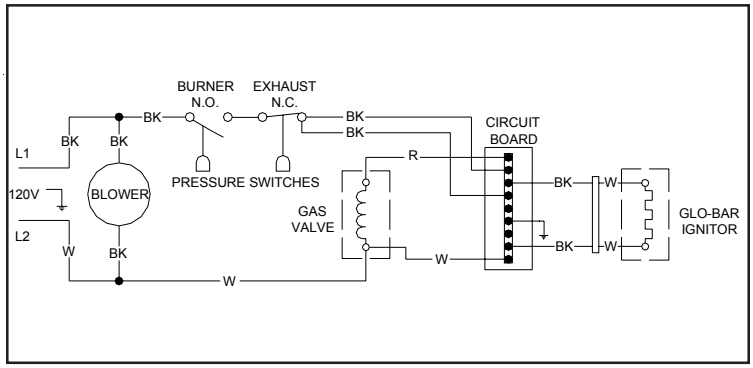
When voltage is applied to L1 and L2, a circuit is completed from L1 via the blower motor to L2. The blower fan is mounted in the control box and rated to supply sufficient air for combustion.

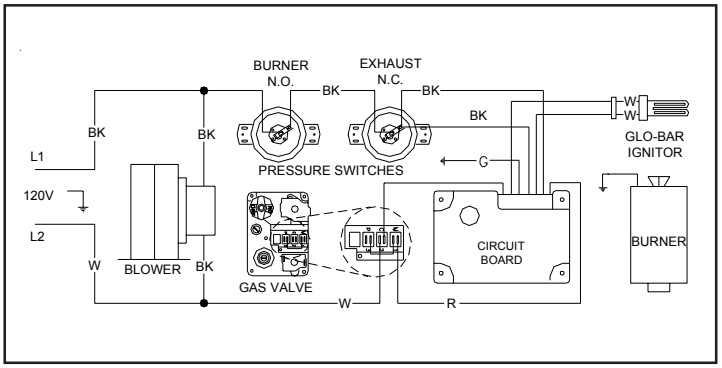
Air pressure generated by the blower will cause the normally-open burner pressure switch No. 1 to close. The control completes another circuit from L1 to the hot surface ignition control and back to L2. There is a five-second delay, then the glo-bar is powered. After the glo-bar has been powered for 45 seconds, the control causes the gas valve to open and initiates the ignition trial. Power to the glo-bar is shut off during the last two or three seconds of the ignition trial.

- **Starting Circuit**

When power is removed from the glo-bar, the glo-bar is utilized as a flame probe. 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 seconds, the unit will lock out. If lockout occurs, the control can be reset by briefly interrupting the power source.

Figure 2.2

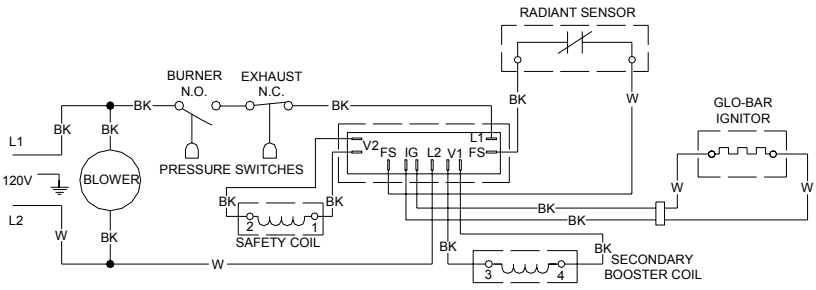




DTHS-2 Models: 125,000 BTU/H and 150,000 BTU/H

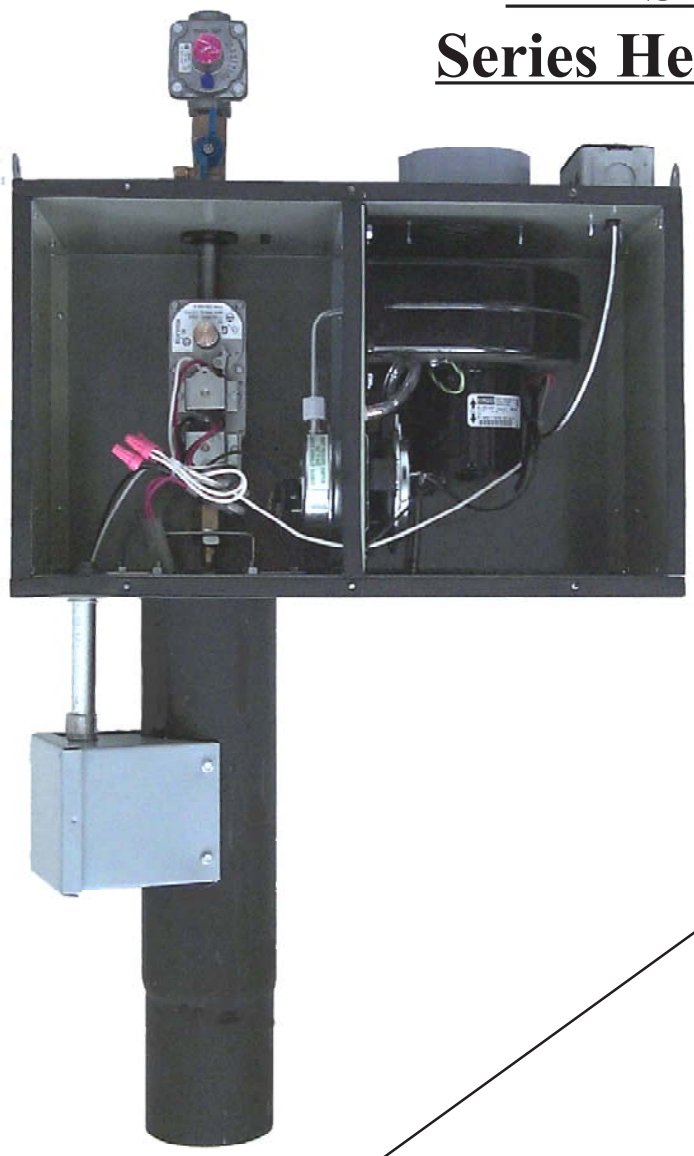
Please consult the factory when troubleshooting the DTH(S)-2 125,000 & 150,000.

