9.0 Commissioning and Startup (cont'd)

9.3 Check installation after startup (cont'd)

☐Close all panels tightly. With the heater on, check limit control by completely blocking off distribution air. The limit control should open within a few minutes, shutting off the gas supply to the main burners.

☐ Place "Literature Bag" containing Limited Warranty Card, this booklet, and any optional information in an accessible location near the heater. Follow the instructions on the bag

DANGER

The gas burner in this gas-fired equipment is designed and equipped to provide safe, complete combustion. However, if the installation does not permit the burner to receive the proper supply of combustion air, complete combustion may not occur. The result is incomplete combustion which produces carbon monoxide, a poisonous gas that can cause death. Safe operation of indirect-fired gas burning equipment requires a properly operating vent system which vents all flue products to the outside atmosphere. FAILURE TO PROVIDE PROPER VENTING WILL RESULT IN A HEALTH HAZARD WHICH COULD CAUSE SERIOUS PERSONAL INJURY OR DEATH. Always comply with the combustion air requirements in the installation codes and in Paragraph 2.2. 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. Indoor units installed in a confined space must be supplied with air for combustion as required by Code and in Paragraph 2.2 of this heater installation manual. MAINTAIN THE VENT SYSTEM IN STRUCTURALLY SOUND AND PROPERLY OPERATING CONDITION.

10.0 Maintenance and Service

10.1 Maintenance Schedule

WARNING

If you turn off the power supply, turn off the gas. See Hazard Levels, Page 2.

This unit will operate with a minimum of maintenance. To ensure long life and satisfactory performance, a furnace that is operating under normal conditions should be inspected every four months. If the furnace is operating in an area where an unusual amount of dust or soot or other impurities are present in the air, more frequent inspection is recommended.

The following procedures should be carried out at least annually (See Paragraphs 10.2.1- 10.2.4 for specific instructions.):

☐ Clean all dirt and grease from the primary and secondary combustion air openings.

☐ Check the gas valve to ensure that gas flow is being shutoff completely.

☐ Clean the heat exchanger both internally and externally.

☐ Check the pilot burner and main burners for scale, dust, or lint accumulation. Clean as needed.

☐ Check the vent system for soundness. Replace any parts that do not appear sound.

☐ Check the wiring for any damaged wire. Replace damaged wiring. (See the wiring diagram for replacement wiring requirements.)

CAUTION: When cleaning, wearing eye protection is recommended.

NOTE: Use only factory-authorized replacement parts.

10.2 Maintenance Procedures

10.2.1 Operating Gas Valve

WARNING

The operating valve is the prime safety shutoff. All gas supply lines must be free of dirt or scale before connecting to the unit to ensure positive closure. See Hazard Levels, page 2.

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:

NOTE: Operational pressure settings and instructions for checking pressure settings are in Paragraph 6.1.

1) Locate the 1/8" FPT **INLET** pressure tap on the combination valve (**FIGURE 24**).

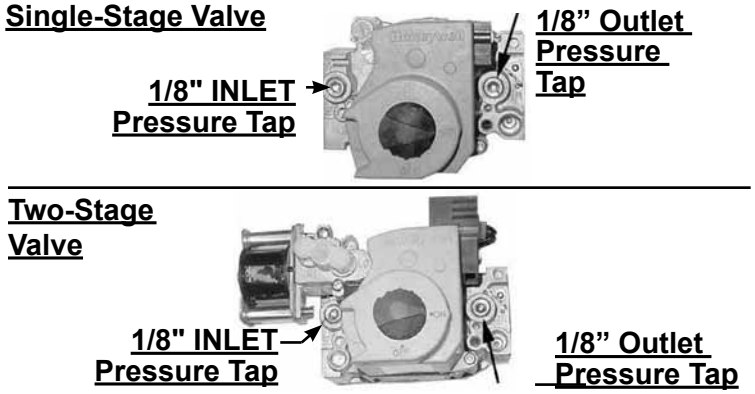


FIGURE 24 - Gas Valve Shutoff Check

CAUTION: DO NOT bottom out the gas valve regulator adjusting screw. This can result in unregulated manifold pressure causing excess overfire and heat exchanger failure.

2) With the manual valve turned off to prevent flow to the gas valve, connect a manometer to the 1/8" inlet pressure tap in the valve. **NOTE:** A manometer (fluid-filled gauge) with an inches water column scale is recommended.

