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Dallas, Texas, USA

INSTALLATION INSTRUCTIONS

G60UH(X) Series



GAS FURNACE
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Supersedes 10/2009

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**RETAIN THESE INSTRUCTIONS
FOR FUTURE REFERENCE**



⚠ WARNING

FIRE OR EXPLOSION HAZARD.

Failure to follow safety warnings exactly could result in serious injury, death, or property damage.



Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

Installation and service must be performed by a qualified installer, service agency or the gas supplier.

WHAT TO DO IF YOU SMELL GAS:

- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Leave the building immediately.**
- **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
- **If you cannot reach your gas supplier, call the fire department.**



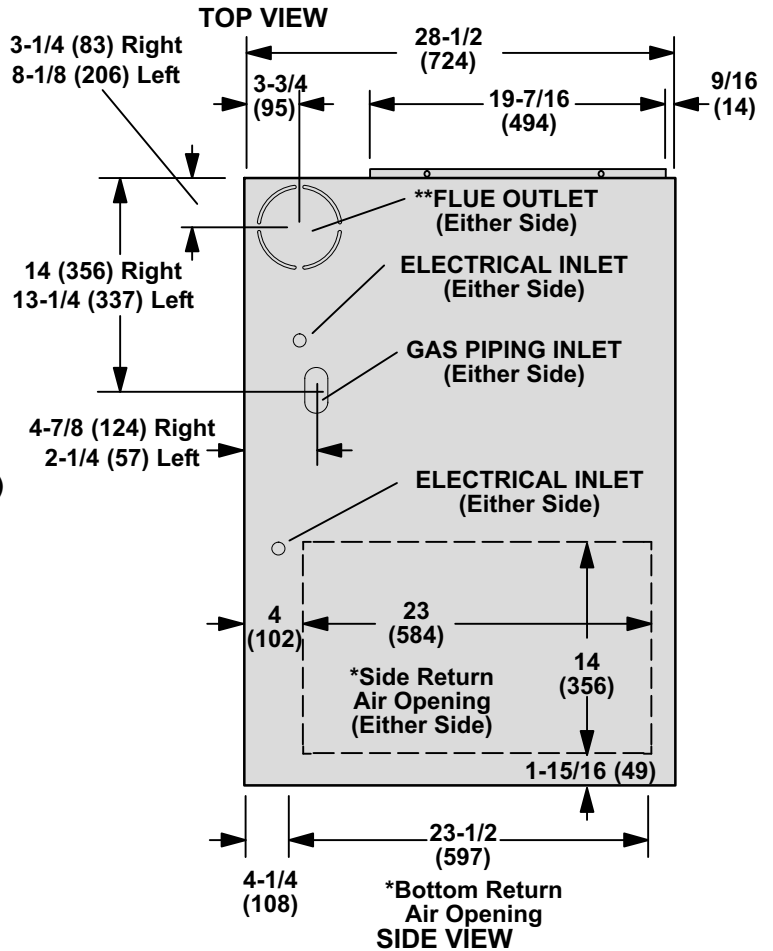
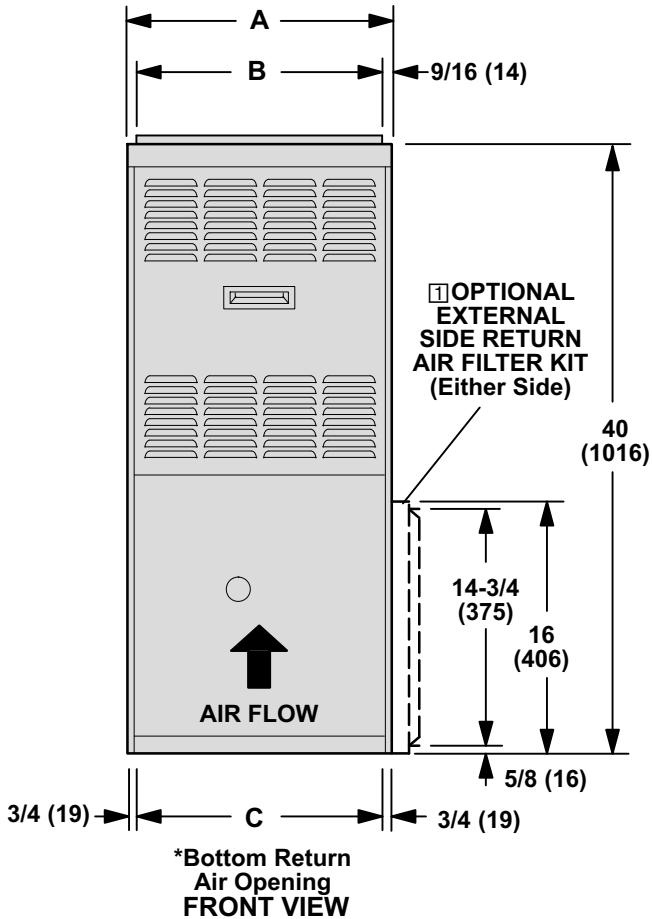
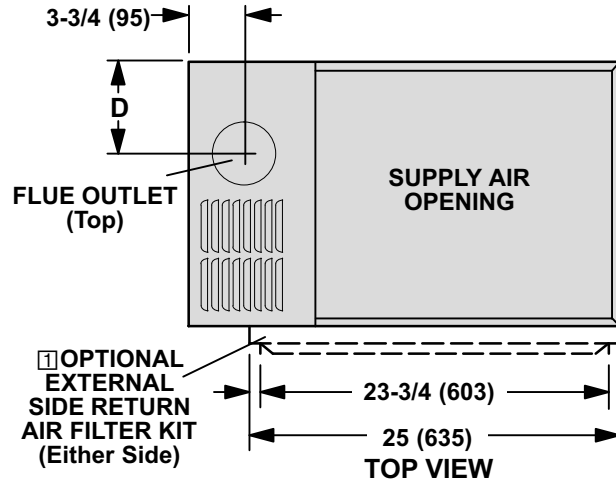
G60UH(X) Unit Dimensions - inches (mm)

***NOTE - 60C and 60D units that require air volumes over 1800 cfm (850 L/s) must have one of the following:**

1. Return air from single side with transition which will accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter. (Required to maintain proper air velocity.)
 2. Return air from single side with optional RAB Return Air Base.
 3. Return air from bottom.
 4. Return air from both sides.
 5. Return air from bottom and one side.
- Refer to Engineering Handbook for additional information.

**Flue outlet may be horizontal but furnace must be vented vertically

① Optional external side return air filter kit cannot be used with the optional RAB Return Air Base.



Model No.	A		B		C		D	
	in.	mm	in.	mm	in.	mm	in.	mm
G60UH-24A-070, G60UH-36A-070	14-1/2	368	13-3/8	340	13	330	4-1/2	114
G60UH-36B-090, G60UH-48B-090	17-1/2	446	16-3/8	416	16	406	6	152
G60UH-36C-110, G60UH-48C-110, G60UH-60C-110	21	533	19-7/8	454	19-1/2	495	7-3/4	197
G60UH-60D-135	24-1/2	622	23-3/8	546	23	584	9-1/2	241

G60UH(X) Parts Arrangement

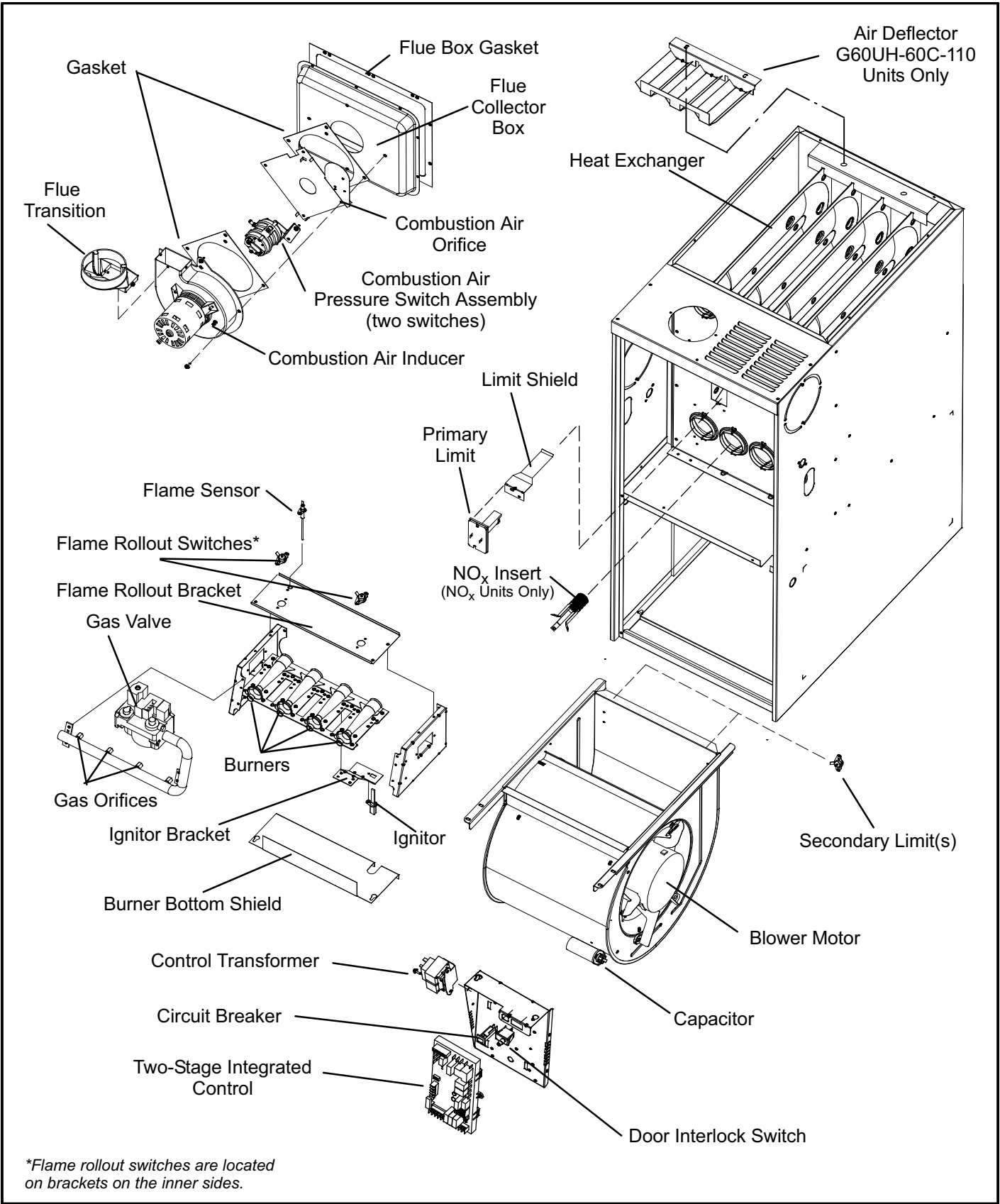


FIGURE 1

G60UH(X) Gas Furnace

The G60UH(X) gas furnace is equipped with a two-stage integrated control. Each G60UH(X) unit is shipped ready for installation in the upflow or horizontal position (left or right). The furnace is shipped with the bottom panel in place. The bottom panel must be removed if the unit is to be installed in a horizontal application. The panel may also be removed in upflow applications.

Shipping and Packing List

Package 1 of 1 contains

- 1 - Assembled G60UH(X) unit
- 1 - Bag assembly containing the following:
 - 2 - Screws
 - 3 - Wire nuts
 - 1 - Snap bushing
 - 1 - Snap plug
 - 1 - Wire tie
 - 1 - Vent warning label
 - 1 - Owner's manual and warranty card

The following items may be ordered separately:

- 1 - Thermostat
- 1 - Hanging bracket (for horizontal installations)
- 1 - Propane/LP changeover kit
- 1 - Return air base
- 1 - High altitude kit
- 1 - Side filter kit

Check equipment for shipping damage. If you find any damage, immediately contact the last carrier.

DANGER

Danger of explosion.

There are circumstances in which odorant used with LP/propane gas can lose its scent. In case of a leak, LP/propane gas will settle close to the floor and may be difficult to smell. An LP/propane leak detector should be installed in all LP applications.

Safety Information

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause property damage, personal injury or loss of life. Installation and service must be performed by a licensed professional installer (or equivalent), service agency or the gas supplier.

CAUTION

As with any mechanical equipment, personal injury can result from contact with sharp sheet metal edges. Be careful when you handle this equipment.

The G60UH is designed for installation as a Non-Direct Vent gas central furnace.

NOTE - In Non-Direct Vent installations, combustion air is taken from indoors and flue gases are discharged outdoors.

Use only the type of gas approved for use with this furnace. Refer to unit nameplate.

G60UH(X) units are CSA International certified to ANSI Z21.47 and CSA 2.3 standards.

In the USA, installation of gas furnaces must conform with local building codes. In the absence of local codes, units must be installed according to the current National Fuel Gas Code (ANSI-Z223.1/NFPA 54). The National Fuel Gas Code is available from the following address:

American National Standards Institute, Inc.
11 West 42nd Street
New York, NY 10036

In Canada, installation must conform with current National Standard of Canada CSA-B149 Natural Gas and Propane Installation Code, local plumbing or waste water codes and other applicable local codes.

Adequate clearance must be made around the air openings into the vestibule area. In order to ensure proper unit operation, combustion and ventilation air supply must be provided according to the current National Fuel Gas Code or CSA-B149 standards.

Vent installations must be consistent with the venting tables (in this instruction) and applicable provisions of local building codes.

This furnace is CSA International certified for installation clearances to combustible material as listed on the unit nameplate and in the tables in figures 6 and 11. Accessibility and service clearances must take precedence over fire protection clearances.

NOTE - For installation on combustible floors, the furnace shall not be installed directly on carpeting, tile, or other combustible material other than wood flooring.

For installation in a residential garage, the furnace must be installed so that the burner(s) and the ignition source are located no less than 18 inches (457 mm) above the floor. The furnace must be located or protected to avoid physical damage by vehicles. When a furnace is installed in a public garage, hangar, or other building that has a hazardous atmosphere, the furnace must be installed according to recommended good practice requirements and current National Fuel Gas Code or CSA B149 standards.

NOTE - Furnace must be adjusted to obtain a temperature rise (high and low fire) within the range(s) specified on the unit nameplate. Failure to do so may cause erratic limit operation.

This G60UH(X) furnace must be installed so that its electrical components are protected from water.

When this furnace is used with cooling units, it shall be installed in parallel with, or on the upstream side of, cooling units to avoid condensation in the heating compartment. With a parallel flow arrangement, a damper (or other means to control the flow of air) must adequately prevent chilled air from entering the furnace. If the damper is manually operated, it must be equipped to prevent operation of either the heating or the cooling unit, unless it is in the full **HEAT** or **COOL** setting.

When installed, this furnace must be electrically grounded according to local codes. In addition, in the United States, installation must conform with the current National Electric Code, ANSI/NFPA No. 70. The National Electric Code (ANSI/NFPA No. 70) is available from the following address:

National Fire Protection Association
1 Battery March Park
Quincy, MA 02269

In Canada, all electrical wiring and grounding for the unit must be installed according to the current regulations of the Canadian Electrical Code Part I (CSA Standard C22.1) and/or local codes.

NOTE - This furnace is designed for a minimum continuous return air temperature of 60°F (16°C) or an intermittent operation down to 55°F (13°C) dry bulb for cases where a night setback thermostat is used. Return air temperature must not exceed 85°F (29°C) dry bulb.

The G60UH(X) furnace may be installed in alcoves, closets, attics, basements, garages, and utility rooms in the up-flow or horizontal position.

This furnace design has not been CSA International certified for installation in mobile homes, recreational vehicles, or outdoors.

Never use an open flame to test for gas leaks. Check all connections using a commercially available soap solution made specifically for leak detection.

Use of Furnace as a Construction Heater

Lennox does not recommend the use of G60UH(X) units as a construction heater during any phase of construction. Very low return air temperatures, harmful vapors and operation of the unit with clogged or misplaced filters will damage the unit.

G60UH(X) units may be used for heating of buildings or structures under construction, if the following conditions are met:

- The vent system must be permanently installed per these installation instructions.
- A room thermostat must control the furnace. The use of fixed jumpers that will provide continuous heating is not allowed.
- The return air duct must be provided and sealed to the furnace.
- Return air temperature range between 60°F (16°C) and 80°F (27°C) must be maintained.
- Air filters must be installed in the system and must be maintained during construction.
- Air filters must be replaced upon construction completion.
- The input rate and temperature rise must be set per the furnace rating plate.
- One hundred percent (100%) outdoor air must be provided for combustion air requirements during construction. Temporary ducting may supply outdoor air to the furnace. Do not connect duct directly to the furnace. Size the temporary duct following these instructions in section for Combustion, Dilution and Ventilation Air in a confined space with air from outside.
- The furnace heat exchanger, components, duct system, air filters and evaporator coils must be thoroughly cleaned following final construction clean-up.
- All furnace operating conditions (including ignition, input rate, temperature rise and venting) must be verified according to these installation instructions.

NOTE - The Commonwealth of Massachusetts stipulates these additional requirements:

- **Gas furnaces shall be installed by a licensed plumber or gas fitter only.**
- **The gas cock must be "T handle" type.**
- **When a furnace is installed in an attic, the passageway to and service area surrounding the equipment shall be floored.**

General

These instructions are intended as a general guide and do not supersede local codes in any way. Consult authorities having jurisdiction before installation.

In addition to the requirements outlined previously, the following general recommendations must be considered when installing a G60UH(X) furnace:

- Place the furnace as close to the center of the air distribution system as possible. The furnace should also be located close to the chimney or vent termination point.
- Do not install the furnace where drafts might blow directly into it. This could cause improper combustion and unsafe operation.
- Do not block the furnace combustion air openings with clothing, boxes, doors, etc. Air is needed for proper combustion and safe unit operation.
- When the furnace is installed in an attic or other insulated space, keep insulation away from the furnace.

⚠️ WARNING

Product contains fiberglass wool.

Disturbing the insulation in this product during installation, maintenance, or repair will expose you to fiberglass wool. Breathing this may cause lung cancer. (Fiberglass wool is known to the State of California to cause cancer.)

Fiberglass wool may also cause respiratory, skin, and eye irritation.

To reduce exposure to this substance or for further information, consult material safety data sheets available from address shown below, or contact your supervisor.

**Lennox Industries Inc.
P.O. Box 799900
Dallas, TX 75379-9900**

Combustion, Dilution & Ventilation Air

In the past, there was no problem in bringing in sufficient outdoor air for combustion. Infiltration provided all the air that was needed. In today's homes, tight construction practices make it necessary to bring in air from outside for combustion. Take into account that exhaust fans, appliance vents, chimneys, and fireplaces force additional air that could be used for combustion out of the house. Unless outside air is brought into the house for combustion, negative pressure (outside pressure is greater than inside pressure) will build to the point that a downdraft can occur in the furnace vent pipe or chimney. As a result, combustion gases enter the living space creating a potentially dangerous situation.

In the absence of local codes concerning air for combustion and ventilation, use the guidelines and procedures in this section to install G60UH(X) furnaces to ensure efficient and safe operation. You must consider combustion air needs and requirements for exhaust vents and gas piping. A portion of this information has been reprinted with permission from the National Fuel Gas Code (ANSI-Z223.1/NFPA 54). This reprinted material is not the complete and official position of the ANSI on the referenced subject, which is represented only by the standard in its entirety.

In Canada, refer to the standard CSA B149 installation code.

⚠️ CAUTION

Do not install the furnace in a corrosive or contaminated atmosphere. Meet all combustion and ventilation air requirements, as well as all local codes.

⚠️ CAUTION

Insufficient combustion air can cause headaches, nausea, dizziness or asphyxiation. It will also cause excess water in the heat exchanger resulting in rusting and premature heat exchanger failure. Excessive exposure to contaminated combustion air will result in safety and performance related problems. Avoid exposure to the following substances in the combustion air supply:

**Permanent wave solutions
Chlorinated waxes and cleaners
Chlorine base swimming pool chemicals
Water softening chemicals
De-icing salts or chemicals
Carbon tetrachloride
Halogen type refrigerants
Cleaning solvents (such as perchloroethylene)
Printing inks, paint removers, varnishes, etc.
Hydrochloric acid
Cements and glues
Antistatic fabric softeners for clothes dryers
Masonry acid washing materials**

All gas-fired appliances require air for the combustion process. If sufficient combustion air is not available, the furnace or other appliances will operate inefficiently and unsafely. Enough air must be provided to meet the needs of all fuel-burning appliances and appliances such as exhaust fans which force air out of the house. When fireplaces, exhaust fans, or clothes dryers are used at the same time as the furnace, much more air is necessary to ensure proper combustion and to prevent a downdraft. Insufficient air causes incomplete combustion which can result in carbon monoxide.

