Always comply with the combustion air requirements in the installation codes. Combustion air at the burner should be regulated only by manufacturer-provided equipment. NEVER RESTRICT OR OTHERWISE ALTER THE SUPPLY OF COMBUSTION AIR TO ANY HEATER. MAINTAIN THE VENT/COMBUSTION AIR SYSTEM IN STRUCTURALLY SOUND AND PROPER OPERATING CONDITION.

12.0 Maintenance and Service

WARNING

If you turn off the power supply, turn off the gas (refer to Hazard Levels, page 2).

The material contained in the MAINTENANCE AND SERVICE Section of this manual is designed to aid a qualified service person in maintaining and servicing this equipment. This heater will operate with a minimum of maintenance. To ensure long life and satisfactory performance, a heater that is operated under normal conditions should be inspected and cleaned at the start of each heating season. If the heater is operating in an area where an unusual amount of dust or soot or other impurities are present in the air, more frequent maintenance is recommended.

When any service is completed, be careful to reassemble correctly to ensure that no unsafe conditions are created. When relighting, always follow the lighting instructions on the heater.

12.1 Maintenance Schedule

The following procedures should be carried out at least annually (see **FIGURE 28, page 37,** and Paragraphs 12.2.1 through 12.2.16):

- Clean all dirt, lint, and grease from the combustion air opening and venter assembly.
- Clean all dirt, lint, and grease from the fan blade, fan guard, and motor.
- Clean the condensate traps.
- Check the heat exchanger both internally and externally.
- Check the burner for scale, dust, or lint accumulation. Clean if needed.
- Check gas valve to ensure that gas flow is being shutoff completely.
- Check the vent/combustion air system for soundness. Clean openings. Replace any parts that do not appear sound.
- Check the wiring for any damaged wire. Replace damaged wiring (refer to Paragraph 8 for replacement wiring requirements).

NOTE: If replacement parts are required, use only factory-authorized parts.

12.2 Maintenance Procedures

12.2.1 Heat Exchanger Maintenance

This heater has a TCORE^{3} ® heat exchanger (patent pending).
Remove any external dirt or dust accumulation. Visually check the heat exchanger for cracks and holes. If a crack or hole is observed, replace the heat exchanger. A TCORE^{3} ® heat exchanger has a primary and a secondary heat exchanger; check both sections.

NOTE: Inspection of the lower portion of the heat exchanger is done with the burner removed. Refer to the Burner Service section below for information on inspecting the lower portion of the heat exchanger.

12.2.2 Burner Maintenance

This heater is equipped with a TCORE^{2}® burner.

Inspect the burner/control compartment annually to determine if cleaning is necessary. If there is an accumulation of dirt, dust, and/or lint, clean the compartment and follow the instructions below to remove and clean the burner.

CAUTION: Use of eye protection is recommended.

Burner Removal Instructions (See FIGURE 27)

1. Outside the cabinet, shut the gas supply off at the manual valve ahead of the union.
2. Turn off electric supply.
3. Disconnect the gas supply at the union outside of the cabinet.
4. Remove the access panel.

