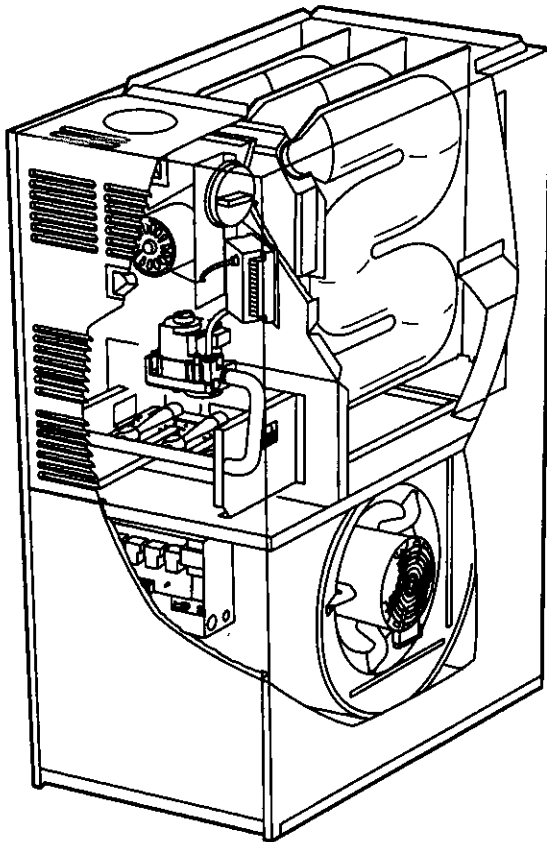


INSTALLATION INSTRUCTIONS

G23 SERIES UNITS



GAS UNITS
 503,035M
 12/93
 Supersedes 502,905M

Technical
 Literature
 Litho U.S.A.

TABLE OF CONTENTS

UNIT DIMENSIONS	2
PARTS ARRANGEMENT	3
REQUIREMENTS	4
GENERAL	5
COMBUSTION, DILUTION AND VENTILATION AIR	5
INSTALLATION—Setting Equipment	7
RETURN AIR OPENING GUIDELINES	7
FILTER ASSEMBLY AND FILTERS	8
DUCT SYSTEM	8
VENTING	9
GAS PIPING	12
ELECTRICAL	13
START-UP AND ADJUSTMENTS	17
SERVICE	19
REPAIR PARTS	21
BCC2 TROUBLESHOOTING	22
START-UP AND PERFORMANCE CHECK LIST	23

**RETAIN THESE INSTRUCTIONS
 FOR FUTURE REFERENCE**



⚠ WARNING

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



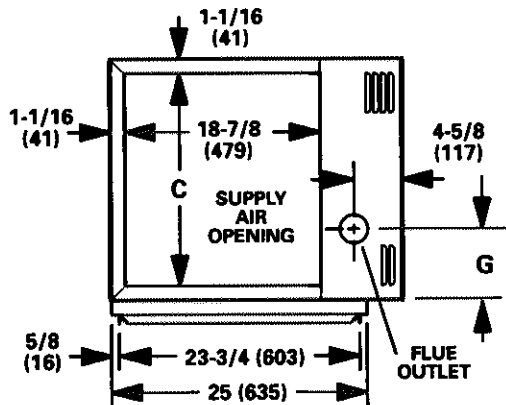
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

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

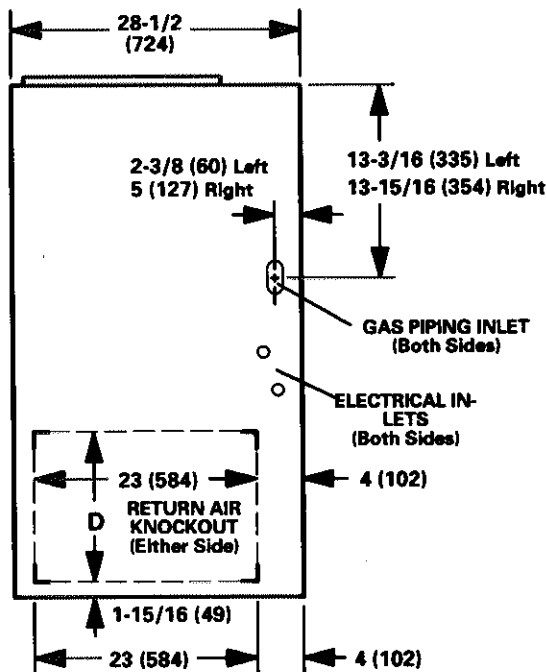
WHAT TO DO IF YOU SMELL GAS:

- 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.

G23 UNIT DIMENSIONS—INCHES (MM)

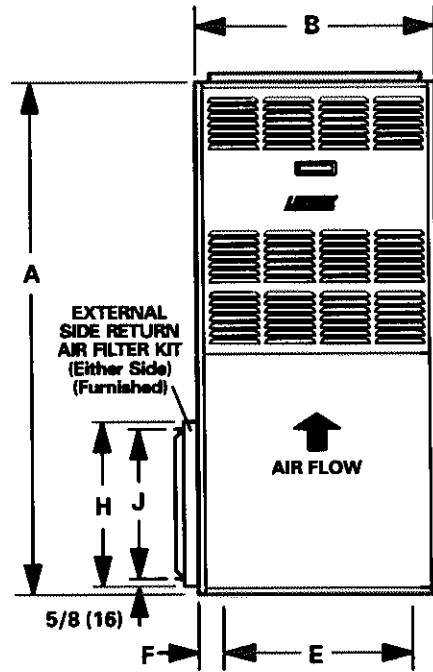


TOP VIEW



Return Air Knockout (Bottom)

SIDE VIEW



Bottom Return Air Knockout

FRONT VIEW

Model No.		A	B	C	D	E	F	G	H	J
G23Q2-50 G23Q3-50 G23Q2/3-75	in.	40	16-1/4	14-1/8	12	12	2-1/8	5	14	12-3/4
	mm	1016	413	359	305	305	54	127	356	324
G23Q3-100	in.	40	21-1/4	19-1/8	14	14	3-5/8	7-1/2	16	14-3/4
	mm	1016	540	486	356	356	92	191	406	375
G23Q4/5-75 G23Q3/4-100 G23Q4/5-100 G23Q3/4-125	in.	46	21-1/4	19-1/8	18	18	1-5/8	7-1/2	20	18-3/4
	mm	1168	540	486	457	457	41	191	508	476
G23Q5/6-125 G23Q5/6-150	in.	46	26-1/4	24-1/8	18	18	4-1/8	10	20	18-3/4
	mm	1168	667	613	457	457	105	254	508	476

G23 UNIT WITH PANELS REMOVED

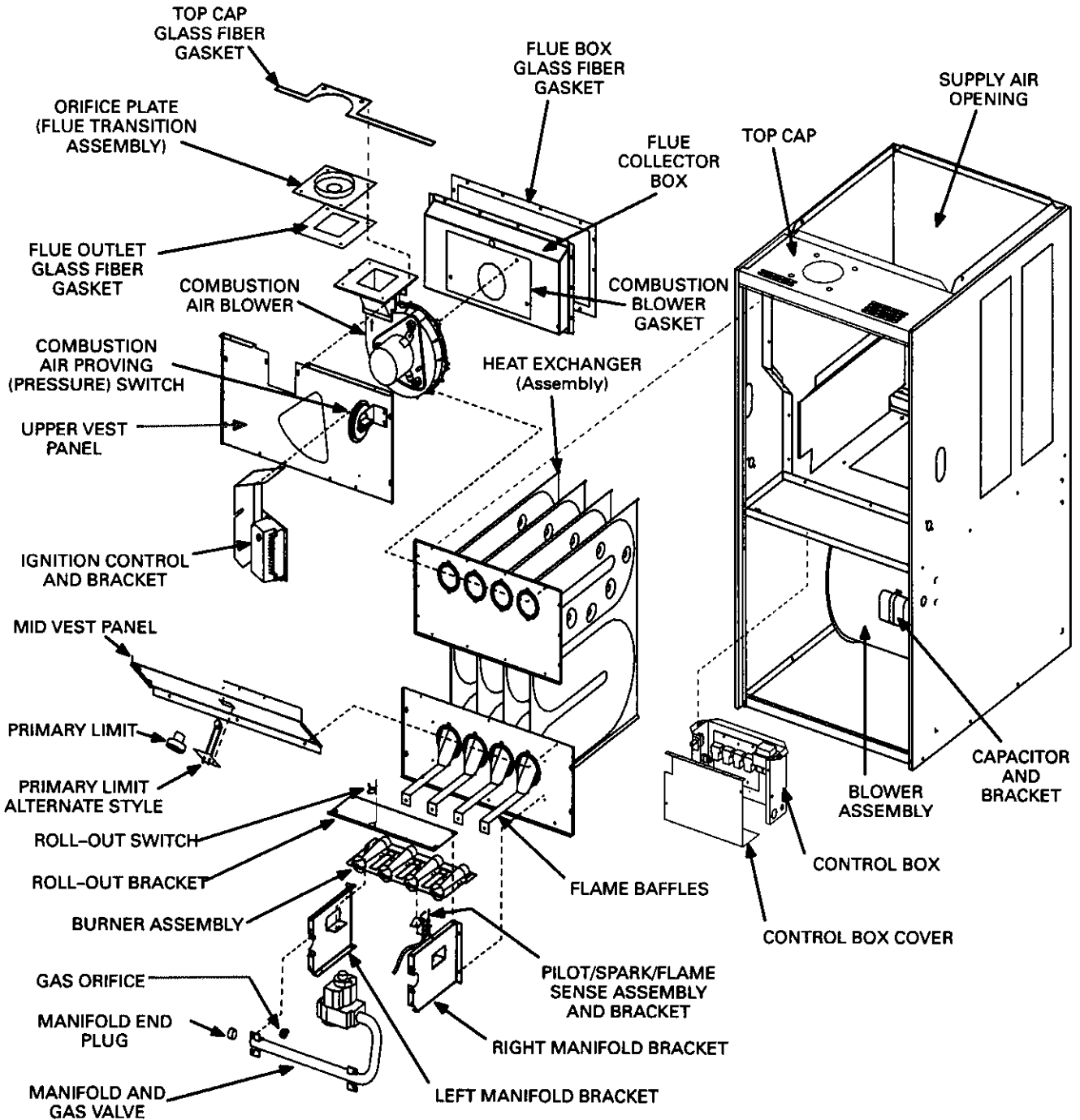


FIGURE 1

REQUIREMENTS

Installation of Lennox gas central furnaces must conform with local building codes or, in the absence of local codes, with the current National Fuel Gas Code (ANSI-Z223.1). The National Fuel Gas Code is available from:

American National Standards Institute, Inc.
1430 Broadway
New York, NY 10018

All G23 units are A.G.A. (American Gas Association) and C.G.A. (Canadian Gas Association) certified.

