RE-VERBER-RAY

DETROIT RADIANT PRODUCTS COMPANY

®

TUBE HEATER TROUBLESHOOTING GUIDE

MODELS: DX, DX-2 & XTS

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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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).

Theory of Operation

Starting Circuit

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.

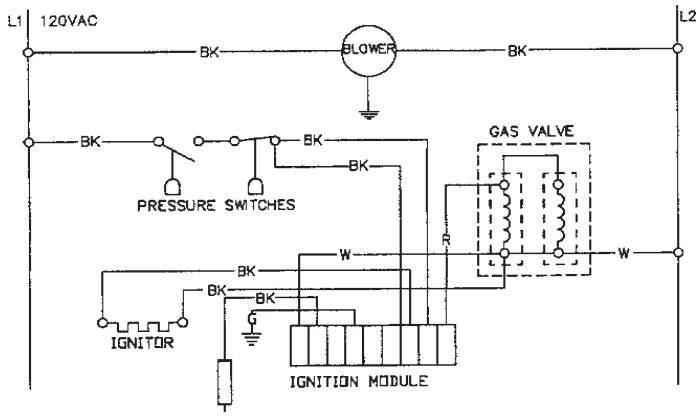
Air pressure generated by the blower will cause the normally open burner pressure switch No. 1 to close. Another circuit is completed from L1 to the hot surface ignition control and back to L2. There is a five second delay, then the glo-bar is powered. After the glo-bar has been powered for 45 seconds, 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.

Running Circuit

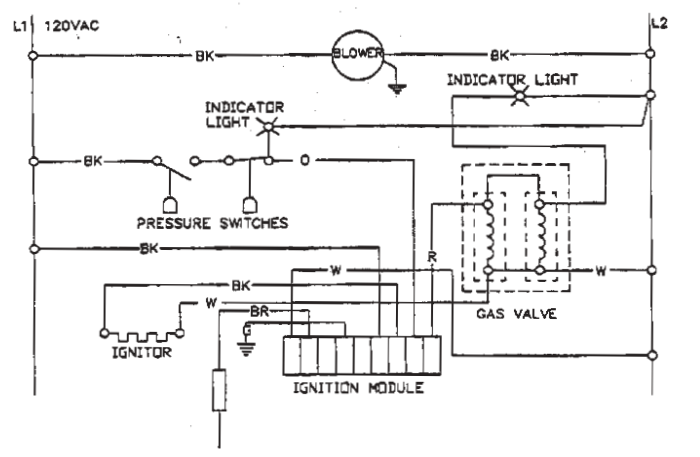
After ignition, the flame rod monitors the flame. As long as a flame is present, the valve is held open. If the flame is lost, the control acts to close the valve within one second, and a new trial sequence identical to that at start-up is initiated. If proof of flame is not established within 8.5 seconds,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

Note: The DX-2 Series heaters have added indicator lights to assist in troubleshooting and ignition sequence.

