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Dallas, Texas

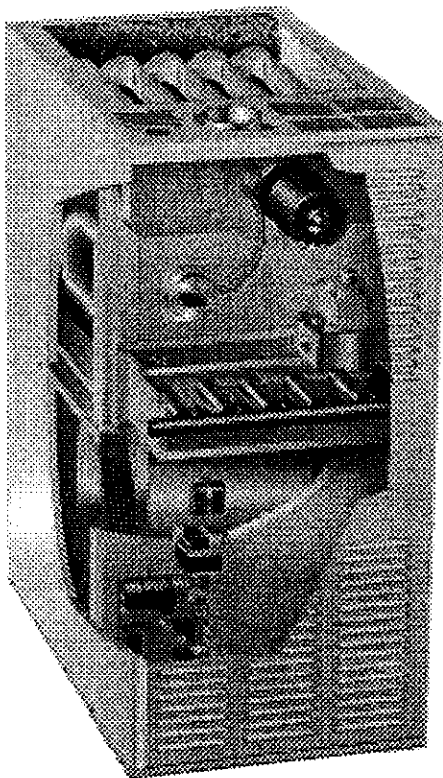
INSTALLATION INSTRUCTIONS

G24M Series

GAS FURNACE
SureLight™ Ignition System
504,197M
02/2000
Supersedes 503,981M

TP Technical
Publications

Litho USA



**RETAIN THESE INSTRUCTIONS
FOR FUTURE REFERENCE**

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⚠ WARNING

If the information in this manual is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.



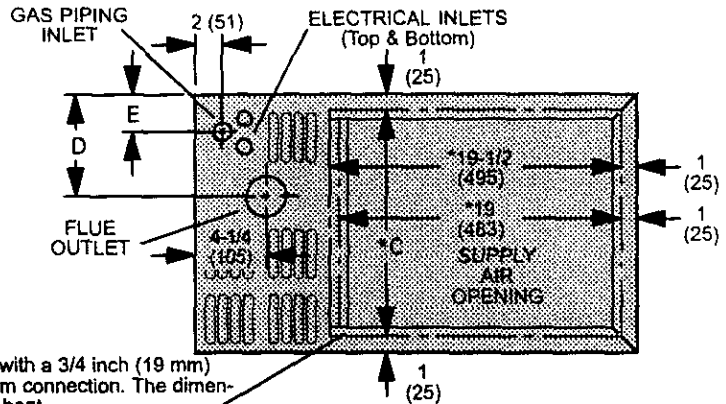
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

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

WHAT TO DO IF YOU SMELL GAS:

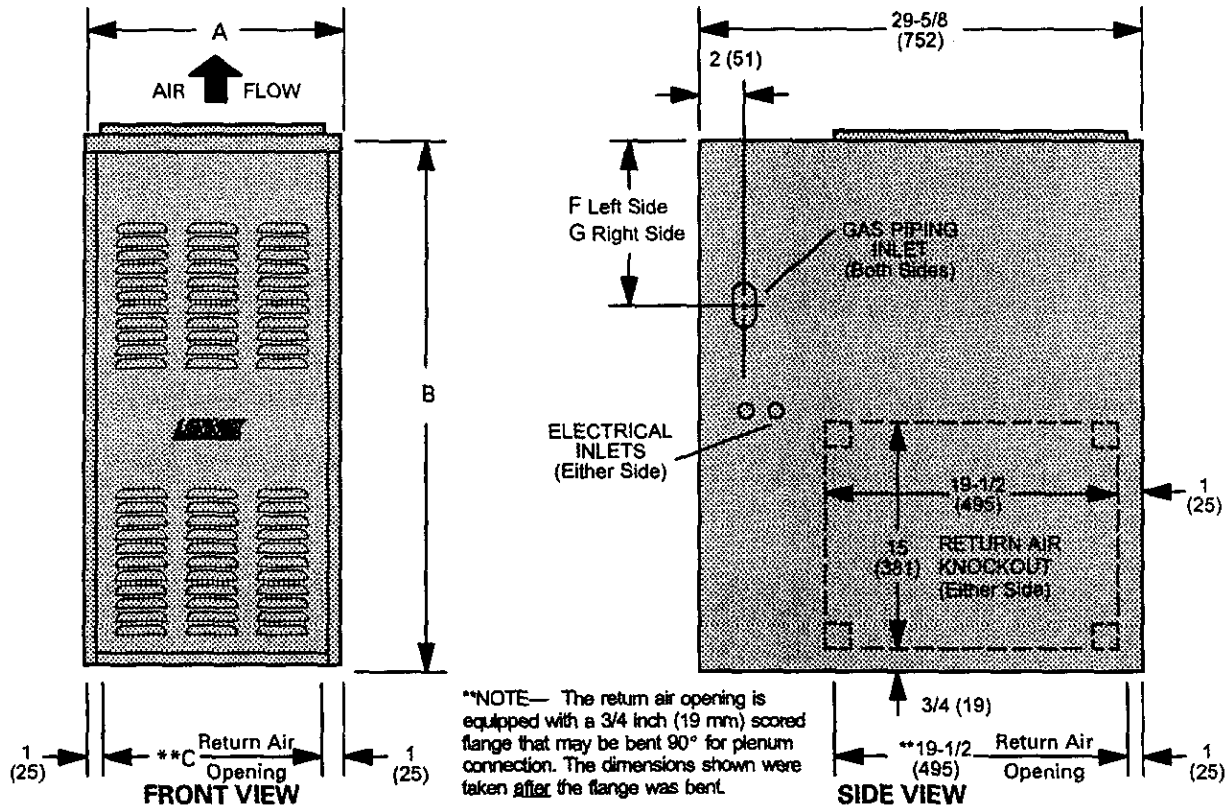
- Do not try to light any appliance.
- Extinguish any open flames.
- Do not touch any electrical switch; do not use any phone in your building.
- Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
- If you cannot reach your gas supplier, call the fire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

G24M Unit Dimensions - inches (mm)



*NOTE - The supply air opening is equipped with a 3/4 inch (19 mm) scored flange that may be bent 90° for plenum connection. The dimensions shown were taken after the flange was bent.

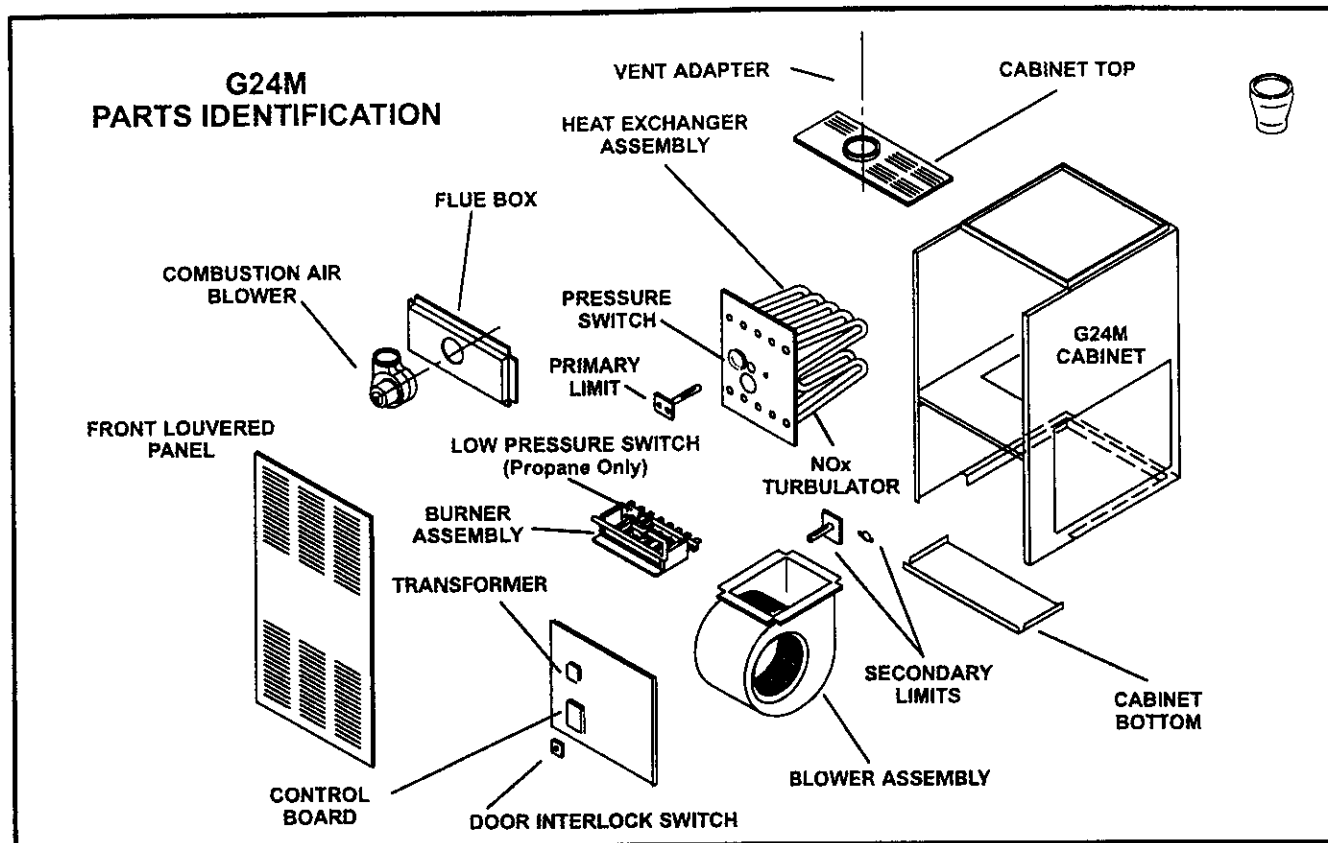
The double scored flange at the front of the supply air opening may be bent for a total opening dimension (front to rear) of either 19-1/2 inches (495 mm) or 19 inches (483 mm).



**NOTE— The return air opening is equipped with a 3/4 inch (19 mm) scored flange that may be bent 90° for plenum connection. The dimensions shown were taken after the flange was bent.

Model No.		A	B	C	D	E	F	G
G24M2-45	in.	17	36-1/4	15	6-3/4	2-7/16	11-1/2	6-1/2
G24M2-60	mm	432	921	381	171	62	293	165
G24M3-60	in.	20-1/2	39	18-1/2	8-3/8	4-1/4	13	8
G24M3-75	mm	521	991	470	213	108	331	203
G24M4-75	in.	23-1/4	39	21-1/4	9-3/4	4-1/4	12-31/32	7-3/32
G24M4/5-100	mm	591	991	540	248	108	329	180
G24M4/5-120								
G24M4/5-140								

G24M Parts Arrangement



G24M Gas Furnace

The G24M gas furnace is shipped ready for installation in the upflow position. The unit can easily be converted for installation in either downflow or horizontal applications. The furnace is shipped with a bottom seal panel in place for side return air in upflow applications.

Shipping and Packing List

Package 1 of 1 contains:

- 1 - Assembled G24M unit (includes vent adapter except for 140 kBtuh units)
- 1 - Vent adapter (140 kBtuh units only)

The following additional items may be ordered separately, if required:

- 1 - Thermostat
- 1 - External filter rack kit
- 1 - Hanging bracket kit
- 1 - Propane/LP changeover kit

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

Requirements

Lennox G24M units are American Gas Association (AGA) and Canadian Gas Association (CGA) certified.

In the USA, installation of Lennox gas central 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) in the United States. The National Fuel Gas Code is available from the following address:

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

In Canada, installation must conform with current National Standard of Canada CAN/CGA-B149.1 "Installation Code for Natural Gas Burning Appliances and Equipment" and CAN/CGA-B149.2 "Installation Code for Propane Gas Burning Appliances and Equipment," local plumbing or waste water codes and other applicable local codes.

Adequate clearance must be made around the air openings into the vestibule area. Provisions must be made for proper operation and for combustion air and ventilation air supply according to the current National Fuel Gas Code or CAN/CGA-B149 standards.

Vent installations must be according to the provided venting tables and applicable provisions of local building codes.

This furnace is AGA and CGA certified for installation clearances to combustible material as listed on the unit rating plate and in the tables in figures 5, 7 and 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 CAN/CGA B149.1 and B149.2 standards.

The furnace must be adjusted to obtain a temperature rise within the range specified on the unit rating plate.

The G24M furnace must be installed so that electrical components are protected from water.

When the 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, the 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.

Field wiring connections must meet or exceed specifications of type T wire and withstand a maximum temperature rise of 180°F (82°C).

When the furnace is installed so that supply ducts carry air circulated by the furnace to areas outside of the space containing the furnace, return air shall be handled by a duct(s) sealed to the furnace casing and terminating outside space containing furnace.

NOTE - G24M series units must not be used as a construction heater during any phase of construction. Very low return air temperatures, harmful vapors and misplacement of the filters will damage the unit and lower its efficiency.