In addition to providing combustion air, fresh outdoor air dilutes contaminants in the indoor air. These contaminants may include bleaches, adhesives, detergents, solvents and other contaminants which can corrode furnace components.

The requirements for providing air for combustion and ventilation depend largely on whether the furnace is installed in an unconfined or a confined space.

Unconfined Space

An unconfined space is an area such as a basement or large equipment room with a volume greater than 50 cubic feet (1.42 m³) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This space also includes adjacent rooms which are not separated by a door. Though an area may appear to be unconfined, it might be necessary to bring in outdoor air for combustion if the structure does not provide enough air by

infiltration. If the furnace is located in a building of tight construction with weather stripping and caulking around the windows and doors, follow the procedures in the air from outside section.

Confined Space

A confined space is an area with a volume less than 50 cubic feet (1.42 m³) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This definition includes furnace closets or small equipment rooms.

When the furnace is installed so that supply ducts carry air circulated by the furnace to areas outside the space containing the furnace, the return air must be handled by ducts which are sealed to the furnace casing and which terminate outside the space containing the furnace. This is especially important when the furnace is mounted on a platform in a confined space such as a closet or small equipment room. Even a small leak around the base of the unit at the platform or at the return air duct connection can cause a potentially dangerous negative pressure condition. Air for combustion and ventilation can be brought into the confined space either from inside the building or from outside.

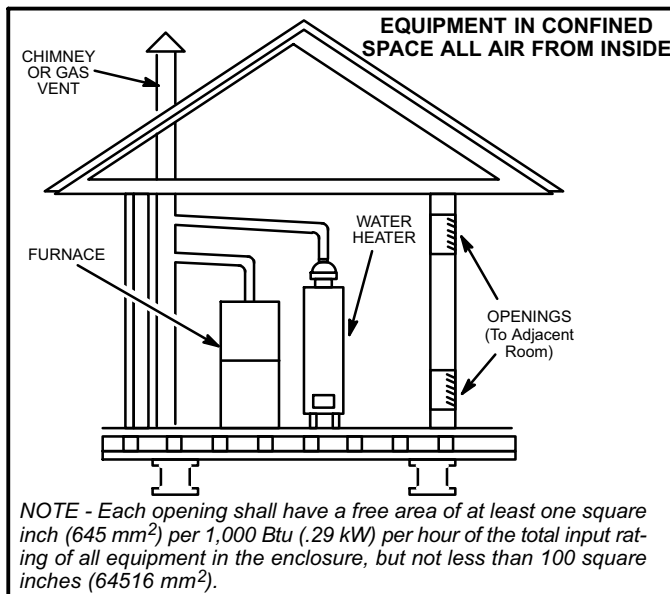


FIGURE 2

Air from Inside

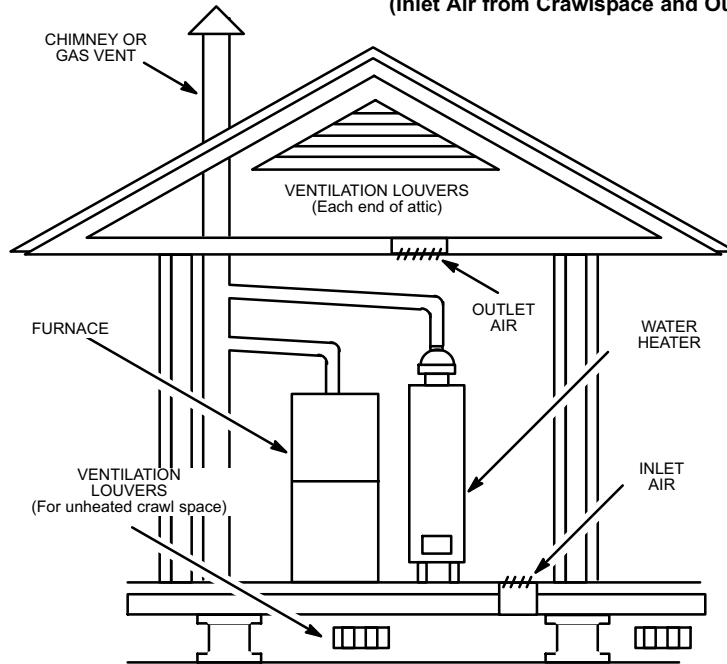
If the confined space that houses the furnace adjoins a space categorized as unconfined, air can be brought in by providing two permanent openings between the two spaces. Each opening must have a minimum free area of 1 square inch (645 mm²) per 1,000 Btu (.29 kW) per hour of total input rating of all gas-fired equipment in the confined space. Each opening must be at least 100 square inches (64516 mm²). One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. See figure 2.

Air from Outside

If air from outside is brought in for combustion and ventilation, the confined space must have two permanent openings. One opening shall be within 12 inches (305 mm) of the top of the enclosure and one opening within 12 inches (305 mm) of the bottom. These openings must communicate directly or by ducts with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors or indirectly through vertical ducts. Each opening shall have a minimum free area of 1 square inch (645 mm²) per 4,000 Btu (1.17 kW) per hour of total input rating of all equipment in the enclosure. See figures 3 and 4. When communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch (645 mm²) per 2,000 Btu (.56 kW) per total input rating of all equipment in the enclosure. See figure 5.

When ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be no less than 3 inches (75 mm). In calculating free area, the blocking effect of louvers, grilles, or screens must be considered. If the design and free area of protective covering is not known for calculating the size opening required, it may be assumed that wood louvers will have 20 to 25 percent free area and metal louvers and grilles will have 60 to 75 percent free area. Louvers and grilles must be fixed in the open position or interlocked with the equipment so that they are opened automatically during equipment operation.

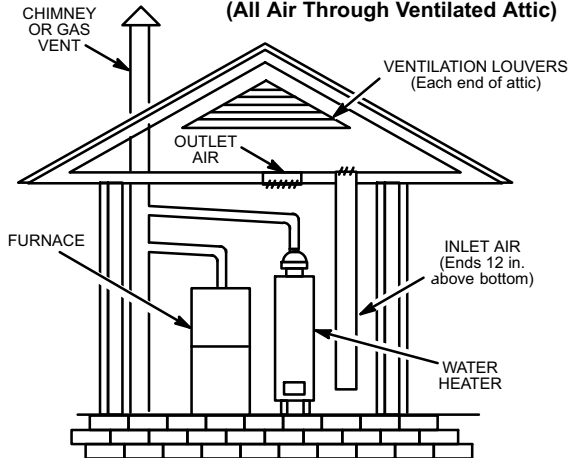
**EQUIPMENT IN CONFINED SPACE
ALL AIR FROM OUTSIDE
(Inlet Air from Crawlspace and Outlet Air to Ventilated Attic)**



NOTE-The inlet and outlet air openings shall each have a free area of at least one square inch (645 mm²) per 4,000 Btu (1.17 kW) per hour of the total input rating of all equipment in the enclosure.

FIGURE 3

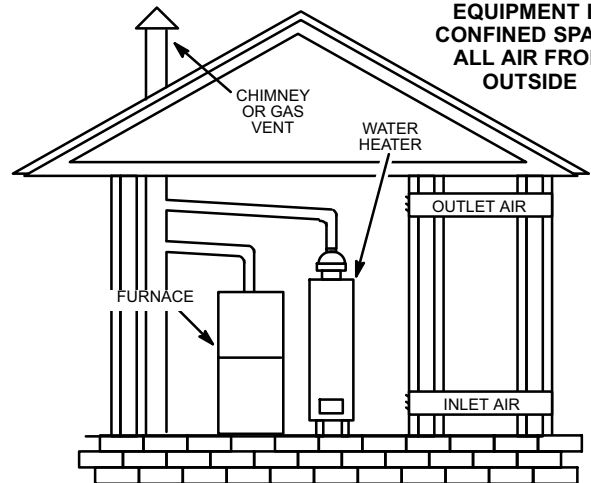
**EQUIPMENT IN CONFINED SPACE
ALL AIR FROM OUTSIDE
(All Air Through Ventilated Attic)**



NOTE-The inlet and outlet air openings shall each have a free area of at least one square inch (645 mm²) per 4,000 Btu (1.17 kW) per hour of the total input rating of all equipment in the enclosure.

FIGURE 4

**EQUIPMENT IN CONFINED SPACE
ALL AIR FROM OUTSIDE**



NOTE - Each air duct opening shall have a free area of at least one square inch (645 mm²) per 2,000 Btu (.59 kW) per hour of the total input rating of all equipment in the enclosure. If the equipment room is located against an outside wall and the air openings communicate directly with the outdoors, each opening shall have a free area of at least one square inch (645 mm²) per 4,000 Btu (1.17 kW) per hour of the total input rating of all other equipment in the enclosure.

FIGURE 5

Setting Equipment

⚠ WARNING

Do not install the furnace on its front or its back. Do not connect the return air ducts to the back of the furnace. Doing so will adversely affect the operation of the safety control devices, which could result in personal injury or death.

The G60UH(X) gas furnace can be installed as shipped in either the upflow position or the horizontal position, with right-hand or left-hand air discharge.

Select a location that allows for the required clearances that are listed on the unit nameplate. Also consider gas supply connections, electrical supply, vent connection, and installation and service clearances [24 inches (610 mm) at unit front]. *The unit must be level.*

*NOTE - 1/3 hp blower motors are equipped with four flexible mounting legs. 1/2 hp blower motors are equipped with three flexible legs and one rigid leg. The rigid leg is equipped with a shipping bolt and a flat white plastic washer (rather than the rubber mounting grommet used with a flexible mounting leg). **The bolt and washer must be removed before the furnace is placed into operation.** After the bolt and washer have been removed, the rigid leg will not touch the blower housing.*

Upflow Applications

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in figure 6.

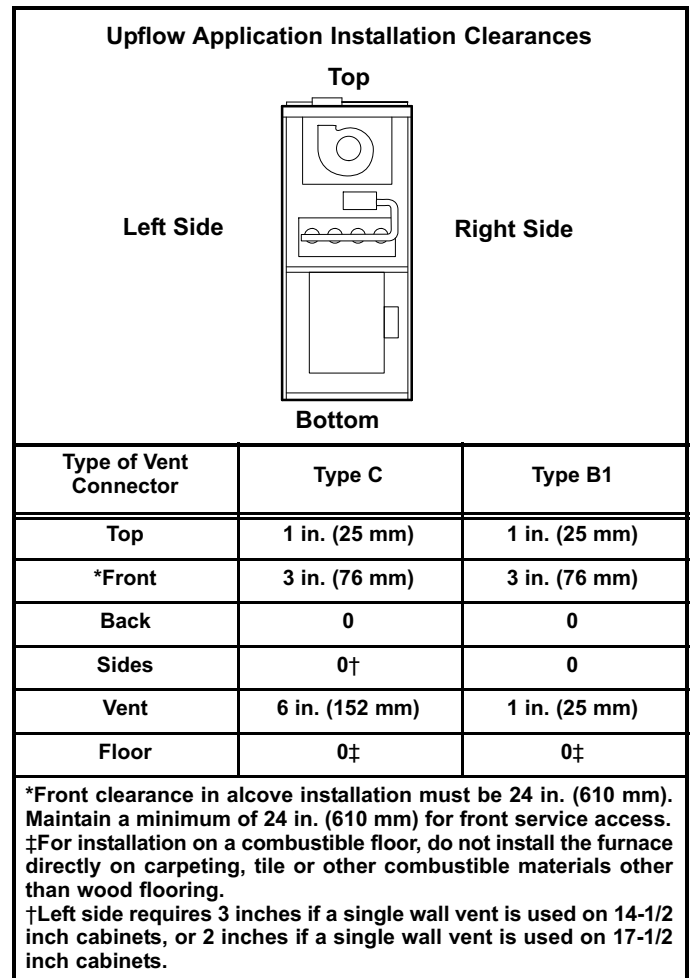


FIGURE 6

Return Air -- Upflow Applications

Return air can be brought in through the bottom or either side of the furnace installed in an upflow application. If the furnace is installed on a platform with bottom return, make an airtight seal between the bottom of the furnace and the platform to ensure that the furnace operates properly and safely. The furnace is equipped with a removable bottom panel to facilitate installation.

Markings are provided on both sides of the furnace cabinet for installations that require side return air. Cut the furnace cabinet at the maximum dimensions shown on page 2.

NOTE - When air volumes over 1800 cfm (850 L/s) are required with 60C or 60D models in an upflow application, the following return air options are available:

- 1 - Return air from single side with transition which will accommodate 20 x 25 x 1 in. (508 x 635 x 25 mm) cleanable air filter. (Required to maintain proper air velocity.) See figure 7.
- 2 - Return air from single side with optional RAB Return Air Base. See figure 8.
- 3 - Return air from bottom.
- 4 - Return air from both sides.
- 5 - Return air from bottom and one side.

Refer to Engineering Handbook for additional information.

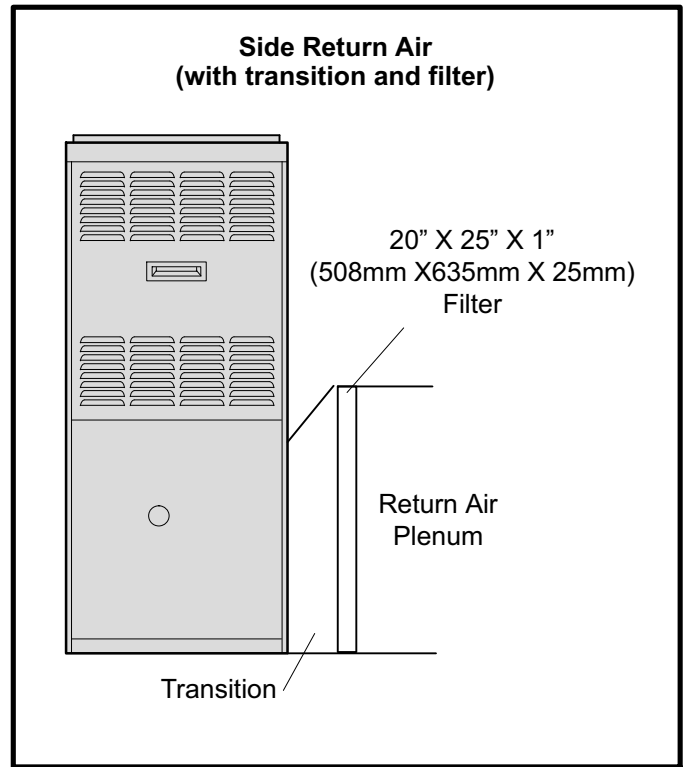


FIGURE 7

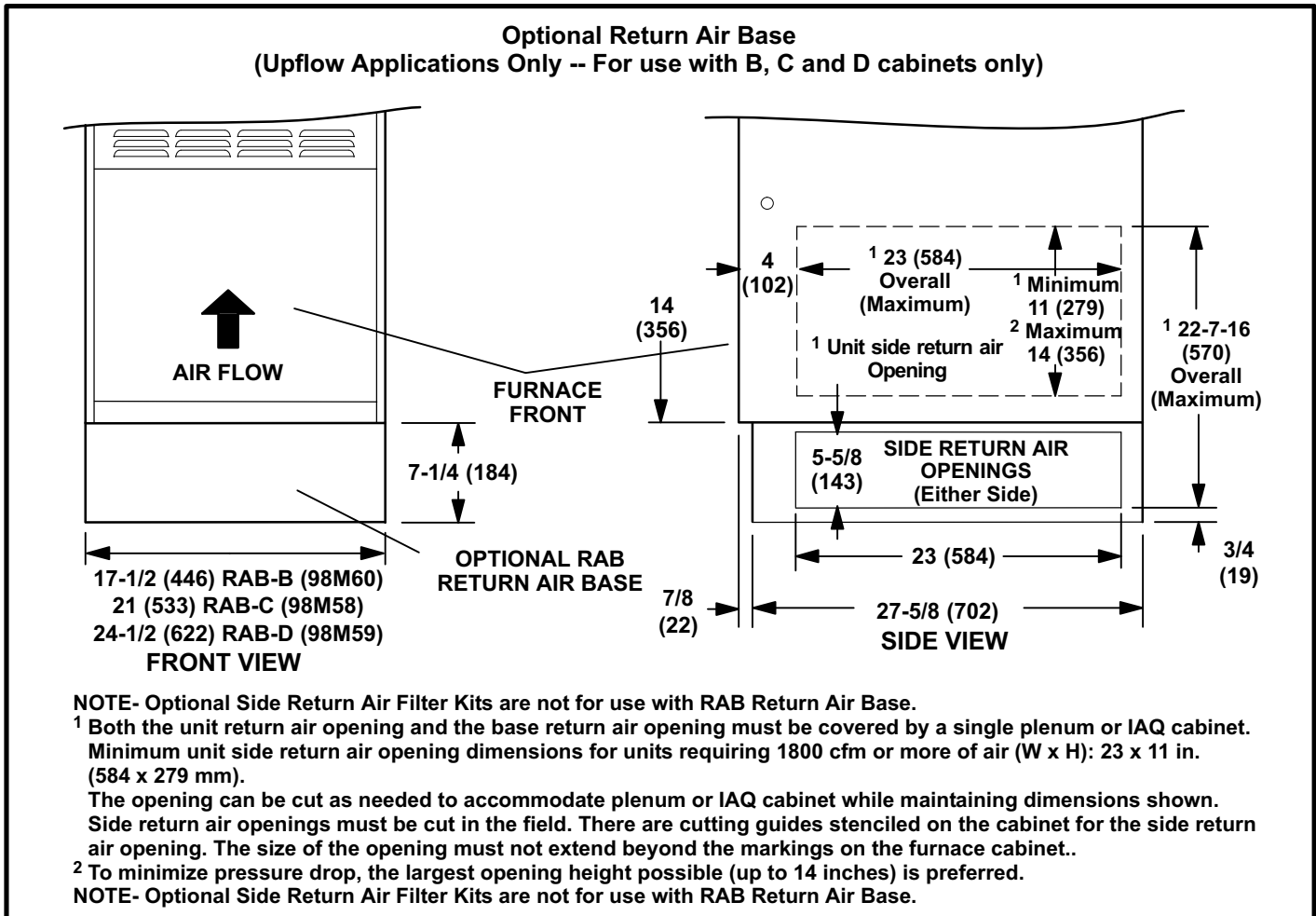


FIGURE 8

Removing the Bottom Panel

Remove the two screws that secure the bottom cap to the furnace. Pivot the bottom cap down to release the bottom panel. Once the bottom panel has been removed, reinstall the bottom cap. See figure 9.

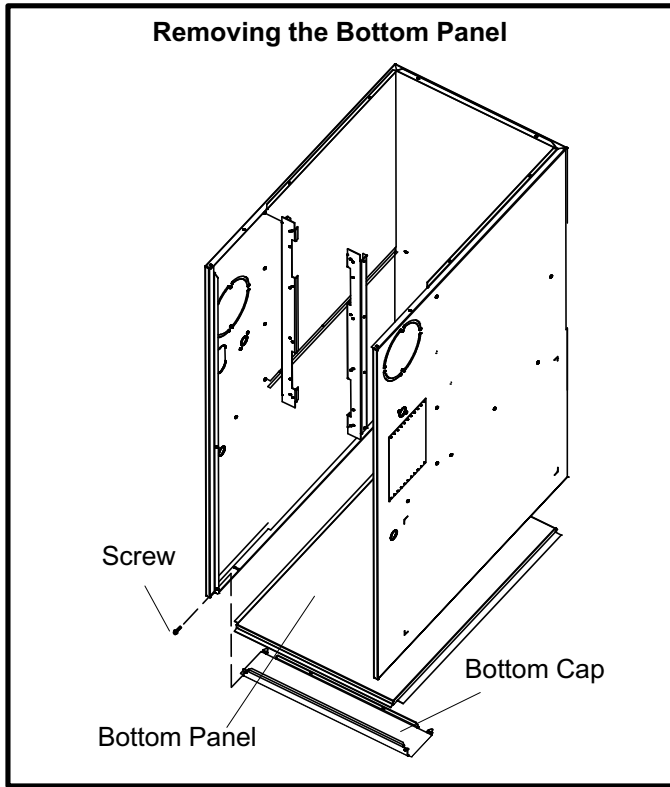


FIGURE 9

Leveling an Upflow Unit

When the side return air inlets are used in an upflow application, it may be necessary to install leveling bolts on the bottom of the furnace. Use field-supplied corrosion-resistant 5/16 inch machine bolts (4) and nuts (8). See figure 10.