Follow the adjasent diagram for proper wiring of the DTH(S)-2 125,000 &150,000.

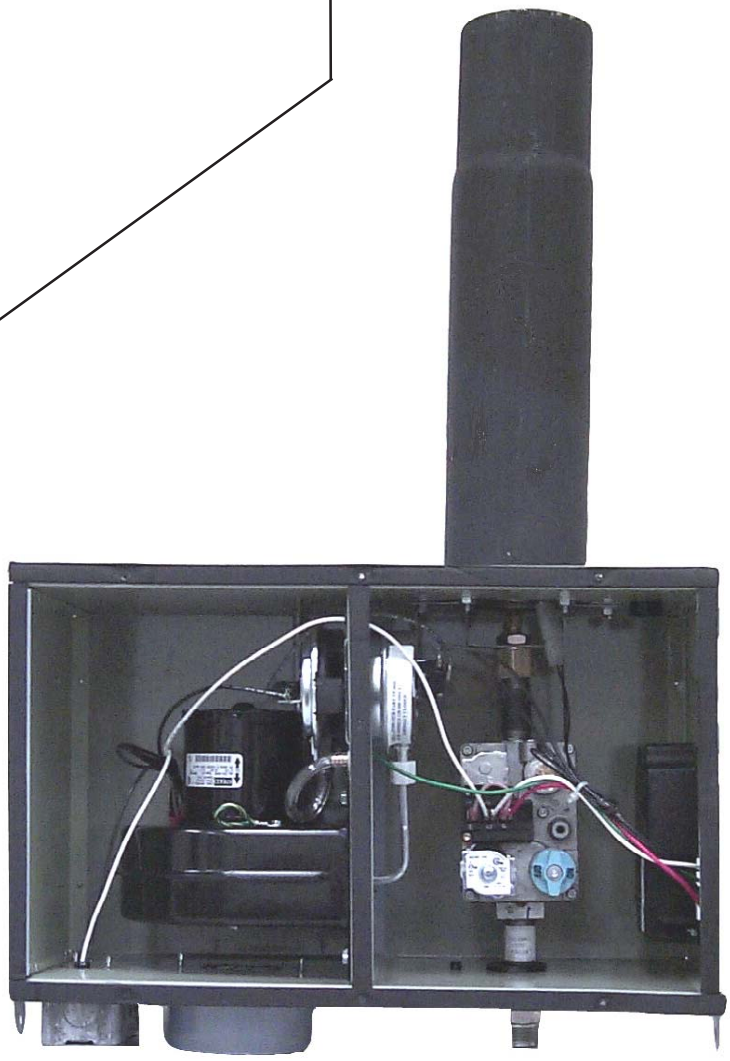


Burner Unit Photographs

DTHS-2
Series Heater

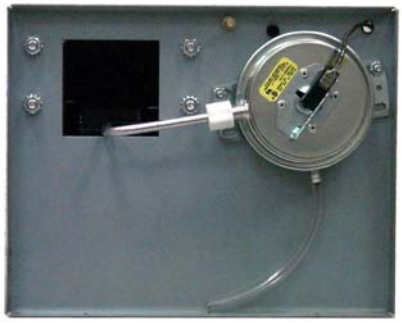
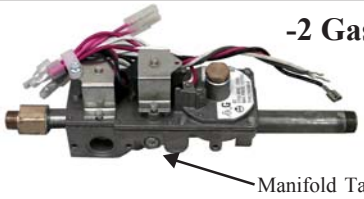


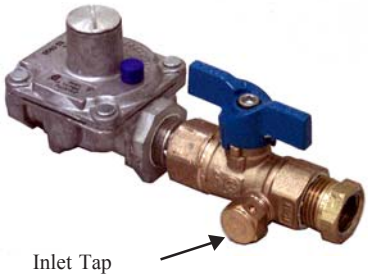
DTHS-3
Series Heater



Component Photographs

PICTURE 1	PICTURE 2	PICTURE 3
		
Burner Pressure Switch	**Gas Burner & Burner Housing**	**Circuit Board**

PICTURE 4	PICTURE 5	PICTURE 6
		 
Exhaust Pressure Switch	**Fan**	

PICTURE 7	PICTURE 8	PICTURE 9
Radiant Sensor  		
Glo-Bar	**Air Intake Collar & Orifice**	**Gas Cock & Regulator**