The Lennox G24M furnace may be installed in alcoves, closets, attics, basements, garages and utility rooms in the upflow, downflow, or horizontal position.

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

⚠ 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.

General

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

In addition to the requirements outlined previously, the following general recommendations should be considered when installing the Lennox G24M furnace.

The furnace should be placed 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 furnace combustion air openings with clothing, boxes, doors, etc. Combustion air is needed for proper combustion and safe unit operation.

When the furnace is installed in an attic or other insulated space, keep insulation away from the furnace.

⚠ WARNING

Product contains fiberglass wool.

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

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

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

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

Combustion, Dilution & Ventilation Air

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

In the absence of local codes concerning air for combustion and ventilation, use the guidelines and procedures in this section to install G24M 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). This reprinted material is not the complete and official position of the ANSI on the referenced subject, which is represented only by the standard in its entirety.

In Canada, refer to the standard CAN/CGA B149.1 and B149.2 installation codes.

⚠ CAUTION

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

⚠ 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.

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

All gas-fired appliances require air for the combustion process. If sufficient combustion air is not available, the furnace or other appliance 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 required to ensure proper combustion and to prevent a downdraft. Insufficient air causes incomplete combustion which can result in carbon monoxide.

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

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

Unconfined Space

An unconfined space is an area such as a basement or large equipment room with a volume greater than 50 cubic feet (1.42 m³) per 1,000 Btu (.29 kW) per hour of the combined input rating of all appliances installed in that space. This space also includes adjacent rooms which are not separated by a door. Though an area may appear to be unconfined, it might be necessary to bring in outdoor air for combustion if the structure does not provide enough air by infiltration. If the furnace is located in a building of tight construction with weather stripping and caulking around the windows and doors, follow the procedures in the air from outside section.

Confined Space

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

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

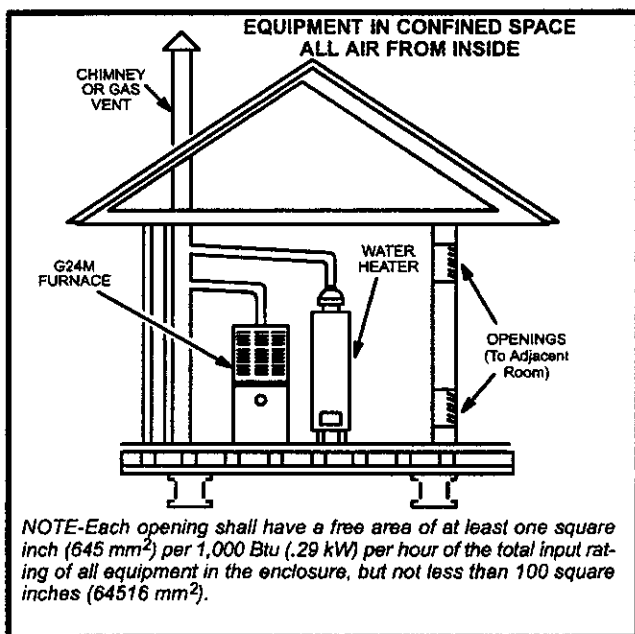


FIGURE 1

Air from Inside

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

Air from Outside

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

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.

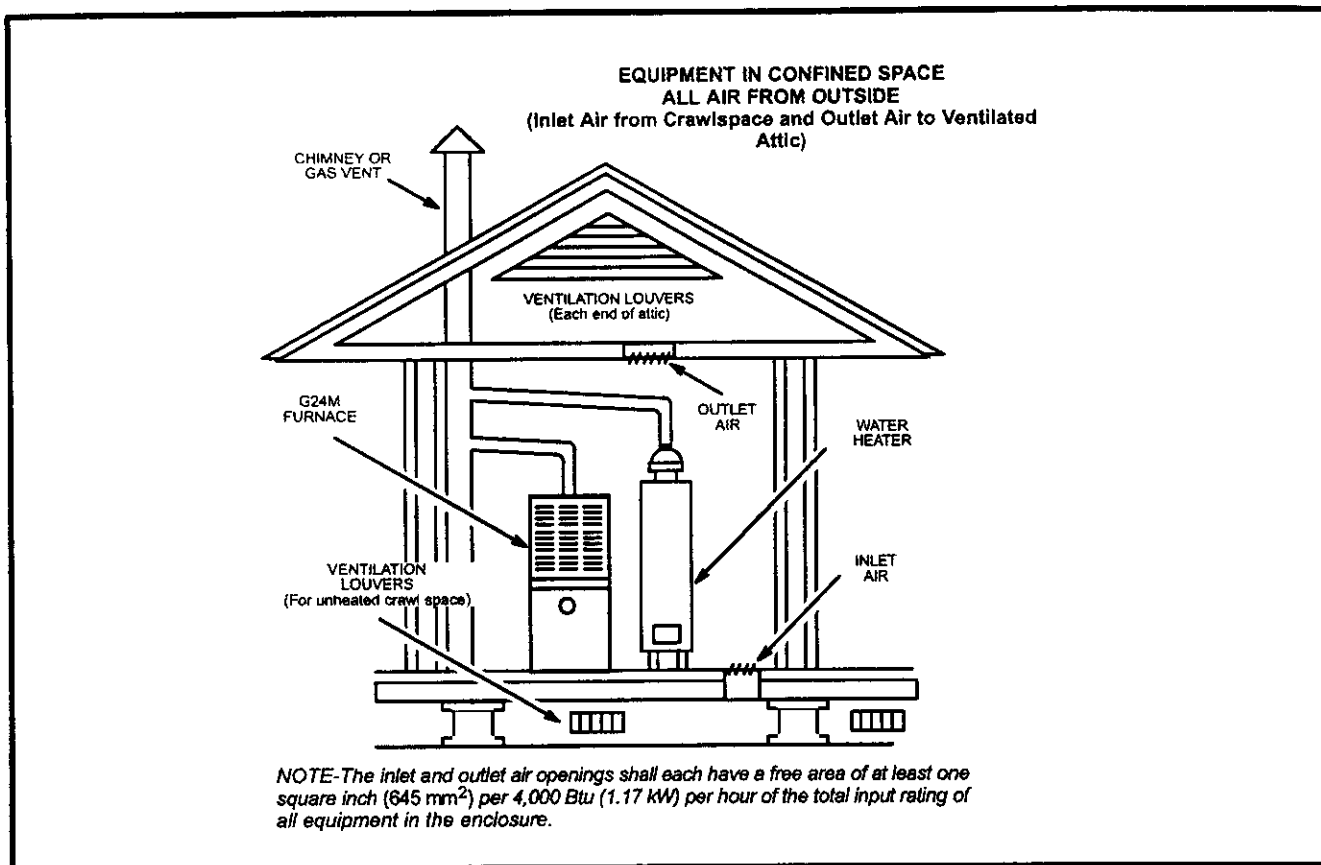


FIGURE 2

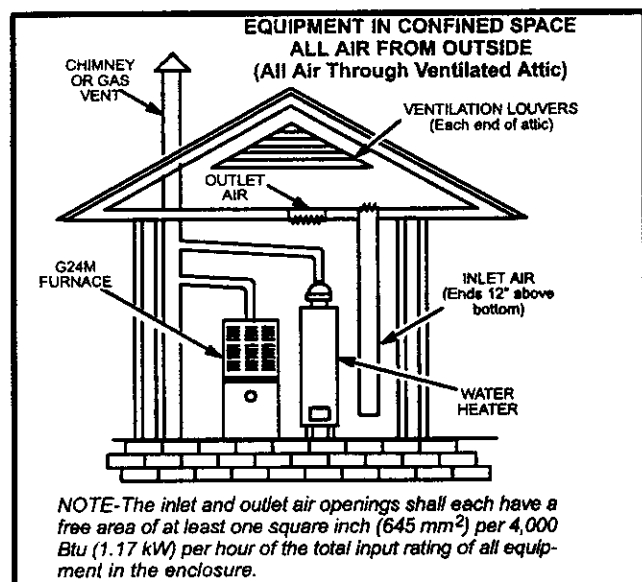


FIGURE 3

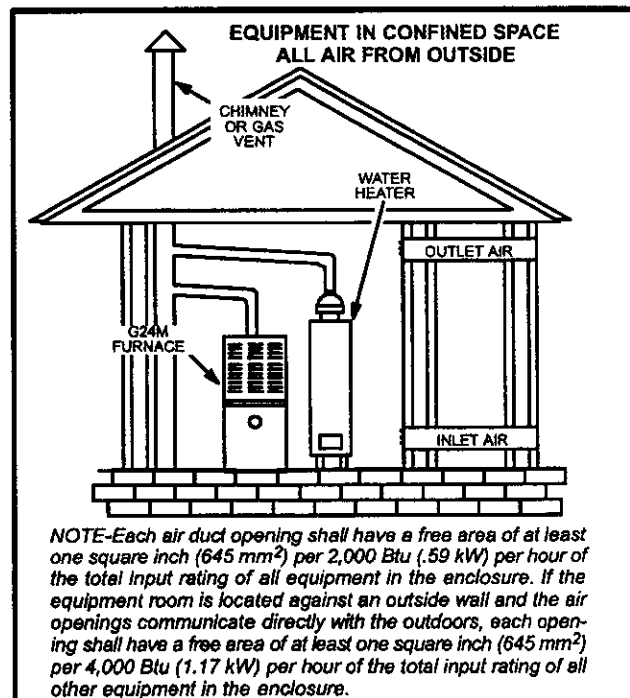


FIGURE 4

Setting Equipment

The Lennox G24M multi-position gas furnace can be installed as shipped in upflow or horizontal position with right-hand or left-hand discharge. The furnace can easily be converted for downflow applications.

Select a location that allows for required clearances listed on the unit rating plate. Also consider gas supply connections, electrical supply, vent connection and installation and service clearances [24 inches (610 mm) at unit front].

NOTE - 1/3 and 1/2 hp blower motors are equipped with either four flexible mounting legs or 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). This shipping bolt and flat washer must be removed before the furnace is put into operation. Once the shipping bolt and washer are removed, the rigid leg will not touch the fan housing.

Upflow Applications

The Lennox G24M furnace is shipped in a standard upflow position. Level the furnace using shims or leveling bolts. Four knockouts in the furnace base panel are factory-provided for the installation of leveling bolts (field-provided). Allow for clearances to combustible materials as indicated on the unit rating plate. Minimum clearances for closet or alcove installations are shown in figure 5.

In upflow applications, return air can be brought in through the bottom or either side of the furnace. If a furnace with bottom return air is installed on a platform, make an airtight seal between the bottom of the furnace and the platform to ensure proper and safe operation.

Knockouts are provided on both sides of the furnace cabinet for installations with side return air. When side return air is used, seal the bottom of the furnace using the panel provided.

An upflow filter rack is available and must be ordered separately. The adjustable rack can be installed beneath the furnace (flush with cabinet edges) for bottom return air applications or on the side of the furnace for side return air.

