

INSTALLATION INSTRUCTIONS

G21Q SERIES UNITS

GAS UNITS
 503,893M
 9/98
 Supersedes 503,225M

TP Technical
 Publications

Litho U.S.A.

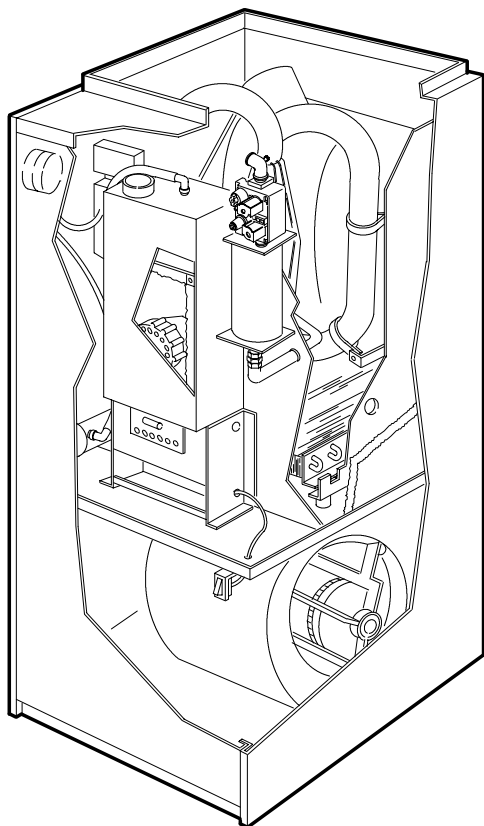
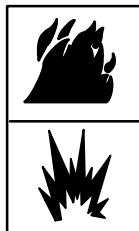


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**RETAIN THESE INSTRUCTIONS
FOR FUTURE REFERENCE**



⚠ WARNING

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



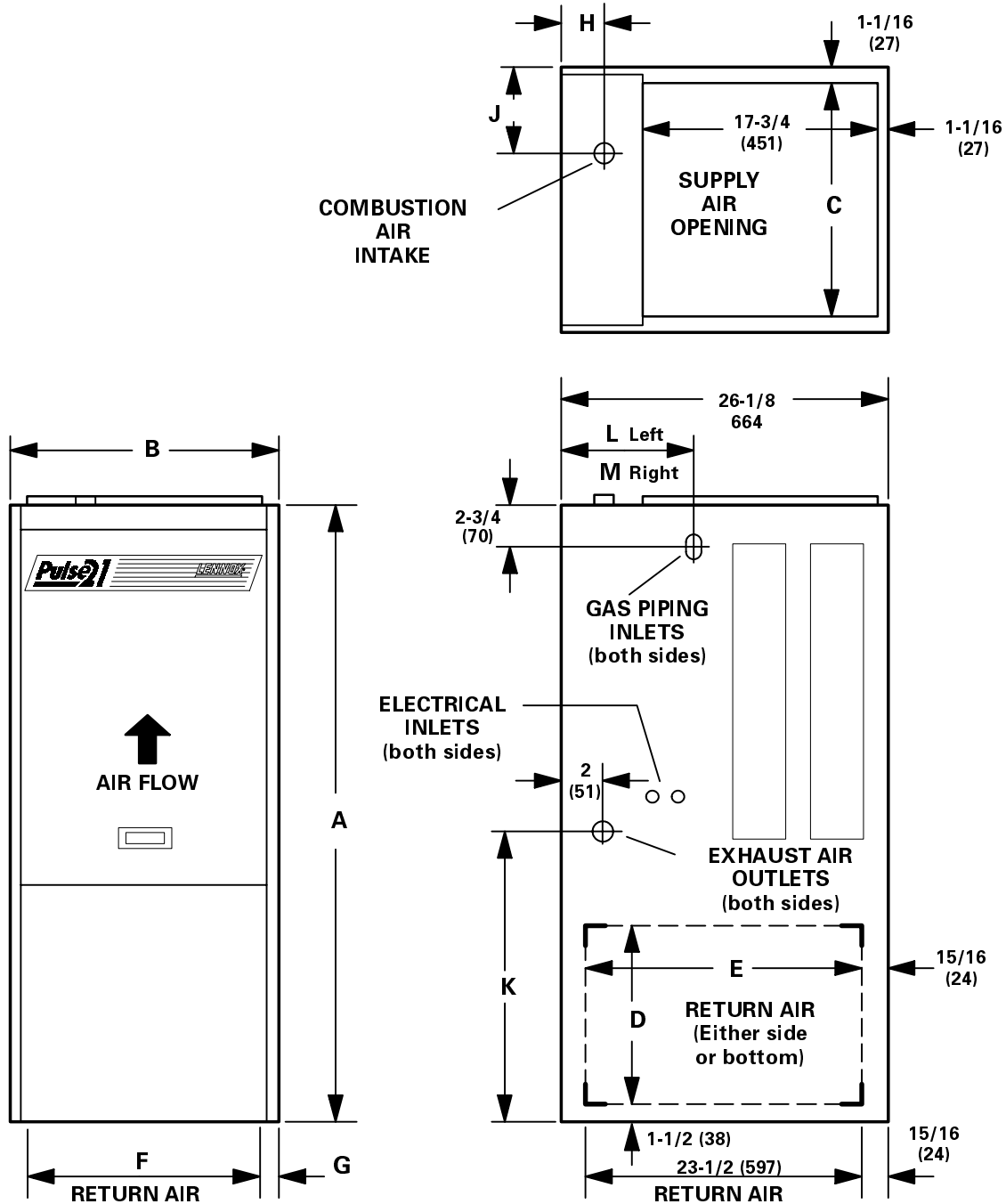
Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.

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.

G21Q UNIT DIMENSIONS-INCHES (MM)



Model No.	A	B	C	D	E	F	G	H	J	K	L	M
G21Q3-40 G21Q3-60 G21Q3-80	49 (1245)	21-1/4 (540)	19-1/8 (232)	14-1/2 (368)	18-1/2 (470)	14-1/2 (368)	3-3/8 (86)	4-1/2 (114)	8-1/2 (216)	20-1/4 (514)	7-1/4 (184)	5-1/4 (133)
G21Q4-60 G21Q4-80	49 (1245)	21-1/4 (540)	19-1/8 (232)	14-1/2 (368)	23-1/2 (597)	14-1/2 (368)	3-3/8 (86)	4-1/2 (114)	8-1/2 (216)	20-1/4 (514)	7-1/4 (184)	5-1/4 (133)
G21Q3-100	53 (1346)	26-1/4 (667)	24-1/8 (613)	18-1/2 (470)	18-1/2 (470)	18-1/2 (470)	3-7/8 (98)	2-1/2 (64)	11 (279)	24-1/4 (616)	4-5/8 (118)	4-5/8 (118)
G21Q5-80 G21Q4/5-100	53 (1346)	26-1/4 (667)	24-1/8 (613)	18-1/2 (470)	23-1/2 (597)	18-1/2 (470)	3-7/8 (98)	2-1/2 (64)	11 (279)	24-1/4 (616)	4-5/8 (118)	4-5/8 (118)

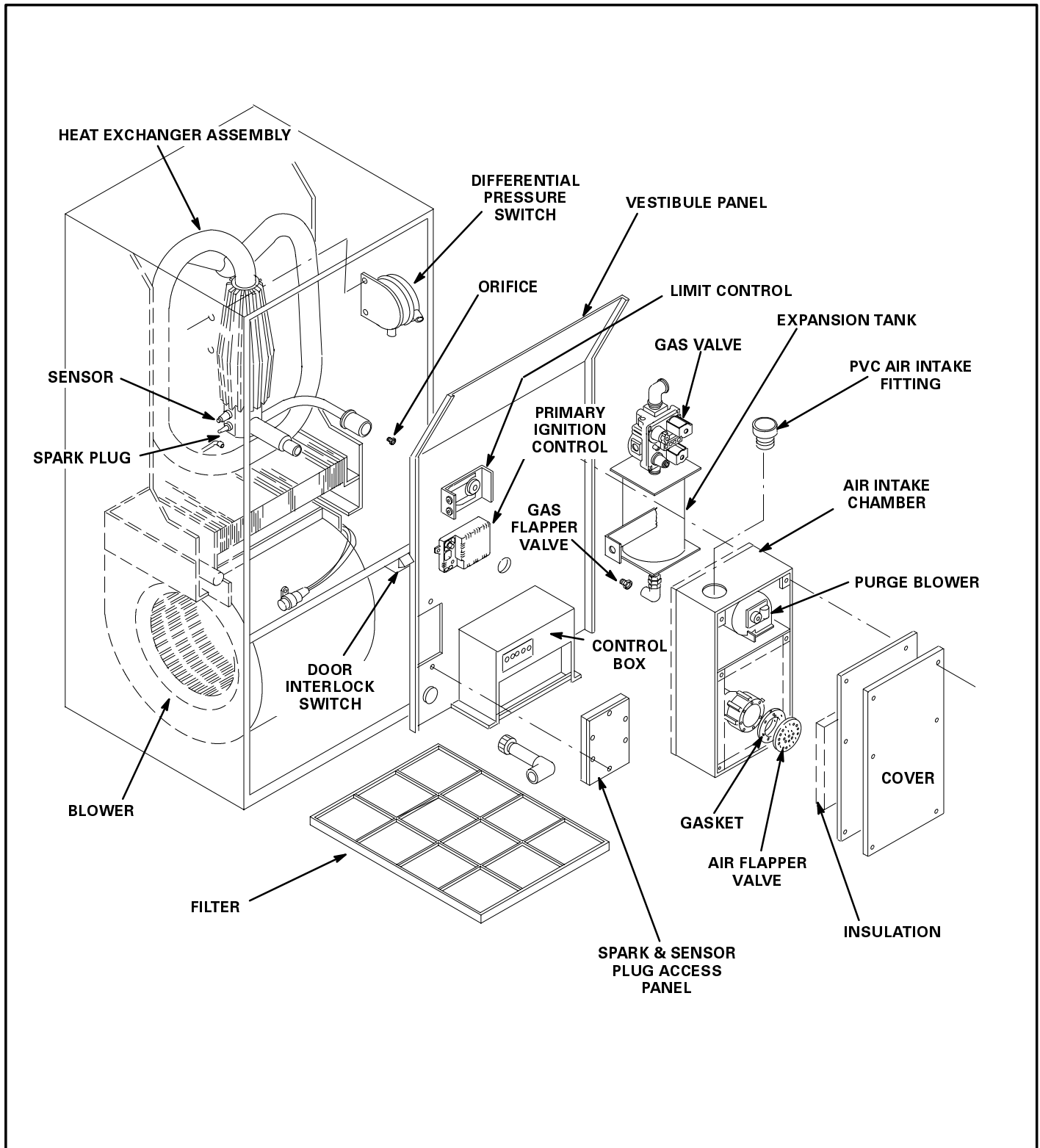
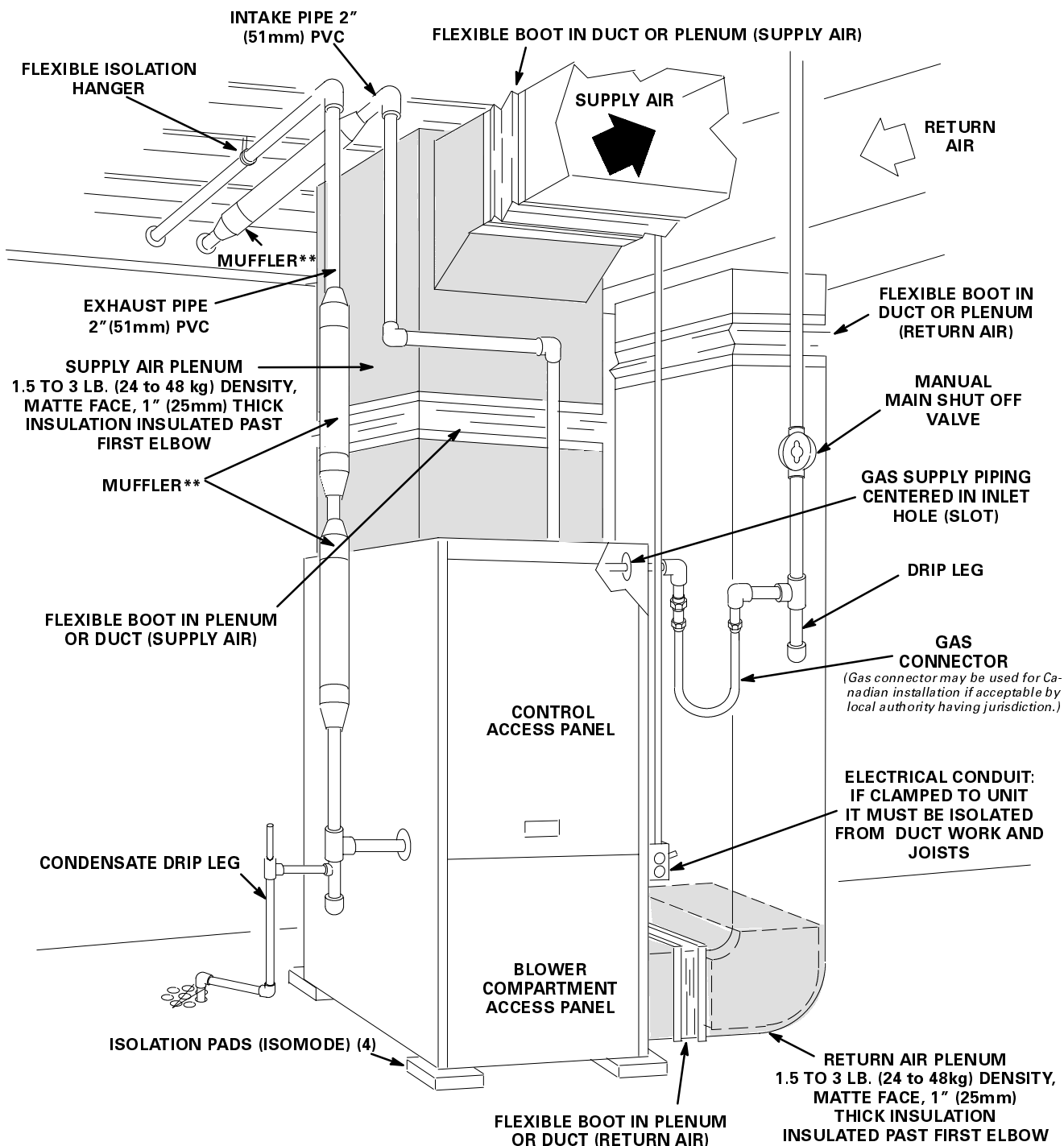


