

INSTALLATION INSTRUCTIONS FOR UPFLOW/HORIZONTAL (RGPH), AND DOWNFLOW (RGLH) INDUCED DRAFT GAS FURNACES WITH ICM BLOWER MOTOR



Recognize this symbol as an indication of Important Safety Information!

▲ WARNING

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

▲ WARNING

PROPOSITION 65: THIS FURNACE CONTAINS FIBERGLASS INSULATION. RESPIRABLE PARTICLES OF FIBERGLASS ARE KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER. EXHAUST GAS FROM THIS FURNACE CONTAINS CHEMICALS, INCLUDING CARBON MONOXIDE, KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

▲ WARNING

THESE INSTRUCTIONS ARE INTENDED AS AN AID TO QUALIFIED SERVICE PERSONNEL FOR PROPER INSTALLATION, ADJUSTMENT AND OPERATION OF THIS UNIT. READ THESE INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING INSTALLATION OR OPERATION. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN IMPROPER INSTALLATION, ADJUSTMENT, SERVICE OR MAINTENANCE, POSSIBLY RESULTING IN FIRE, ELECTRICAL SHOCK, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

Do Not Destroy this Manual. Please read carefully and keep in a safe place for future reference by a serviceman.

▲ FOR YOUR SAFETY

- Do not store or use gasoline or other flammable vapors and liquids, or other combustible materials in the vicinity of this or any other appliance.
- WHAT TO DO IF YOU SMELL GAS
 - Do not try to light any appliance.
 - Do not touch any electrical switch; do not use any phone in your building.
 - 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.
 - Do not return to your home until authorized by the gas supplier or fire department.
- DO NOT RELY ON SMELL ALONE TO DETECT LEAKS. DUE TO VARIOUS FACTORS, YOU MAY NOT BE ABLE TO SMELL FUEL GASES.
 - U.L. recognized fuel gas and CO detectors are recommended in all applications, and their installation should be in accordance with the manufacturer's recommendations and/or local laws, rules, regulations, or customs
- Improper installation, adjustment, alteration, service or maintenance can cause injury, property damage or death. Refer to this manual. Installation and service must be performed by a qualified installer, service agency or the gas supplier.



ISO 9002



Before beginning any troubleshooting procedure, complete the following installation checklist. A furnace malfunction is sometimes caused by an improper installation. By completing this checklist, the problem may be found and corrected. Make copies of the checklist and complete one for every Low Profile Furnace service call for your records.

INSTALLATION CHECKLIST

(Refer to this manual for specifics.)

GAS SUPPLY

- _____ Adequate pipe size
- _____ No gas leaks
- _____ Proper supply and manifold gas pressure (check with an accurate U-tube manometer with the furnace and all other gas appliances operating.)

ELECTRICAL

- _____ Correct thermostat and subbase _____ Thermostat model _____ Subbase model
- _____ Correct thermostat mode and setting
- _____ Correct line supply voltage
- _____ Correct polarity (important with hot surface ignition)
- _____ Correct furnace ground to electrical panel
- _____ DC microamp (μ A) flame signal (hot surface ignition units)
- _____ Correct control voltage
- _____ Measure and set heat anticipator amperage
- _____ Air conditioning low voltage wires connected to terminals "Y" "C" - **not with wire nuts**

VENTING

- _____ Correct vent pipe diameter and length (according to AGA/GAMA tables) _____ Vent connection size
- _____ Correct venting material (according to AGA/GAMA tables)
- _____ Correct lining for masonry chimneys
- _____ Adequate clearance from combustibles
- _____ Proper negative pressure reading in the vent
- _____ Vent pipe secured to induced draft blower housing

COMBUSTION AIR

- _____ Proper source of combustion air
- _____ Correct combustion air opening size

FURNACE INSTALLATION

- _____ Adequate clearance from combustibles
- _____ Adequate clearance for service
- _____ Proper air temperature rise (See furnace rating plate)
- _____ External static pressure _____ inches w.c.
- _____ Correct filter(s)
- _____ Correct cooling coil or accessories (if equipped)
- _____ Adequate supply and return air ducting _____ Return Air Duct Size _____ Supply Air Duct Size
- _____ Air ducts sealed to prevent leakage

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► Installation Instructions are updated on a regular basis. This is done as product changes occur or if new information becomes available. In this publication, an arrow (►) denotes changes from the previous edition or additional new material.

IMPORTANT: TO INSURE PROPER INSTALLATION AND OPERATION OF THIS PRODUCT, COMPLETELY READ ALL INSTRUCTIONS PRIOR TO ATTEMPTING TO ASSEMBLE, INSTALL, OPERATE, MAINTAIN OR REPAIR THIS PRODUCT. UPON UNPACKING OF THE FURNACE, INSPECT ALL PARTS FOR DAMAGE PRIOR TO INSTALLATION AND START-UP.

GENERAL INFORMATION

The RGLH and RGPH series furnaces are design certified by AGA/CGA for use with natural and propane gases as follows:

As a Category I furnace, it may be vented vertically with type B-1 vent pipe and also may be common vented as described in these instructions.

This furnace should be installed in accordance with the American National Standard Z223.1 - latest edition booklet entitled "National Fuel Gas Code"

(NFPA 54) (in Canada, CAN/CGA B149.1 and .2 Installation Codes for gas burning appliances), and the requirements or codes of the local utility or other authority having jurisdiction including local plumbing or waste water codes.

Additional helpful publications available from the "National Fire Protection Association" are: NFPA-90A – Installation of Air Conditioning and Ventilating Systems 1985 or latest edition. NFPA-90B – Warm Air Heating

and Air Conditioning Systems 1984.

These publications are available from:

National Fire Protection Association, Inc.
Batterymarch Park
Quincy, MA 02269

Canadian Gas Association
55 Scarsdale Road
Don Mills, Ontario, Canada
M3B, 2R3

LOCATION REQUIREMENTS AND CONSIDERATIONS

GENERAL INFORMATION

IMPORTANT: If furnace operation is required during construction, and air laden with corrosive compounds such as chlorine and fluorine are present, provisions must be taken to provide clean outdoor combustion and ventilation air to the furnace.

Compounds of chlorine and fluorine, when burned with combustion air, form acids which will cause corrosion of a heat exchanger. Some of these compounds are found in paneling, dry wall, tile adhesives, paints, stains and varnishes, solvents and masonry cleaning materials.

NOTE: This furnace is shipped with heat exchanger support brackets installed under the back of the heat exchanger. These may be removed before installation, but it is not required.

LOCATION

▲ WARNING

THIS FURNACE IS NOT APPROVED FOR INSTALLATION IN A MOBILE HOME. DO NOT INSTALL THIS FURNACE IN A MOBILE HOME. INSTALLATION IN A MOBILE HOME COULD CAUSE FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

IMPORTANT: *This furnace is not approved or recommended for installation on its back, with access doors facing upwards.*

This furnace is suitable for installation in buildings constructed on-site. This heating unit should be located near the chimney and should be centralized with respect to the heat distribution system as much as practicable. When installed in a utility room, the door of the room should be wide enough to allow the largest part of the furnace to enter, or to permit the replacement of another appliance, such as a water heater.

CLEARANCE – ACCESSIBILITY

The design of forced air furnaces with input ratings as listed in the tables on the following pages are certified by A.G.A. Laboratories and CGA for the clearances to combustible materials shown in inches.

See name/rating plate and clearance label for specific model number and clearance information.

Service clearance of at least 24 inches is recommended in front of all furnaces.

ACCESSIBILITY CLEARANCES, WHERE GREATER, MUST TAKE PRECEDENCE OVER FIRE PROTECTION CLEARANCES.

UPFLOW AND HORIZONTAL INSTALLATION — Certified for use on combustible floor.

▲ WARNING

UPFLOW AND HORIZONTAL FURNACES ARE DESIGN-CERTIFIED FOR INSTALLATION ON

COMBUSTIBLE FLOORS. NOTE, HOWEVER, THAT FURNACES MUST NOT BE INSTALLED DIRECTLY ON CARPETING, TILE OR OTHER COMBUSTIBLE MATERIAL OTHER THAN WOOD FLOORING. INSTALLATION ON A COMBUSTIBLE MATERIAL CAN RESULT IN FIRE, CAUSING PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

A SPECIAL COMBUSTIBLE FLOOR SUB-BASE IS REQUIRED WHEN INSTALLING ON A COMBUSTIBLE FLOOR. FAILURE TO INSTALL THE SUB-BASE MAY RESULT IN FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THIS SPECIAL BASE IS OFFERED AS AN ACCESSORY FROM THE FACTORY. SEE THE CLEARANCE LABEL LOCATED INSIDE THE FURNACE FOR THE APPROPRIATE MODEL NUMBER.

THE SPECIAL BASE IS NOT REQUIRED WHEN THE FURNACE IS INSTALLED ON TOP OF AN AIR CONDITIONING PLENUM.

A gas-fired furnace for installation in a residential garage must be installed so that the burner(s) and the ignition source are located not less than 18 inches above the floor and the furnace is located or protected to avoid physical damage by vehicles.

UPFLOW UNIT DESIGN REQUIRES A SOLID METAL BASE PLATE (SEE TABLE ON PAGE 8 OR FURNACE

**FIGURE 1
UPFLOW AND UPFLOW/HORIZONTAL DIMENSIONS**

**CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES)
UPFLOW AND UPFLOW/HORIZONTAL MODELS**

| Model | REDUCED CLEARANCE (IN.) | | | | | | Ship. Wgts. | | | | | |
|-------|-------------------------|--------|--------|---|--------|-----------|-------------|------------|------|-----|-------|----------|
| | A | B | C | D | E | Left Side | | Right Side | Back | Top | Front | Vent |
| 05 | 17 1/2 | 16 1/2 | 12 1/2 | ① | 15 | 0 | 3② | 0 | 1 | 3 | 6③ | 105 lbs. |
| 07 | 21 | 19 7/8 | 13 1/2 | ① | 18 1/2 | 0 | 0 | 0 | 1 | 3 | 6③ | 115 lbs. |
| 10 | 21 | 19 7/8 | 13 1/2 | ① | 18 1/2 | 0 | 0 | 0 | 1 | 3 | 6③ | 120 lbs. |
| 12 | 24 1/2 | 23 1/2 | 15 1/2 | ① | 22 | 0 | 0 | 0 | 1 | 3 | 6③ | 140 lbs. |

- ① May require 3" to 4" or 3" or 5" adapter.
- ② May be 0" with type B vent.
- ③ May be 1" with type B vent.