3) With the field-installed manual valve remaining closed, turn the thermostat up to fire the unit and allow the unit to go through one trial for ignition. Reset the thermostat to shut the unit off. Observe the manometer for two to three minutes for an indication of gas pressure. No pressure should be indicated on the manometer. **If the manometer indicates a gas pressure**, the field-installed manual gas valve must be replaced or repaired before the combination gas valve can be checked.

4) **If the manometer does not indicate gas pressure**, slowly open the field-installed manual gas valve. After the manometer's indicated gas pressure has reached equilibrium, close the manual shutoff valve. Observe the gas pressure. There should be no loss of gas pressure on the manometer. If the manometer indicates a loss of pressure, replace the combination gas valve before placing the heater in operation.

10.2.2 Burner Rack Removal Instructions

1. Turn off the gas supply.
2. Turn off the electric supply.
3. Remove control access side panel.
4. Disconnect the pilot tubing & thermocouple or flame sensor lead.
5. Mark and disconnect electric valve leads.
6. Uncouple the union in the gas supply.
7. Remove sheetmetal screws in the top corners of the burner rack assembly.
8. Pull "drawer-type" burner rack out of the furnace.

To disassemble the burner rack:

1. Remove Carryover System --

   Natural Gas - remove the flash carryover system from the "manifold end" of the burner rack.

   Propane - break the lighter tube connection at the regulator and remove the lighter tube orifice supply tubing; remove the retaining screws in the drip shield and the shield; remove the retaining screws and slide out the lighter tube.
2. Pull main burners horizontally away from injection opening and lift out.
3. Remove manifold bracket screws and remove manifold.
4. Remove main burner orifices.
5. Remove screws and lift out pilot burner.

Follow the instructions in Paragraph 10.2.3 to clean. To re-assemble and replace, reverse the above procedures being careful not to create any unsafe conditions.

10.0 Maintenance and Service (cont'd)

10.2.3 Cleaning Pilot and Main Burners

In the event the pilot flame is short and/or yellow, check the pilot orifice for blockage caused by lint or dust accumulation. Remove the pilot orifice and clean with air pressure. DO NOT REAM THE ORIFICE. Check and clean the aeration slot in the pilot burner.

Clean the metal sensing probe and the pilot hood with an emery cloth and wipe off the ceramic insulator. Check the spark gap; spark gap should be maintained to 7/64". After the pilot is cleaned, blow any dirt away with compressed air. (See ignition requirements in Paragraph 8.5.)

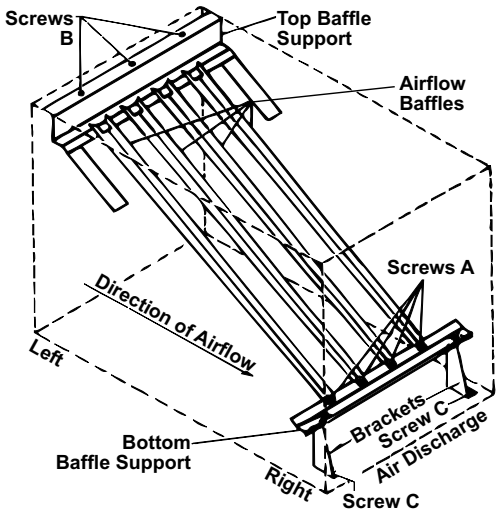
Clean main burners and burner orifices using air pressure. Use an air nozzle to blow out scale and dust accumulation from the burner ports. Alternately blow through the burner ports and the venturi. Use a fine wire to dislodge any stubborn particles from the burner ports. Do not use anything that might change the port size.

Clean the burner rack carryover systems with air pressure.

10.2.4 Cleaning the Heat Exchanger

Outer Surfaces - To clean the outer surfaces (circulating air side) of the heat exchanger, gain access by removing the inspection panels in the ductwork or remove the ductwork. There are baffles between the heat exchanger tubes as shown in **FIGURE 25**. (**NOTE**: If the heater has been converted to high CFM (see **APPENDIX,** page 28, and Label on the unit), these baffles will have already been removed.) To clean the outside of the tubes and the baffles, remove each baffle individually. Remove the screws marked "A" in **FIGURE 25**, and slide each baffle forward. Use a brush and/or an air hose to remove accumulated dust and grease deposits from the heat exchanger tubes and the baffles. Re-install the baffles by sliding them into the rear slot and replacing the screw.