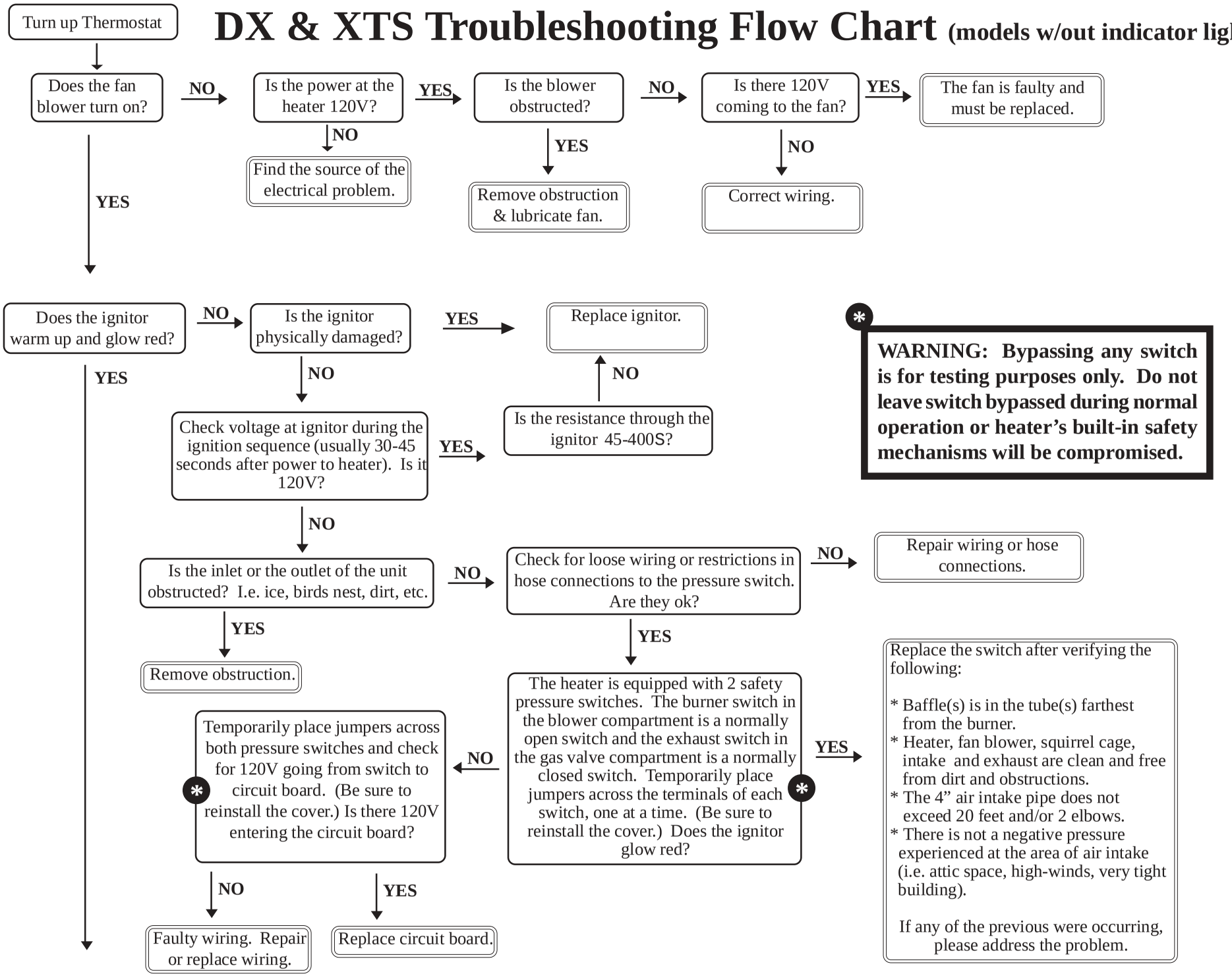
DX/XTS Series Heaters

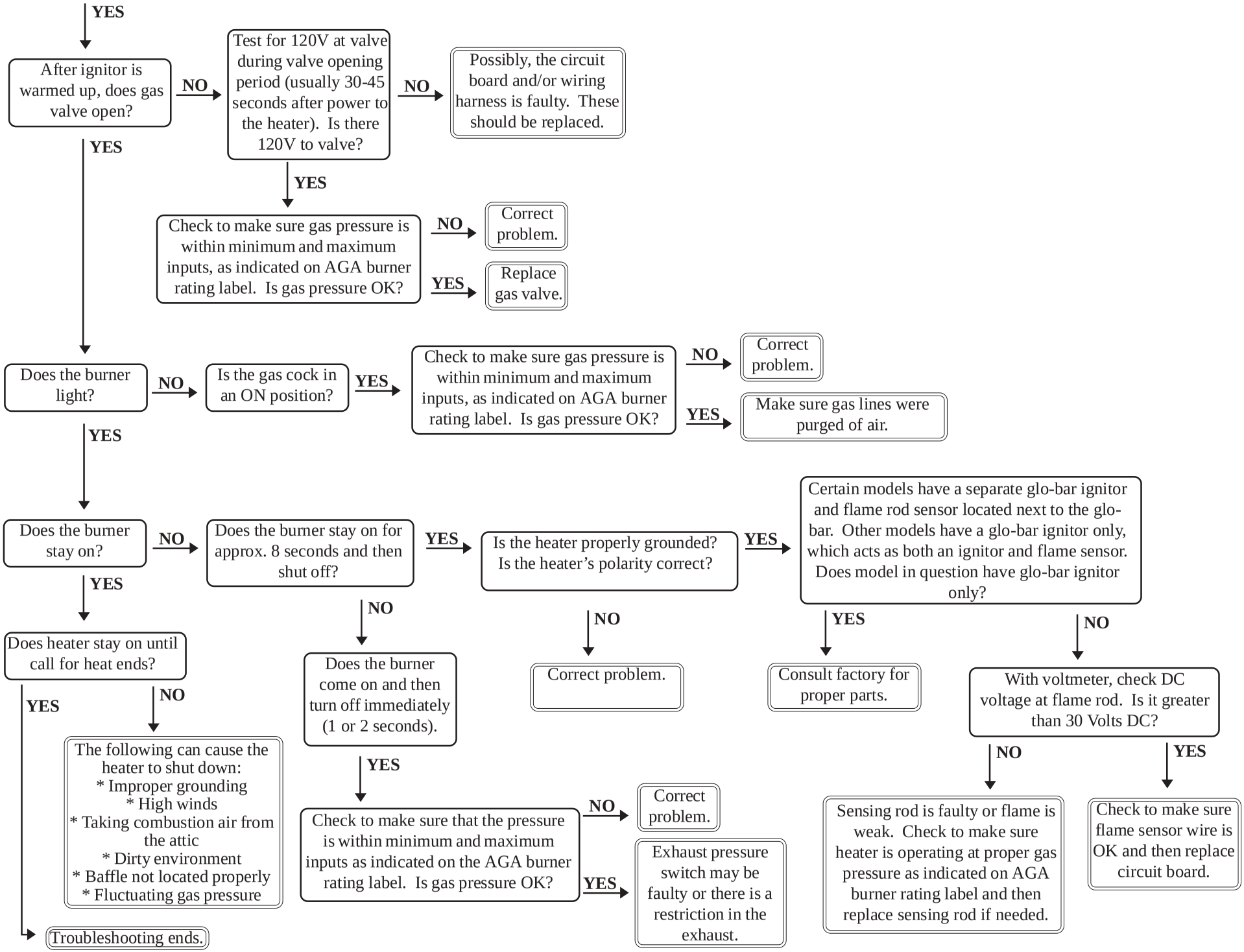


DX-2 Series Heaters