FIGURE 1

G21Q TYPICAL INSTALLATION



*Installation procedures outlined in this manual are presented as recommendation only and do not supersede or replace local or state code. If local or state codes do not exist, the procedures outlined in this manual are recommended only and do not constitute code.

**All G21-80/100 units require the use of at least one muffler in the exhaust pipe and one in the intake pipe. Mufflers are recommended options on all other units.

NOTE—Many of the specific installation recommendations such as insulated plenums, flexible boots and isolation hangers are strongly suggested to control vibration and to ensure acceptable sound levels in the conditioned space. The recommendations should be used as a guideline when installing the system. Specific installation methods, duct construction and insulation methods may vary and are acceptable provided the methods provide the same objective, are industry accepted and meet code requirements.

REQUIREMENTS

The G21Q unit is designed as a North American unit. It is certified for use in both the United States and Canada. Refer to the requirements section below for specific information concerning installation in the two countries. 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). The National Fuel Gas Code is available from the following address:

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

The installation of Lennox high efficiency gas furnaces must conform with the current "Installation Code for Gas Burning Appliances and Equipment" CAN/CGA-B149.1 – (natural gas) or CAN/CGA-B149.2 – (propane gas) and/or local codes. For unspecified requirements the installation must conform with the manufacturer's C.G.A. certified instructions contained herein.

All G21 units are A.G.A. (American Gas Association) and C.G.A. (Canadian Gas Association) certified.

The electrical installation must conform with the Canadian Electrical Code Part 1, C.S.A. C22.1, and/or local codes.

The plumbing installation must comply with local plumbing or waste water codes where applicable.

This furnace is certified for installation clearances to combustible material as listed on the unit rating plate and in table 1 for installation in an alcove or closet.

TABLE 1

Clearances	Location	Inches (mm)
Service access	Front	36 (914)
	Exhaust side	6 (152) (from side of unit)
To combustible materials	Top	1 (25)
	Exhaust	0
	Side, rear and front	0
	Floor	0*

*Appliance shall not be installed directly on carpeting, tile or other combustible material other than wood flooring.

NOTE—Service access clearance must be maintained.

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

For installation in a residential garage, the furnace must be located or protected to avoid physical damage by vehicles. The furnace must be adjusted to obtain a temperature rise and external static pressure within the range specified on the unit rating plate.

The G21Q 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 element. 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 cooling unit unless it is in the full "heat" or "cool" setting.

When installed, the furnace must be electrically grounded according to the current National Electric Code, ANSI/NFPA No. 70 in the U.S. and current CSA C22.1 Canadian Electrical Code Part 1 in Canada, if an external electrical source is utilized. The National Electric Code is available from the following address:

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

Field wiring between the furnace and devices not attached to the furnace, or between separate devices which are field-installed and located, shall conform with the temperature limitation for type T wire [63° F (17° C) rise] when installed in accordance with these instructions.

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

NOTE -- G21 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.

GENERAL

A - Shipping Damage

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

NOTE - Special care should be taken to check the alignment of the gas piping at the point it penetrates the vestibule panel. Inspect the rubber grommet for damage. There must be no direct contact between the gas pipe and the vestibule panel.

B - Shipping and Packing List

- 1 - Assembled G21Q furnace
- 1 - Filter
- 1 - Bag assembly containing:
 - 1-Drip leg assembly
 - 1-Exhaust pipe
 - 1-Pipe plug
 - 1-Gas connector
 - 4-Anti-vibration pads
 - 1-Reducing tee
 - 1-Filter rack
- 1 - Bag assembly containing:
 - 1-1/2" dia. CPVC pipe nipple (2" long)
 - 1-Snap bushing (3/8" opening)
 - 1-Snap bushing
 - 2-Filter clips
 - 2-Snap hole plugs
 - 1-Rubber grommet
 - 1-Button plug

C - Shipping Bolt Removal

Remove four heat section shipping bolts from the bottom of the blower deck before starting unit. Access the bolts through the blower compartment.

WARNING

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

INSTALLATION - Setting & Leveling Unit

When the unit is installed where freezing temperatures are possible, the condensate trap and the condensate line must be protected by a grounded and sheathed self-regulating heating cable and insulation. The condensate trap must be accessible for servicing and the unit must be level to ensure proper drainage from the coil. Heating cable is available from Lennox in various lengths: 6ft. (1.8m) - kit no. 18K48; 24ft. (7.3m) - kit no. 18K49; and 50ft. (15.2m) - kit no. 18K50. The heat cable kit may be used on the exhaust pipe and vent terminations to prevent freezing.

1 - Holes are provided in the corners of unit base for leveling unit. Install leveling bolts (if desired as shown, or shim under unit. See figure 2.

2 - Set unit in desired location keeping in mind clearances listed on unit rating plate. Also keep in mind gas supply connection, electrical supply, vent connections and clearances for installing and servicing unit.

CAUTION

If leveling bolts are used, be sure to install the plastic nuts as shown and tighten snugly before setting unit.

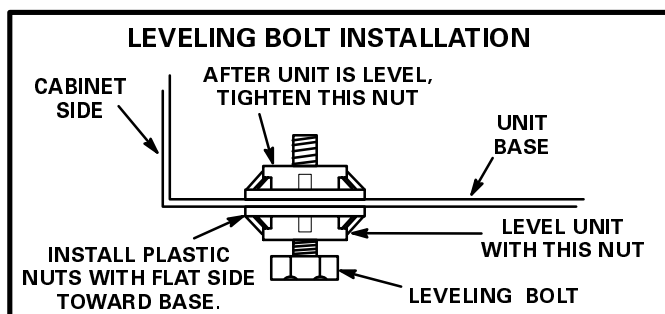


FIGURE 2

RETURN AIR OPENING GUIDELINES

Return air can be brought in either side or bottom of unit. Scribe lines show the outline of each return air opening. Remove remaining insulation from around return air opening. See figure 3.

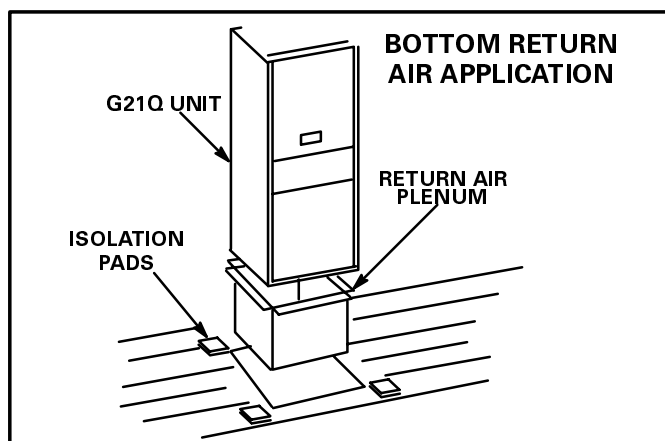


FIGURE 3

NOTE - Insulation adhesive is only used inside of scribe lines.

NOTE - Units with Q4, Q4/5 and Q5 blowers use larger opening.

For bottom return air applications, use duckbill pliers to bend up the flange on the blower door to aid in securing the filter.

Bottom Return Air Opening

- 1 - Cut opening in floor or platform.
- 2 - Flange return air plenum and lower into opening.
- 3 - Place glass fiber insulation strips around opening. Position isolation mounting pads at corners of insulation. Insulation should not overlap the mounting pads. Trim away any excess insulation from strips.
- 4 - Set unit. Make sure unit is sitting on isolation pads.

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

FILTER ASSEMBLY AND FILTERS

G21 series units are equipped with a reusable foam filter. Filter must be in place any time unit is in operation. For bottom return air opening applications, install filter mounting clips provided and secure with sheet metal screws.

For side return air openings, use U-channel on blower deck and supplied filter rack to install filter. To install filter rack, remove two screws from side of cabinet. Place flange of filter rack inside bottom panel and side panel. Secure with previously removed cabinet/base bottom screws. See figure 4.

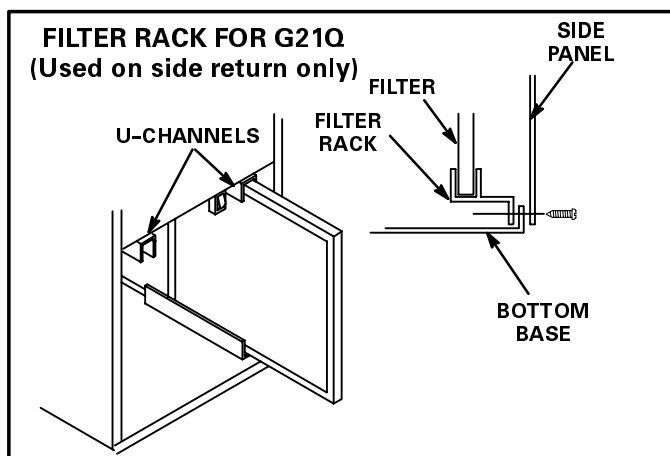


FIGURE 4

DUCT SYSTEM

- 1 - Install flexible canvas boots or equivalent on both supply and return air plenums. Boots should be placed as close as possible to unit.
- 2 - Insulate supply air plenum and duct system at least through the first elbow. Use 1-1/2 to 3 lb. (24 to 48 kg) density, matt face, 1" (25mm) thick insulation. Provisions must be made to keep insulation in place and to protect edges from airflow deterioration.
- 3 - Size and install supply and return system using industry-approved standards that result in a quiet and low-static system with uniform distribution.

Installation of units not equipped with a cooling coil 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.

The return air must not be drawn from a room where another gas appliance (i.e., a water heater) is installed.

Even though this furnace draws its combustion air from outside of the structure, other gas appliances that share a utility room may not. 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 through the house by the furnace duct system.