Air supply for combustion and ventilation must conform to the methods outlined in the current National Fuel Gas Code.

⚠ 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

The furnace is certified for installation clearances to combustible material as listed on the appliance rating plate and in table 1 for installations in an alcove or closet:

TABLE 1

Clearances	Location	Inches (mm)
Service access	Front	36 in. (914mm)
	Side and rear	0 in. (0mm)
To combustible materials	Top	1 in. (25mm)
	Flue	6 in. (152mm)*
	Floor	0 in. (0mm)**
	Front	3 in. (76mm)

NOTE—Service access clearance must be maintained.

** 1" (25mm) for type "B1" Vent Pipe.*

***For installation on combustible floors, appliance shall not be installed directly on carpeting, tile, or other combustible material other than wood flooring.*

Accessibility and service clearances must take precedence over fire protection clearances.

Vent installations shall be in accordance with the GAMA venting tables booklet supplied with this unit and applicable provisions of local building codes.

For installation in a residential garage, unit must be installed so that burners and ignition source are located no less than 18 in. (457 mm) above floor. Furnace must be located or protected to avoid physical damage by vehicles.

Unit must be adjusted to obtain a temperature rise within the range specified on appliance rating plate. G23 units must be installed so that electrical components are protected from water.

When furnace is used in conjunction with cooling units, it shall be installed in parallel with, or on the upstream side of, cooling units to avoid condensation in the heating element. With a parallel flow arrangement, a damper (or other means to control the flow of air) shall be adequate to prevent chilled air from entering the furnace and, if manually operated, must be equipped with means to prevent operation of either unit, unless damper is in the full "heat" or "cool" position.

When installed, furnace must be electrically grounded in accordance with local codes or, in the absence of local codes, with the current National Electric Code, ANSI/NFPA No. 70. The National Electric Code (ANSI/NFPA No. 70) is available from:

National Fire Protection Association
470 Atlantic Avenue
Boston, MA 02210

Field wiring connection with unit must meet or exceed specifications of type T wire and withstand a 63°F (17°C) temperature rise.

This furnace is designed for a minimum continuous return air temperature of 60°F db or an intermittent operation down to 55°F db for cases where a thermostat night setback is used. Return air temperature must not exceed a maximum of 85°F db.

Installation of C.G.A. certified units must conform with current Standard 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," and other applicable local codes. Authorities having jurisdiction should be consulted before installation. Adequate clearance shall be made around air openings into the vestibule area. Provisions shall be made for proper operation and for combustion air and ventilation air supply according to the current CAN/CGA-B149 standards.

All electrical wiring and grounding for the unit must be in accordance with the current regulations of the Canadian Electrical Code Part I (C.S.A. Standard C22.1) and/or local codes.

NOTE—G23 series units must not be used as a "construction heater" at any time during any phase of construction. Very low return air temperatures, harmful vapors and misplacement of the filters will damage the unit and its efficiency.

GENERAL

These instructions are intended as a general guide and do not supersede local codes in any way. Authorities having jurisdiction should be consulted before installation.

A—Shipping and Packing List

- 1— Assembled G23 furnace
- 1— Filter rack assembly with filter, filter door and screws
- 1— Bag assembly containing
 - 1—Electrical make-up box
 - 3—Wire nuts
 - 1—Green ground wire
 - 1—Brown accessory wire
 - 2—Filter door pins
 - 1—Wiring harness
 - 1—Snap bushing
 - 2—Filter clips

B—Shipping Damage

Check unit for shipping damage. Receiving party should contact last carrier immediately if any shipping damage is found.

COMBUSTION, DILUTION & VENTILATION AIR

Until recently, there was no problem in bringing in sufficient amounts of outdoor air for combustion — infiltration provided all the air that was needed and then some. In today's homes built with energy conservation in mind, tight construction practices make it necessary to bring in air from outside for combustion. Consideration must also be given to the use of exhaust fans, appliance vents, chimneys and fireplaces because they force additional air that could be used for combustion out of the house. Unless outside air is brought into the home for combustion, negative pressure (pressure outside is greater than inside pressure) will build to the point that a down draft can occur in the furnace vent pipe or chimney. Combustion gases can enter the living space creating a potentially dangerous situation.

In the absence of local codes concerning air for combustion and ventilation, this section outlines guidelines and recommends procedures for installing G23 furnaces in a manner that ensures efficient and safe operation. Special consideration must be given to combustion air needs as well as 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.

Combustion Air Requirements

⚠ 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.

All gas-fired appliances require air to be used for the combustion process. If sufficient amounts of combustion air are not available, the furnace or other appliance will operate in an inefficient and unsafe manner. Enough air must be provided to meet the needs of all fuel-burning appliances, as well as appliances such as exhaust fans which force air out of the home. 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 down-draft situation. Insufficient amounts of air also cause incomplete combustion which can result in carbon monoxide. The requirements for providing air for combustion and ventilation depend largely on whether the furnace is installed in an unconfined or 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 per 1,000 Btu 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 outlined for using air from the outside for combustion and ventilation.

Confined Space

A confined space is an area with volume less than 50 cubic feet per 1,000 Btu 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.

Air from Inside

If the confined space housing the furnace adjoins 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 per 1,000 Btu per hour of the total input rating of all gas-fired equipment in the confined space. Each opening must be at least 100 square inches. One opening shall be within 12 inches of the top of the enclosure and one opening within 12 inches of the bottom (See figure 2).

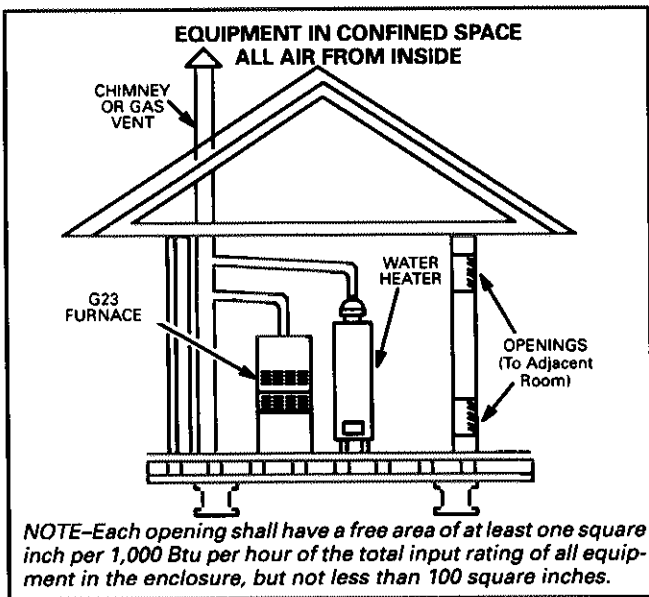


FIGURE 2

Air from Outside

If air from outside is brought in for combustion and ventilation, the confined space shall be provided with two permanent openings. One opening shall be within 12 inches of the top of the enclosure and one within 12 inches 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 per 4,000 Btu 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 per 2,000 Btu per total input rating of all equipment in the enclosure (See figure 5).

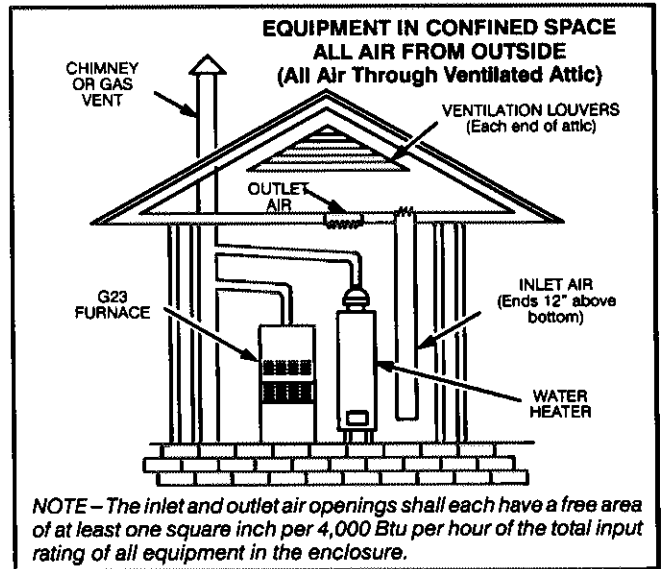


FIGURE 4

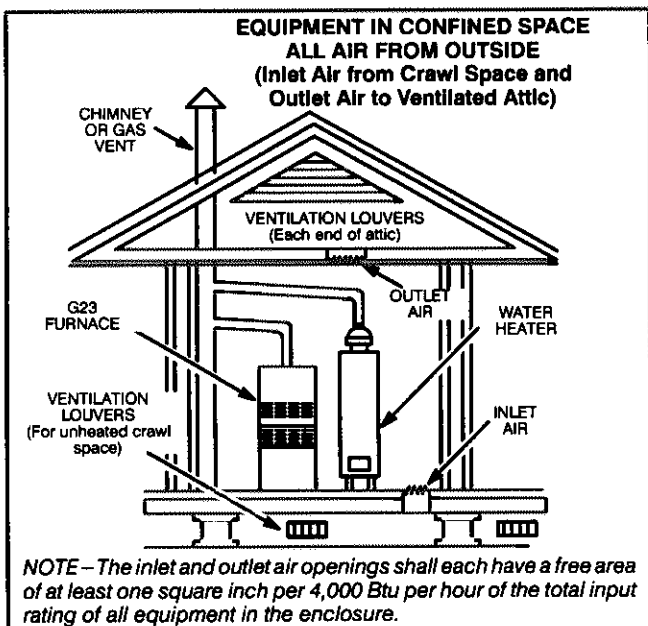


FIGURE 3

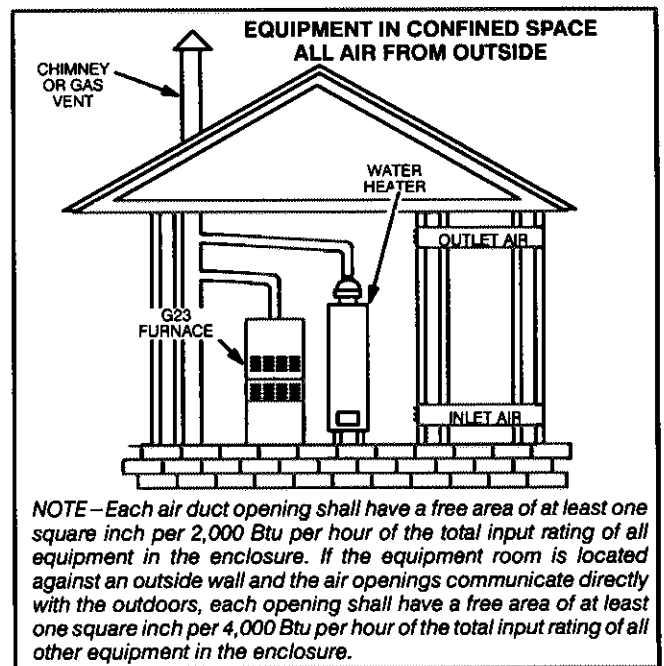


FIGURE 5

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. 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.