NOTE - The maximum length of the bolt is 1-1/2 inches.

- 1 - Lie the furnace on its back and drill a 5/16 inch diameter hole in each corner of the furnace's bottom. See figure 10 for the correct location of the holes. Drill through the bottom panel and the bottom flange of the cabinet.
- 2 - Install one bolt and two nuts into each hole. Screw the first nut onto a bolt and then insert the bolt into a hole. A flat washer may be added between the nut and the bottom of the unit.
- 3 - Screw another nut onto the bolt on the inside of the furnace base. A flat washer may be added between the nut and the bottom of the unit.
- 4 - Adjust the outside nut to the appropriate height and tighten the inside nut to secure the arrangement.

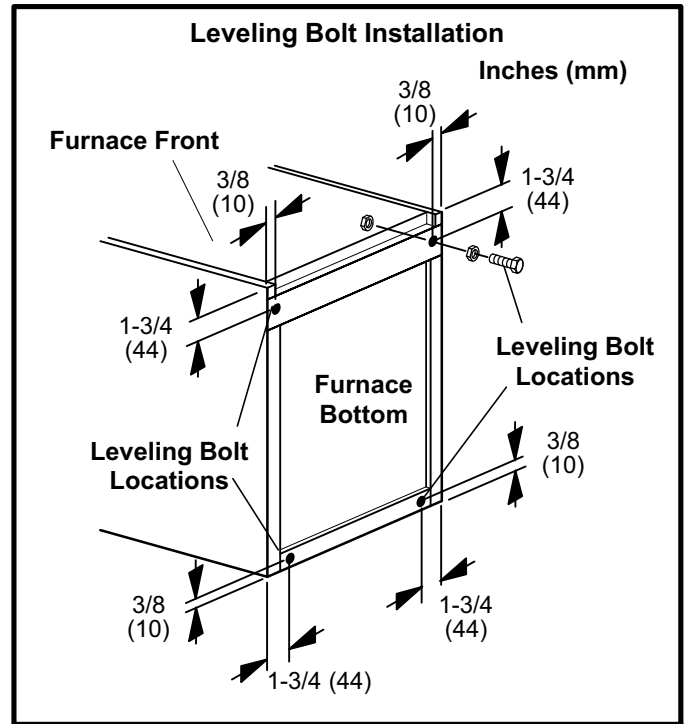


FIGURE 10

Horizontal Applications

The G60UH(X) furnace can be installed in horizontal applications.

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in figure 11.

Horizontal Application Installation Clearances		
	Top	
	Left End	Right End
	Bottom	
Vent Connector Type	Type C	Type B1
Top	0	0
*Front	3 in. (76 mm)	3 in. (76 mm)
Back	0	0
Ends	2 in. (51 mm)	2 in. (51 mm)
Vent	6 in. (152 mm)	1 in. (25 mm)
Bottom	0‡	0‡

*Front clearance in alcove installation must be 24 in. (610 mm). Maintain a minimum of 24 in. (610 mm) for front service access.
 ‡For installations on a combustible floor, do not install the furnace directly on carpeting, tile or other combustible materials other than wood flooring.

FIGURE 11

This furnace may be installed in either an attic or a crawlspace. Either suspend the furnace from roof rafters or floor joists, as shown in figure 12, or install the furnace on a platform, as shown in figure 13. The unit must be supported at both ends and beneath the blower deck to prevent sagging.

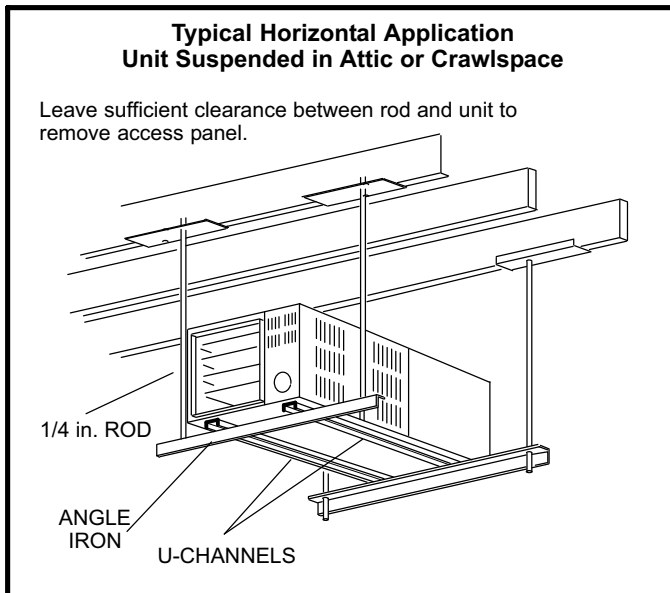


FIGURE 12

*NOTE - Heavy-gauge perforated sheet metal straps (plumbers' straps) may be used to suspend the unit from roof rafters or ceiling joists. When straps are used to suspend the unit in this way, support must be provided for both the ends and the middle of the furnace to prevent sagging. The straps must not interfere with the plenum or exhaust piping installation. Securing screws should be 1/2 inch from the top edge and 1-1/2 inch from the side edge in all cases. **Cooling coils and supply and return air plenums must be supported separately.***

NOTE - When the furnace is installed on a platform in a crawlspace, it must be elevated enough to avoid water damage and to allow the evaporator coil to drain.

Return Air -- Horizontal Applications

Return air can be brought in through the end of a furnace installed in a horizontal application. The furnace is equipped with a removable bottom panel to facilitate installation. See figure 9.

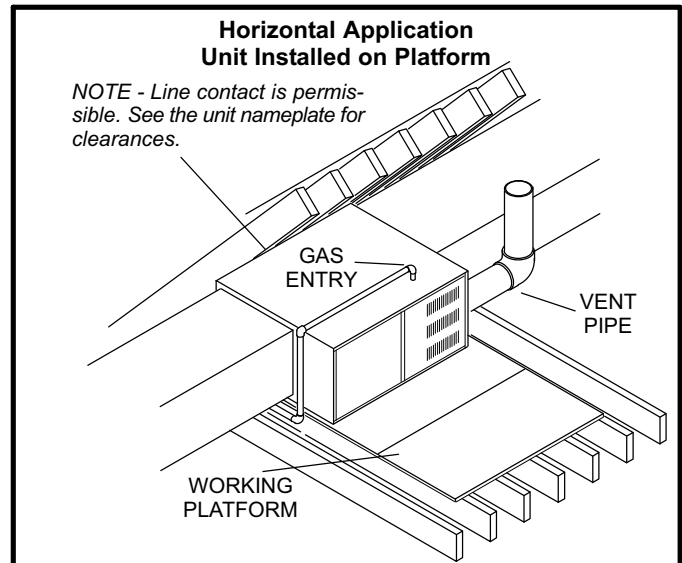


FIGURE 13

⚠ WARNING

Improper installation of the furnace can result in personal injury or death. Combustion and flue products must never be allowed to enter the return air system or the living space. Use screws and joint tape to seal the return air system to the furnace.

In platform installations with bottom return air, the furnace should be sealed airtight to the return air plenum. A door must never be used as a portion of the return air duct system. The base must provide a stable support and an airtight seal to the furnace. Allow absolutely no sagging, cracks, gaps, etc.

The return and supply air duct systems must never be connected to or from other heating devices such as a fireplace or stove, etc. Fire, explosion, carbon monoxide poisoning, personal injury and/or property damage could result.

⚠ WARNING

The blower access panel must be securely in place when the blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into living space resulting in personal injury or death.

Filters

This unit is not equipped with a filter or rack. A field-provided high-velocity filter is required for the unit to operate properly. Table 1 lists recommended filter sizes.

A filter must be in place any time the unit is operating.

TABLE 1

Furnace Cabinet Size	Filter Size	
	Side Return	Bottom Return
14-1/2"	16 X 25 X 1 (1)	14 X 25 X 1 (1)
17-1/2"	16 X 25 X 1 (1)	16 X 25 X 1 (1)
21"	16 X 25 X 1 (1)	20 X 25 X 1 (1)
24-1/2"	16 X 25 X 1 (2)	24 X 25 X 1 (1)

Duct System

Use industry-approved standards (such as those published by Air Conditioning Contractors of America or American Society of Heating, Refrigerating and Air Conditioning Engineers) to size and install the supply and return air duct system. This will result in a quiet and low-static system that has uniform air distribution.

NOTE - Do not operate the furnace with an external static pressure that exceeds 0.8 inches w.c. Higher external static pressures may cause erratic limit operation.

Supply Air Plenum

If the furnace is installed without a cooling coil, a removable access panel must be installed in the supply air duct. The access panel should be large enough to permit inspection (either by smoke or reflected light) of the heat exchanger for leaks after the furnace is installed. The furnace access panel must always be in place when the furnace is operating and it must not allow leaks into the supply air duct system.

Return Air Plenum

NOTE - Return air must not be drawn from a room where this furnace, or any other gas-fueled appliance (i.e., water heater), or carbon monoxide-producing device (i.e., wood fireplace) is installed.

When return air is drawn from a room, a negative pressure is created in the room. If a gas appliance is operating in a room with negative pressure, the flue products can be pulled back down the vent pipe and into the room. This reverse flow of the flue gas may result in incomplete combustion and the formation of carbon monoxide gas. This toxic gas might then be distributed throughout the house by the furnace duct system.

In upflow applications, the return air can be brought in through the bottom or either side of the furnace. If a furnace with bottom return air is installed on a platform, make an airtight seal between the bottom of the furnace and the platform to ensure that the unit operates properly and safely. Use fiberglass sealing strips, caulking, or equivalent sealing method between the plenum and the furnace cabinet to ensure a tight seal. If a filter is installed, size the return air duct to fit the filter frame.

Venting

A 4-inch diameter flue transition is factory-installed on the combustion air inducer outlet of all models. **Modifying or removing the flue transition will cause the unit to operate unsafely and will void the unit certification.** The vent connector does not require insulation.

The combustion air inducer may be rotated clockwise or counterclockwise by 90° to allow for top or side vent discharge in all applications. When the unit is installed, the flue transition must be in the 9 o'clock, 12 o'clock or 3 o'clock position. **The unit will not vent properly with the flue transition pointed down in the 6 o'clock position.** Remove the four mounting screws, rotate the assembly (including the gasket), then reinstall the mounting screws.

See figure 14. Use the provided wire tie to bundle the pressure switch wires with the inducer motor power leads. **Route the wires away from moving parts and the heat of the inducer motor to prevent damage to the wires.**

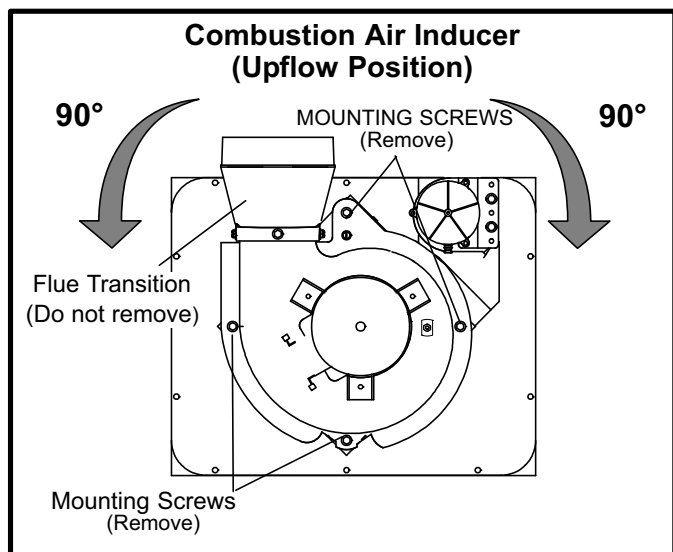


FIGURE 14

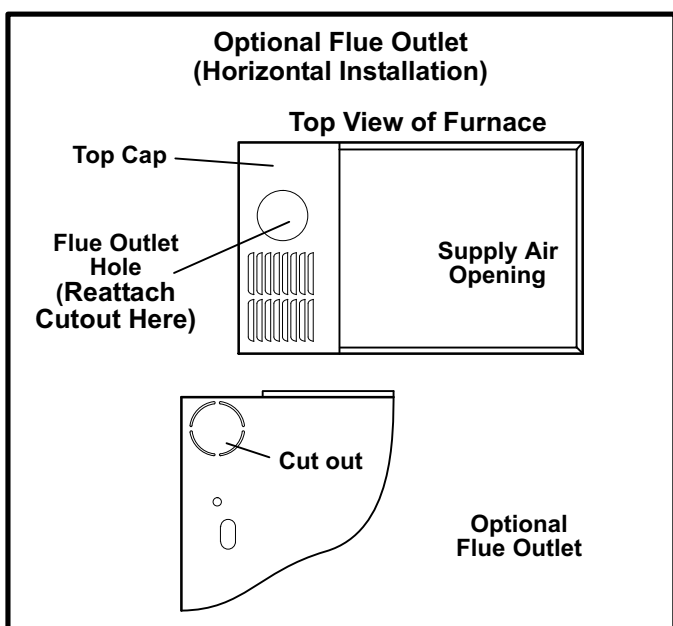


FIGURE 15

Use sheet metal shears to remove the cut out from the side of the cabinet. Use the two provided sheet metal screws to install the cut out on the top cap to cover the original flue outlet opening. See figure 15.

The G60UH(X) series units are classified as fan-assisted Category I furnaces when vertically vented according to the latest edition of National Fuel Gas Code (ANSI-Z223.1/NFPA 54) in the USA and the current standards of CSA B149 Natural Gas and Propane Installation

Codes in Canada. A fan-assisted Category I furnace is an appliance equipped with an integral mechanical means to either draw or force combustion products through the combustion chamber and/or heat exchanger.

NOTE - Use these instructions as a guide. They do not supersede local codes. This furnace must be vented according to all local codes these installation instructions, and the provided venting tables in these instructions

The venting tables in this manual were extracted from the National Fuel Gas Code (ANSI-Z223.1/NFPA 54) and are provided as a guide for proper vent installation. Proper application, termination, construction and location of vents must conform to local codes having jurisdiction. In the absence of local codes, the NFGC serves as the defining document.

Refer to the tables and the venting information contained in these instructions to properly size and install the venting system.

⚠ IMPORTANT

Once the venting system is installed, attach the "Disconnected Vent" warning sticker to a visible area of the plenum near the vent pipe. The warning sticker is provided in the bag assembly.

⚠ WARNING

Asphyxiation hazard. The exhaust vent for this furnace must be securely connected to the furnace flue transition at all times.

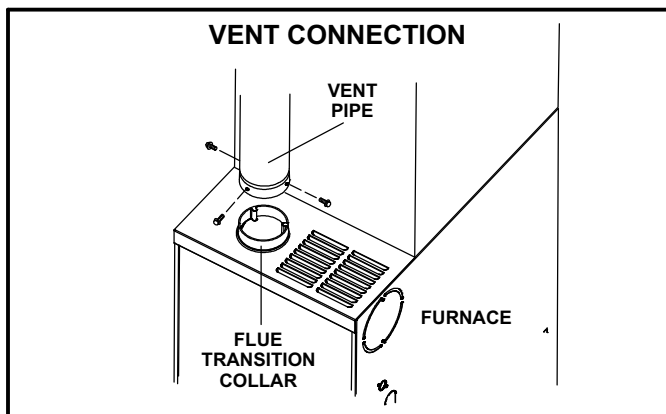


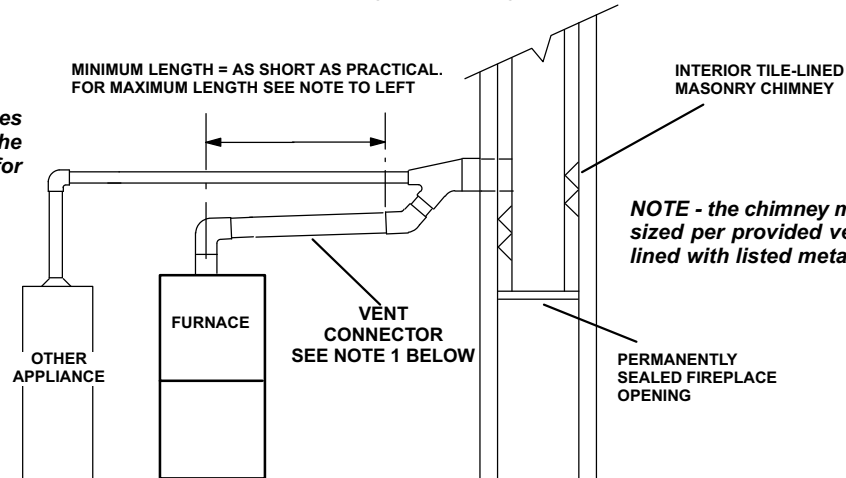
FIGURE 16

Use self-drilling sheet metal screws or a mechanical fastener to firmly secure the vent pipe to the round collar of the flue transition. If self-drilling screws are used to attach the vent pipe, it is recommended that three be used. Drive one self-drilling screw through the front and one through each side of the vent pipe and collar. See figure 16.

Install the first vent connector elbow at a minimum of six inches (152 mm) from the furnace vent outlet.

Common Venting Using Tile-Lined Interior Masonry Chimney and Combined Vent Connector

NOTE- Refer to provided venting tables for installations in the USA and the venting tables in current CSA-B149 for installations in Canada.



NOTE - Either single-walled or double-walled vent connector may be used. Refer to the capacity requirements as shown in the provided venting tables for installations in USA and the venting tables in current CSA-B149 for installations in Canada.

FIGURE 17

Venting Using a Masonry Chimney

The following additional requirements apply when a lined masonry chimney is used to vent this furnace.

Masonry chimneys used to vent Category I central furnaces must be either tile-lined or lined with a listed metal lining system or dedicated gas vent. Unlined masonry chimneys are prohibited. See figures 18 and 17 for common venting.

A chimney with one or more sides exposed to the outside of the structure is considered to be an exterior chimney.

An exterior masonry chimney that is not tile-lined must be lined with B1 vent or a listed insulated flexible metal vent. An exterior tile-lined chimney that is sealed and capped may be lined with a listed uninsulated flexible metal vent.

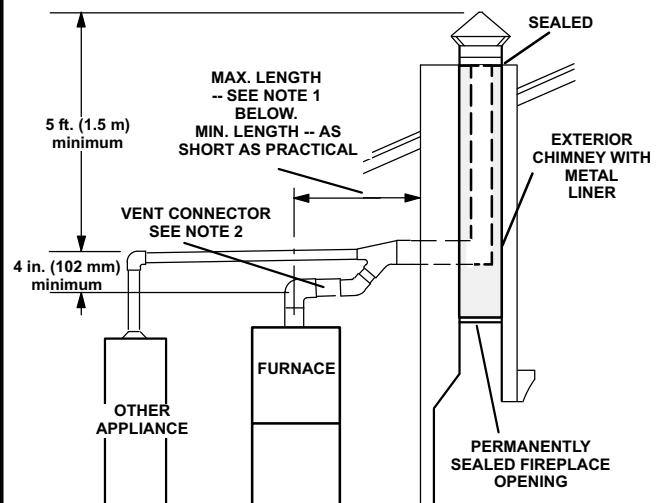
If the existing chimney will not accommodate a listed metal liner, either the chimney must be rebuilt to accommodate one of these liners or an alternate approved venting method must be found.

G60UH units installed in upflow applications may be vented into a tile-lined masonry chimney without using a listed metal liner, provided that the optional masonry chimney vent adapter kit (18M79) is used. Instructions provided with the kit must be followed exactly.

Insulation for the flexible vent pipe must be an encapsulated fiberglass sleeve recommended by the flexible vent pipe manufacturer. See figure 18.

DO NOT insulate the space between the liner and the chimney wall with puffed mica or any other loose granular insulating material

Common Venting Using Metal-Lined Masonry Chimney



NOTE 1 - Refer to the provided venting tables for installations in the USA and the venting tables in CSA-B149 for installations Canada.

NOTE 2 - Either single-walled or double-walled vent connector may be used. Refer to the capacity requirements shown in the provided venting tables for installations in USA and the venting tables in current CSA-B149 for installations in Canada.

FIGURE 18

! IMPORTANT

SINGLE appliance venting of a fan-assisted furnace into a tile-lined masonry chimney (interior or outside wall) is **PROHIBITED**. The chimney must first be lined with either type B1 vent or an insulated single wall flexible vent lining system which has been sized according to the provided venting tables and the vent pipe manufacturer's instructions.