FIGURE 25 - Clean Heat Exchanger Air Baffles



When cleaning outer heat exchanger surface, remove the air baffles in the heat exchanger individually.

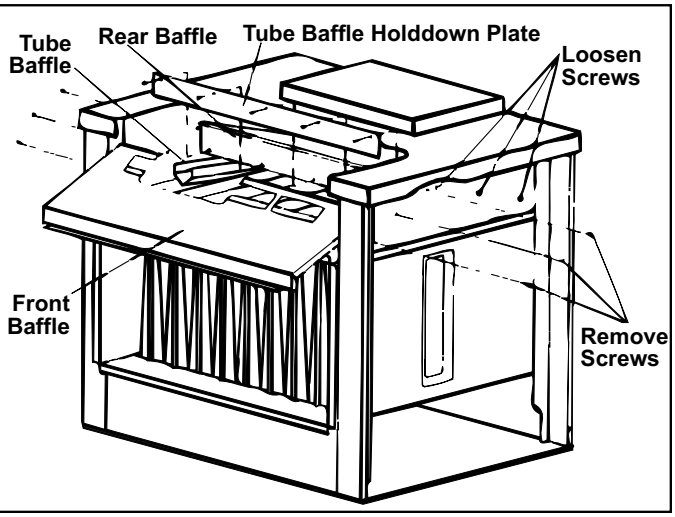
Remove Screws "A" and slide each baffle out. Clean all baffles and re-install.

Inner Surface - The inner surfaces (combustion air side) of the heat exchanger can be reached for cleaning with the burner rack removed. (See Paragraph 10.2.3.) An

FIGURE 26 - Remove "V" Baffles to Clean Inner Surface of Heat Exchanger Tubes

Instructions to Remove Heat Exchanger "V" Baffles:

1) Remove the screws (the number varies depending on unit size) along the bottom of the front baffle and the three on each end Slide the front baffle out of the furnace.
2) Remove the screws that attach the tube baffle hold-down plate to the rear flue baffle.
3) Pull the "V" baffles out of the heat exchanger.



air hose, an 18-24" long, 1/2" diameter furnace brush (or heavy wire with steel wool securely attached), a flashlight, and a mirror are needed.

The furnace has "V" shaped baffles in the top of each heat exchanger tube. Follow the instructions in **FIGURE 26** to remove the "V" baffles when cleaning the inner surfaces of the heat exchanger. **NOTE:** Furnaces manufactured prior to 3/95 may not have **heat exchanger "V" baffles.**

Clean the inner surfaces of the heat exchanger from beneath using the brush to "scrub" the tube walls to remove any accumulated dust, rust and/or soot. Clean the "V" tubes and re-assemble the heat exchanger and the furnace.

Check the furnace for proper operation.