12.0 Maintenance and Service (Continued)

12.2 Maintenance Procedures (Continued)

12.2.2 Burner Maintenance (Continued)

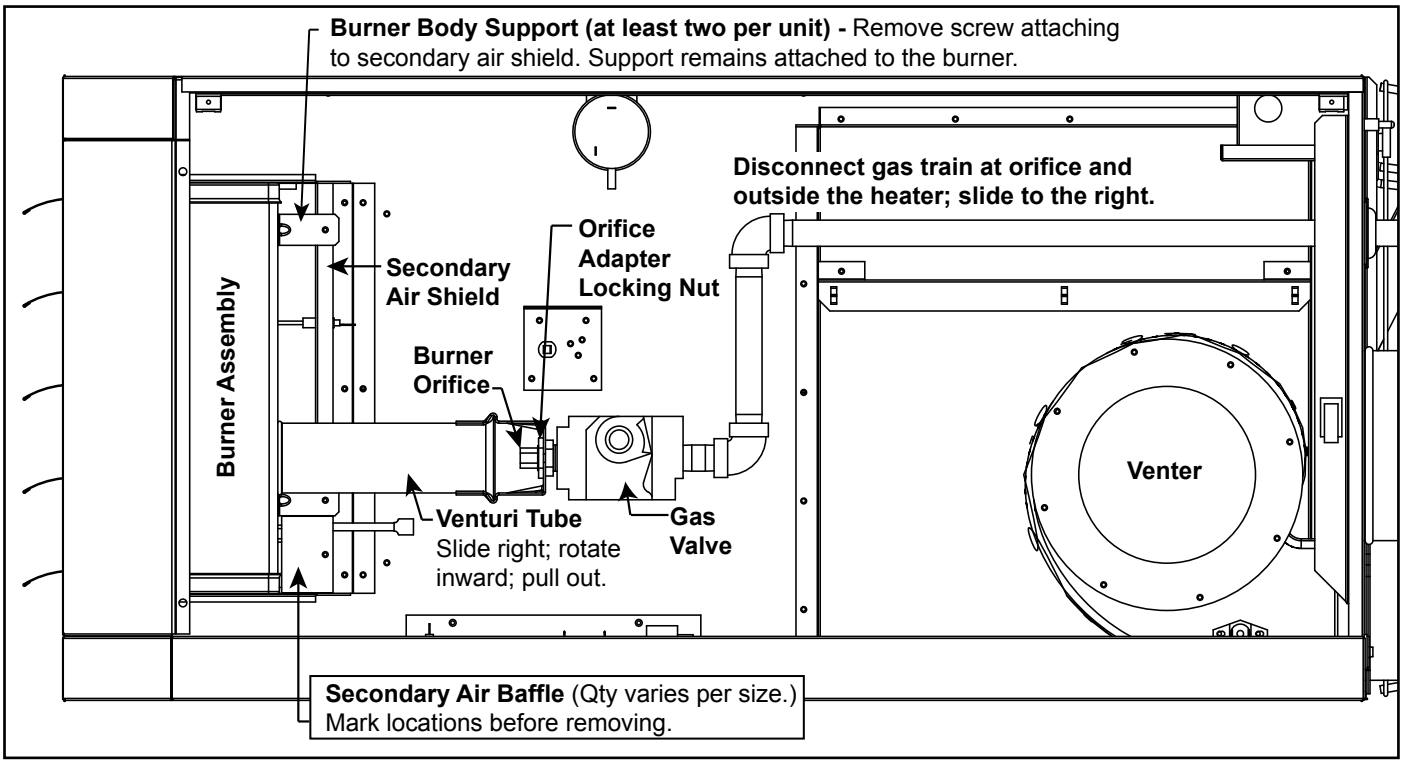
Burner Removal Instructions (Continued)

5. **Disconnect and Move the Gas Train:** At the gas valve, mark and disconnect the wires. Carefully remove the burner orifice and orifice adapter locking nut. Slide the orifice adapter out through the bracket on the burner pushing the gas train to the right. This will move the gas train out of the way.
6. **Remove Secondary Air Baffles:** Vertical along the right side of the burner, locate the flat plate(s) identified as the secondary air baffle(s). The quantity of baffles could be one to four depending on heater size. Each baffle is held in place by one screw. **For reassembly, on the secondary air shield, mark the location (top and bottom) of each baffle.** Remove all baffles.
7. **Remove Burner Assembly:**

   a) Locate the burner body supports. Depending on the size, the burner will have two or more supports. At each support, remove the one screw that attaches it to the secondary air shield

   b) Holding the venturi tube, slide the entire burner assembly slightly to the right to disengage the burner from the supports on the left. Then rotate the open end of the venturi tube inward toward the heater. Carefully pull the burner assembly out of the cabinet.

FIGURE 27. Burner Removal



Inspect and Clean the Burner

With the burner assembly removed, shine a flashlight on the burner ribbons. Look for carbon buildup, scale, dust, lint, and/or anything that might restrict flow through the spaces between the burner ribbons. Holding the burner assembly so that any foreign material will fall away from the burner, use a stiff bristle brush to loosen and remove any foreign material(s). If the burner is excessively dirty, remove one of the burner end caps. Remove the four screws that hold the end cap to the burner housing. Lightly tap the end cap to remove it.

Clean all foreign material from the burner and venturi. After the burner is thoroughly clean, replace the end cap making certain that it is tight against the burner housing. **NOTE:** If any of the burner components are damaged or deteriorated, replace the burner assembly.

Inspect the Lower Portion of the Heat Exchanger (with burner assembly removed)

At the burner flame entrance of each tube, shine a bright light into each heat exchanger section. With the light shining into the heat exchanger, observe the outside for visible light. Repeat this procedure with each heat exchanger section. If any light is observed, replace the heat exchanger.

