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Dallas, Texas, USA

# INSTALLATION INSTRUCTIONS

## G40DF(X) Series



**GAS FURNACE**  
505,253M  
10/2009  
Supersedes 05/2009

**TP** Technical  
Publications

Litho U.S.A.

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**THIS MANUAL MUST BE LEFT WITH THE  
HOMEOWNER 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.**

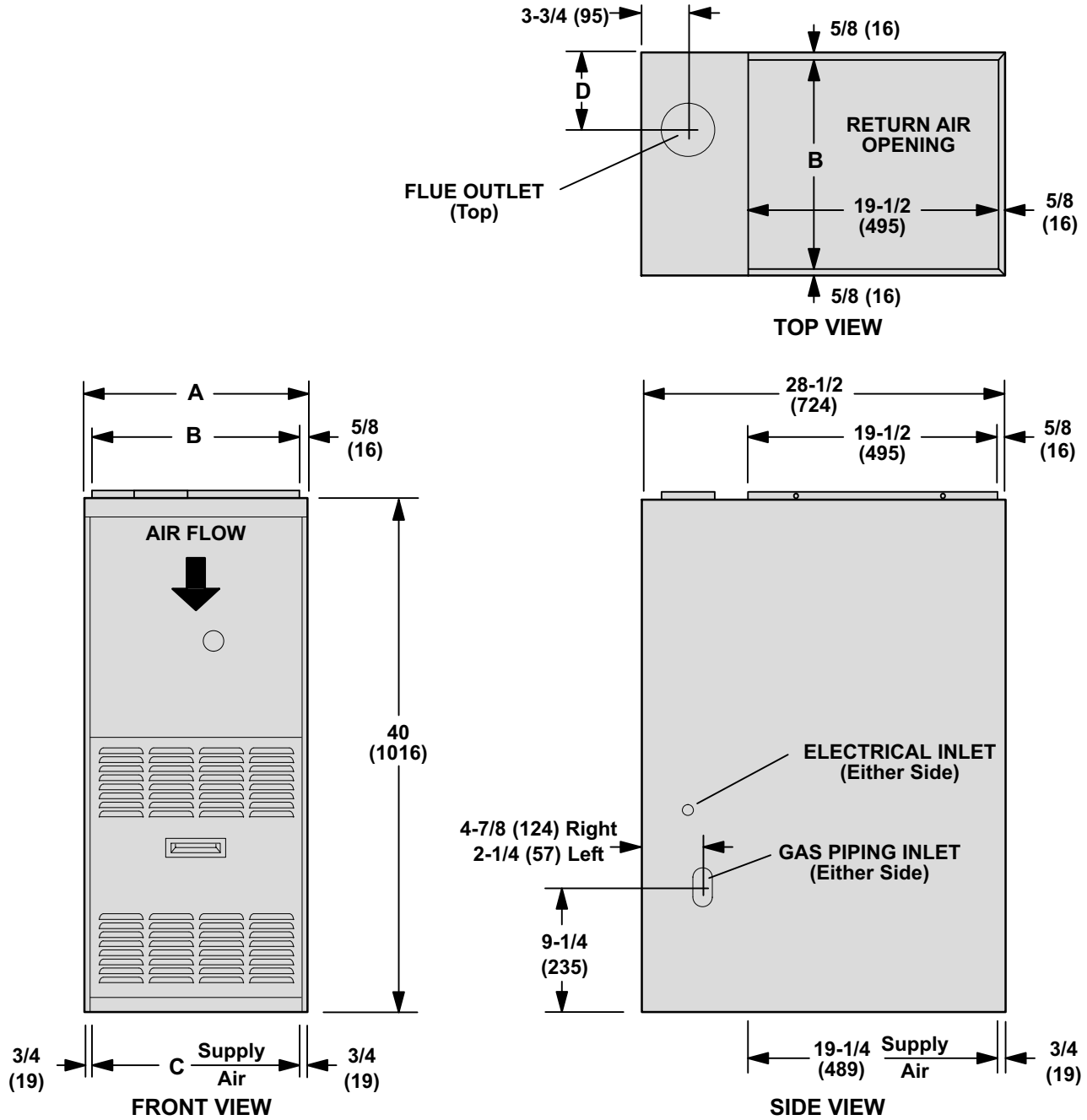
**Installation and service must be performed by a qualified installer, service agency or the gas supplier.**

### **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.**



# G40DF(X) Unit Dimensions - inches (mm)



Model No.	A		B		C		D	
	in.	mm	in.	mm	in.	mm	in.	mm
G40DF(X)-24A-045, G40DF(X)-36A-070	14-1/2	368	13-1/4	337	13	330	4-1/2	114
G40DF-36B-090	17-1/2	446	16-1/4	413	16	406	6	152
G40DF(X)-48C-090, G40DF-48C-110, G40DF(X)-60C-110	21	533	19-1/4	502	19-1/2	495	7-3/4	197
G40DF-60D-135	24-1/2	622	23-1/4	591	23	584	9-1/2	241

# G40DF(X) Parts Arrangement

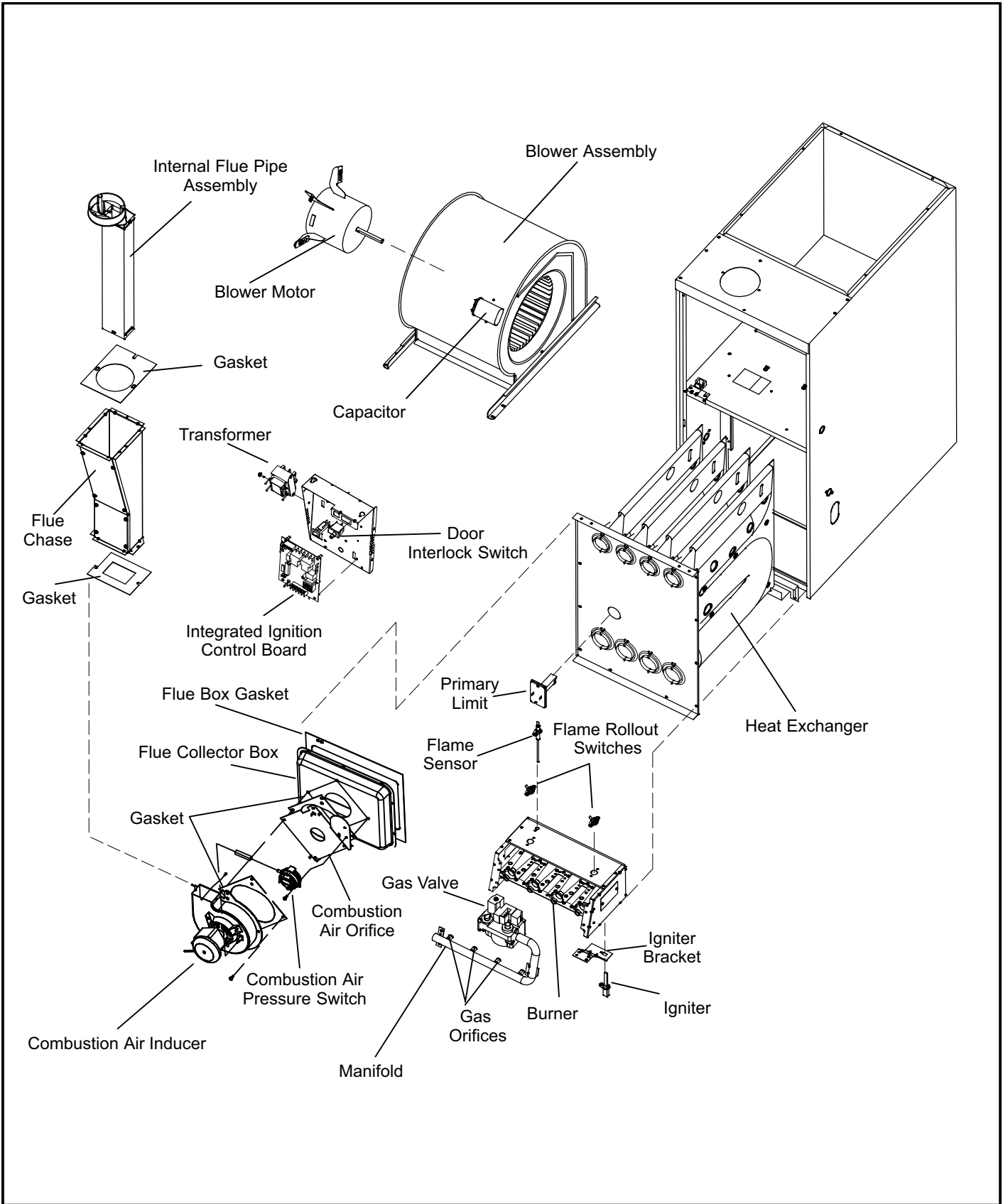


FIGURE 1

## G40DF(X) Gas Furnace

The G40DF(X) gas furnace is shipped ready for installation in the downflow position fueled by natural gas. A conversion kit (ordered separately) is required for use in propane/LP gas applications.

## Shipping and Packing List

### Package 1 of 1 contains

- 1 - Assembled G40DF(X) unit
- 1 - Bag assembly containing the following:
  - 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 - Propane/LP changeover 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.**

G40DF(X) units are CSA International certified to ANSI Z21.47 and CSA 2.3 standard.

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). 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 CSA B149 Natural Gas and Propane Installation Codes, 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 table in figure 9. 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 within the range specified on the unit nameplate. Failure to do so may cause erratic limit operation and premature heat exchanger failure.*

This G40DF(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 intermittent operation down to 55°F (13°C) dry bulb in cases where a night setback thermostat is used. Return air temperature must not exceed 85°F (29°C) dry bulb.*

*NOTE - G40DF(X) series units should not be installed as a unit heater.*

The G40DF(X) furnace may be installed in alcoves, closets, attics, basements, garages, and utility rooms in the downflow position.

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

### Use of Furnace as Construction Heater

Lennox does not recommend the use of G40DF(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.

G40DF(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.

## 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**

In addition to the requirements outlined previously, the following general recommendations must be considered when installing a G40DF(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.

## Combustion, Dilution, & Ventilation Air

### ⚠ 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

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 G40DF(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 CSA B149 installation codes.