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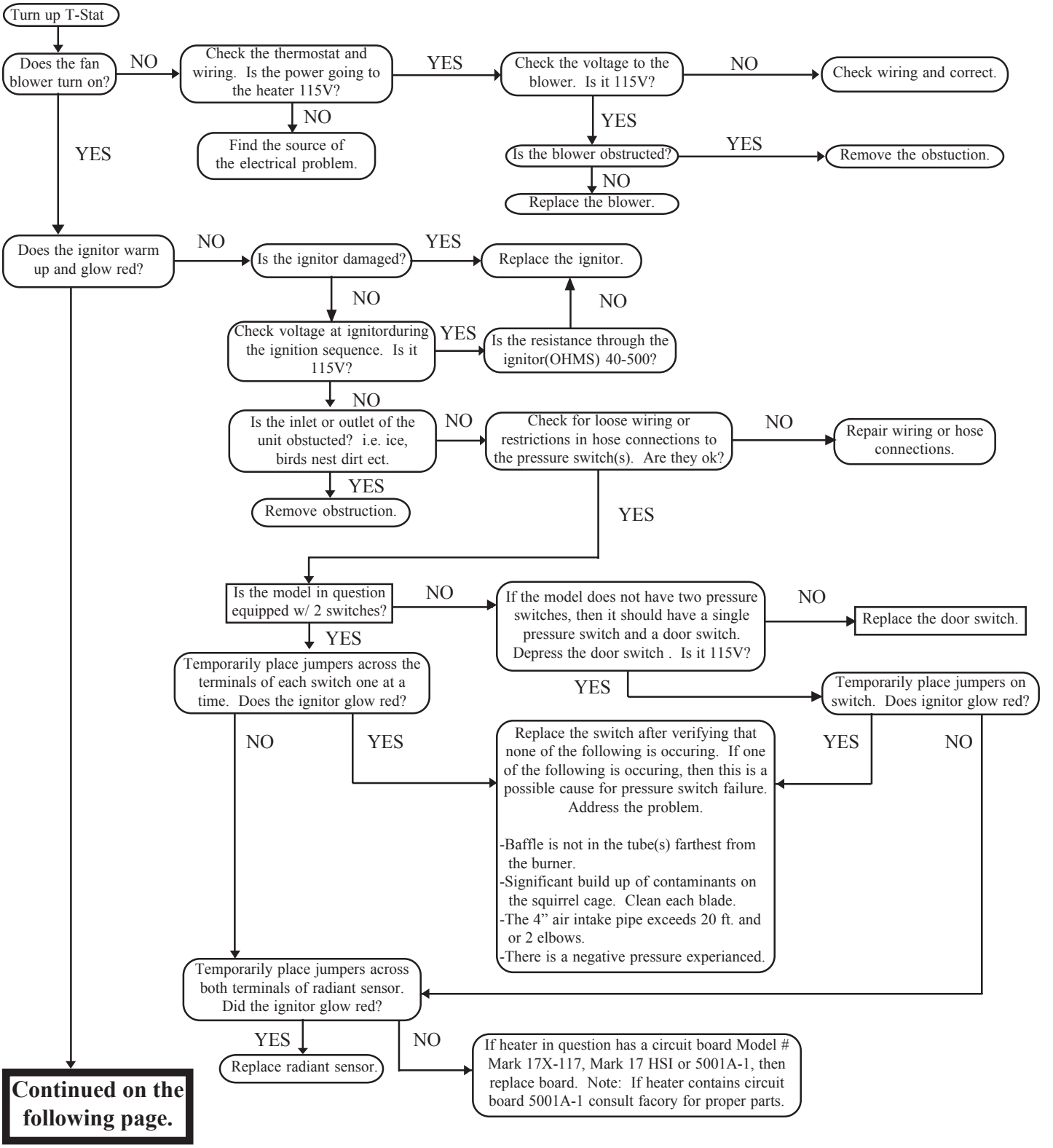
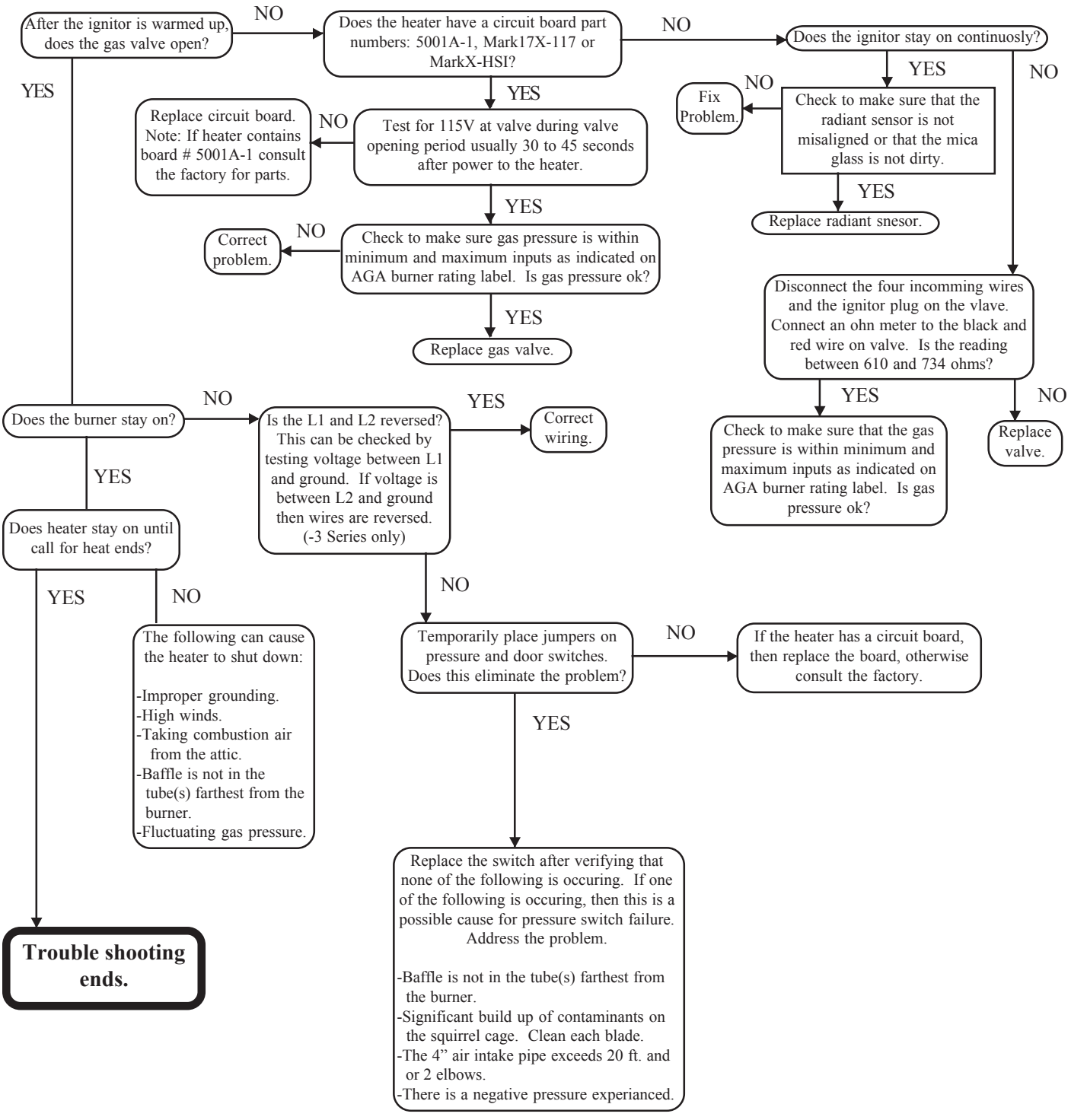
DTH (S) Trouble Shooting Flow Chart