Reinstall the Burner

Instructions to Reinstall the Burner (Refer to FIGURE 27)

1. **Attach the Burner Assembly:** Holding the venturi tube, slide the entire burner assembly into position. Align the supports on the left side with the slots in the burner shield; sliding the supports into the slots. On the right, reattach each burner body support to the secondary air shield.
2. **Attach the Secondary Air Baffles:** Reattach the secondary air baffles as marked. Baffles may be different sizes and each **must** be attached in the correct location.
3. **Attach the Control Assembly:** Carefully slide the control assembly into position. Reattach with the same screws. Check to be sure all wire connections are secure.
4. **Attach the Gas Train:** Slide the gas train so that the orifice adapter is through the bracket. Fasten the gas train to the bracket with the locking nut. Install the gas orifice. Reconnect the wires to the gas valve.
5. **Close the access panel.**
6. **Reconnect the gas supply** at the union outside of the cabinet. Leak test the connection with leak detecting solution.
7. **Turn on the electric and the gas. Check for proper operation**.

12.2.3 Burner Orifice

Burner orifice usually only needs to be replaced when installing a gas conversion kit. If ordering a replacement orifice only, give BTUh content and specific gravity of gas, as well as the model and serial number of the unit. When removing or replacing the burner orifice, be careful not to damage the venturi tube and/or the bracket.