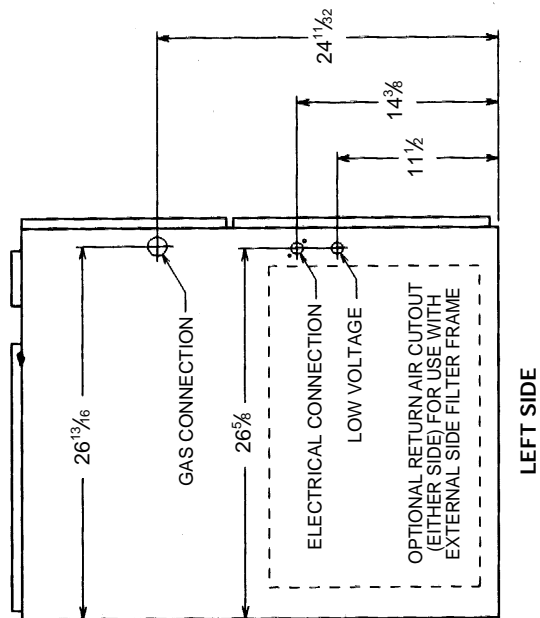
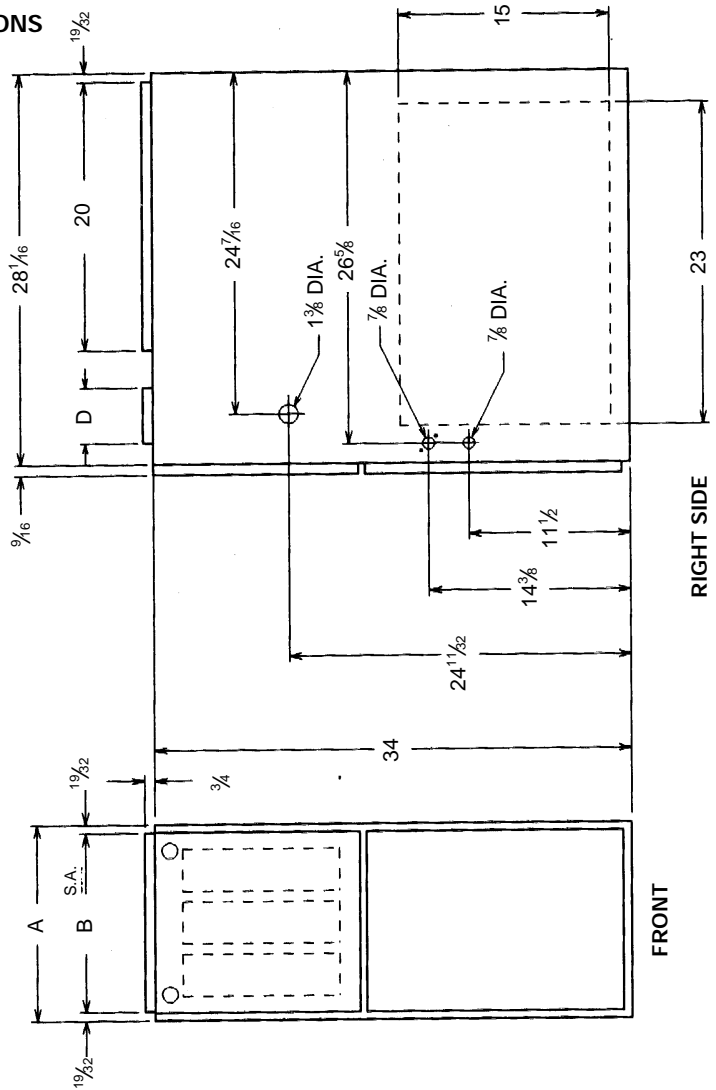
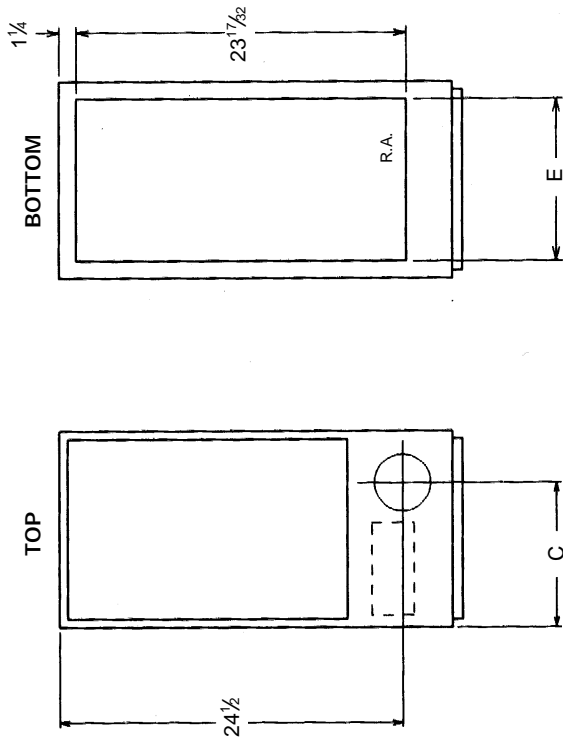
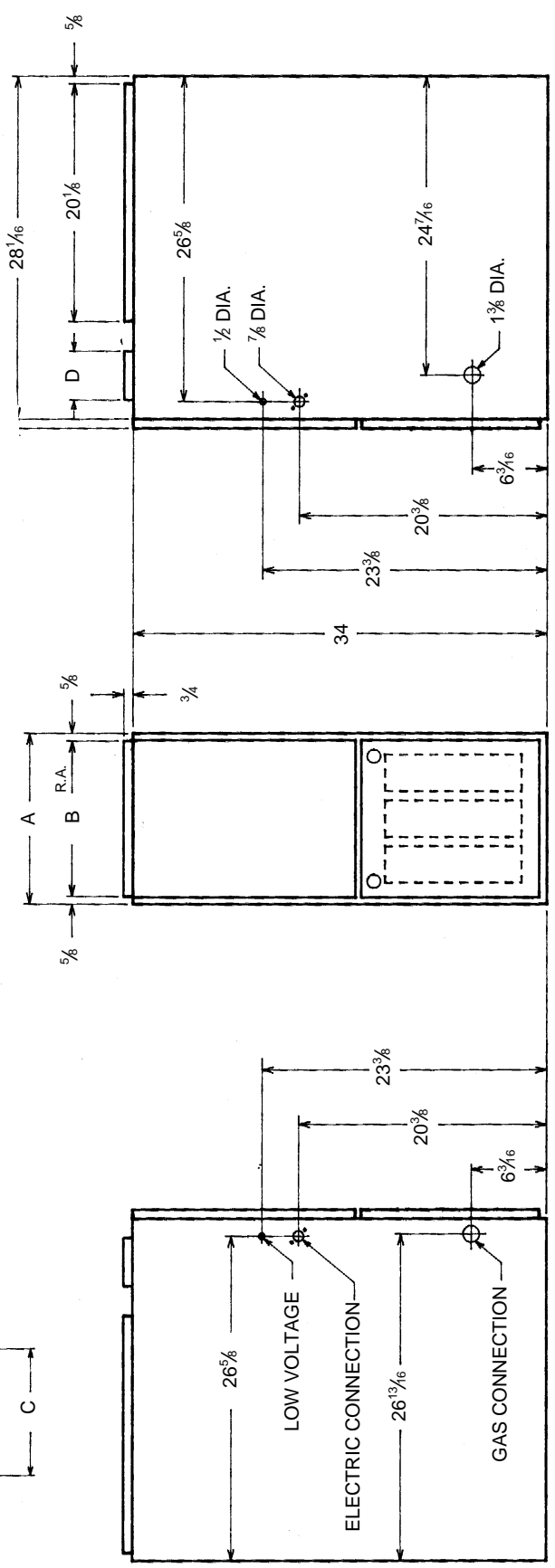
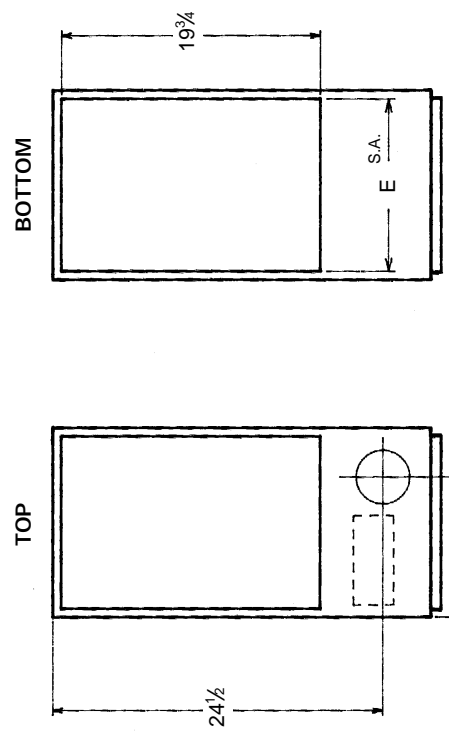


FIGURE 2

**CLEARANCE TO COMBUSTIBLE MATERIAL (INCHES)
DOWNFLOW MODELS**

| Model | A | B | C | D | E | REDUCED CLEARANCE (IN.) | | | | Ship. Wgts. | | |
|-------|--------|--------|--------|---|--------|-------------------------|------------|------|-----|-------------|-------|----------|
| | | | | | | Left Side | Right Side | Back | Top | | Front | Vent |
| 05 | 17 1/2 | 16 1/2 | 12 1/2 | ① | 16 5/8 | 0 | 3② | 0 | 1 | 3 | 6③ | 105 lbs. |
| 07 | 21 | 19 7/8 | 13 1/2 | ① | 16 5/8 | 0 | 0 | 0 | 1 | 6 | 6③ | 115 lbs. |
| 10 | 21 | 19 7/8 | 13 1/2 | ① | 20 1/8 | 0 | 0 | 0 | 1 | 6 | 6③ | 120 lbs. |
| 12 | 24 1/2 | 23 1/2 | 15 5/8 | ① | 23 5/8 | 0 | 0 | 0 | 1 | 3 | 6③ | 140 lbs. |

- ① May require 3" to 4" or 3" or 5" adapter.
- ② May be 0" with type B vent.
- ③ May be 1" with type B vent.



CLEARANCE LABEL FOR PART NUMBER) MUST BE IN PLACE WHEN THE FURNACE IS INSTALLED WITH SIDE OR REAR AIR RETURN DUCTS. FAILURE TO INSTALL A BASE PLATE COULD CAUSE PRODUCTS OF COMBUSTION TO BE CIRCULATED INTO THE LIVING SPACE AND CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING.

TABLE 1

| FURNACE WIDTH | BASE PLATE NO. | BASE PLATE SIZE |
|---------------|----------------|-----------------|
| 17½" | RXGB-D17 | 15½" x 23¾" |
| 21" | RXGB-D21 | 18⅝" x 23⅞" |
| 24½" | RXGB-D24 | 25⅝" x 23⅞" |

▲ CAUTION

When coils are used with air handlers or furnaces and installed above a finished ceiling or living area, it is recommended that an auxiliary sheet metal condensate drain pan be fabricated and installed under entire unit. Failure to do so can result in property damage.

SITE SELECTION

1. Select a site in the building near the center of the proposed, or existing, duct system.
2. Give consideration to the vent system piping when selecting the furnace location. Be sure the venting system can get from the furnace to the termination with minimal length and elbows.
3. Locate the furnace near the existing gas piping. Or, if running a new gas line, locate the furnace to minimize the length and elbows in the gas piping.
4. Locate the furnace to maintain proper clearance to combustibles as shown in the preceding tables.

▲ WARNING

COMBUSTIBLE MATERIAL MUST NOT BE PLACED ON OR AGAINST THE FURNACE JACKET OR WITHIN THE SPECIFIED CLEARANCES OF THE VENT PIPE. THE AREA AROUND THE FURNACE MUST BE

KEPT CLEAR AND FREE OF ALL COMBUSTIBLE MATERIALS INCLUDING GASOLINE AND OTHER FLAMMABLE VAPORS AND LIQUIDS. PLACEMENT OF COMBUSTIBLE MATERIALS ON, AGAINST OR AROUND THE FURNACE JACKET CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THE HOMEOWNER SHOULD BE CAUTIONED THAT THE FURNACE AREA MUST NOT BE USED AS A BROOM CLOSET OR FOR ANY OTHER STORAGE PURPOSES.

DUCTING

Proper air flow is required for the correct operation of this furnace. Too little air flow can cause erratic operation and can damage the heat exchanger. The duct system must carry the correct amount of air for heating and cooling if summer air conditioning is used.

Size the ducts according to acceptable industry standards and methods. The total static pressure drop of the entire system should not exceed .8" w.c.

IMPORTANT: Some high efficiency filters have a greater than normal resistance to air flow. This can adversely affect furnace operation. BE SURE TO CHECK AIR FLOW if using any filter other than the factory-provided filter.

▲ WARNING

NEVER ALLOW PRODUCTS OF COMBUSTION OR THE FLUE PRODUCTS TO ENTER THE RETURN AIR DUCTWORK, OR THE CIRCULATING AIR SUPPLY. ALL RETURN DUCTWORK MUST BE ADEQUATELY SEALED AND SECURED TO THE FURNACE WITH SHEET METAL SCREWS, AND JOINTS TAPED. WHEN A FURNACE IS MOUNTED ON A PLATFORM, WITH RETURN THROUGH THE BOTTOM, IT MUST BE SEALED AIRTIGHT BETWEEN THE FURNACE AND THE RETURN AIR PLENUM. THE RETURN AIR PLENUM MUST

BE PERMANENTLY ENCLOSED. NEVER USE A DOOR AS A PART OF THE RETURN AIR PLENUM. THE FLOOR OR PLATFORM MUST PROVIDE SOUND PHYSICAL SUPPORT OF THE FURNACE, WITHOUT SAGGING, CRACKS, GAPS, ETC., AROUND THE BASE AS TO PROVIDE A SEAL BETWEEN THE SUPPORT AND THE BASE.

FAILURE TO PREVENT PRODUCTS OF COMBUSTION FROM BEING CIRCULATED INTO THE LIVING SPACE CAN CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

DO NOT, UNDER ANY CIRCUMSTANCES, CONNECT RETURN OR SUPPLY DUCTWORK TO OR FROM ANY OTHER HEAT PRODUCING DEVICE SUCH AS A FIREPLACE INSERT, STOVE, ETC. DOING SO MAY RESULT IN FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PERSONAL INJURY OR PROPERTY DAMAGE.