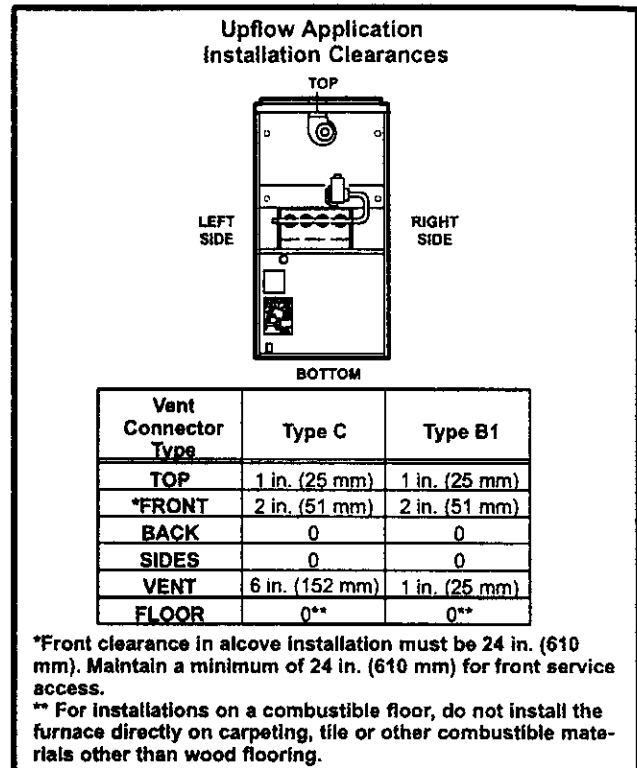


FIGURE 5

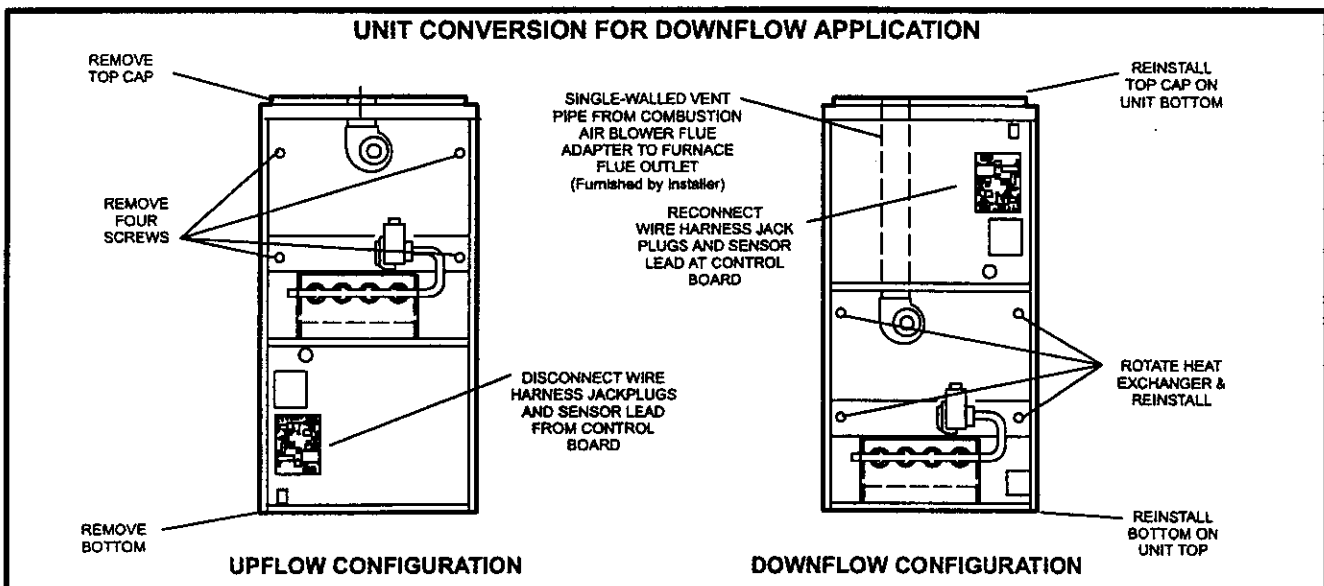


FIGURE 6

Downflow Applications

The Lennox G24M furnace is shipped in the upflow configuration and must be converted for downflow installation. Refer to figure 6 and the following steps to convert the unit for downflow installation:

- 1 - Place unit on its back and remove access panel.
- 2 - Disconnect wire harness jackplugs from control board.
- 3 - Disconnect sensor lead from control board.
- 4 - Remove four screws securing cabinet top cap to cabinet.
- 5 - Remove four screws holding heat exchanger assembly in place. Slide heat exchanger out through top of cabinet.
- 6 - Rotate heat exchanger 180° and slide back into cabinet through top. Resecure using four screws.
- 7 - Remove four screws securing cabinet bottom piece to cabinet. Replace with cabinet top cap.
- 8 - Use four screws to install cabinet bottom piece where cabinet top was.
- 9 - Reconnect sensor lead to control board.
- 10 - Reconnect wire harness jackplugs to control board.
- 11 - Replace unit access panel.
- 12 - **Use cord clip located on right side of furnace to hold wiring away from hot surfaces in heating compartment.** Install two #10 sheet metal screws in cabinet top to provide a better air seal.

In downflow applications, the unit can be installed in three different ways: on non-combustible flooring, on combustible floor using an additive base, or on a reverse-flow cooling cabinet. Do not drag unit across floor.

Allow clearances to combustible materials as indicated on unit rating plate. Minimum clearances for closet or alcove installations are shown in figure 7.

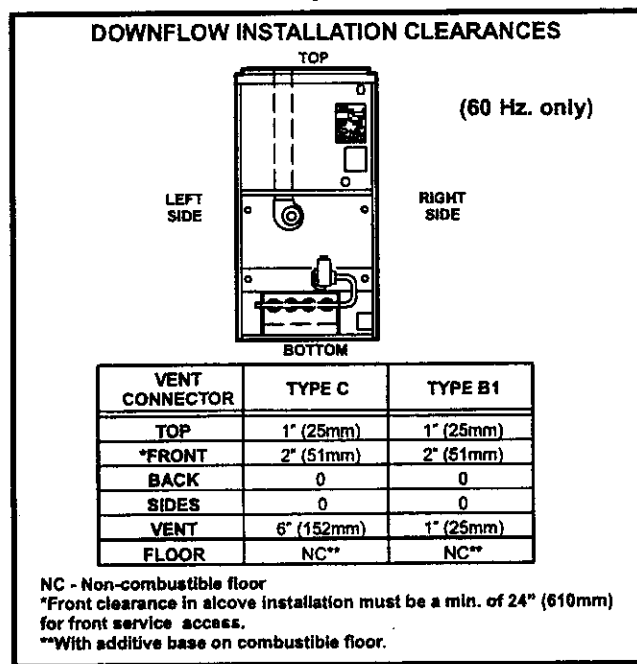


FIGURE 7

A separate downflow filter kit is available for use in downflow applications.

A-Installation on Non-Combustible Flooring

- 1 - Cut floor opening keeping in mind the clearances listed on the unit rating plate. Also, keep in mind gas supply and electrical supply, vent connections and sufficient installation and service clearances. See table 1 for correct floor opening size.

TABLE 1
NONCOMBUSTIBLE FLOOR OPENING

UNIT	Front to Rear		Side to Side	
	in	mm	in	mm
G24M-45/60/75	19-3/4	502	15-1/4	388
G24M-100/120	19-3/4	502	18-3/4	477
G24M-140	19-3/4	502	21-1/2	546

NOTE - Floor opening dimensions listed are 1/4" (6mm) larger than unit openings.

- 2 - Flange warm air plenum and lower into opening.
- 3 - Set unit over plenum.
- 4 - Check to see that an adequate seal is made.

B-Installation on Combustible Flooring

- 1 - When unit is installed on a combustible floor, an additive base (ordered separately) must be installed between the furnace and the floor. See table 2 for opening size to cut in the floor.

TABLE 2
ADDITIVE BASE FLOOR OPENING

UNIT	Front to Rear		Side to Side	
	in	mm	in	mm
G24M-45/60/75	21-7/8	556	17-5/16	440
G24M-100/120	21-7/8	556	20-3/4	528
G24M-140	21-7/8	556	23-1/2	597

NOTE - Floor opening dimensions listed are 1/4" (6mm) larger than additive base openings.

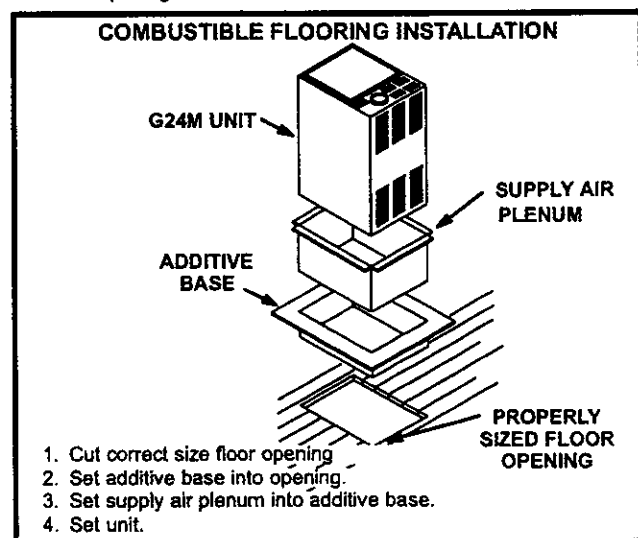


FIGURE 8

- 2 - After opening is cut, set the 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.
- 5 - Set unit on additive base so unit flanges drop into plenum. Refer to figure 8.

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

C-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, install furnace so flanges drop inside cabinet opening.
- 3 - Seal cabinet and check for air leakage.

Horizontal Applications

The Lennox G24M furnace can be installed in horizontal applications in either upflow or downflow configuration (See figure 6). It is preferable to install the unit in the standard upflow configuration, if possible, because the vent pipe will not interfere with service access for blower. Install two #10 screws in the cabinet bottom (upflow configuration) or cabinet top (downflow configuration) to provide a better air seal. **The unit cannot be installed on its back.**

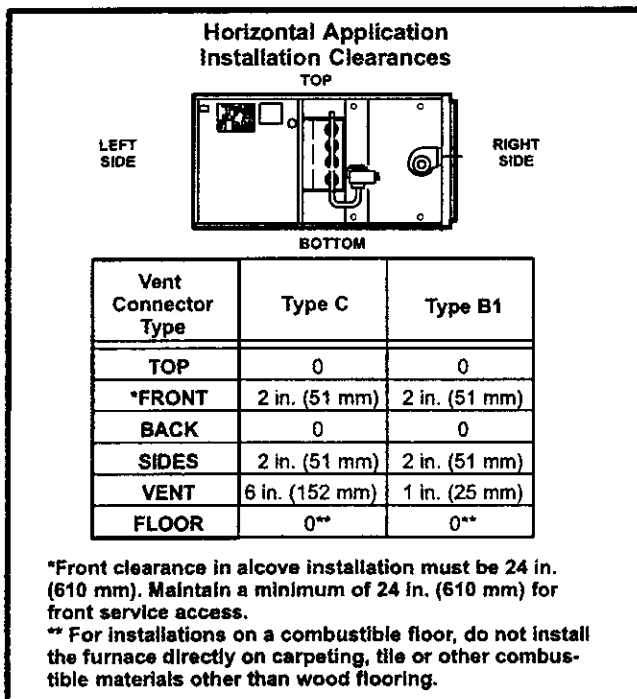


FIGURE 9

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

Furnaces may be installed in either an attic or a crawlspace.

See figure 10 for furnace installations on a platform.

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

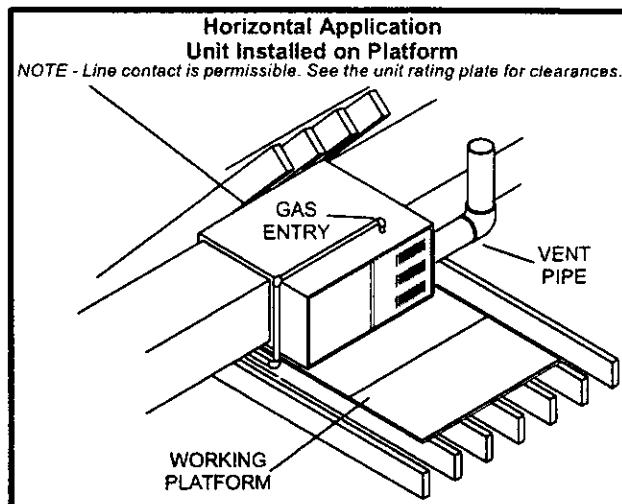


FIGURE 10

Anyone of the following methods may be used to suspend the furnace from roof rafters or floor joists:

- 1 - Using Lennox hanging bracket kit catalog number 46J66 - Install as indicated in the installation instructions provided with the hanging bracket kit.
- 2 - Using angle iron with at least 1/4 in. diameter rods - Install as shown in figure 11.

Note - Rods must not interfere with plenum or exhaust piping; cooling coils and supply and return air plenums must be supported separately.

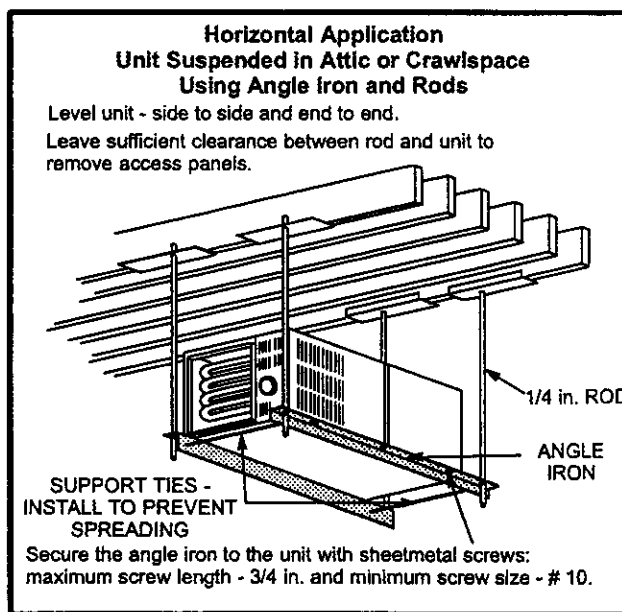


FIGURE 11

- 3- Using heavy gauge perforated steel straps ("plumber's straps") - Install as shown in figure 12.

Note - Straps must not interfere with plenum or exhaust piping; cooling coils and supply and return air plenums must be supported separately.