INSTALLATION—Setting Equipment

Set unit in desired location allowing for clearances listed on appliance rating plate. Also allow for gas supply connection, electrical supply, vent connections and installation and service clearances. The furnace must be level.

After unit has been positioned, remove and discard the bolt and washer securing the shipping bracket on the combustion air blower motor to the aluminum housing. See figure 6.

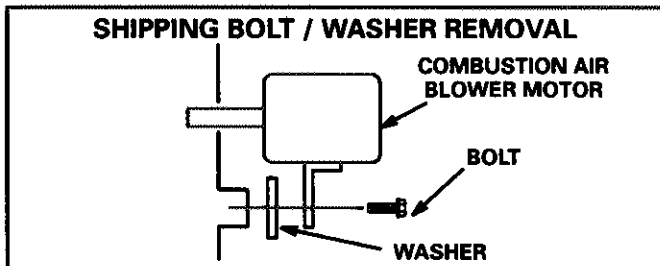


FIGURE 6

RETURN AIR OPENING GUIDELINES

! WARNING

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

In platform installations with furnace return, 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.

For no reason should return and supply air duct systems ever 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

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

Return air can be brought in either side or at the bottom of the unit. Scribe lines show the outline of each side and the bottom return air opening.

Bottom Return Air Applications

If cold air return is to terminate through the floor under the furnace, a direct, airtight and sealed connection must be made to the bottom of the furnace.

- 1- Cut opening in floor or platform. Using knockouts provided, cut bottom of base panel. See figure 7.

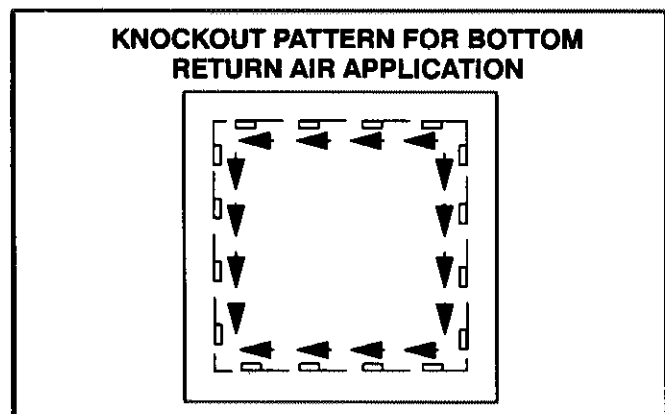


FIGURE 7

- 2- Bend a flange on return air plenum and lower into floor or platform opening. See figure 8.
- 3- Position unit over return air opening. Seal unit airtight with return air plenum.

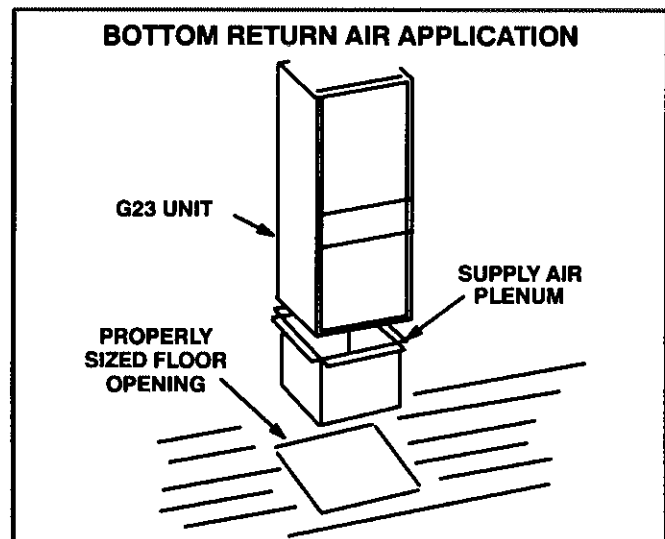


FIGURE 8

Side Return Air Applications

For installations where the return air is taken from a return air drop, unit may be installed using either the left or right side of furnace.

For side return air applications, cut furnace cabinet at maximum dimensions given on page 2. Embossed corners are provided on both cabinet sides for return air opening location.

FILTER ASSEMBLY AND FILTERS

G23 series units are equipped with a reusable foam filter. The filter must be in place anytime the unit is in operation.

Bottom Return Air Applications

- 1- Remove blower access panel.
- 2- Install filter clips, provided with unit, by slipping folded section of clip on edge of bottom opening. See figure 9.
- 3- Place filter in bottom of blower compartment beneath rear filter clip. Press down on filter sides. Filter clips flex allowing filter to snap into place.
- 4- To remove filter, press clip and pull filter up and out.

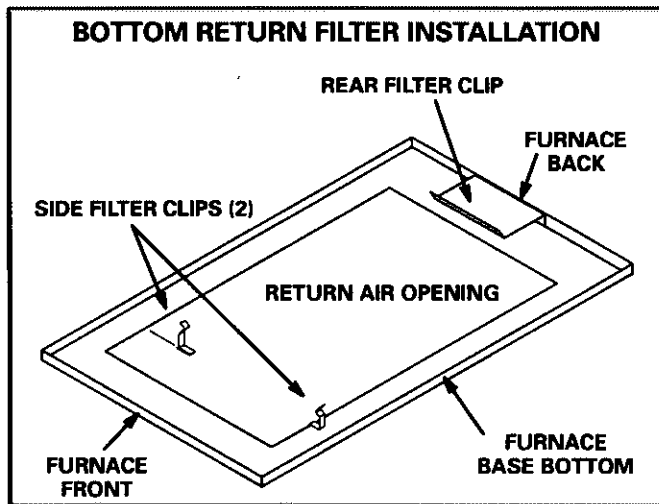


FIGURE 9

Side Return Air Applications

An external filter rack is shipped (in blower compartment) and requires field installation.

- 1- Align filter rack opening with the inside edge of the side return opening. Bottom of rack should be approximately 1" (25.4mm) from the bottom and 3" (76mm) from the front of the unit.
- 2- Screw filter rack into place with the six self drill, self tap screws provided. See figure 10.
- 3- Push filter door pins through the two holes in filter door from the inside of the u-channel. See figure 11.
- 4- Position filter door on end of filter so that the thumb tab side of the filter door is away from the furnace. Squeeze thumb tabs to secure filter to door.

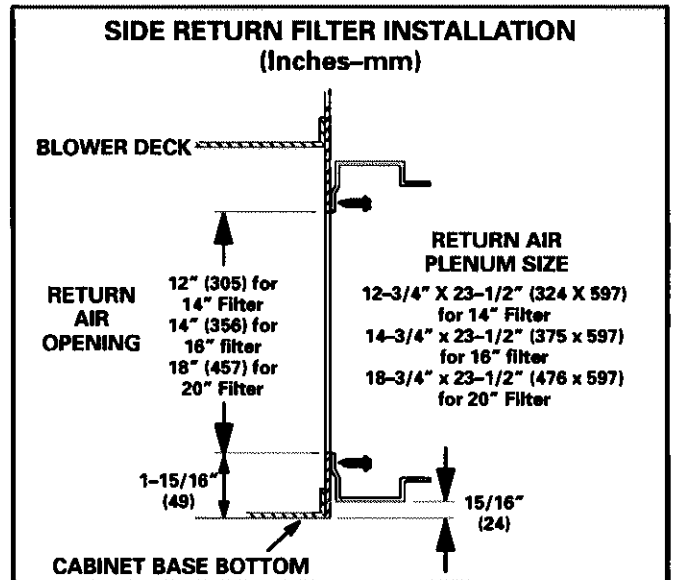


FIGURE 10

- 5- Guide filter and filter door into the filter rack installed on side of furnace. Push door into filter rack until secure.
- 6- To remove filter, pull filter door pins until door is released from filter rack.

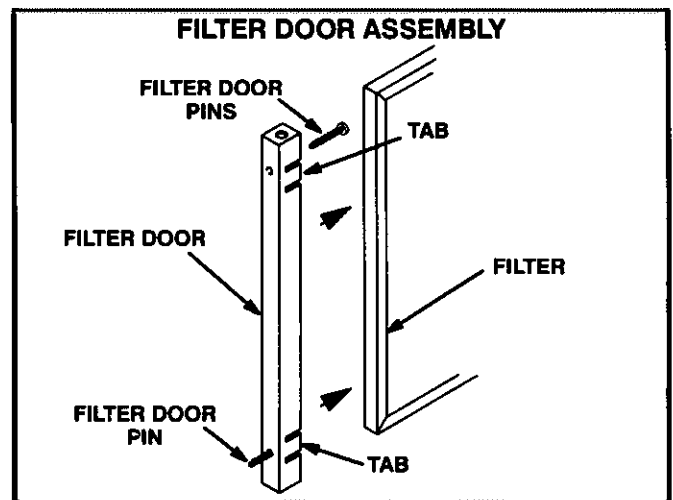


FIGURE 11

DUCT SYSTEM

Size and install supply and return air duct system using industry-approved standards that result in a quiet and low-static system with uniform air distribution. Refer to ACCA (Air Conditioning Contractors of America) Manual N.

Supply Air Duct System

C.G.A. certified units require a removable access panel in the supply air duct. The access panel should be large enough to permit inspection of heat exchanger for leaks after installation (either by smoke or reflected light). The access panel must not allow leaks in the supply air duct system.

Return Air Duct System

NOTE—For bottom return air, return air duct should be secured to the unit using rivets or S-locks. For side return air, secure return air duct to filter rack using screws. When using screws, take care to avoid interference with the filter which may cause improper filtration.

VENTING

G23 series furnaces must be vented in compliance with all local codes, the GAMA venting tables booklet included with this unit for applications in the U.S.A., the current standards of CAN/CGA-B149.1 and -B149.2 in Canada, and these instructions.