FIGURE 28. Location of Controls

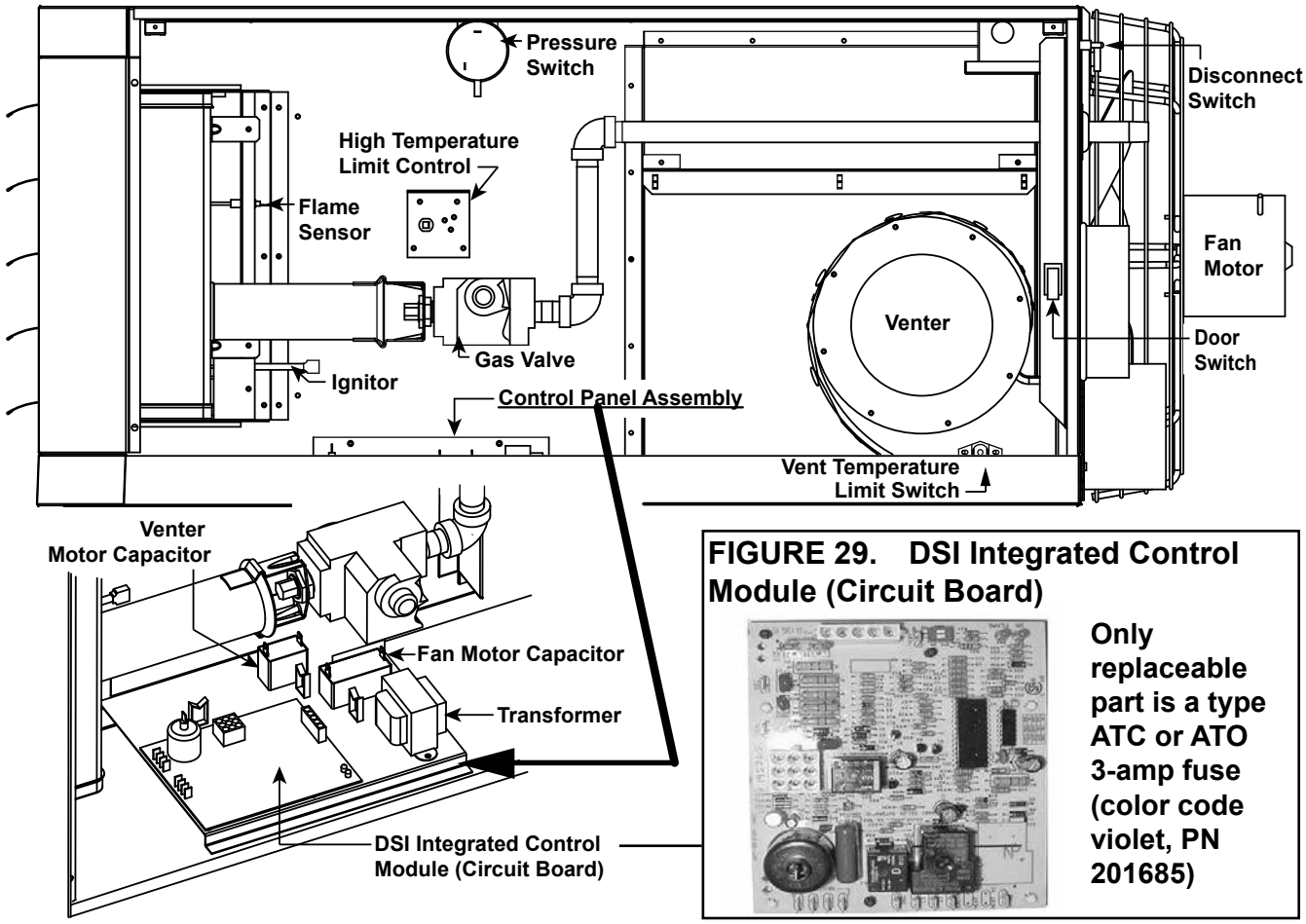


FIGURE 29. DSI Integrated Control Module (Circuit Board)

Only replaceable part is a type ATC or ATO 3-amp fuse (color code violet, PN 201685)

12.2.4. Ignition System

DSI Integrated Control Module (circuit board, see FIGURE 29): The module monitors the operation of the heater including ignition. The only replaceable component is the 3 amp Type ATC or ATO fuse. If the fuse is blown, the problem is most likely an external overload. Correct the problem and replace the fuse.

12.0 Maintenance and Service (Continued)

12.2 Maintenance Procedures (Continued)

12.2.4. Ignition System (Continued)

Do not attempt to disassemble the control module. However, each heating season check the lead wires for insulation deterioration and good connections.

Proper operation of the direct spark ignition system requires a minimum flame signal of 1.0 microamps as measured by a microampmeter.

NOTE: For additional information and check out procedure on the direct spark ignition system, refer to Paragraph 10 and the Troubleshooting Flow Chart in Paragraph 12.3.

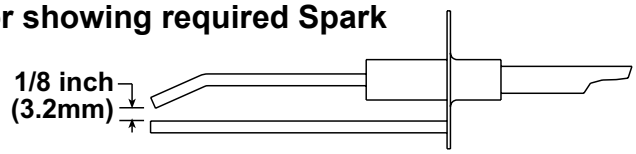
Ignitor: Refer to **FIGURE 28** and locate the ignitor. Disconnect the wire; remove the screw and the ignitor. Clean the ignitor assembly with an emery cloth.

Spark gap must be maintained to 1/8" (see **FIGURE 30**).

IMPORTANT: When reassembling, the brown ground wire must remain attached to the ignitor.

CAUTION: Due to high voltage on the spark wire and electrode, do not touch when energized (refer to Hazard Levels, page 2).

FIGURE 30. Ignitor showing required Spark Gap Measurement

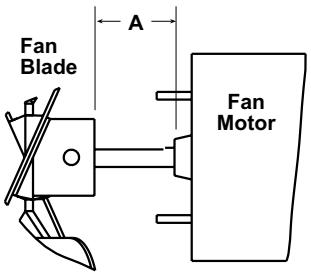


Flame Sensor

Flame Sensor: Refer to **FIGURE 28** and locate the flame sensor. Disconnect the wire; remove the screw and the flame sensor. Clean with an emery cloth.

12.2.5 Fan Motor, Fan Blades, and Guard

FIGURE 31. Fan Blade Position on Shaft



Dimension A

Size	inches	mm
130, 180	1-5/8	67
260	2	51
310	1-7/8	48

Remove dirt and grease from the motor, the fan guard, and blades. Use care when cleaning the fan blades to prevent causing misalignment or imbalance. Check that the hub of the fan blades is secure to the shaft.

Follow these instructions for replacement of the fan guard, fan motor and/or fan blades.

1. If the heater is installed, turn off the gas and disconnect the electric power.
2. Open the access door and disconnect the fan motor wires, capacitor wires at the capacitor, and ground screw.
3. Remove the assembled parts (the fan guard, the motor and the fan blade).
4. Disassemble and replace whatever parts are needed and reassemble using whatever part(s) are being replaced and the original parts. Be sure the fan blade is in the proper position on the shaft; refer to the illustration and table in **FIGURE 31.**

   Position the assembly on the heater. Attach the fan guard.

   Rotate the fan blade to check for adequate clearance. If adjustment is required, loosen the mounting screws, reposition the fan guard, and tighten the screws. Rotate the fan blade and recheck for adequate clearance. Repeat this procedure until the assembly is positioned properly.
5. Reconnect the fan motor wires according to the wiring diagram and close the access panel.
6. Restore power to the heater and turn on the gas. Light, following the instructions on the lighting instruction plate. Check for proper operation.