10.3 Troubleshooting

TROUBLE	PROBABLE CAUSE	REMEDY
Pilot will not light (spark ignition system)	**1.** Manual valve not open.	**1.** Open manual valve.
	2. Air in gas line.	**2.** Bleed gas line.
	3. Dirt in pilot orifice.	**3.** Remove and clean with compressed air or solvent (do not ream).
	4. Gas pressure too high or too low.	**4.** Adjust supply pressure. (See Paragraph 6.1.)
	5. Kinked pilot tubing.	**5.** Replace tubing.
	6. Pilot valve does not open.	**6.** If 24 volt available at valve, replace valve.
	7. No spark:	**7.**
	a) Loose wire connections	**a)** Be certain all wires connections are solid.
	b) Transformer failure.	**b)** Be certain 24 volts is available.
	c) Incorrect spark gap.	**c)** Maintain spark gap at 7/64".
	d) Spark cable shorted to ground.	**d)** Replace worn or grounded spark cable.
	e) Spark electrode shorted to ground.	**e)** Replace pilot if ceramic spark electrode is cracked or grounded.
	f) Drafts affecting pilot.	**f)** Make sure all panels are in place and tightly secured to prevent drafts at pilot.
	g) Ignition control not grounded.	**g)** Make certain ignition control is grounded to furnace chassis.
	h) Faulty ignition controller.	**h)** If 24 volt is available to ignition controller and all other causes have been eliminated, replace ignition control.
	8. Optional lockout device interrupting control circuit by above causes.	**8.** Reset lockout by interrupting control at thermostat.
	9. Faulty combustion air proving switch.	**9.** Replace combustion air proving switch.
Pilot lights, main valve will not open (spark Ignition system)	**1.** Manual valve not open.	**1.** Open manual valve.
	2. Main valve not operating.	**2.**
	a) Defective valve.	**a)** If 24 volt is measured at valve connections and valve remains closed, replace valve.
	b) Loose wire connections.	**b)** Check and tighten all wiring connections.
	3. Ignition control does not power main valve.	**3.**
	a) Loose wire connections.	**a)** Check and tighten all wiring connections.
	b) Flame sensor grounded. (Pilot lights - spark continues)	**b)** Be certain flame sensor lead is not grounded or insulation or ceramic is not cracked. Replace as required.
	c) Gas pressure incorrect.	**c)** Set supply pressure at 5" w.c. to 8" w.c. for natural gas and 11" w.c. for propane.
	d) Cracked ceramic at sensor.	**d)** Replace sensor.
	e) Faulty ignition controller.	**e)** See Paragraph 8.5. If all checks indicate no other cause, replace ignition controller. DO NOT ATTEMPT TO REPAIR IGNITION CONTROLLER. THIS DEVICE HAS NO FIELD REPLACEABLE PARTS.
Pilot will not light (match-lit system) - NOTE: Units manufactured prior to 10/2003	**1.** Manual valve not open.	**1.** Open manual valve.
	2. Air in gas line.	**2.** Bleed gas line.
	3. Dirt in pilot orifice.	**3.** Remove and clean with compressed air or solvent (do not ream).
	4. Gas pressure too high or too low.	**4.** Adjust supply pressure. (See Paragraph 6.1).
	5. Bent or kinked pilot tubing.	**5.** Replace tubing.
	6. Failed ECO device	**6.** Replace ECO device.
Pilot lights, main valve will not open (Match-lit system) **NOTE:** Units manufactured prior to 10/2003	**1.** Manual valve not open.	**1.** Open manual valve.
	2. Power not turned on or thermostat not calling for heat.	**2.** Turn on power; check fuses; turn on thermostat.
	3. Circuit to valve open.	**3.** Check wiring and connections at transformer and thermostat.
	4. Faulty transformer.	**4.** Replace the transformer.
	5. Faulty or dirty thermocouple or safety pilot switch; or failed ECO device	**5.** Clean and test with millivolt member or test. Replace defective part.
	6. Faulty thermostat (see manufacturer's instructions)	**6.** Replace thermostat.
	7. Faulty valve.	**7.** Replace valve or magnetic head.
	8. High gas pressure.	**8.** Maximum supply gas pressure 8 oz. or 14" w.c.
	9. Activated blocked vent switch.	**9.** Correct venting problem. Reset switch.
No heat (Heater operating)	**1.** Dirty filters in blower system.	**1.** Clean or replace filters.
	2. Incorrect manifold pressure or orifices.	**2.** Check manifold pressure (See Paragraph 6.1.2).
	3. Cycling on limit control.	**3.** Check air throughput (See Paragraph 6.3).
	4. Improper thermostat location or adjustment.	**4.** See thermostat manufacturer's instructions.
	5. Belt slipping on blower	**5.** Adjust belt tension
Cold air delivered on Startup; during Operation	**1.** Fan control improperly wired	**1.** Connect as per wiring diagram.
	2. Defective fan control.	**2.** Replace fan control.
	3. Incorrect manifold pressure.	**3.** Check manifold line pressure (See Paragraph 6.1.2).
	4. Blower set for too low temperature rise.	**4.** Slow down blower or increase static pressure.

APPENDIX — Converting Model X Duct Furnace for Lower Temperature Rise and Higher CFM Application

WARNING

This conversion shall be done by a qualified service agency in accordance with the manufacturer's instructions and all applicable codes and requirements of the authority having jurisdiction. If the information in these instructions is not followed exactly, a fire, explosion or production of carbon monoxide may result causing property damage, personal injury or loss of life. The qualified service agency performing this work assumes responsibility for the conversion of this appliance to provide for higher CFM.

WARNING

The instructions in this sheet are designed to prepare duct furnace for increased air throughput conversion prior to installation. If your duct furnace is installed, for your safety, turn off the gas and the electric before servicing.

Description/Application

This duct furnace was factory assembled with the air throughput range listed on the rating plate. The conversion in these instructions will change the air throughput range as specified in the table below.