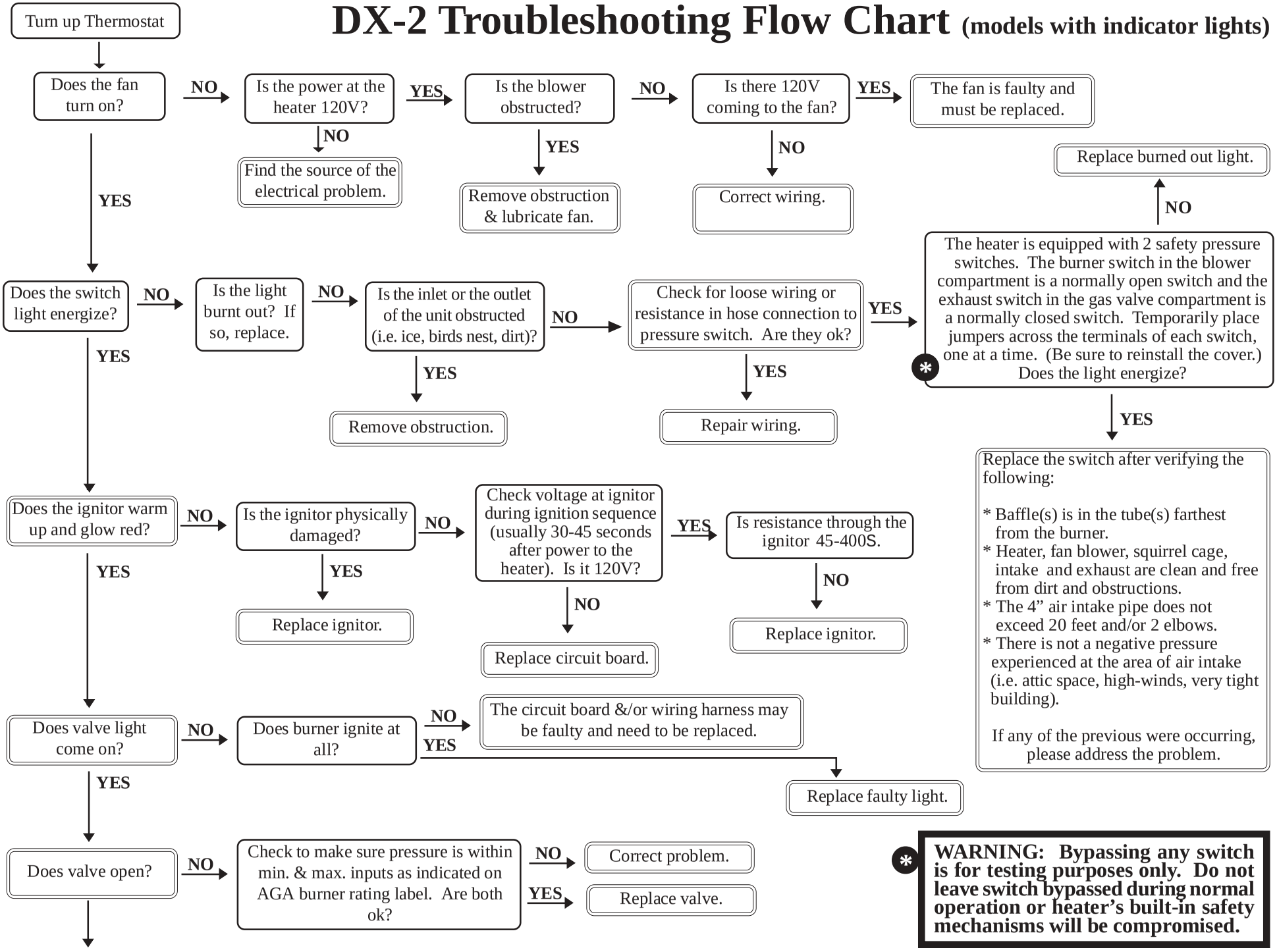


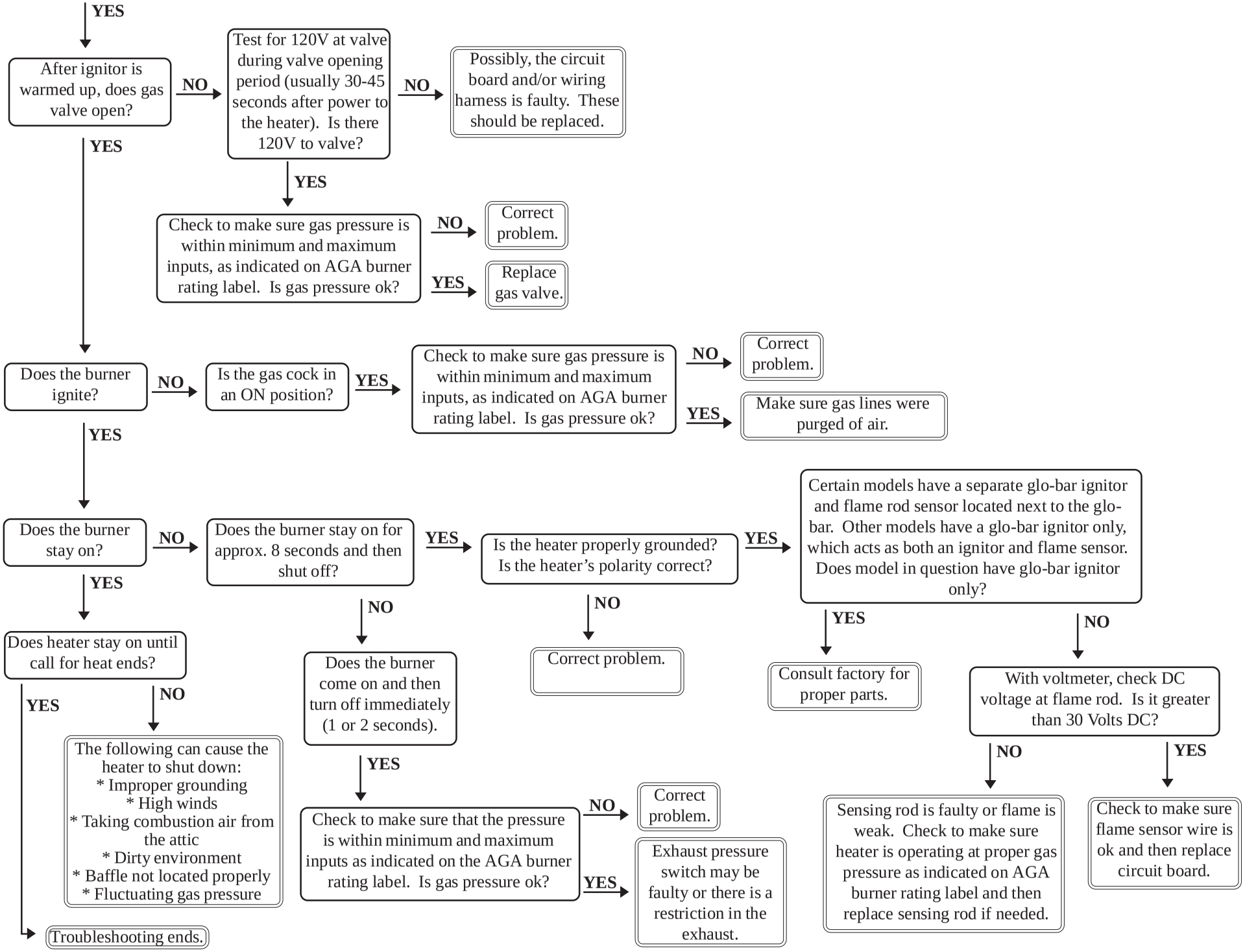
DX & XTS Troubleshooting Flow Chart (models w/out indicator lights)