12.2.6 Venter Motor, Wheel, and Pressure Sensing Tap

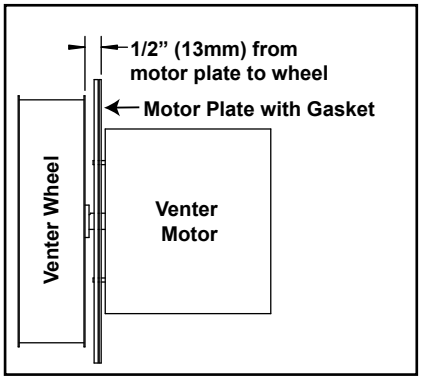
Remove dirt and grease from the motor casing, the venter housing, pressure sensing tap, and the venter wheel. Venter motor bearings are permanently lubricated. Follow these instructions for replacement of the venter motor and wheel assembly. Keep all hardware removed to be used in reassembling and installing the replacement parts.

1. Turn off the gas and disconnect the electric power.
2. Open the burner/control compartment access panel.

Replacement Instructions

3. Disconnect the three venter motor wires at the DSI control, capacitor wires at the capacitor (if applicable), and ground screw (located on the control panel).
4. Holding the venter motor, remove the six screws that attach the venter motor mounting plate to the venter housing. Remove the motor and wheel assembly from the heater.
5. Reassemble with the replacement venter motor and wheel assembly (see **FIGURE 32**). If the motor plate gasket is damaged, it must be replaced.
6. Follow the wiring diagram to connect the venter wires.
7. Replace the access panel. Restore power to the heater and turn on the gas. Light, following the instructions on the lighting instruction plate. Check for proper operation.

FIGURE 32. Venter Wheel Position on Shaft



12.2.7 Operating Gas Valve

WARNING

The operating valve is the prime safety shutoff. To ensure positive closure, clean all dirt and scale from gas supply lines before connecting to the unit (refer to Hazard Levels, page 2).

FIGURE 33. Pressure Tap for Checking Gas Flow Shutoff

NOTE: Operational pressure settings and instructions for checking pressure settings are in Paragraph 7.1.3.

Carefully remove external dirt accumulation and check wiring connections.

The combination gas valve must be checked annually to ensure that the valve is shutting off gas flow completely.

Instructions:

1) Locate the 1/8" NPT pressure tap on the combination valve.
2) With the manual valve turned off to prevent flow to the gas valve, connect a manometer to the 1/8" outlet pressure tap in the valve. **NOTE**: A manometer (fluid-filled gauge) is recommended.
3) Turn the manual valve to the ON position and the heater OFF. Use your finger to fully block the main burner orifice for several seconds. Observe the manometer with the orifice blocked, and if any pressure is indicated, the gas valve is leaking. **A leaking gas valve must be replaced before the heater is put back in operation**.

Top Views of Two Styles of Valves Used on UEAS Units

Pressure Switch

Limit Control

Door Switch

Transformer

12.2.8 Combustion Air Pressure Switch

See **FIGURE 28**, page 37, for location. If it is determined that the pressure switch needs replacing, use only the factory-authorized replacement part that is designed for the model and size of heater being serviced.

12.2.9 Limit Control

If it is determined that the limit control needs replacing, use only a factory-authorized replacement part that is designed for the size of heater.

For approximate limit location, see **FIGURE 28**, page 37.

12.2.10 Door Switch

If it is determined that the door switch needs replacing, use only a factory-authorized replacement part that is designed for the heater.

12.2.11 Transformer

Use a voltmeter to verify that there are 24 volts output from the transformer. If the transformer is not functioning, it must be replaced. Use a replacement transformer identical to the factory-installed model.

12.0 Maintenance and Service (Continued)

For location of controls, see FIGURE 28, page 37.

Vent Temperature Limit Switch

Disconnect Switch

12.2.14 Vent/Combustion Air System

12.2.15 Condensate Drain System

12.3 Troubleshooting

IMPORTANT: When using a multimeter to troubleshoot the 24 volt circuit, place the meter's test leads into the 5 or 9 pin connectors located on the ignition control. Do not remove connectors or terminals from the electrical components. Doing so can result in misinterpreted readings due to the ignition control board's fault mode monitoring circuits.