NOTE: If airflow is being reversed or other field-installed options apply, refer to the other information in Paragraph 3.2 before performing this conversion.

Model and Size	High Air Throughput (CFM)	
	MAXIMUM	MINIMUM
X 75	2765	735
X 100	3685	980
X 125	4605	1225
X 150	5530	1475
X 175	6450	1720
X 200	7370	1965
X 225	8295	2210
X 250	9215	2455
X 300	11060	2945
X 350	12900	3440
X 400	14745	3930

Verify the size on the heater rating plate. After confirming that the conversion is appropriate for the unit, follow the instructions.

FIGURE 27 - Fill in the Information on the Conversion Label

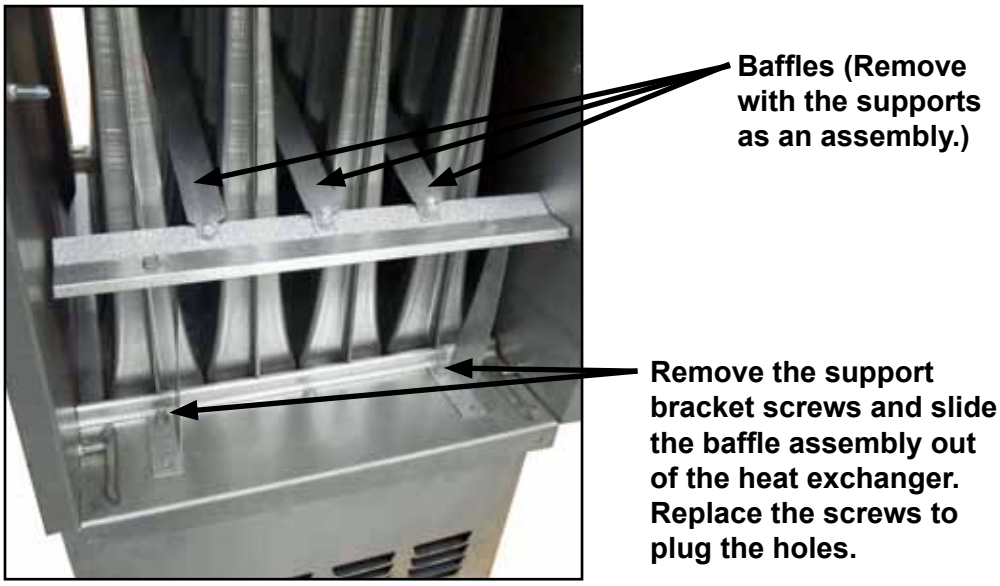
IMPORTANT

This appliance has been converted on
Cet appareil a été converti _____ *(date)* _____
to _____ cfm maximum throughput
au _____ pi^3/min consommation maximum
to _____ cfm minimum throughput
au _____ pi^3/min consommation minimum
by / par _____ *(name & address of company making this conversion)* _____ ,
with kit no. / avec la kit no _____ *263308* _____.
which accepts the responsibility that this conversion has been properly made.
qui accepte la responsabilité que cette conversion a été correctement faite.

263310

1. **Fill in the Field Conversion Label** - Remove the conversion label, **P/N 263310**, from the literature bag. Complete the information.
2. **Remove the Heat Exchanger Baffles** - Refer to **FIGURE 28** and identify the air baffles to be removed. Remove the screws from the support brackets and slide the entire baffle assembly out of the heat exchanger. Reinstall the screws to plug the holes.