Continued on the following page.

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.

Flow Chart Continued



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.
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GENERAL TROUBLESHOOTING CHART

	SYMPTOM	EXPLANATION	SOLUTION	
Page 11	Thermostat closed, fan does not operate.	1. Blown fuse. 2. Faulty thermostat. 3. Loose or disconnected wire. 4. Faulty fan.	1. Replace. 2. Replace. 3. Repair as required. 4. Lubricate, repair or replace.	**1**
Page 12-13	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. Faulty pressure switches. 7. Faulty circuit control. 8. Faulty glo-bar.	1. Repair as required. 2. Put in place. 3. Clean as necessary. 4. Remove foreign matter. 5. Reposition baffle. 6. Replace only - do not adjust. 7. Replace circuit control. 8. Replace glo-bar.	**2**
Page 14	Thermostat Closed. Fan and glo-bar operate. Glo-bar does not shut off and valve does not open.	1. Radiant sensor stuck close. 2. Dirty radiant sensor mica. 3. Dirty radiant sensor glass.	1. Replace. 2. Clean as necessary. 3. Clean as necessary.	**3**
Page 15	Thermostat closed. Fan and glo-bar operate. After 45 second glo-bar shuts off. No ignition.	1. Closed gas supply. 2. Dirty or restricted gas orifice. 3. Faulty valve. Disconnected valve wire. 4. Inlet pressure too high - (max pressure = 14").	1. Open all gas connections. 2. Remove and clean with a soft cloth. 3. Replace valve or reconnect wires. 4. Adjust pressure.	**4**
Page 16	Thermostat closed, fan & glo-bar operate. Ignition occurs, burner cycles off after 35 to 55 seconds & glo-bar starts to glo immediately.	1. Closed gas supply. 2. Dirty or restricted gas orifice. 3. Faulty radiant sensor. 4. Low gas pressure.	1. Open. 2. Remove & clean with soft cloth. 3. Replace radiant sensor. 4. Adjust pressure.	**5**
Page 16	Thermostat closed. Fan and glo-bar operate. Ignition occurs. Burner cycles off and will not recycle.	1. Polarity reversed. 2. No electrical ground. 3. Faulty circuit control. 4. Low gas pressure. 5. Glo-bar faulty. 6. Faulty exhaust switch.	1. Correct polarity. 2. Connect electrical ground to junction box. 3. Replace. 4. Provide required gas pressure. 5. Replace. 6. Replace.	**6**
Page 17	Thermostat closed. Fan & glo-bar operate. Ignition occurs. Burner cycles off. Burner recycles.	1. Polarity reversed. 2. No electrical ground. 3. Faulty circuit control. 4. Low gas pressure. 5. Glo-bar faulty. 6. Faulty exhaust switch.	1. Correct polarity. 2. Connect electrical ground to junction box. 3. Replace. 4. Provide required gas pressure. 5. Replace. 6. Replace.	**7**

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.