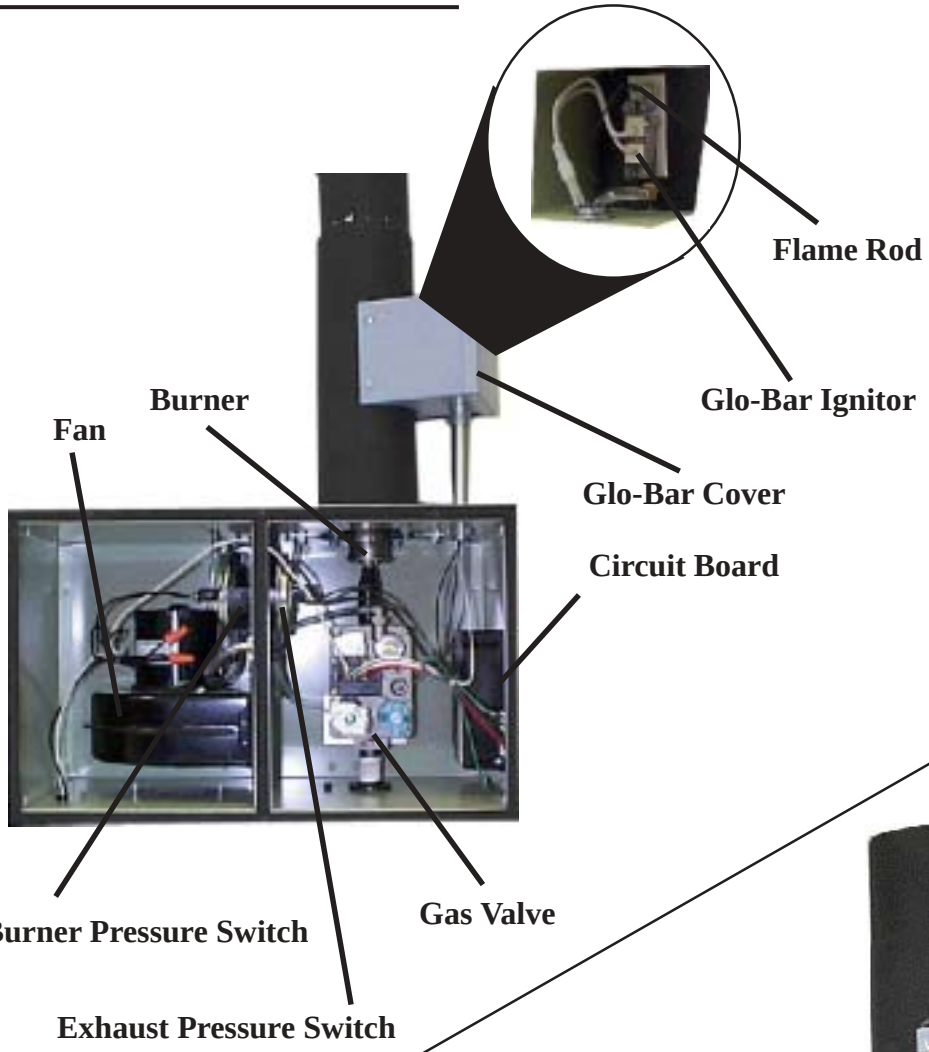

YES
After ignitor is warmed up, does gas valve open?
NO
Test for 120V at valve during valve opening period (usually 30-45 seconds after power to the heater). Is there 120V to valve?
NO
Possibly, the circuit board and/or wiring harness is faulty. These should be replaced.
YES
YES
Check to make sure gas 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.
Does the burner light?
NO
Is the gas cock in an 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.
YES
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?
YES
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
NO
Correct problem.
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.
Check to make sure flame sensor wire is OK and then replace circuit board.
YES
Does heater stay on until call for heat ends?
YES
NO
The following can cause the heater to shut down:
* Improper grounding
* High winds
* Taking combustion air from the attic
* Dirty environment
* Baffle not located properly
* Fluctuating gas pressure
Troubleshooting ends.
NO
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?
NO
Correct problem.
YES
Exhaust pressure switch may be faulty or there is a restriction in the exhaust.

DX-2 Troubleshooting Flow Chart (models with indicator lights)