EXHAUST, INTAKE & CONDENSATE PIPING

A - Exhaust and Intake Piping Requirements

For U.S. installation, venting requirements must comply with the current AGA/GAMA standards. For Canadian installation, the venting system must comply with current ULC standard for type BH gas vents No. S636. Furnace shall not be connected to any type B, BW or L vent or vent connector and shall not be connected to any portion of a factory built or masonry chimney.

Two mufflers (one each in the exhaust and intake piping) are required and furnished for use with the G21-80/100 units. See table 2 for optional usage of mufflers with G21 units. Mufflers should be located and installed as directed in instructions packaged with muffler kit.

⚠ IMPORTANT

Exhaust piping muffler(s) installed horizontally in unconditioned spaces must be protected by self-regulating heating cable and insulation.

TABLE 2

MODEL NO.	EXHAUST MUFFLER	INTAKE MUFFLER
G21Q-40/60	1(optional)	1(optional)
G21Q-80/100	1(required) 2(additional option)	1(required) 2(additional option)

All PVC pipe, fittings, primer and solvent cement must conform with American National Standard Institute and the American Society for Testing and Materials (ANSI/ASTM) standards. Refer to table 3 for approved piping and fitting materials. The solvent shall be free flowing and contain no lumps, undissolved particles or any foreign matter that adversely affects the joint strength or chemical resistance of the cement. The cement shall show no gelation, stratification, or separation that cannot be removed by stirring.

**TABLE 3
PIPING AND FITTINGS SPECIFICATIONS**

PIPE & FITTING MATERIAL	ASTM SPECIFICATION
Schedule 40 PVC (Pipe–Type 1120 or 1220)	D1785
Schedule 40 PVC (Cellular Core Pipe)	F891
Schedule 40 PVC (Fittings–PVC1 or PVC12)	D2466
SDR–21PVC (Pipe)	D2241
SDR–26 PVC (Pipe)	D2241
PVC–DWV (Drain Waste & Vent) Pipe & Fittings)	D2665

⚠ CAUTION

Solvent cements for plastic pipe are flammable liquids and should be kept away from all sources of ignition. Do not use excessive amounts of solvent cement when making joints. Good ventilation should be maintained to reduce fire hazard and to minimize breathing of solvent vapors. Avoid contact of cement with skin and eyes.

Primers and solvents must meet ASTM specifications. PVC primer is specified in ASTM F 656. Use PVC solvent cement as specified in ASTM D 2564. Low temperature solvent cement is recommended. Metal, plastic strapping or large wire ties may be used for vent pipe hangers.

PVC pipe used for exhaust and intake lines should be sized per table 4. Note that maximum length of vent pipe is for one run; either intake or exhaust. Maximum vent length given is **not** the total length of intake + exhaust vents.

TABLE 4

MINIMUM DIAMETER FOR G21 VENTING					
Linear Pipe Length (Max. Feet)	Number of 90° Elbows				
	0	2	4	6	8
5 (1.5m)	2" (51mm)	2" (51mm)	2" (51mm)	2" (51mm)	2" (51mm)
10 (3m)	2" (51mm)	2" (51mm)	2" (51mm)	2" (51mm)	2" (51mm)
20 (6.1m)	2" (51mm)	2" (51mm)	2" (51mm)	2" (51mm)	2-1/2" (64mm)
30 (9.1m)	2" (51mm)	2" (51mm)	2" (51mm)	2-1/2" (64mm)	2-1/2" (64mm)
35 (10.6m)	2" (51mm)	2" (51mm)	2" (51mm)	2-1/2" (64mm)	2-1/2" (64mm)
40 (12.2m)	2" (51mm)	2" (51mm)	2-1/2" (64mm)	2-1/2" (64mm)	2-1/2" (64mm)
50 (15.2m)	2" (51mm)	2-1/2" (64mm)	2-1/2" (64mm)	2-1/2" (64mm)	2-1/2" (64mm)
60 (18.3m)	2-1/2" (64mm)	2-1/2" (64mm)	2-1/2" (64mm)	2-1/2" (64mm)	3" (76mm)
70 (21.3m)	2-1/2" (64mm)	2-1/2" (64mm)	2-1/2" (64mm)	3" (76mm)	3" (76mm)
80 (24.4m)	2-1/2" (64mm)	2-1/2" (64mm)	3" (76mm)	3" (76mm)	3" (76mm)
90 (27.4m)	2-1/2" (64mm)	3" (76mm)	3" (76mm)	3" (76mm)	3" (76mm)

Each 90° elbow is equivalent to 5 feet (1.5m) of vent pipe. Two 45° elbows are equivalent to one 90° elbow. One 45° elbow is equal to 2.5 feet (.76M) of vent pipe.

If intake and exhaust piping runs are not equal in length and combination, the larger diameter pipe (as sized per table 4) must be used for both runs. Regardless of the diameter of pipe used, the standard roof and wall terminations described in section D–Intake and Exhaust Piping Terminations should be used. Exhaust piping must terminate with 1-1/2" (38mm) pipe.

Muffler lengths should be excluded when measuring vent pipe runs for sizing. Vent pipe must be sized at 2" (51mm) between unit and mufflers.

Procedure for Cementing Joints Per ASTM D2855

- 1 – Measure and cut PVC pipe to desired length.
- 2 – Debur and chamfer end of pipe, removing any ridges or rough edges. If end is not chamfered, edge of pipe may remove cement from fitting socket and result in a leaking joint.
- 3 – Clean and dry surfaces to be joined.
- 4 – Test fit joint and mark depth of fitting on outside of pipe.
- 5 – Uniformly apply liberal coat of primer to inside socket surface of fitting and male end of pipe to depth of fitting socket.
- 6 – Promptly apply solvent cement to end of pipe and inside socket surface of fitting. Cement should be applied lightly but uniformly to inside of socket. Take care to keep excess cement out of socket. Apply second coat to end of pipe.

NOTE – Time is critical at this stage. Do not allow primer to dry before applying cement.

- 7 – Immediately after applying last coat of cement to pipe, and while both inside socket surface and end of pipe are wet with cement, forcefully insert end of pipe into socket until it bottoms out. Turn pipe 1/4 turn during assembly (but not after pipe is fully inserted) to distribute cement evenly.

NOTE – Assembly should be completed within 20 seconds after last application of cement. Hammer blows should not be used when inserting pipe.

- 8 – After assembly, wipe excess cement from pipe at end of fitting socket. A properly made joint will show a bead around its entire perimeter. Any gaps may indicate a defective assembly due to insufficient solvent.

- 9 – Handle joints carefully until completely set.

B – Exhaust and Condensate Piping

This unit is designed for either right or left side exit of exhaust piping.

NOTE – If unit is equipped with a Q4 or Q4/5 blower and side return air is used, it is recommended that the exhaust piping drip leg be routed out of the side opposite the return air duct. This should be done to avoid interference between the drip leg and the return air duct. The drip leg may be installed on the return air side provided it clears the duct.

- 1 – Cut PVC pipe (provided) to the desired length for exit from the unit.
- 2 – Slide PVC pipe through rubber grommet in cabinet. Care must be taken to center pipe in hole.
- 3 – Compression elbow is mounted for left side exhaust pipe exit on G21-40/60/80 units and right side exit on G21-100 units. If piping must exit on other side, disconnect exhaust pressure tubing, rotate and tighten compression elbow and reconnect tubing.

NOTE – Differential pressure switch will not operate properly if tubing is kinked.

- 4 – Cement PVC pipe to compression elbow which is already in place.

NOTE – Care must be taken to assure a secure, tight seal between compression elbow assembly and manifold outlet.

- 5 – Cement drip leg assembly tee to PVC pipe as shown in figure 5.

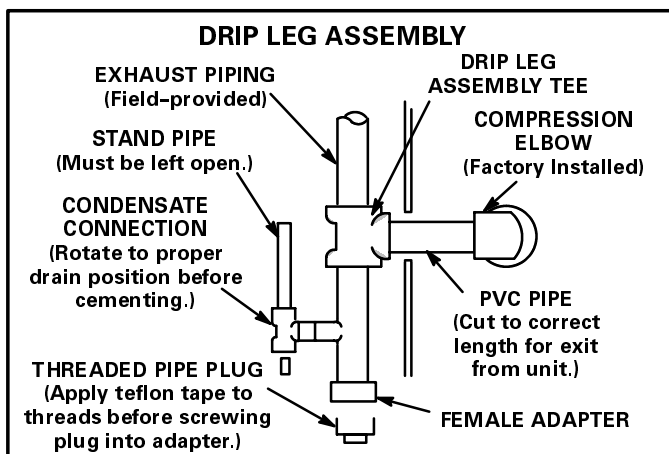


FIGURE 5

- 6 – Apply teflon tape to threads of pipe plug. Screw pipe plug into female adapter of drip leg subassembly. Cement drip leg subassembly to drip leg assembly tee after rotating condensate connection to suitable drain position.

IMPORTANT – Leave enough clearance below drip leg to remove threaded pipe plug for future maintenance. Debris may buildup in bottom of drip leg and prevent proper drainage.

IMPORTANT – Stand pipe must remain open at the top to vent drain. Open end of pipe must not be used to connect drain hoses or other condensate hoses.

- 7 – Cement exhaust pipe into top of drip leg assembly tee and route to outside of structure using exhaust and intake piping requirements listed in section A. All horizontal runs of exhaust pipe must slope back toward unit. A minimum of 1/4" (6mm) drop for each 12" (305mm) of horizontal run is mandatory for drainage. Horizontal runs of exhaust piping must be supported every 5 ft. (1524mm) using isolation hangers.

NOTE – Exhaust piping must be insulated with 1/2" (13mm) Armaflex or equivalent when run through unheated space. Do not leave any area of exhaust pipe open to outside air; exterior exhaust must be insulated with 1/2" (13mm) Armaflex or equivalent.

! CAUTION

Do not discharge exhaust into an existing stack or stack that also serves another gas appliance. If vertical discharge through an existing unused stack is required, insert PVC pipe inside the stack until the end is even with the top or outlet end of the metal stack.

- 8 – Connect condensate drain line (1/2" [13mm] SDR 11 plastic pipe or tubing) to condensate connection on drip leg assembly and route to open drain. Condensate line must be sloped downward away from drip leg to drain. If drain level is above drip leg, condensate pump must be used to condensate line. Condensate drain line should be routed within the conditioned space to avoid freezing of condensate and blockage of drain line. If this is not possible, a heat cable kit may be used on the condensate drip leg and line. Heating cable kit is available from Lennox in various lengths; 6ft. (1.8m) – kit no. 18K48; 24ft. (7.3m) – kit no. 18K49; and 50ft. (15.2m) – kit no. 18K50.

! CAUTION

Do not use copper tubing or existing copper condensate lines for drain line.

- 9 – Seal unused exhaust line piping hole in cabinet with snap-plug provided.

! CAUTION

The exhaust vent pipe operates under positive pressure and must be completely sealed to prevent leakage of combustion products into the living space.

C – Intake Piping

- 1 – Cement intake piping in slip connector located at top of unit.
- 2 – Determine intake piping size using table 4.

- 3 – Suspend piping at a minimum of every 5 ft. (1.52m) using isolation hangers. A suitable hanger can be fabricated by putting a sleeve of Armaflex refrigeration piping insulation around the pipe and suspending it using metal strapping as shown in figure 6. Place a small sheet metal strip between the Armaflex and the metal strapping to prevent crimping. Do not secure piping directly to joist or flooring.
- 4 – In areas where piping penetrates joists or interior walls, hole must be large enough to allow clearance on all sides of pipe through center of hole using an isolation hanger.

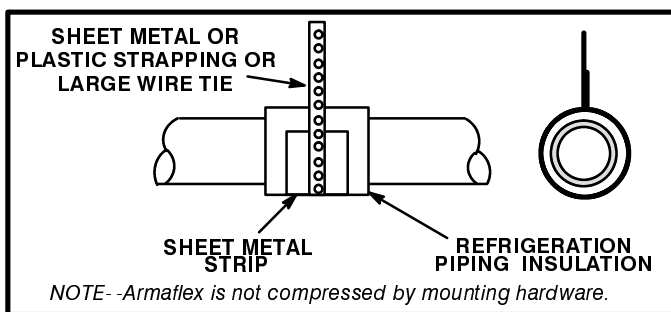


FIGURE 6

- 5 – Route piping to outside of structure. Continue with installation following instructions given in exhaust and intake piping termination section.