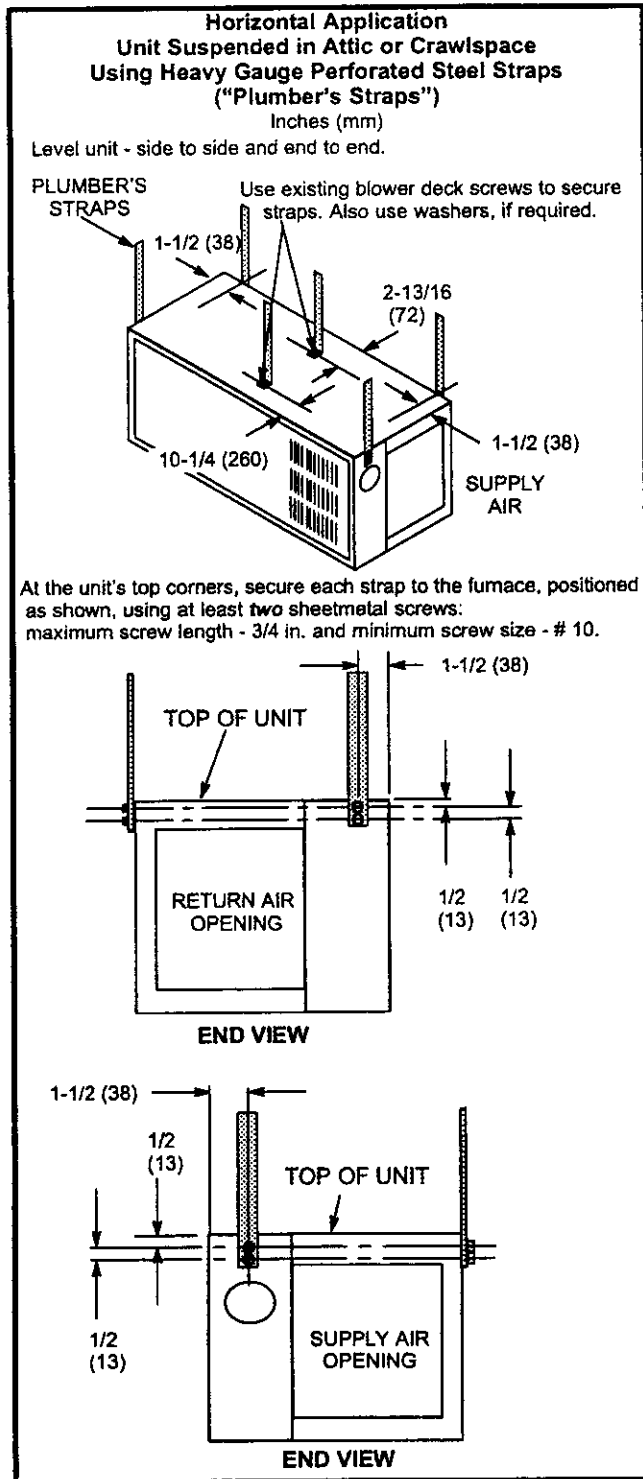


FIGURE 12

⚠ 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.

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.

Supply Air Plenum

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

Return Air Plenum

Return air must not be drawn from a room where this furnace, or any other gas appliance (ie., a water heater), is installed. When return air is drawn from a room, a negative pressure is created in the room. If a gas appliance is operating in a room with negative pressure, the flue products can be pulled back down the vent pipe and into the room. This reverse flow of the flue gas may result in incomplete combustion and the formation of carbon monoxide gas. This toxic gas might then be distributed throughout the house by the furnace duct system.

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

In downflow applications, use the following steps when installing return air plenum:

- 1 - Flange bottom edge of plenum with a hemmed edge. See figure 13.
- 2 - Use fiberglass sealing strips between plenum and the unit cabinet to ensure a tight seal.

- 3 - In all cases, secure the plenum to the top flanges of the furnace using sheet metal screws. See figure 13.

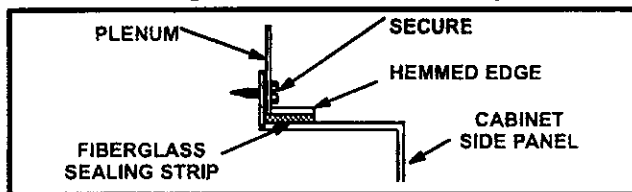


FIGURE 13

- 4 - In closet installations, it may be necessary to install sheet metal screws from the inside. If this is the case, make plenum with a removable front to install screws as shown in figure 14.

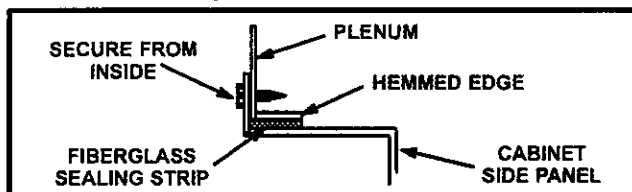


FIGURE 14

Venting

A vent adapter is factory-installed on the combustion air blower outlet of all models, except the G24M-140. On the G24M-140, the flue adapter is supplied with the furnace, and must be field-installed, between the combustion air blower flue outlet and the vent connector, using one or two corrosion-resistant screws. **Modification of or failure to install the adapter will cause unsafe unit operation and will void AGA and CGA unit certification.** The vent connector does not require insulation.

The G24M series units are classified as fan-assisted Category I furnaces when vertically vented according to the latest edition of ANSI Z21.47 Central Furnace Standard in the USA and the current standards of CAN/CGA B149.1 and B149.2 of the 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 products of combustion through the combustion chamber and/or heat exchanger.

NOTE - Use these instructions as a guide. They do not supersede local codes.

The vent sizing tables in this manual were extracted from the National Fuel Gas Code (NFPA 54 / ANSI Z223.1) 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 NFPA 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.

Install the first vent connector elbow a minimum of 6 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 an G24M 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 15 and 16 for common venting.

A Category I appliance must never be connected 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 fan-assisted furnace may be commonly vented into an existing lined masonry chimney if the following conditions are met:

- 1 - The chimney is currently serving at least one draft-hood equipped appliance.
- 2 - 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 CAN/CGA B149.1 and B149.2 of the Natural Gas and Propane Installation Code in Canada.

⚠ 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, sized according to the provided venting tables.

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.

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

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

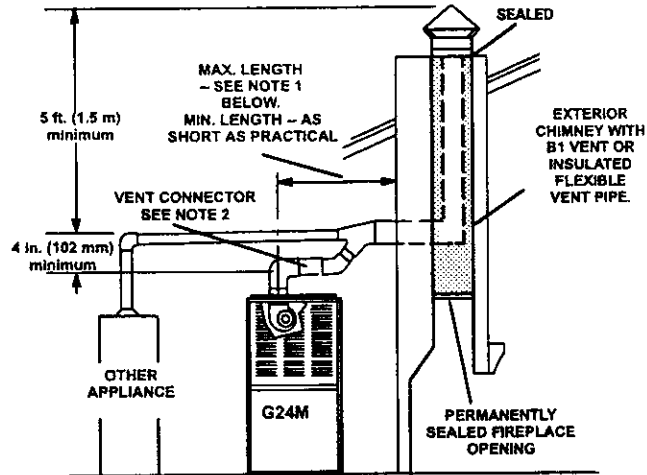
Insulation for the flexible vent pipe must be an encapsulated fiberglass sleeve recommended by the flexible vent pipe manufacturer. See figure 15.

The space between the liner and the chimney wall should NOT be insulated with puffed mica or any other loose granular insulating material.

If B1 vent or an insulated flexible vent pipe cannot be used as liners, the chimney must be rebuilt to accommodate one of these methods or some alternate approved method must be found to vent the appliance.

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 G24M series units. The chimney passageway must be checked periodically to ensure that it is clear and free of obstructions.

Common Venting Using Metal-lined Masonry Chimney



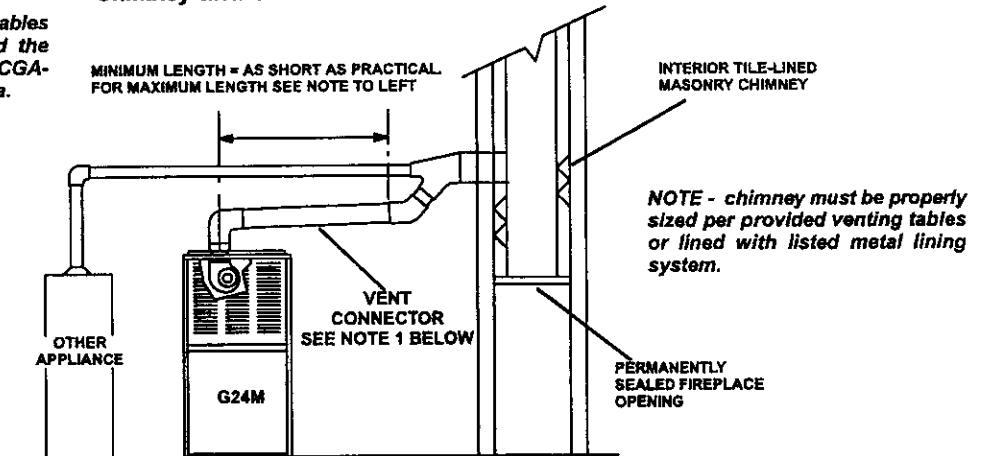
NOTE 1 - Refer to the provided venting tables for installations in the USA and the venting tables in CAN/CGA-B149.1 for installations in Canada.

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 CAN/CGA-B149.1 for installations in Canada.

FIGURE 15

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 CAN/CGA-B149.1 for installations in Canada.



Note 1 - 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 CAN/CGA-B149.1 for installations in Canada.

FIGURE 16

General Venting Requirements

All G24M furnaces must be vented 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 CAN/CGA B149.1 and B149.2 of the Natural Gas and Propane Installation Code 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 CAN/CGA B149.1 and B149.2 of the Natural Gas and Propane Installation Code for Canada.

- 3 - *For single appliance vents:* If the vertical vent or tile-lined chimney has a larger diameter or flow area than the vent connector, use the **vertical vent diameter** to determine the **minimum vent capacity** and the **vent connector diameter** to determine the **maximum vent capacity**. The flow area of the vertical vent, however, shall not exceed 7 times the flow area of the listed appliance categorized vent area, draft hood outlet area or flue collar area unless designed according to approved engineering methods.
- 4 - *For multiple appliance vents:* The flow area of the largest section of vertical vent or chimney shall not exceed 7 times the smallest listed appliance categorized vent area, draft hood outlet area or flue collar area unless designed according to approved engineering methods.
- 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, see tables 4 and 5, 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 6, 7, 8, and 9 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 3

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

- 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. The vent connector should be routed 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. See local and national installation codes for support intervals and methods. National installation code in the USA is current edition of National Fuel Gas Code (ANSI-Z223.1). National installation codes in Canada are current editions of CAN/CGA-B149 codes.

- 11 - Vent connectors shall be firmly attached to 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 manufacturer'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 NFPA (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%, 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, the venting system must be inspected for signs of corrosion and general condition. The sizing of the vent system must be reviewed and must conform to these instructions and the provided venting tables for the USA, and the appropriate venting tables in the standards of CAN/CGA B149.1 and B149.2 of the Natural Gas and Propane Installation Code for Canada. If the existing system is in conflict with these requirements, the venting system must be re-sized.

TABLE 4
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 5
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 6
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 7
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 8
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 9
COMMON VENT CAPACITY
TYPE B DOUBLE-WALL VENTS WITH SINGLE-WALL METAL CONNECTORS
SERVING TWO OR MORE CATEGORY I APPLIANCES

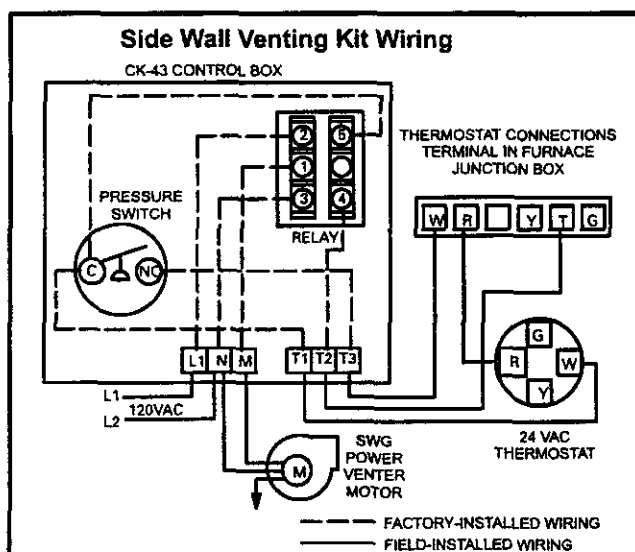
Vent Height H (feet)	Common Vent Diameter - D (inches)							
	4 inch		5 inch		6 inch		7 inch	
	Appliance Input Rating in Thousands of Btu Per Hour							
	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT	FAN + FAN	FAN + NAT
6	89	78	136	113	200	158	304	244
8	98	87	151	126	218	173	331	269
10	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. The following test should be conducted while each appliance in operation and the other appliances not in operation remain connected to the common venting system. If the venting system has been installed improperly, the system must be corrected as indicated in the general venting requirements section.