### ⚠ 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.**

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

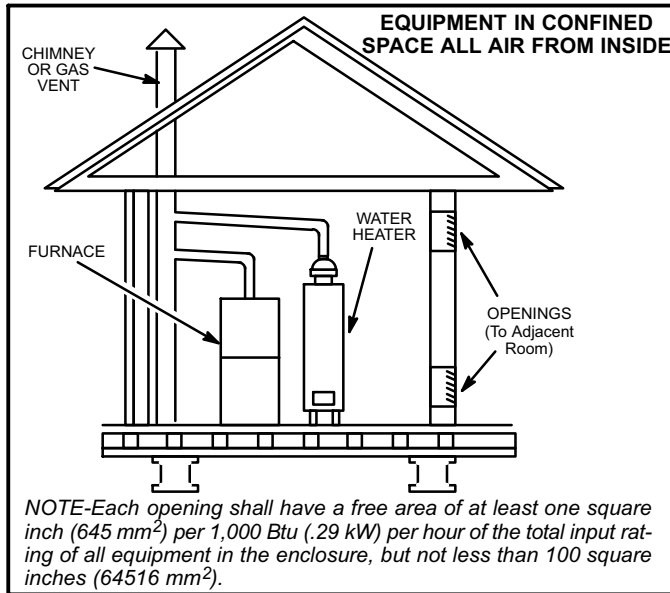
An unconfined space is an area such as a basement or large equipment room with a volume greater than 50 cubic feet (1.42 m<sup>3</sup>) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This space also includes adjacent rooms which are not separated 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 m<sup>3</sup>) 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**

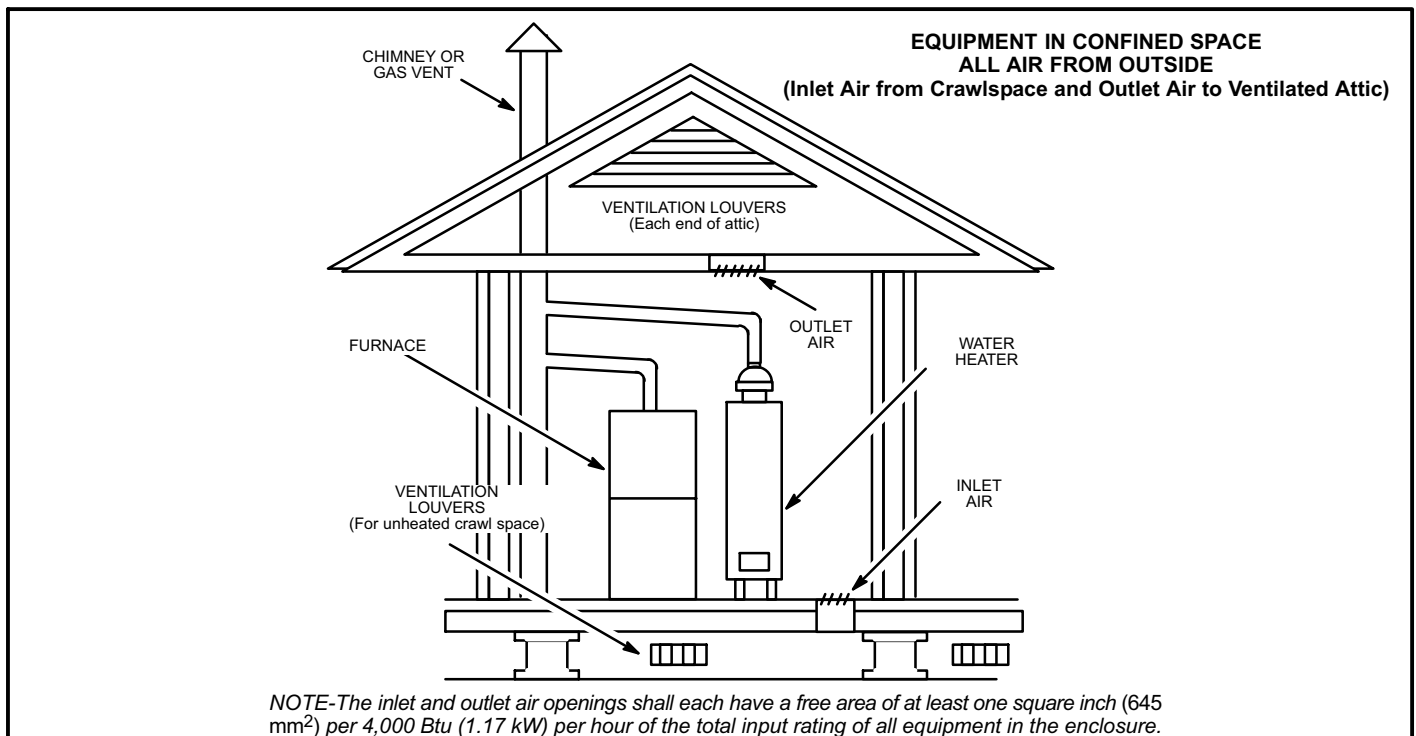
If the confined space that houses the furnace adjoins a space categorized as unconfined, air can be brought in by providing two permanent openings between the two spaces. Each opening must have a minimum free area of 1 square inch (645 mm<sup>2</sup>) per 1,000 Btu (.29 kW) per hour of

total input rating of all gas-fired equipment in the confined space. Each opening must be at least 100 square inches (64,516 mm<sup>2</sup>). 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.

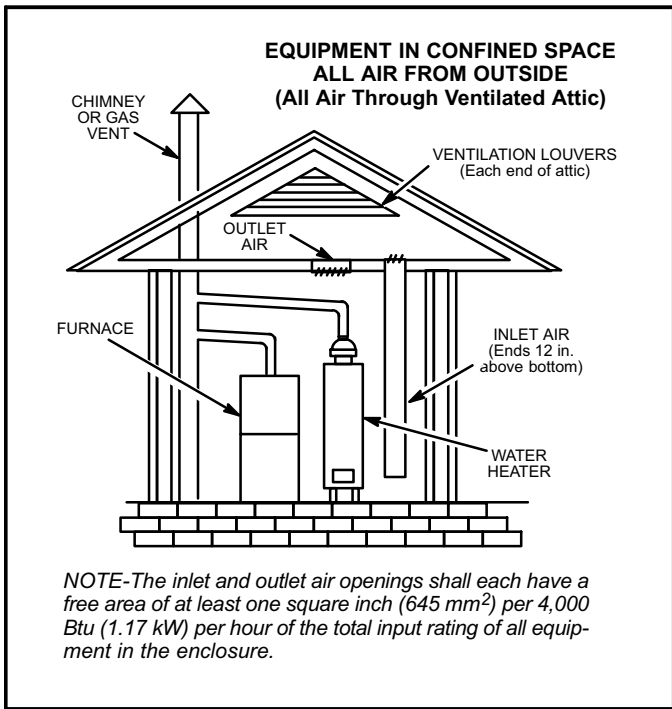
**Air from Outside**

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 mm<sup>2</sup>) 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 mm<sup>2</sup>) per 2,000 Btu (.56 kW) per total input rating of all equipment in the enclosure. See figure 5.

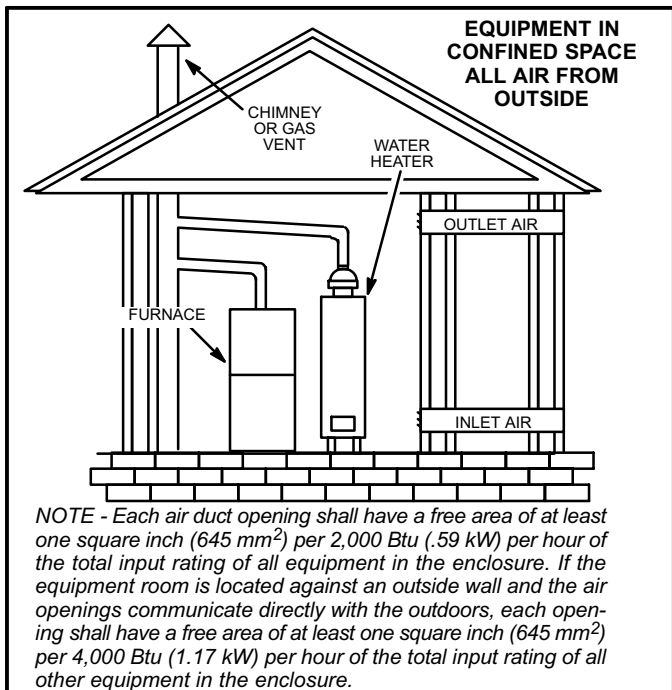
When ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be no less than 3 inches (75 mm). In calculating free area, the blocking effect of louvers, grilles, or screens must be considered. 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.



**FIGURE 3**



**FIGURE 4**



**FIGURE 5**

**Downflow Installation**

Downflow unit installs in three ways: on noncombustible flooring, on combustible flooring using an additive base, or on a reverse-flow cooling cabinet. Do not drag the unit across the floor.

**Installation on Noncombustible Flooring**

- 1 - Cut floor opening keeping in mind clearances listed on unit rating plate. Also keep in mind gas supply connections, electrical supply, flue and air intake connections and sufficient installation and servicing clearances. See table 1 for correct floor opening size.
- 2 - Flange warm air plenum and lower the plenum into the opening.
- 3 - Set the unit over the plenum and seal the plenum to the unit.
- 3 - Ensure that the seal is adequate.

**TABLE 1  
NONCOMBUSTIBLE FLOOR OPENING SIZE**

Model No.	Front to Rear		Side to Side	
	in.	mm	in.	mm
A Cabinet (14.5")	19 - 3/4	502	13 - 1/4	337
B Cabinet (17.5")	19 - 3/4	502	16 - 1/4	413
C Cabinet (21")	19 - 3/4	502	19 - 3/4	502
D Cabinet (24.5")	19 - 3/4	502	23 - 1/4	591

*NOTE - Floor opening dimensions listed are 1/4 inch (6 mm) larger than the unit opening. See figure 1.*

**Installation on Combustible Flooring**

- 1 - When unit is installed on a combustible floor, an additive base must be installed between the furnace and the floor. The base must be ordered separately for the following cabinet sizes:

- A cabinet 14.5" - # 11M59
- B cabinet 17.5" - # 11M60
- C cabinet 21" - # 11M61
- D cabinet 24.5" - # 11M62

See table 2 for opening size to cut in floor.

**⚠ CAUTION**

The furnace and additive base shall not be installed directly on carpeting, tile, or other combustible material other than wood flooring.

The furnace and additive base shall not be installed directly on carpeting, tile, or other combustible material other than wood flooring.

**TABLE 2  
ADDITIVE BASE FLOOR OPENING SIZE**

Model No.	Front to Rear		Side to Side	
	in.	mm	in.	mm
A Cabinet (14.5")	22	559	15 - 3/4	400
B Cabinet (17.5")	22	559	18 - 3/4	476
C Cabinet (21")	22	559	22 - 3/4	578
D Cabinet (24.5")	22	559	25 - 3/4	654

*NOTE - Floor opening dimensions listed are 1/4 inch (6 mm) larger than unit opening. See figure 1.*



- 2 - After opening is cut, set additive base into opening.
- 3 - Check fiberglass strips on additive base to make sure they are properly glued and positioned.
- 4 - Lower supply air plenum into additive base until plenum flanges seal against fiberglass strips.

*NOTE - Be careful not to damage fiberglass strips. Check for a tight seal.*

- 5 - Set the furnace over the plenum.
- 6 - Ensure that the seal between the furnace and plenum is adequate.

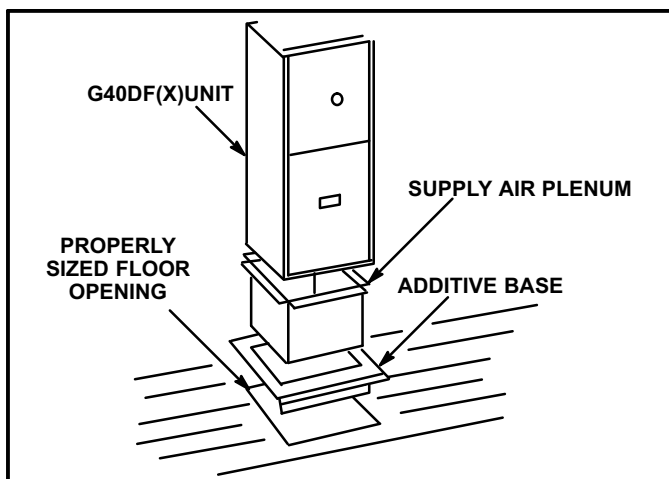


FIGURE 6

#### Installation on Cooling Cabinet

- 1 - Refer to reverse-flow coil installation instructions for correctly sized opening in floor and installation of cabinet.
- 2 - When cooling cabinet is in place, set and secure the furnace according to the instructions that are provided with the cooling coil. Secure the furnace to the cabinet.
- 3 - Seal the cabinet and check for air leaks.

#### Return Air Opening -- Downflow Units

The following steps should be taken when installing plenum:

- 1 - Bottom edge of plenum should be flanged with a hemmed edge (See figure 7).
- 2 - Fiberglass sealing strips should be used.