GENERAL TROUBLESHOOTING CHART

	SYMPTOM	EXPLANATION	SOLUTION
Page 17	Loss of heater efficiency.	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.	1. Provide required gas pressure. **8** 2. Remove and clean with a soft cloth. 3. Clean as necessary. 4. Clean with aluminum cleaner and soft cloth. 5. Clean.
Page 17	Radiant tube leaking burnt gases.	1. Loose tube connections. 2. Holes or cracks in radiant tubes.	1. Assure that tube is fully inserted into flared end and properly clamped. 2. Replace. **9**
Page 18	Condensation.	1. Stack length too long. 2. Light gauge flue stack used. 3. Contaminated combustion air.	1. Shorten stack. **10** 2. Minimum of 26 gauge vent pipe is required. 3. Provide fresh air inlet duct.
Page 18	Tube bowing.	1. Insufficient combustion air. 2. Contaminated combustion air. 3. Overfired. 4. Heater's tubes are unable to expand.	1. Provide 2 sq. in. of free air per 5000 BTU/H of input. **11** 2. Provide fresh air inlet duct. 3. Check gas pressure and orifice size. 4. Remount heater with 16" section of flex.
Page 18	Tube corroding.	1. Contaminated combustion air.	1. Provide fresh air inlet duct. **12**
Page 19	Visual inspection of burner operation not possible.	1. Dirty or sooted sight glass. 2. Unit mounted upside down.	1. Remove and clean or replace. **13** 2. Mount correctly.
Page 19	Stack sooting.	1. Insufficient combustion air. 2. Improper gas.	1. Provide 1 sq. in. of free air for every 5000 BTU/H of input. 2. Correct with proper gas input. **14**
Page 19	Odor or fumes in space.	1. Vaporized solvents decomposing when contacting radiant tubes. 2. Evaporation of oils/solvents at floor level. 3. Fork lifts. 4. Loose tube connections.	1. Address ventilation concerns. **15** 2. Address ventilation concerns. 3. Address ventilation concerns/repair. 4. Tighten tube clamps to 50-100 ft. lb.
Page 20	"How To" Instructions	Inlet pressure, manifold reading, proper polarity, positive ground, negative pressure, bypass pressure switches.	

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.

Solution 1

Thermostat Closed, Fan Does Not Operate

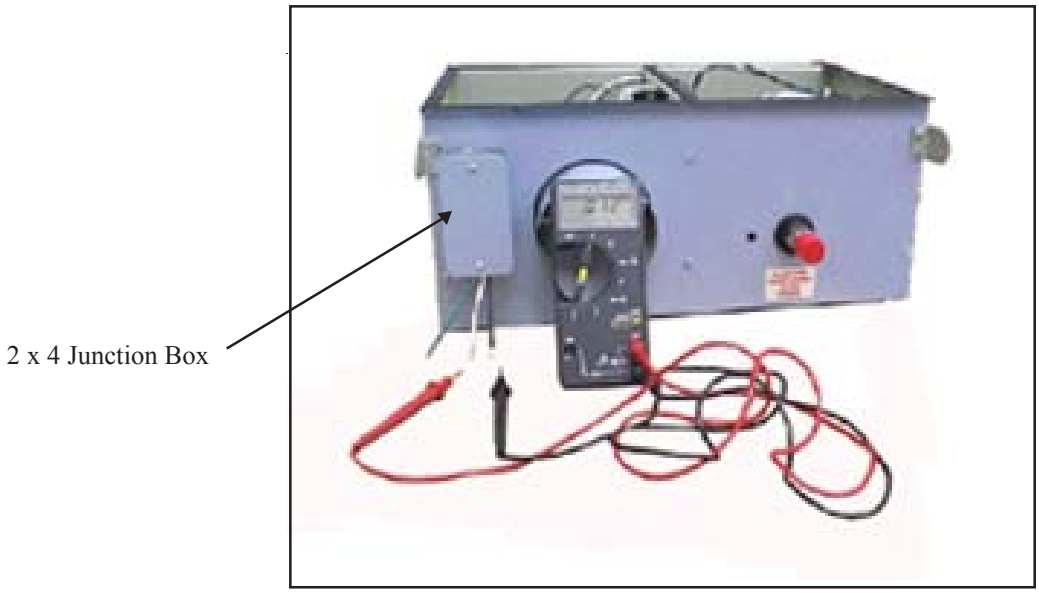
If the thermostat is closed (on) and heater does not operate, check the following:

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

1.2
Thermostat Operation: Verify the thermostat is allowing power to be sent to the heater. Confirm by measuring the voltage to the heater using a volt meter **(See picture below)**. If there is no power, the problem is in the thermostat and it should be replaced. If power is at the heater, continue on to the next step.