- 1 - Seal any unused openings in the common venting system.
- 2 - Visually inspect the venting system for proper size and horizontal pitch. Determine there is no blockage or restriction, leakage, corrosion, or other deficiencies which could cause an unsafe condition.
- 3 - To the extent that it is practical, 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. Place the appliance being inspected in operation. Adjust thermostat so appliance will operate continuously.
- 5 - Test for spillage of flue gases at the draft hood relief opening after 5 minutes of main burner operation. Use the flame of a match or candle, or smoke from a cigarette, cigar or pipe.

- ### Horizontal Venting

**FIGURE 17**

When horizontally vented, the minimum clearance for termination from electric meters, gas meters, regulators and relief equipment is 4 feet (1.2 m) for US installations. Refer to the current CAN/CGA B149.1 and B149.2 for installations in Canada or with authorities having local jurisdiction.

At vent termination, care must be taken to maintain protective coatings over building materials (prolonged exposure to exhaust condensate can destroy protective coatings). It is recommended that the exhaust outlet not be located within 6 feet (1.8 m) of a condensing unit because the condensate can damage the painted coating.

Gas Piping

GAS SUPPLY

- 1 - This unit is shipped standard for left or right side installation of gas piping (or top entry in horizontal applications). Connect the gas supply to the piping assembly.
- 2 - When connecting the gas supply, factors such as length of run, number of fittings and furnace rating must be considered to avoid excessive pressure drop. Table 10 lists recommended pipe sizes for typical applications.
- 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)] using suitable hangers or straps. A drip leg should be installed in vertical pipe runs to the unit.
- 5 - In some localities, codes may require installation of a manual main shut-off valve and union (furnished by the installer) external to the unit. Union must be of the ground joint type.

! 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 18.

NOTE - In case emergency shutoff is required, shut off main manual gas valve and disconnect main power to unit. These devices should be properly labeled by the installer.

TABLE 10
GAS PIPE CAPACITY - FT³/HR (M³/HR)

Nominal Iron Pipe Size inches (mm)	Internal Diameter inches (mm)	Length of Pipe - feet (m)									
		10 (3.048)	20 (6.096)	30 (9.144)	40 (12.192)	50 (15.240)	60 (18.288)	70 (21.336)	80 (24.384)	90 (27.432)	100 (30.480)
1/4 (6.35)	.364 (9.246)	43 (1.13)	29 (.82)	24 (.68)	20 (.57)	18 (.51)	16 (.45)	15 (.42)	14 (.40)	13 (.37)	12 (.34)
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)	1460 (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 (121.78)	3900 (110.43)	3700 (104.77)	3450 (97.69)	3250 (92.03)
4 (101.6)	4.026 (102.260)	23000 (651.27)	15800 (447.39)	12800 (362.44)	10900 (308.64)	9700 (274.67)	8800 (249.18)	8100 (229.36)	7500 (212.37)	7200 (203.88)	6700 (189.72)

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

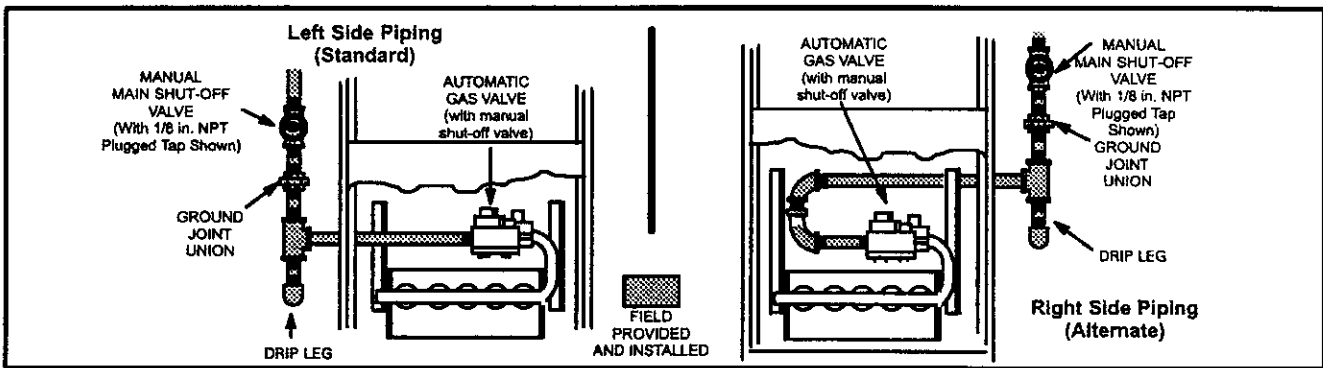


FIGURE 18

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.

NOTE - In case emergency shutoff is required, shut off the main manual gas valve and disconnect the main power to the furnace. These devices should be properly labeled by the installer.

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 equal to or less than 1/2 psig (3.48 kPa).

IMPORTANT

When testing pressure of gas lines, gas valve must be disconnected and isolated. See figure 19. Gas valves can be damaged if subjected to more than 1/2 psig (3.48 kPa).

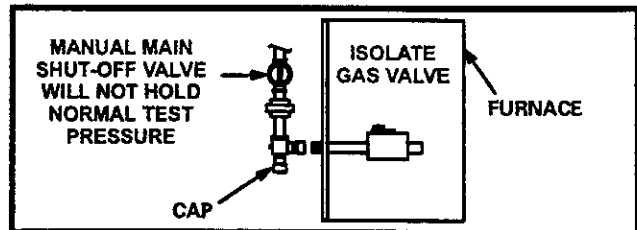


FIGURE 19

⚠ 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.

These units operate on 120 volt, single phase, 60 hz electrical power. Refer to figure 20 for field wiring and figure 22 for schematic wiring diagram and troubleshooting.

- 1 - Select circuit protection and wire size according to the unit rating plate.
- 2 - Knockouts are provided on both sides of the furnace cabinet to facilitate wiring.
- 3 - Install the room thermostat according to instructions provided with the thermostat.
- 4 - Install a separate disconnect switch (protected by either fuse or circuit breaker) near the unit so power can be turned off for servicing.
- 5 - Before connecting the thermostat or the power wiring, check to make sure the wires will be long enough to facilitate servicing at a later date. Remove the blower access panel and open the panel to check wire length for access.
- 6 - Complete wiring connections to the equipment using wiring diagram provided with unit and wiring diagrams

shown in figures 20 and 22. Use 18 gauge wire or larger for thermostat connections.

- 7 - 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.

NOTE - The G24M furnace contains electronic components that are polarity sensitive. Make sure that the furnace is wired correctly and is properly grounded.

- 8 - One line voltage accessory "ACC" terminal is provided on the furnace control board with a protective plastic cap. Any accessory rated up to 4 amps can be connected to this terminal (after removing the protective cap) with the neutral leg of the circuit being connected to the line voltage neutral wire. See figure 21 for control board configuration. This terminal is energized whenever the blower is in operation.
- 9 - One line voltage heating accessory "HTG ACC" terminal is provided on the furnace control board with a protective plastic cap. Any accessory rated up to 4 amps can be connected to this terminal (after removing the protective cap) with the neutral leg of the circuit being connected to the line voltage neutral wire. See figure 21 for control board configuration. This terminal is energized in the heating mode whenever the blower is in operation.

Indoor Blower Speeds (Refer to Figure 22)

- 1 - When the thermostat is set to "FAN ON", the indoor blower will run continuously on low speed when there is no cooling or heating demand.
- 2 - When the G24M is running in the heating mode, the indoor blower will run on the heating speed.
- 3 - When there is a cooling demand, the indoor blower will run on the cooling speed.