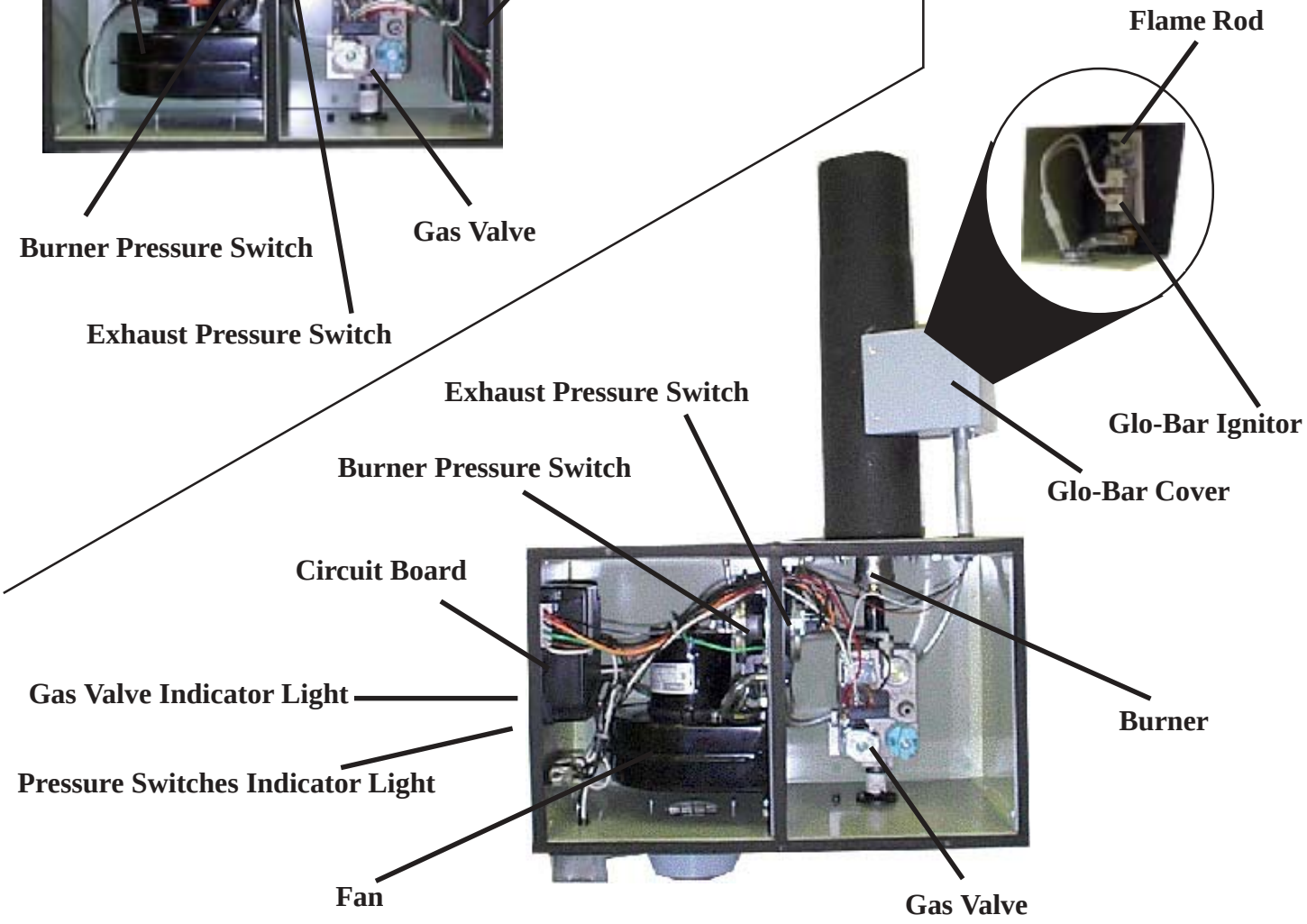



YES
After ignitor is warmed up, does gas valve open?
NO
Test for 120V at valve during valve opening period (usually 30-45 seconds after power to the heater). Is there 120V to valve?
NO
Possibly, the circuit board and/or wiring harness is faulty. These should be replaced.
YES
YES
Check to make sure gas 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.
Does the burner ignite?
NO
Is the gas cock in an 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.
YES
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?
YES
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
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.
YES
Check to make sure flame sensor wire is ok and then replace circuit board.
NO
Correct problem.
YES
Does heater stay on until call for heat ends?
NO
The following can cause the heater to shut down:
* Improper grounding
* High winds
* Taking combustion air from the attic
* Dirty environment
* Baffle not located properly
* Fluctuating gas pressure
YES
Troubleshooting ends.
NO
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?
NO
Correct problem.
YES
Exhaust pressure switch may be faulty or there is a restriction in the exhaust.

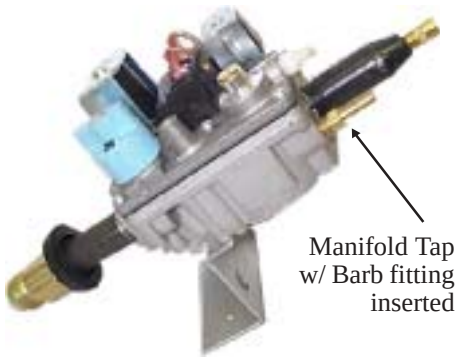
DX & XTS Series Heater

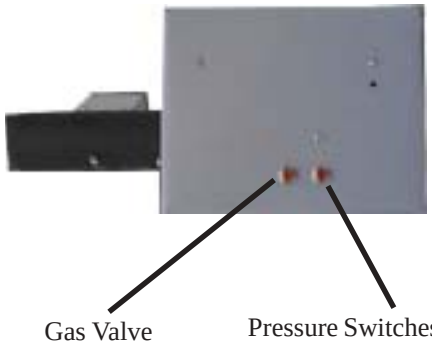


DX-2 Series Heater



PICTURE 1	PICTURE 2	PICTURE 3
		
Burner Pressure Switch	1) 125M-200M - Natural or Propane 2) 100M & below - Natural 3) 100M & below - Propane **Gas Burners**	**Circuit Board**

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

PICTURE 7	PICTURE 8	PICTURE 9
		
Glo-Bar & Flame Rod	**Air Intake Collar & Orifice**	**Switch & Valve Indicator Lights**

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.	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 12-13	Thermostat Closed. Fan operates. No Switch Lights. **Note:** If Glo-Bar is energized, the switch light is faulty.	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.	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.	2
Page 14	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.	3
Page 14	Thermostat closed, fan operates. Switch light is energized. No glo-bar energization.	1. Faulty glo-bar. 2. Faulty circuit control.	1. Replace. 2. Replace.	3
Page 15	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. Flame rod faulty.	1. Correct polarity. 2. Connect electrical ground with junction box. 3. Replace. 4. Provide required gas pressure. 5. Replace.	4
Page 15	Thermostat closed, fan operates. Switch light is energized. Glo-Bar is energized. No Valve light. **Note:** If heater fires, the valve light is faulty.	1. Disconnected valve wire. 2. Faulty circuit control.	1. Reconnect wire. 2. Replace circuit control.	4
Page 16	Thermostat closed. Fan and glo-bar operate. Ignition occurs. Burner cycles off. Burner recycles.	1. Low gas pressure. 2. Baffle improperly positioned. 3. Faulty exhaust pressure switch. 4. Restricted flue vent.	1. Provide required gas pressure. 2. Reposition baffle. 3. Replace. 4. Remove foreign matter.	5
Page 16	Thermostat closed, fan operates. Switch light, Glo-Bar and Valve light is energized. After 45 seconds, glo-bar shuts off. No Ignition.	1. Closed gas supply. 2. Dirty or restricted gas orifice. 3. Faulty valve or disconnected wires. 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. Lower inlet pressure.	5

Refers to DX-2 Series Heaters ***with*** Indicator Lights

Refers to DX or XTS Series Heaters ***without*** Indicator Lights

Refers to all Heaters

GENERAL TROUBLESHOOTING CHART

	SYMPTOM	EXPLANATION	SOLUTION
Page 16	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. **6** 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. **7**
Page 17	Condensation.	1. Stack length too long. 2. Light gauge flue stack used. 3. Contaminated combustion air.	1. Shorten stack. **8** 2. Minimum of 26 gauge vent pipe is required. 3. Provide fresh air inlet duct.
Page 17	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. **9** 2. Provide fresh air inlet duct. 3. Check gas pressure and orifice size. 4. Remount heater with 16" section of flex.
Page 17	Tube corroding.	1. Contaminated combustion air.	1. Provide fresh air inlet duct. **10**
Page 18	Visual inspection of burner operation not possible.	1. Dirty or sooted sight glass. 2. Unit mounted upside down.	1. Remove and clean or replace. **11** 2. Mount correctly.
Page 18	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. **12**
Page 18	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. **13** 2. Address ventilation concerns. 3. Address ventilation concerns/repair. 4. Tighten tube clamps to 50-100 ft. lb.
Page 19	"How To" Instructions	inlet pressure, manifold reading, proper polarity, positive ground, negative pressure, bypass pressure switches	