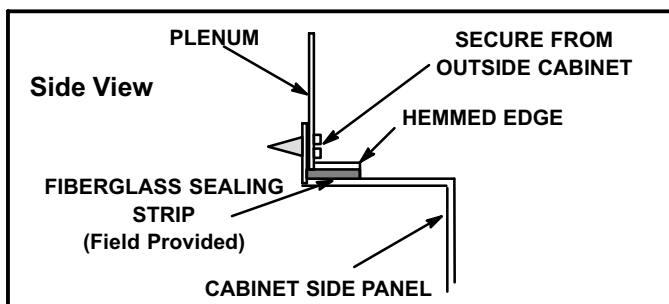


FIGURE 7

- 3 - In all cases, plenum should be secured to top flanges of furnace with sheet metal screws.
- 4 - In closet installations, it may be impossible to install sheet metal screws from the outside. In this case, make plenum with a removable front and install screws from the inside (See figure 8).
- 5 - Make certain that an adequate seal is made.

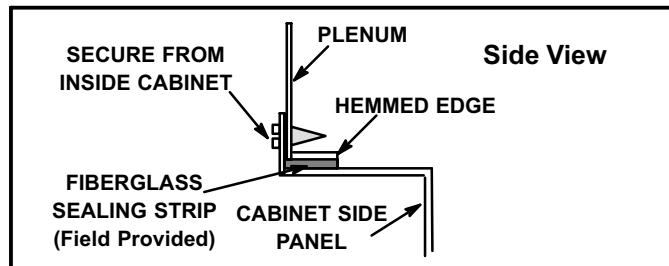


FIGURE 8

#### 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.**

Install the G40DF(X) gas furnace as shipped. **Do not install the furnace horizontally.**

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, and 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.*

*NOTE - G40DF-36C-110 units include a bracket which stabilizes the blower motor during shipping. The bracket is secured to the blower housing by two screws. **This bracket must be removed prior to placing the unit into operation.** See figure 1.*

#### Downflow Application

Allow for clearances to combustible materials as indicated on the unit nameplate. Minimum clearances for closet or alcove installations are shown in figure 9.

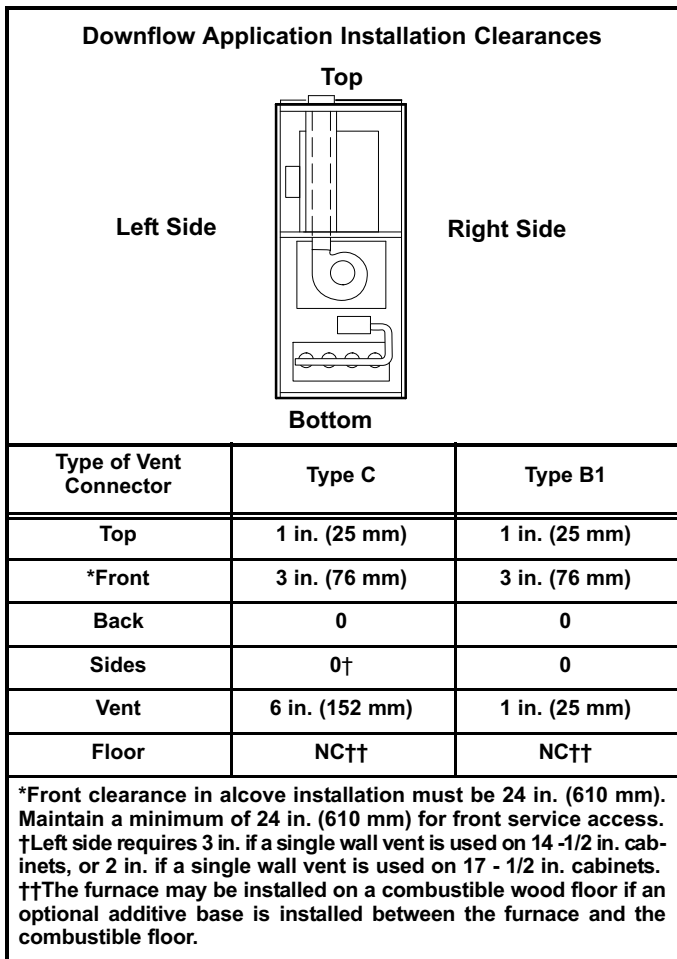


FIGURE 9

**⚠ 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 3 lists the recommended minimum filter sizes.

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

**TABLE 3**

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

**Duct System**

Use industry-approved standards 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.

Ensure that you have made a seal between the supply air plenum and the furnace and between the furnace and the return air plenum.

*NOTE - Do not operate the furnace with an external static pressure that exceeds 0.5 inches w.c. Higher external static pressures may cause erratic limit operation.*

**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.

**Venting**

A 4-inch diameter flue transition is factory-installed on 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 G40DF(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 Code 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 (5 through 10) 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.

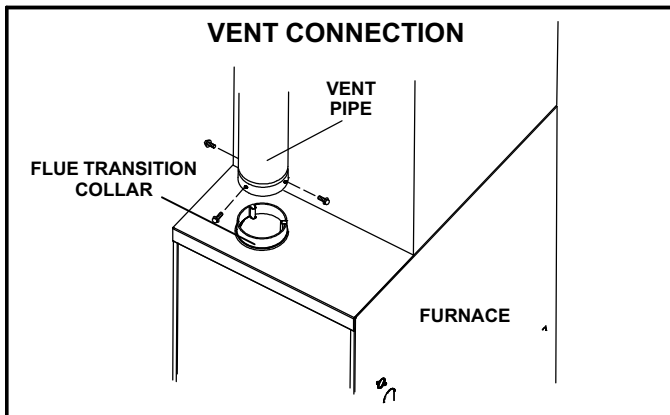
Refer to the tables and the venting information contained in these instructions to properly size and install the venting system.

**⚠ 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 10**

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 10.

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

**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 11 and 12 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.

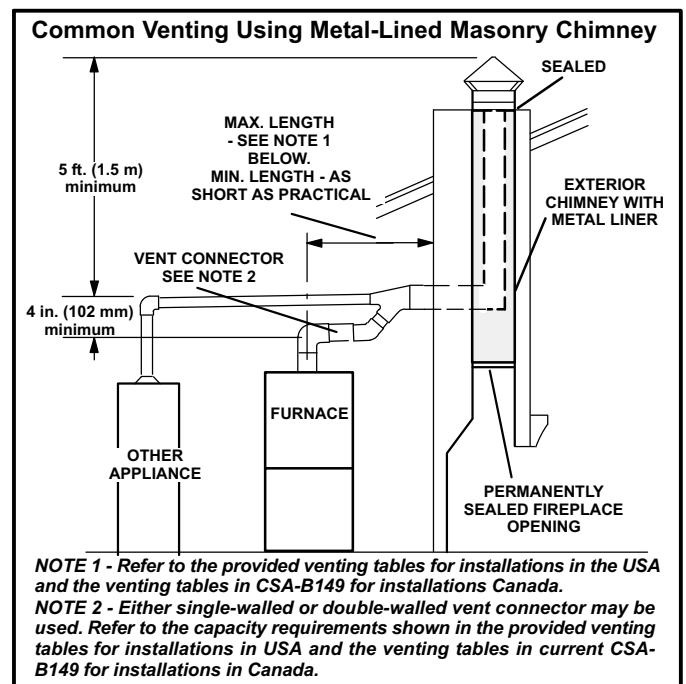
If the existing chimney will not accommodate a B1 vent or an insulated flexible vent pipe liner, either the chimney must be rebuilt to accommodate one of these liners or an alternate approved venting method must be found.

Insulation for the flexible vent pipe must be an encapsulated fiberglass sleeve recommended by the flexible vent pipe manufacturer. See figure 11.

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

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 draffhood 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 Code in Canada



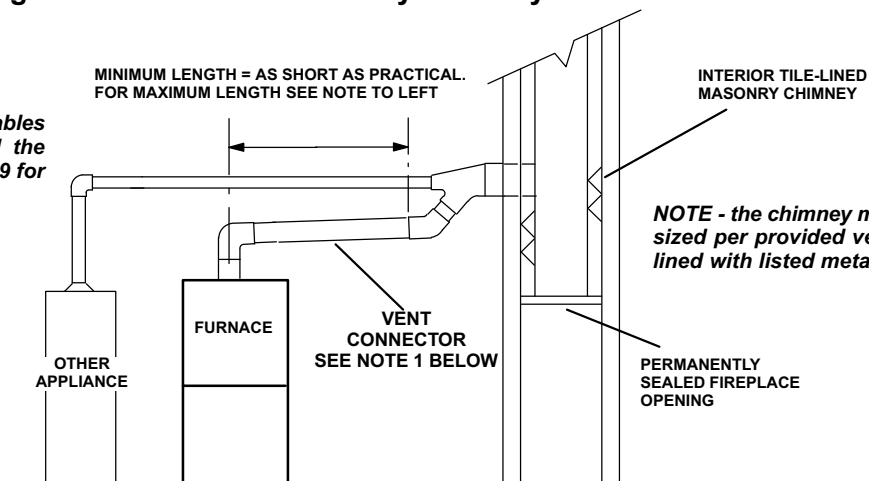
**NOTE 1 - Refer to the provided venting tables for installations in the USA and the venting tables in CSA-B149 for installations Canada.**

**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 11**

## 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 -** the chimney must be properly sized per provided venting tables or lined with listed metal lining system.

**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 12

### ⚠ 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.

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 G40DF(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 G40DF(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 - *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 seven 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.
- 4 - *Multiple appliance vents* - The flow area of the largest section of vertical vent or chimney shall not exceed seven times the smallest listed appliance categorized vent area, draft hood outlet area or flue collar area unless designed according to approved engineering methods.
- 5 - The entire length of single wall metal vent connector shall be readily accessible for inspection, cleaning, and replacement.

- 6 - Single appliance venting configurations with zero lateral lengths (tables 5 and 6), 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).
- 7 - The common venting tables (7, 8, 9, and 10) 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 4**

<b>Connector Diameter inches (mm)</b>	<b>Maximum Horizontal Connector Length -- feet (m)</b>
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)

- 8 - 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.
- 9 - 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.
- 10 - 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.
- 11 - Vent connectors shall be firmly attached to the furnace flue collars by screws or other approved means, except vent connectors of listed type B vent material which shall be assembled according to the manufac-

turer's instructions. Joints between sections of single wall connector piping shall be fastened by screws or other approved means.

- 12 - When the vent connector used for Category I appliances must be located in or pass through a crawlspace 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.
- 13 - 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).
- 14 - No portion of the venting system can extend into, or pass through any circulation air duct or plenum.
- 15 - 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.
- 16 - 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 percent, the equivalent of one 90° elbow (0.90 x maximum common vent capacity).
- 17 - The common vent diameter must always be at least as large as the largest vent connector diameter.
- 18 - 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.
- 19 - Do not install a manual damper, barometric draft regulator or flue restrictor between the furnace and the chimney.
- 20 - 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 5**  
**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 6**  
**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 7**  
**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 8**  
**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 9**  
**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 10**  
**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 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. 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 11 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 13.*

*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.*

**TABLE 11**  
**Gas Pipe Capacity - ft<sup>3</sup>/hr (m<sup>3</sup>/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 (m<sup>3</sup>) of gas per hour and based on 0.60 specific gravity gas.*

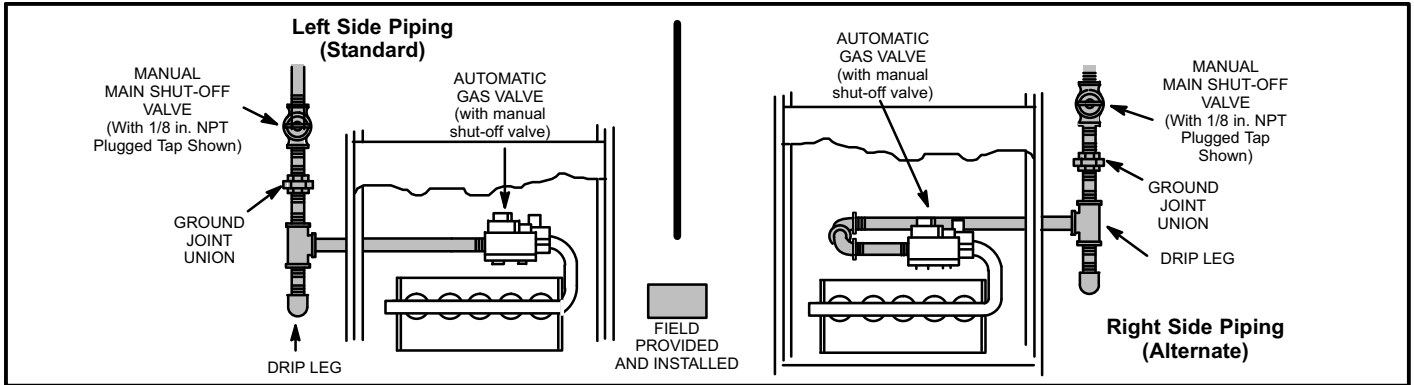


FIGURE 13

**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.

**⚠ 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.

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 15. Gas valves can be damaged if subjected to pressures greater than 1/2 psig (3.48 kPa, 14 inches w.c.).