1.3
Check the electrical connections leading to the fan. Be sure that the wire nuts are tight.

1.4
Using the voltmeter, check to be sure power is going to the fan **(pg. 6, pic. 5)**. If there is power, try cleaning and oiling (SAE-20 oil) the motor. If the fan is still not working, it is faulty.



Picture 1.2

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.

Solution 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. 6, pic. 1)**. This switch must be closed before the glo-bar can be energized. ***Bypass this switch **(pg. 21, #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.

2.2a
Be sure the lid is on correctly and the gasket is intact.

2.2b
Make sure the clear vinyl tube that bleeds pressure to the outside of the heater is clean and clear of obstructions.

2.2c
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.

2.2d
Make sure the heater's baffle is located properly. It should be found at the exhaust end of the emitter tube.

2.2e
The fan may not be accurately pressurizing the heater. Clean obstructions from the air-intake connection and cap **(pg. 6, pic. 8)**. Clean the squirrel cage. Oil the motor (SAE-20). Examine and clean the fan blades **(pg. 6, 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 2.2f.

2.2f
If steps 2.2a - 2.2f were performed and the heater still won't properly function, the burner pressure switch 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.

Solution 2

Thermostat Closed, Fan Operates, No Glo-Bar Energization (cont.)

(This step is applicable for all models)

2.3

The **Exhaust Pressure Switch** is located on the valve side of the heater **(pg. 6, pic. 4)**. ***Bypass this switch **(pg. 21, #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.

2.3a

Be sure the lid is on correctly and tightly, and the gasket is in intact.

2.3b

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

2.3c

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

2.3d

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.

2.3e

Check to make sure the sensing tube pointed in the outlet of the fan is at the bottom of the opening **(pg 5, pic. 4)**

2.3f

If steps 2.3a - 2.3e were performed and the heater still won't properly function, the exhaust pressure switch is faulty.

2.4(-2) *(This step is applicable for non-DTHS-2 & DTHS-2 model heaters 40-100 MBTU/H).*

Check the normally closed radiant sensor to see if it is stuck in the open position. See how to **(pg. 22, #8)**. If stuck open, the radiant sensor can be bypassed. See "How To" **(pg. 22, #7)** to confirm that there are no other failures.

2.4(-3) *(This step is applicable for DTHS-3 models only)*

Check the **Circuit Board (pg. 6, pic. 3)**. Use a volt meter to ensure that power is actually entering the circuit board. Turn off the gas to the heater and *bypass both pressure switches **(pg. 21, #6)**, as a heater with no cover will not allow pressure switches to function properly. 120 volts exiting the circuit board indicates that the glo-bar is faulty. If no voltage exits the circuit board, it 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.

Solution 3

Thermostat Closed, Fan & Glo-bar Operate, Glo-bar does not shut off and Valve does not open

(This step is applicable for all models)

3.1

The normally closed radiant sensor, located on the side of the tube in the sensor box, may be stuck in the open position. This can be confirmed by bypassing it. See how to **(pg. 22, #7)**.

If the heater operates with the switch bypassed, the problem is with the radiant sensor or what it is sensing, therefore you should continue with step 3.1a. If bypassing the radiant sensor does not work, the valve is faulty and must be replaced.

3.1a

Be sure the radiant sensor MICA is clean and intact.

3.1b

Check to make sure the glass on the underside of the radiant sensor is clear and not cracked or broken.

3.1c

Reconnect the radiant sensor into the system. If steps 3.1a - 3.1b were performed and the heater will not properly function, The radiant sensor 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.

Solution 4

Thermostat Closed, Fan & Glo-Bar Operate. After 45 Seconds Glo-Bar Shuts Off, No Ignition.

4.1
Be sure that the gas valves inside (DTHS-3 Series) and outside of the heater are turned to the **ON** position.

4.2
Locate and confirm that the gas orifice is not plugged with dirt, spider webs or rust.

4.3
(DTHS-3 models) Turn off the gas to the heater and ***bypass both the ***Burner & Exhaust*** Pressure Switches **(pg. 21, #6)**. Test the voltage coming from the **Circuit Board** to the **Gas Valve (pg. 6, pic. 6)** using a volt meter. If there is 120 volts, the gas valve is faulty. If there is less than 102 volts or no voltage at all, the circuit board is faulty.

(DTHS-2 models) One of the three (3) coils on the gas valve may be faulty. This can be confirmed by ohming out the valve. See how to **(pg. 22, #9)**. If one or more coils are bad the valve is faulty and must be replaced.

4.4
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 (DTHS-3) OR EXTERNAL REGULATOR (DTHS-2) ARE 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 REACHING 1/2 POUND.
>
> **NOTE:** THE EXTERNAL REGULATOR CAN STICK CLOSED IF HIGH PRESSURE IS PUT TO IT. TO CONFIRM THIS, LOOK INTO THE INLET OF THE REGULATOR. IF YOU CAN SEE THE POPPET HANGING FROM THE TOP OF IT, IT IS NOT LOCKED UP. IF YOU CANNOT, IT IS LOCKED UP FROM HIGH PRESSURE AND MUST BE REPLACED.