12.2 Maintenance Procedures (Continued)

12.2.12 Vent Temperature Limit Switch

The vent temperature limit switch is located on the discharge of the combustion air blower (venter) and its purpose is to prevent the vent gas temperature from exceeding a temperature that will harm the PVC vent pipe. If the vent temperature limit switch is activated, the cause must be determined and corrected before the heater is placed back into operation. Activation of the manually reset vent temperature limit switch could be caused by one or more of the following:

- Manifold gas pressure too high
- The heat content of the fuel being burned is too high
- Reduced circulating airflow due to dirty an/or plugged air moving components
- Excess dirt on the heat exchangers
- Failed heat exchanger(s)

After the cause is determined and corrected, depress the red button on the switch to reset it.

12.2.13 Disconnect Switch

The disconnect switch is located in the sealed electrical box inside the control compartment with the toggle on the rear of the heater.

If it is determined that the disconnect switch needs replacing, use only the factory-authorized replacement part that is designed for the heater. Always replace electrical box cover.

Check the complete system at least once a year. Inspection should include all joints, seams, concentric adapter box, inlet air guard or cap, and the vent terminal cap. Clean openings. Replace any defective parts.

Check the condensate disposal system annually. Remove the condensate traps and flush them with clear tap water to remove any sediment that my have accumulated. Check to be certain the piping to the sanitary drain has not been damaged. Check the sanitary drain to verify that it flows freely.

Check the Lights on the DSI Integrated Control Module (Circuit Board)

The integrated circuit board monitors the operation of the heater and includes two LED signal lights that indicate normal operation and various abnormal conditions. If the heater fails to operate properly, check this signal to determine the cause and/or to eliminate certain causes. LED is visible through the door (refer to operating sequence in Paragraph 10).

Do not attempt to repair the DSI integrated control module (circuit board); the only field-replaceable component is the fuse.