⚠ CAUTION

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

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

D – Removal of the Furnace from Common Vent

If a G21 furnace replaces a furnace which was commonly vented with another gas appliance, the size of the existing vent pipe for that gas appliance must be checked. Without the heat of the original furnace flue products, the existing vent pipe is probably oversized for the single water heater or other appliance. The vent should be checked for proper draw with the remaining appliance.

The following test should be conducted while all appliances (both in operation and those not in operation) are connected to the common venting system. If the venting system has been installed improperly, the system must be corrected.

- 1 – Seal any unused openings in the common venting system.
- 2 – Visually inspect the venting system from 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.
- 6 – After determining that each appliance remaining connected to the common venting system properly vents when tested as indicated 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. The common venting system should be resized to approach the minimum size as determined by using the appropriate tables in appendix G in the current standards of the National Fuel Gas Code ANSI Z223.1 in the U.S.A., and the appropri-

ate Category 1 Natural Gas and Propane appliances venting sizing tables in the current standards of the CAN/CGA-B149.1 and .2 in the Natural Gas and Propane Installation Code in Canada.

E – Intake and Exhaust Piping Terminations

Intake and exhaust pipes may be routed either horizontally through an outside wall or vertically through the roof. In attic or closet installations, vertical termination through the roof is preferred. Figures 7 through 18 show typical terminations.

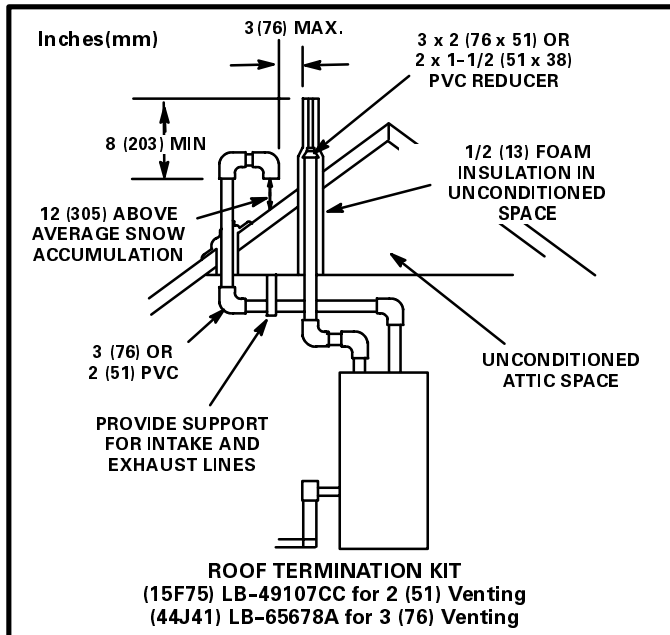


FIGURE 7

- 1 – Use PVC pipe for both intake and exhaust piping
- 2 – Secure all joints, including drain leg, gas tight using approved PVC solvent.
- 3 – Piping diameters should be determined according to length of pipe run. See table 4. Locate intake piping upwind (prevailing wind) from exhaust piping. To avoid recirculation of exhaust gas on roof terminations, end of exhaust pipe must be higher than intake pipe.
Exhaust and intake exits must be in same pressure zone. Do not exit one through the roof and one on the side. Also, do not exit the intake on one side and the exhaust on another side of the house or structure.
- 4 – Intake and exhaust pipes should be placed as close together as possible at termination end (refer to illustrations). Maximum separation is 3" (76mm) on roof terminations and 6" (152mm) on side wall terminations.
- 5 – Exhaust piping must terminate straight out or up as shown. On roof terminations, the intake piping should terminate straight down using two 90° elbows (See figure 7). In rooftop applications, a 2" X

1-1/2" (51 x 38mm) reducer must be used on the exhaust piping at the point where it exits the structure to improve the velocity of exhaust away from the intake piping.

! IMPORTANT

Do not use screens or perforated metal in intake and exhaust terminations. Doing so will cause freeze-ups and may block the terminations.

NOTE – If winter design temperature is below 32° F (0° C), exhaust piping must be insulated with 1/2" (13mm), Armaflex or equivalent when run through unheated space. Do not leave any surface area of exhaust pipe open to outside air; exterior exhaust pipe must be insulated with 1/2" (13mm) Armaflex or equivalent. In extreme cold climate areas, 3/4" (19mm) Armaflex or equivalent is recommended. Insulation on outside runs of exhaust pipe must be painted or wrapped to protect insulation from deterioration.

NOTE – During extremely cold temperatures, below approximately 20° F (6.67° C), units with long runs of vent pipe through unconditioned space, even when insulated, may form ice in the exhaust termination that prevents the unit from operating properly. Longer run times of at least 5 minutes will alleviate most icing problems. A low ambient thermostat kit (70G49) can be installed to increase run times. Also, a heating cable may be installed on exhaust piping and termination to prevent freeze-ups. Heating cable installation kit is available from Lennox. See Exhaust and Condensate Piping section for part numbers.

- 6 – On field supplied terminations for side wall exits, exhaust piping should extend a minimum of 12" (305mm) beyond the outside wall. Intake piping should be as short as possible. See figure 8.

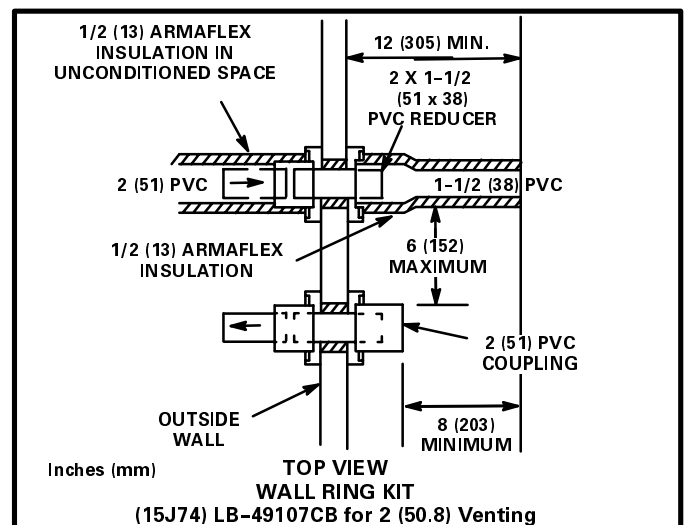


FIGURE 8

NOTE – Care must be taken to avoid recirculation of exhaust back into intake pipe.

- 7 – On field supplied terminations, the minimum separation distance between the end of the exhaust pipe and the end of the intake pipe is 8" (203mm).
- 8 – If intake and exhaust piping must be run up a side wall to position above snow accumulation or other obstructions. Piping must be supported every 3 ft. (.91m) as shown in figure 6. Refer to figures 12 and 13 for proper piping method. WTK wall termination kit must be extended for use in this application. See figure 16 or use kit WTKX shown in figure 17. When exhaust and intake piping must be run up an outside wall, the exhaust piping is reduced to 1-1/2" (38mm) after the final elbow. The intake piping may be equipped with a 90° elbow turn-down. Using turn-down will add 5 ft. (1.5m) to the equivalent length of the pipe.

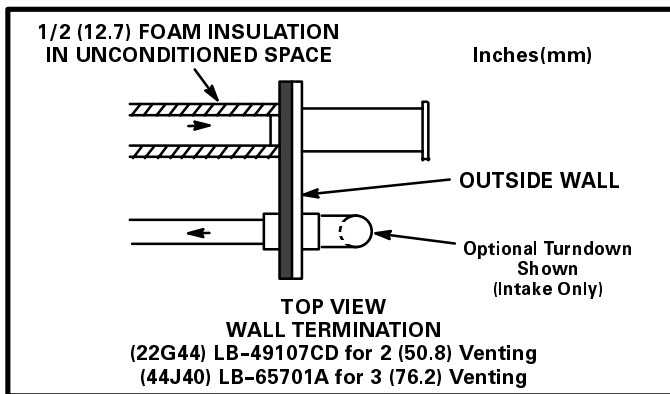


FIGURE 9

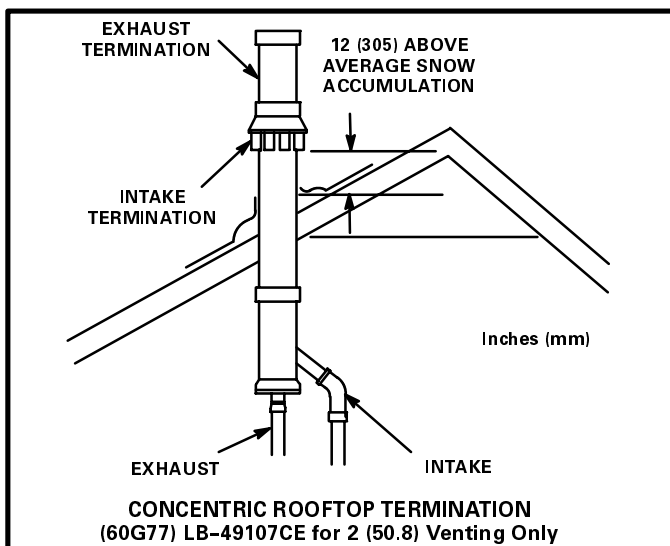


FIGURE 10

- 9 – Position termination ends so they are free from any obstructions and above the level of snow accumulation (where applicable). Termination ends must be a minimum of 12" (305mm) above grade

level. Do not point into window wells, stairwells, alcoves, courtyard areas or other recessed areas. Do not position termination ends directly below roof eaves or above a walkway. Since the G21 unit is a certified, direct vent Category IV gas furnace, the location of the termination is limited by local building codes. In the Absence of local codes, refer to the current National Fuel Gas Code Z223.1 in the US, and the current standards CAN/CGA-B149.1 and -B149.2 of the natural gas and propane installation instructions in Canada for details. The termination should be at least 12" (305mm) from any opening through which flue products could enter the building.

When horizontally vented, minimum clearance for termination from electric meters, gas meters, regulators and relief equipment is 4 ft. (1.2m) 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). Condensation from terminations placed closer than 6 ft. (1.83m) to a condensing unit may discolor the unit's paint.

! IMPORTANT

Combustion air intake inlet and exhaust outlet should not be located within 6 ft. (1.8m) of dryer vent or combustion air inlet or outlet of another appliance. Piping should not exit less than 3 ft. (.91m) from opening into another building.

! IMPORTANT

For Canadian Installations Only:
In accordance to CAN/CGA-B149.1 and .2, the minimum allowed distance between the combustion air intake inlet and the exhaust outlet of other appliances shall not be less than 12" (305mm).

- 10– Suspend piping at a minimum of every 5 ft. (1.52m) using isolation hangers. A suitable hanger can be fabricated by putting a sleeve of Armaflex refrigeration piping insulation around the pipe and suspending it using metal or plastic strapping or a large wire tie or other flexible strap to dampen the vibrations as shown in figure 6. Place a small sheet metal strip between the Armaflex and the metal strapping to prevent crimping. Do not secure piping directly to joist or flooring.

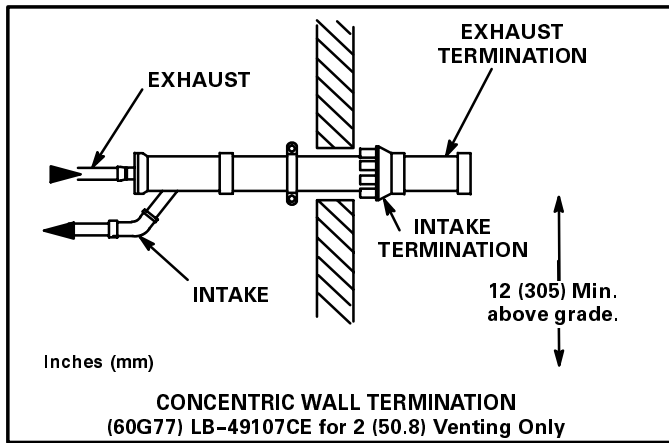


FIGURE 11

- 11- In areas where piping penetrates joists or interior walls, hole must be large enough to allow clearance on all sides of pipe through center of hole using an isolation hanger.
- 12- Isolate piping at the point where it exits the outside wall or roof. Use termination kit LB-49107C.
- 13- When furnace is installed in a residence where unit is shut down for an extended period of time, such as a vacation home, make provisions for draining drip leg on exhaust line.
- 14- Based on the recommendation of the manufacturer, a multiple furnace installation may use a group of up to four termination kits WTK assembled together horizontally, as shown in figure 15.