Solution 5

Thermostat Closed. Fan & Glo-Bar Operate. Ignition Occurs. Burner Cycles Off after 35 to 55 seconds & Glo-bar starts to glo immediately.

(DTHS-2 models) The glo-bar is hot enough to open the radiant sensor, but the flame is not hot enough to hold it open (see 3.1).

Take a manifold pressure to verify proper gas supply (see 4.4) **(pg. 21, #2)**.

Solution 6

Thermostat Closed. Fan & Glo-Bar Operate. Ignition Occurs. Burner Cycles Off & will not Recycle.

There are two possibilities:

1) The Burner cycles for 8 seconds and shuts off (DTHS-3 Models).

6.1
The polarity could be incorrect. Check the systems wiring **(pg. 21, #3) (See installation-operation manual wiring diagram)**.

6.2
The heater senses flame through ground. Therefore, the unit might not be properly grounded. The wiring should be inspected **(pg. 21, #4)**.

6.3
There may be loose connections somewhere within the heater, or, the circuit board may be faulty.

6.4
The gas pressure is too low. Check the manifold pressure **(pg. 6, pic. 6 & pg. 21, #2)** for appropriate pressure.

6.5
The glo-bar may be cracked. **(pg. 6, pic. 7)**. Check for visible damage.

2) The Burner cycles for more or less than 8 seconds and shuts off (DTHS-2 & -3).

6.6
Follow steps 6.1 - 6.5.

6.7
The **Exhaust Pressure Switch** is located on the valve side of the heater **(pg. 6, pic. 4)**. ***Bypass this switch **(pg. 21, #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)*. If bypassing this switch does not cause the heater to work, continue with step 2.4 *(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.

Solution 7

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

Refer to steps 6.6 - 6.7.

Solution 8

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.

8.1
If the manifold pressure is not high enough, (3.8" natural for 40-125 MBH, 6.0" natural for 150 MBH and 10" for propane) the heater will not deliver the desired amount of heat. Check the **Manifold Pressure (pg. 6, pic. 6)** and **pg. 21, #1 & #2)**.

8.2
Locate and confirm the orifice is not plugged with dirt, spider webs or rust.

8.3
Check the burner assembly to make sure it is clear of any obstructions.

8.4
Be sure the reflector is in place and clean. Use a soft cloth and aluminum cleaner to clean the reflector.

8.5
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.

Solution 9

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.

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.

Solution 10

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 (Tow To part 2). 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.

Solution 11

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 below.

11.1
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. 6, pics. 5 & 8)**.

11.2
Contaminated combustion air could alter the flame characteristics, overheating the tube and causing it to bow. See your manual for air-intake specifications.

11.3
Too much gas may also overheat the tube and cause it to bow.Check the manifold (How To part 2) pressure **(pg. 6, pic. 6)**.

11.4
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.

Solution 12

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.


Solution 13

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.

Solution 14

Stack Sooting

Soot accumulation can be caused by the following:

14.1
If the air entering the system is not clean (see solutions 6 & 8), soot will form.

14.2
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 2.2e) **(pg. 6 pic. 8)**.

14.3
Too much gas entering the system will cause soot to form. Check the manifold (section 6.1) pressure **(pg. 6, pic.6** and **pg. 21, #2**) for the appropriate pressure.

14.4
Check the atmospheric vents on both pressure switches to be sure they are clean and clear. (see 2.3b).

14.5
Be sure there is no excessive back pressure on the system. (Example - high winds, bird nest, snow, etc.)

Solution15

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 solutions 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.