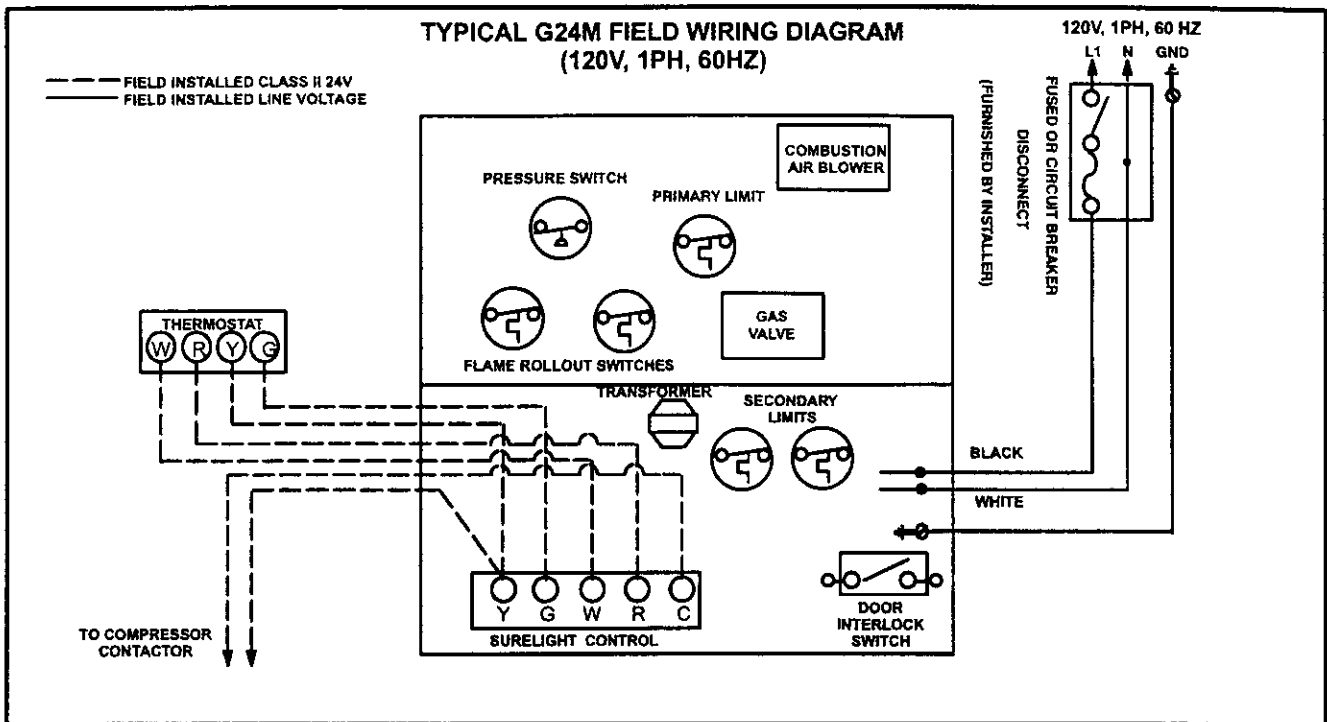


FIGURE 20

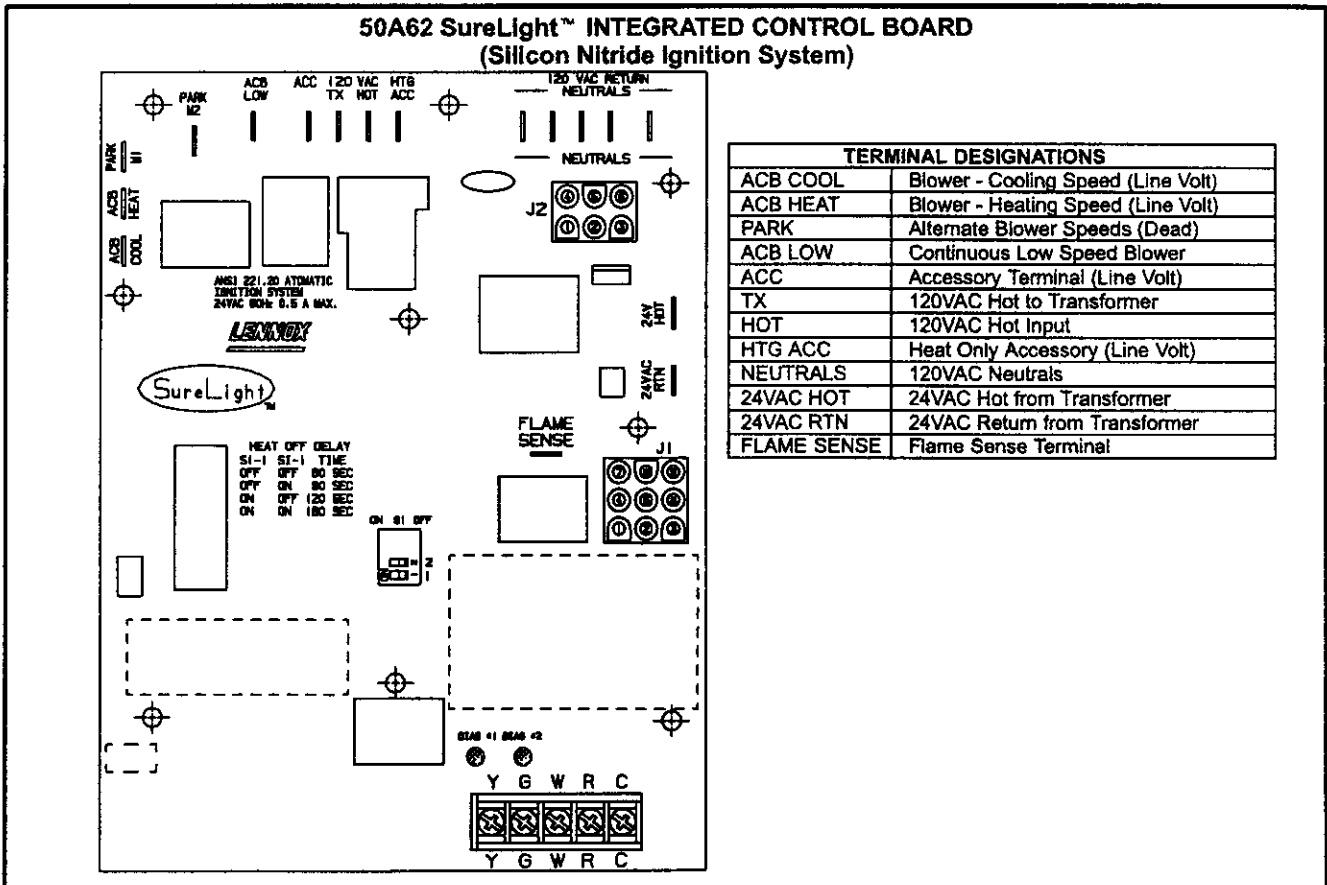
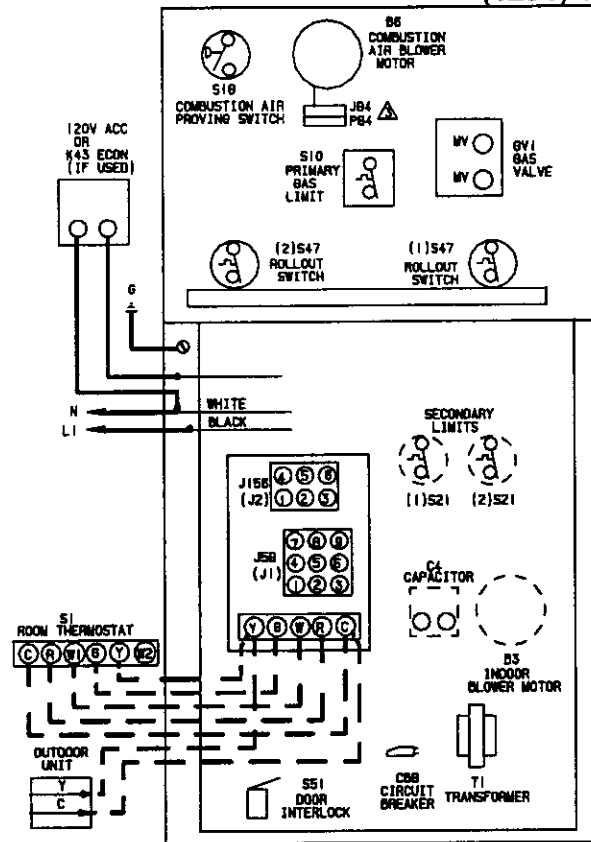


FIGURE 21

G24M Schematic Wiring Diagram (120V, 1PH, 60HZ)



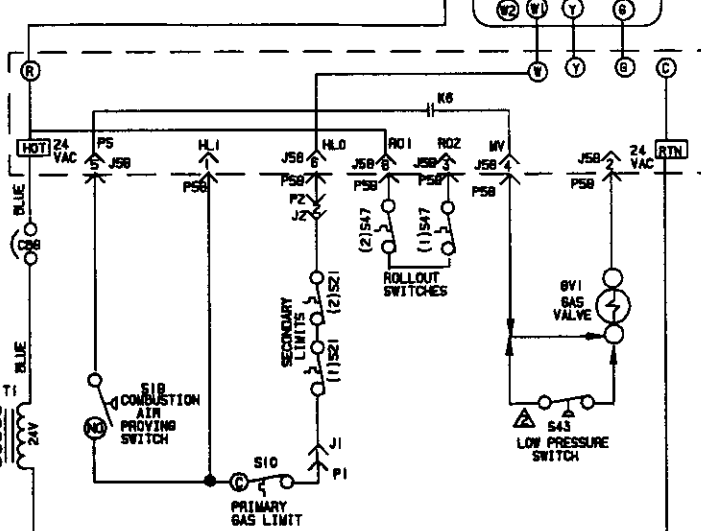
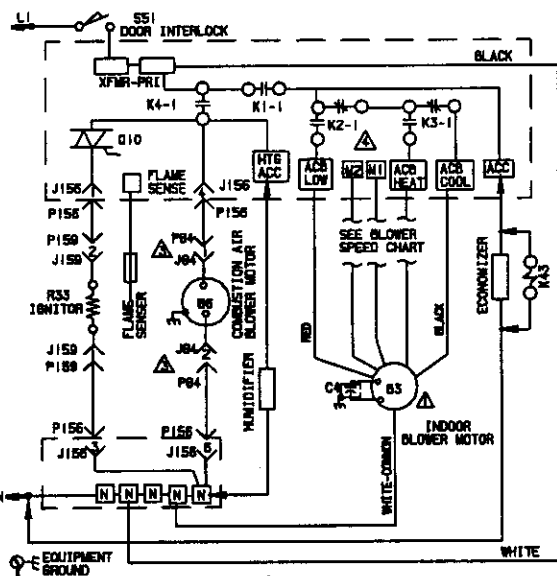
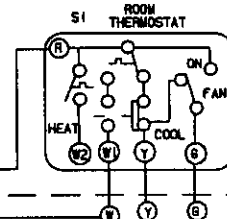
KEY	DESCRIPTION
AX	CONTROL, BURNER, IGNITION
B3	MOTOR, BLOWER
B6	MOTOR, COMBUSTION AIR BLOWER
C4	CAPACITOR, BLOWER MOTOR
CBR	CIRCUIT BREAKER
GV1	VALVE, GAS
P1	PI, PRIMARY LIMIT
P2	P2, SECONDARY LIMIT
P58	JACK-BURNER CONTROL
P64	JACK-COMB. AIR BLOWER (FOR G24M(X)-140 UNIT ONLY)
P156	JACK, INDUCER/IGNITOR
P158	JACK, IGNITOR
P1	PI, PRIMARY LIMIT
P2	P2, SECONDARY LIMIT
P58	JACK-BURNER CONTROL
P64	JACK-COMB. AIR BLOWER (FOR G24M(X)-140 UNIT ONLY)
P156	P156, INDUCER/IGNITOR
P158	P158, IGNITOR
S10	LIMIT, PRIMARY, GAS
S18	SWITCH, COMB. AIR BLWR PRV
(1)S21	LIMIT, SECONDARY
(2)S21	LIMIT, SECONDARY
S43	SWITCH, LOW PRESS. GAS
(1)S47	SWITCH, ROLLOUT
(2)S47	SWITCH, ROLLOUT
S51	SWITCH, DOOR INTERLOCK
T1	TRANSFORMER, CONTROL

UNIT	FACTORY CONNECTED SPEED TAPS				MOTOR SPEEDS AVAILABLE
	COOL	HEAT	ACB LOW	M1 M2	
G2-45/60		YELLOW		BROWN	4
G3-60/75		YELLOW		BROWN	4
G4-75-100		BLUE		YELLOW BROWN	5
G4-75-100/120		BLACK	YELLOW	RED	5
G4-75-100/120		BLACK	BROWN	YELLOW	4
G4-75-140		BROWN		YELLOW	4
G4-75-120		BROWN		YELLOW	4

SET THERMOSTAT HEAT ANTICIPATION
FOR G24M SERIES UNITS AS FOLLOWS:
WHITE RODGERS VALVE..... 0.5
HONEYWELL VALVE..... 0.7

— LINE VOLTAGE FIELD INSTALLED
- - - CLASS II VOLTAGE FIELD WIRING

← DENOTES OPTIONAL COMPONENTS



- ▲ IMPORTANT - TO PREVENT MOTOR BURNOUT, NEVER CONNECT MORE THAN ONE MOTOR LEAD TO ANY ONE CONNECTION
- ▲ FOR PROPANE/LP ONLY
- ▲ JP64 FOR G24M4/S(X)-140 ONLY
- ▲ M1 & M2 ARE UNPOWERED TERMINALS. ALL UNUSED MOTOR MUST BE PARKED ON M1 OR M2.

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

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

LENNOX Industries Inc. WIRING DIAGRAM		5/99
HEATING UNITS-GAS		9/99
G24M2(X)-45/60-12	G24M3/4(X)-100/120-12	
G24M3(X)-60/75-12	G24M4/5(X)-100/120/140-12	
G24M4(X)-75-12		
SECTION A		
Supersedes Form No.	Use Form No.	
	532, 988W	
©1999 Lennox Industries Inc.		LiThe U.S.A.

FIGURE 22

Unit Start-Up

⚠ 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.

FOR YOUR SAFETY READ BEFORE LIGHTING

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.

Use only your hand to turn the gas control knob. Never use tools. If the knob will not turn by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

Placing Furnace Into Operation

G24M furnaces are equipped with a SureLight™ ignition system. Do not attempt to manually light burners on these furnaces. Each time the thermostat calls for heat, the burners will automatically light.

⚠ 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 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 access panel.

- 6 - *White Rodgers 36E Gas Valve* - Switch gas valve lever to **OFF**. See figure 23.
Honeywell VR8205 Gas Valve - Turn knob on gas valve clockwise ➡ to **OFF**. Do not force. 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.

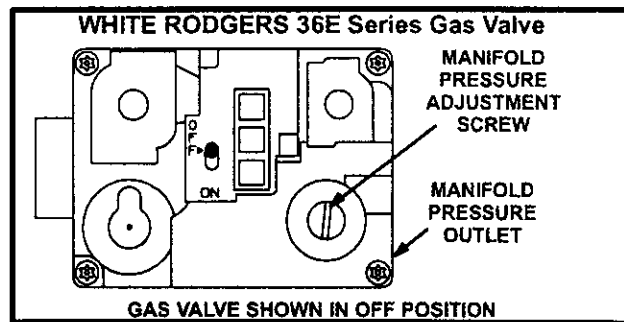


FIGURE 23

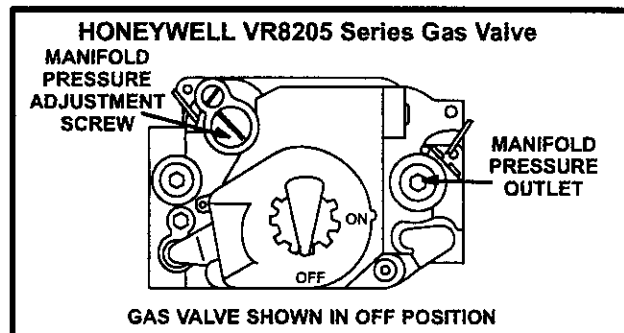


FIGURE 24

- 8 - *White Rodgers 36E Gas Valve* - Switch gas valve lever to **ON**.
Honeywell VR8205 Gas Valve - Turn knob on gas valve counterclockwise ➡ to **ON**. Do not force.
- 9 - Replace the access panel.
- 10 - Turn on all electrical power to the unit.
- 11 - Set the thermostat to desired setting.

NOTE – When unit is initially started, steps 1 through 11 may need to be repeated to purge air from gas line.

- 12 - If the appliance will not operate, follow the instructions "Turning Off Gas to Unit" and call your service technician or 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 access panel.
- 4 - *White Rodgers 36E Gas Valve* - Switch gas valve lever to **OFF**.
Honeywell VR8205 Gas Valve - Turn knob on gas valve clockwise ➡ to **OFF**. Do not force.
- 5 - Replace the access panel.

Heating Sequence Of Operation

- 1 - When thermostat calls for heat, combustion air blower starts.
- 2 - Combustion air pressure switch proves blower operation. Switch is factory set and requires no adjustment.
- 3 - After a 15 second prepurge, hot surface ignitor energizes.
- 4 - After a 20 second ignitor warm-up period, gas valve solenoid opens.
- 5 - Gas is ignited, ignition sensor proves the flame and combustion process continues.
- 6 - If flame is not detected after first ignition trial, ignition control will repeat steps 3 and 4 four more times before locking out the gas valve ("WATCHGUARD" flame failure mode). Ignition control will then automatically repeat steps 3, 4, 5 and 6 after 60 minutes.
- 7 - 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

To check for proper gas flow to the combustion chamber, determine the Btu (kW) input from the unit rating plate. Divide this input rating by the Btu (kW) per cubic foot (cubic meter) of available gas. The result is the required number of cubic feet (cubic meter) per hour. Determine the flow of gas through the gas meter for two minutes and multiply by 30 to get the hourly flow of gas.