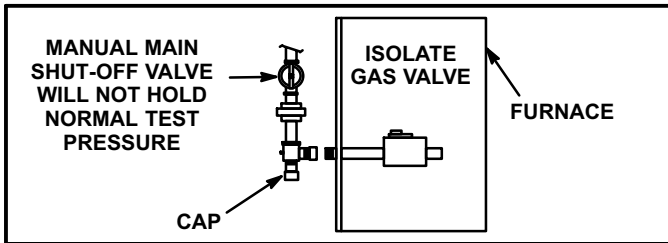


FIGURE 14

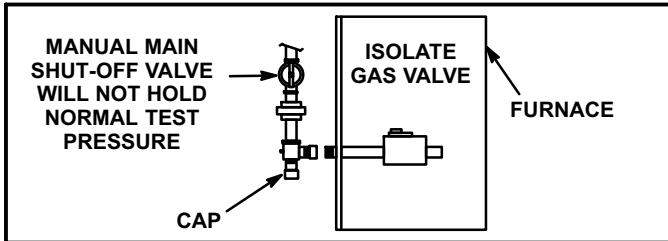


FIGURE 15

**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. Secure the excess wire to the existing harness to protect it from damage.

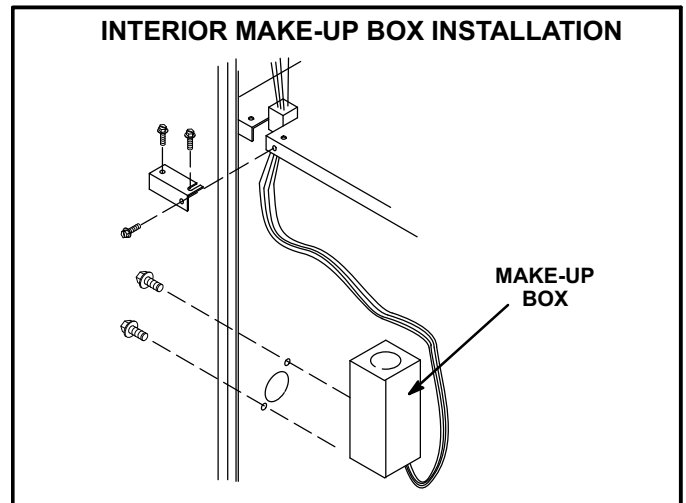
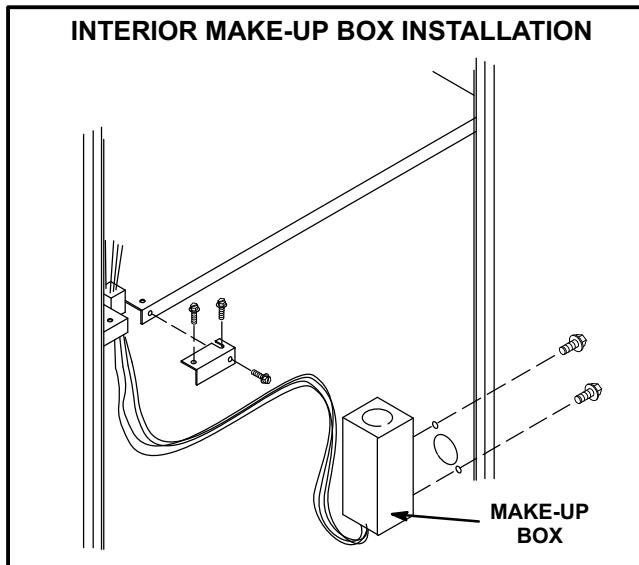


FIGURE 16



**FIGURE 17**

Refer to figure 19 for field wiring and figure 21 for schematic wiring diagram and troubleshooting.

Select circuit protection and wire size according to the unit nameplate. The power supply wiring must meet Class I restrictions.

Holes are on both sides of the furnace cabinet to facilitate wiring.

Install a separate disconnect switch (protected by either fuse or circuit breaker) near the furnace so that power can be turned off for servicing.

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.

Complete the wiring connections to the equipment. Use the provided unit wiring diagram and the field wiring diagram shown in figure 19. Use 18-gauge wire or larger that is suitable for Class II rating for thermostat connections.

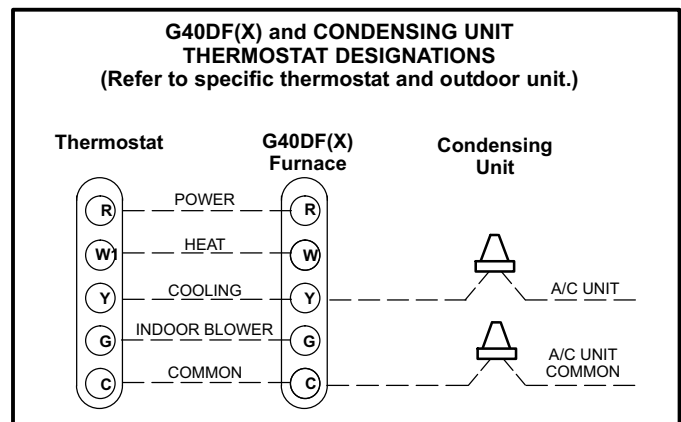
Electrically ground the unit according to local codes or, in the absence of local codes, according to the current National Electric Code (ANSI/NFPA No. 70) for the USA and current Canadian Electric Code part 1 (CSA standard C22.1) for Canada. A green ground wire is provided in the field make-up box.

*NOTE - The G40DF(X) furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.*

One line voltage “EAC” terminal is provided on the furnace control board. 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 any of the “NEUTRAL” terminals. See figure 20 for control board configuration. This terminal is energized when the blower is operating.

One line voltage “HUM” terminal is provided on the furnace control board. Any humidifier rated up to one amp can be connected to this terminal with the neutral leg of the circuit being connected to any of the “NEUTRAL” terminals. See figure 20 for control board configuration. This terminal is energized in the heating mode whenever the combustion air inducer is operating.

Install the room thermostat according to the instructions provided with the thermostat. See figure 18 for thermostat designations. If the furnace is being matched with a heat pump, refer to the FM21 installation instruction.



**FIGURE 18**

### Indoor Blower Speeds

When the thermostat is set to “FAN ON,” the indoor blower will run continuously on the heat speed when there is no cooling or heating demand.

When the G40DF(X) is running in the heating mode, the indoor blower will run on the heating speed.

When there is a cooling demand, the indoor blower will run on the cooling speed.

## TYPICAL G40DF(X) FIELD WIRING DIAGRAM

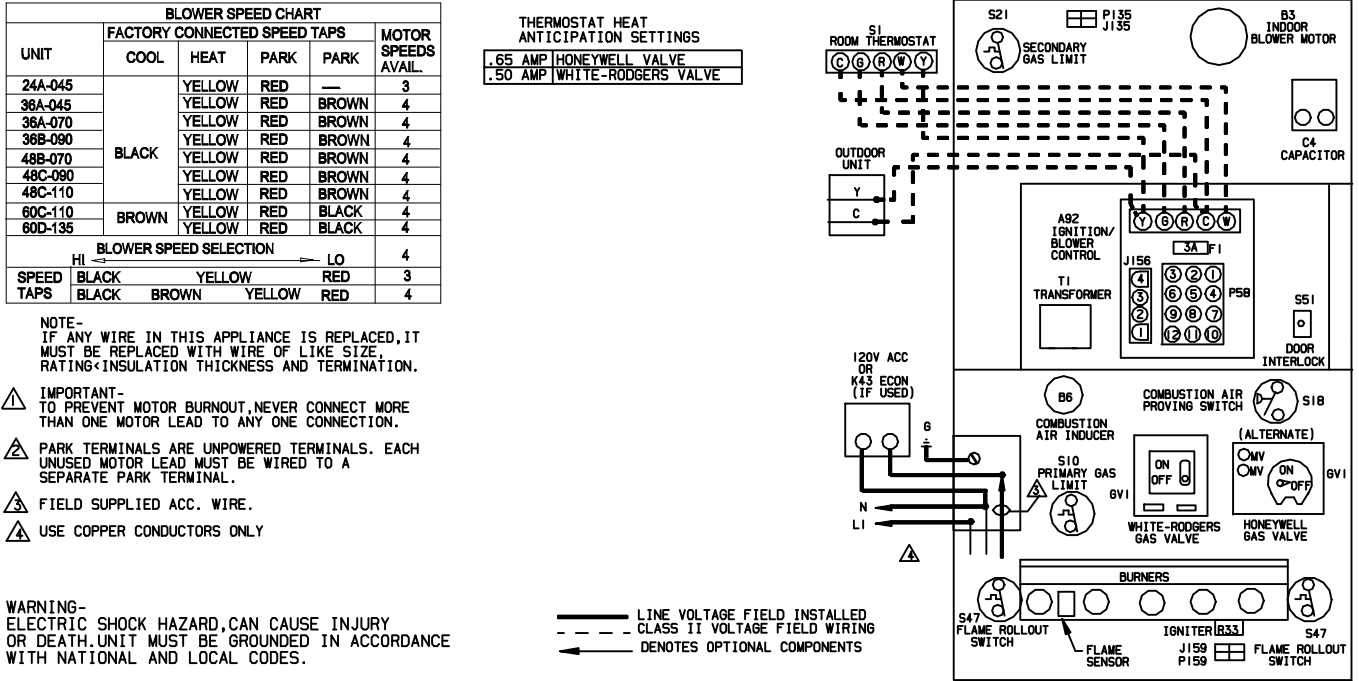
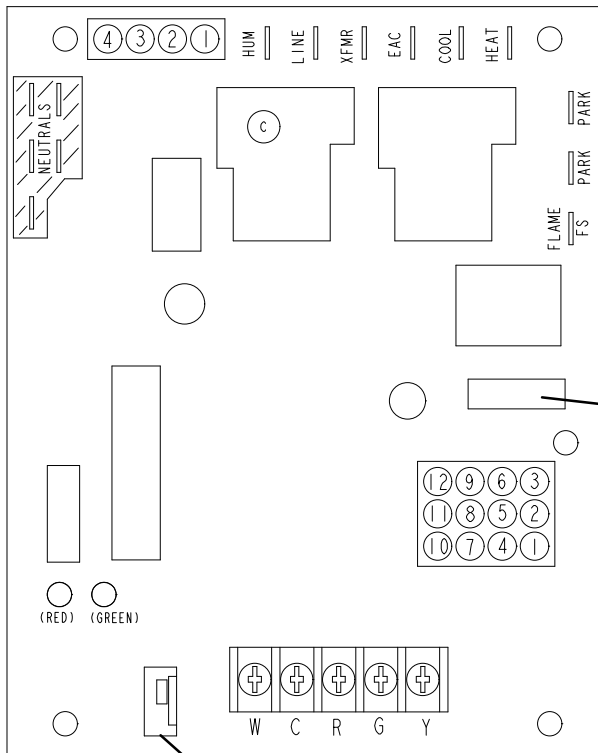