The G23 series units have been classified as fan assisted Category I type furnaces when vertically vented in accordance with the latest edition of ANSI Z21.47 Central Furnace Standard in the U.S.A. and the current standards of CAN/CGA-B149.1 and B149.2 of the National Gas and Propane Installation Code in Canada. The GAMA venting booklet, provided with this furnace, contains new venting tables that are designed specifically for vent installations of Category I fan assisted furnaces. Refer to the tables and the venting information contained in these instructions for proper sizing and installation of the venting system. A vent system sized according to the venting tables in the current National Fuel Gas Code (NFGC), ANSI Z223.1 (latest edition), may be oversized. Use of the new GAMA venting tables will prevent improper sizing and should reduce the potential for condensate formation.

The G23 series units have the following flue collar sizes: -50 unit, 3" diameter; -75 and -100 units, 4" diameter; and -125 & -150 units, 5" diameter. Use this information in conjunction with the GAMA venting

tables in the U.S.A., and the appropriate venting tables in the standards of CAN/CGA-B149.1 and B149.2 of the National Gas and Propane Installation Code in Canada, to properly size the vent or vent connector that attaches to the furnace flue collar.

Venting Using a Masonry Chimney

The following additional requirements apply when a lined masonry chimney is being used to vent an G23 furnace:

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.

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.

A fan assisted furnace may be commonly vented into an existing masonry chimney provided:

- 1- The chimney is currently serving at least one drafthood equipped appliance.
- 2- The vent connectors and chimney are sized in accordance with the enclosed GAMA venting tables in the U.S.A., and the appropriate venting tables in the standards of CAN/CGA-B149.1 and B149.2 of the National Gas and Propane Installation Code in Canada.

SINGLE APPLIANCE VENTING OF A FAN ASSISTED FURNACE INTO A TILE LINED MASONRY CHIMNEY IS PROHIBITED. THE CHIMNEY MUST FIRST BE LINED WITH EITHER TYPE B VENT OR A LISTED, SINGLE WALL, METAL LINING SYSTEM, SIZED IN ACCORDANCE WITH THE ENCLOSED GAMA VENTING TABLES.

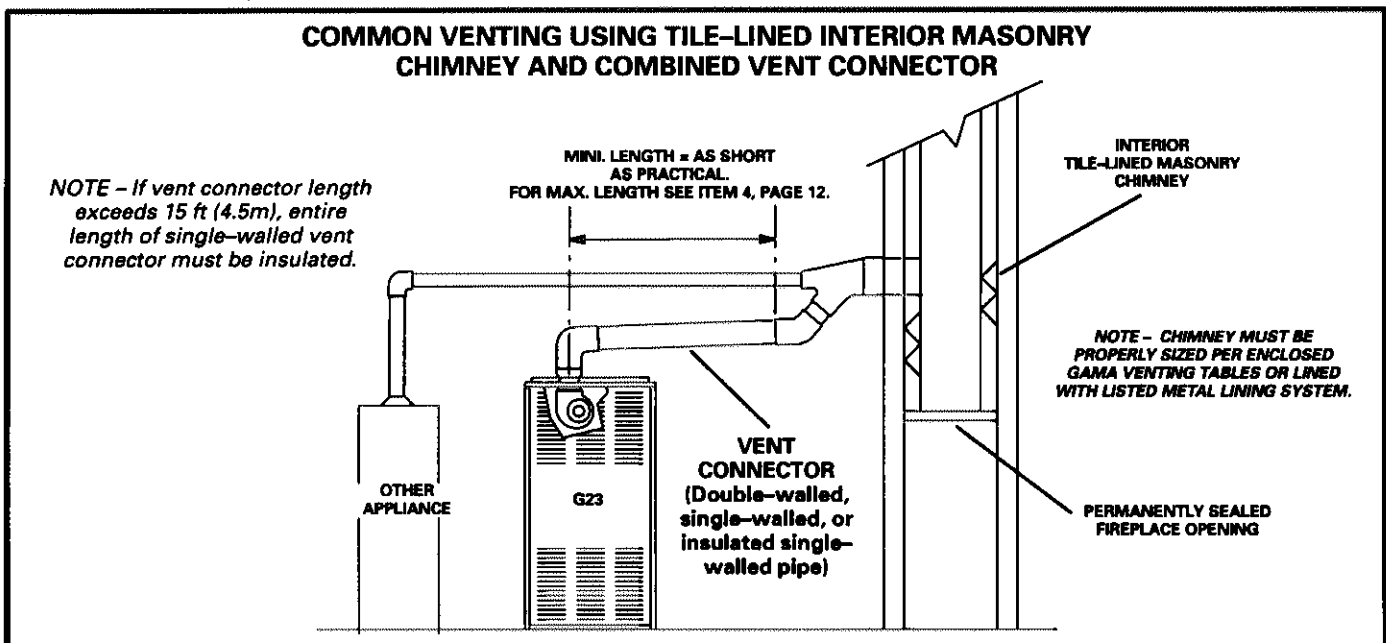


FIGURE 12

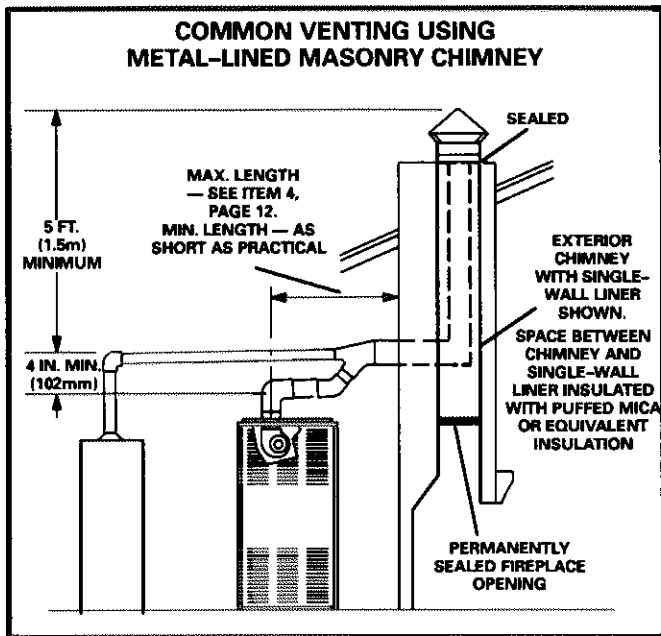


FIGURE 13

A Type B vent or masonry chimney liner shall terminate above the roof surface with a listed cap or a listed roof assembly in accordance with 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 B double-wall vent is used inside a chimney, no other appliance can be vented into the chimney. Outer wall of type B vent pipe must not be exposed to flue products.

Insulate space between exterior masonry chimney and single-wall flue pipe. See figure 13.

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 G23 series units. The chimney passageway must be checked periodically to ensure that it is clear and free of obstructions.

See figures 12 and 13 for common venting.

General Venting Requirements

All G23 furnaces must be vented in accordance with the methods outlined in these instructions.

1- Vent diameter recommendations and maximum runs allowed are found in the GAMA venting tables in the U.S.A., and the appropriate venting tables in the standards of CAN/CGA-B149.1 and B149.2 of the National Gas and Propane Installation Code in Canada.

- 2- In no case should the vent or vent connector diameter be less than the diameter specified in the GAMA venting tables in the U.S.A., and the appropriate venting tables in the standards of CAN/CGA-B149.1 and B149.2 of the National Gas and Propane Installation Code in Canada.
- 3- The vent pipe should be as short as possible with the least number of elbows and angles to do the job.
- 4- A vent connector shall be supported without any dips or sags and shall slope a minimum of 1/4" per linear foot of connector, back towards the appliance.
- 5- Vent connectors shall be firmly attached to furnace flue collars by sheet metal screws or other approved means, except vent connectors of listed Type B vent material which shall be assembled in accordance with the manufacturer's instructions. Joints between sections of single wall connector piping shall be fastened by sheet metal screws or other approved means.
- 6- When the vent connector used for Category I appliances must be located in or pass through a crawl space or other areas which may be cold, that portion of the vent connector shall be listed double-wall Type B vent material or material having equivalent insulation qualities.
- 7- The entire length of single wall metal vent connector shall be readily accessible for inspection, cleaning, and replacement.
- 8- 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).
- 9- No portion of the venting system can extend into, or pass through any circulation air duct or plenum.
- 10- Vent connectors serving Category I appliances shall not be connected to any portion of mechanical draft systems operation under positive pressure such as Category III or IV venting systems.
- 11- A manual damper, barometric draft regulator or flue restrictor must not be installed between furnace and any chimney.
- 12- 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 conform to these instructions and the GAMA venting tables in the U.S.A., and the appropriate venting tables in the standards

of CAN/CGA-B149.1 and B149.2 of the National Gas and Propane Installation Code in Canada. If the existing system is in conflict with these requirements, the venting system must be resized.

Removal of Unit from Common Venting System

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 is 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 outlined in the previous section.

- 1- Seal any unused openings in the common venting system.
- 2- Visually inspect the venting system for proper size and horizontal pitch and determine there is no blockage or restriction, leakage, corrosion and other deficiencies which could cause an unsafe condition.
- 3- Insofar as 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- Following the lighting instruction, place the appliance being inspected in operation. Adjust thermostat so appliance will operate continuously.

- 5- Test for spillage 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.
- 6- After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas burning appliance to their previous condition of use.
- 7- If improper venting is observed during any of the above tests, the common venting system must be corrected.

Horizontal Venting

G23 series unit are **NOT** certified for horizontal venting in Canada. In the U.S.A. the -50, -75, -100 and -125 G23 series units may also be vented as Category III appliances in accordance with the latest edition of ANSI A21.47 Central Furnace Standard. Pressure tight venting materials are required for all horizontal venting applications. Each unit also requires a field installed adapter kit in order to accommodate horizontal venting. The specific installation instructions are contained in each adapter kit. Refer to table 2 for maximum vent lengths and number of 90° elbows applicable to each G23 furnace. Do not exceed these limits when installing any size G23 with a horizontal vent.

**TABLE 2
HORIZONTAL VENT ADAPTER KITS**

FURNACE MODEL INPUTS	HORIZ. VENT DIAMETER	MAX. LENGTH OF VENT	MAX. # OF 90° ELBOWS	ADAPTER KIT PART NUMBER
-50	3"	45FT.	5*	LB-65686A
-75	3"	25FT.	5*	LB-65686A
	4"	45FT.	5*	LB-65686D
-100	3"	20FT.	2*	LB-65686B
	4"	45FT.	5*	LB-65686D
-125	4"	25FT.	5*	LB-65686C

*Number includes one metal elbow provided in horizontal vent kit.