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 regulator pressure. Manifold pressures are given in table 11. See figures 23 and 24 for manifold pressure adjustment screw location.

Note - A natural gas to LP/propane gas changeover kit is required to convert the unit.

High Altitude Information

Refer to table 11 for manifold pressure settings for installations at different altitudes and for different fuels.

TABLE 11
MANIFOLD ABSOLUTE PRESSURE (OUTLET) IN. W.C. (KPA)

FUEL	Altitude - feet (m) above sea level				
	0-2000 (0-610)	2000-4500 (610-1372)	4500-5500 (1372-1676)	5500-6500 (1676-1981)	6500-7500 (1981-2286)
NAT	3.5 (0.87)	3.5 (0.87)*	3.4 (0.85)	3.3 (0.82)	3.2 (0.80)
LP	9.5 (2.36)	9.5 (2.36)*	9.2 (2.29)	8.9 (2.21)	8.6 (2.14)

*No adjustment required.

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

The combustion air pressure switches are factory-set and require no adjustment.

At elevations of 4500 feet (1372 m) or greater, replace the factory-installed pressure switch with the switch listed in table 12.

TABLE 12

Unit Model	Pressure Switch Part Number
G24M-45	NO CHANGE
G24M-60	NO CHANGE
G24M-75	88J8001
G24M-100	18L2401
G24M-120	18L2401
G24M-140-7	NO CHANGE

Other Unit Adjustments

Primary and Secondary Limits

The primary limit is located on the heating compartment vestibule panel. Two secondary limits are located in the blower compartment, behind the blower. These limits are factory-set and require no adjustment.

Flame Rollout Switches (Two)

These manually reset switches are located just above the burner box. If tripped, a check for adequate combustion air should be made before resetting.

Combustion Air Pressure Switch

The combustion air pressure switch is located on the heating compartment vestibule panel. This switch checks for proper combustion air blower operation before allowing ignition trial. The switch is factory-set and requires no adjustment.

Fan Control

The fan on time of 45 seconds is not adjustable. Fan off time (time that the blower operates after the heat demand has been satisfied) can be adjusted by flipping the dip switches located on the Surelight integrated control. The unit is shipped with a factory fan off setting of 90 seconds. Fan off time will affect comfort and is adjustable to satisfy individual applications. See figure 25.

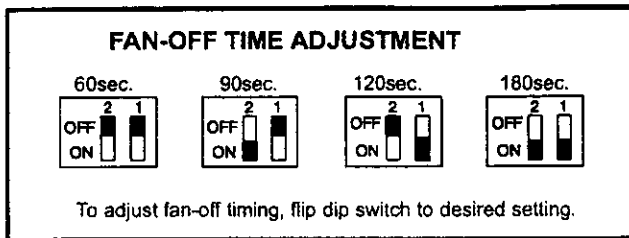


FIGURE 25

Temperature Rise

Check the temperature rise and, if necessary, adjust the blower speed to maintain the temperature rise within the range shown on the unit rating plate.

Thermostat Heat Anticipation

Set the thermostat heat anticipation:

0.50 amps	White Rodgers gas valves
0.70 amps	Honeywell gas valves

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 _____

Blower Speeds

NOTE - CFM readings are taken external to unit with a dry evaporator coil and without accessories.

- 1 - Turn off electrical power to furnace.
- 2 - Remove unit access panel.
- 3 - Disconnect existing speed tap at control board speed terminal.

NOTE - TERMINATION OF ANY UNUSED MOTOR LEADS MUST BE INSULATED.

- 4 - Refer to blower speed selection chart on unit wiring diagram for desired heating or cooling speed.
- 5 - Connect selected speed tap at control board speed terminal.
- 6 - Resecure unit access panel.
- 7 - Turn on electrical power to furnace.

Electronic Ignition

The SureLight™ integrated control has an added feature of an internal watchdog control. The feature serves as an automatic reset device for ignition controls locked-out because the burner has failed to light. This type of nuisance lockout is usually attributed to low gas line pressure. After one hour of continuous thermostat demand for heat, the watchdog will break and remake thermostat demand to the furnace and automatically reset the control to relight the furnace.

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.

Burner Flame Adjustment

The G24M burner flame is not adjustable; however, the flame should be inspected at the beginning of each heating season. If necessary, clean the burners. The burner flame should be blue when burning natural gas, and blue/yellow when burning propane gas. See figure 26.

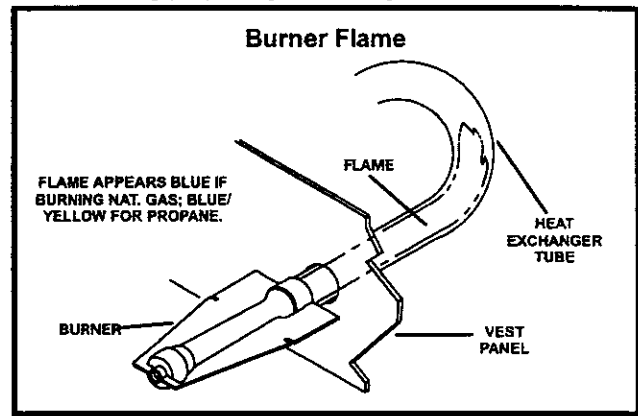


FIGURE 26

Turbulator

G24M(X) series units include a ceramic fiber turbulator in each heat exchanger inlet. The turbulators lower nitrogen oxide emissions. Prior to unit start-up, inspect the turbulators for shipping damage. The turbulators are fragile; they should be removed only if it is necessary to replace them.

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, call the service technician to inspect the unit for blockages.

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, service items A through E as described below:

A - 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 _____

B - Blowers

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

C - Filters

All G24M filters are installed external to the unit. Filters should be inspected monthly. Clean or replace the filters when necessary to ensure proper furnace operation. See table 13 for filter sizes. Replacement filters for G24M-45/60/75 units must have a minimum velocity rating of 400 FPM. Replacement filters for G24M-100/120/140 units require a minimum velocity rating of 625 FPM.

TABLE 13

Model Number	Filter Size - inches (mm)
G24M-45/60/75	16 X 20 X 1 (406 X 508 X 25)
G24M-100/120/140	20 X 20 X 1 (508 X 508 X 25)

⚠ 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.

D - Flue And Chimney

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

E - Burners

Inspect the burners and burner flame at the beginning of each heating season. If necessary, clean the burners as indicated below:

- 1 - Turn off the electrical and gas supply to the furnace.
- 2 - Remove the burner box top.
- 3 - Remove the burner retaining bracket.
- 4 - Remove the burners.

- 5 - Clean the inside of each burner with a bottle brush as shown in figure 27.

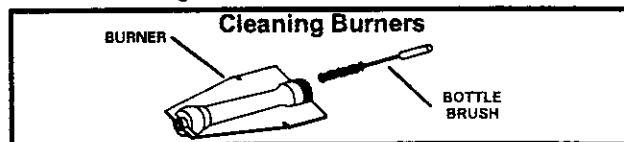


FIGURE 27

- 6 - Replace the burners and the burner retaining bracket. Make sure the burners are properly seated in the slots on the tray. The burner orifice must be aligned with the manifold.
- 7 - Reinstall the burner box top.
- 8 - Restore electrical power and gas supply to the furnace. Follow lighting instructions on the front of the unit. Check the appearance of the burner flame, burner pressure, gas flow, and temperature rise. If necessary, make adjustments. See the other unit adjustments section.

Heat Exchanger

Periodically inspect the heat exchanger tubes and the flue box for corrosion and soot deposits. If necessary, clean as indicated below:

- 1 - Turn off the electrical and gas supply to the furnace.
- 2 - Disconnect the wiring to the combustion air fan.
- 3 - Remove the screws securing the flue box to the furnace. Clean the flue box with a wire brush (brass-bristle brush recommended), and rags or a shop vacuum cleaner.
- 4 - Disconnect the gas supply piping and the ignitor and sensor wires. Remove the burner assembly from the furnace.
- 5 - Since the heat exchanger tubes are crimped in several locations, a thorough cleaning of the entire length of each tube is not possible. However, remove any soot deposits which are accessible with a wire brush (brass-bristle brush recommended), and rags or a shop vacuum cleaner.
- 6 - Reinstall the flue box using a new gasket.
- 7 - Reconnect the combustion air fan wiring.
- 8 - Reinstall the burner box, ignitor and sensor wires and the gas supply piping.
- 9 - Carefully check all piping connections (factory and field) for gas leaks. Use a leak detecting solution or other preferred means.

⚠ IMPORTANT

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.

- 10 - Restore electrical power and gas supply. Follow lighting instructions on front of unit. Check burner flame and adjust if necessary.

Repair Parts List

The following repair parts are available through independent Lennox dealers. When ordering parts, include the complete furnace model number listed on the A.G.A. or C.G.A. rating plate — Example: G24M3-75. Refer to page 3 for parts identification.

CABINET PARTS

Front access panel
Blower access panel
Cabinet cap
Cabinet bottom
Vent adapter

ELECTRICAL PARTS

Transformer
Control board (Hot Surface Ignition)
Door interlock switch

BLOWER PARTS

Blower wheel
Motor
Blower housing cut-off plate
Motor capacitor

HEATING PARTS

Heat exchanger
Main burners
Main burner orifices
Gas manifold/Burner box assembly
Gas valve

NOx turbulator (60 Hz. X units only)

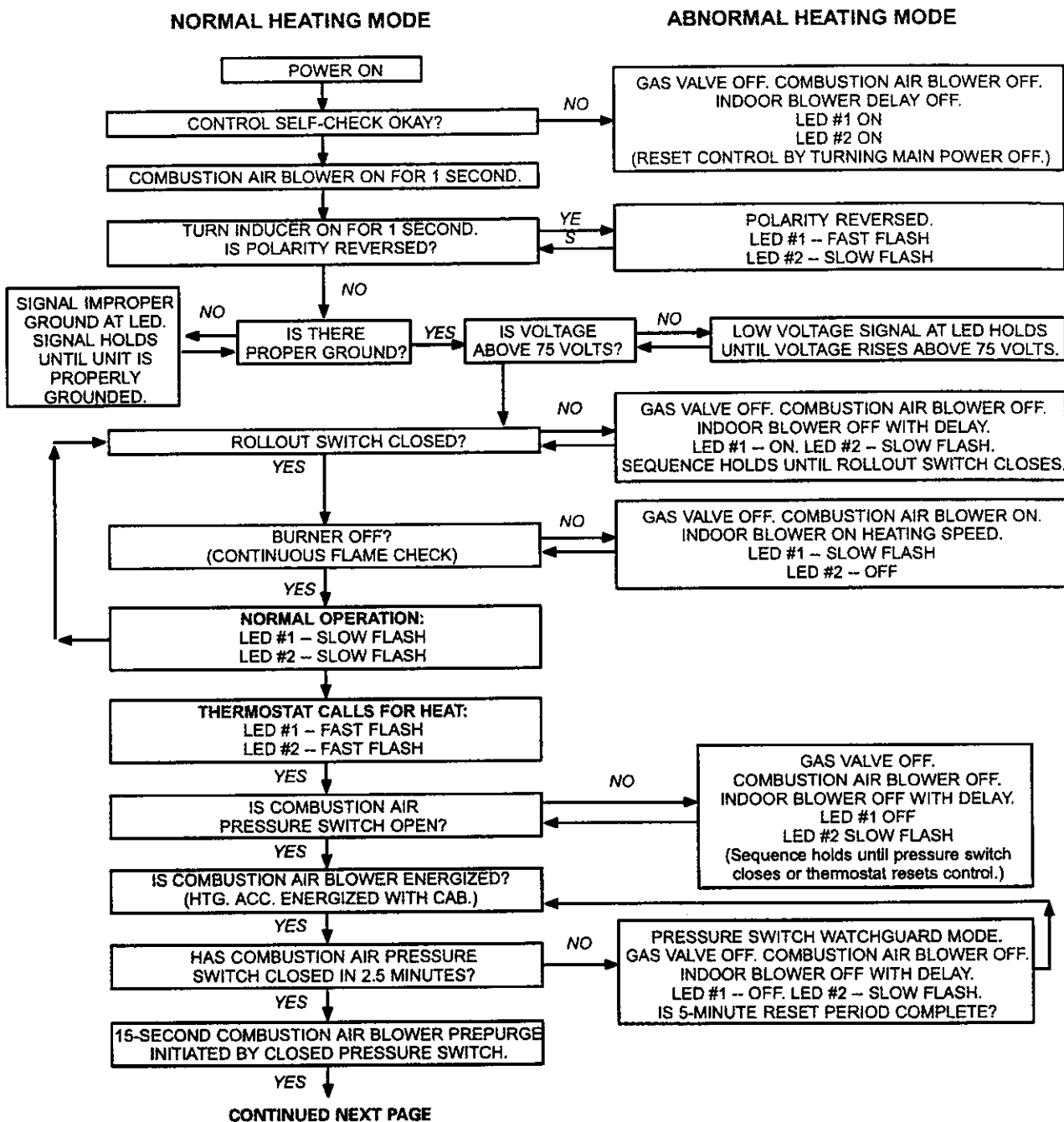
Hot Surface Ignitor
Flame rollout switch (two)
Flame sensor
Primary limit
Secondary limit (two)
Pressure switch
Wire harness plug / cap
Flue box
Combustion air blower
Gaskets
Low gas pressure switch (propane only)

Ignition Control Board Diagnostic Codes

DIAGNOSTIC CODES		
LED #1	LED #2	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.
OFF	SLOW FLASH	Pressure switch open or has opened 5 times during a single call for heat; OR: Blocked inlet/exhaust vent; OR: Condensate line blocked; OR: Pressure switch closed prior to activation of combustion air blower.
ALTERNATING SLOW FLASH	ALTERNATING SLOW FLASH	Watchguard -- burners failed to ignite.
SLOW FLASH	OFF	Flame sensed without gas valve energized.
ON	SLOW FLASH	Rollout switch open. OR: 9-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 .7 microAmps. Replace flame sense rod.
ALTERNATING FAST FLASH	ALTERNATING FAST FLASH	Improper main ground or line voltage below 75 volts; OR: Broken ignitor; OR: Open ignitor circuit.