▲ WARNING

BLOWER AND BURNERS MUST NEVER BE OPERATED WITHOUT THE BLOWER DOOR IN PLACE. THIS IS TO PREVENT DRAWING GAS FUMES (WHICH COULD CONTAIN HAZARDOUS CARBON MONOXIDE) INTO THE HOME THAT COULD RESULT IN PERSONAL INJURY OR DEATH.

UPFLOW UNITS

1. Position the unit to minimize long runs or runs with many turns and elbows.
2. Open the return air compartment.
 - a. If using side or back return air, install the bottom base.

▲ WARNING

A SOLID METAL BASE PLATE, SEE TABLE 1, OR FURNACE CLEARANCE LABEL FOR PART

NUMBER MUST BE IN PLACE WHEN THE FURNACE IS INSTALLED WITH SIDE OR REAR AIR RETURN DUCTS. FAILURE TO INSTALL A BASE PLATE COULD CAUSE PRODUCTS OF COMBUSTION TO BE CIRCULATED INTO THE LIVING SPACE AND CREATE POTENTIALLY HAZARDOUS CONDITIONS, INCLUDING CARBON MONOXIDE POISONING OR DEATH.

- b. Cut an opening in the side or back. The opening should be cut the full width of the knockouts on the unit.

NOTE: Where the maximum air flow is 1800 CFM or more, both sides or the bottom must be used for return air.

3. Connect the return duct or return air cabinet to the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.
4. **Be sure to have adequate space for the unit filter.**
NOTE: DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.
5. If summer air conditioning is desired, position the indoor coil on the top of the unit. Insure that no air can bypass this coil.
6. Connect the supply air plenum to the furnace plenum opening.

DOWNFLOW UNITS

1. Position the unit to minimize long runs or runs with many turns and elbows.
2. If summer air conditioning is desired, position the indoor coil on the bottom of the unit. Insure that no air can bypass this coil.
3. If installing on a combustible floor and not using an air conditioning plenum, install the special combustible floor base. See Figure 4.

▲ WARNING

THE DOWNFLOW FURNACE DESIGN IS CERTIFIED FOR INSTALLATION ON A NON-COMBUSTIBLE FLOOR. USE THE SPECIAL BASE SPECIFIED ON THE FURNACE CLEARANCE LABEL. FAILURE TO INSTALL THE SPECIAL BASE MAY RESULT IN FIRE, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH. THIS SPECIAL BASE IS SHIPPED FROM THE FACTORY AS AN ACCESSORY.

4. Connect the furnace to the supply air plenum.
5. Connect the return air ducting to the return air opening at the top of the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.

6. **Be sure to have adequate space for the unit filter.**

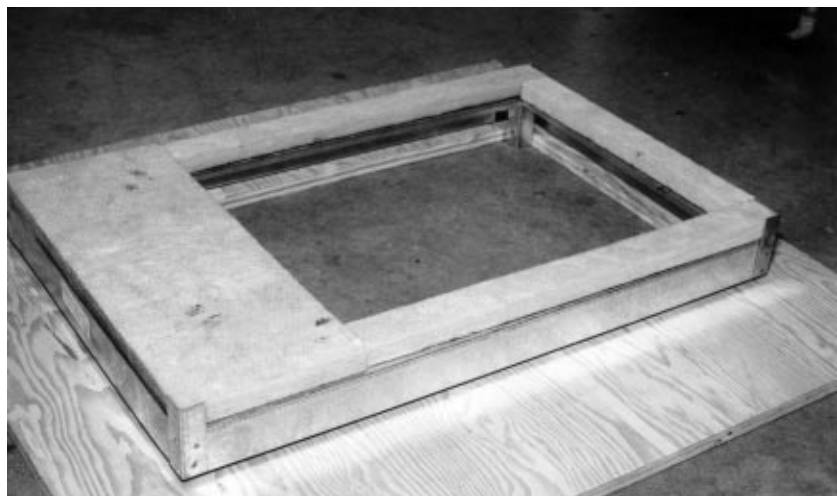
NOTE: DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

HORIZONTAL UNITS

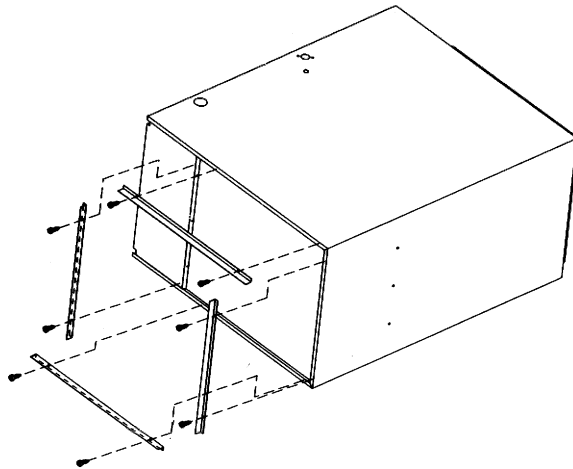
1. Position the unit to minimize long runs or runs with many turns and elbows.
2. If summer air conditioning is desired, position the indoor coil on the supply air side of the unit. Insure that no air can bypass this coil.
3. Connect the furnace to the supply air plenum.
4. Secure the four angle brackets shipped with the unit to the return air opening. See Figure 5. Connect the return air ducting to the return air opening at the top of the unit. Make the connection air tight to prevent entraining combustion gases from an adjacent fuel-burning appliance.
5. **Be sure to have adequate space for the unit filter.**

NOTE: DO NOT take return air from bathrooms, kitchens, furnace rooms, garages, utility or laundry rooms, or cold areas.

**FIGURE 4
COMBUSTIBLE FLOOR BASE**



**FIGURE 5
HORIZONTAL RETURN AIR DUCT**



FOUR ANGLE BRACKETS ARE SHIPPED WITH EACH UNIT THAT CAN BE INSTALLED HORIZONTALLY. THESE BRACKETS MAY BE USED TO SECURE THE RETURN AIR DUCT TO A HORIZONTAL UNIT.

IMPORTANT: Air for combustion and ventilation must not come from a corrosive atmosphere. Any failure due to corrosive elements in the atmosphere is excluded from warranty coverage.

The following types of installation may require OUTDOOR AIR for combustion, due to chemical exposures:

- Commercial buildings
- Buildings with indoor pools
- Furnaces installed in laundry rooms
- Furnaces in hobby or craft rooms
- Furnaces installed near chemical storage areas.

Exposure to the following substances in the combustion air supply may also require OUTDOOR AIR for combustion:

- Permanent wave solutions
- Chlorinated waxes and cleaners
- Chlorine-based 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

COMBUSTION AND VENTILATION AIR

▲ WARNING

THIS FURNACE AND ANY OTHER FUEL-BURNING APPLIANCE MUST BE PROVIDED WITH ENOUGH FRESH AIR FOR PROPER COMBUSTION AND VENTILATION OF THE FLUE GASES. MOST HOMES WILL REQUIRE THAT OUTSIDE AIR BE SUPPLIED INTO THE FURNACE AREA. FAILURE TO DO SO CAN CAUSE DEATH FROM CARBON MONOXIDE POISONING.

Adequate facilities for providing air for combustion and ventilation must be provided in accordance with section 5.3, Air for Combustion and Ventilation, of the National Fuel Gas Code, ANSI, Z223.1 latest edition or CAN/CGA B149.1 and .2 or, applicable provisions for the local building codes, and not obstructed so as to prevent the flow of air to the furnace.

OVERTEMPERATURE SAFETY SWITCHES

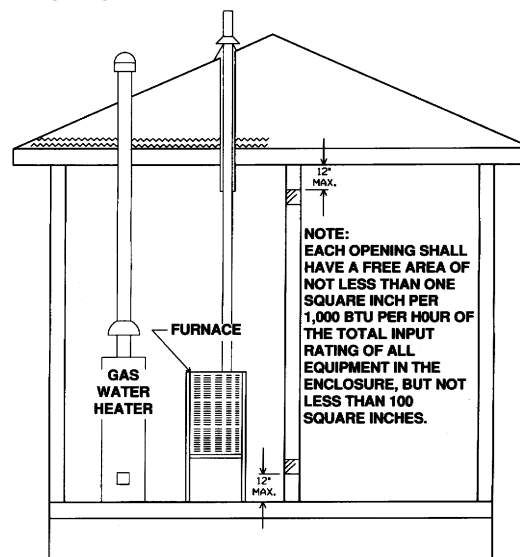
This furnace is equipped with safety switches in the control compartment to protect against overtemperature conditions caused by inadequate combustion air supply. The switches are located just above the burners on the furnace center panel on upflow and downflow models and also on each side of the burners on upflow/horizontal and horizontal "only" models, and must be manually reset if tripped. DO NOT jumper this switch. If this switch should trip, a qualified

furnace installer, service agency or the gas supplier should be called to check and/or correct for adequate combustion air supply. If this unit is mounted in a closet, the door must be closed when making this check of the installation.

DO NOT reset the overtemperature switch without taking corrective action to assure that an adequate supply of combustion air is maintained under all conditions of operation.

Replace this switch only with the identical replacement part.

**FIGURE 6
AIR FROM HEATED SPACE**



NOTE:
EACH OPENING SHALL HAVE A FREE AREA OF NOT LESS THAN ONE SQUARE INCH PER 1,000 BTU PER HOUR OF THE TOTAL INPUT RATING OF ALL EQUIPMENT IN THE ENCLOSURE, BUT NOT LESS THAN 100 SQUARE INCHES.

Combustion air must be free of acid forming chemicals; such as sulphur, fluorine and chlorine. These elements are found in aerosol sprays, detergents, bleaches, cleaning solvents, air fresheners, paint and varnish removers, refrigerants and many other commercial and household products. Vapors from these products when burned in a gas flame form acid compounds. The acid compounds increase the dew point temperature of the flue products and are highly corrosive after they condense.

▲ WARNING

ALL FURNACE INSTALLATIONS MUST COMPLY WITH THE NATIONAL FUEL GAS CODE AND LOCAL CODES TO PROVIDE ADEQUATE COMBUSTION AND VENTILATION AIR FOR THE FURNACE. FAILURE TO DO SO CAN CREATE HAZARDOUS CONDITIONS RESULTING IN PROPERTY DAMAGE, BODILY INJURY OR DEATH FROM SMOKE, FIRE OR CARBON MONOXIDE.

Combustion air requirements are determined by whether the furnace is in an open (unconfined) area or in a confined space such as a closet or small room.

EXAMPLE 1. FURNACE LOCATED IN AN UNCONFINED SPACE

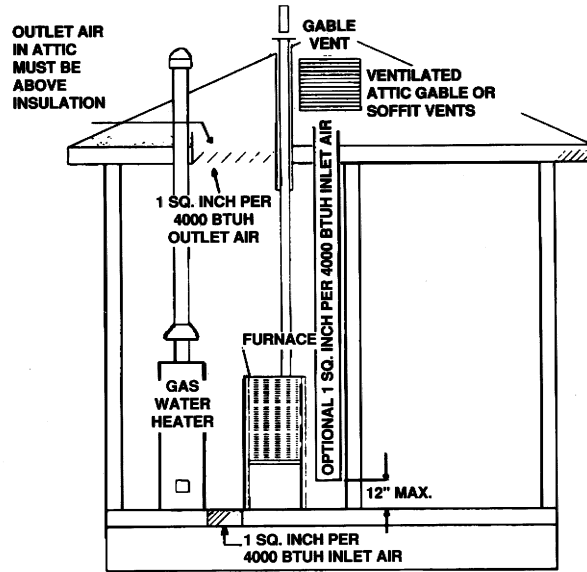
Using indoor air for combustion.

An unconfined space must have at least 50 cubic feet for each 1,000 Btuh of the total input for all appliances in the space. Here are a few examples of the room sizes required for different inputs. The sizes are based on 8 foot ceilings.

| Btuh Input | Minimum Sq. Feet With 8' Ceiling | Typical Room Size With 8' Ceiling |
|------------|----------------------------------|-----------------------------------|
| 50,000 | 312 | 14'x24' or 18'x18' |
| 75,000 | 469 | 15'x31' or 20'x24' |
| 100,000 | 625 | 20'x31' or 25'x25' |
| 125,000 | 833 | 23'x34' or 26'x30' |

If the open space containing the furnace is in a building with tight construction (contemporary construction), outside air may still be required for the furnace to operate and vent properly. Outside air openings should be sized the same as for a confined space.