A fan-assisted furnace may be commonly vented into an existing lined masonry chimney if the following conditions are met:

- The chimney is currently serving at least one draft hood equipped appliance
- The vent connectors and chimney are sized according to the provided venting tables for the USA, and the appropriate venting tables in the standards of CSA B149 Natural Gas and Propane Installation Codes in Canada.

If type B1 double-wall vent is used inside a chimney, no other appliance can be vented into the chimney. The outer wall of type B1 vent pipe must not be exposed to flue products.

A type B1 vent or masonry chimney liner shall terminate above the roof surface with a listed cap or a listed roof assembly according to the terms of their respective listings and the vent manufacturer's instructions.

When inspection reveals that an existing chimney is not safe for the intended purpose, it shall be rebuilt to conform to nationally recognized standards, lined or relined with suitable materials, or replaced with a gas vent or chimney suitable for venting G60UH(X) series units. The chimney passageway must be checked periodically to ensure that it is clear and free of obstructions.

Do not install a manual damper, barometric draft regulator, or flue restrictor between the furnace and the chimney.

Never connect a Category I appliance to a chimney that is servicing a solid-fuel appliance. If a fireplace chimney flue is used to vent this appliance, the fireplace opening must be permanently sealed.

A type B or listed chimney lining system that passes through an unused masonry chimney flue is not considered to be exposed to the outdoors.

General Venting Requirements

Vent all G60UH(X) furnaces according to these instructions:

- 1 - Vent diameter recommendations and maximum allowable piping runs are found in the provided venting tables for the USA, and the appropriate venting tables in the standards of CSA B149 Natural Gas and Propane Installation Codes for Canada.
- 2 - In no case should the vent or vent connector diameter be less than the diameter specified in the provided venting tables for the USA, and the appropriate venting tables in the standards of CSA B149 Natural Gas and Propane Installation Codes for Canada.
- 3 - The minimum vent capacity determined by the sizing tables must be less than the low fire input rating and the maximum vent capacity must be greater than the high fire input rating.

- 4 - *Single appliance vents* - If the vertical vent or tile-lined chimney has a larger diameter or flow area than the vent connector, use the **vertical vent diameter** to determine the **minimum vent capacity** and the **vent connector diameter** to determine the **maximum vent capacity**. The flow area of the vertical vent, however, shall not exceed 7 times the flow area of the listed appliance categorized vent area, draft hood outlet area or flue collar area unless designed according to approved engineering methods.
- 5 - *Multiple appliance vents* - The flow area of the largest section of vertical vent or chimney shall not exceed 7 times the smallest listed appliance categorized vent area, draft hood outlet area or flue collar area unless designed according to approved engineering methods.
- 6 - The entire length of single wall metal vent connector shall be readily accessible for inspection, cleaning, and replacement.
- 7 - Single appliance venting configurations with zero lateral lengths (tables 3 and 4) are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10% (0.90 x maximum listed capacity).
- 8 - The common venting tables (5, 6, 7, and 8) were generated using a maximum horizontal vent connector length of 1-1/2 feet (.46 m) for each inch (25 mm) of connector diameter as follows:

TABLE 2

Connector Diameter inches (mm)	Maximum Horizontal Connector Length feet (m)
3 (76)	4-1/2 (1.37)
4 (102)	6 (1.83)
5 (127)	7-1/2 (2.29)
6 (152)	9 (2.74)
7 (178)	10-1/2 (3.20)

- 9 - If the common vertical vent is offset, the maximum common vent capacity listed in the common venting tables should be reduced by 20%, the equivalent of two 90° elbows (0.80 x maximum common vent capacity). The horizontal length of the offset shall not exceed 1-1/2 feet (.46 m) for each inch (25 mm) of common vent diameter.
- 10 - The vent pipe should be as short as possible with the least number of elbows and angles required to complete the job. Route the vent connector to the vent using the shortest possible route.

- 11 - A vent connector shall be supported without any dips or sags and shall slope a minimum of 1/4 inch (6.4 mm) per linear foot (305 mm) of connector, back toward the appliance.
- 12 - Vent connectors shall be firmly attached to the furnace flue collar by self-drilling screws or other approved means, except vent connectors of listed type B vent material which shall be assembled according to the manufacturer's instructions. Joints between sections of single wall connector piping shall be fastened by screws or other approved means.
- 13 - When the vent connector used for Category I appliances must be located in or pass through a crawl-space or other areas which may be cold, that portion of the vent connector shall be constructed of listed double-wall type B vent material or material having equivalent insulation qualities.
- 14 - All venting pipe passing through floors, walls, and ceilings must be installed with the listed clearance to combustible materials and be fire stopped according to local codes. In absence of local codes, refer to NFGC (Z223.1).
- 15 - No portion of the venting system can extend into, or pass through any circulation air duct or plenum.
- 16 - Vent connectors serving Category I appliances shall not be connected to any portion of mechanical draft systems operating under positive pressure such as Category III or IV venting systems.
- 17 - If vent connectors are combined prior to entering the common vent, the maximum common vent capacity listed in the common venting tables must be reduced by 10%, the equivalent of one 90° elbow (0.90 x maximum common vent capacity).
- 18 - The common vent diameter must always be at least as large as the largest vent connector diameter.
- 19 - In no case, shall the vent connector be sized more than two consecutive table size diameters over the size of the draft hood outlet or flue collar outlet.
- 20 - Do not install a manual damper, barometric draft regulator or flue restrictor between the furnace and the chimney.
- 21 - When connecting this appliance to an existing dedicated or common venting system, you must inspect the venting system's general condition and look for signs of corrosion. The existing vent pipe size must conform to these instructions and the provided venting tables for the USA, and the appropriate venting tables in the standards of CSA B149 Natural Gas and Propane Installation Codes for Canada. If the existing venting system does not meet these requirements, it must be resized.

TABLE 3
Capacity of Type B Double-Wall Vents with Type B Double-Wall Connectors
Serving a Single Category I Appliance

Height H (feet)	Lateral L (feet)	Vent and Connector Diameter - D (inches)							
		3 Inch		4 Inch		5 Inch		6 Inch	
		Appliance Input Rating in Thousands of Btu Per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	0	0	78	0	152	0	251	0	375
	2	13	51	18	97	27	157	32	232
	4	21	49	30	94	39	153	50	227
	6	25	46	36	91	47	149	59	223
8	0	0	84	0	165	0	276	0	415
	2	12	57	16	109	25	178	28	263
	5	23	53	32	103	42	171	53	255
	8	28	49	39	98	51	164	64	247
10	0	0	88	0	175	0	295	0	447
	2	12	61	17	118	23	194	26	289
	5	23	57	32	113	41	187	52	280
	10	30	51	41	104	54	176	67	267
15	0	0	94	0	191	0	327	0	502
	2	11	69	15	136	20	226	22	339
	5	22	65	30	130	39	219	49	330
	10	29	59	40	121	51	206	64	315
	15	35	53	48	112	61	195	76	301
20	0	0	97	0	202	0	349	0	540
	2	10	75	14	149	18	250	20	377
	5	21	71	29	143	38	242	47	367
	10	28	64	38	133	50	229	62	351
	15	34	58	46	124	59	217	73	337
	20	48	52	55	116	69	206	84	322
30	0	0	100	0	213	0	374	0	587
	2	9	81	13	166	14	283	18	432
	5	21	77	28	160	36	275	45	421
	10	27	70	37	150	48	262	59	405
	15	33	64	44	141	57	249	70	389
	20	56	58	53	132	66	237	80	374
	30	NR	NR	73	113	88	214	104	346

NOTE - Single appliance venting configurations with zero lateral lengths are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).

TABLE 4
Capacity of Type B Double-Wall Vents with Single-Wall Metal Connectors
Serving a Single Category I Appliance

Height H (feet)	Lateral L (feet)	Vent and Connector Diameter - D (inches)							
		3 Inch		4 Inch		5 Inch		6 Inch	
		Appliance Input Rating in Thousands of Btu Per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	0	38	77	59	151	85	249	126	373
	2	39	51	60	96	85	156	123	231
	4	NR	NR	74	92	102	152	146	225
	6	NR	NR	83	89	114	147	163	220
8	0	37	83	58	164	83	273	123	412
	2	39	56	59	108	83	176	121	261
	5	NR	NR	77	102	107	168	151	252
	8	NR	NR	90	95	122	161	175	243
10	0	37	87	57	174	82	293	120	444
	2	39	61	59	117	82	193	119	287
	5	52	56	76	111	105	185	148	277
	10	NR	NR	97	100	132	171	188	261
15	0	36	93	56	190	80	325	116	499
	2	38	69	57	136	80	225	115	337
	5	51	63	75	128	102	216	144	326
	10	NR	NR	95	116	128	201	182	308
	15	NR	NR	NR	NR	158	186	220	290
20	0	35	96	54	200	78	346	114	537
	2	37	74	56	148	78	248	113	375
	5	50	68	73	140	100	239	141	363
	10	NR	NR	93	129	125	223	177	344
	15	NR	NR	NR	NR	155	208	216	325
	20	NR	NR	NR	NR	186	192	254	306
30	0	34	99	53	211	76	372	110	584
	2	37	80	55	164	76	281	109	429
	5	49	74	72	157	98	271	136	417
	10	NR	NR	91	144	122	255	171	397
	15	NR	NR	115	131	151	239	208	377
	20	NR	NR	NR	NR	181	223	246	357
	30	NR	NR	NR	NR	NR	NR	NR	NR

NOTE - Single appliance venting configurations with zero lateral lengths are assumed to have no elbows in the vent system. For all other vent configurations, the vent system is assumed to have two 90° elbows. For each additional 90° elbow or equivalent (for example two 45° elbows equal one 90° elbow) beyond two, the maximum capacity listed in the venting table should be reduced by 10 percent (0.90 x maximum listed capacity).

TABLE 5
Vent Connector Capacity
Type B Double-Wall Vents with Type B Double-Wall Connectors
Serving Two or More Category I Appliances

Vent Height H (feet)	Connector Rise R (feet)	Vent and Connector Diameter - D (inches)							
		3 Inch		4 Inch		5 Inch		6 Inch	
		Appliance Input Rating in Thousands of Btu Per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	1	22	37	35	66	46	106	58	164
	2	23	41	37	75	48	121	60	183
	3	24	44	38	81	49	132	62	199
8	1	22	40	35	72	49	114	64	176
	2	23	44	36	80	51	128	66	195
	3	24	47	37	87	53	139	67	210
10	1	22	43	34	78	49	123	65	189
	2	23	47	36	86	51	136	67	206
	3	24	50	37	92	52	146	69	220
15	1	21	50	33	89	47	142	64	220
	2	22	53	35	96	49	153	66	235
	3	24	55	36	102	51	163	68	248
20	1	21	54	33	99	46	157	62	246
	2	22	57	34	105	48	167	64	259
	3	23	60	35	110	50	176	66	271
30	1	20	62	31	113	45	181	60	288
	2	21	64	33	118	47	190	62	299
	3	22	66	34	123	48	198	64	309

TABLE 6
Common Vent Capacity
Type B Double-Wall Vents with Type B Double-Wall Connectors
Serving Two or More Category I Appliances

Vent Height H (feet)	Common Vent Diameter - D (inches)							
	4 Inch		5 Inch		6 Inch		7 Inch	
	Appliance Input Rating in Thousands of Btu Per Hour							
	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT
6	92	81	140	116	204	161	309	248
8	101	90	155	129	224	178	339	275
10	110	97	169	141	243	194	367	299
15	125	112	195	164	283	228	427	352
20	136	123	215	183	314	255	475	394
30	152	138	244	210	361	297	547	459

TABLE 7
Vent Connector Capacity
Type B Double-Wall Vents with Single-Wall Metal Connectors
Serving Two or More Category I Appliances

Vent Height H (feet)	Connector Rise R (feet)	Vent and Connector Diameter - D (inches)							
		3 Inch		4 Inch		5 Inch		6 Inch	
		Appliance Input Rating in Thousands of Btu Per Hour							
		MIN	MAX	MIN	MAX	MIN	MAX	MIN	MAX
6	1	NR	NR	NR	NR	NR	NR	NR	NR
	2	NR	NR	NR	NR	NR	NR	168	182
	3	NR	NR	NR	NR	121	131	174	198
15	1	NR	NR	79	87	116	138	177	214
	2	NR	NR	83	94	121	150	185	230
	3	NR	NR	87	100	127	160	193	243
30	1	47	60	77	110	113	175	169	278
	2	50	62	81	115	117	185	177	290
	3	54	64	85	119	122	193	185	300

TABLE 8
Common Vent Capacity
Type B Double-Wall Vents with Single-Wall Metal Connectors
Serving Two or More Category I Appliances

Vent Height H (feet)	Common Vent Diameter - D (inches)							
	4 Inch		5 Inch		6 Inch		7 Inch	
	Appliance Input Rating in Thousands of Btu Per Hour							
	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT
6	89	78	136	113	200	158	304	244
8	98	87	151	126	218	173	331	269
10	106	94	163	137	237	189	357	292
15	121	108	189	159	275	221	416	343
20	131	118	208	177	305	247	463	383
30	145	132	236	202	350	286	533	446

Removal of the Furnace from Common Vent

In the event that an existing furnace is removed from a venting system commonly run with separate gas appliances, the venting system is likely to be too large to properly vent the remaining attached appliances.

Conduct the following test while each appliance is operating and the other appliances (which are not operating) remain connected to the common venting system. If the venting system has been installed improperly, you **must** correct the system as indicated in the general venting requirements section.

- 1 - Seal any unused openings in the common venting system.
- 2 - Inspect the venting system for proper size and horizontal pitch. Determine that there is no blockage, restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
- 3 - Close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located

and other spaces of the building. Turn on clothes dryers and any appliances not connected to the common venting system. Turn on any exhaust fans, such as range hoods and bathroom exhausts, so they will operate at maximum speed. Do not operate a summer exhaust fan. Close fireplace dampers.

- 4 - Follow the lighting instructions. Turn on the appliance that is being inspected. Adjust the thermostat so that the appliance operates continuously.
- 5 - After the main burner has operated for 5 minutes, test for leaks of flue gases at the draft hood relief opening. Use the flame of a match or candle, or smoke from a cigarette, cigar, or pipe.
- 6 - After determining that each appliance connected to the common venting system is venting properly, (step 3) return all doors, windows, exhaust fans, fireplace dampers, and any other gas-burning appliances to their previous mode of operation.
- 7 - If a venting problem is found during any of the preceding tests, the common venting system must be modified to correct the problem.

Resize the common venting system to the minimum vent pipe size determined by using the appropriate tables in Appendix G. (These are in the current standards of the National Fuel Gas Code ANSI-Z223.1/NFPA 54 in the USA, and the appropriate Category 1 Natural Gas and Propane appliances venting sizing tables in the current standards of the CSA B149 Natural Gas and Propane Installation Codes in Canada.)

- 3 - The gas piping must not run in or through air ducts, clothes chutes, gas vents or chimneys, dumb waiters, or elevator shafts.
- 4 - The piping should be sloped 1/4 inch (6.4 mm) per 15 feet (4.57 m) upward toward the meter from the furnace. The piping must be supported at proper intervals [every 8 to 10 feet (2.44 to 3.01 m)] with suitable hangers or straps. Install a drip leg inside vertical pipe runs to the unit.
- 5 - In some localities, codes may require the installation of a manual main shut-off valve and union (furnished by the installer) external to the unit. The union must be of the ground joint type.

Gas Piping

⚠ CAUTION

If a flexible gas connector is required or allowed by the authority that has jurisdiction, black iron pipe shall be installed at the gas valve and extend outside the furnace cabinet.

Gas Supply

- 1 - This unit is shipped standard for left or right side installation of gas piping (or top entry in horizontal applications). Connect the gas supply to the piping assembly.
- 2 - When connecting the gas supply piping, consider factors such as length of run, number of fittings, and furnace rating to avoid excessive pressure drop. Table 9 lists recommended pipe sizes for typical applications.

⚠ IMPORTANT

Compounds used on threaded joints of gas piping must be resistant to the actions of liquified petroleum gases.

NOTE - Install a 1/8 inch NPT plugged tap in the field piping upstream of the gas supply connection to the unit. The tap must be accessible for test gauge connection. See figure 19.

NOTE - If emergency shutoff is necessary, shut off the main manual gas valve and disconnect main power to the furnace. The installer should properly label these devices.

TABLE 9
Gas Pipe Capacity - ft³/hr (m³/hr)

Nominal Iron Pipe Size inches (mm)	Internal Diameter inches (mm)	Length of Pipe - feet (m)									
		10 (3.048)	20 (6.096)	30 (9.144)	40 (12.192)	50 (15.240)	60 (18.288)	70 (21.336)	80 (24.384)	90 (27.432)	100 (30.480)
3/8 (9.53)	.493 (12.522)	95 (2.69)	65 (1.84)	52 (1.47)	45 (1.27)	40 (1.13)	36 (1.02)	33 (.73)	31 (.88)	29 (.82)	27 (.76)
1/2 (12.7)	.622 (17.799)	175 (4.96)	120 (3.40)	97 (2.75)	82 (2.32)	73 (2.07)	66 (1.87)	61 (1.73)	57 (1.61)	53 (1.50)	50 (1.42)
3/4 (19.05)	.824 (20.930)	360 (10.19)	250 (7.08)	200 (5.66)	170 (4.81)	151 (4.28)	138 (3.91)	125 (3.54)	118 (3.34)	110 (3.11)	103 (2.92)
1 (25.4)	1.049 (26.645)	680 (919.25)	465 (13.17)	375 (10.62)	320 (9.06)	285 (8.07)	260 (7.36)	240 (6.80)	220 (6.23)	205 (5.80)	195 (5.52)
1-1/4 (31.75)	1.380 (35.052)	1400 (39.64)	950 (26.90)	770 (21.80)	660 (18.69)	580 (16.42)	530 (15.01)	490 (13.87)	460 (13.03)	430 (12.18)	400 (11.33)
1-1/2 (38.1)	1.610 (40.894)	2100 (59.46)	460 (41.34)	1180 (33.41)	990 (28.03)	900 (25.48)	810 (22.94)	750 (21.24)	690 (19.54)	650 (18.41)	620 (17.56)
2 (50.8)	2.067 (52.502)	3950 (111.85)	2750 (77.87)	2200 (62.30)	1900 (53.80)	1680 (47.57)	1520 (43.04)	1400 (39.64)	1300 (36.81)	1220 (34.55)	1150 (32.56)
2-1/2 (63.5)	2.469 (67.713)	6300 (178.39)	4350 (123.17)	3520 (99.67)	3000 (84.95)	2650 (75.04)	2400 (67.96)	2250 (63.71)	2050 (58.05)	1950 (55.22)	1850 (52.38)
3 (76.2)	3.068 (77.927)	11000 (311.48)	7700 (218.03)	6250 (176.98)	5300 (150.07)	4750 (134.50)	4300 (121.76)	3900 (110.43)	3700 (104.77)	3450 (97.69)	3250 (92.03)

NOTE - Capacity given in cubic feet (m³) of gas per hour and based on 0.60 specific gravity gas.

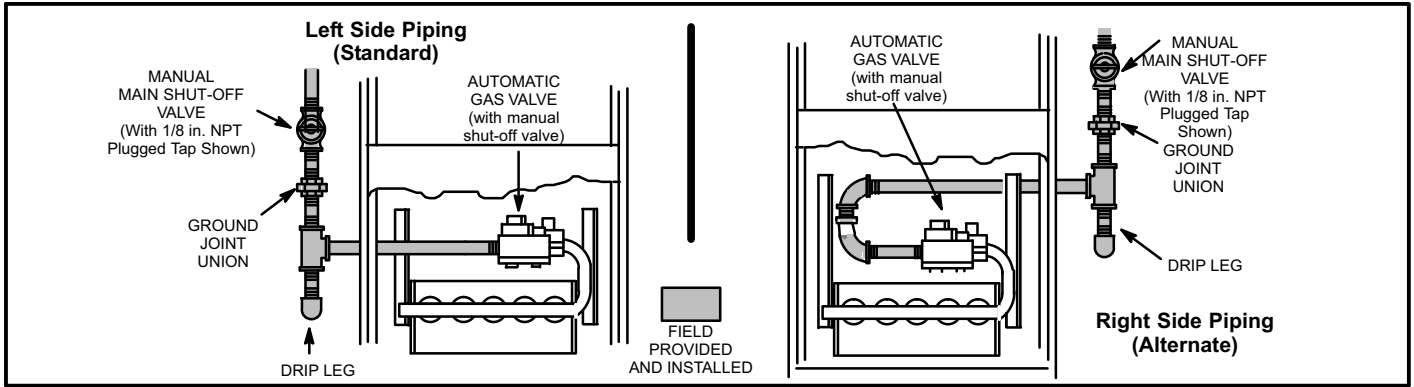


FIGURE 19

Leak Check

After gas piping is completed, carefully check all piping connections (factory- and field-installed) for gas leaks. Use a leak detecting solution or other preferred means.