FIGURE 19

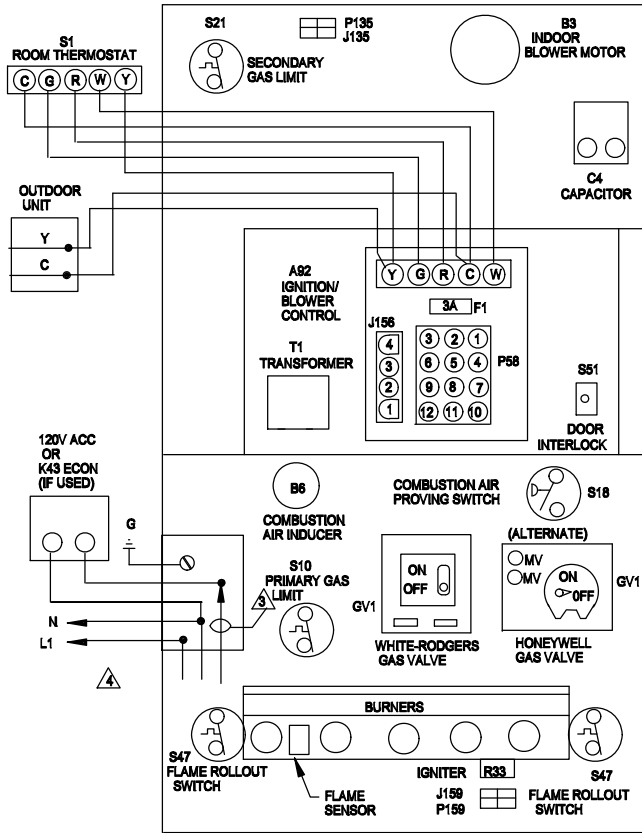
## INTEGRATED CONTROL BOARD (Automatic Hot Surface Ignition System)



TERMINAL DESIGNATIONS	
HUM	Humidifier (120VAC)
LINE	Input (120VAC)
XFMR	Transformer (120VAC)
EAC	Electronic Air Cleaner (120VAC)
COOL	Blower - Cooling Speed (120VAC)
HEAT	Blower - Heating Speed (120VAC)
PARK	Dead terminals to park alternate spd taps
FLAME	Flame sensor
NEUTRALS	Neutral terminals (120VAC)

FIGURE 20

# G40DF(X) Typical Schematic Wiring Diagram



BLOWER SPEED CHART					
UNIT	FACTORY CONNECTED SPEED TAPS				MOTOR SPEEDS AVAIL.
	COOL	HEAT	PARK	PARK	
24A-045		YELLOW	RED	—	3
36A-045		YELLOW	RED	BROWN	4
36A-070		YELLOW	RED	BROWN	4
36B-080		YELLOW	RED	BROWN	4
48B-070	BLACK	YELLOW	RED	BROWN	4
48C-080		YELLOW	RED	BROWN	4
48C-110		YELLOW	RED	BROWN	4
60C-110		YELLOW	RED	BLACK	4
80D-135	BROWN	YELLOW	RED	BLACK	4

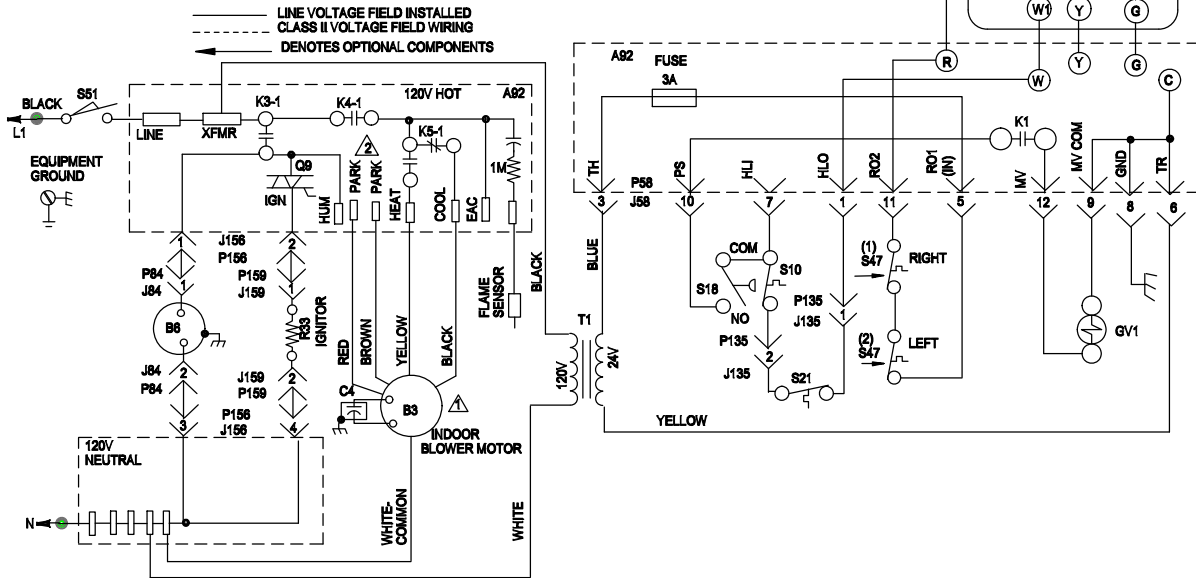
BLOWER SPEED SELECTION			
HI	LO		
BLACK	YELLOW	RED	3
BLACK	BROWN	YELLOW	RED
			4

THERMOSTAT HEAT ANTICIPATION SETTINGS	
.65 AMP	HONEYWELL VALVE
.50 AMP	WHITE-RODGERS VALVE

JACKPLUG CHART	
J,P58	JACK/PLUG-BURNER CONTROL
J,P84	JACK/PLUG-COMB AIR INDUCER
J,P135	JACK/PLUG-SECONDARY LIMIT
J,P156	JACK/PLUG-INDUCER/IGNITER
J,P159	JACK/PLUG-IGNITION

NOTE: IF ANY WIRE IN THIS APPLIANCE IS REPLACED, IT MUST BE REPLACED WITH WIRE OF LIKE SIZE, RATING-INSULATION THICKNESS AND TERMINATION.

- ⚠ IMPORTANT- TO PREVENT MOTOR BURNOUT, NEVER CONNECT MORE THAN ONE MOTOR LEAD TO ANY ONE CONNECTION.
- ⚠ PARK TERMINALS ARE UNPOWERED TERMINALS. EACH UNUSED MOTOR LEAD MUST BE WIRED TO A SEPARATE PARK TERMINAL.
- ⚠ FIELD SUPPLIED ACC. WIRE.
- ⚠ USE COPPER CONDUCTORS ONLY



WARNING- ELECTRIC SHOCK HAZARD, CAN CAUSE INJURY OR DEATH. UNIT MUST BE GROUNDED IN ACCORDANCE WITH NATIONAL AND LOCAL CODES.

FIGURE 21

## Unit Start-Up

FOR YOUR SAFETY READ BEFORE LIGHTING

### ⚠ WARNING

Do not use this furnace if any part has been underwater. Immediately call a qualified service technician to inspect the furnace and to replace any part of the control system and any gas control which has been under water.

### ⚠ WARNING

If overheating occurs or if gas supply fails to shut off, shut off the manual gas valve to the appliance before shutting off 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 G40DF(X) unit may be equipped with either a gas control knob or gas control lever. Use only your hand to push the lever or to turn the gas control knob. Never use tools. If the knob will not turn or if the lever will not move by hand, do not try to repair it. Force or attempted repair may result in a fire or explosion.

#### Placing the furnace into operation:


G40DF(X) units are equipped with an automatic hot surface ignition system. Do not attempt to manually light burners on this furnace. Each time the thermostat calls for heat, the burners will automatically light. The igniter does not get hot when there is no call for heat on these units.

### ⚠ 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 22, 23, and 24)

- 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 - *Honeywell VR8205 Gas Valve with ON/OFF Switch* - Move gas valve switch to **OFF**. See figure 22.  
*Honeywell VR8205 Gas Valve with Control Knob* - Turn knob on gas valve clockwise  to **OFF**. Do not force. See figure 23.  
*White Rodgers 36G Gas Valve* - Move gas valve switch to **OFF**. See figure 24.
- 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.

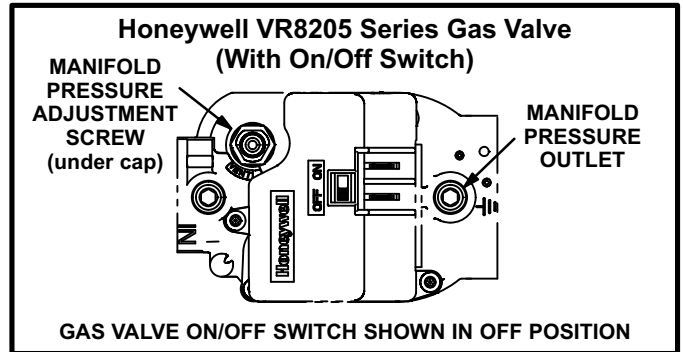


FIGURE 22

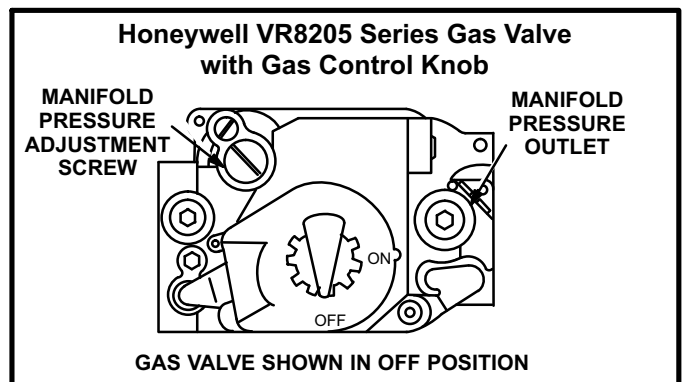


FIGURE 23

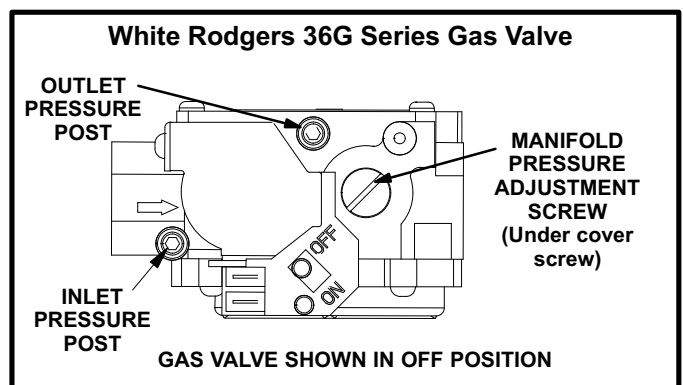




FIGURE 24

- 8 - *Honeywell VR8205 Gas Valve with ON/OFF Switch* - Move gas valve switch to **ON**. See figure 22.  
*Honeywell VR8205 Gas Valve with Control Knob* - Turn knob on gas valve counterclockwise  to **ON**. Do not force. See figure 23.  
*White Rodgers 36G Gas Valve* - Move gas valve switch to **ON**. See figure 24.
- 9 - Replace the upper access panel.