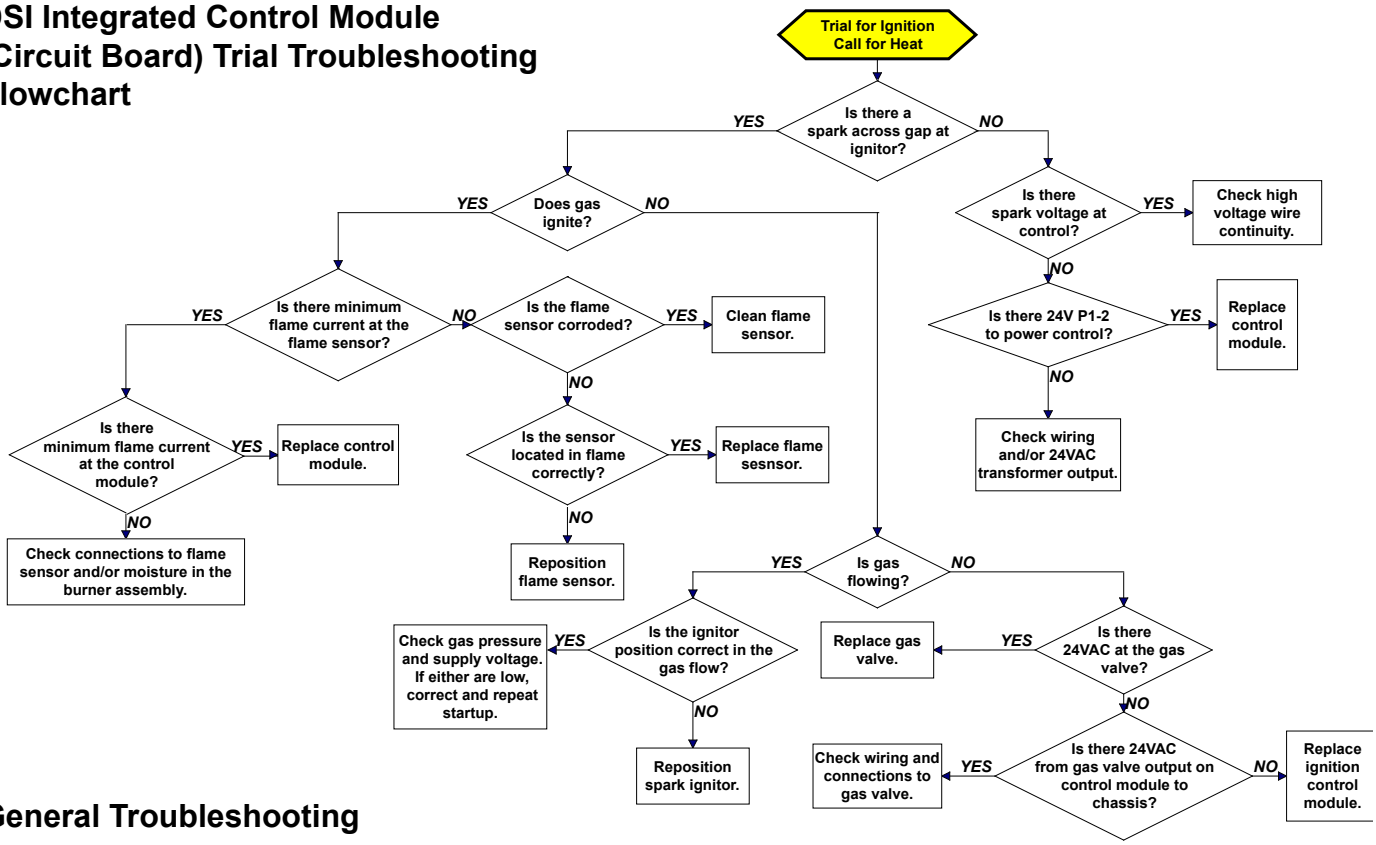
Control Status: Green LED Codes

Steady ON.....Normal Operation, No call for heat
Fast Flash.....Normal Operation, Call for heat
1 Flash.....System Lockout, Failed to detect or sustain flame
2 Flashes.....Pressure Switch Did Not Close within 30 Seconds of Venter Motor
3 Flashes.....High Limit or Vent Temperature Limit Open
4 Flashes.....Pressure Switch is Closed Before Venter Motor is Energized
Steady OFF....Blown fuse, No Power, or Defective Board

Flame Status: Yellow LED Codes

Steady ON.....Flame is sensed
Slow Flash.....Weak flame (current below 1.0 microamps ± 50%)
Fast Flash.....Undesired Flame (valve open and no call for heat)

DSI Integrated Control Module (Circuit Board) Trial Troubleshooting Flowchart



General Troubleshooting

Problem	Probable Cause	Remedy
Venter motor will not start	1. No power to unit	Turn on power; check supply fuses or main circuit breaker
		Turn on built-in disconnect switch; replace switch if not operating
	2. No 24V power to integrated circuit board	Turn up thermostat; check control transformer output
	3. Integrated circuit board fuse blown	Correct cause; replace fuse (type ATC or ATO, 32VDC, 3A)
	4. No power to venter motor	Tighten connections at circuit board and/or motor terminals
	5. Integrated circuit board defective	Replace integrated circuit board
	6. Defective venter motor	Replace venter motor (refer to Paragraph 12.2.6)
Burner will not light	1. Manual valve not open	Open manual valve
	2. Air in the gas line	Bleed gas line (initial startup only)
	3. Gas pressure too high or too low	Supply pressure should be 5–14 IN WC for natural gas or 11–14 IN WC for propane
	4. No spark	
	a) Loose wire connections	Ensure that all wire connections are solid
	b) Transformer failure	Ensure that 24 volts is available
	c) Incorrect spark gap	Maintain spark gap at 1/8" (3.2 mm)
	d) Spark cable shorted to ground	Replace worn or grounded spark cable
	e) Spark electrode shorted to ground	Replace if ceramic spark electrode is cracked or grounded
	f) Burner not grounded	Ensure that integrated circuit board is grounded to ignitor
	g) Circuit board not grounded	Ensure that integrated circuit board is grounded to furnace chassis
	h) Unit not properly grounded	Ensure that unit is properly field-grounded to earth ground and properly phased (L1 to hot lead L2 to neutral)
	i) Integrated circuit board fuse blown	Correct cause; replace fuse (type ATC or ATO, 32VDC, 3A)
	j) Faulty integrated circuit board	If 24 volt is available to integrated circuit board and all other causes have been eliminated, replace board
	5. Lockout device interrupting control circuit by above causes	Reset lockout by interrupting control at thermostat or main power
	6. Interlock door switch open	Close access door or replace switch
	7. Combustion air proving switch not closing	
	a) Unit is not properly vented	Ensure that unit is properly vented
	b) Obstructed vent	Remove obstructions from vent
	c) Faulty tubing to pressure switch	Replace faulty tubing to pressure switch
	8. Faulty combustion air proving switch	Replace combustion air proving switch
	9. Main valve not operating	
	a) Defective valve	If 24 volt is measured at valve connections and valve remains closed, replace valve
	b) Loose wire connections	Check and tighten all wiring connections