NOTE - If emergency shutoff is necessary, shut off the main manual gas valve and disconnect the main power to the furnace. The installer should properly label these devices.

⚠ WARNING

FIRE OR EXPLOSION HAZARD

Failure to follow the safety warnings exactly could result in serious injury, death, or property damage. Never use an open flame to test for gas leaks. Check all connections using a commercially available soap solution made specifically for leak detection. Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed.

The furnace must be isolated from the gas supply system by closing its individual manual shut-off valve during any pressure testing of the gas supply system at pressures less than or equal to 1/2 psig (3.48 kPa, 14 inches w.c.).

⚠ IMPORTANT

When testing pressure of gas lines, gas valve must be disconnected and isolated. See figure 20. Gas valves can be damaged if subjected to pressures greater than 1/2 psig (3.48 kPa, 14 inches w.c.).

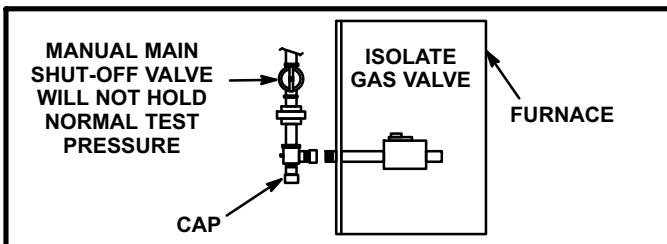


FIGURE 20

Electrical

ELECTROSTATIC DISCHARGE (ESD)

Precautions and Procedures

⚠ CAUTION

Electrostatic discharge can affect electronic components. Take precautions during furnace installation and service to protect the furnace's electronic controls. Precautions will help to avoid control exposure to electrostatic discharge by putting the furnace, the control and the technician at the same electrostatic potential. Neutralize electrostatic charge by touching hand and all tools on an unpainted unit surface, such as the gas valve or blower deck, before performing any service procedure.

The unit is equipped with a field make-up box. The make-up box may be moved to the right side of the furnace to facilitate installation. If the make-up box is moved to the right side, the excess wire must be pulled into the blower compartment. Secure the excess wire to the existing harness to protect it from damage.

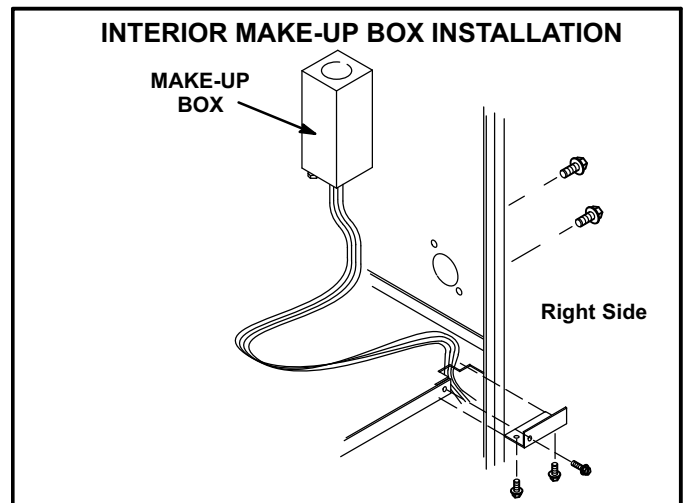


FIGURE 21

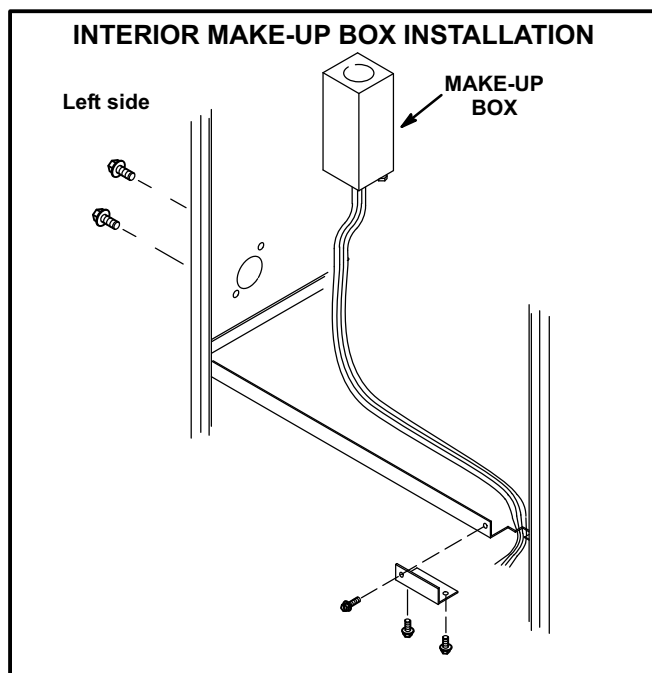


FIGURE 22

Refer to figure 23 for schematic wiring diagram and troubleshooting and table 10 and figure 24 for field wiring.

- 1 - The power supply wiring must meet Class I restrictions. Protected by either a fuse or circuit breaker, select circuit protection and wire size according to unit nameplate.

NOTE - Unit nameplate states maximum current draw. Maximum Over-Current Protection allowed is 20AMP.

- 2 - Holes are on both sides of the furnace cabinet to facilitate wiring.
- 3 - Install a separate (properly sized) disconnect switch near the furnace so that power can be turned off for servicing.
- 4 - Before connecting the thermostat or the power wiring, check to make sure the wires will be long enough for servicing at a later date. Remove the blower access panel to check the length of the wire.
- 5 - Complete the wiring connections to the equipment. Use the provided unit wiring diagram and the field wiring diagrams shown in table 10 and figure 24. Use 18-gauge wire or larger that is suitable for Class II rating for thermostat connections.

- 6 - Electrically ground the unit according to local codes or, in the absence of local codes, according to the current National Electric Code (ANSI/NFPA No. 70) for the USA and current Canadian Electric Code part 1 (CSA standard C22.1) for Canada. A green ground wire is provided in the field make-up box.

NOTE - The G60UH(X) furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

- 7 - One line voltage "HUM" 1/4" spade terminal is provided on the furnace integrated control. Any humidifier rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. See figure 25 for control configuration. This terminal is energized in the heating mode when the combustion air inducer is operating.
- 8 - One line voltage "EAC" 1/4" spade terminal is provided on the furnace integrated control. Any electronic air cleaner rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to one of the provided neutral terminals. See figure 25 for control configuration. This terminal is energized when the indoor blower is operating.
- 9 - One 24V "H" terminal is provided on the furnace integrated control terminal block. Any humidifier rated up to 0.5 amp can be connected to this terminal with the ground leg of the circuit being connected to either ground or the "C" terminal. See figure 25 for control configuration.
- 10 - Install the room thermostat according to the instructions provided with the thermostat. See table 10 for field wiring connections in varying applications. If the furnace is being matched with a heat pump, refer to the instruction packaged with the dual fuel thermostat.

Indoor Blower Speeds

- 1 - When the thermostat is set to "FAN ON," the indoor blower will run continuously on the low speed when there is no cooling or heating demand.
- 2 - When the G60UH(X) is operating in the high-fire or low-fire heating mode, the indoor blower will run on the corresponding heating speed.
- 3 - When there is a cooling demand, the indoor blower will run on the cooling speed.

TABLE 10
Field Wiring Applications

Thermostat	DIP Switch Settings and On-Board Links (See figure 25)			Wiring Connections
	DIP Switch 1	W915 Two-Stage Cooling	W951 Heat Pumps	
1 Heat / 1 Cool <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-10 minutes. ON-15 minutes.</i>	ON	Intact	Intact	
1 Heat / 2 Cool <i>NOTE - Use DIP switch 2 to set second-stage heat ON delay. OFF-10 minutes. ON-15 minutes.</i>	ON	Cut	Intact	

TABLE 10
Field Wiring Applications (Continued)

Thermostat	DIP Switch Settings and On-Board Links (See figure 25)			Wiring Connections
	DIP Switch 1	W915 Two-Stage Cooling	W951 Heat Pumps	
2 Heat / 2 Cool	OFF	Cut	Intact	
2 Heat / 1 Cool	OFF	Intact	Intact	

G60UH(X) Schematic Wiring Diagram

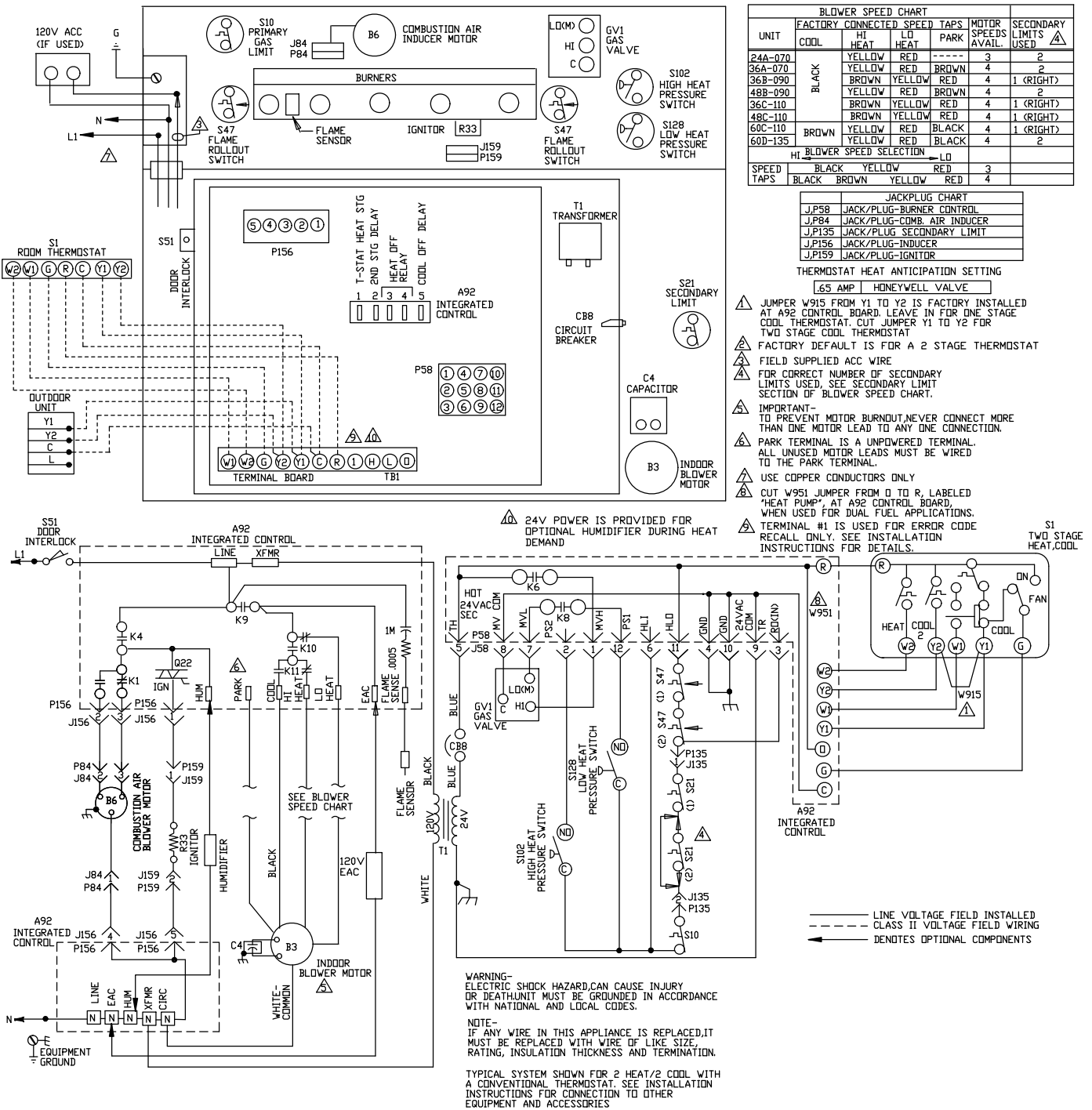


FIGURE 23

TYPICAL G60UH(X) FIELD WIRING DIAGRAM

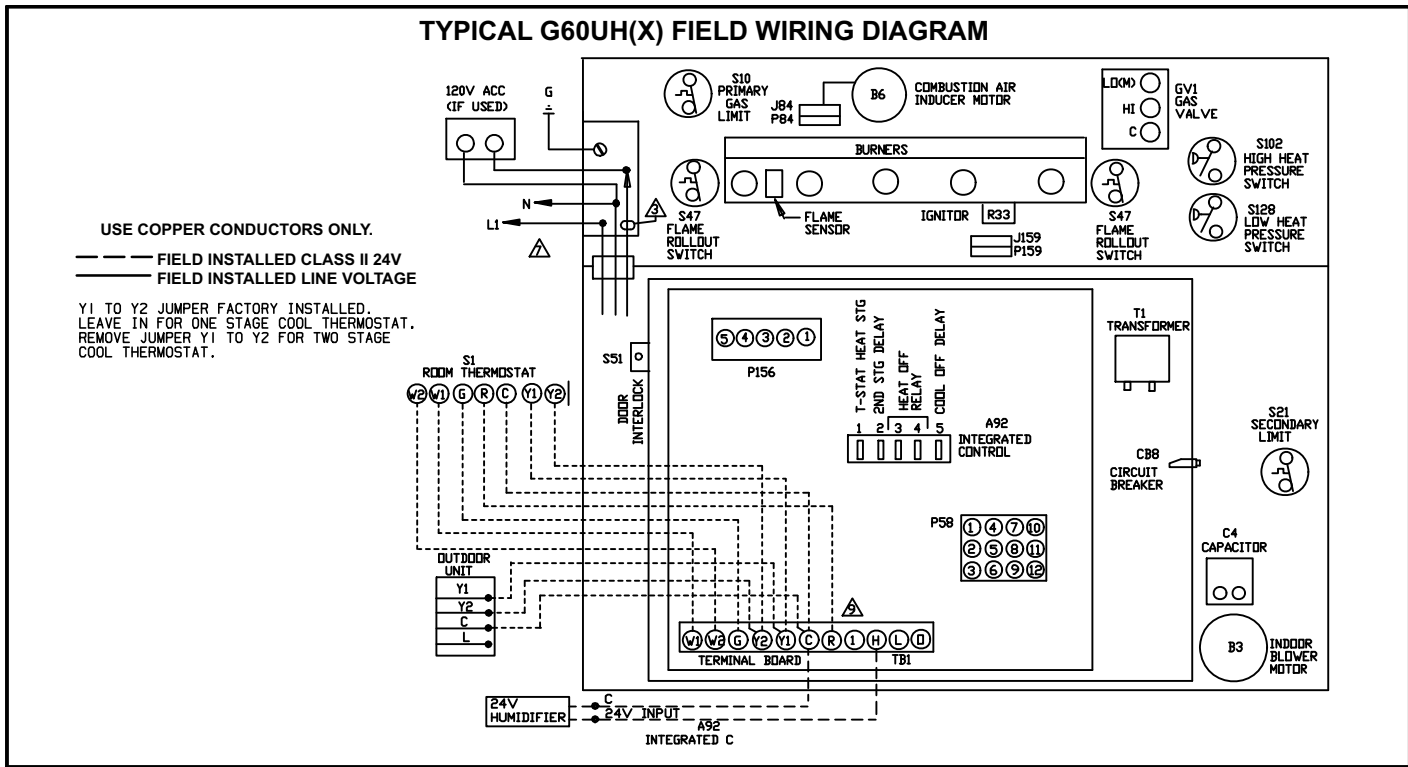


FIGURE 24

TWO-STAGE INTEGRATED CONTROL

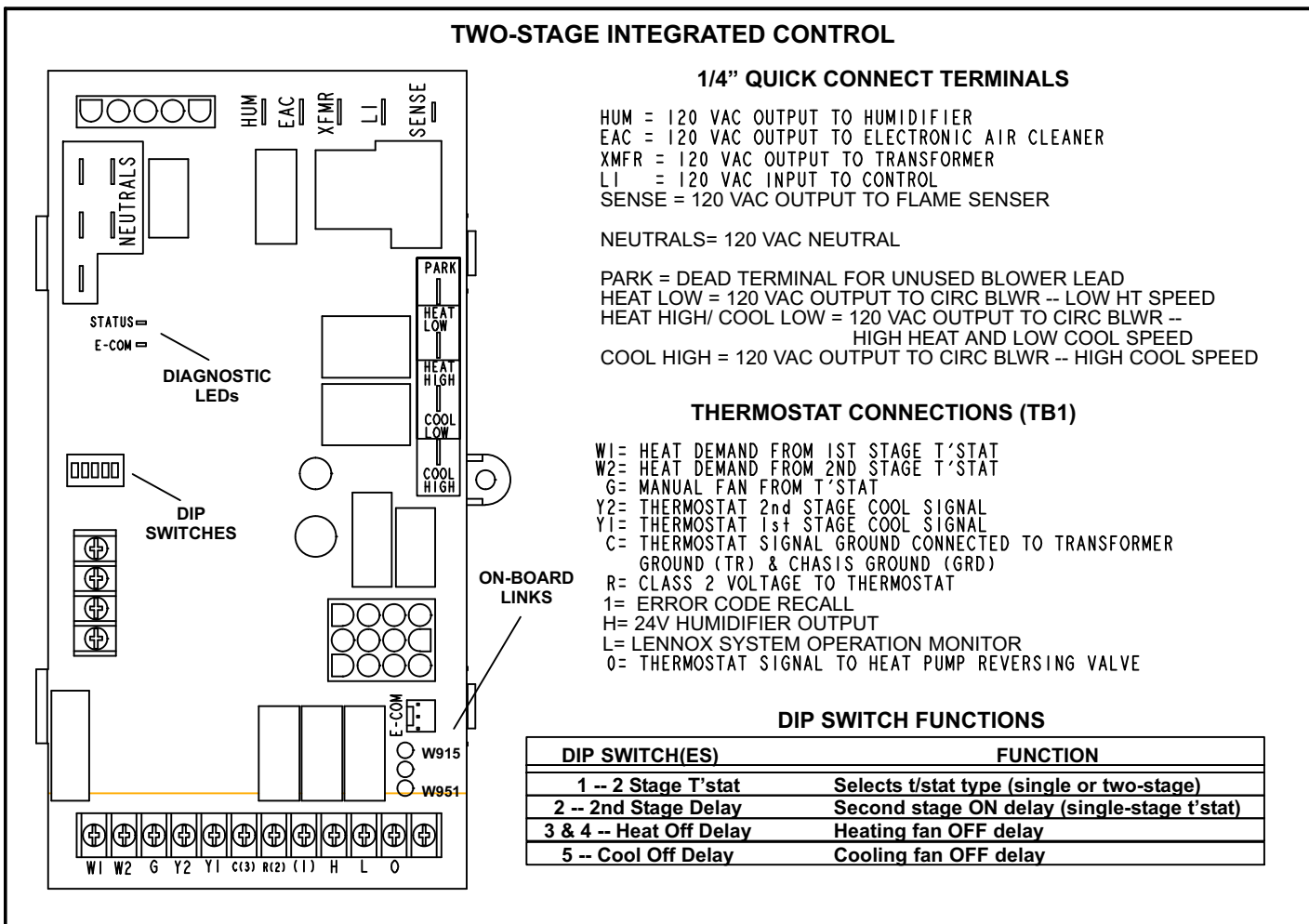


FIGURE 25

Integrated Control

G60UH units are equipped with a two-stage integrated control. This control manages ignition timing and fan off delays based on selections made using the control DIP switches and jumpers. The control includes an internal watchdog feature which automatically resets the ignition control when it has been locked out. After one hour of continuous thermostat demand for heat, the watchdog will break and remake thermostat demand to the furnace and automatically reset the control to relight the furnace.

DIP Switch Settings

Switch 1 -- Thermostat Selection -- This unit may be used with either a single-stage or two-stage thermostat. The thermostat selection is made using a DIP switch which must be properly positioned for the particular application. The DIP switch is factory-positioned for use with a two-stage thermostat. If a single-stage thermostat is to be used, the DIP switch must be repositioned.