GAS PIPING

Gas Supply

- 1- This unit is shipped standard for left side installation of gas piping. Simply connect gas supply to piping assembly.
- 2- A piping hole is also fabricated in the right side of the unit for alternate piping arrangements.
- 3- When connecting gas supply, factors such as length of run, number of fittings and furnace rating must be considered to avoid excessive pressure drop. Table 3 lists recommended pipe sizes for typical applications.
- 4- Gas piping must not run in or through air ducts, clothes chutes, chimneys or gas vents, dumb waiters or elevator shafts.
- 5- Piping should be sloped 1/4 inch per 15 feet upward toward the gas meter from the furnace. The piping must be supported at proper intervals (every 8 to 10 feet) using suitable hangers or straps. A drip leg should be installed in vertical pipe runs to the unit.
- 6- In some localities, codes may require installation of a manual main shut-off valve and union (furnished by 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—In case of an 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.

NOTE—Installer must provide a 1/8" N.P.T. plugged tap in the field piping upstream of the gas supply connection to the unit. Tap must be accessible for test gauge connection. See figure 14.

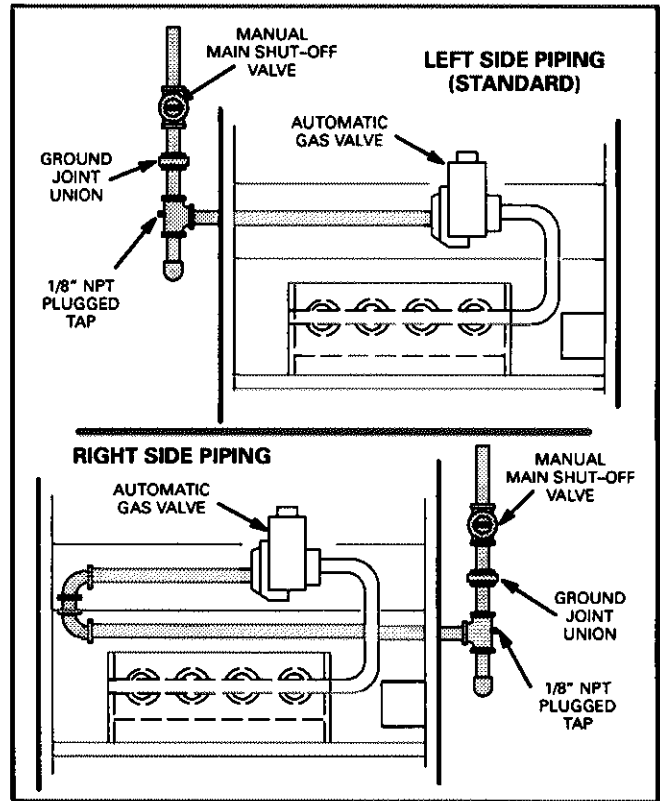


FIGURE 14

High Altitude Operation

G23Q series units are **NOT** C.G.A. certified for operation at an altitude over 2,000 ft. (610 m).

Leak Check

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

**TABLE 3
GAS PIPE CAPACITY (FT³/HR)**

Nominal Iron Pipe Size (Inches)	Internal Diameter (Inches)	Length of Pipe (Feet)									
		10	20	30	40	50	60	70	80	90	100
1/4	.364	43	29	24	20	18	16	15	14	13	12
3/8	.493	95	65	52	45	40	36	33	31	29	27
1/2	.622	175	120	97	82	73	66	61	57	53	50
3/4	.824	360	250	200	170	151	138	125	118	110	103
1	1.049	680	465	375	320	285	260	240	220	205	195
1-1/4	1.380	1,400	950	770	660	580	530	490	460	430	400
1-1/2	1.610	2,100	1,460	1,180	990	900	810	750	690	650	620
2	2.067	3,950	2,750	2,200	1,900	1,680	1,520	1,400	1,300	1,220	1,150
2-1/2	2.469	6,300	4,350	3,520	3,000	2,650	2,400	2,250	2,050	1,950	1,850
3	3.068	11,000	7,700	6,250	5,300	4,750	4,300	3,900	3,700	3,450	3,250
4	4.026	23,000	15,800	12,800	10,900	9,700	8,800	8,100	7,500	7,200	6,700

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

⚠ 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.

⚠ 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 more than 1/2 psig (3.48 kPa).

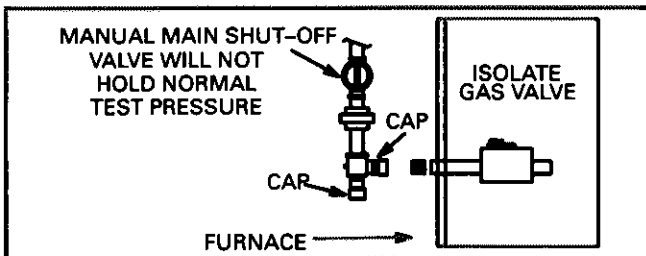


FIGURE 15

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).

ELECTRICAL

A field make-up box is provided for line voltage wiring. Line voltage wiring to unit is done through the J69 jack from the field make-up box to plug P69 from the control box. See figures 17 and 18 for make-up box installation.

Figure 19 shows thermostat designations for identification purposes. Refer to figure 20 for control box arrangement, figure 21 for a detail of the BCC2 blower control center, figure 22 for point to point field wiring and figure 23 for schematic wiring diagram and troubleshooting.

- 1- Install field make-up box on either side, inside or out of the cabinet. Wiring knockouts are provided in box and cabinet. See figures 17 and 18.
- 2- Remove cap from knockout in blower deck on the same side as the installed make-up box.
- 3- Electrically ground unit in accordance with local codes or, in the absence of local codes, in accordance with the current National Electric Code (ANSI/NFPA No. 70) and in Canada with the current Canadian Electric Code part 1 (CSA standard C22.1). The green ground wire is provided in the field make-up box.

To ensure proper grounding of the furnace, two star washers are included in the electrical make-up box bag assembly. Place the star washer on securing screw before installing the make-up box. Make sure the star washer breaks the paint on the cabinet so that the washer is touching metal. Unit is not properly grounded if paint has not been removed by star washer.

- 4 - An optional 120 volt accessory wire is provided with G23 units. Install brown accessory wire into J69 jack plug by inserting the pin of the brown wire into the open socket of the jack. See figure 16.

Any accessory rated up to 4 amps can be connected to this wire. Connect the neutral leg of the accessory to the neutral white wire in the make-up box. The accessory terminal is energized whenever the blower is in operation. A troubleshooting flowchart for the BCC2 blower control is located in figure 30.

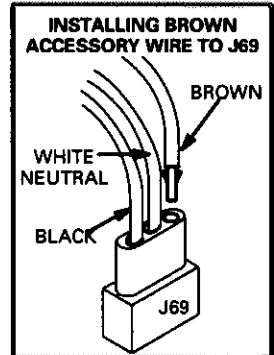


FIGURE 16

- 5- Insert the three pin (P69) plug from control box into knockout provided in blower deck.
- 6- Connect jack (J69) from make-up box to jack plug in blower deck.

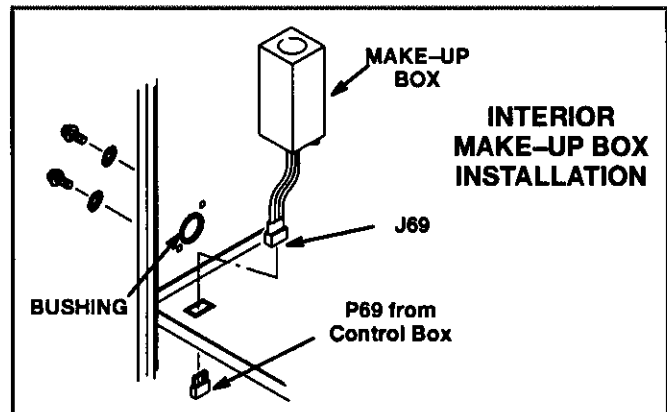


FIGURE 17

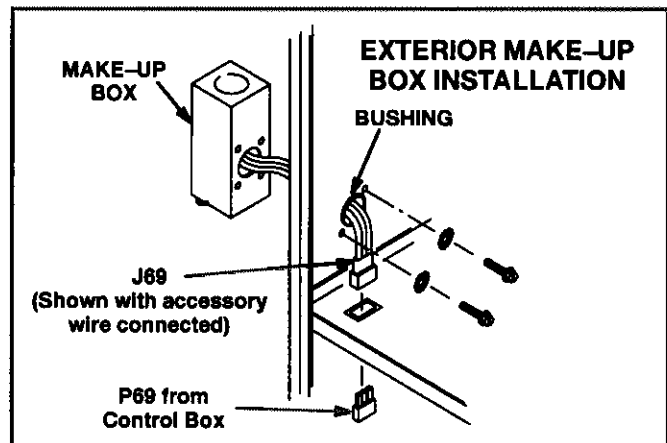


FIGURE 18

- 7- Select wire size according to the blower motor amps.
- 8- Snaphole bushing is provided for the wiring entry hole in the cabinet. A snaphole plug is provided to seal the unused wire entry hole.
- 9- Install room thermostat according to instructions provided with thermostat. See figure 19 for thermostat designations. If furnace is being used with heat pump refer to FM21 installation instruction.

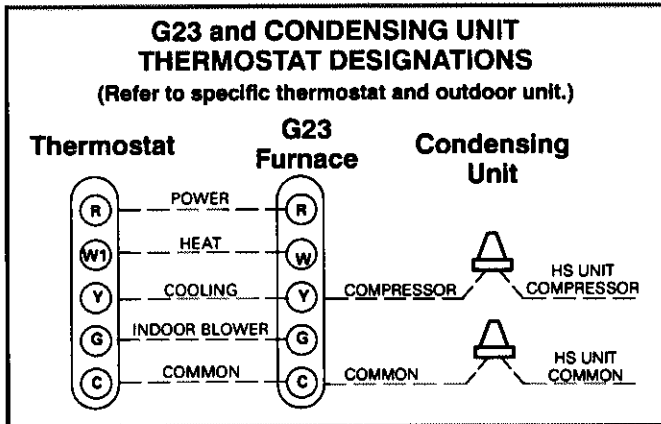


FIGURE 19

- 10- Install a separate fused disconnect switch near the unit so power can be turned off for servicing.
- 11- To access thermostat wiring connections, remove screws holding the front door of the control box.