- 10- Turn on all electrical power to 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 - *Honeywell VR8205 Gas Valve with ON/OFF Switch* - Move gas valve switch to **OFF**. See figure 22.  
*Honeywell VR8205 Gas Valve with Control Knob* - Turn knob on gas valve clockwise  to **OFF**. Do not force. See figure 23.  
*White Rodgers 36G Gas Valve* - Move gas valve switch to **OFF**. See figure 24.
- 5 - Replace the upper access panel.

**Heating Sequence Of Operation**

When thermostat calls for heat, combustion air inducer starts.

Combustion air pressure switch proves combustion air inducer operation. Switch is factory set and requires no adjustment.

After a 15 second prepurge, the hot surface igniter energizes.

After a 20 second igniter warm-up period, the gas valve solenoid opens.

Gas is ignited, flame sensor proves the flame, and the combustion process continues.

If flame is not detected after first ignition trial, the ignition control will repeat steps 3 and 4 four more times before locking out the gas valve ("WATCHGUARD" flame failure mode). The ignition control will then automatically repeat steps 1 through 6 after 60 minutes.

To interrupt the 60-minute "WATCHGUARD" period, move thermostat from "Heat" to "OFF" then back to "Heat." Heating sequence then restarts at step 1.

**Gas Pressure Adjustment**

**Gas Flow (Approximate)**

- 1 - 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.
- 2 - 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.

- 3 - Remove temporary gas meter if installed.  
*NOTE - To obtain accurate reading, shut off all other gas appliances connected to meter.*

**TABLE 12**

Gas Flow Rate (Ft. <sup>3</sup> /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

** IMPORTANT**

**For safety, shut unit off and remove manometer as soon as an accurate reading has been obtained. Take care to replace pressure tap plug.**

**Gas Pressure**

- 1 - 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.
- 2 - After the line pressure has been checked and adjusted, check the manifold pressure. A natural gas to LP/propane gas changeover kit is required to convert the unit. Manifold pressure for all units fueled by natural gas at all altitudes is 3.5" w.c. Manifold pressure for all units fueled by L.P./propane gas at all altitudes is 10.0" w.c. See figures 22, 23 and 24 for the location of the manifold pressure adjustment screws.



## High Altitude Information

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

Manifold pressure for all units fueled by natural gas at all altitudes is 3.5" w.c. Manifold pressure for all units fueled by L.P./propane gas at all altitudes is 10.0" w.c.

*NOTE - A natural to L.P. propane gas changeover kit is necessary to convert this unit. L.P. conversion kit 25W20 is used with all units installed at altitudes up to 7,500 feet. L.P. conversion kit 25W21 is used with all units installed at altitudes from 7,501 to 10,000 feet above sea level. Refer to the changeover kit installation instruction for the conversion procedure.*

*NOTE - Units fueled by natural gas and installed at altitudes of 7501-10,000 feet above sea level require installation of a high altitude orifice kit (59M17).*

The combustion air pressure switch is factory-set and requires no adjustment. The factory-installed pressure switch is acceptable for use in units installed at altitudes up to 10,000 feet above sea level.

## Other Unit Adjustments

### Primary and Secondary Limits

The primary limit is located on the heating compartment vestibule panel. The secondary limit is 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 the burner box. If tripped, check for adequate combustion air before resetting.

### Pressure Switch

The pressure switch is located in the heating compartment adjacent to the combustion air inducer. This switch checks for proper combustion air inducer operation before allowing ignition trial. The switch is factory-set and requires no adjustment.

### Temperature Rise

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

### Fan Control

There is no cooling mode fan on delay; however, there is a cooling fan off delay of 45 seconds. This delay is not adjustable.

The heating mode fan on time of 45 seconds is not adjustable. The heating mode fan off delay (amount of time that the blower operates after the heat demand has been satisfied) may be adjusted by changing the jumper position

across the five pins on the integrated control. The unit is shipped with a factory fan off setting of 90 seconds. The fan off delay affects comfort and is adjustable to satisfy individual applications. Adjust the fan 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 return air temperatures; shorter settings provide higher return air temperatures. See figure 25.

JUMPER POSITION		HEAT OFF DELAY
OFF	OFF	180
PIN1	PIN2	60
PIN2	PIN3	90
PIN3	PIN4	120
PIN4	PIN5	180

To adjust fan-off timing, reposition jumper across pins to achieve desired setting.

**FIGURE 25**

### 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.*

### Blower Speeds

*NOTE - CFM readings are taken external to unit with a dry evaporator coil and without accessories. See blower performance data beginning on Page 26.*

Turn off electrical power to furnace.

Remove blower access panel.

Disconnect existing speed tap at control board speed terminal.

*NOTE - Termination of any unused motor leads must be connected to the park terminals on the control board.*

Refer to blower speed selection chart on unit wiring diagram for desired heating or cooling speed.

Connect selected speed tap at control board speed terminal.

Resecure blower access panel.

Turn on electrical power to furnace.

### Electronic Ignition

The integrated ignition control 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. 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 cover.

## 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?
- 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

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

### G40DF-24A-045 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds					
	High		Medium		Low	
	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1200	417	1060	367	830	278
0.05	1185	410	1040	360	820	274
0.10	1165	402	1025	353	810	270
0.15	1145	396	1010	346	795	265
0.20	1125	390	990	338	775	260
0.25	1105	382	980	335	765	257
0.30	1080	374	965	331	750	254
0.40	1020	357	920	319	710	244
0.50	960	342	875	306	650	234
0.60	900	330	810	290	620	231
0.70	815	313	690	272	565	221
0.80	685	289	620	259	465	203
0.90	560	271	510	238	395	190

### G40DF-36B-090 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1600	608	1410	526	1165	436	965	355
0.05	1580	599	1400	518	1165	428	965	351
0.10	1560	589	1390	509	1160	420	970	346
0.15	1530	573	1370	497	1155	413	965	341
0.20	1495	556	1350	485	1150	406	965	335
0.25	1465	544	1325	473	1135	398	955	329
0.30	1430	532	1300	460	1125	389	945	323
0.40	1370	509	1250	438	1095	373	935	313
0.50	1295	482	1200	420	1055	355	900	302
0.60	1215	456	1140	397	1010	343	860	285
0.70	1140	437	1055	371	915	313	800	272
0.80	1000	401	950	342	850	295	730	251
0.90	900	374	820	313	740	272	---	---

### G40DF-36A-070 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds					
	High		Medium-High		Low	
	cfm	Watts	cfm	Watts	cfm	Watts
0.00	1475	616	1345	554	1150	495
0.05	1450	606	1320	543	1140	481
0.10	1425	595	1300	532	1125	466
0.15	1395	585	1275	521	1115	452
0.20	1375	574	1255	510	1105	437
0.25	1345	563	1230	494	1090	428
0.30	1320	552	1205	478	1075	418
0.40	1250	528	1150	455	1040	395
0.50	1200	508	1095	432	1000	374
0.60	1110	475	1035	409	950	354
0.70	1030	455	970	390	855	338
0.80	960	434	875	359	735	299
0.90	770	389	715	321	665	278

### G40DF-48C-090 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	2040	749	1850	657	1595	562	1325	466
0.05	2000	727	1825	638	1575	547	1340	460
0.10	1955	704	1800	619	1555	532	1350	453
0.15	1920	692	1770	602	1540	518	1340	441
0.20	1885	679	1740	585	1525	503	1330	428
0.25	1845	662	1700	568	1500	488	1300	414
0.30	1800	645	1665	551	1475	473	1270	399
0.40	1695	606	1585	517	1415	448	1225	378
0.50	1600	570	1490	485	1335	414	1170	360
0.60	1495	540	1405	457	1250	389	1110	337
0.70	1380	509	1300	426	1165	367	1025	316
0.80	1250	478	1160	390	1025	331	---	---
0.90	1095	439	1030	360	925	307	---	---

## Blower Performance

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

### G40DF-48C-110 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
0.00	2035	846	1790	712	1510	595	1225	477
0.05	2000	825	1760	694	1495	581	1225	470
0.10	1970	803	1730	675	1475	567	1220	463
0.15	1925	781	1710	657	1475	555	1220	455
0.20	1880	758	1685	638	1465	542	1215	447
0.25	1835	736	1655	618	1440	528	1200	437
0.30	1795	714	1625	597	1420	514	1185	427
0.40	1680	669	1550	564	1360	483	1135	400
0.50	1620	630	1445	524	1280	447	1065	371
0.60	1445	592	1310	479	1165	404	1000	343
0.70	1290	545	1180	434	1055	369	905	319
0.80	1155	502	1065	406	955	348	815	296
0.90	1010	472	930	372	840	320	690	265

### G40DF-60C-110 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
.00	2475	1276	2280	987	1995	845	1690	698
.10	2390	1248	2235	955	1990	829	1675	690
.20	2330	1223	2180	945	1975	809	1665	675
.30	2245	1192	2125	911	1940	786	1660	657
.40	2175	1187	2050	880	1895	757	1650	636
.50	2085	1145	1970	849	1835	734	1625	619
.60	2020	1129	1880	815	1750	695	1580	599
.70	1920	1094	1775	785	1660	669	1525	579
.80	1785	1052	1685	762	1585	645	1440	556
.90	1670	1020	1600	741	1520	633	1370	538

### G40DF-60D-135 PERFORMANCE

External Static Pressure in. w.g.	Air Volume / Watts at Different Blower Speeds							
	High		Medium-High		Medium-Low		Low	
	cfm	Watts	cfm	Watts	cfm	Watts	cfm	Watts
.00	2660	1379	2325	1059	1960	864	1655	684
.10	2560	1353	2310	1030	1945	840	1640	667
.20	2490	1325	2280	1000	1940	824	1630	661
.30	2415	1293	2225	972	1930	801	1625	649
.40	2345	1264	2170	941	1910	779	1620	638
.50	2265	1235	2115	918	1870	754	1615	624
.60	2165	1199	2020	880	1830	733	1585	604
.70	2050	1160	1940	854	1755	705	1570	604
.80	1955	1112	1865	828	1680	683	1515	584
.90	1865	1096	1760	797	1605	656	1465	567

## 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 qualified technician 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 G40DF(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 air-flow. Table 3 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 using 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 supplies to the furnace. Remove the furnace access panels.

- 2 - Remove the three screws that secure the vent pipe to the flue collar. See figure 10.
- 3 - Remove the screw that secures the internal flue pipe to the combustion air inducer. See figure 26.
- 4 - Scrape away the silicone sealant that is between the internal flue pipe and the combustion air inducer.
- 5 - Pull the internal flue pipe into the chase.