- a - Select "OFF" for two-stage heating operation controlled by a two-stage heating thermostat (factory setting);
- b - Select "ON" for two-stage heating operation controlled by a single-stage heating thermostat. This setting provides a timed delay before second-stage heat is initiated.

Switch 2 -- Second Stage Delay (Used with Single-Stage Thermostat Only) -- This switch is used to determine the second stage on delay when a single-stage thermostat is being used. The switch is factory-set in the OFF position, which provides a 10-minute delay before second-stage heat is initiated. If the switch is toggled to the ON position, it will provide a 15-minute delay before second-stage heat is initiated. This switch is only activated when the thermostat selector jumper is positioned for SINGLE-stage thermostat use.

Switches 3 and 4 -- Heating Blower-Off Delay -- The heating blower-on delay of 45 seconds is not adjustable. The heating blower-off delay (time that the blower operates after the heating demand has been satisfied) can be adjusted by moving switches 3 and 4 on the integrated control. The unit is shipped from the factory with a heating blower-off delay of 90 seconds. The heating blower off delay affects comfort and is adjustable to satisfy individual applications. Adjust the blower off delay to achieve a supply air temperature between 90° and 110°F at the exact moment that the blower is de-energized. Longer off delay settings provide lower supply air temperatures; shorter settings provide higher supply air temperatures. Table 11 provides the blower off timings that will result from different switch settings.

TABLE 11
Heating Blower-Off Delay Switch Settings

Blower Off Delay (Seconds)	Switch 3	Switch 4
60	Off	On
90	Off	Off
120	On	Off
180	On	On

Switch 5 -- Cooling Blower-Off Delay -- The cooling blower-off delay (time that the blower operates after the cooling demand has been satisfied) can be adjusted by moving switch 5 on the integrated control. The switch is factory-set in the OFF position, which provides a cooling blower-off delay of 45 seconds. If the switch is toggled to the ON position, it will provide a 2-second cooling blower-off delay.

On-Board Link W951

On-board link W951 is a clippable connection between terminals R and O on the integrated control. W951 must be cut when the furnace is installed in applications which include a heat pump unit and a thermostat which features dual fuel use. If the link is left intact, terminal "O" will remain energized eliminating the HEAT MODE in the heat pump.

On-Board Link W915

On-board link W915 is a clippable connection between terminals Y1 and Y2 on the integrated control. W915 must be cut if two-stage cooling will be used. If the link is not cut the outdoor unit will operate in second-stage cooling only.

Unit Start-Up

FOR YOUR SAFETY READ BEFORE LIGHTING

⚠ WARNING

Do not use this furnace if any part has been underwater. A flood-damaged furnace is extremely dangerous. Attempts to use the furnace can result in fire or explosion. Immediately call a licensed professional service technician (or equivalent) to inspect the furnace and to replace all gas controls, control system parts, and electrical parts that have been wet or to replace the furnace, if deemed necessary.

⚠ WARNING



Danger of explosion. Can cause injury or product or property damage. Should the gas supply fail to shut off or if overheating occurs, shut off the gas valve to the furnace before shutting off the electrical supply.

⚠ CAUTION

Before attempting to perform any service or maintenance, turn the electrical power to unit OFF at disconnect switch.

BEFORE LIGHTING smell all around the appliance area for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.

The gas valve on the G60UH(X) unit may be equipped with either a gas control knob or gas control switch. Use only your hand to move the control switch or to turn the gas control knob. Never use tools. If the knob will not turn or if the control switch will not move by hand, do not try to repair it. Call a licensed professional service technician (or equivalent). Force or attempted repair may result in a fire or explosion.

Placing the furnace into operation:

G60UH(X) units are equipped with an automatic ignition system. Do not attempt to manually light burners on these furnaces. Each time the thermostat calls for heat, the burners will automatically light. The ignitor does not get hot when there is no call for heat on units with this ignition system.

⚠ WARNING

If you do not follow these instructions exactly, a fire or explosion may result causing property damage, personal injury or death.

Gas Valve Operation (Figures 26 and 27)

- 1 - **STOP!** Read the safety information at the beginning of this section.
- 2 - Set the thermostat to the lowest setting.
- 3 - Turn off all electrical power to the unit.
- 4 - This furnace is equipped with an ignition device which automatically lights the burners. Do **not** try to light the burners by hand.
- 5 - Remove the upper access panel.
- 6 - *White Rodgers 36E Gas Valve* - Move gas valve control switch to **OFF**. See figure 26.
Honeywell VR8205 Gas Valve - Turn knob on gas valve clockwise ➡ to **OFF**. Do not force. See figure 27.
- 7 - Wait five minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas go to next step.

- 8 - *White Rodgers 36E Gas Valve* - Move the gas valve control switch to **ON**. See figure 26.
Honeywell VR8205 Gas Valve - Turn knob on gas valve counterclockwise ↶ to **ON**. Do not force. See figure 27.
- 9 - Replace the upper access panel.

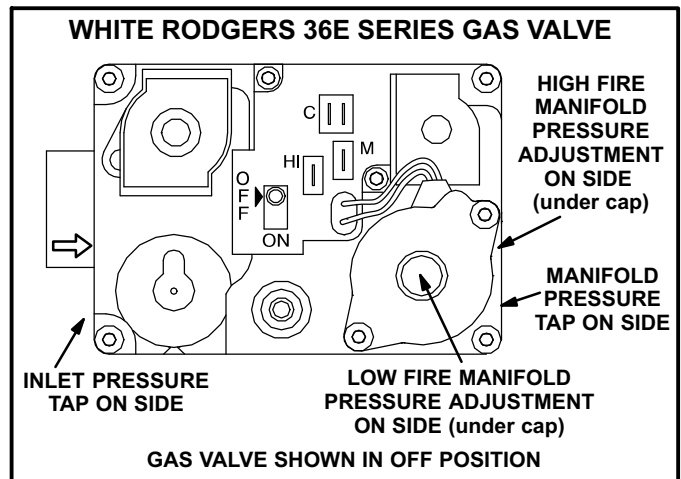


FIGURE 26

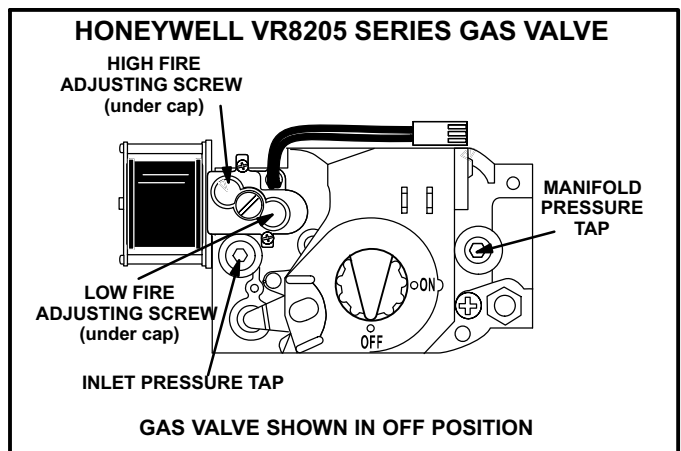


FIGURE 27

- 10- Turn on all electrical power to the unit.
 - 11- Set the thermostat to desired setting.
- NOTE - When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.*
- 12- If the appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call the gas supplier.

Turning Off Gas to Unit

- 1 - Set the thermostat to the lowest setting.
- 2 - Turn off all electrical power to the unit if service is to be performed.
- 3 - Remove the upper access panel.
- 4 - *White Rodgers 36E Gas Valve* - Move gas valve control switch to **OFF**.
Honeywell VR8205 Gas Valve - Turn knob on gas valve clockwise ➡ to **OFF**. Do not force.
- 5 - Replace the upper access panel.

Gas Pressure Adjustment

Gas Flow (Approximate)

- Operate unit at least 15 minutes before checking gas flow. Determine the time in seconds for one revolutions of gas through the meter. A portable LP gas meter (17Y44) is available for LP applications.

TABLE 12

Gas Flow Rate (Ft. ³ /Hr.)		
Seconds for 1 Revolution	Gas Meter Size	
	1/2 cu ft Dial	1 cu ft Dial
10	180	360
12	150	300
14	129	257
16	113	225
18	100	200
20	90	180
22	82	164
24	75	150
26	69	138
28	64	129
30	60	120
32	56	113
34	53	106
36	50	100
38	47	95
40	45	90
42	43	86
44	41	82
46	39	78
48	38	75
50	36	72
52	35	69
54	33	67
56	32	64
58	31	62
60	30	60

- Compare the number of seconds and the gas meter size in table 12 to determine the gas flow rate. Multiply the gas flow rate by the heating value to determine the unit input rate. If manifold pressure is correct and the unit input rate is incorrect, check gas orifices for proper size and restriction.

- Remove temporary gas meter if installed.

NOTE - To obtain accurate reading, shut off all other gas appliances connected to meter.

Gas Pressure

- Check the gas line pressure with the unit firing at maximum rate. A minimum of 4.5 in. w.c. for natural gas or 11.0 in. w.c. for LP/propane gas should be maintained.
- After the line pressure has been checked and adjusted, check the low fire and high fire manifold pressures. See figures 26 and 27 for the location of the manifold pressure adjustment screws. Low and high fire manifold pressures are given in table 13. A natural gas to LP/propane gas changeover kit is required to convert the unit.

High Altitude Information

Refer to table 13 for high altitude requirements and manifold pressure settings at all altitudes.

NOTE - In Canada, certification for installations at elevations over 4500 feet (1372 m) is the jurisdiction of local authorities.

NOTE - A natural to L.P. propane gas changeover kit is necessary to convert this unit. Refer to the changeover kit installation instruction for the conversion procedure.

TABLE 13

High Altitude Requirements / Manifold Pressure Settings

Model Input Size	Gas	Altitude				Manifold Pressure at all altitudes			
		0 - 7500 ft. (0 - 2285 m)		7501-10,000 ft. (2286 - 3048 m)		Low Fire		High Fire	
		Required Conversion Kit	Pressure Switch	Required Conversion Kit	Pressure Switch	in. w.g.	kPa	in. w.g.	kPa
-070, -090, -110, -135	Nat.	N/A	N/A	44W51	18M64	1.7	0.42	3.5	0.87
	LPG	44W48	N/A	44W50	18M64	4.9	1.22	10.0	2.5

Pressure switch is factory set. No adjustment necessary. All models use the factory installed pressure switch from 0-7500 feet (0-2285 m).

Other Unit Adjustments

Primary and Secondary Limits

The primary limit is located on the heating compartment vestibule panel. The secondary limits (if equipped) are located in the blower compartment, attached to the back side of the blower. These limits are factory set and require no adjustment.

Flame Rollout Switches (Two)

These manually reset switches are located on (or inside of) the burner box. If tripped, check for adequate combustion air before resetting.

Pressure Switches

The pressure switch assembly (includes two switches) is located in the heating compartment adjacent to the combustion air inducer. These switches check for proper combustion air inducer operation before allowing ignition trial. The switches are factory-set and require no adjustment.

Temperature Rise

Unit must be adjusted for the temperature rise range and within the allowable external static pressure as listed on unit nameplate.

Place the unit into operation with a second-stage heating demand. After supply and return air temperatures have stabilized, check the temperature rise. If necessary, adjust the heating blower speed to maintain the temperature rise within the range shown on the unit nameplate. Increase the blower speed to decrease the temperature rise. Decrease the blower speed to increase the temperature rise. Failure to properly adjust the temperature rise may cause erratic limit operation.

Blower Speeds

NOTE - CFM ratings are taken external to unit with a dry evaporator coil and without accessories. See blower performance data which begins on page 33.

Thermostat Heat Anticipation

Set the heat anticipator setting (if adjustable) according to

the amp draw listed on the wiring diagram that is attached to the unit.

Electrical

- 1 - Check all wiring for loose connections.
- 2 - Check for the correct voltage at the furnace (furnace operating).
- 3 - Check amp-draw on the blower motor.
Motor Nameplate _____ Actual _____

NOTE - Do not secure the electrical conduit directly to the air ducts or structure.

Electronic Ignition

The two-stage SureLight® integrated control used in G60UH units has an added feature of an internal Watchguard control. The feature serves as an automatic reset device for ignition control lockout caused by ignition failure. This type of lockout is usually due to low gas line pressure. After one hour of continuous thermostat demand for heat, the Watchguard will break and remake thermostat demand to the furnace and automatically reset the control to begin the ignition sequence.

Flue And Chimney

- 1 - Check flue pipe, chimney and all connections for tightness and to make sure there is no blockage.
- 2 - Check unit for proper draft.
- 3 - Is pressure switch closed? Obstructed flue will cause unit to shut off at pressure switch. Check flue and outlet for blockages.
- 4 - Reset manual flame rollout switches on burner box.

Failure To Operate

If the unit fails to operate, check the following:

- 1 - Is the thermostat calling for heat?
- 2 - Are access panels securely in place?
- 3 - Is the main disconnect switch closed?
- 4 - Is there a blown fuse or tripped circuit breaker?
- 5 - Is the filter dirty or plugged? Dirty or plugged filters will cause the limit control to shut the unit off.
- 6 - Is gas turned on at the meter?
- 7 - Is the manual main shut-off valve open?
- 8 - Is the internal manual shut-off valve open?
- 9 - Is the unit ignition system in lock out? If the unit locks out again, inspect the unit for blockages.

Blower Performance Data

NOTES All air data is measured external to unit with 1 in. cleanable filter (not furnished - field provided) in place.
Air volume based on bottom air return air. Actual air volume may vary on side return air applications.

G60UH-24A-070 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds					
	High		Medium		Low	
	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1075	445	905	375	730	290
0.05	1070	445	900	375	725	290
0.10	1065	440	895	370	720	285
0.15	1060	435	890	365	715	285
0.20	1055	430	885	360	710	280
0.25	1045	425	880	360	700	280
0.30	1030	415	875	355	690	270
0.40	1010	400	860	350	675	270
0.50	975	390	840	340	660	265
0.60	940	375	805	325	640	255
0.70	890	360	755	305	605	240
0.80	830	340	700	285	565	225
0.90	765	305	640	265	515	205

G60UH-36A-070 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watt	cfm	Watt	cfm	Watt	cfm	Watt
0.00	1500	705	1290	565	985	455	830	375
0.05	1475	695	1275	555	980	445	820	365
0.10	1450	680	1255	545	970	440	810	360
0.15	1425	670	1240	535	965	430	805	355
0.20	1400	655	1225	525	955	425	795	350
0.25	1370	645	1205	510	945	415	790	345
0.30	1340	630	1180	500	930	405	780	335
0.40	1285	610	1140	475	900	390	745	325
0.50	1215	580	1080	450	865	375	705	310
0.60	1150	560	1015	430	810	355	655	290
0.70	1060	535	940	405	730	330	585	270
0.80	955	515	800	370	655	305	480	260
0.90	785	475	605	325	585	270	410	255

G60UH-36B-090 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watt	cfm	Watt	cfm	Watt	cfm	Watt
0.00	1500	720	1255	595	1040	460	900	370
0.05	1485	705	1250	580	1040	450	895	365
0.10	1465	685	1240	570	1035	445	890	360
0.15	1450	675	1235	555	1035	440	885	355
0.20	1435	660	1225	545	1030	435	880	350
0.25	1420	645	1215	530	1025	425	875	345
0.30	1400	630	1200	520	1020	415	870	340
0.40	1345	595	1170	495	1000	400	855	330
0.50	1300	575	1135	475	965	380	830	300
0.60	1235	545	1080	445	930	360	780	290
0.70	1165	510	1020	415	870	340	740	280
0.80	1080	480	940	385	800	315	670	260
0.90	985	445	840	355	710	290	600	245

G60UH-36C-110 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watt	cfm	Watt	cfm	Watt	cfm	Watt
0.00	1555	715	1335	575	1085	460	925	365
0.05	1540	705	1330	555	1080	450	920	360
0.10	1525	690	1320	545	1075	440	915	355
0.15	1510	680	1310	535	1070	430	910	350
0.20	1490	670	1295	525	1065	420	900	340
0.25	1465	655	1280	510	1060	415	890	335
0.30	1440	645	1260	495	1050	405	880	330
0.40	1385	615	1230	485	1030	390	865	320
0.50	1320	590	1190	460	995	375	835	300
0.60	1260	570	1135	430	960	355	815	295
0.70	1190	545	1075	410	915	345	775	285
0.80	1090	515	970	385	860	325	760	280
0.90	975	485	880	360	790	305	705	275

NOTES All air data is measured external to unit with 1 in. cleanable filter (not furnished - field provided) in place.
Air volume based on bottom air return air. Actual air volume may vary on side return air applications.

G60UH-48B-090 PERFORMANCE

G60UH-48C-110 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watt	cfm	Watt	cfm	Watt	cfm	Watt
0.00	1970	790	1810	735	1585	670	1340	565
0.05	1940	780	1785	715	1580	650	1335	555
0.10	1915	765	1760	695	1570	630	1325	540
0.15	1880	745	1730	660	1560	615	1325	530
0.20	1840	730	1700	620	1545	600	1320	520
0.25	1805	715	1670	625	1520	585	1310	510
0.30	1765	695	1640	625	1490	565	1295	500
0.40	1695	670	1570	595	1440	540	1260	480
0.50	1600	635	1490	560	1360	505	1195	450
0.60	1505	600	1400	530	1285	480	1140	425
0.70	1395	565	1265	485	1170	440	990	380
0.80	1250	520	1100	445	975	390	905	355
0.90	1005	460	870	385	900	365	810	325

External Static Pressure in. w.g.	Air Volume / Watts at Various Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watt	cfm	Watt	cfm	Watt	cfm	Watt
0.00	2015	895	1620	780	1340	640	1150	525
0.05	1990	870	1615	760	1340	640	1150	525
0.10	1965	850	1610	745	1340	640	1150	525
0.15	1930	825	1605	725	1335	630	1150	525
0.20	1895	805	1600	710	1335	615	1150	525
0.25	1860	785	1590	695	1330	605	1150	520
0.30	1820	765	1580	675	1330	590	1145	515
0.40	1740	725	1530	635	1320	560	1140	490
0.50	1665	695	1475	600	1285	525	1120	470
0.60	1575	650	1405	555	1230	490	1075	445
0.70	1475	610	1310	515	1165	470	1015	415
0.80	1350	560	1210	485	1080	430	930	380
0.90	1210	520	1070	430	870	365	740	325

G60UH-60C-100X PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds															
	Bottom Return Air, Side Return Air with Optional RAB Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.					Single Side Return Air - Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity.										
	High		Medium-High		Medium-Low		Low		High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
.00	2555	1378	2300	1027	1985	863	1655	678	2385	1296	2185	981	1915	836	1650	686
.10	2490	1354	2265	1002	1980	839	1640	667	2330	1274	2150	961	1900	815	1635	677
.20	2420	1330	2225	980	1975	832	1635	660	2255	1234	2095	930	1885	794	1625	664
.30	2355	1300	2175	957	1945	810	1625	653	2190	1207	2035	902	1855	769	1620	651
.40	2275	1265	2115	934	1915	785	1620	639	2115	1179	1970	876	1820	751	1605	639
.50	2175	1229	2040	903	1860	762	1595	623	2055	1156	1905	853	1760	725	1575	622
.60	2085	1199	1965	873	1800	733	1565	608	1985	1141	1830	827	1705	704	1525	602
.70	1990	1140	1870	843	1730	714	1525	590	1910	1119	1745	797	1635	680	1475	582
.80	1890	1105	1770	807	1630	676	1455	567	1810	1088	1650	772	1560	659	1430	571
.90	1760	1067	1655	777	1535	649	1370	541	1715	1058	1570	751	1485	638	1355	549

NOTE - All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished - field provided) in place.

G60UH-60D-135 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds															
	Bottom Return Air, Side Return Air with Optional RAB Return Air Base, Return Air from Both Sides or Return Air from Bottom and One Side.					Single Side Return Air - Air volumes in bold require field fabricated transition to accommodate 20 x 25 x 1 in. air filter in order to maintain proper air velocity.										
	High		Medium-High		Medium-Low		Low		High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
.00	2715	1407	2255	1070	1910	850	1660	674	2455	1336	2170	1019	1850	829	1555	673
.10	2640	1403	2250	1030	1900	834	1645	668	2380	1299	2140	974	1840	812	1550	664
.20	2540	1355	2245	1006	1890	821	1630	665	2305	1266	2105	947	1830	791	1545	656
.30	2480	1319	2200	975	1890	781	1625	656	2235	1234	2045	914	1820	774	1540	642
.40	2390	1282	2155	940	1885	775	1615	642	2160	1240	1985	886	1800	755	1540	628
.50	2320	1251	2085	904	1860	758	1605	631	2065	1170	1925	863	1745	726	1535	614
.60	2205	1210	2020	876	1815	731	1595	611	1990	1146	1870	844	1700	706	1505	599
.70	2080	1161	1935	839	1760	707	1545	588	1895	1111	1775	808	1655	689	1465	573
.80	2010	1122	1855	810	1690	679	1495	568	1805	1074	1680	779	1565	656	1425	562
.90	1880	1071	1755	781	1585	646	1430	545	1695	1042	1590	752	1480	630	1335	533

NOTE - All air data is measured external to unit with 1 in. (25 mm) cleanable filter (not furnished - field provided) in place.