FIGURE 7 AIR FROM ATTIC/CRAWL SPACE



EXAMPLE 2. FURNACE LOCATED IN A CONFINED SPACE

A confined space (any space smaller than shown above as “unconfined”) must have two openings into the space. One opening must be within 12” of the ceiling and the other must be within 12” of the floor. The openings must be sized by how they are connected to the heated area or to the outside, and by the input of all appliances in the space.

If confined space is within a building with tight construction, combustion air must be taken from outdoors or area freely communicating with the outdoors.

A. USING INDOOR AIR FOR COMBUSTION

If combustion air is taken from the heated area, the openings must each have at least 100 square inches of free area. Each opening must have at least one square inch of free area for each 1,000 Btuh of total input in the space. Here are some examples of typical openings required.

| Btuh Input | Free Area Each Opening |
|------------|------------------------|
| 50,000 | 100 Square Inches |
| 100,000 | 100 Square Inches |
| 125,000 | 125 Square Inches |

IMPORTANT: Air should not be taken from a heated space with a fireplace, exhaust fan or other device that may produce a negative pressure.

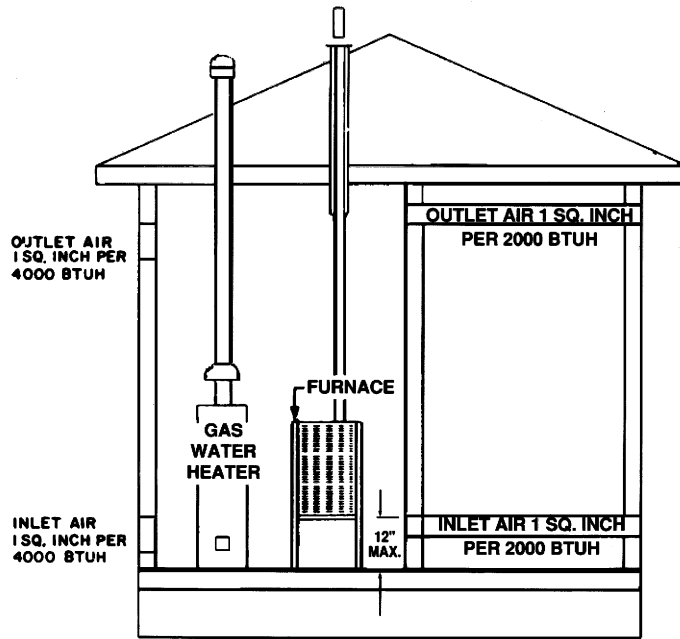
B. USING OUTDOOR AIR FOR COMBUSTION

If combustion air is taken from outdoors through vertical ducts, the openings and ducts must have at least one square inch of free area for each 4,000 Btuh of total appliance input. Here are some typical sizes.

| Btuh Input | Free Area Each Opening | Round Pipe Size |
|------------|------------------------|-----------------|
| 50,000 | 12.5 Square Inches | 4" |
| 75,000 | 18.75 Square Inches | 5" |
| 100,000 | 25 Square Inches | 6" |
| 125,000 | 31.25 Square Inches | 7" |

IMPORTANT: Do not take air from an attic space that is equipped with power ventilation.

**FIGURE 8
OUTSIDE AIR USING A HORIZONTAL INLET & OUTLET**



If combustion air is taken from outdoors through horizontal ducts, the openings and ducts must have at least one square inch of free area for each 2,000 Btuh of total appliance input. Here are typical sizes.

| Btuh Input | Free Area Each Opening | Round Pipe Size |
|------------|------------------------|-----------------|
| 50,000 | 25 Square Inches | 6" |
| 75,000 | 37.5 Square Inches | 7" |
| 100,000 | 50 Square Inches | 8" |
| 125,000 | 62.5 Square Inches | 9" |

If unit is installed where there is an exhaust fan, sufficient ventilation must be provided to prevent the exhaust fan from creating a negative pressure in the room.

Combustion air openings must not be restricted in any manner.

CONSULT LOCAL CODES FOR SPECIAL REQUIREMENTS.

Air openings in furnace casing front, return air grilles, and warm air registers must not be obstructed.

VENTING

GENERAL INFORMATION

The furnace must be vented in accordance with these instructions, ANSI Z21.47-1993/CAN/CGA-2.3-M93 or latest edition Venting Tables and the "National Fuel Gas Code" (NFPA No. 54-1992, ANSI Z223.1-1992 and requirements or codes of the local utility or other authority having jurisdiction.

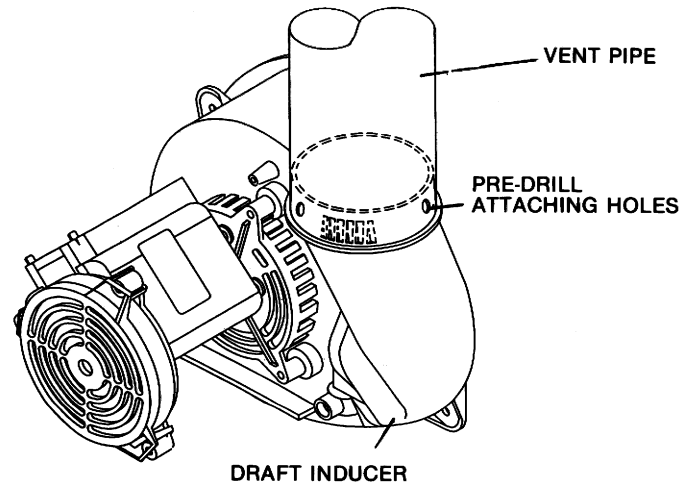
▲ WARNING

DEVICES ATTACHED TO THE FLUE OR VENT FOR THE PURPOSE OF REDUCING HEAT LOSS UP THE CHIMNEY HAVE NOT BEEN TESTED AND HAVE NOT BEEN INCLUDED IN THE DESIGN CERTIFICATION OF THIS FURNACE. WE, THE MANUFACTURER, CANNOT AND WILL NOT BE RESPONSIBLE FOR INJURY OR DAMAGE CAUSED BY THE USE OF SUCH UNTESTED AND/OR UNCERTIFIED DEVICES, ACCESSORIES OR COMPONENTS.

DRAFT INDUCER

IMPORTANT: Vent pipe attaching holes must be pre-drilled in draft inducer collar to prevent plastic material from cracking. Drill $\frac{1}{8}$ " diameter holes through vent pipe and collar and use #8 screws to attach. See Figure 9.

FIGURE 9
ATTACHING TO DRAFT INDUCER COLLAR



FURNACE CATEGORY INFORMATION

This furnace is shipped as a Category I type induced draft furnace. A Category I furnace operates with a nonpositive vent pressure and has a vent gas temperature at least 140°F above the dew point of the vent gases. A Category I type may be a draft hood equipped furnace or have a fan assisted combustion system (induced draft). The inducer is used to pull flue products through the combustion chamber and as they leave the furnace, most of the energy has been dissipated. The buoyant effect of the flue gases provides venting to the outdoors.

During the off cycle, the inducer is off and there is very little flow through the vent, cooling the vent. During the on cycle there is no dilution airflow, as with a draft hood type furnace. Although the vent heats up rapidly without dilution air, the flue products contain more water vapor, which results in a higher dew point temperature. It is most important that you follow the guidelines in these instructions to prevent the possible formation of condensation in the venting system.

As a Category I furnace it may be vented vertically with type B-1 vent pipe and also may be common vented, as described in these instructions.

IMPORTANT APPLICATION NOTES

When the furnace is used as a replacement, the existing vent system should be inspected to assure that there are no obstructions, blockage, or any signs of corrosion.

NOTE: WHEN THE VENT TABLE PERMITS MORE THAN ONE DIAMETER OF PIPE FOR A CONNECTOR OR VENT, THE SMALLEST PERMITTED DIAMETER MUST BE USED,

VENT PIPE MAY BE TYPE "B-1," EITHER RIGID OR SUITABLE FLEXIBLE CONSTRUCTION THAT CARRIES A U.L. LISTING.

COMMON VENTING IS ALLOWED WITH VERTICAL B-1 VENT SYSTEMS, AND LINED MASONRY CHIMNEYS. FOLLOW THE AGA/GAMA VENTING TABLES FOR PROPER INSTALLATION PRACTICES.

SINGLE WALL VENT CONNECTORS TO "B-1 VENT OR MASONRY CHIMNEYS" MAY BE USED UNDER THE GUIDELINES OF THE AGA/GAMA VENTING TABLES.

The entire length of the vent connector shall be readily accessible for inspection, cleaning and replacement.

"B-1" VERTICAL VENTING

Type "B-1" vents must be installed in accordance with the terms of their listings and the vent manufacturer's instructions.

"B-1" vents must be supported and spaced in accordance with their listings and the manufacturer's instructions. All vents must be supported to maintain their minimum clearances from combustible material.

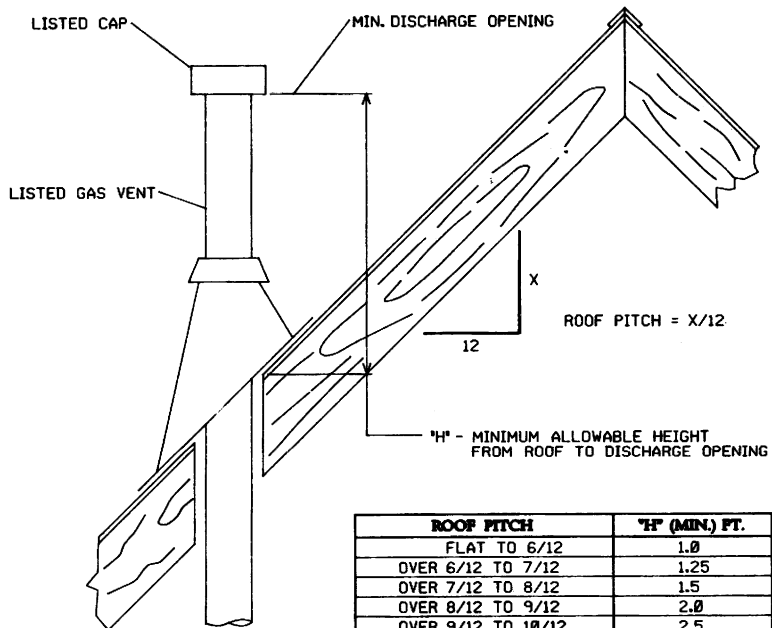
| VERTICAL VENTING | |
|------------------|--|
| Input | Categorized Furnace Vent Size Required |
| 50K | 3" |
| 75K | *4" |
| 100K | *4" |
| 125K | *4" |

*NOTE: All furnaces have a 3" vent connection as shipped from the factory. A 3" to 4" vent transition is required on all but the 50,000 BTUH models when vertically vented or common vented with metal vent pipes. **THE VENT TRANSITION CONNECTION MUST BE MADE AT THE FURNACE VENT EXIT.** It must originate with an adapter if required, at the furnace flue collar and terminate either in a listed cap or roof assembly. When common venting, the vent connector size may differ from the above diameters depending on application. See ANSI Z21.47-1993/CAN/CGA-2.3-M93 or latest edition tables.

VERTICAL VENT SYSTEMS:

1. A gas vent shall terminate above the roof surface with a listed cap or listed roof assembly. Gas vents 12 inches in size or smaller with listed caps shall be permitted to be terminated in accordance with Figure 10, provided they are at least 8 feet from a vertical wall or similar obstruction. All other gas vents shall terminate not less than 2 feet above the highest point where they pass through the roof and at least 2 feet higher than any portion of a building within 10 feet.
2. A type B gas vent shall terminate at least 5 feet in vertical height above the highest connected equipment draft hood or flue collar.
3. Must rise 1/4" per foot away from the furnace on horizontal runs and be supported with straps or hangers so it has no sags or dips. Supports at 4 foot intervals and at all elbows are recommended.
4. The vent connector must be mechanically fastened to the outlet collar of the furnace with at least (2) sheet metal screws except vent

FIGURE 10
TYPICAL VENTING WITH "B-1" VENT



| ROOF PITCH | H* (MIN.) FT. |
|---------------------|---------------|
| FLAT TO 6/12 | 1.0 |
| OVER 6/12 TO 7/12 | 1.25 |
| OVER 7/12 TO 8/12 | 1.5 |
| OVER 8/12 TO 9/12 | 2.0 |
| OVER 9/12 TO 10/12 | 2.5 |
| OVER 10/12 TO 11/12 | 3.25 |
| OVER 11/12 TO 12/12 | 4.0 |
| OVER 12/12 TO 14/12 | 5.0 |
| OVER 14/12 TO 16/12 | 6.0 |
| OVER 16/12 TO 18/12 | 7.0 |
| OVER 18/12 TO 20/12 | 7.5 |
| OVER 20/12 TO 21/12 | 8.0 |

connectors that are B-1 material.