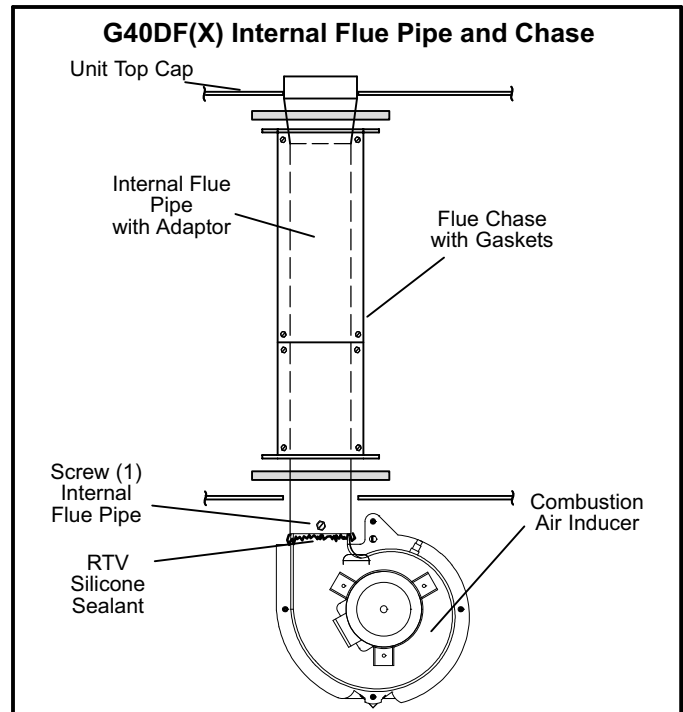


FIGURE 26

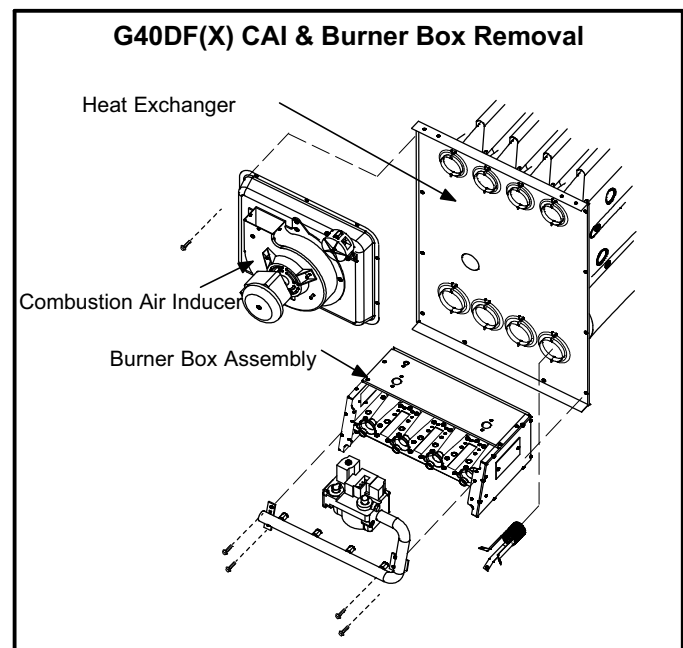


FIGURE 27

- 6 - 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.
- 7 - Label the wires from gas valve and rollout switches, then disconnect them.

- 8 -Disconnect gas supply piping. Remove four screws securing the burner manifold assembly to the vestibule panel and remove the assembly from the unit.

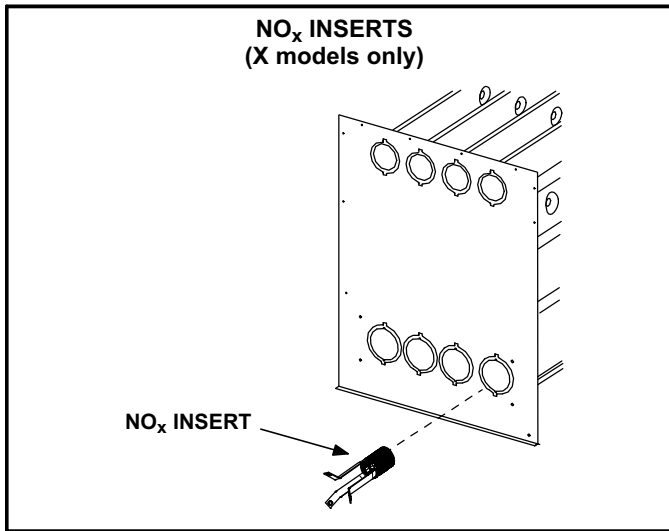


FIGURE 28

- 9 -**NO<sub>x</sub> units only** - Remove the three screws that attach the NO<sub>x</sub> insert to the corbel at the entrance to each heat exchanger section. Carefully remove the NO<sub>x</sub> insert from each section. See figure 28.
- 10 -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.
- 11 -Repeat procedure for each heat exchanger section.
- 12 -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.
- 13 -Remove the cable from the heat exchanger. Use a vacuum cleaner to remove debris knocked loose during cleaning.
- 14 -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.

- 15 -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.
- 16 -To clean the burner, run a vacuum cleaner with a soft brush attachment over the face of burners. Inspect inside the burners and crossovers for any blockage. Clean the inside of the burner if necessary.
- 17 -Label and disconnect the pressure switch wires.
- 18 -Remove the four screws that secure the combustion air inducer. Carefully remove the combustion air inducer to avoid damaging the blower gasket. If the gasket is damaged, it must be replaced to prevent leakage. See figure 27.
- 19 -**NO<sub>x</sub> Units** - Reattach the NO<sub>x</sub> inserts to the corbels at the entrance to each heat exchanger opening. See figure 28.
- 20 -Reinstall the burner/manifold assembly on the vestibule panel.
- 21 -Reconnect wires to pressure switch, roll-out switches, gas valve and combustion air inducer. Refer to unit wiring diagram.
- 22 -Use screws to resecure the junction box to the cabinet.
- 23 -Apply RTV/high temperature silicone sealant between the internal flue pipe and the combustion air inducer.
- 24 -Use one screw to resecure the internal flue pipe to the combustion air inducer.
- 25 -Use three screws to resecure the vent pipe to the flue collar. See figure 10.
- 26 -Reconnect the gas supply piping.
- 27 -Turn on power and gas supply to the unit.
- 28 -Set thermostat and check for proper operation.
- 29 -Check all piping connections, factory and field, for gas leaks. Use a leak detecting solution or other preferred means.

## ⚠ 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.**

- 30 -If a leak is detected, shut gas and electricity off and repair leak.
- 31 -Repeat steps 35 and 36 until no leaks are detected.
- 32 -Replace front access panels.

## Planned Service

A service technician should check the following items during an annual inspection. Power to the unit must be shut off for 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, cracked 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. For instance, items innocently stored next to the furnace may obstruct the combustion air supply. This could cause incomplete combustion and the production of carbon monoxide gas.

## 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: G40DF(X)-24A-045-15. **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
- Integrated ignition control board
- Door interlock switch
- Circuit breaker

### Blower Parts

- Blower wheel
- Motor
- Motor mounting frame
- Motor capacitor
- Blower housing cut-off plate

### Heating Parts

- Flame Sensor
- Heat exchanger assembly
- Gas manifold
- Combustion air inducer
- Gas valve
- Main burner cluster
- Main burner orifices
- Pressure switch
- Igniter
- Primary limit control
- Flame rollout switches
- Secondary limit
- Combustion air inducer gaskets
- Flue box gaskets
- Flue chase gaskets
- Internal flue pipe assembly

## Ignition Control Board Diagnostic Codes

### DIAGNOSTIC CODES

Make sure to Identify LED'S Correctly.  
Refer to figure 20 for control board layout.

LED #1 (Red)	LED #2 (Green)	DESCRIPTION
SIMULTANEOUS SLOW FLASH	SIMULTANEOUS SLOW FLASH	Power on - Normal operation. Also signaled during cooling and continuous fan.
SIMULTANEOUS FAST FLASH	SIMULTANEOUS FAST FLASH	Normal operation - signaled when heating demand initiated at thermostat.
SLOW FLASH	ON	Primary or secondary limit switch open. Limit must close within 3 minutes or unit goes into 1 hour Watchguard.
OFF	SLOW FLASH	Pressure prove switch open. OR: Blocked inlet/exhaust vent; OR: Pressure switch closed prior to activation of combustion air inducer.
ALTERNATING SLOW FLASH	ALTERNATING SLOW FLASH	Watchguard -- burners failed to ignite or lost flame 5 times during single heating demand.
SLOW FLASH	OFF	Flame sensed without gas valve energized.
ON	SLOW FLASH	Rollout switch open. OR: 12-pin connector improperly attached.
ON ON OFF	ON OFF ON	Circuit board failure or control wired incorrectly.
FAST FLASH	SLOW FLASH	Main power polarity reversed. Switch line and neutral.
SLOW FLASH	FAST FLASH	Low flame signal. Measures below 1.5 microamps. Replace flame sense rod.
ALTERNATING FAST FLASH	ALTERNATING FAST FLASH	Improper main ground. OR: Line voltage below 90 volts.

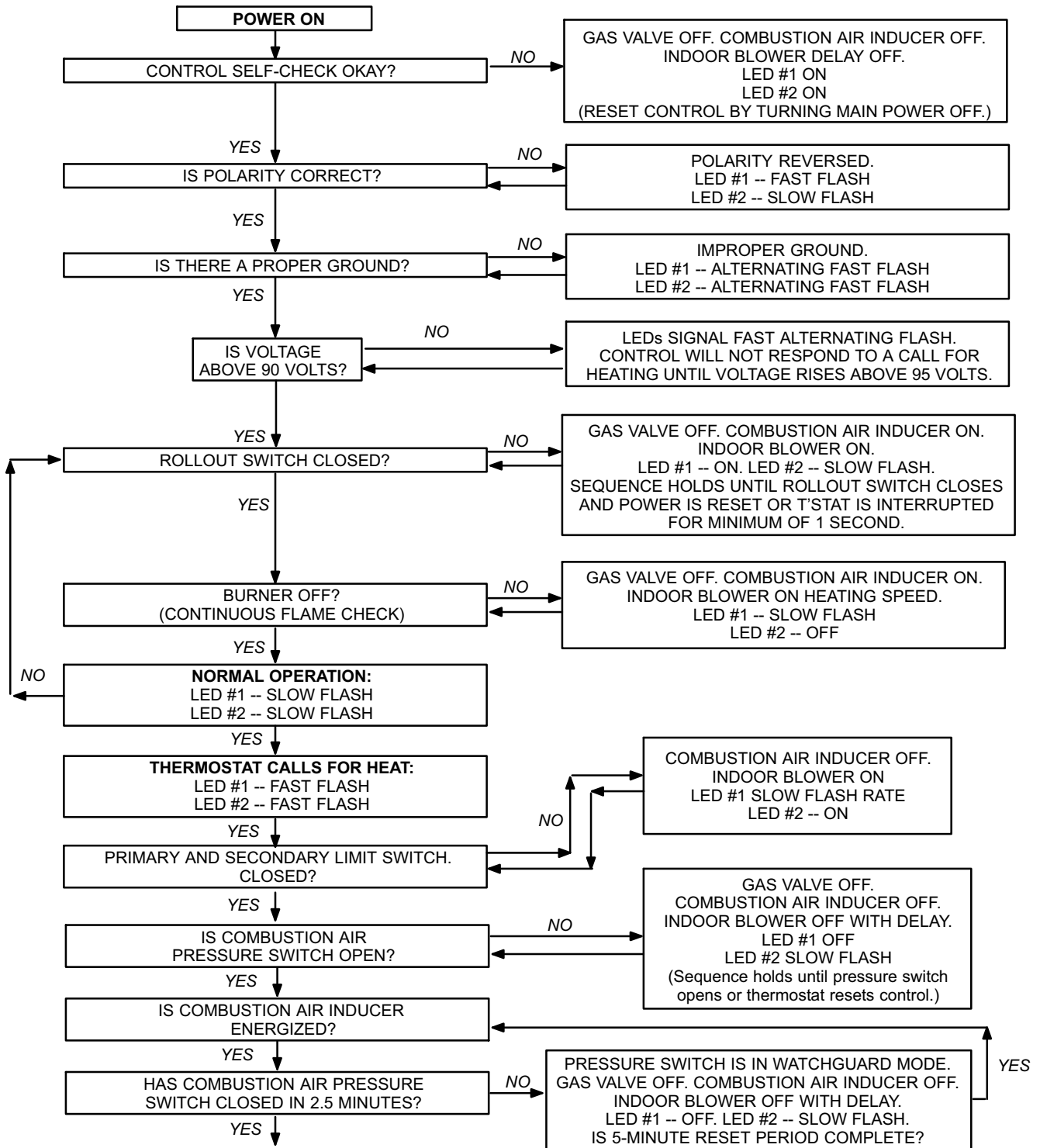
*NOTE - Slow flash rate equals 1 Hz (one flash per second). Fast flash rate equals 3 Hz (three flashes per second). Minimum flame sense current = 0.5 microAmps.*