- 12- Complete wiring connections to equipment using wiring diagrams provided with unit and in figures 22 and 23. Use 18 gauge wire or larger for thermostat connections.
- 13- The continuous fan (CF) 120 volt terminal is used with an optional continuous low fan kit that is available from Lennox. The kit allows the furnace blower to run continuously on low speed. The kit cannot be used on units without a CF terminal on the BCC2 board.

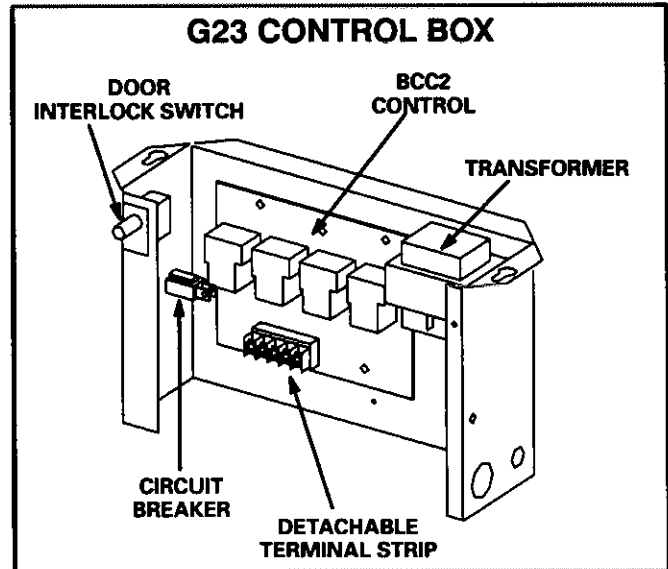


FIGURE 20

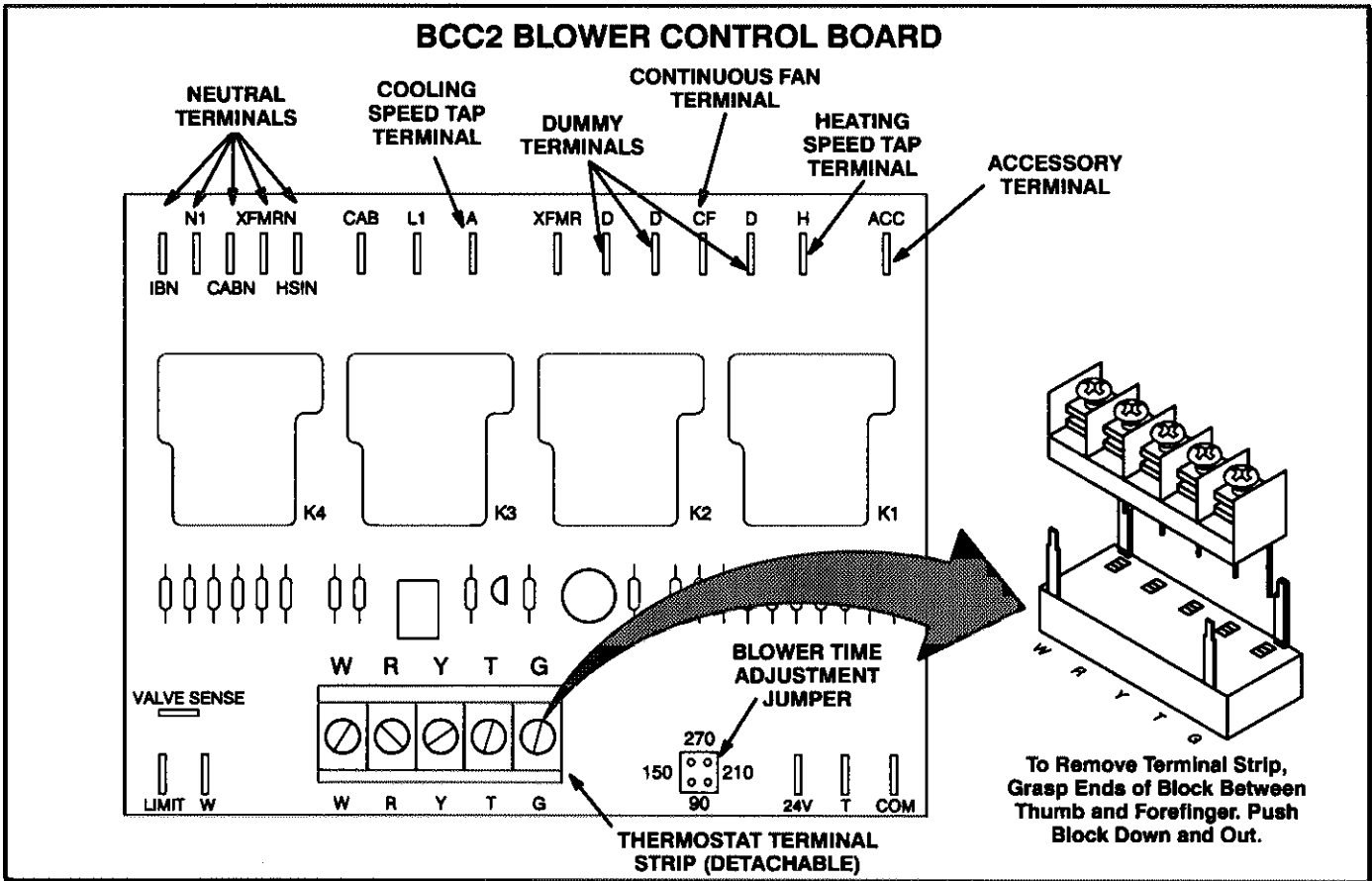


FIGURE 21

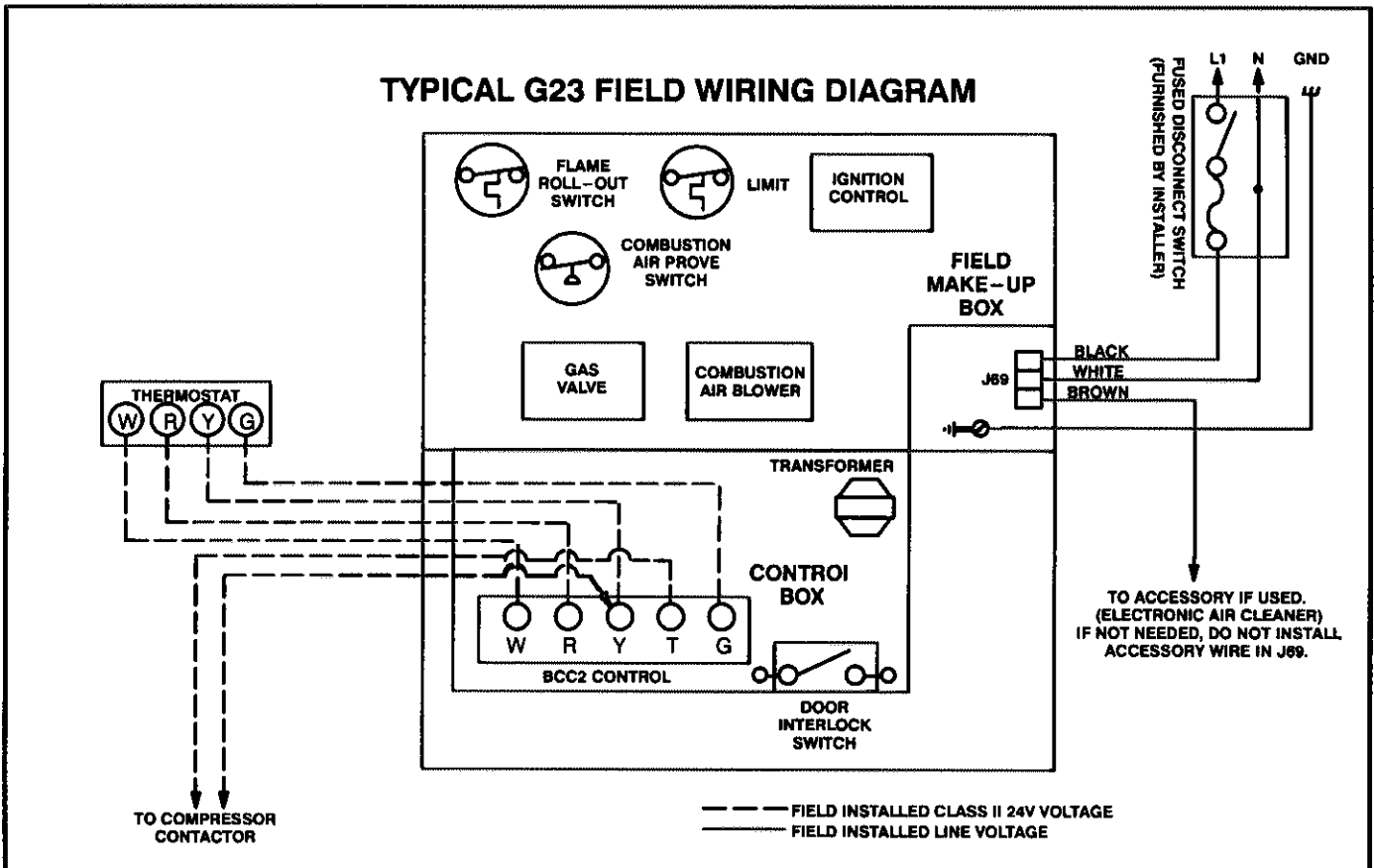


FIGURE 22

TYPICAL G23 WIRING DIAGRAM

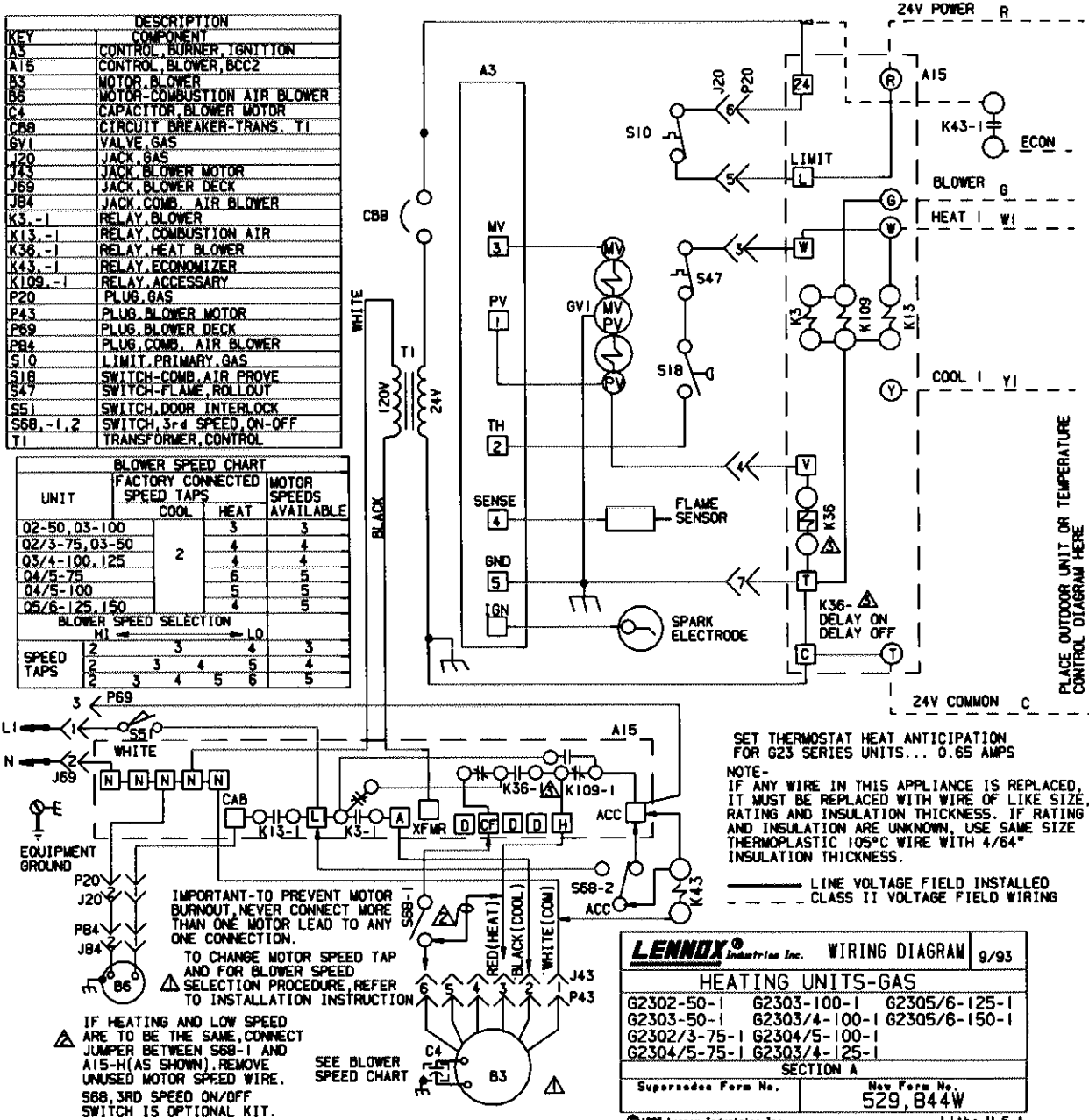


FIGURE 23

START-UP AND ADJUSTMENTS

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.

Use only your hand to push in or turn the gas control knob or lever. Never use tools. If the knob or lever will not push in or 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.

To place G23 furnace into operation:

G23 units are equipped with an intermittent pilot ignition system. Do not attempt to manually light pilots on these furnaces. Each time thermostat calls for heat, the pilot will be automatically lit. The pilot does not burn when there is no call for heat on units with electronic ignitions.

⚠ WARNING

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

Gas Valve Operation (Figures 25)

- 1- **STOP!** Read the safety information at the beginning of this section.
- 2- Set thermostat to lowest setting. See figure 24.

THERMOSTATS

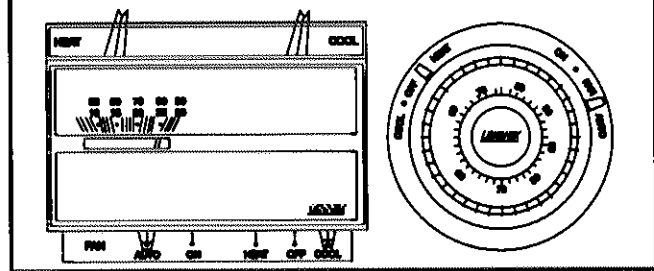
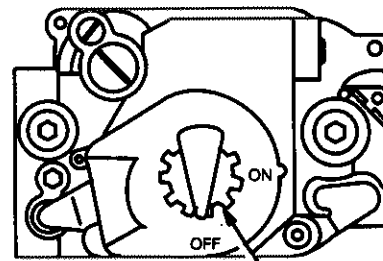


FIGURE 24

- 3- Turn off all electrical power to appliance.
- 4- This appliance is equipped with an ignition device which automatically lights the pilot. Do not try to light the pilot by hand.
- 5- Remove upper access panel.
- 6- On Honeywell VR8204 gas valves, turn knob on gas valve clockwise to OFF. Do not force. See figure 25.

HONEYWELL VR8204 SERIES GAS VALVE



GAS VALVE SHOWN IN OFF POSITION

FIGURE 25

- 7- Wait five (5) minutes to clear out any gas. If you then smell gas, **STOP!** Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions. If you do not smell gas go to next step.
- 8- Turn knob on gas valve counterclockwise to ON.
- 9- Replace upper access panel.
- 10- Turn on all electrical power to unit.
- 11- Set thermostat to desired setting.