Refers to DX-2 Series Heaters ***with*** Indicator Lights

Refers to DX or XTS Series Heaters ***without*** Indicator Lights

Refers to all Heaters

1 - Thermostat Closed, Fan Does Not Operate

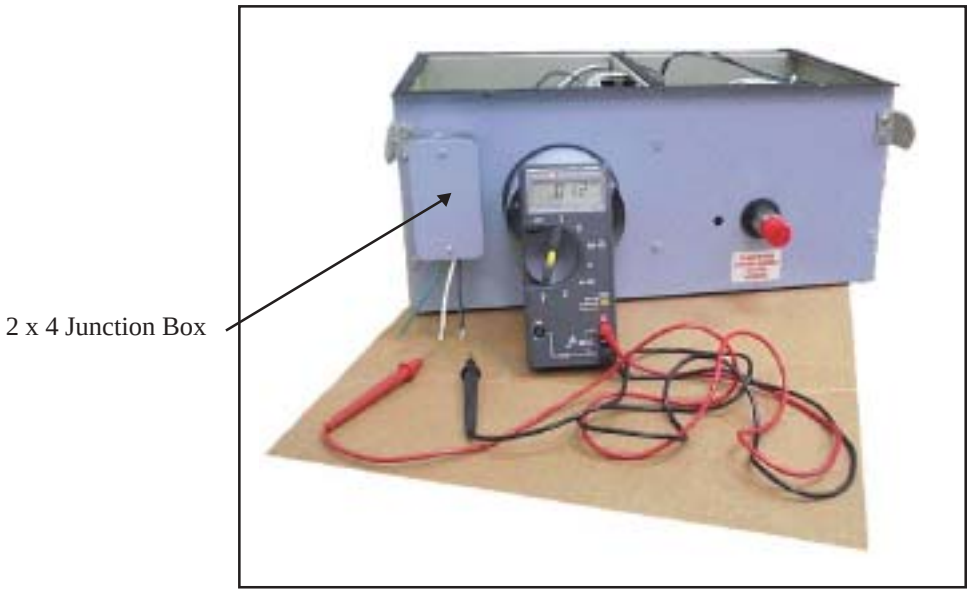
If the thermostat is closed (on) and heater does not operate, check the following:

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. 8, pic. 5)**. If there is power, try cleaning and oiling (SAE-20 oil) the motor. If fan still not working, it is faulty.



Picture 1.2

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. 19, #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 located properly. It should be found at the exhaust end of the emitter tube.

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 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

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. 8, pic. 4)**. ***Bypass this switch **(pg. 19, #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 correctly and tightly 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.

2.4 *(This step is applicable for DX & XTS models only)*

Check the **Circuit Board (pg. 8, 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. 19, #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

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

(This step is applicable for DX & XTS models only)

3.1
Be sure that the gas valves inside and outside of the heater are turned to the **ON** position.

3.2
Locate and confirm that the gas orifice is not plugged with dirt, spider webs or rust.

3.3
Turn off the gas to the heater and ***bypass both the **Burner & Exhaust Pressure Switches (pg. 19, #6)**. Test the voltage coming from the **Circuit Board** to the **Gas Valve (pg. 8, 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.

3.4
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 REACHING 1/2 POUND.

3 - Thermostat Closed, Fan Operates. Switches Light is Energized. No Glo-Bar Energization.

(This step is applicable for the DX-2 models only)

Check the **Circuit Board (pg. 8, pic. 3)**. Use a volt meter to measure the voltage the circuit board is sending to the glo-bar. This is done by hooking the voltmeters probes to the black and white wires leading from the circuit board to the glo-bar. If the measurement is 102V or less, the circuit board is faulty. If it measures 120V, the glo-bar is faulty.

NOTE: Do not unplug the glo-bar.


4 - 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.

4.1
The polarity could be incorrect. Check the systems wiring **(pg. 19, #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. 19, #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. 19, #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. 19, #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)*.

4 - Thermostat Closed. Fan Operates. Switch Light & Glo-Bar Energized. No Valve Light.

(This step is applicable for DX-2 models only)

Disconnected Valve Wire - The wire between the circuit board and the gas valve may be disconnected. Inspect and reconnect if necessary.

Faulty Circuit Board - If the valve wire is connected properly, the circuit board is faulty and must be replaced.

NOTE: If the Valve Wire is properly connected and the heater fires, the valve light is faulty.

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

(This step is applicable for DX/XTS models only)

Refer to steps 4.6 - 4.7.

5 - Thermostat Closed. Fan Operates. Switch Light, Valve Light & Glo-Bar Energized. After 45 Secs., Glo-Bar Shuts Off. No Ignition.

(This step is applicable for DX-2 models only)

5.1
Be sure that the gas valves inside and outside of the heater are turned to the **ON** position.

5.2
Locate and confirm that the gas orifice is not plugged with dirt, spider webs or rust.

5.3
Bypass both the **Burner & Exhaust Pressure Switches (pg. 19, #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 120 volts, the gas valve is faulty. If there is less than 102 volts or no voltage at all, the circuit board is faulty.

5.4
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 REACHING 1/2 POUND.

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. 19, #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 clean 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. 19, #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.)

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.

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:

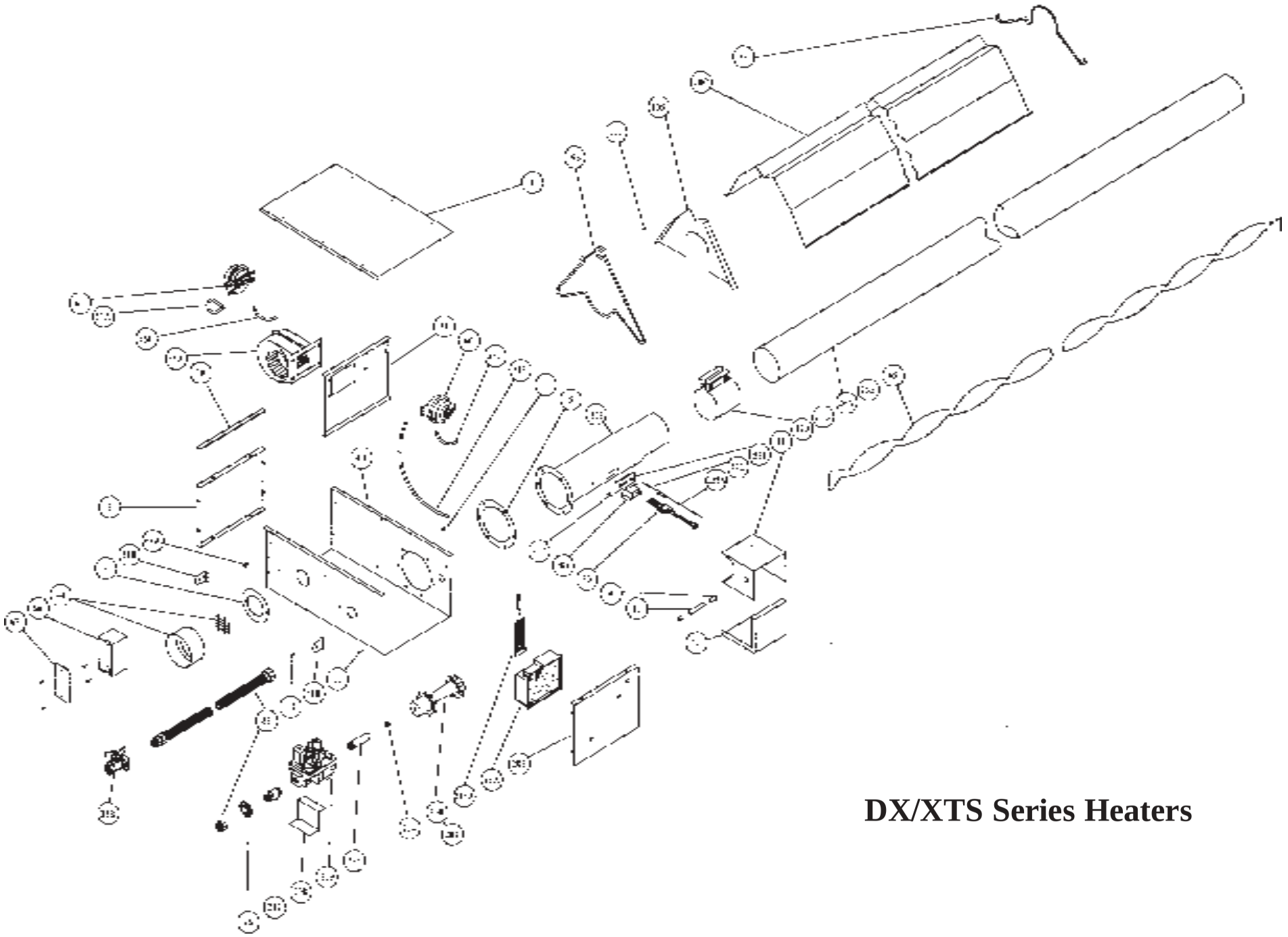
- Turn power off.
- Disconnect both black wires attached to the safety switches with a 1/4" female spade.
- Attach them to each other using alligator clips or electrical tape.
- Be sure this connection touches nothing else, especially metal.
- Turn power back on (***Do not leave switches bypassed during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