These shall be assembled in accordance with the manufacturer's instructions. See Figure 9.

NOTE: Refer to the ANSI Z21.47-1993/CAN/CGA-2.3-M93 or latest edition venting tables for venting category I furnaces.

Single appliance venting of a fan assisted furnace into a tile-lined masonry chimney is prohibited. The chimney must be lined with either Type B vent or with a listed, single wall, metal lining system. Reference ANSI Z21.47-1993/CAN/CGA-2.3-M93 or latest edition vent tables. See Figure 11 for typical B-1 vent chase.

▲ WARNING

DO NOT CONNECT THIS FURNACE TO A CHIMNEY USED TO VENT A SOLID FUEL APPLIANCE (WOOD OR COAL). VENTING WITH A SOLID FUEL APPLIANCE CAN LEAD TO IMPROPER FUNCTIONING OF THE UNIT, AND DUE TO SOOTING, THE POSSIBILITY OF FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

HORIZONTAL VENTING

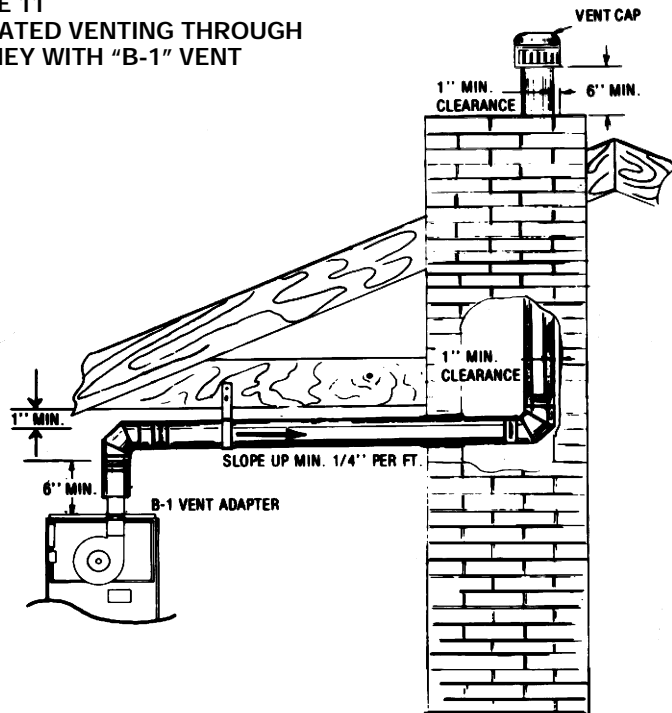
IMPORTANT: IT IS RHEEM'S POSITION NOW THAT NEW INSTALLATIONS OF ANY HTPV PIPE USED IN A CATEGORY III VENT APPLICATION, INCLUDING SELKIRK'S SELVENT™ II HTPV PRODUCT, SHOULD CEASE IMMEDIATELY.

TJERNLUND POWER VENTER

This gas fired furnace is AGA and CGA certified for use with the Tjernlund Model GPAK-1TR Power Venter when installed in accordance with the manufacturer's installation instructions. The vent pipe is to be double wall construction with a maximum of 20 feet and a minimum length of 10 feet and no more than three (3) 90° elbows.

Important: It should be noted that common venting with another appliance is **not** an option when using the Tjernlund GPAK-1TR. The use of any other type of power vent system is not approved or recommended by the manufacturer.

**FIGURE 11
DEDICATED VENTING THROUGH
CHIMNEY WITH "B-1" VENT**



EXISTING VENT SYSTEMS IMPORTANT RETROFIT VENTING INSTRUCTIONS

If this furnace is a replacement installation, **ALWAYS INSPECT** the existing vent system to be sure there are no obstructions, blockages, or signs of corrosion.

When the existing furnace is removed from a venting system serving other appliances, the venting is likely to be too large to properly vent the remaining attached appliances.

The following steps shall be followed with each appliance that remains connected to the common venting system, while the other appliances that remain connected to the common venting systems are not in operation.

NOTE: WHEN THE VENT TABLE PERMITS MORE THAN ONE DIAMETER OF PIPE FOR A CONNECTOR OR VENT, THE SMALLEST PERMITTED DIAMETER MUST BE USED.

1. Seal any unused openings in the common venting system.
2. Visually inspect the venting system for proper size and horizontal pitch and determine that there is no blockage, restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.

3. Insofar as is practical, close all building doors, windows and all doors between the space where the appliances remaining connected to the common venting system are located. Turn on clothes dryers and any appliance 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 into operation. Adjust the thermostat so the 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 that remains 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 conditions of use.
7. If improper venting is observed during any of the above tests, the common venting system must be resized. Refer to appendix G in the National Fuel Gas Code ANSI Z223.1 1988 or the ANSI Z21.47-1993/CAN/CGA-2.3-M93 or latest edition venting tables for category I furnaces.

GAS SUPPLY AND PIPING

GAS SUPPLY

▲ WARNING

THIS FURNACE IS EQUIPPED AT THE FACTORY FOR USE ON NATURAL GAS ONLY. CONVERSION TO LP GAS REQUIRES A SPECIAL KIT SUPPLIED BY THE DISTRIBUTOR OR MANUFACTURER. MAILING ADDRESSES ARE LISTED ON THE FURNACE RATING PLATE, PARTS LIST AND WARRANTY. FAILURE TO USE THE PROPER CONVERSION KIT CAN CAUSE FIRE, CARBON MONOXIDE POISONING, EXPLOSION, PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

See the conversion kit index supplied with the furnace. This index identifies the proper LP Gas Conversion Kit required for each particular furnace.

IMPORTANT: Any additions, changes or conversions required for the furnace to satisfactorily meet the application should be made by a qualified installer, service agency or the gas supplier, using factory-specified or approved parts.

IMPORTANT: Connect this furnace only to gas supplied by a commercial utility.

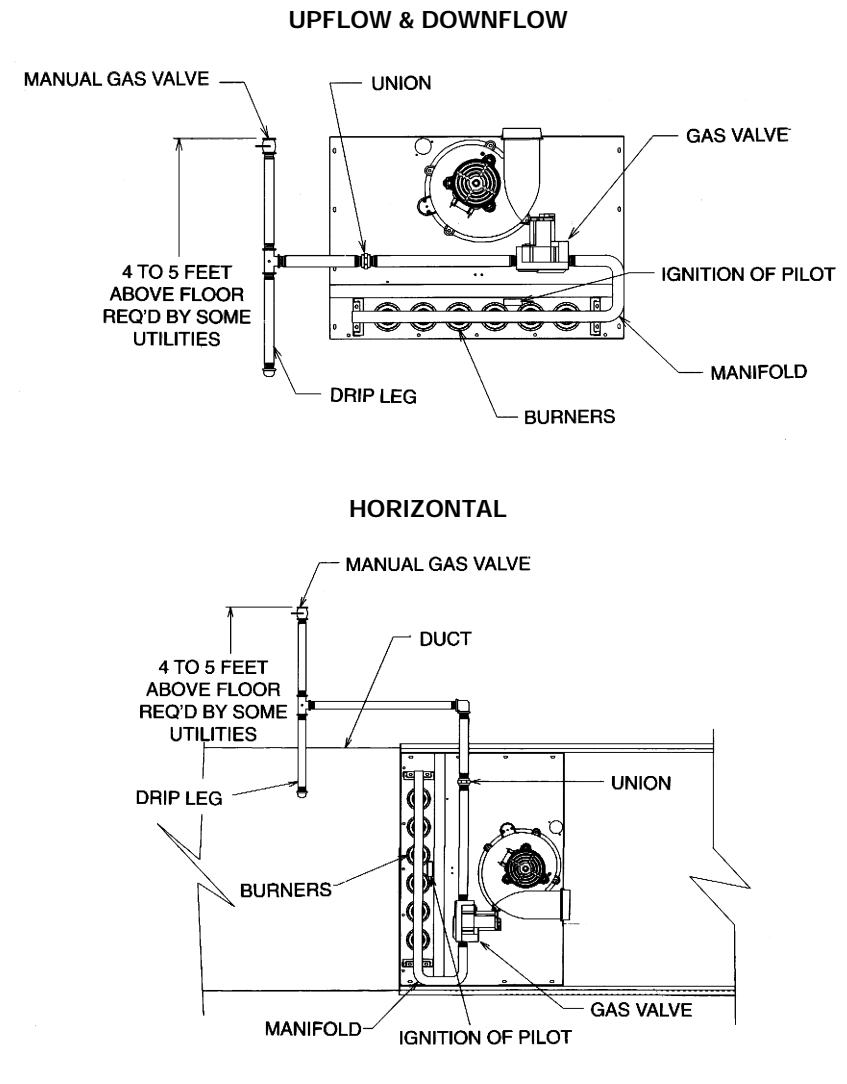
IMPORTANT: A U.L. recognized fuel gas and CO detector(s) are recommended in all applications, and their installation should be in accordance with the detector manufacturer's recommendations and/or local laws, rules, regulations or customs.

GAS PIPING

Install the gas piping according to all local codes and regulations of the utility company.

If possible, run a separate gas supply line directly from the meter to the furnace. Consult the local gas company for the location of the manual main shut-off valve. **The gas line and manual gas valve must be adequate in size to prevent undue pressure drop and never smaller than the pipe size to the combination gas valve on the furnace.** Refer to Table 2 for the recommended pipe size for natural gas and Table 3 for LP gas pipe sizes.

FIGURE 12
GAS PIPING INSTALLATION



IMPORTANT: It is permissible to run flexible gas connector inside the unit to a piece of black pipe.

Install a ground joint union inside the cabinet to easily remove the control valve assembly. Install a manual shut-off valve in the gas line outside the furnace casing. The valve should be readily accessible to turn the gas supply on or off. Install a drip leg in the gas supply line as close to the furnace as possible. Always use a pipe compound resistant to the action of liquefied petroleum gases on all threaded connections.

IMPORTANT: When making gas pipe connections, use a back-up wrench to prevent any twisting of the control assembly and gas valve.

Any strains on the gas valve can change the position of the gas orifices in the burners. This can cause erratic furnace operation.

IMPORTANT: ENSURE that the furnace gas control valve not be subjected to high gas line supply pressures.

DISCONNECT the furnace and its individual shut-off valve from the gas supply piping during any pressure testing that exceeds 1/2 p.s.i.g. (3.48 kPa).

GAS PRESSURE

Natural gas supply pressure should be 5" to 7" w.c. LP gas supply pressure should be 11" to 14" w.c. This pressure must be maintained with all other gas-fired appliances in operation. Never exceed a maximum gas supply pressure of 14" w.c. with any fuel.

The minimum supply pressure to the gas valve for proper furnace input adjustments is 5" w.c. for natural gas, however 6" to 7" is recommended. The minimum supply pressure is 11" w.c. for LP gas.