NOTE—When unit is initially started, steps 1 through 11 may need to be repeated to purge air from pilot line.
- 12- If the appliance still will not operate, follow the instructions "To Turn Off Gas To Unit" and call your service technician or gas supplier.

To Turn Off Gas To Unit

- 1- Set thermostat to lowest setting.
- 2- Turn off all electrical power to unit if service is to be performed.
- 3- Remove upper access panel.
- 4- Turn knob on gas valve clockwise to OFF. Do not force.
- 5- Replace upper access panel.

Gas Flow

To check for proper gas flow to combustion chamber, determine Btu input from appliance rating plate. Divide this input rating by the Btu per cubic foot of available gas. Result is the required number of cubic ft. per hour. Determine the flow of gas through gas meter for two minutes and multiply by 30 to get the hourly flow of gas to burner.

Gas Pressure

- 1- Check gas line pressure with 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 line pressure has been checked and adjusted, check regulator pressure. Correct manifold pressure for LP/propane gas is 10.0 in. w.c. A natural gas to LP/propane gas changeover kit is required to convert unit. Refer to the installation instructions supplied with changeover kit for conversion procedure. Correct regulator pressure for natural gas at altitudes below 2000 ft. is 3.5 in. w.c. See figure 26 for gas pressure adjustment screw location.

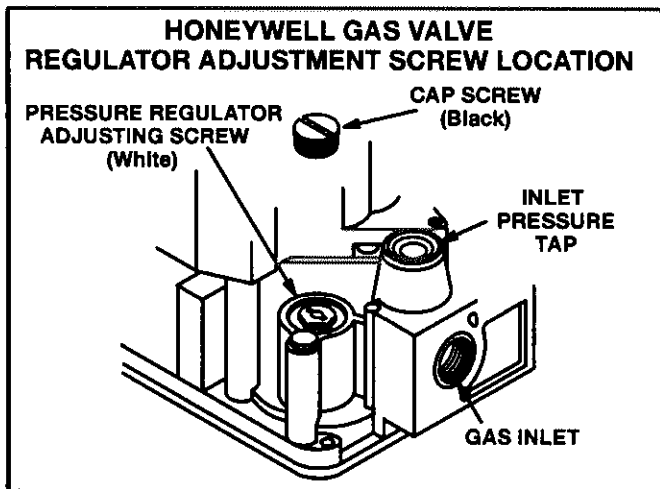


FIGURE 26

Limit Control

Limit Control—Factory set: No adjustment necessary.

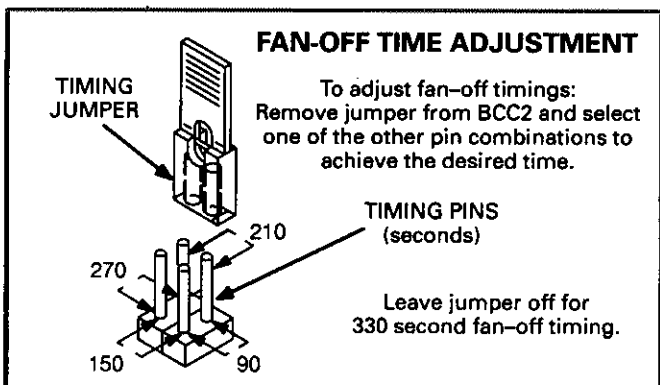


FIGURE 27

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 moving the jumper on the BCC2 blower control center. 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 27.

Temperature Rise

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

Thermostat Adjustment

Thermostat anticipator setting (if adjustable) should be set according to amps listed on wiring diagram on unit.

Electrical

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

Blower Speeds

Blower speed selection is accomplished by changing the taps at the harness connector at the blower motor. See figure 28.

Refer to speed selection chart on unit wiring diagram.
NOTE—CFM readings are taken external to unit with a dry evaporator coil and without accessories.

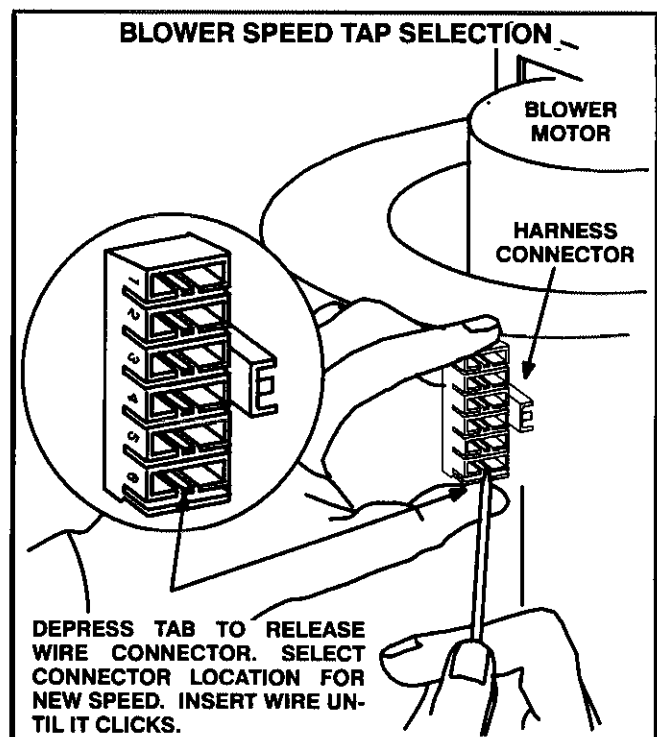


FIGURE 28

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.