DX, XTS, DX-2 SERIES PARTS LISTING

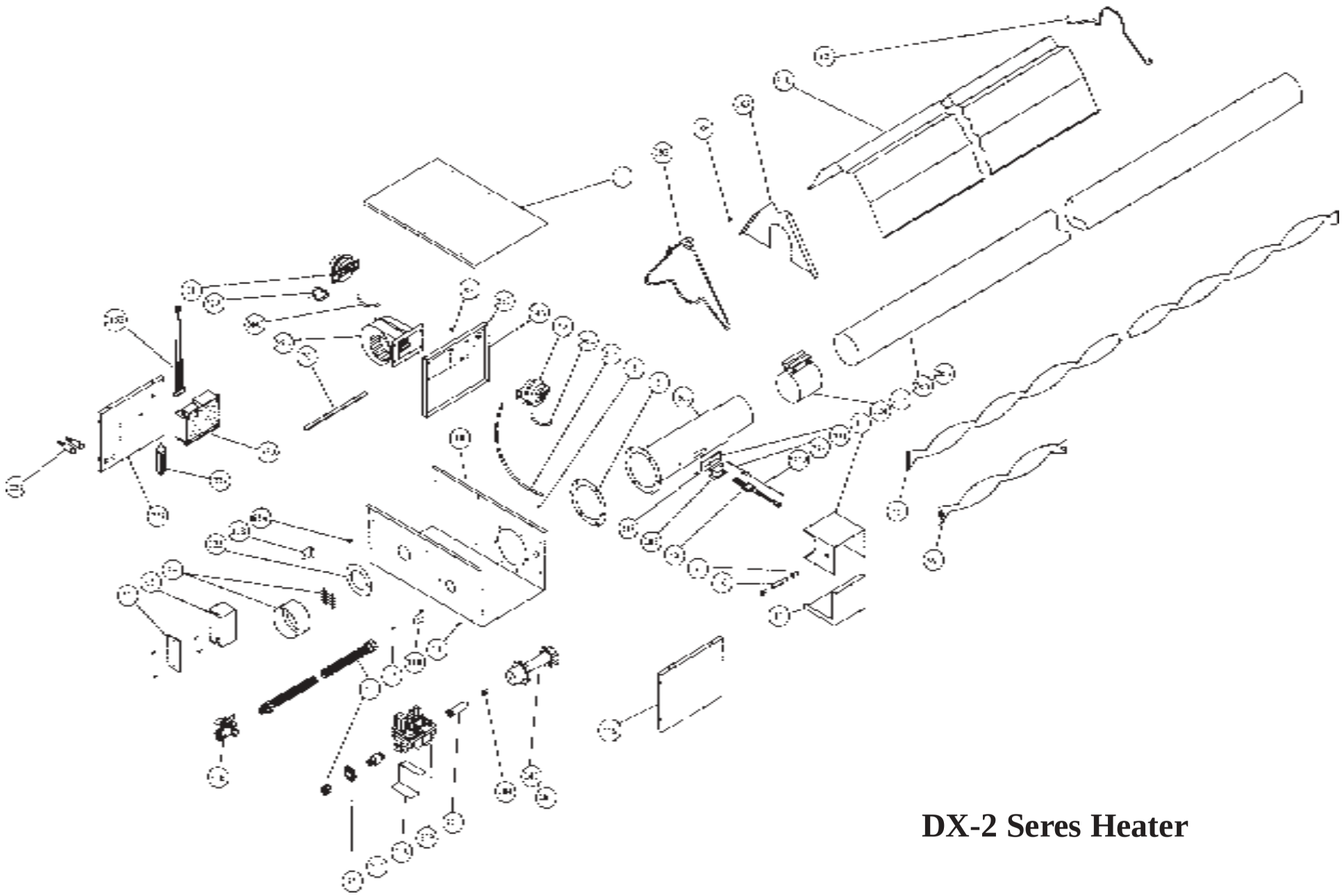
KEY	TP#	ITEM
ALL	TP-1	CONTROL BOX COVER
DX, XTS	TP-2	END PANEL NO HOLES - LEFT SIDE
ALL	TP-4B	DX/HL CONTROL BOX
ALL	TP-5	FLANGE GASKET
ALL	TP-9	CONDUIT COUPLING
ALL	TP-10	CONDUIT 4" X 1/2"
ALL	TP-11	GLO-BAR IGNITOR BOX
ALL	TP-12	GLO-BAR IGNITOR BOX COVER
ALL	TP-14	SIGHT GLASS GASKET
ALL	TP-15	SIGHT GLASS
ALL	TP-16	SIGHT GLASS WASHER
ALL	TP-19B	WIRE HANGER
ALL	TP-20C	120° REFLECTOR
ALL	TP-21B	TUBE CLAMP
ALL	TP-26A	10 FT. RADIANT TUBE STRAIGHT
ALL	TP-26B	10 FT. RADIANT TUBE STRAIGHT (AL-TI)
ALL	TP-31B	CONTROL BOX BRACKET
ALL	TP-33B	1/2" GAS COCK
ALL	TP-44	AIR ORIFICE W/SCREEN - CONSULT FACTORY
ALL	TP-50	GLO-BAR IGNITOR
ALL	TP-54	BURNER BOX DIVIDER
ALL	TP-54A	DIVIDER PANEL W/ P.S. MOUNTING TABS
ALL	TP-55A	FAN BLOWER
ALL	TP-59C	1/4" ATMOSPHERIC TUBE (VINYL)
ALL	TP-57A	1/4" PRESSURE TUBE
ALL	TP-60F	EXHT PRESS. SWITCH (50 TO 150 MBTU/H)
ALL	TP-60G	EXHT PRESS. SWITCH (175 & 200 MBTU/H)
ALL	TP-61B	BURNER PRESS SWITCH (50 TO 100MBTU/H)
ALL	TP-61C	BURNER PRESS. SWITCH (200 MBTU/H)
ALL	TP-61D	BURNER PRESS. SWITCH (125, 150, 175 MBTU/H)
ALL	TP-65A	66" HEAT DIFFUSER (BAFFLE)
ALL	TP-65B	99" HEAT DIFFUSER (BAFFLE)
ALL	TP-65C	132"HEAT DIFFUSER (BAFFLE)
ALL	TP-65D	165"HEAT DIFFUSER (BAFFLE)
ALL	TP-65I	INTERLOCKING 33" BAFFLE SECTION
DX,DX-2	TP-66	2" X 4" OUTLET BOX
DX, DX-2	TP-67	2" X 4" OUTLET BOX COVER
ALL	TP-68A	STRAIN RELIEF BUSHING
DX-2	TP-69	GREEN SELF TAP GROUND SCREW

KEY	TP#	ITEM
ALL	TP-70	CONTROL BOX COVER GASKET(PER FOOT**)
ALL	TP-76	RUBBER GROMMET
ALL	TP-76A	MARK 17X-117 CIRCUIT BOARD
ALL	TP-92	REFLECTOR CENTER SUPPORT
ALL	TP-93	STAINLESS STEEL FLEX CONNECTOR
ALL	TP-101	SUB TP-225
ALL	TP-104	SUB TP-223
ALL	TP-105	REFLECTOR END CAP
ALL	TP-106	REFLECTOR CLIP
ALL	TP-108	5' AL-TI TUBE, PAINTED W. ONE CLAMP
ALL	TP-111	5' ALUM. TUBE, PAINTED W/1 CLAMP
ALL	TP-112	5' REFLECTOR
ALL	TP-122	GASKET FOR AIR ORIFICE & AIR COLLAR
ALL	TP-200	BURNER (50 TO 100 MBTU/H NAT GAS)
ALL	TP-200A	BURNER (50 TO 100 MBTU/H LP GAS)
ALL	TP-201	BURNER (125 TO 200 MBTU/H NAT OR LP GAS)
ALL	TP 202	16' BURNER TUBE WITH FLANGE
DX, XTS	TP-203	DX END PANEL - RIGHT
ALL	TP-204	GAS ORIFICE - CONSULT FACTORY
ALL	TP-205	GLO-BAR HOLDER
ALL	TP-208	"Z" MOUNTING BRACKET
ALL	TP-209	36E36A-246 GAS VALVE - NAT GAS ASSY
ALL	TP-209P	36E36A-240 GAS VALVE - LP GAS ASSY
ALL	TP-212	1/2" X 3" PIPE NIPPLE
DX	TP-215	DX WIRING HARNESS
DX, XTS	TP-215A	SHORT WIRING HARNESS (USE W/ FLAME ROD)
DX-2	TP-215B	LONG WIRING HARNESS (USE W/ FLAME ROD)
ALL	TP-217	PRESSURE BARB FITTING
ALL	TP-218	EXHAUST PRESSURE TUBE (VINYL)
DX, DX-2	TP-220	STAIN. STL. TUBE CLAMP (175 & 200 MBTU/H)
ALL	TP-221	GLO-BAR HOLDER GASKET
ALL	TP-222	FLAME ROD
ALL	TP-222A	FLAME ROD WIRE
ALL	TP-223	GAS MANIFOLD
DX-2	TP-226	RIGHT END PANELS - NO HOLES
DX-2	TP-227	LEFT END PANEL W/ LIGHT HOLES
DX-2	TP-229	120V INDICATOR LIGHT
DX-2	TP-228	1/4" NEUTRAL TERMINAL BLOCK
DX-2	TP-230	DIVIDER GROMMET

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



DX/XTS Series Heaters



DX-2 Seres Heater

NOTES