▲ WARNING

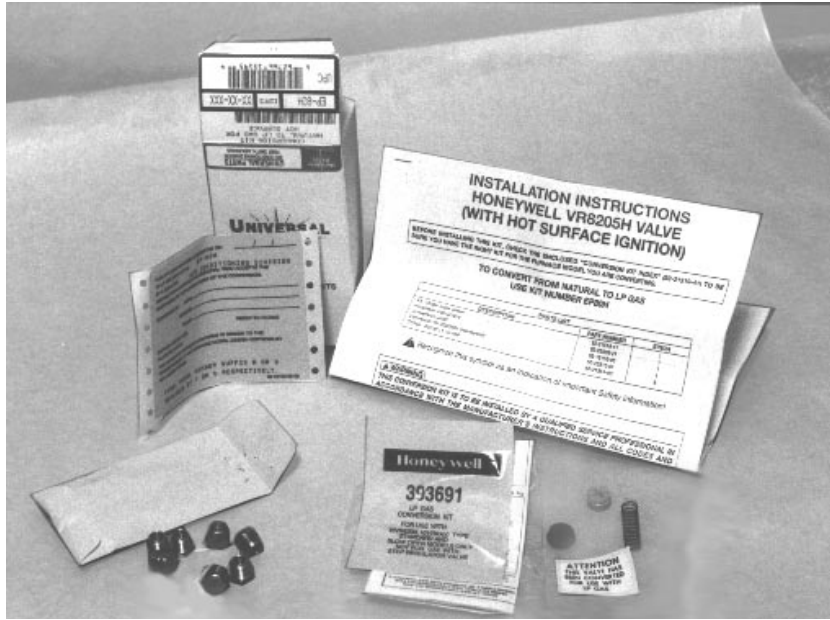
NEVER PURGE A GAS LINE INTO THE COMBUSTION CHAMBER. NEVER USE MATCHES, FLAME OR ANY IGNITION SOURCE FOR CHECKING LEAKAGE. FAILURE TO FOLLOW THIS WARNING CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

To check for gas leakage, use an approved chloride-free soap and water solution, an electronic combustible gas detector (see Figure 13), or other approved method.

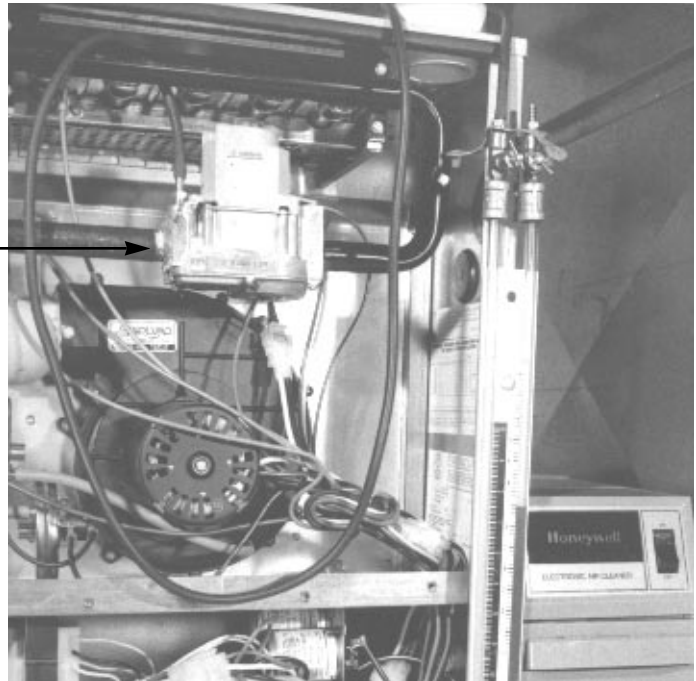
**FIGURE 13
ELECTRONIC COMBUSTIBLE
GAS DETECTOR**



**FIGURE 14
LP KIT CONTENTS**



**FIGURE 15
HOSE CONNECTION TO LINE PRESSURE TAP**



LP CONVERSION

The valve can be converted to use liquefied petroleum (LP) gas by replacing the pressure regulator spring with the conversion kit spring. This LP kit spring allows the regulator to maintain the proper manifold pressure for LP gas. The correct burner LP orifices are included in the kit. See Figure 14.

NOTE: Order the correct LP conversion kit from the furnace manufacturer. ***Furnace conversion to LP gas must be performed by a qualified technician.***

To change orifice spuds for either conversion to LP or for elevation:

1. Shut off the manual main gas valve and remove the gas manifold.
2. Replace the orifice spuds.
3. Reassemble in reverse order.

Consult the tables at right if there is any question concerning orifice sizing.

4. Turn the gas supply back on and check for proper operation and manifold pressure.
5. Attach the notice label alerting the next service technician that the furnace has been converted to LP gas.

NOx MODELS

When converting furnaces equipped with NOx inserts to LP gas, remove the NOx insert assemblies. Steps for removal are listed below:

1. Turn off all electrical power and the gas supply to the furnace.
2. Remove the burner door from the furnace.
3. Remove the igniter assembly – **handle with care.**
4. Remove the two screws attaching the NOx insert retainer brackets to the center panel. Pull the retainer rod.
5. Put the two screws back into the holes in the center panel.
6. Re-install the igniter and burner assemblies.
7. Replace burner door.
8. Turn on electrical power and gas supply to the unit.

ORIFICE SIZING CHART

| RATING PLATE INPUT BTU/HR | ELEVATION | |
|---------------------------------|--|---------------------|
| | 0 TO 7,999 FT. | 8,000 FT. AND ABOVE |
| NATURAL GAS | HEATING VALUE @ 1,000 BTU/FT ³ , SPECIFIC GRAVITY 0.62 MANIFOLD PRESSURE @ 3.5" W.C. | |
| 50,000 | 42 | 43 |
| 75,000 | 42 | 43 |
| 100,000 | 42 | 43 |
| 125,000 | 42 | 43 |
| L.P. GAS | HEATING VALUE @ 2,475 BTU/FT ³ , SPECIFIC GRAVITY 1.52/ MANIFOLD PRESSURE @ 10" W.C. | |
| 50,000 | 54 | 55 |
| 75,000 | 54 | 55 |
| 100,000 | 54 | 55 |
| 125,000 | 54 | 55 |

ORIFICE SIZING CHART (CANADA)

| RATING PLATE INPUT BTU/HR | ELEVATION | |
|---------------------------------|--|------------------------|
| | 0 TO 1,999 FT. | 2,000 FT. TO 4,500 FT. |
| NATURAL GAS | HEATING VALUE @ 1,000 BTU/FT ³ , SPECIFIC GRAVITY 0.62 MANIFOLD PRESSURE @ 3.5" W.C. | |
| 50,000 | 42 | 43 |
| 75,000 | 42 | 43 |
| 100,000 | 42 | 43 |
| 125,000 | 42 | 43 |
| L.P. GAS | HEATING VALUE @ 2,475 BTU/FT ³ , SPECIFIC GRAVITY 1.52/ MANIFOLD PRESSURE @ 10" W.C. | |
| 50,000 | 54 | 55 |
| 75,000 | 54 | 55 |
| 100,000 | 54 | 55 |
| 125,000 | 54 | 55 |

SETTING GAS PRESSURE

The maximum gas supply pressure to the furnace should be 7" w.c. natural gas, or 14" w.c. LP gas. The minimum supply gas pressure to the gas valve should be 5" w.c. natural gas or 11" w.c. LP gas. A properly calibrated U-Tube manometer is required for accurate gas pressure measurements.

Supply Gas Pressure Measurement. A line pressure tap is on the input side of the gas valve.

1. With gas shut off to the furnace at the manual gas valve outside the unit, remove the input pressure tap plug.

2. Connect a U-Tube manometer to the pressure tap. See Figure 15.
3. Turn on the gas supply and operate the furnace and all other gas-fired units on the same gas line as the furnace.
4. Note or adjust the line gas pressure to give:
 - A. 5" - 7" w.c. for natural gas.
 - B. 11" - 14" w.c. for LP gas.
5. Shut off the gas at the manual gas valve and remove the U-Tube manometer.
6. Replace the pressure tap plug before turning on the gas.

If the supply gas line pressure is above these ranges, install an in-line gas regulator to the furnace for natural gas units. With LP gas, have the LP supplier reduce the line pressure at the regulator.

If supply gas line pressure is below these ranges, either remove any restrictions in the gas supply piping or enlarge the gas pipe. See Tables 2 and 3. With LP gas, have the LP supplier adjust the line pressure at the regulator.

**TABLE 2
NATURAL GAS PIPE CAPACITY TABLE (CU. FT./HR.)**

Capacity of gas pipe of different diameters and lengths in cu. ft. per hr. with pressure drop of 0.3 in. and specific gravity of 0.60 (natural gas).

| Nominal Iron Pipe Size, Inches | Length of Pipe, Feet | | | | | | | |
|--------------------------------|----------------------|-------|-----|-----|-----|-----|-----|-----|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 |
| 1/2 | 132 | 92 | 73 | 63 | 56 | 50 | 46 | 43 |
| 3/4 | 278 | 190 | 152 | 130 | 115 | 105 | 96 | 90 |
| 1 | 520 | 350 | 285 | 245 | 215 | 195 | 180 | 170 |
| 1-1/4 | 1,050 | 730 | 590 | 500 | 440 | 400 | 370 | 350 |
| 1-1/2 | 1,600 | 1,100 | 890 | 760 | 670 | 610 | 560 | 530 |

After the length of pipe has been determined, select the pipe size which will provide the minimum cubic feet per hour required for the gas input rating of the furnace. By formula:

$$\text{Cu. Ft. Per Hr. Required} = \frac{\text{Gas Input of Furnace (BTU/HR)}}{\text{Heating Value of Gas (BTU/FT}^3\text{)}}$$

The gas input of the furnace is marked on the furnace rating plate. The heating value of the gas (BTU/FT³) may be determined by consulting the local natural gas utility or the LP gas supplier.

**TABLE 3
LP GAS PIPE CAPACITY TABLE (CU. FT./HR.)**

Maximum capacity of pipe in thousands of BTU per hour of undiluted liquefied petroleum gases (at 11 inches water column inlet pressure).
(Based on a Pressure Drop of 0.5 Inch Water Column)

| Nominal Iron Pipe Size, Inches | Length of Pipe, Feet | | | | | | | | | | | |
|--------------------------------|----------------------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|
| | 10 | 20 | 30 | 40 | 50 | 60 | 70 | 80 | 90 | 100 | 125 | 150 |
| 1/2 | 275 | 189 | 152 | 129 | 114 | 103 | 96 | 89 | 83 | 78 | 69 | 63 |
| 3/4 | 567 | 393 | 315 | 267 | 237 | 217 | 196 | 182 | 173 | 162 | 146 | 132 |
| 1 | 1,071 | 732 | 590 | 504 | 448 | 409 | 378 | 346 | 322 | 307 | 275 | 252 |
| 1-1/4 | 2,205 | 1,496 | 1,212 | 1,039 | 913 | 834 | 771 | 724 | 677 | 630 | 567 | 511 |
| 1-1/2 | 3,307 | 2,299 | 1,858 | 1,559 | 1,417 | 1,275 | 1,181 | 1,086 | 1,023 | 976 | 866 | 787 |
| 2 | 6,221 | 4,331 | 3,465 | 2,992 | 2,646 | 2,394 | 2,205 | 2,047 | 1,921 | 1,811 | 1,606 | 1,496 |

Example (LP): Input BTU requirement of unit, 150,000
Equivalent length of pipe, 60 ft. = 3/4" IPS required.

ELECTRICAL WIRING

⚠ WARNING

TURN OFF ELECTRIC POWER AT THE FUSE BOX OR SERVICE PANEL BEFORE MAKING ANY ELECTRICAL CONNECTIONS.

ALSO, THE GROUND CONNECTION MUST BE COMPLETED BEFORE MAKING LINE VOLTAGE CONNECTIONS. FAILURE TO DO SO CAN RESULT IN ELECTRICAL SHOCK, SEVERE PERSONAL INJURY OR DEATH.

IMPORTANT: THE FURNACE MUST BE INSTALLED SO THAT THE ELECTRICAL COMPONENTS ARE PROTECTED FROM WATER (FURNACE CONDENSATE).

ELECTRICAL CONNECTIONS

⚠ WARNING

THE CABINET MUST BE PERMANENTLY GROUNDED. A GROUND SCREW IS PROVIDED IN THE JUNCTION BOX FOR THIS PURPOSE. FAILURE TO DO SO CAN RESULT IN FIRE, ELECTRICAL SHOCK, PERSONAL INJURY OR DEATH.

The electrical supply requirements are listed on the furnace rating plate.

Use a separate fused branch electrical circuit containing a properly sized fuse or circuit breaker. Run this circuit directly from the main switch box to an electrical disconnect which must be readily accessible and located within sight of the furnace. Connect from the disconnect to the junction box on the left side of the furnace, inside the control compartment. See appropriate wiring diagram.

NOTE: The electrical junction box inside the furnace control compartment may be relocated to the right side if necessary. A knockout is provided.

NOTE: L1 (hot) and L2 (neutral) polarity must be observed when making field connections to the furnace. The ignition control on electric ignition models will not sense flame if L1 and L2 are reversed.