Heating Sequence of Operation

NOTE - The thermostat selection DIP switch on the integrated control is factory-set in the "TWO-STAGE" position.

Applications Using a Two-Stage Thermostat

A - Heating Sequence -- Integrated Control Thermostat Selection DIP switch in "Two-Stage" Position (Factory Setting)

- 1 - On a call for heat, thermostat first-stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts. The combustion air inducer is energized at low speed and the humidifier terminal is energized.
- 2 - Once the control receives a signal that the low pressure switch has closed, the combustion air inducer begins a 15-second pre-purge in low speed.
- 3 - After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at low speed.
- 4 - After the 20-second warm-up period has ended, the gas valve is energized on low fire (first stage) and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 45-second ON-delay. When the delay ends, the indoor blower motor is energized on the low fire heating speed. The furnace will continue this operation as long as the thermostat has a first-stage heating demand.
- 5 - If second-stage heat is required, the thermostat second-stage heat contacts close and send a signal to the integrated control. The integrated control initiates a 30-second second-stage recognition delay.
- 6 - At the end of the recognition delay, the integrated control energizes the combustion air inducer at high speed. The control also checks the high-fire (second stage) pressure switch to make sure it is closed. The high-fire (second stage) gas valve is energized and the indoor blower motor is energized for operation at the high-fire heating speed.
- 7 - When the demand for high-fire (second stage) heat is satisfied, the combustion air inducer is switched to the low-fire heating speed and the high-fire (second stage) gas valve is de-energized. The low-fire (first stage) gas valve continues operation. The indoor blower motor is switched to the low-fire heating speed.
- 8 - When the thermostat demand for low-fire (first stage) heat is satisfied, the gas valve is de-energized and the field-selected indoor blower-off delay begins. The combustion air inducer begins a 5-second post-purge period.
- 9 - When the combustion air post-purge period is complete, the inducer and humidifier terminal are de-energized. The indoor blower is de-energized at the end of the off delay.

Applications Using A Single-Stage Thermostat

B - Heating Sequence -- Integrated Control Thermostat Selection DIP switch in "Single-Stage" Position

NOTE - In these applications, two-stage heat will be initiated by the integrated control if heating demand has not been satisfied after the field adjustable period (10 or 15 minutes).

- 1 - On a call for heat, thermostat first-stage contacts close sending a signal to the integrated control. The integrated control runs a self-diagnostic program and checks high temperature limit switches for normally closed contacts and pressure switches for normally open contacts. The combustion air inducer is energized at low speed and the humidifier terminal is energized.
- 2 - Once the control receives a signal that the low pressure switch has closed, the combustion air inducer begins a 15-second pre-purge in low speed.
- 3 - After the pre-purge is complete, a 20-second initial ignitor warm-up period begins. The combustion air inducer continues to operate at low speed.
- 4 - After the 20-second warm-up period has ended, the gas valve is energized on low fire (first stage) and ignition occurs. At the same time, the control module sends a signal to begin an indoor blower 45-second ON-delay. When the delay ends, the indoor blower motor is energized on the low-fire heating speed. The integrated control also initiates a second-stage on delay (factory-set at 10 minutes; adjustable to 15 minutes).
- 5 - If the heating demand continues beyond the second-stage on delay, the integrated control energizes the combustion air inducer at high speed. The control also checks the high-fire (second stage) pressure switch to make sure it is closed. The high-fire (second stage) gas valve is energized and the indoor blower motor is energized for operation at the high-fire heating speed.
- 6 - When the thermostat heating demand is satisfied, the combustion air inducer begins a 5-second post-purge. The field-selected indoor blower-off delay begins.
- 7 - When the combustion air post-purge period is complete, the inducer and humidifier terminal are de-energized. The indoor blower is de-energized at the end of the off delay.

Service

WARNING

Disconnect power before servicing unit.

CAUTION

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

At the beginning of each heating season, a licensed professional technician (or equivalent) should check the system as follows:

Blower

Check the blower wheel for debris and clean if necessary. The blower motors are prelubricated for extended bearing life. No further lubrication is needed.

WARNING

The blower access panel must be securely in place when the blower and burners are operating. Gas fumes, which could contain carbon monoxide, can be drawn into living space resulting in personal injury or death.

Filters

All G60UH(X) filters are installed external to the unit. Filters should be inspected monthly. Clean or replace the filters when necessary to ensure that the furnace operates properly. Replacement filters must be rated for high velocity airflow. Table 1 lists recommended filter sizes.

Flue And Chimney

Check the flue pipe, chimney and all connections for tightness and to make sure there is no blockage.

Electrical

- 1 - Check all wiring for loose connections.
- 2 - Check for the correct voltage at the furnace (furnace operating).
- 3 - Check amp-draw on the blower motor.
Motor Nameplate _____ Actual _____

Cleaning the Heat Exchanger and Burners

NOTE - Use papers or protective covering in front of the furnace during cleaning.

Cleaning the heat exchanger requires a steel spring "snake," a reversible drill and a vacuum cleaner. The steel spring snake may be constructed by purchasing a 4 ft. long by 1/4 inch diameter steel wire cable and a 1/4 inch diameter wire brush. These items are available at a hardware store. Insert wire end of brush into the open end of the spring cable. Crimp the cable around the brush so that the brush is secured and will not come off during cleaning. Attach the other end of the cable to the reversible drill to complete the tool for cleaning the heat exchanger.

- 1 - Turn off both electrical and gas power supplies to furnace.
- 2 - Remove flue pipe and top cap from the unit. Label the pressure switch wires, then disconnect them.

- 3 - Remove the four screws that secure the combustion air inducer. Carefully remove the combustion air inducer to avoid damaging blower gasket. If gasket is damaged, it must be replaced to prevent leakage. See figure 1.
- 4 - Remove the collector box located behind the combustion air inducer. Be careful with the collector box gasket. If the gasket is damaged, it must be replaced to prevent leakage.
- 5 - Label the wires from gas valve and rollout switches, then disconnect them.
- 6 - Disconnect gas supply piping. Remove six screws securing the burner box / manifold assembly to the vestibule panel and remove the assembly from the unit. Take care not to damage the gasket.
- 7 - **NOx units only** - Remove the three screws that attach the NOx insert to the corbel at the entrance to each heat exchanger section. Carefully remove the NOx insert from each section. See figure 29.
- 8 - Insert the brush end of cable snake into the top of one of the heat exchanger openings. **Do not force the cable into the heat exchanger.** Insert the cable and operate the drill on slow speed. Move the cable in and out of the heat exchanger section three or four times or until sufficient cleaning is accomplished. Reverse drill and slowly work the cable out of opening.
- 9 - Repeat procedure for each heat exchanger section.
- 10- After each of the top heat exchanger sections has been cleaned, insert the brush end of the cable snake into the bottom openings of each of the heat exchanger sections and clean as described in step 8.
- 11- Remove the cable from the heat exchanger. Use a vacuum cleaner to remove debris knocked loose during cleaning.
- 12- Attach the exhaust end (positive pressure) of the vacuum cleaner to the top of the heat exchanger section. Any loose debris will be forced to the bottom of the heat exchanger section. Vacuum debris from bottom openings.
- 13- Replace collector box and combustion air inducer. Check gaskets for damage. Damaged gaskets must be replaced to avoid heat exchanger leaks. Replace all screws to the collector box and combustion air inducer. Failure to replace all screws may cause leaks.
- 14- To clean the burner, run a vacuum cleaner with a soft brush attachment over the face of burners. Visually inspect inside the burners and crossovers for any blockage caused by foreign matter. Remove any blockage.
- 15- **NOx units only** - Reattach the NOx inserts to the corbels at the entrance to each heat exchanger opening. See figure 29.
- 16- Re-install burner box / manifold assembly onto the vestibule panel.

17- Reconnect wires to pressure switch, roll-out switches, gas valve and combustion air inducer. Refer to unit wiring diagram.

22- Check all piping connections, factory and field, for gas leaks. Use a leak detecting solution or other preferred means.

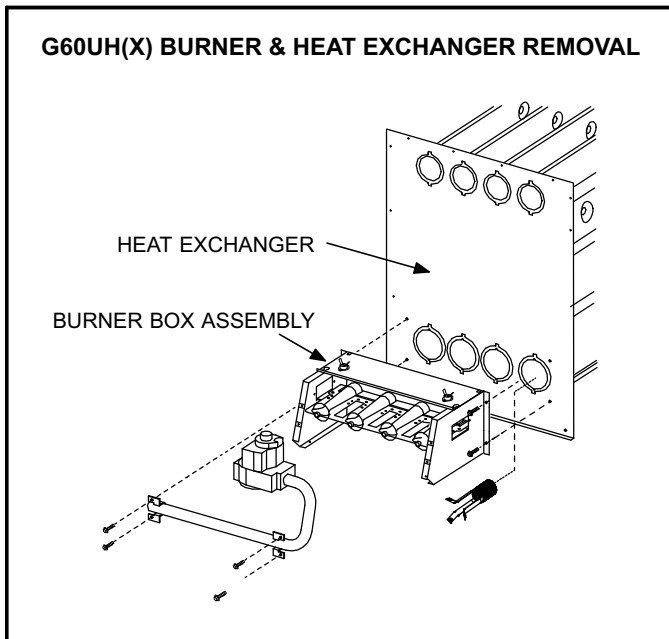


FIGURE 28

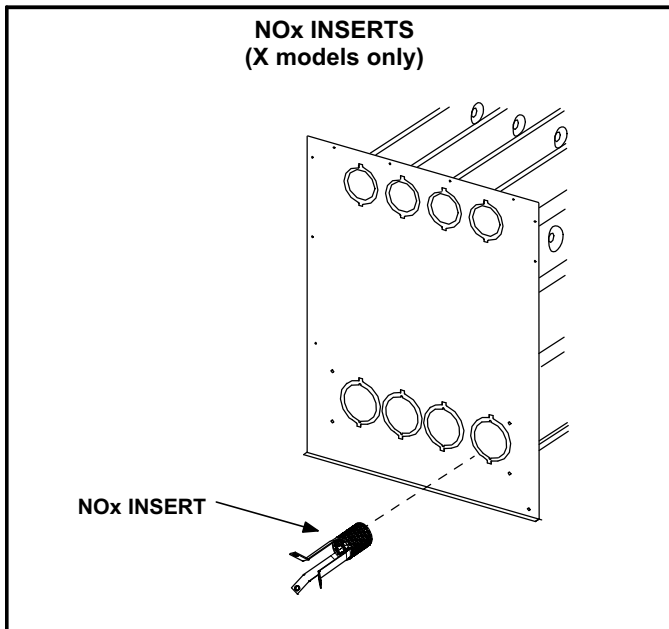


FIGURE 29

18- Re-install top cap and re-secure vent pipe to combustion air inducer outlet.

19- Reconnect gas supply piping.

20- Turn on power and gas supply to unit.

21- Set thermostat and check for proper operation.

CAUTION

Some soaps used for leak detection are corrosive to certain metals. Carefully rinse piping thoroughly after leak test has been completed. Do not use matches, candles, flame or other sources of ignition to check for gas leaks.

23- If a leak is detected, shut gas and electricity off and repair leak.

24- Repeat steps 23 and 24 until no leaks are detected.

25- Replace front access panel.

Planned Service

The service technician should check the following during an annual inspection. Power to the unit must be shut off for the service technician's safety.

Fresh air grilles and louvers (on the unit and in the room where the furnace is installed) - Must be open and unobstructed to provide combustion air.

Burners - Must be inspected for rust, dirt, or signs of water.

Vent pipe - Must be inspected for signs of water, damaged or sagging pipe, or disconnected joints.

Unit appearance - Must be inspected for rust, dirt, signs of water, burnt or damaged wires, or components.

Blower access door - Must be properly in place and provide a seal between the return air and the room where the furnace is installed.

Return air duct - Must be properly attached and provide an air seal to the unit.

Operating performance - Unit must be observed during operation to monitor proper performance of the unit and the vent system.

Combustion gases - Flue products must be analyzed and compared to the unit specifications.

Problems detected during the inspection may make it necessary to temporarily shut down the furnace until the items can be repaired or replaced.

Instruct the homeowners to pay attention to their furnace. Situations can arise between annual furnace inspections that may result in unsafe operation.

Integrated Control Diagnostic Codes

FLASH CODE (X + Y)	STATUS / ERROR DESCRIPTION
FLASH CODE DESCRIPTIONS	
Pulse	A 1/4 second flash followed by four seconds of off time.
Heartbeat	Constant 1/2 second bright and 1/2 second dim cycles.
X + Y	LED flashes X times at 2Hz, remains off for two seconds, flashes Y times at 2Hz, remains off for four seconds, then repeats.
Pulse	Power on - Standby.
Heartbeat	Normal operation - signaled when heating demand initiated at thermostat.
FLAME CODES	
1 + 2	Low flame current -- run mode.
1 + 3	Flame sensed out of sequence -- flame still present.
PRESSURE SWITCH CODES	
2 + 3	Low pressure switch failed open.
2 + 4	Low pressure switch failed closed.
2 + 5	High pressure switch failed open.
2 + 6	High pressure switch failed closed.
2 + 7	Low pressure switch opened during ignition trial or heating demand.
LIMIT CODE	
3 + 1	Limit switch open.
WATCHGUARD CODES	
4 + 1	Watchguard -- Exceeded maximum number of retries.
4 + 2	Watchguard -- Exceeded maximum number of retries or last retry was due to pressure switch opening.
4 + 3	Watchguard -- Exceeded maximum number of retries or last retry was due to flame failure.
4 + 5	Watchguard -- Limit remained open longer than three minutes.
4 + 6	Watchguard -- Flame sensed out of sequence; flame signal gone.
4 + 7	Ignitor circuit fault -- Failed ignitor or triggering circuitry.
4 + 8	Low line voltage.
HARD LOCKOUT CODES	
5 + 1	Hard lockout -- Rollout circuit open or previously opened.
5 + 2	Control failed self check, internal error (control will restart if error recovers).
5 + 3	No Earth ground (control will restart if error recovers).
5 + 4	Reversed line voltage polarity (control will restart if the error recovers).
5 + 6	Low secondary (24VAC) voltage.

Error Code Storage

The ignition control stores the last ten error codes in memory. The codes are retained in case of power loss.

Error Code Review

- 1 - Short R (2) to (1). Within 1/2 second, the STATUS LED will stay lit continuously to indicate that the short was sensed.
- 2 - Continue to hold the short between R (2) to (1). After 5 seconds, STATUS LED will go from being continuously lit to off. This indicates that error code review is pending.
- 3 - Remove R (2) to (1) short within ten seconds of STATUS LED turning off. This activates error code review.
- 4 - Last ten error codes will be flashed on the STATUS LED.

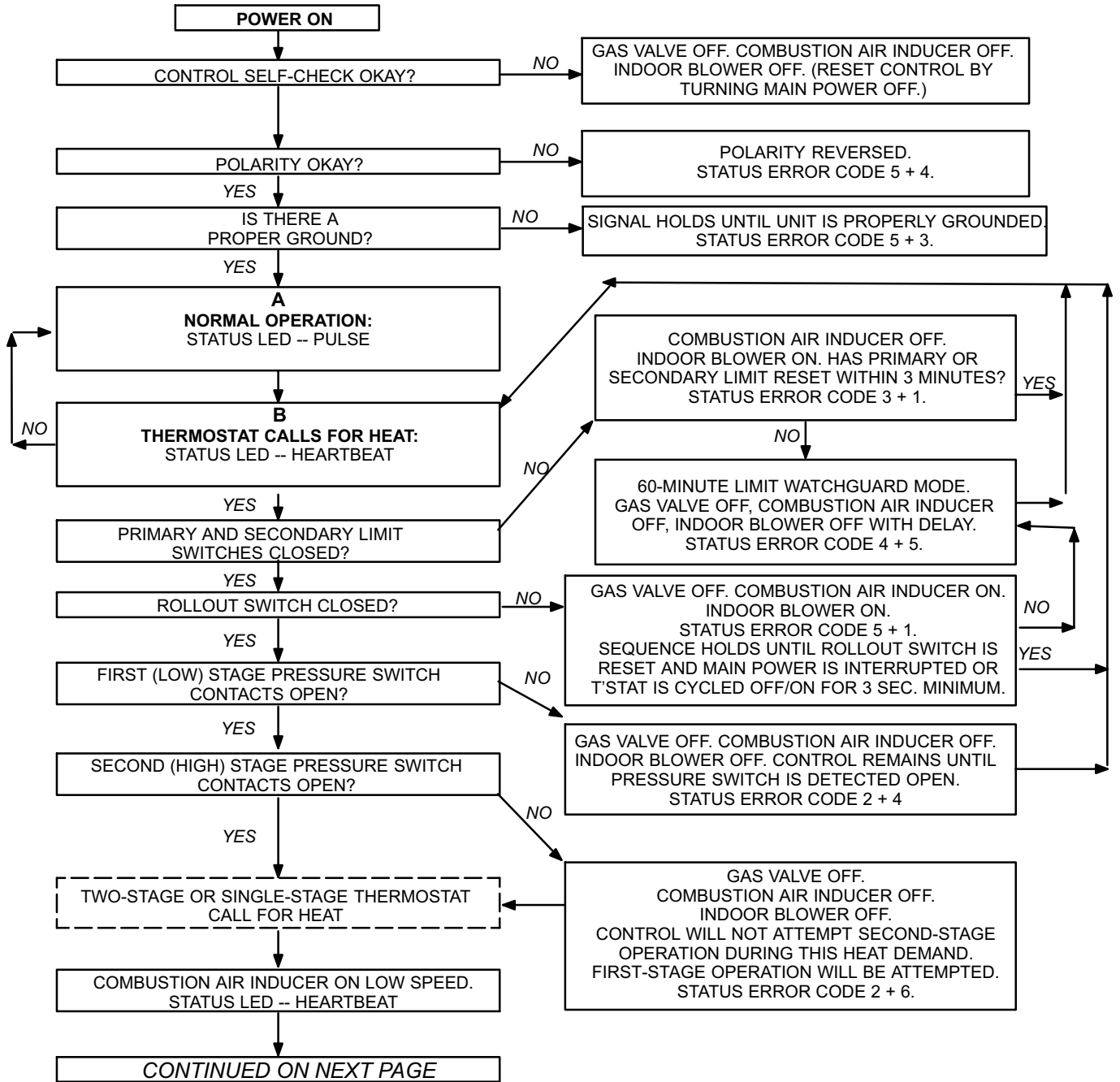
- 5 - After final error code is indicated, STATUS LED will flash to indicate normal operation.