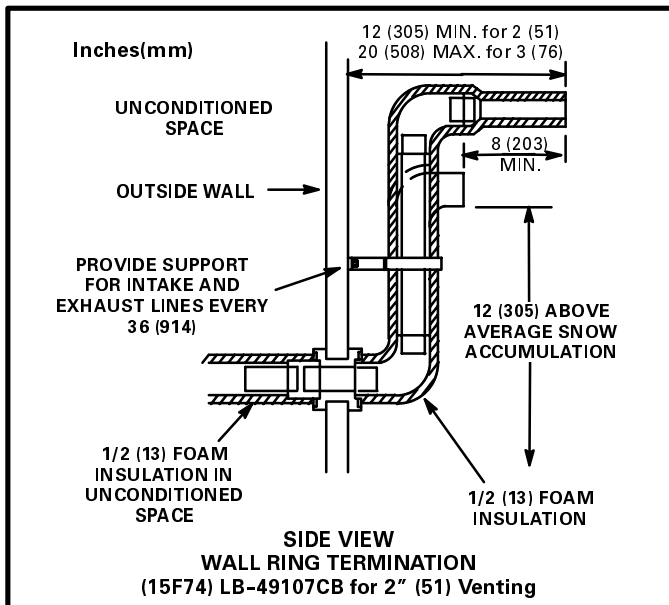


FIGURE 12

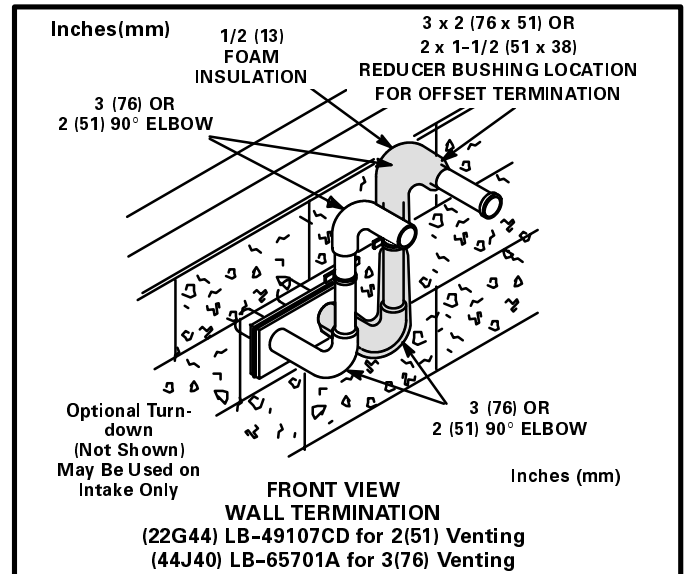


FIGURE 13

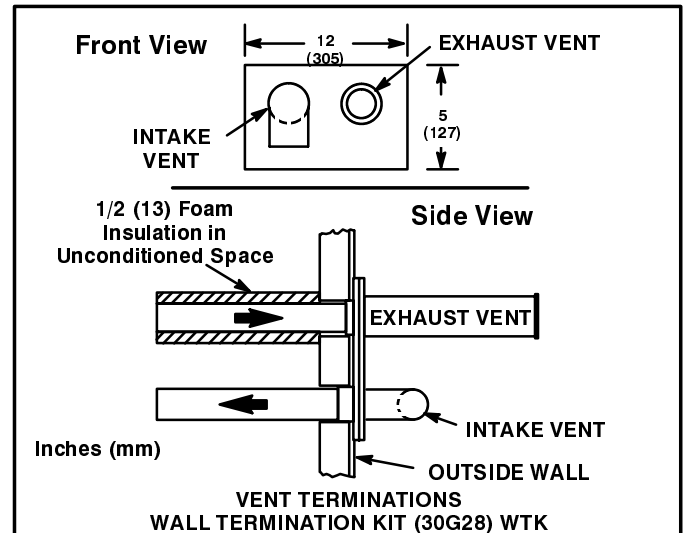


FIGURE 14

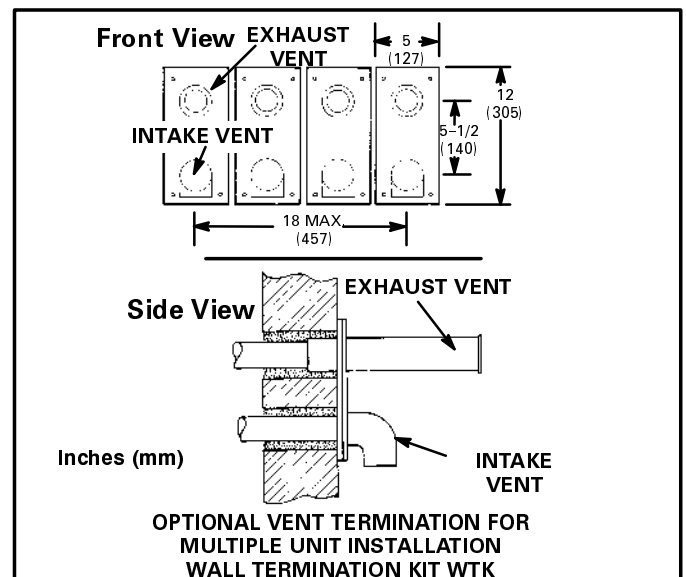


FIGURE 15

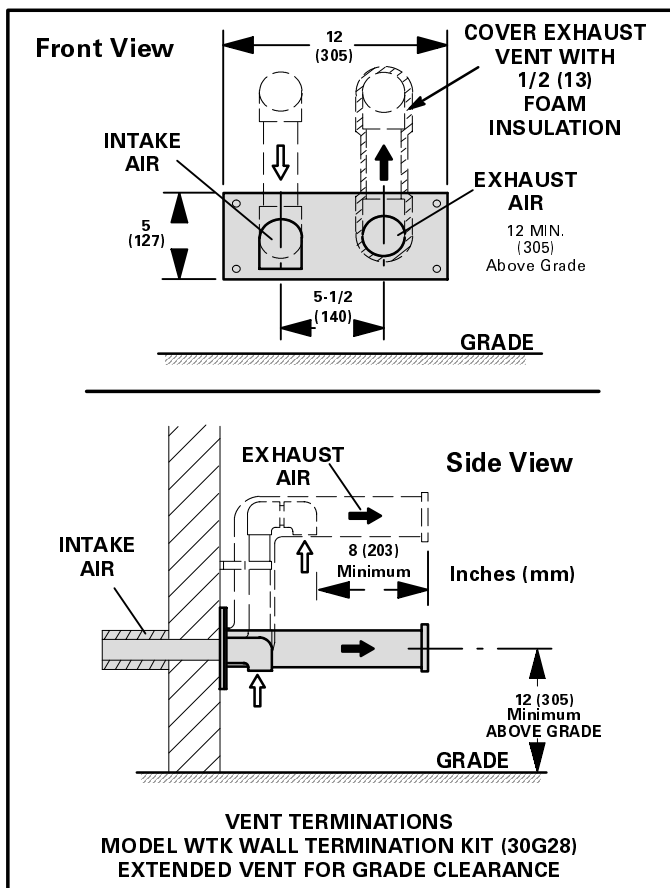


FIGURE 16

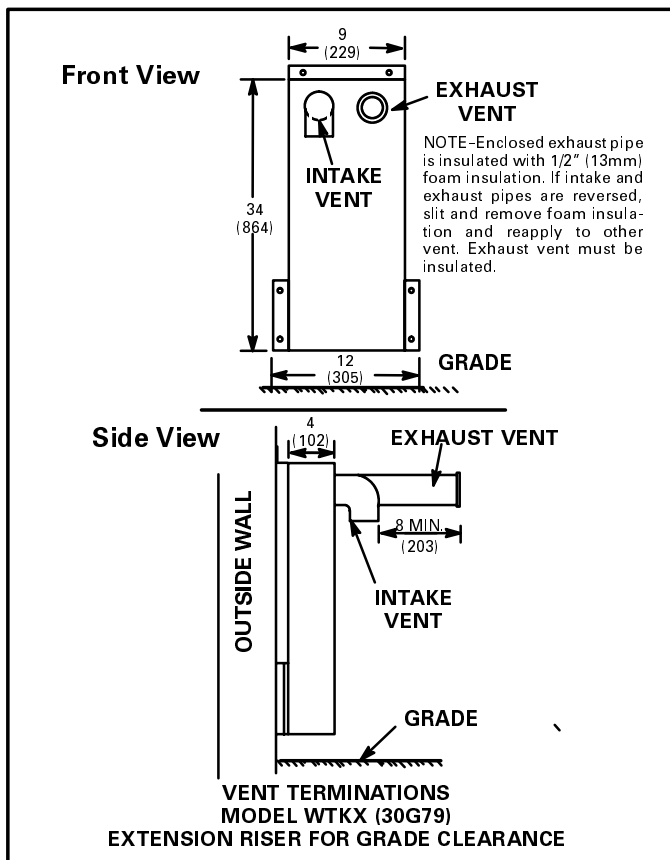


FIGURE 17

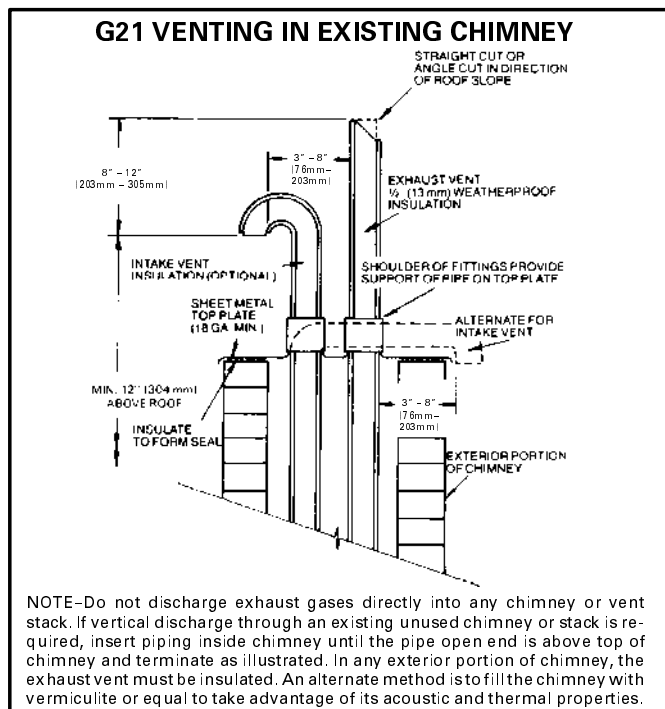


FIGURE 18

GAS PIPING

Gas Supply

The unit is shipped standard for right-side installation of gas piping. A piping hole is also fabricated in the left side for an alternate piping arrangement.

- 1 - When connecting the gas supply, factors such as length of run from the meter, the number of fittings and furnace rating must be considered to avoid excessive pressure drop. Table 5 lists recommended pipe sizes for typical applications.

A drip leg should be installed in the pipe run to the unit. In some localities, codes may require a manual main shut-off valve and union (furnished by installer) installed external to unit. Union must be of ground joint type.

A 1/8" (3.2mm) N.P.T. plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the furnace.

! IMPORTANT

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

- 2 - The use of one of the following gas connectors is recommended:
 - * ANS Z21.24 Appliance Connectors of Corrugated Metal Tubing and Fittings.
 - * ANS Z21.45 Assembled Flexible Appliance Connectors of Other than All-Metal Construction.
 - * For Canadian installations-All flexible gas connectors must be C.G.A. certified components.

TABLE 5
GAS PIPE CAPACITY - FT³/HR (kL/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 (19.25)	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 (121.76)	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.