# Troubleshooting: Heating Sequence of Operation

## HEATING SEQUENCE OF OPERATION

### NORMAL HEATING MODE

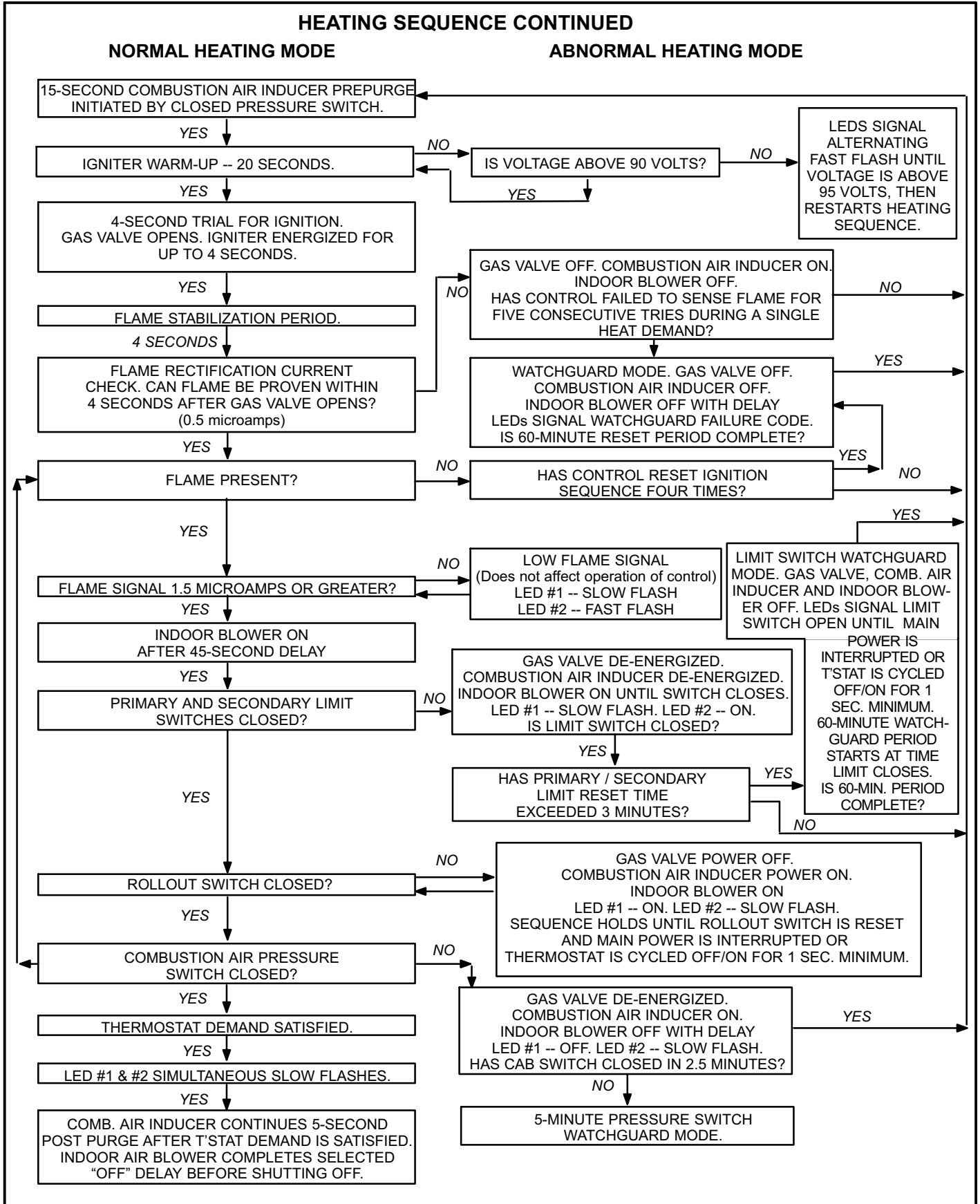
### ABNORMAL HEATING MODE



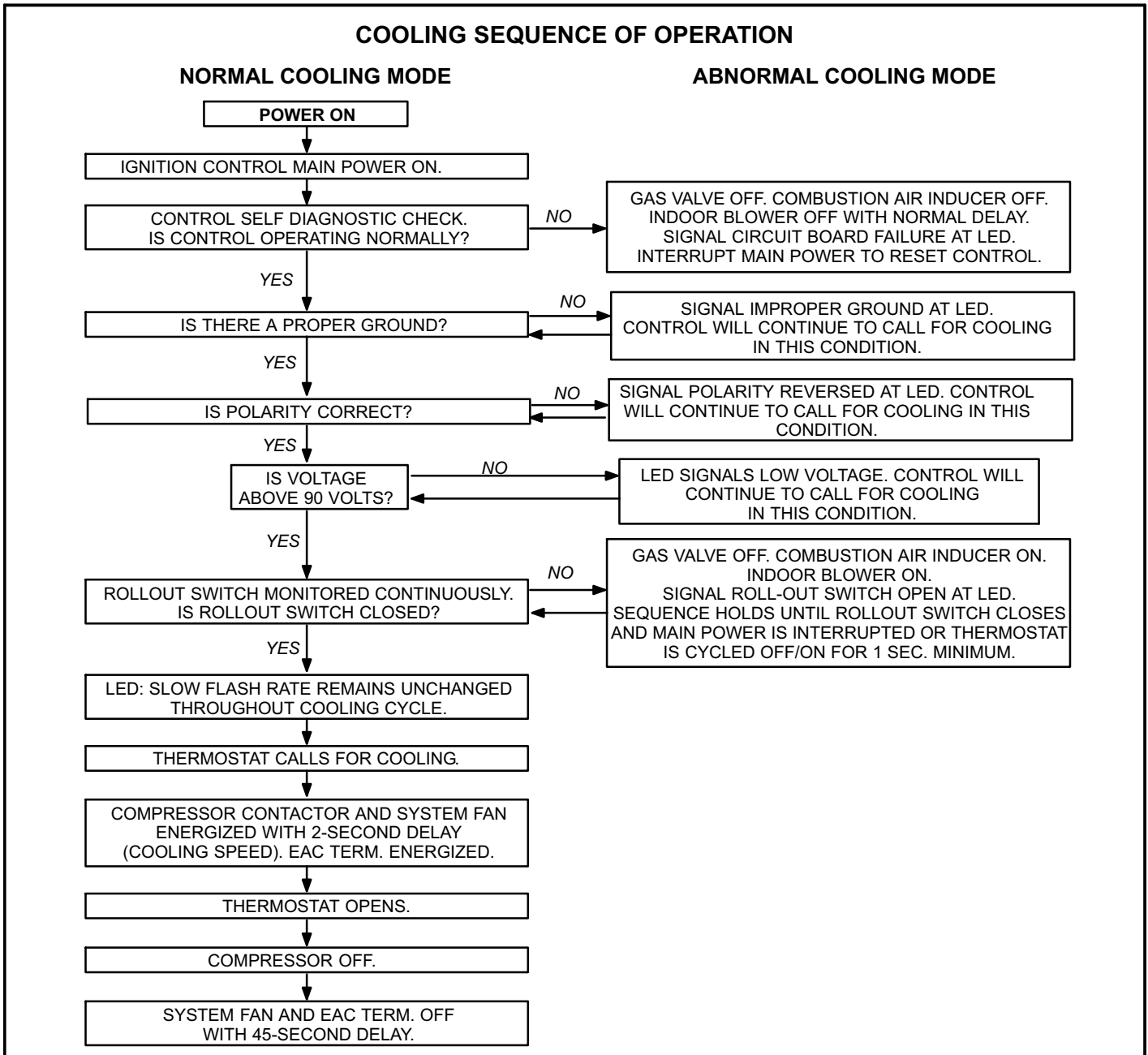
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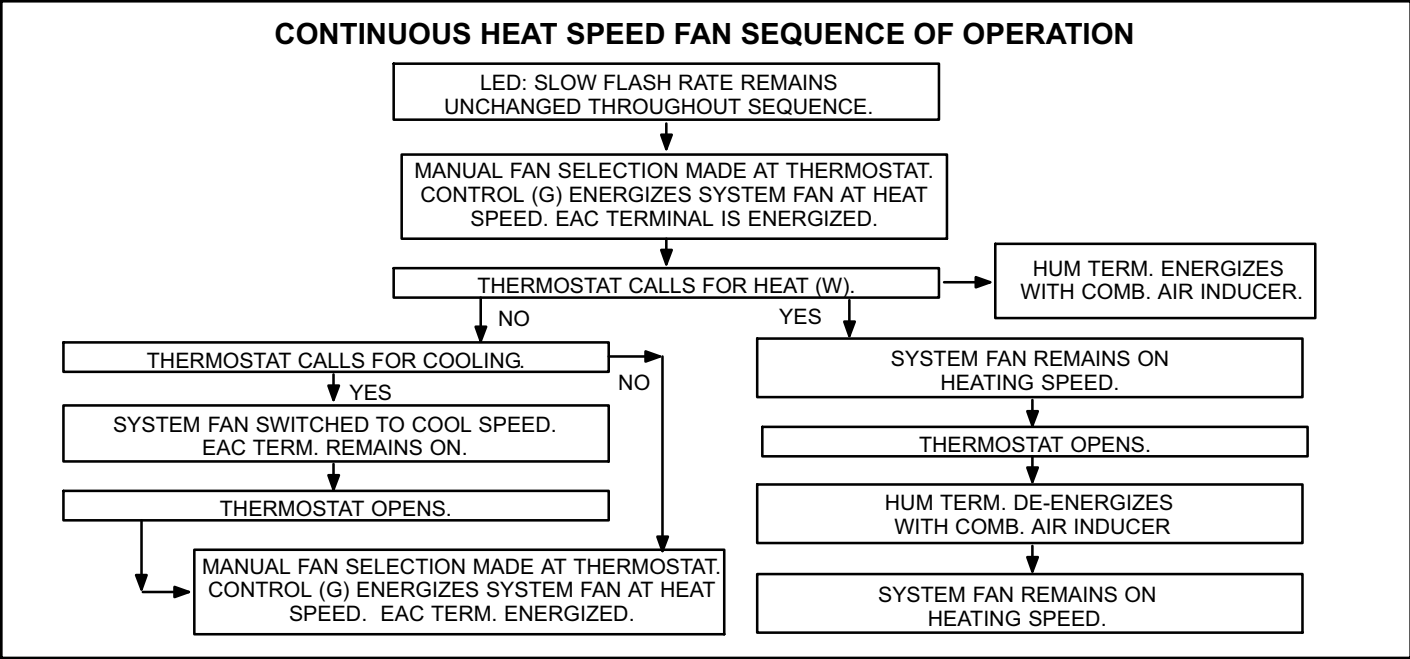
**Troubleshooting: Heating Sequence of Operation (Continued)**



# Troubleshooting: Cooling Sequence of Operation



## Troubleshooting: Continuous Fan Sequence of Operation



## G40DF(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?       Supply Voltage \_\_\_\_\_      Blower Motor H.P. \_\_\_\_\_  
 Blower Motor Amps \_\_\_\_\_      Gas Piping Connections Tight & Leak-Tested?   
 Fuel Type: Natural Gas?       LP/Propane Gas?   
 Furnace Btu Input \_\_\_\_\_      Line Pressure \_\_\_\_\_  
 Regulator Pressure \_\_\_\_\_ w.c. - Nat.: \_\_\_\_\_ w.c. - LP/Propane  
 Flue Connections Tight?       Proper Draft?   
 Combustion Gas Tested?      CO<sub>2</sub>       CO   
 Fan Control Setting (45 Seconds Fixed On) \_\_\_\_\_      Temperature Rise \_\_\_\_\_  
 Fan Control Off Setting \_\_\_\_\_  
 Filter Clean & Secure?       Vent Clear?

**Thermostat**

Calibrated?       Heat Anticipator Properly Set?       Level?