NOTE - Slow flash equals 1 Hz (one flash per second). Fast flash equals 3 Hz (three flashes per second).
Minimum flame sense current = 0.15 microAmps.

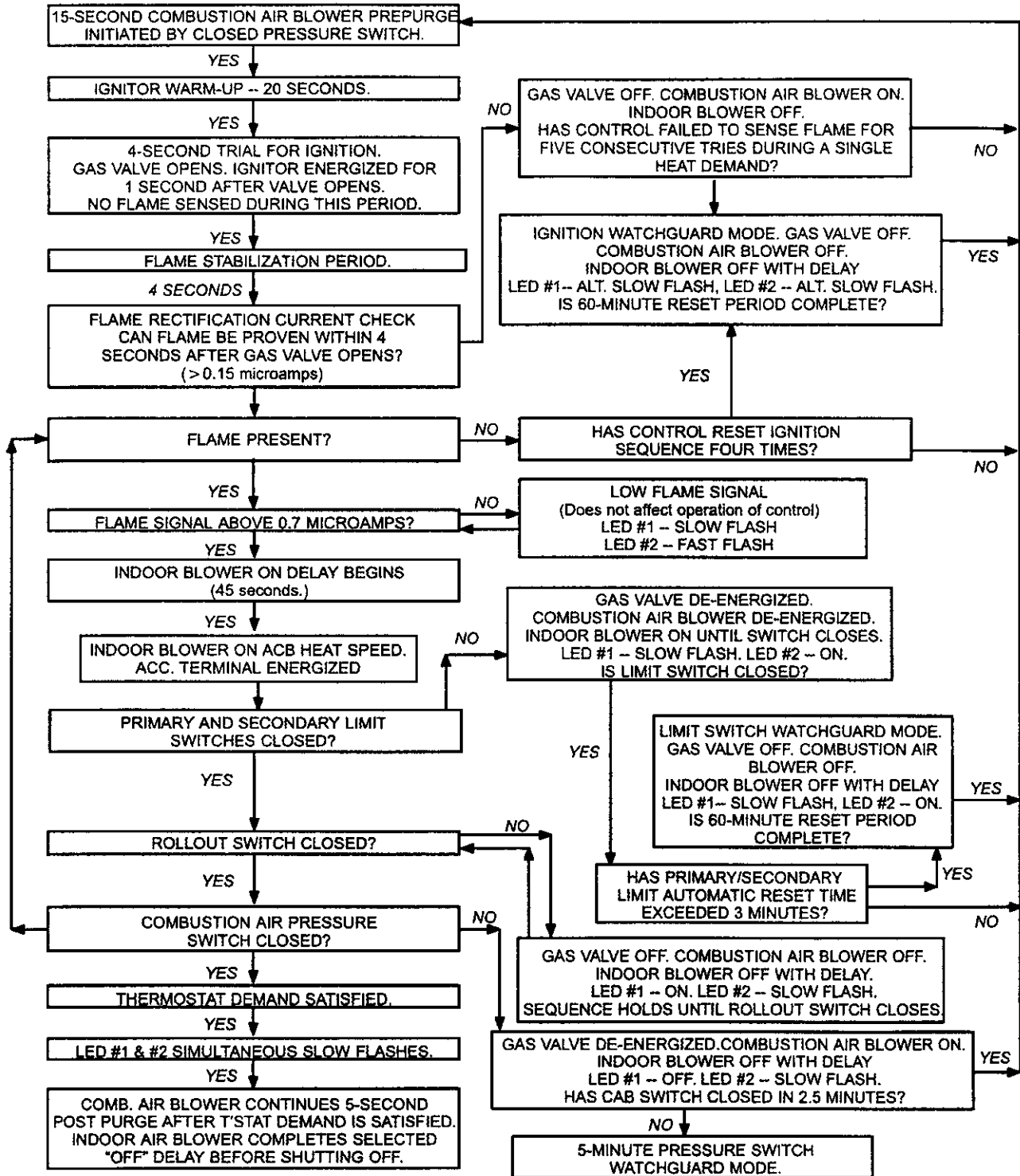
HEATING SEQUENCE OF OPERATION



HEATING SEQUENCE CONTINUED

NORMAL HEATING MODE

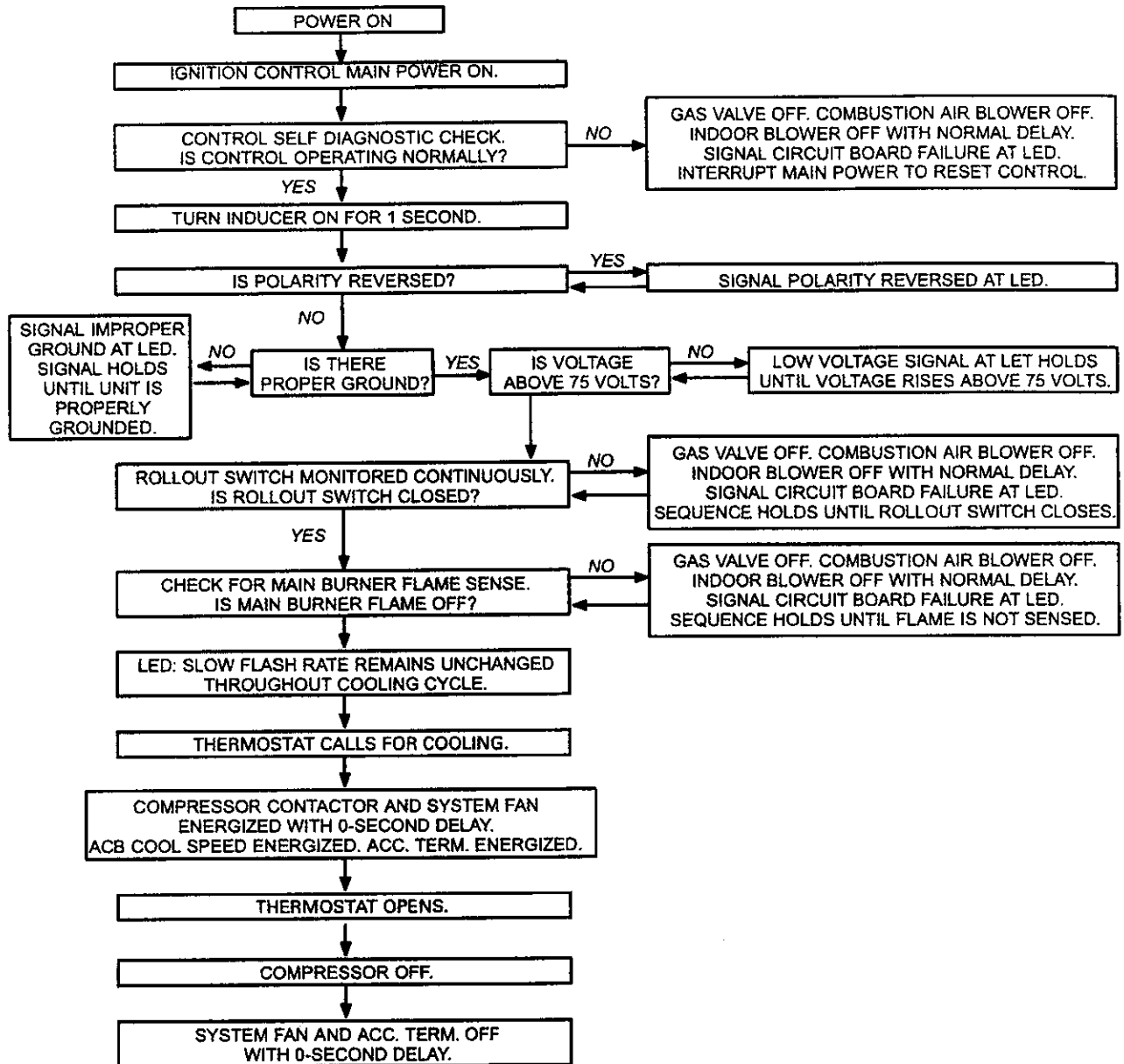
ABNORMAL HEATING MODE



COOLING SEQUENCE OF OPERATION

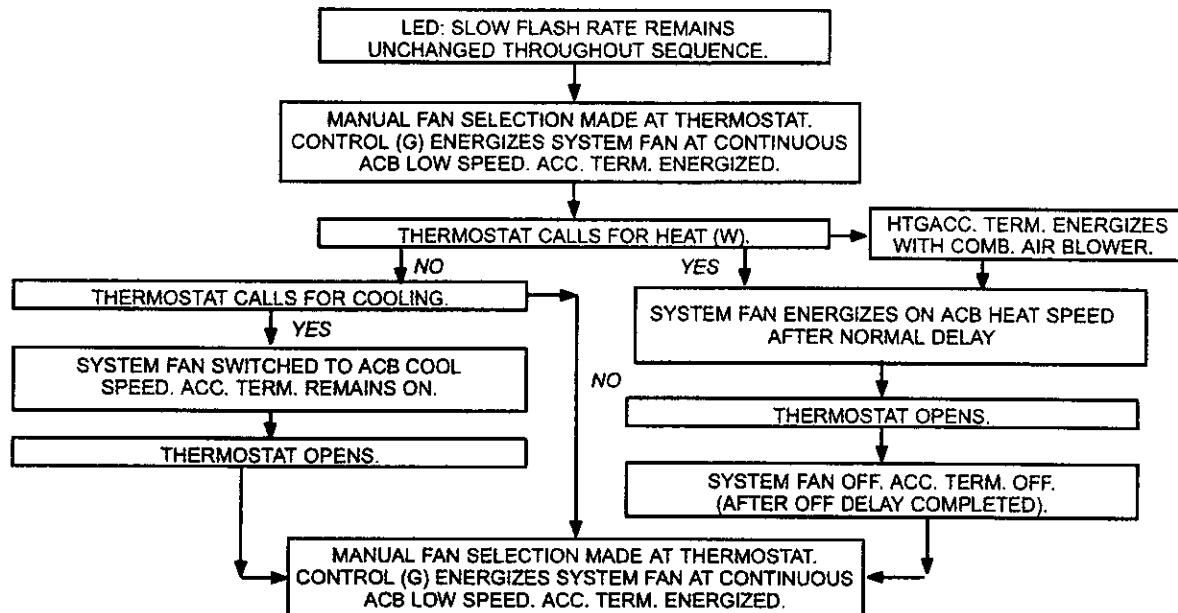
NORMAL COOLING MODE

ABNORMAL COOLING MODE



Troubleshooting

CONTINUOUS LOW SPEED FAN SEQUENCE OF OPERATION



G24M Start-up and Performance Check List

START-UP AND PERFORMANCE CHECK LIST

Job Name _____ Job Number _____ Date _____
 Job Location _____ City _____ State/Province _____ Installer _____
 City _____ State/Province _____
 Unit Model Number _____ Serial Number _____ Service Technician _____

HEATING SECTION

Electrical Connections Tight? ☐ Supply Voltage _____
 Blower Motor Amps _____ Blower Motor Horsepower/kw _____
 Gas Piping Connections Tight & Leaks Tested? ☐
 Fuel Type: Natural Gas? ☐ LP/Propane Gas? ☐
 Furnace Btu (kW) Input _____ Line Pressure _____
 Regulator Pressure w.c./Pa -- Nat. _____ w.c./Pa -- LP/Propane _____
 Connections Tight? ☐ Proper Draft? ☐
 Fan Control Setting (45 Seconds Fixed On) _____ Fan Control Off Setting _____
 Temperature Rise _____ Filter Clean & Secure? ☐ Vent Clear? ☐

THERMOSTAT

Calibrated? ☐ Heat Anticipator Properly Set? ☐ Level? ☐