The above connectors may be used if acceptable by the authority having jurisdiction. A gas connector is provided and, if used, should be installed between the manual main shut-off valve and ground joint union. See figure 19 for correct piping.

3 - Center gas line through piping hole. Gas line should not touch side of unit.

4 - Connect gas supply line.

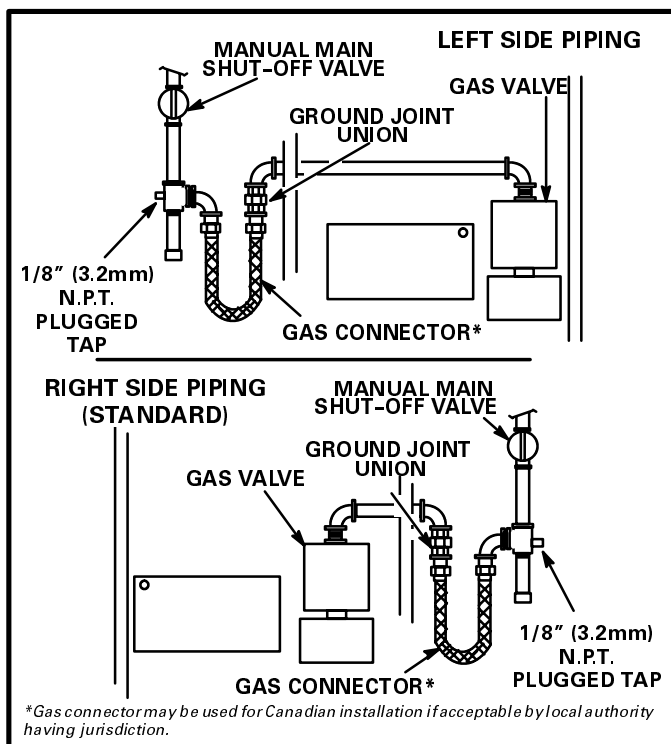


FIGURE 19

⚠ CAUTION

Flexible gas connector must not be used to exit the unit. Flex connector must be installed in U-shaped fashion in order to achieve its purpose (See figure 19). Do not secure to unit ducting or structure.

B - 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.

⚠ IMPORTANT

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 piping system at test pressures equal to or less than 1/2 psig (3.45 kPa).

The furnace and its individual shut-off valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressures greater than 1/2 psig (3.45 kPa).

ELECTRICAL

- 1 – Select circuit protection and wire size according to the unit rating plate.
- 2 – Access openings are provided on both sides of the furnace cabinet to facilitate wiring.
- 3 – Install the room thermostat according to instructions provided with the thermostat. See figure 20 for thermostat designations.
- 4 – Install a separate disconnect switch (protected by either fuse or circuit breaker) near the unit so that power can be turned off for servicing.
- 5 – Complete wiring connections to the equipment using the provided wiring diagrams.
- 6 – Electrically ground the unit according to local codes or, in the absence of local codes, according

to the current National Electric Code ANSI/NFPA for the U.S.A. and current Canadian Electrical Code Part 1 for Canada.

- 7 – Install an auxiliary receptacle near unit.

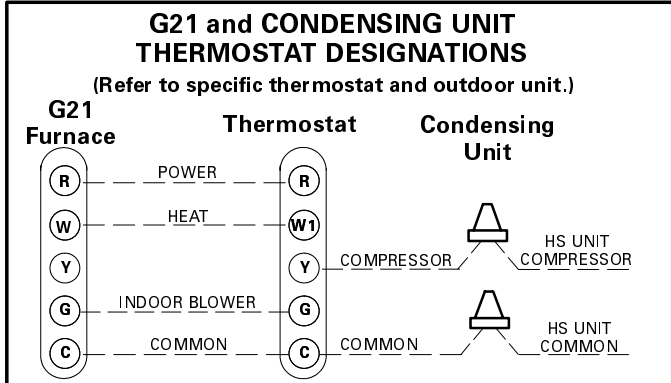


FIGURE 20

TYPICAL G21Q WIRING DIAGRAM

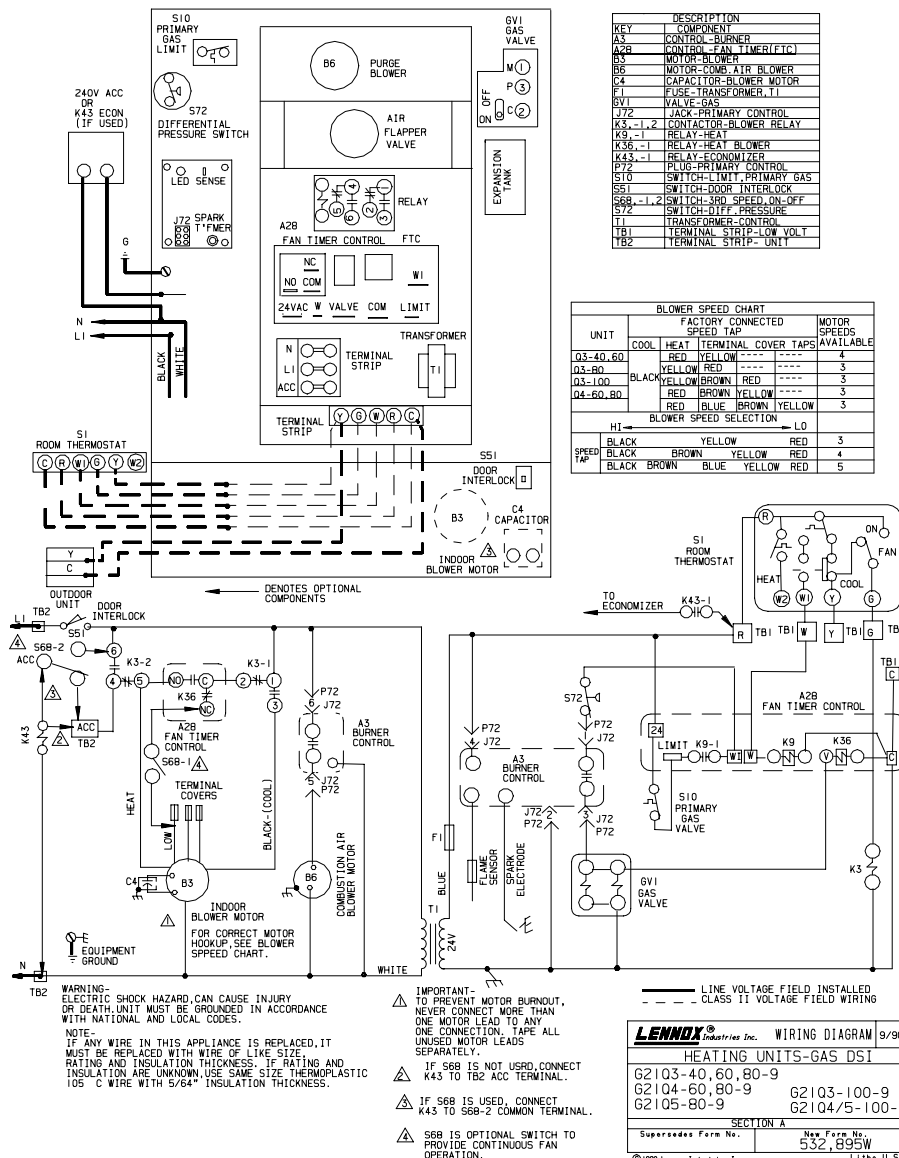


FIGURE 21

UNIT START-UP

FOR YOUR SAFETY READ BEFORE LIGHTING

WARNING

Do not use this furnace if any part has been under water. 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 move the gas control lever or switch. Never use tools. If the lever or switch will not push in or move by hand, do not try to repair it, call a qualified service technician. Force or attempted repair may result in a fire or explosion.

Gas Valve Operation

WARNING

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

This unit is equipped with an automatic spark ignition system with flame rectification. Once combustion has started, the purge blower and spark ignitor are turned off. Do **not** try to light by hand.

Gas Valve Operation for Robertshaw and White Rodgers Valves (Figure 22)

- 1 - Set the thermostat to the lowest setting.
- 2 - Turn off all electrical power to the unit.

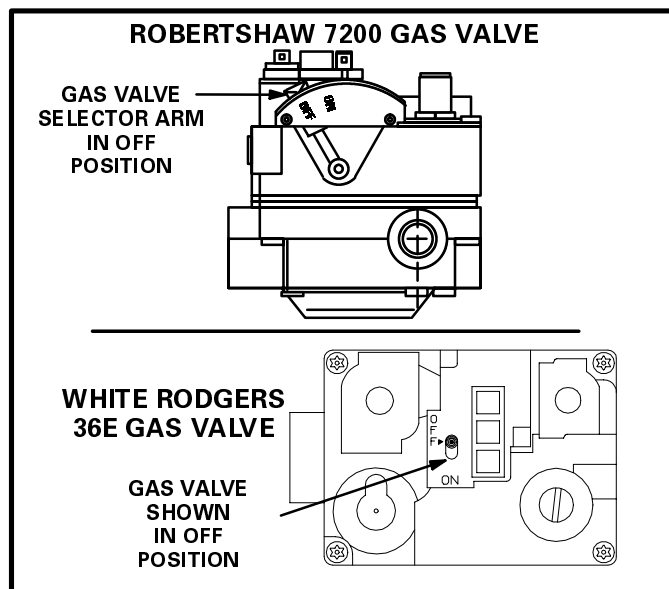


FIGURE 22

- 3 - This appliance is equipped with an ignition device which automatically lights the burner. Do **not** try to light the burner by hand.
- 4 - Remove the unit access panel.
- 5 - On Robertshaw 7200 gas valve, push lever on gas control and move to **OFF** and release. For White Rodgers 36E gas valves, move switch to **OFF**. Do not force.
- 6 - Wait five minutes to clear out any gas. Smell for gas, including near the floor. 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.
- 7 - On Robertshaw 7200 gas valve, push lever on gas control and move to **ON**, then release. For White Rodgers 36E gas valves, move switch to **ON**.
- 8 - Replace the unit access panel.
- 9 - Turn on all electrical power to unit.
- 10 - Set the thermostat to the desired setting.
- 11 - If the furnace 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 heat section access panel.
- 4 - On Robertshaw 7200 gas valve, push lever on gas control and move to **OFF**, then release. For White Rodgers 36E gas valves, move switch to **OFF**. Do not force.
- 5 - Replace the unit access panel.

GAS PRESSURE ADJUSTMENT

Gas Flow

To check proper gas flow to the combustion chamber, determine Btu (kW) input from the appliance rating plate. Divide this input rating by the Btu per cubic foot (cubic meter) of available gas. Result is the number of cubic feet (cubic meter) per hour required. Determine the flow of gas through gas meter for 2 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. Normal natural gas inlet line pressure should be 7.0 in. w.c. (1.74 kPa). Normal line pressure for propane/LP gas is 11.0 in. w.c. (2.75 kPa).

NOTE – Minimum gas supply pressure is listed on unit rating plate for normal input. Operation below minimum pressure may cause nuisance lockouts.

- 2 – After the line pressure has been checked and adjusted, check the regulator pressure. The correct manifold pressure (unit running) is specified on the unit nameplate. To measure, connect gauge to the pressure tap in the elbow below the expansion tank.

HIGH ALTITUDE INFORMATION

The G21Q unit is approved for altitudes of 0 to 4,500 ft. (0 to 1,372 m) above sea level in both the U.S.A. and Canada. No adjustment is necessary. Due to the self-adjusting characteristics of Pulse combustion, a high altitude kit should NOT be necessary at any altitude.

OTHER UNIT ADJUSTMENTS

Heat Anticipation Settings

Units with White Rodgers gas valves -- 0.6

Units with Robertshaw gas valves -- 0.6

Propane/LP Gas Conversion

NOTE – G21Q series units are NOT shipped with the components required for field conversion to propane/LP gas. A separate kit must be ordered. Follow the directions supplied with the conversion kit.

Limit Control

Limit Control -- Factory set. No adjustment necessary.

Fan Control

Fan-On Delay -- Factory set at 45 seconds and adjustable from 30 to 60 seconds.

Fan-Off Delay -- Factory set at 180 seconds and adjustable from 120 to 240 seconds.