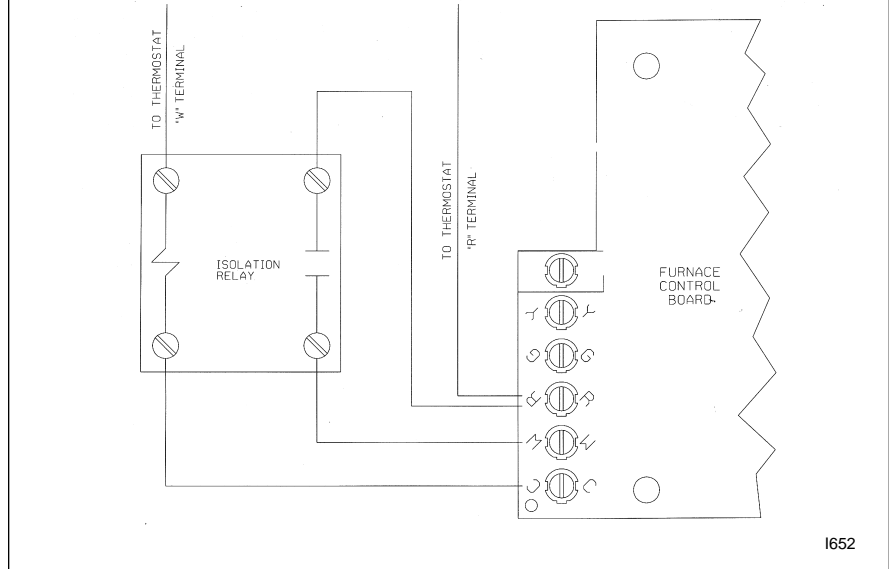
Installation of the electric supply line should be in accordance with the National Electric Code ANSI/NFPA No. 70, latest edition, or Canadian Electrical Code Part 1 - CSA Standard C22.1 and local building codes.

This can be obtained from:

National Fire Protection Association
Battery March Park
Quincy, MA 02269

Canadian Standards Association
178 Roxdale Boulevard
Roxdale, Ontario, Canada M92 1R3

FIGURE 16
ISOLATION RELAY



THERMOSTAT

The room thermostat must be compatible with the integrated furnace control on the furnace. All thermostats available from the furnace manufacturer's Parts Department are acceptable. Generally, all thermostats that are not of the "current robbing" type are compatible with the integrated furnace control we use.

NOTICE: An isolation relay can be added to prevent any compatibility problems that may occur. Use a single-pole, single-throw relay with a 24-volt AC coil. The contacts should be rated for .5 amps minimum at 24 volts. See Figure 16.

Install the room thermostat in accordance with the instruction sheet in the box with the thermostat. Run the thermostat lead wires inside the control compartment. Connect the thermostat as shown on the wiring diagram.

NOTE: "Y" must be connected to the Integrated Furnace Control. Never install the thermostat on an outside wall or where it will be influenced by drafts, concealed hot or cold water pipes, lighting fixtures, radiation from fireplace, rays of sun, lamps, television, radios or air streams from registers. Refer to the instructions packed with the thermostat for best anticipator adjustment or selection or see below.

HEAT ANTICIPATOR SETTINGS

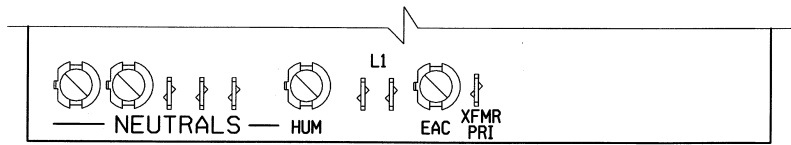
For adjusting the thermostat heat anticipator setting; (a) add the current draw of the various components in the system or (b) measure the current flow on either the R or W thermostat circuit and set the thermostat heat anticipator according to the current flow measured. The "nominal" setting for this control is 0.15 A.

| FIELD WIRE SIZE FOR 24 VOLT THERMOSTAT CIRCUITS | | | | | | |
|---|--------------------------|-----|-----|-----|-----|-----|
| Thermostat Load - Amps | SOLID COPPER WIRE - AWG. | | | | | |
| | 3.0 | 16 | 14 | 12 | 10 | 10 |
| 2.5 | 16 | 14 | 12 | 12 | 12 | 10 |
| 2.0 | 18 | 16 | 14 | 12 | 12 | 10 |
| | 50 | 100 | 150 | 200 | 250 | 300 |
| | Length of Run - Feet (1) | | | | | |

① The total wire length is the distance from the furnace to the thermostat and back to the furnace.

NOTE: Do not use 24 volt control wiring smaller than No. 20.

FIGURE 17
LINE VOLTAGE CONNECTIONS
UTEC 1012-922 CONTROL BOARD



I653

FIELD INSTALLED OPTION ACCESSORIES

ELECTRONIC AIR CLEANER

1. Electronic air cleaner line voltage power can be supplied from the screw terminal "EAC" and a line voltage neutral screw terminal on the control board. See Figure 17. This will power the electronic air cleaner whenever the circulating air blower is in operation.

HUMIDIFIER

2. Humidifier line voltage power can be supplied from screw terminal "HUM" to a line voltage neutral screw terminal on the control board. See Figure 17. This will power the humidifier whenever the burner is on and the circulating air blower is operating in the heating mode.

NOTE: Maximum current –1.0 amps for each option.

HOT SURFACE IGNITION LIGHTING INSTRUCTIONS

This appliance is equipped with a hot surface ignition device. This device lights the main burners each time the room thermostat (closes) calls for heat. See lighting instructions on the furnace.

TO START FURNACE

▲ WARNING

- 1. BE SURE THAT THE MANUAL GAS CONTROL HAS BEEN IN THE "OFF" POSITION FOR AT LEAST FIVE MINUTES. DO NOT ATTEMPT TO MANUALLY LIGHT THE MAIN BURNERS. FAILURE TO FOLLOW THIS WARNING CAN CAUSE A FIRE OR AN EXPLOSION RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.**
2. Set the room thermostat to the lowest setting.
3. Turn the gas control knob to the "On" position, or move the gas control lever to the "On" position.
4. Replace the control access door.
5. Turn on the electrical power.
6. Set the room thermostat to a point above room temperature to light the main burners. After the burners are lit, set room thermostat to a desired temperature.

TO SHUT DOWN FURNACE

1. Set the room thermostat to its lowest setting.
2. Shut off the gas to main burners by turning the gas control knob to the "Off" position, or by depressing the gas control lever and moving it to the "Off" position.

▲ WARNING

SHOULD OVERHEATING OCCUR OR THE GAS SUPPLY FAIL TO SHUT OFF, SHUT OFF THE MANUAL GAS VALVE TO THE APPLIANCE BEFORE SHUTTING OFF THE ELECTRICAL SUPPLY. FAILURE TO DO SO CAN CAUSE AN EXPLOSION OR FIRE RESULTING IN PROPERTY DAMAGE, PERSONAL INJURY OR DEATH.

SEQUENCE OF OPERATION

UTEC Integrated Control with Hot Surface Ignition.

1. Each time the thermostat contacts close, the induced draft blower (inducer) begins a prepurge cycle.
2. The air proving negative pressure switch(es) closes.
3. **20 seconds after the pressure switch(es) close, the hot surface igniter heats for 5 seconds** to full temperature. The induced draft blower operates for the complete heating cycle.
4. After the 5-second igniter warm up, **the gas valve opens for a 8-second trial for ignition.**
5. The igniter lights the gas burners and **stays energized for the first 7 seconds after the gas valve opens.**
6. 7 seconds after the gas valve opens **the remote flame sensor must prove flame ignition for one second** using the process of flame rectification. If the burners don't light, the system goes through another ignition sequence. It does this **up to four** times.
7. The main blower starts ramping up approximately 12 seconds after the gas valve opens.
8. When the thermostat cycle ends, the gas valve closes, the burners go out, the induced draft blower runs for a **5-second post-purge**, and the negative pressure switch(es) open.
9. The main blower continues until timed off by the setting on the integrated furnace control board.

Sequence if the system doesn't light or doesn't sense flame:

1. On a call for heat, the control runs the inducer for 20 seconds to prepurge.
2. After the 20-second prepurge, the hot surface igniter heats for 5 seconds. The inducer continues to run.
3. After the 5-second igniter warm up, the gas valve opens for a 8-second trial for ignition. The inducer continues and the igniter stays energized.
4. The igniter heats for 5 seconds. After 5 seconds, the gas valve opens for 8 seconds. If no flame is sensed, it closes the gas valve, the igniter de-energizes, **the inducer runs for 30 seconds more before the next ignition trial.**
5. If flame is not sensed during the eighth second after the gas valve opens the second time, the gas valve closes, and the igniter de-energizes. **Both the inducer and main blower operate for 180 seconds after the second trial.**
6. It repeats this process up to four times. At the end of the last try, the inducer stops immediately. **The system is in "soft" lock out.**
7. **To reset the lock out, make and break power at the unit disconnect switch for 5 to 10 seconds.** It then goes through another set of trials for ignition.

SETTING BLOWER TIMINGS

NOTE: It is not permissible to use this furnace in twinning applications.

IMPORTANT: *This furnace may not be used in by pass zoning applications.*

The ICM motor in this furnace is programmed to operate over a wide range of static pressures (0.1-0.8 IWC static) with an essentially constant level of air flow. The air flow required for a given cooling application is selected by utilizing the appropriate dip switch on the furnace integrated control board. For heating, the temperature rise of the unit is selected by dip switch settings as well. Wiring schemes for the thermostat and fossil fuel kit are identical to those used with other (-)GDG/(-)GPH/(-)GLH furnaces.

The furnace integrated control was designed specifically for use with the ICM motor. On the control, there are two banks of dip switches. The bank with two switches controls the heating blower off delay in a similar fashion to the 1012-920 boards used in other (-)GDG/(-)GPH/(-)GLH furnaces.

The other dip switch bank contains eight switches as shown in Figure 18.

These eight switches define the operation of the ICM motor. The switches are actually broken down into four dip switch pairs. Switches 1 and 2 act as a pair as do switches 3 and 4, 5 and 6, 7 and 8. Each dip switch pair has a total of four possible selections corresponding to A, B, C and D as shown in Figure 19.

FIGURE 18

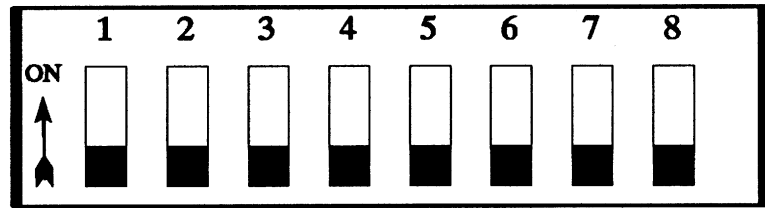
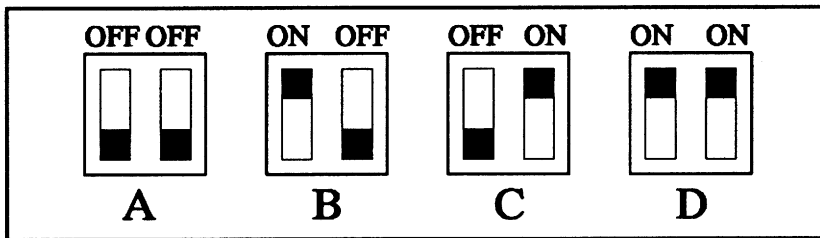


FIGURE 19



The assignments of the switch pairs are shown in Table 4. Pins 1 and 2 regulate the airflow in the heating mode. Likewise, pins 5 and 6 regulate the airflow in cooling mode. Pins 7 and 8 allow for fine tuning of the cooling airflow and pins 3 and 4 are used to adjust the cooling off delay.

COOLING AIRFLOW

This furnace is programmed to provide cooling airflow of 1 1/2, 2, 2 1/2, and 3 tons in the (-)GPH/LH-07 units and 3, 3 1/2, 4 and 5 tons in the (-)GPH/LH-12 unit. As shown in Table 6, this airflow is selected by properly setting switches 5 and 6. Table 4 shows which setting will be necessary for switches 5 and 6 in order to obtain the desired airflow.

The switch setting corresponding to selections A, B, C, and D are shown in Figure 19.