12.0 Maintenance and Service (Continued)

12.3 Troubleshooting (Continued)
General Troubleshooting (Continued)

Problem	Probable Cause	Remedy
Burner will not light (continued)	10. Integrated circuit board does not power main valve	
	a) Loose wire connections	Check and tighten all wiring connections
	b) Flame sensor grounded	Ensure that flame sensor lead is not grounded or that insulation or ceramic is not cracked; replace as required
	c) Incorrect gas pressure	Supply pressure should be 5–14 IN WC for natural gas or 11–14 IN WC for propane
	d) Cracked ceramic at sensor	Replace sensor
	11. Faulty time delay relay (applies to units manufactured *before* DEC 2012)	Replace time delay relay
Burner cycle on and off	1. Gas pressure too high or too low	Supply pressure should be 5–14 IN WC for natural gas or 5–14 IN WC for propane
	2. Burner not grounded	Ensure that integrated circuit board is grounded to ignitor
	3. Circuit board not grounded	Ensure that integrated circuit board is grounded to furnace chassis
	4. Faulty integrated circuit board	If 24 volt is available to integrated circuit board and all other causes have been eliminated, replace board
	5. Combustion air proving switch not closing	
	a) Unit is not properly vented	Ensure that unit is properly vented
	b) Obstructed vent	Remove obstructions from vent
	c) Faulty tubing to pressure switch	Replace faulty tubing to pressure switch
	6. Faulty combustion air proving switch	Replace combustion air proving switch
	7. Flame sensor grounded	Ensure that flame sensor lead is not grounded or that insulation or ceramic is not cracked; replace as required
	8. Cracked ceramic at sensor	Replace sensor
	9. Incorrect polarity	Reverse line volt leads to integrated circuit board
	10. Pin terminal loose on 9-pin plug	Replace wire harness
No heat (heater operating)	1. Incorrect valve outlet pressure or orifice	Check valve outlet pressure (refer to rating plate for manifold pressure)
	2. Cycling on limit control	Check air throughput
	3. Improper thermostat location or adjustment	Refer to thermostat manufacturer's instructions
Fan or venter motor will not run	1. Circuit open	Check wiring and connections
	2. Defective integrated circuit board	Replace board
	3. Defective motor	Replace motor
Fan or venter motor turns on and off while burner is operating	1. Motor overload device cycling on and off	Check motor load against motor rating plate; Replace motor if needed
Fan or venter motor cuts out on overload	1. Low or high voltage supply	Correct electric supply
	2. Defective motor	Replace motor
	3. Poor airflow	Clean motor, fan, and fan guard

APPENDIX

[A] CSA ratings for altitudes to 2000 feet.

[B] Size shown is for gas connection to a single-stage gas valve, not supply line size.

[C] MOCP = 2.25 × (largest motor FLA) + smallest motor FLA. Answer is rounded to the nearest available standard circuit breaker size.

[D] Except where indicated, information in this table is based on a heater equipped with a standard 115 volt open fan motor.

TECHNICAL DATA

	Unit Size	130	180	260	310
Input Heating Capacity	BTUh	131,000	175,000	260,000	305,000
	kW	38.4	51.2	76.1	89.3
Thermal Efficiency (%)		93	91	92	91
Output Heating Capacity [A]	BTUh	121,830	159,250	239,200	277,550
	kW	35.7	46.6	70.0	81.3
Gas Connection (inches) [B]	Natural or Propane	1/2	1/2	3/4	3/4
Vent Connection Diameter (inches)		4	4	4	4
Combustion Air Inlet Diameter (inches)		6	6	6	6
Control Amps (24 volt)		1.0	1.0	1.0	1.0
Full Load Amps (115 volt)		6.3	6.3	10.0	10.0
Maximum Over Current Protection [C D]	Standard 115V	15	15	20	20
Normal Power Consumption (watts)		657	657	1020	1020
Discharge Air Temperature Rise (°F)		50	60	50	60
Air Volume	cfm	2256	2458	4430	4283
	M^3/Minute	63.9	69.6	125.4	121.3
Discharge Air Opening Area	ft^2	2.6	2.6	4.8	4.8
	M^2	0.2	0.2	0.5	0.5
Outlet Velocity	fpm	883	962	924	894
	M/Minute	269	293	282	272
Fan Motor HP [D]	Standard Open	1/4	1/4	1/2	1/2
	Optional Enclosed	1/4	1/4	1/2	1/2
Fan Motor rpm		1050	1050	1050	1050
Fan Diameter (inches)		18	18	24	24
Approximate Condensate per Hour	Gallons	1	1	2	2
	Liters	4	4	8	8