Temperature Rise and External Static Pressure

Check the temperature rise and the external static pressure. If necessary, adjust the blower speed to maintain a temperature rise and external static pressure within the range shown on the unit rating plate.

Electrical

- 1 – Check all wiring for loose connections.
- 2 – Check the fuse located on the unit control box. The fuse should be a 2 amp AGC fast blow.
- 3 – Check for correct voltage at the unit (unit operating).
- 4 – Check amp-draw on blower motor.
Motor Nameplate _____ Actual _____.

NOTE – Do not secure electrical conduit directly to ducting or structure.

Blower Speeds

Refer to the blower speed selection chart on the unit wiring diagram.

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

ELECTRONIC IGNITION

The ignition control has an internal watchguard control. The watchguard automatically resets the ignition control if it has been 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 watchguard will break and remake thermostat demand to the furnace and automatically reset the electronic ignition control to relight the furnace.

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, system should be checked as follows:

Electrical

- 1 - Check all wiring for loose connections.
- 2 - Check fuse located on unit control box. Fuse should be a 2 amp AGC fast blow.
- 3 - Check for correct voltage at unit (unit operating).
- 4 - Check amp-draw on blower motor.
Motor Nameplate _____ Actual _____
- 5 - Check to see that heat (if applicable) is operating.

Blower

- 1 - Check and clean blower wheel.
- 2 - Motors are pre-lubricated for extended life; no further lubrication is required.

Filters

- 1 - Filters must be cleaned or replaced when dirty to assure proper furnace operation.
- 2 - Reusable foam filters supplied with G21 can be washed with water and mild detergent. When dry, they should be sprayed with filter handicoater prior to reinstallation. Filter handicoater is RP Products coating no. 481 and is available as Lennox part no. P-8-5069.
- 3 - If replacement is necessary, order Lennox part number :P-8-7822 for 16 X 25 inch (406 x 635mm) filter used on all -40, -60, and Q3 and Q4-80 units; and P-9-7831 for 20 X 25 inch (508 x 635mm) filter used on Q5-80, and all -100 units.

Air Diaphragm

- 1 - Check for signs of wear, holes or fraying.
- 2 - Material must be changed every four years.

Intake and Exhaust Lines

Check intake and exhaust PVC lines and all connections for tightness and make sure there is no blockage. Also check and clean condensate system for free flow during operation.

Insulation

Outdoor piping insulation should be inspected yearly for deterioration. If necessary, replace with same materials.

Cleaning Heat Exchanger/Burner Assembly

Cleaning the heat exchanger is not a required annual maintenance. If cleaning is required, follow the below procedure.

NOTE—Use papers or protective covering in front of furnace while removing heat exchanger assembly. Refer to figure 1 when disassembling unit.

CAUTION

Before removing spark plug and sensor wires after unit has been operating, unit should be allowed to cool down at least 15 minutes before placing hands into heat chamber access opening. Residual heat in combustion chamber transfers back to air intake valve causing it to become very hot when unit is first shut down. To cool completely to room temperature, blower should be run continuously for approximately 40 minutes.

- 1 - Turn off the electrical and gas supply to the furnace.
- 2 - Remove the upper and lower furnace access panels.
- 3 - Remove the cover from the air decoupler box.
- 4 - Remove insulation pieces from the lower section of the air decoupler box.
- 5 - Unscrew the air valve housing along with the bushing.
- 6 - Disconnect the wiring to the purge blower.
- 7 - Remove the nut from the PVC air inlet fitting.
- 8 - Remove nuts from the air decoupler box mounting bolts and the gas decoupler bracket.
- 9 - Remove the air decoupler box from the unit.
- 10 - Remove the rubber pad(s) from the air pipe.
- 11 - Detach the PVC exhaust pipe from the coil manifold outlet (located in lower corner of vestibule panel).
- 12 - Disconnect the gas supply piping from the unit.
- 13 - Disconnect the wiring to the gas valve.
- 14 - Disconnect the gas line at the union just below the gas decoupler. Remove the gas valve, gas decoupler and piping assembly.
- 15 - Remove the remaining gas piping from the fitting at the vestibule panel.
IMPORTANT - Hex head fitting contains gas diaphragm valve. Take care when handling this portion of the piping assembly.
- 16 - Disconnect the blower motor wires from the control box.
- 17 - Disconnect the spark plug and sensor wires from the plugs in the combustion chamber. (The access plate is located to the left of the air decoupler box.)
- 18 - Remove the vest panel.
- 19 - Remove four nuts holding rubber heat train mounts from bottom of blower deck.

- 20- Lift heat train from unit.
 21- Backflush heat train with a soapy water solution or steam clean.

- 22- Reverse above steps to replace heat exchanger assembly. Be sure rubber seal pad is in place on air pipe and that ground wire on gas valve is put back on the upper-right air decoupler box mounting stud.

! IMPORTANT

If unit is backflushed with water, make sure all water is drained from heat train before replacing.

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 unit rating plate. Example: G21Q3-60-1.

CABINET PARTS

Top access panel
 Blower panel
 Vestibule panel
 Control box cover

CONTROL PANEL PARTS

Transformer
 Indoor blower relay
 Fan Timer Control

BLOWER PARTS

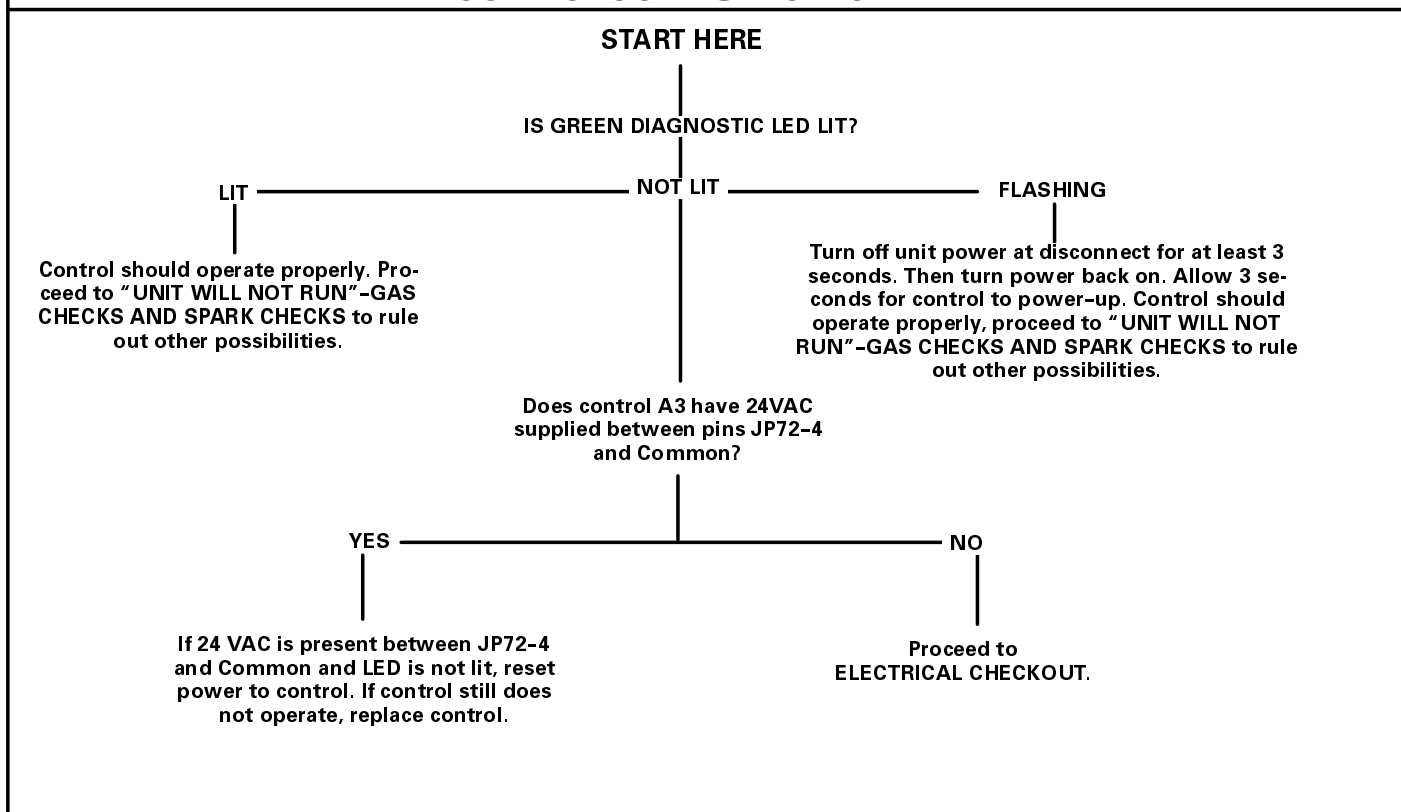
Blower wheel
 Motor
 Motor mounting frame
 Motor capacitor
 Blower housing cut-off plate
 Blower housing

HEATING PARTS

Heat exchanger assembly
 Gas orifice
 Gas valve
 Gas decoupler
 Gas flapper valve
 Purge blower
 Air intake flapper valve
 Primary control
 Ignition lead
 Spark plug ignitor
 Flame sensor lead
 Flame sensor

G21Q TROUBLESHOOTING

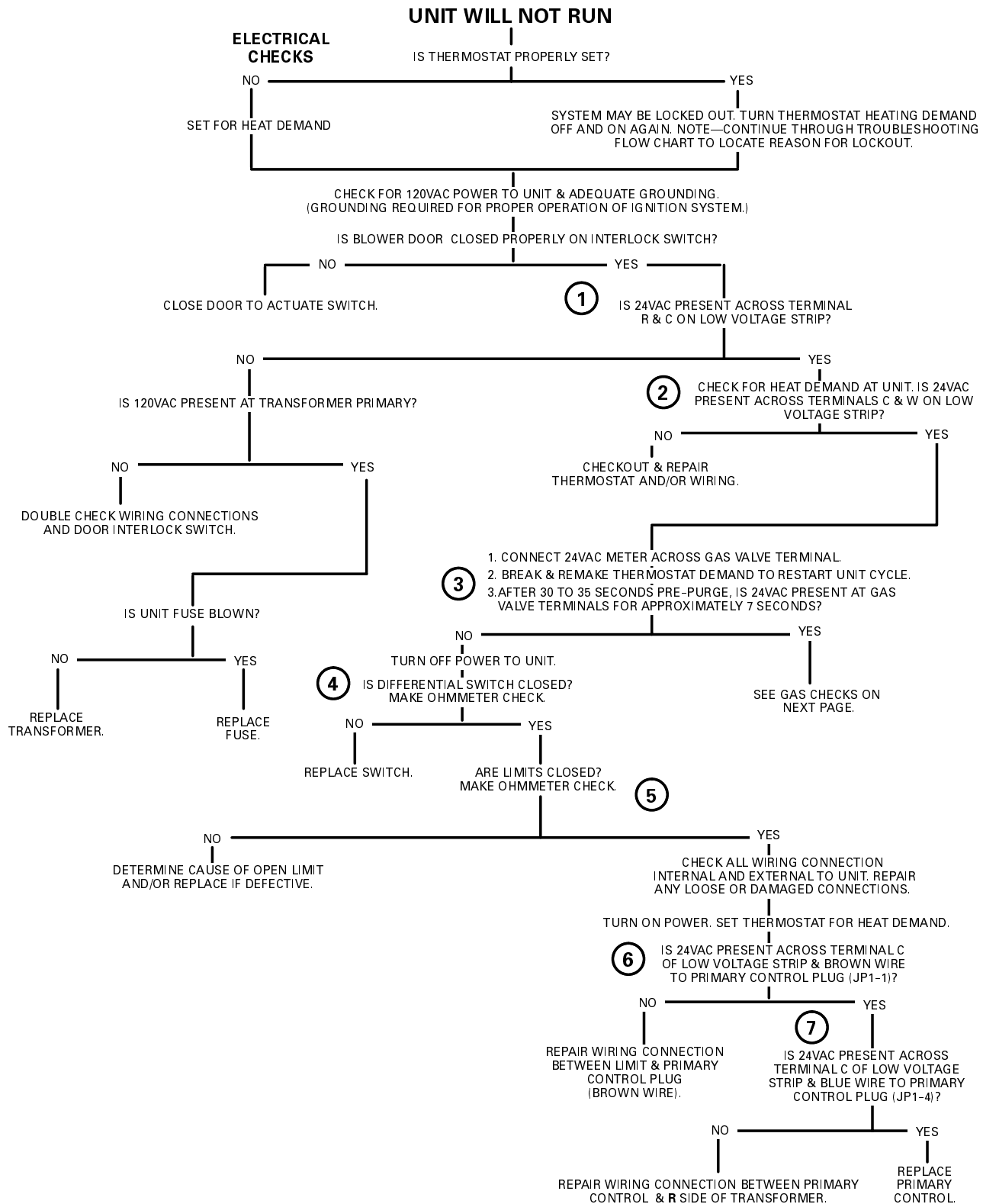
GC3 AND G891 IGNITION CONTROL TROUBLESHOOTING FLOW CHART



G21 TROUBLESHOOTING FLOW CHART

(continued from flow chart on previous page)

NOTE—Numbered steps refer to illustrations on next to last page.