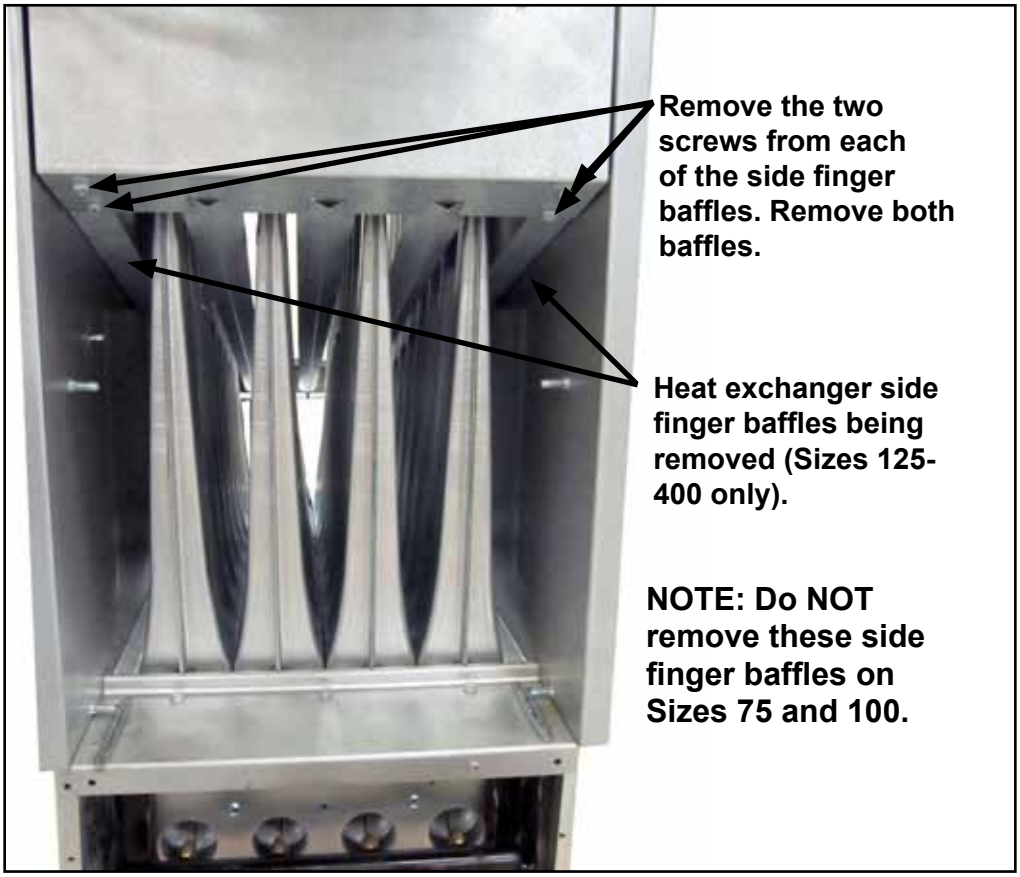
FIGURE 28 - Discharge Air End of the Heat Exchanger showing the Baffle Assembly to be Removed



Conversion is complete for Sizes 75-100; skip to Step 4.

3. **Sizes 125-400 only** - Remove the Side Finger Baffles – Refer to **FIGURE 29** showing the entering air side of the heat exchanger (baffles shown in **FIGURE 28** have already been removed). Identify the side finger baffles. Remove both side baffles; each baffle is attached with two screws.

FIGURE 29 - Entering Air End of the Heat Exchanger showing the Side Finger Baffles to be Removed

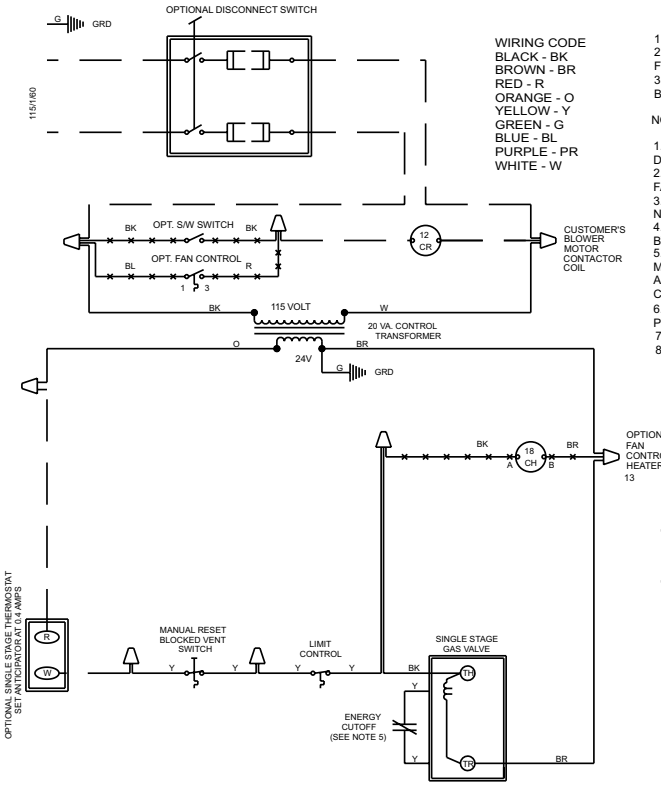


Conversion is complete for Sizes 125-400; continue to Step 4.