Failure to Operate

If unit fails to operate check the following:

- 1- Is thermostat calling for heat?
- 2- Is main disconnect switch closed?
- 3- Is the circuit breaker open?
- 4- Is filter dirty or plugged? Dirty or plugged filters will cause unit to go off on limit control.
- 5- Is gas turned on at meter?
- 6- Is manual main shut-off valve open?
- 7- Is internal manual shut-off valve open?

After items 1 through 7 have been checked and unit still will not start, check for vent blockage and for proper draft. If unit still does not start, reset roll-out switch located over burners. If unit starts and cuts out, check heat section for blockage.

Pilot and Burner Flame

- 1- *Pilot Flame* — Pilot flame must surround the end of flame sensor for proper operation of pilot safety circuit. See figure 29.
- 2- *Burner Flame* — Start burner and allow to operate for a few minutes to establish normal burning conditions.

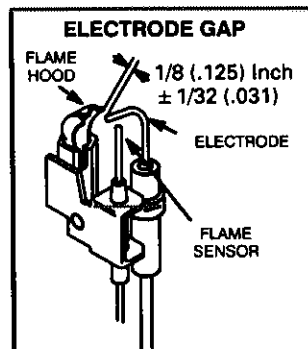


FIGURE 29

Check burner flame by observation. Flame should be predominantly blue in color and strong in appearance.

CAUTION

Check pilot flame and burner flame periodically to ensure proper operation.

SERVICE

WARNING

Disconnect power before servicing unit.

At the beginning of each heating season, the system should be checked by a qualified service technician as follows:

Blower

Check and clean blower wheel for any debris. Blower motor is pre-lubricated for extended bearing life. No further lubrication is needed.

Filters

- 1- Filters should be inspected monthly and must be cleaned or replaced when dirty to assure proper furnace operation.
- 2- Reusable foam filters supplied with G23 can be washed with water and mild detergent. When dry, they should be sprayed with filter handcoater prior to reinstallation. Filter handcoater is RP Products coating no. 418 and is available as Lennox part no. P-8-5069.
- 3- If replacement is necessary, order Lennox part no. 31J81 for 14 X 25 inch filter for Q2-50, Q3-50 and Q2/3-75 units, P-8-7822 for 16 X 25 inch filter for Q3-100 units, and P-8-7831 for 20" x 25" filter used on Q3/4-100, Q3/4-125, Q4/5-75, Q4/5-100, Q5/6-125 and Q5/6-150 units.

Flue and Chimney

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

Electrical Check

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

Cleaning Heat Exchanger and Burners

NOTE—Use papers or protective covering in front of furnace while cleaning furnace.

Cleaning the heat exchanger requires a steel spring "snake," a reversible drill and a vacuum cleaner. The steel spring snake may be constructed by purchasing a 4 ft. long by 1/4" diameter steel wire cable and a 1/4" 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. See figure 1 for parts arrangement when disassembling furnace.

- 1- Turn off both electrical and gas power supplies to furnace.
- 2- Remove flue pipe and top cap from unit. Mark and disconnect wiring from pressure switch and ignition control. Remove ignition control and pressure switch from upper vestibule panel.
- 3- Remove upper vestibule panel to expose the combustion air blower.

- 4- Remove three screws securing the combustion air blower. Carefully remove the combustion air blower to avoid damaging blower gasket. If gasket is damaged, it must be replaced to prevent leakage.
- 5- Remove collector box located behind combustion air blower. Care must be taken to avoid damaging the collector box gasket. If the gasket is damaged it must be replaced to prevent leakage.
- 6- Mark then disconnect wires from gas valve and roll-out switch.
- 7- Disconnect gas supply piping. Remove four screws securing the burner manifold assembly to the lower vestibule panel and remove the assembly from the unit.
- 8- Remove the screws holding the combustion baffles in the heat exchanger clam shells. Carefully remove each baffle from each heat exchanger section. To avoid damaging baffles, turn baffles 90° before pulling out through heat exchanger outlet.

⚠ IMPORTANT

Mark each baffle so that they are returned to the proper heat exchanger section.

- 9- Insert brush end of cable snake into top of one of the heat exchanger openings. **DO NOT FORCE CABLE INTO HEAT EXCHANGER.** Once the cable has been inserted, operate 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 cable out of opening.
- 10- Repeat this procedure for each heat exchanger section.
- 11- When the top heat exchanger sections are complete, place brush end of cable snake into the bottom openings of each of the heat exchanger sections. Clean the bottom opening as described in step 9.
- 12- Remove cable from heat exchanger. Use a vacuum to remove debris knocked loose during cleaning from each heat exchanger section.
- 13- Attach the exhaust end (positive pressure) of the vacuum to the top of the heat exchanger sections. Any loose debris will be forced to the bottom of the heat exchanger section. Vacuum debris from bottom openings.

- 14- Replace collector box and combustion air blower. Check gaskets for damage. Damaged seals must be replaced to avoid heat exchanger leaks. Replace all screws to the collector box and combustion air blower. Leaving off screws may cause leaks.
- 15- Replace upper vestibule panel, top cap, pressure switch and ignition control.
- 16- Clean burner by running a vacuum with a soft brush attachment over face of burners. Visually inspect inside of burners and crossovers for any blockage caused by foreign matter. Remove any blockage.
- 17- Replace combustion baffles in each heat exchanger section. **DO NOT BEND** baffles. Baffles should sit on the bottom of each heat exchanger section.
- 18- Replace burner / manifold assembly onto lower vestibule panel.
- 19- Reconnect wires to ignition control, pressure switch, roll-out switch, gas valve and combustion air blower. Refer to wiring diagram in figure 23.
- 20- Reconnect vent pipe to combustion blower outlet.
- 21- Reconnect gas supply piping.
- 22- Turn on power and gas supply to unit.
- 23- Set thermostat and check furnace for proper operation.
- 24- 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.

- 25- If a leak is detected, shut gas and electricity off and repair leak.
- 26- Repeat steps 23 and 24 until no leaks are detected.
- 27- Replace front access panel.

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: G23Q3-100-1.

CABINET PARTS

- Upper access panel
- Blower panel
- Top Cap

CONTROL PANEL PARTS

- Transformer
- Blower Control Center (BCC2)
- Circuit Breaker
- Door interlock switch

BLOWER PARTS

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

HEATING PARTS

- Heat exchanger assembly
- Gas manifold
- Combustion air blower
- Gas valve
- Main burner cluster
- Pilot burner
- Ignition control
- Main burner orifices
- Pressure switch
- Pilot/electrode assembly
- Primary limit control
- Flame roll-out switch
- 9 pin plug
- 3 pin plug (2 wires factory installed)

BCC2 TROUBLESHOOTING FLOWCHART

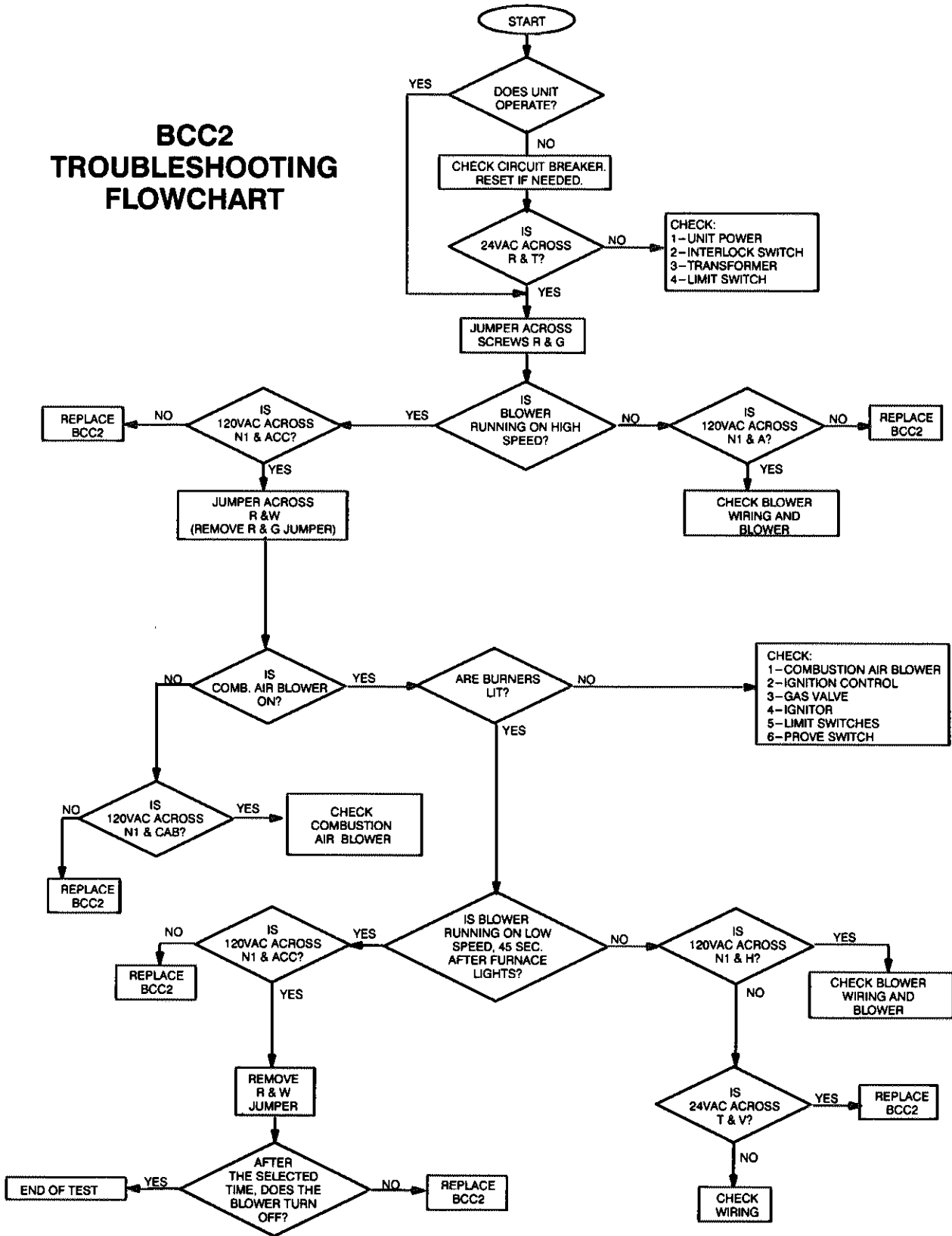


FIGURE 30

G23 START-UP AND 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?

Blower Motor Lubrication O.K.?

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?

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?