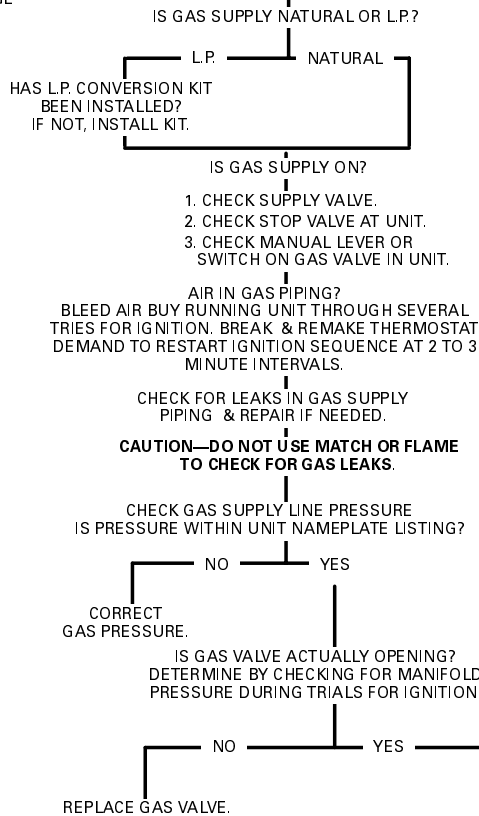
G21 TROUBLESHOOTING FLOW CHART

(continued from flow chart on previous page)

NOTE—Numbered steps refer to illustrations on next to last page.

CONTINUED FROM
UNIT WILL NOT RUN
FLOW CHART ON
PREVIOUS PAGE

GAS CHECKS



CHECK FOR LEAKS IN UNIT MANIFOLD PIPING.

LEAKS — REPAIR LEAKS & RETEST.

NO LEAKS —

VISUALLY CHECK OUTSIDE TERMINATIONS OF INTAKE & EXHAUST PVC PIPING FOR OBSTRUCTIONS.

VISUALLY CHECK CONDENSATE DRAIN FOR OBSTRUCTIONS.

REFER TO INSTALLATION INSTRUCTIONS: ARE INTAKE & EXHAUST LINES PROPERLY SIZED & APPLIED WITHIN LENGTH, DIAMETER & ELBOW LIMITS?

NO — CORRECT PIPING ERRORS & RETEST.

YES —

AIR CHECKS

TURN OFF GAS TO UNIT.

REMOVE AIR INTAKE CHAMBER COVER (USE CARE TO PREVENT DAMAGE TO COVER GASKET).

CHECK PURGE BLOWER FOR BINDING OR MECHANICAL DAMAGE.

BREAK & REMAKE THERMOSTAT DEMAND TO INITIATE CONTROL SEQUENCE.

8 IS 120VAC PRESENT ACROSS PURGE BLOWER MOTOR TERMINALS?

NO —

YES — DOES PURGE BLOWER RUN?

YES —

NO — REPLACE PURGE BLOWER.

9 IS 120VAC PRESENT BETWEEN JP1-6 AND JP1-5?

YES — CHECKOUT WIRING CONNECTIONS & REPAIR.

NO — REPLACE PRIMARY CONTROL.

SPARK CHECKS

CAUTION—HIGH VOLTAGE

TO CHECK FOR SPARK, USE EXTERNAL PLUG CONNECTED TO SPARK WIRE. MAKE SURE SPARK GROUND STRAP IS FIRMLY GROUNDED TO UNIT.

DANGER—SHOCK HAZARD. TURN OFF GAS SUPPLY BEFORE TESTING. DO NOT HANDLE SPARK PLUG OR WIRE DURING TEST.

RESTART IGNITION SEQUENCE (BREAK & REMAKE THERMOSTAT DEMAND).

AFTER 30 TO 35 SECONDS PRE-PURGE, IS SPARKING PRESENT FOR APPROXIMATELY 7 SECONDS DURING IGNITION TRIAL?

YES —

NO — CHECK FOR IGNITION WIRE (FOR BREAKS OR SHORTS TO GROUND) & FOR LOOSE CONNECTIONS TO CONTROL AND/OR SPARK PLUG. MAKE OHMMETER CHECK.

BREAK & REMAKE THERMOSTAT DEMAND TO INITIATE CONTROL SEQUENCE.

SPARK —

NO SPARK — REPLACE PRIMARY CONTROL.

TURN OFF POWER.

REMOVE & CHECK SPARK PLUG (USE 3/4" SPARK PLUG SOCKET).

1. WAS PLUG TIGHT WHEN REMOVED?
2. ARE CRACKS PRESENT IN PORCELAIN?
3. IS PLUG GAPPED PROPERLY?
4. REPLACE AND/OR REGAP PLUG IF REQUIRED.

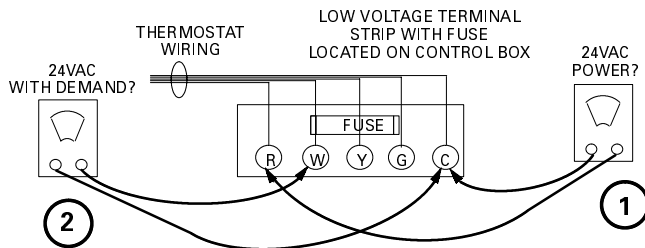
10

PUT PLUG BACK IN UNIT. TURN ON POWER. (LEAVE GAS OFF) & RETEST FOR SPARK.

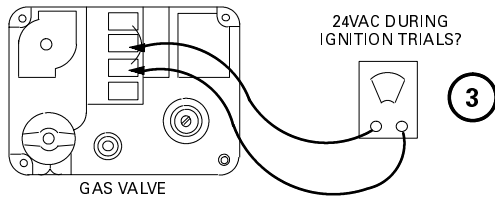
REPLACE AIR INTAKE CHAMBER COVER. TURN ON GAS & RESTART UNIT.

G21 TROUBLESHOOTING FLOW CHART — UNIT WILL NOT RUN

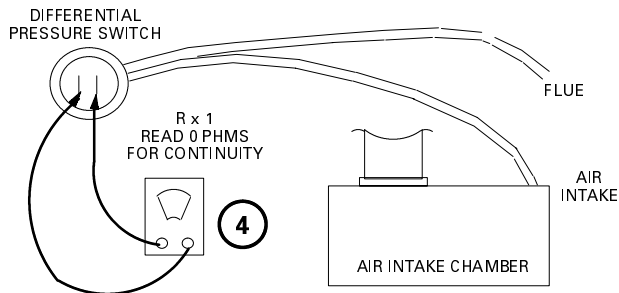
CHECK VOLTAGE AT TERMINAL AND CHECKING THERMOSTAT DEMAND



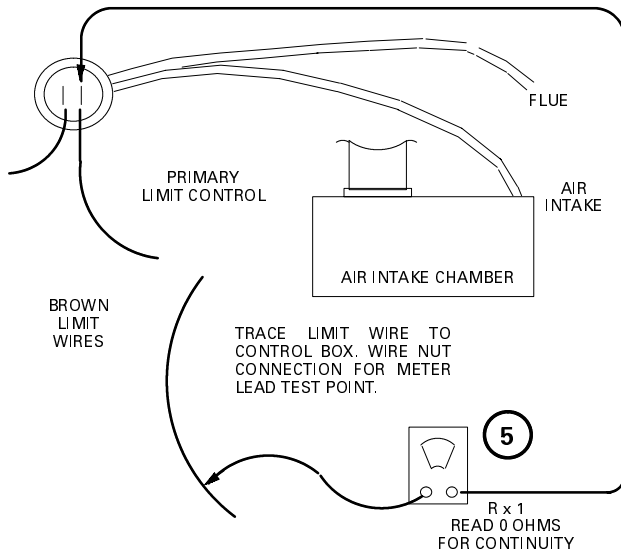
CHECKING VOLTAGE AT GAS VALVE



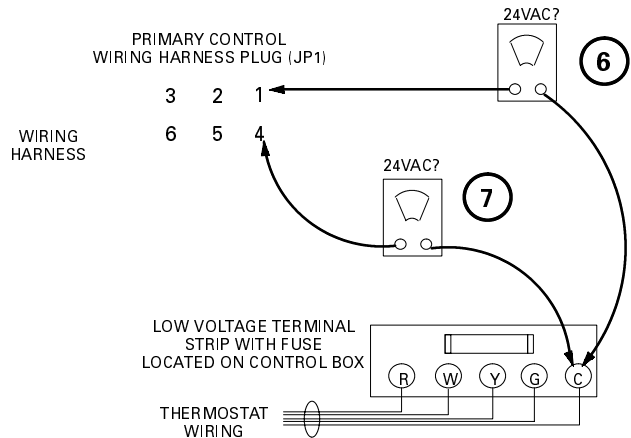
CHECKING FOR OPEN SWITCH



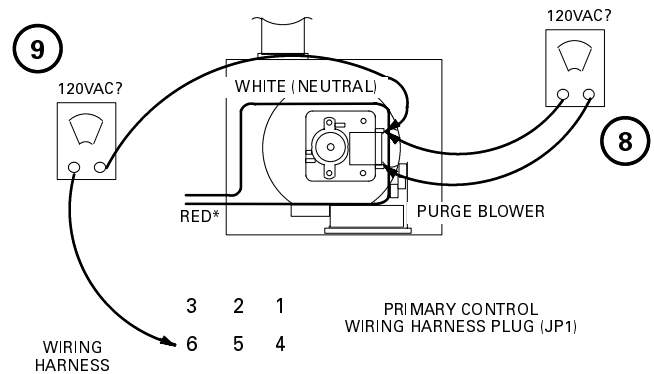
CHECKING FOR OPEN SWITCH IN LIMIT CONTROL



CHECKING VOLTAGE AT PRIMARY CONTROL



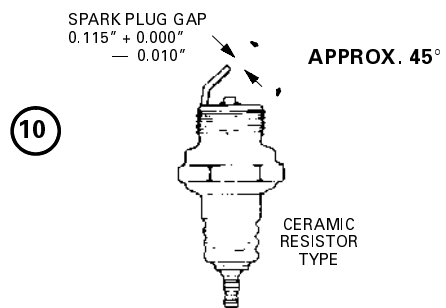
CHECKING VOLTAGE AT PURGE BLOWER



*NOTE-RED WIRE GOES TO PRIMARY CONTROL HARNESS JP1-5.

SPARK PLUG

IT IS NORMAL FOR THE ELECTRODE TO PROTRUDE AT AN UNUSUAL ANGLE



CHAMPION FI-21500

NOTE- CARBON RESISTOR TYPE PLUGS SHOULD NOT BE USED.

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. — Natural Gas; _____ w.c. — LP/Propane

Flue Connections Tight? ☐

Fan Timer Control Fan On Setting (45 Seconds Factory Setting) _____

Fan Timer Control Fan Off Setting (180 Seconds Factory Setting) _____

Temperature Rise _____

Filter Clean & Secure? ☐

Vent Clear? ☐

THERMOSTAT

Calibrated? ☐

Heat Anticipator Properly Set? ☐

Level? ☐