4. Select a location adjacent to the rating plate for the conversion label. Being sure the surface is clean and dry, adhere the conversion label that was completed in Step 1.

Test for proper operation. Be sure to comply with the air throughputs in the table on page 28.

FIGURE 30 - For Reference Only, W. D. 113235 for Model X with Standard Match-Lit Pilot and Standard Single-Stage Gas Valve - APPLIES ONLY TO UNITS MANUFACTURED PRIOR TO 10/03.



OPERATING SEQUENCE

1. FOLLOW LIGHTING INSTRUCTIONS AND ESTABLISH PILOT.
2. THERMOSTAT CALLS FOR HEAT ENERGIZING THE SINGLE STAGE GAS VALVE, FIRING UNIT AT FULL RATE.
3. FAN CONTROL SENSES HEAT EXCHANGER TEMPERATURE, ENERGIZING THE BLOWER MOTOR.

NOTES

1. THE FOLLOWING CONTROLS ARE FIELD INSTALLED OPTIONS: DISCONNECT SWITCH, THERMOSTAT
2. THE FOLLOWING CONTROLS ARE FACTORY SUPPLIED OPTIONS: FAN CONTROL AND S/W SWITCH
3. THE FOLLOWING CONTROLS ARE SUPPLIED BY REZNOR FOR FIELD INSTALLATION: NONE
4. DOTTED WIRING AND THE FOLLOWING CONTROLS ARE SUPPLIED AND INSTALLED BY OTHERS: NONE
5. CAUTION: IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 105 DEGREES C., EXCEPT FOR ENERGY CUTOFF OR BLOCKED VENT SWITCH WIRE WHICH MUST BE 150 DEGREES C.
6. LINE AND BLOWER MOTOR BRANCH CIRCUIT WIRE SHOULD BE SIZED TO PREVENT VOLTAGE DROP BEYOND FIVE PERCENT OF SUPPLY LINE VOLTAGE.
7. USE #14 GA. WIRE FOR LINE AND MOTOR WIRING ON UNIT.
8. USE #18 GA. FOR 24 VOLT CONTROL WIRING ON UNIT.

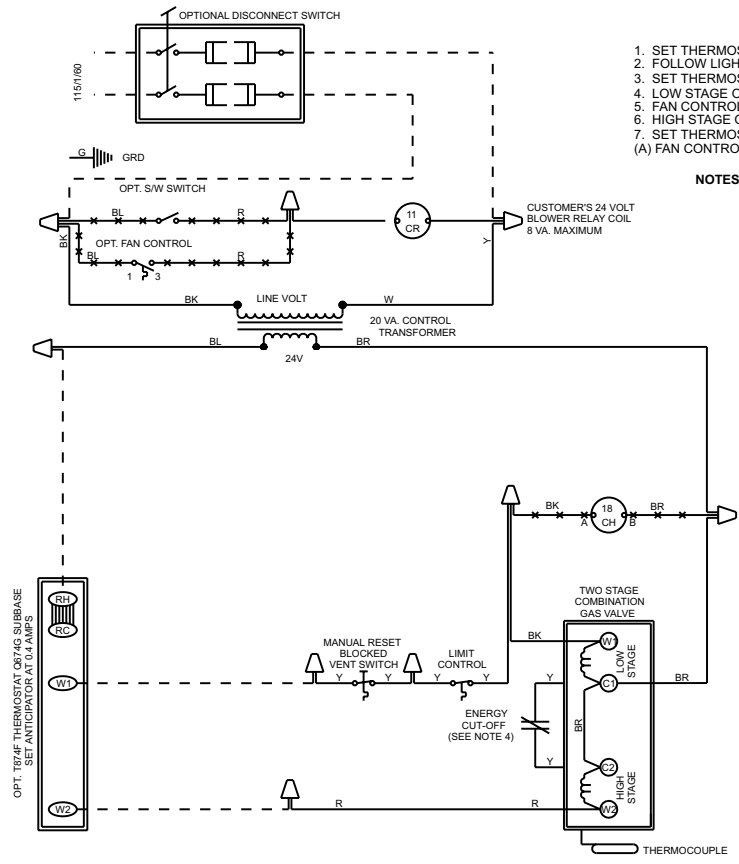
FIELD CONTROL WIRING

TOTAL WIRE LENGTH	MINIMUM RECOMMENDED WIRE SIZE
150 FEET	#18 GA.
250 FEET	#16 GA.
350 FEET	#14 GA.