DTH / DTHS History

Model	Year	Fan	Burner Switch	Exhaust Switch	Sensor/ Circuit Board	Glo-Bar	Regulator	Valve	Manifold Pressure	Tubes
DTH	NOV. 86 & PRIOR	TP-55	TP-61	TP-60	TP-64	TP-50	N) TP-33 P) TP-33P	TP-36	N) 3.8" P) 10.0"	TP-8 SUB TP-8B 100MBH. N AND BELOW. TP-8D 100MBH. P.
DTHS	1984 & PRIOR	TP-55	TP-61	TP-60	TP-64	TP-50	N) TP-33 P) TP-33P	TP-36	N) 3.8" P) 10.0"	**16 INCH TUBE:** TP-6 SUB TP-6A. **10 FOOT TUBE:** TP-26 SUB TP 26A 100MBH. N AND BELOW, TP-26B 100MBH. P.
DTHS	1985 TO NOV. 86	TP-55	TP-61	NONE	TP-64	TP-50	N) TP-33 P) TP-33P	TP-36	N) 3.8" P) 10.0"	**16 INCH TUBE:** TP-6 SUB TP-6A. **10 FOOT TUBE:** TP-26 SUB TP 26A 100MBH. N AND BELOW, TP-26B 100MBH. P.
DTH(S)-2	NOV. 86 TO JAN. 87	TP-55A	TP-61A	TP-60	TP-64	TP-50	N) TP-33 P) TP-33P	TP-36	N) 3.8" P) 10.0"	DTH: TP-8B 100MBH. N AND BELOW. TP-8D 100MBH. P. DTHS: **16 INCH TUBE:** TP6A **10 FOOT TUBE:** TP26A 100MBH. N AND BELOW TP-26B 100MBH. P.
DTH(S)-2	JAN. 87 TO APR. 92	TP-55A	TP-61A	TP-60A	TP-64	TP-50	N) TP-33 P) TP-33P	TP-36	N) 3.8" P) 10.0"	DTH: TP-8B 100MBH. N AND BELOW. TP-8D 100MBH. P. DTHS: **16 INCH TUBE:** TP6A **10 FOOT TUBE:** TP26A 100MBH. N AND BELOW TP-26B 100MBH. P.
DTH(S)-2	APR. 92 TO JAN 00	TP-55A	TP-61B	TP-60C	TP-64	TP-50	N) TP-33 P) TP-33P	TP-36	N) 3.8" P) 10.0"	DTH: TP-8B 100MBH. N AND BELOW. TP-8D 100MBH. P. DTHS: **16 INCH TUBE:** TP6A **10 FOOT TUBE:** TP26A 100MBH. N AND BELOW TP-26B 100MBH. P.
DTH(S)-2 125, 150MBH	1988 TO 1989	TP-55A	TP-61A	TP-60B	TP-77	TP-50	N/A	TP-36 (A,B,C)	125 N) 3.8" 125 P) 10.0" 150 N) 6.0" 150 P) 10.0"	DTH: TP-8B 100MBH. N AND BELOW. TP-8D 100MBH. P. 125 AND 150MBH. N OR P. DTHS: **16 INCH TUBE:** TP6A **10 FOOT TUBE:** TP26A 100MBH. N AND BELOW TP-26B 100MBH. P. 125 AND 150MBH N OR P.
DTH(S)-3 125, 150MBH	1989 TO 1994	TP-55A	TP-61A SUB TP-61B	TP-60B SUB TP-60D	TP-78A W/TP-78B	TP-50	N/A	125N: TP-107 125P: TP-107P 150N: TP-79 150P: TP-79A	126 N) 3.8" 125 P) 10.0" 150 N) 6.0" 150 P) 10.0"	DTH: TP-8B 100MBH. N AND BELOW. TP-8D 100MBH. P. 125 AND 150MBH. N OR P. DTHS: **16 INCH TUBE:** TP6A **10 FOOT TUBE:** TP26A 100MBH. N AND BELOW TP-26B 100MBH. P. 125 AND 150MBH N OR P.

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. 6, 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 - Bypass 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).***

HOW TO...

7- Bypass a Radiant Sensor:

- Turn off the power to the heater.
- Remove the cover on the radiant sensor box.
- Disconnect the black and white wire from the radiant sensor and connect them together. (**WARNING**: **there will be 120 volts at these two wires so they can not be touching you or anything else.)**
- Turn on the power to the heater and let the glo-bar heat up for one minute.
- Disconnect the two wires, if the heater fires and keeps firing up until the thermostat is satisfied the radiant sensor may be bad or the sensor mica may be dirty. (**WARNING**: **there will be 120 volts at these two wires so they can not be touching you or anything else.)**

8- Checking a Radiant Sensor for continuity:

- Turn off the power to the heater.
- Remove the cover on the radiant sensor box.
- Disconnect the black and white wire from the radiant sensor. (**WARNING**: **there will be 120 volts at these two wires so they can not be touching you or anything else.)**
- Using a multi-meter measure across the normally closed switch, if it is open then the radiant sensor is bad.

9- Ohming out the WR 25K valve:

- Turn off the power to the heater.
- Remove the cover on the radiant sensor box.
- Disconnect the black and white wire going to the radiant sensor (**WARNING**: **there will be 120 volts at these two wires so they can not be touching you or anything else.)**, at the white or orange wirenuts. Disconnect the black valve wire going to the pressure switch, the red neutral wire, and the two red glo-bar wires, at the plug.
- Using a muli-meter measure the ohm reading across the red(-) and black(+) on the valve. If the reading is 567-694 ohms the coils are good, if 1100-1430 one or more coils are bad and valve must be replaced.

10- Enlarge the Radiant Sensor hole:

- Turn off the power to the heater.
- Remove the cover on the radiant sensor box.
- Disconnect the black and white wire from the radiant sensor and remove the sensor and mica.
- If the hole is ¼" x 1" it will have to be enlarged to 5/8" x 1 ¼". This is best accomplished by using a die grinder. Note: If using any tool that penetrates the tube more than ¼" remove the glo-bar as not to damage it.

HOW TO...

11- Installing a TP-CPA-2 on a single pressure switch straight tube.

- Turn off the power to the heater.
- Remove the burner box lid.
- Disconnect the wires going to the fan, door switch and pressure switch(s) along with the white neutral wire going to the red neutral on the gas valve.
- Remove the door switch.
- Remove the 6 screws that hold the center panel in the burner box, then remove the center panel along with the fan and pressure switch still attached.
- Install the new center panel using the old screws.
- Rewire the heater according to the wiring diagram on page 3.
- On the front panel of the burner box (same side that the emitter tube is attached to) there are two bolts with nuts. One bolt is plugging a hole in the fan compartment the other is plugging a hole in the valve compartment. Remove these bolts and discard.
- Align the vinyl tube from the atmospheric side of the pressure switch in front of the hole and install the brass barb fitting from the outside of the box.
- Install the burner box lid and turn power to heater back on.