Clearing Error Codes

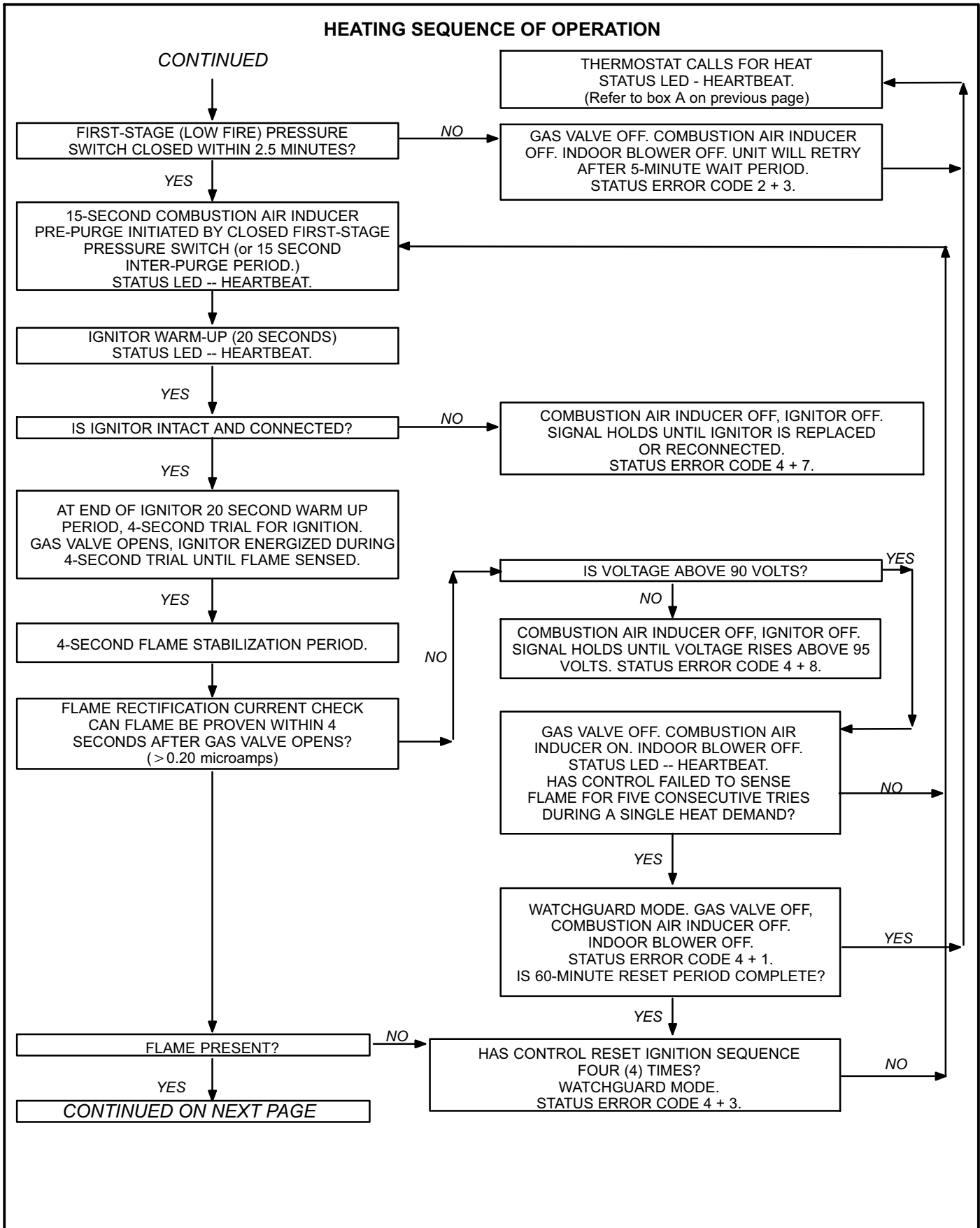
- 1 - Short R (2) to (1). Within 1/2 second, the STATUS LED will stay lit continuously to indicate that the short was sensed.
- 2 - Continue to hold the short between R (2) to (1). After 5 seconds, STATUS LED will go from being continuously lit to off.
- 3 - Continue to hold the short between R (2) to (1) beyond ten seconds after STATUS LED has turned off. STATUS LED will turn on, indicating that error codes have been cleared.
- 4 - Remove R (2) to (1) short. STATUS LED will flash to indicate normal operation.

Troubleshooting: Heating Sequence of Operation

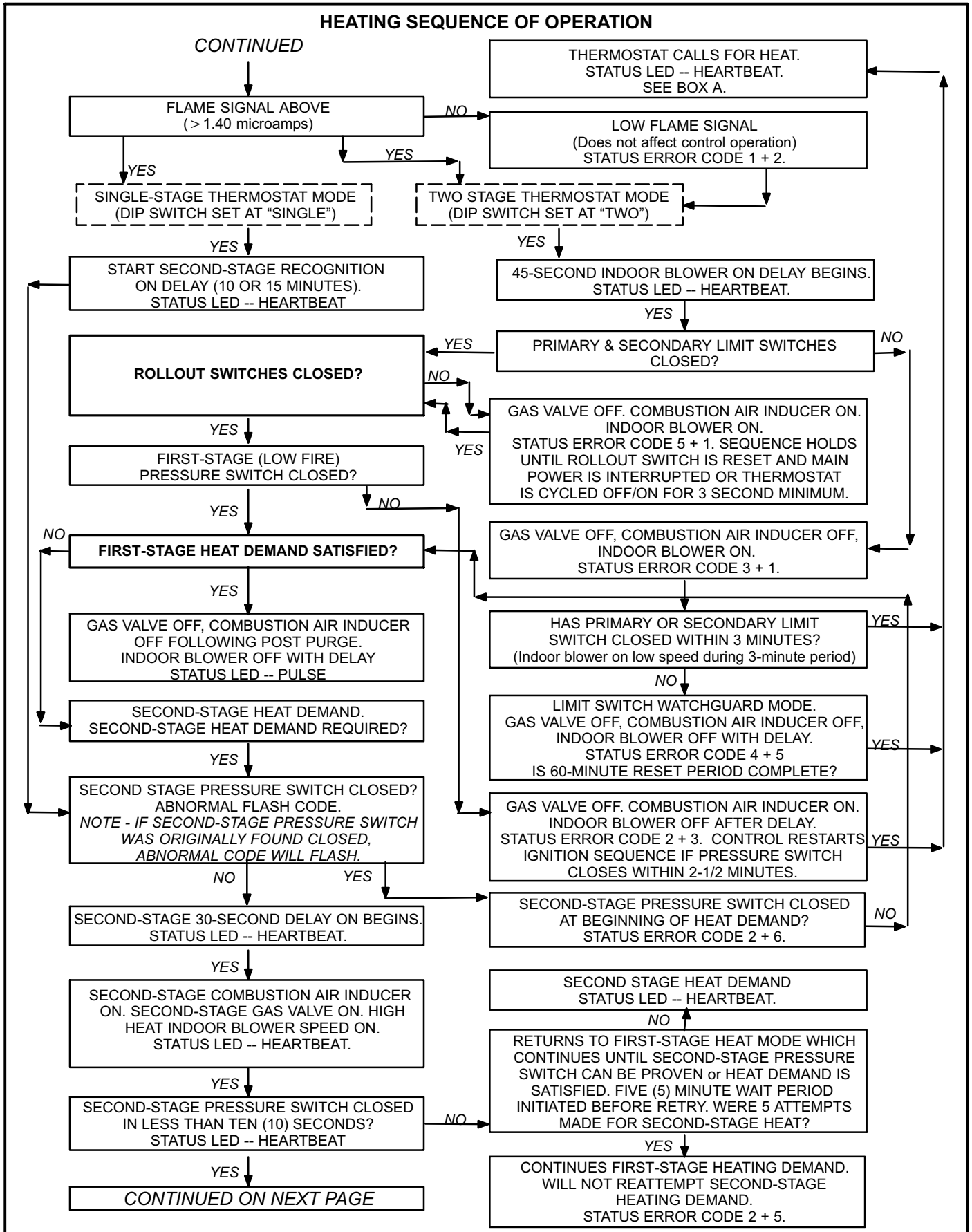
HEATING SEQUENCE OF OPERATION NORMAL AND ABNORMAL HEATING MODE



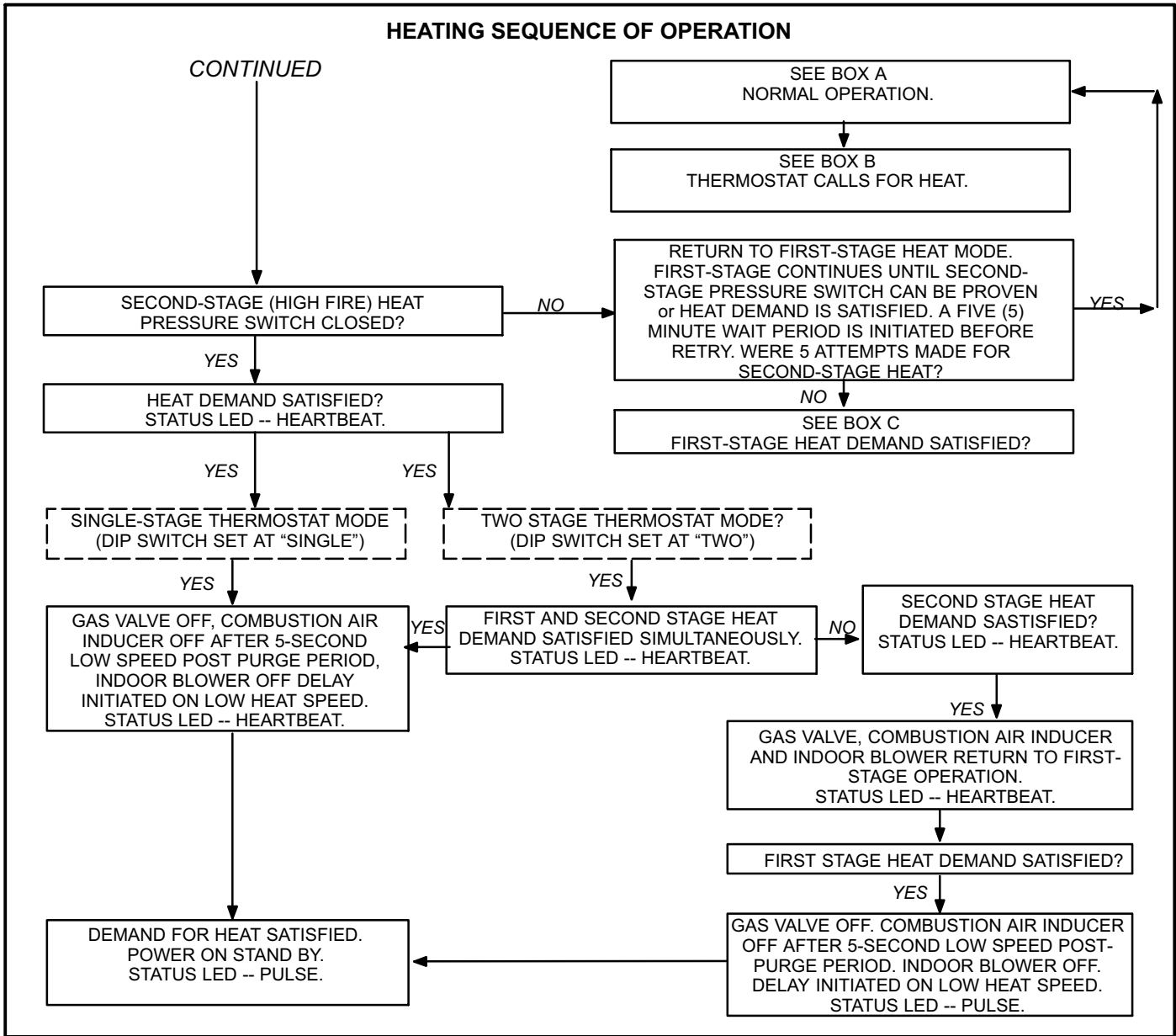
Troubleshooting: Heating Sequence of Operation (Continued)



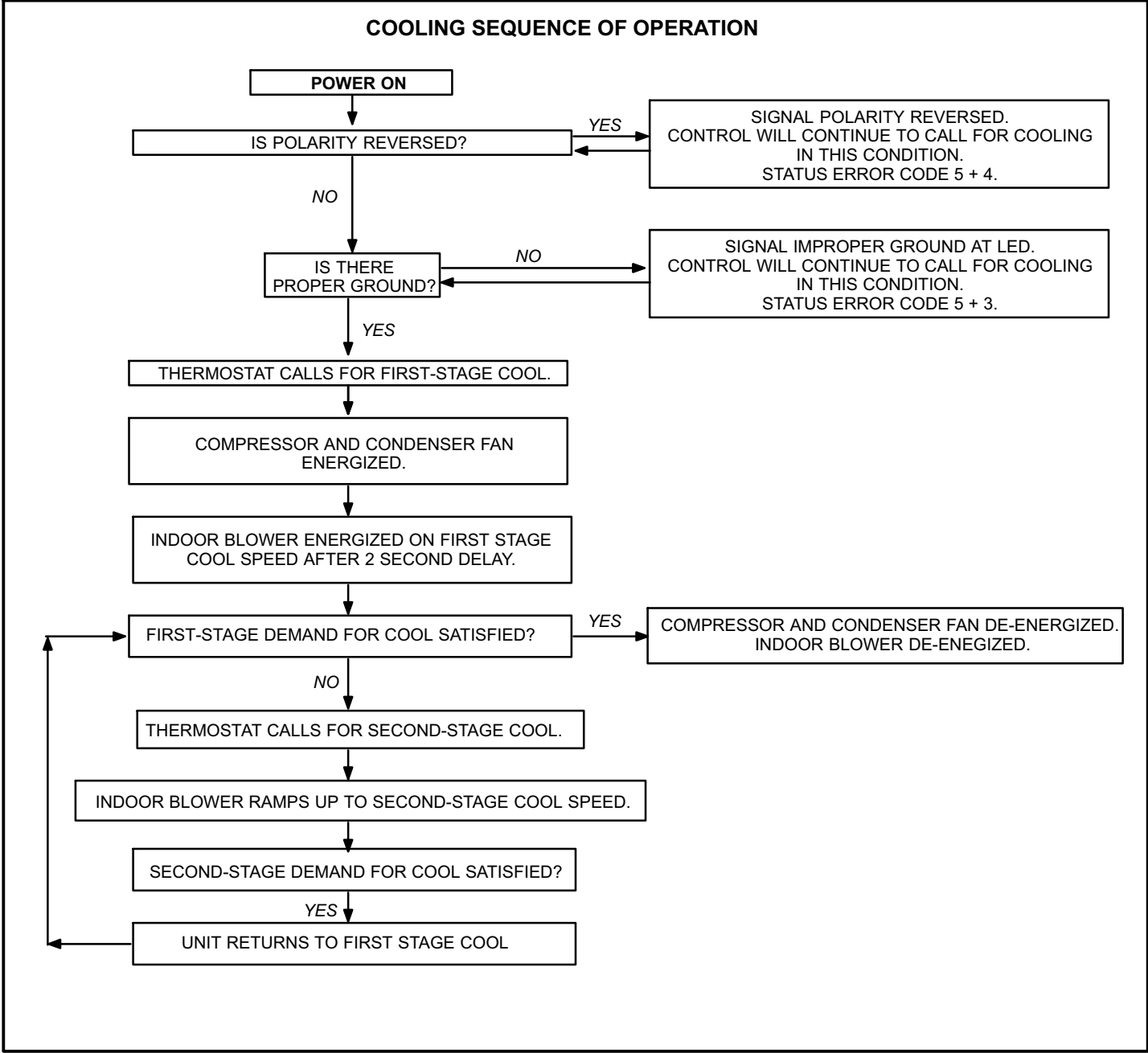
Troubleshooting: Heating Sequence of Operation (Continued)



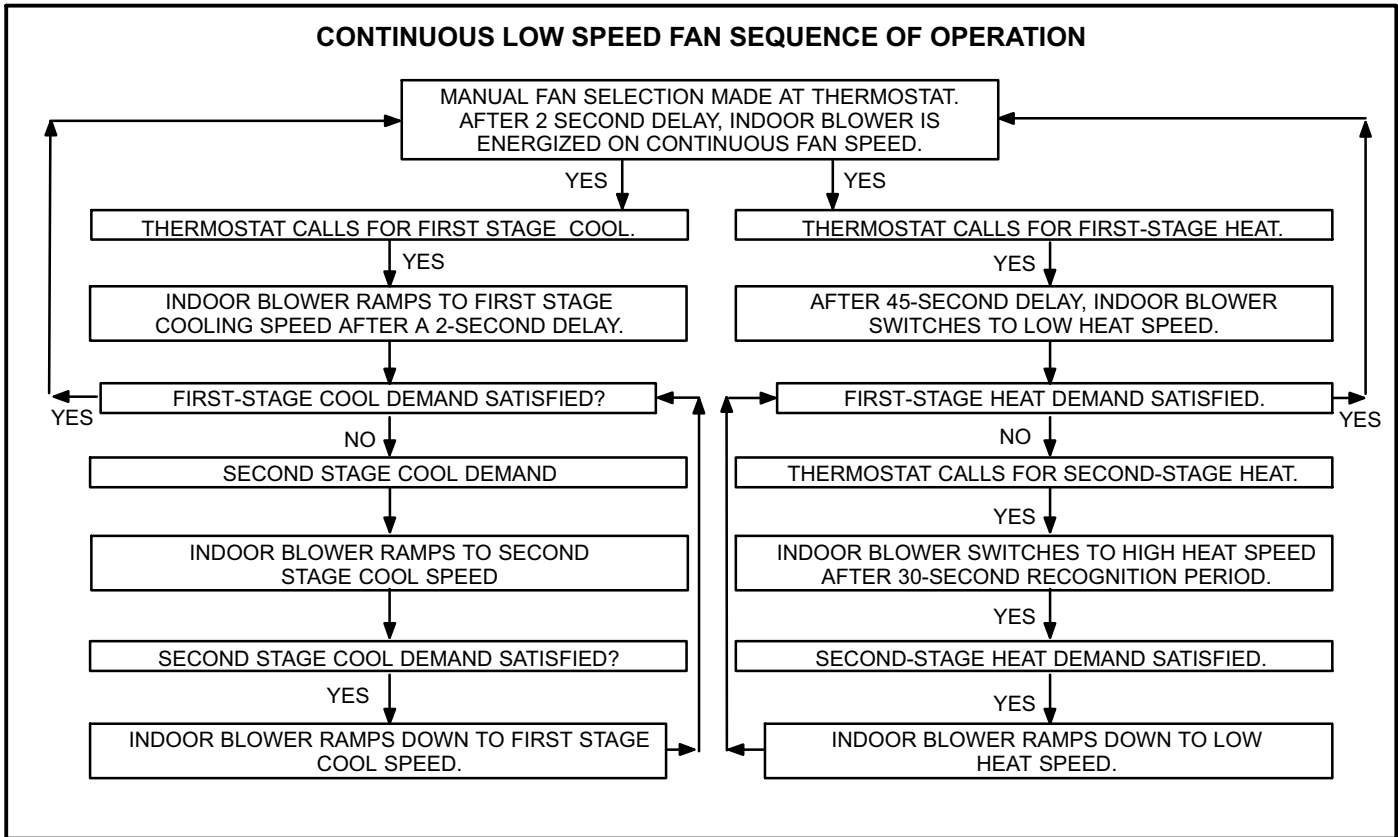
Troubleshooting: Heating Sequence of Operation (Continued)



Troubleshooting: Cooling Sequence of Operation



Troubleshooting: Continuous Fan Sequence of Operation



Repair Parts List

The following repair parts are available through Lennox dealers. When ordering parts, include the complete furnace model number listed on the CSA International nameplate -- Example: G60UH(X)-36A-070-4. **All service must be performed by a licensed professional installer (or equivalent), service agency, or gas supplier.**

Cabinet Parts

- Upper access panel
- Blower panel
- Top cap

Control Panel Parts

- Transformer
- Two-stage integrated control
- Door interlock switch
- Circuit breaker

Blower Parts

- Blower wheel
- Blower housing
- Motor
- Capacitor
- Motor mounting frame
- Blower housing cutoff plate

Heating Parts

- Flame Sensor
- Heat exchanger assembly
- Gas manifold
- Two-speed combustion air inducer
- Two-stage gas valve
- Main burner cluster
- Main burner orifices
- Pressure switch
- Ignitor
- Primary limit control
- Flame rollout switch
- Secondary limit

G60UH(X) Start-Up & Performance Check List

Job Name _____ Job No. _____ Date _____

Job Location _____ City _____ State _____

Installer _____ City _____ State _____

Unit Model No. _____ Technician _____

Serial No. _____

Heating Section

Electrical Connections Tight?

Line Voltage _____

Blower Motor H.P. _____

Blower Motor Amps _____

Gas Piping Connections
Tight & Leak-Tested?

Fuel Type: Natural Gas?

LP/Propane Gas?

Furnace Btu Input (High fire) _____ - Line Pressure _____

Low Fire Manifold Pressure _____ w.c. - Nat.: _____ w.c. - LP/Propane

High Fire Manifold Pressure _____ w.c. - Nat.: _____ w.c. - LP/Propane

Flue Connections Tight?

Proper Draft?

Combustion Gas Tested (high fire and low fire)? CO₂ CO

Blower ON delay confirmed?
(45 Seconds Fixed On) External Static Pressure? _____
(0.5 maximum)

Blower OFF Delay Setting (60, 90, 120 or 180)? _____ Temperature Rise _____

Filter Clean & Secure?

Thermostat

Heat Anticipator Setting? _____

Thermostat Level?