FACTORY WIRING
FIELD WIRING
OPTIONAL FACTORY WIRING

WD 113235 REV. #5

FIGURE 31 - For Reference Only, W.D. 115936 for Model X with Standard Match-Lit Pilot and Optional Two-Stage Gas Valve - APPLIES ONLY TO UNITS MANUFACTURED PRIOR TO 10/03.



OPERATING SEQUENCE

1. SET THERMOSTAT SYSTEM SWITCH AT "OFF" POSITION.
2. FOLLOW LIGHTING INSTRUCTIONS AND ESTABLISH PILOT.
3. SET THERMOSTAT SYSTEM SWITCH AT "AUTO" POSITION.
4. LOW STAGE OF THERMOSTAT CALLS FOR HEAT ENERGIZING THE LOW STAGE GAS VALVE.
5. FAN CONTROL SENSES HEAT EXCHANGER TEMPERATURE ENERGIZING THE BLOWER MOTOR.
6. HIGH STAGE OF THERMOSTAT CALLS FOR HEAT ENERGIZING THE HIGH STAGE GAS VALVE.
7. SET THERMOSTAT SYSTEM SWITCH AT "OFF" POSITION FOR SHUTDOWN.

(A) FAN CONTROL KEEPS THE BLOWER MOTOR ON WHILE UNIT IS HOT.

NOTES

1. THE FOLLOWING CONTROLS ARE SUPPLIED BY REZNOR FOR FIELD INSTALLATION: NONE
2. THE FOLLOWING CONTROLS ARE SUPPLIED AS OPTIONAL EQUIPMENT. DISCONNECT SWITCH, THERMOSTAT, FAN CONTROL AND S/W SWITCH
3. DOTTED WIRING AND THE FOLLOWING CONTROLS ARE SUPPLIED AND INSTALLED BY OTHERS: NONE
4. WARNING: AN ECO CIRCUIT INTERRUPTION IS A MAJOR FAILURE CAUSED BY A MALFUNCTION OF THE PRIMARY SAFETY CONTROLS OR MIS-WIRING.
5. CAUTION: IF ANY OF THE ORIGINAL WIRE AS SUPPLIED WITH THE APPLIANCE MUST BE REPLACED, IT MUST BE REPLACED WITH WIRING MATERIAL HAVING A TEMPERATURE RATING OF AT LEAST 105 DEGREES C., EXCEPT FOR BLOCKED VENT SWITCH OR SENSOR LEAD WIRE WHICH MUST BE 150 DEGREES C.
6. LINE AND BLOWER MOTOR BRANCH CIRCUIT WIRE SHOULD BE SIZED TO PREVENT VOLTAGE DROP BEYOND FIVE PERCENT OF SUPPLY LINE VOLTAGE.
7. USE #14 GA. WIRE FOR LINE AND MOTOR WIRING ON UNIT.
8. USE #18 GA. FOR 24 VOLT CONTROL WIRING ON UNIT.

WIRING CODE
BLACK - BK
BROWN - BR
RED - R
ORANGE - O
YELLOW - Y
GREEN - G
BLUE - BL
PURPLE - PR
WHITE - W

FIELD CONTROL WIRING

TOTAL WIRE LENGTH	MINIMUM RECOMMENDED WIRE SIZE
150 FEET	#18 GA.
250 FEET	#16 GA.
350 FEET	#14 GA.

FACTORY WIRING
FIELD WIRING
OPT. FACTORY WIRING

X-HX-CX-HCX AG2-CL7 WD 115936

INDEX

INSTALLATION RECORD - to be completed by the installer:

Installer:

Name _____

Company _____

Address _____

_____

_____

Phone _____

Distributor (company from which the unit was purchased):

Company _____

Contact _____

Address _____

_____

_____

Phone _____

Model _____ Serial No._____Date of Installation _____

SPECIFIC INSTALLATION NOTES: (i.e. Location, Amps, Gas Pressure, Temperature, Voltage, Adjustments, Warranty, etc.)

_____

_____

_____

_____

_____

BUILDING OWNER OR MAINTENANCE PERSONNEL:

For service or repair

- Contact the installer listed above.
- If you need additional assistance, contact the Distributor listed above.
- For more information, contact your Factory Representative.

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Form I-X (2-16)