Occasionally, the field installer may wish to make adjustments to the cooling airflow listed in Table 5. This can be done by using switches 7 and 8. Switches 7 and 8 allow the selected cooling air flow to be increased or decreased by 10% as shown in Table 6. The minimum air flow possible is approximately 600 sCFM.

NOTE: The air flow adjustments in Table 6 apply to cooling mode only. Switches 7 and 8 cannot adjust the heating air flow.

CONTINUOUS FAN

When in fan only mode, the furnace will provide approximately 600 sCFM of air flow.

HEATING AIR FLOW

Since the air flow provided by the ICM motor is essentially constant over the range of .1 to .8 IWC static, the temperature rise across the unit may also be adjusted. The installer is given the option of three air flow options in heating mode as shown in Table 7. Switches 1 and 2 regulate the heating mode air flow.

It must be noted that the temperatures listed in Table 7 are design temperatures. Your installation may vary from these designed temperatures and must be checked upon installation. If the temperature rise falls outside the furnace listed rise range, select another heating air flow which will allow for operation within the rise range.

TABLE 4

| Switches | Function |
|----------|-------------------|
| 1 & 2 | Heating Air Flow |
| 3 & 4 | Cooling Off Delay |
| 5 & 6 | Cooling Air Flow |
| 7 & 8 | Cooling Adjust |

TABLE 5. COOLING AIR FLOW (SWITCHES 5 & 6)

| Switch Selection | (-)GPH/LH-07 Air Flow | (-)GPH/LH-12 Air Flow | (-)GPH/LH-05 Air Flow | (-)GPH/LH-10 Air Flow |
|------------------|-----------------------|-----------------------|-----------------------|-----------------------|
| A | 1200 | 2000 | 1200 | 2000 |
| B | 1000 | 1600 | 1000 | 1600 |
| C | 800 | 1400 | 800 | 1400 |
| D | 600 | 1200 | 600 | 1200 |

TABLE 6. AIR FLOW ADJUSTMENT (SWITCHES 7 & 8)

| Switch Selection | Air Flow Adjustment |
|------------------|---------------------|
| A | No Adjustment |
| B | +10% |
| C | -10% |
| D | No Adjustment |

TABLE 7. HEATING AIR FLOW SELECTIONS (SWITCHES 1 & 2)

| Switch Selection | Temperature Rise °F |
|------------------|---------------------|
| A | Mid-Rise |
| B | Mid-Rise |
| C | Mid-Rise -10°F |
| D | Mid-Rise + 10°F |

MOTOR START UP AND SHUT DOWN

The ICM motor is programmed to provide a “soft” start and stop. On a call for heat or cool, the motor will gradually ramp up to the field selected blower speed. This eliminates the sudden rush of air normally associated with a PSC motor. Once the thermostat is satisfied, the motor will gradually ramp down as well.

HEATING BLOWER OFF DELAY

The heating blower off delay is controlled by the dip switch bank containing 2 switches. These switches have the same adjustment settings as the normal UTEC Integrated Furnace Control used in the 80+ product line.

**TABLE 8. COOLING BLOWER OFF DELAY
(SWITCHES 3 & 4)**

| Switch Selection | Cooling Blower Off Delay |
|------------------|--------------------------|
| A | 45 Seconds |
| B | 30 Seconds |
| C | 60 Seconds |
| D | 0 Seconds |

MOTOR STATUS LIGHT

The integrated furnace control comes equipped with an additional light that indicates motor status. The furnace control continually monitors the rpm of the ICM motor and if the motor is operating within specified limits, the light will remain on. If the motor is operating outside the specified limits, the light will flash.

If the motor should fail, the integrated control will verify that the motor is not turning within 15 seconds. After verification, the control will go into soft lock out, however, the control will continue to attempt to start the motor for 2 minutes. If the motor starts during this time period, the control will recover and continue normal operation. If the motor does not start, the control will discontinue trying to start the motor and will try again in one hour. During the soft lockout, the motor status light will flash.

ICM MOTOR FIELD SETTINGS EXAMPLE

Situation

A furnace with an input 75,000 Btu/hr is to provide 1000 CFM of cooling air flow. A 60 second cooling blower off delay is desired. The heating flow is to be adjusted to mid-rise + 10°F.

Solution

Consult the quick reference chart. The heating air flow chart shows that mid-rise + 10°F can be obtained by placing switches 1 and 2 in the ON position. The cooling off delay chart shows that a 60 second cooling blower off delay is obtained by setting switch 3 to the OFF position and switch 4 to the ON position. The cooling airflow table shows that for a furnace with 75,000 Btu/hr input, a cooling air flow of 1000 CFM can be obtained by setting switch 5 to ON and switch 6 to OFF. Switches 7 and 8 can either both be On or both OFF because no cooling air flow adjustment is required. If an adjustment to the cooling air flow is desired, it can be adjusted upward or downward by 10% as shown on the table for switches 7 and 8.

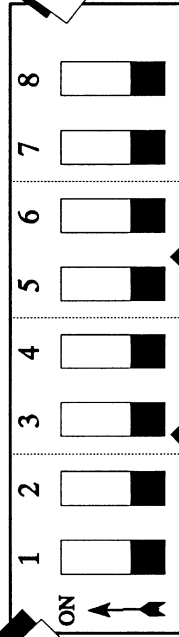
ICM MOTOR QUICK REFERENCE

2/15/96

Switches 1 & 2

| Switch | Temperature Rise °F |
|--------|---------------------|
| 1 | 2 |
| OFF | Mid-Rise |
| ON | Mid-Rise |
| OFF | Mid-Rise -10°F |
| ON | Mid-Rise + 10°F |

Heating Air Flow



Switches 7 & 8

| Switch | Air Flow ±10% Adjustment |
|--------|--------------------------|
| 7 | 8 |
| OFF | No Adjustment |
| ON | +10% |
| OFF | -10% |
| ON | No Adjustment |

Adjust for cooling air flow only.

Cooling Off Delay

| Switch | Cooling Blower Off Delay |
|--------|--------------------------|
| 3 | 4 |
| OFF | 45 Seconds |
| ON | 30 Seconds |
| OFF | 60 Seconds |
| ON | 0 Seconds |

Switches 3 & 4

Cooling Air Flow

| Switch | (-)GDC/LH-07/05 Air Flow (+)GDC/LH-10/12 Air Flow eCFM |
|--------|--|
| 5 | 6 |
| OFF | 1200 |
| ON | 1000 |
| OFF | 800 |
| ON | 600 |

Switches 5 & 6

ADJUSTING OR CHECKING FURNACE INPUT

The maximum gas supply pressure to the furnace should be 7" W.C. for natural gas. The minimum gas supply pressure for purposes of input adjustment to the furnace should be 5" W.C.

A properly calibrated manometer or gauge is required for accurate gas pressure readings.

The manifold pressure should be set at 3.5" W.C. for natural gas. Only small variations in the gas flow should be made by means of the pressure regulator adjustment. In no case should the final manifold pressure vary more than plus or minus 0.3" W.C. from the above specified pressures.

To adjust the pressure regulator:

1. Remove the regulator cap.
2. Turn the adjustment screw clockwise to increase pressure or counterclockwise to decrease pressure.
3. Replace the regulator cap securely.

TABLE 9

| METER TIME IN MINUTES AND SECONDS FOR NORMAL INPUT RATING OF FURNACES EQUIPPED FOR NATURAL OR LP GAS | | | | | | | | | | | |
|--|--------------------|--------------------------------------|----------|---------|----------|---------|----------|---------|----------|---------|----------|
| INPUT BTU/HR | METER SIZE CU. FT. | HEATING VALUE OF GAS BTU PER CU. FT. | | | | | | | | | |
| | | 900 | | 1000 | | 1040 | | 1100 | | 2500 | |
| | | MIN. | SEC. | MIN. | SEC. | MIN. | SEC. | MIN. | SEC. | MIN. | SEC. |
| 50,000 | ONE TEN | 1 10 | 5 50 | 1 12 | 12 00 | 1 12 | 15 30 | 1 13 | 18 12 | 3 30 | 20 00 |
| 75,000 | ONE TEN | 0 7 | 44 12 | 0 8 | 48 0 | 0 8 | 50 19 | 0 8 | 53 48 | 2 20 | 0 0 |
| 100,000 | ONE TEN | 0 5 | 33 24 | 0 6 | 36 0 | 0 6 | 38 15 | 0 6 | 40 36 | 1 15 | 30 0 |
| 125,000 | ONE TEN | 0 4 | 26 19 | 0 4 | 29 48 | 0 5 | 30 0 | 0 5 | 32 17 | 1 12 | 12 0 |

$$\text{Input BTU/HR} = \frac{\text{Heating Value of Gas (BTU/Ft}^3\text{) x 3600}}{\text{Time in Seconds (for 1 cu.ft.) of Gas}}$$

Furnaces for use on LP gas, the LP gas supply pressure must be set between 11.0" and 14.0" W.C. by means of the tank or branch supply regulators. The furnace manifold pressure should be set at 10" W.C. at the gas control valve. For elevations up to 8,000 feet, rating plate input ratings apply. For high altitudes (elevations 8,000 and over) and for any necessary major changes in the gas flow rate the orifice spud must be changed.

To change orifice spuds:

1. Shut off the manual main gas valve and remove the gas manifold.
2. Replace the orifice spuds.
3. Reassemble in reverse order.
4. Turn the gas supply back on and check for proper operation and manifold pressure.

Check of input is important to prevent over firing of the furnace beyond its design-rated input. NEVER SET INPUT ABOVE THAT SHOWN ON THE RATING PLATE.

To check furnace input:

1. Make certain that all other gas appliances are shut off, with the exception of pilot burners.
2. Start the furnace
3. Time the meter to measure the time required to burn one cubic foot of gas.
4. Use Table 9 to determine input rate.

ORIFICE SIZING CHART

| RATING PLATE INPUT BTU/HR | ELEVATION | |
|------------------------------|--|---------------------|
| | 0 TO 7,999 FT. | 8,000 FT. AND ABOVE |
| NATURAL GAS | HEATING VALUE @ 1,000 BTU/FT ³ , SPECIFIC GRAVITY 0.62 MANIFOLD PRESSURE @ 3.5" W.C. | |
| 50,000 | 42 | 43 |
| 75,000 | 42 | 43 |
| 100,000 | 42 | 43 |
| 125,000 | 42 | 43 |
| L.P. GAS | HEATING VALUE @ 2,475 BTU/FT ³ , SPECIFIC GRAVITY 1.52/ MANIFOLD PRESSURE @ 10" W.C. | |
| 50,000 | 54 | 55 |
| 75,000 | 54 | 55 |
| 100,000 | 54 | 55 |
| 125,000 | 54 | 55 |

ORIFICE SIZING CHART (CANADA)

| RATING PLATE INPUT BTU/HR | ELEVATION | |
|------------------------------|--|------------------------|
| | 0 TO 1,999 FT. | 2,000 FT. TO 4,500 FT. |
| NATURAL GAS | HEATING VALUE @ 1,000 BTU/FT ³ , SPECIFIC GRAVITY 0.62 MANIFOLD PRESSURE @ 3.5" W.C. | |
| 50,000 | 42 | 43 |
| 75,000 | 42 | 43 |
| 100,000 | 42 | 43 |
| 125,000 | 42 | 43 |
| L.P. GAS | HEATING VALUE @ 2,475 BTU/FT ³ , SPECIFIC GRAVITY 1.52/ MANIFOLD PRESSURE @ 10" W.C. | |
| 50,000 | 54 | 55 |
| 75,000 | 54 | 55 |
| 100,000 | 54 | 55 |
| 125,000 | 54 | 55 |

MEASURING AIR FLOW

The importance of proper air flow over the heat exchanger cannot be over emphasized. One of the most common causes of heat exchanger failure is overheating due to low air flow. An air flow table is located inside the blower door and on the following pages.

TEMPERATURE RISE CHECK

To determine if the air flow is correct, make a temperature rise check.

1. Insert a thermometer in the supply air duct as close to the furnace as possible yet out of a direct line from the heat exchanger. See Figure 20.
2. Insert a thermometer in the return air duct as close to the furnace as possible.
3. Operate the furnace.
4. When the thermometer in the supply air duct stops rising (approximately five minutes), subtract the return air temperature from the supply air temperature. The difference is the temperature rise.
5. Compare the measured temperature rise to the approved temperature rise range listed on the furnace name plate. See Figure 21.


If the measured temperature rise is above the approved range, the air flow is too low. More air must be moved by speeding up the blower, by removing restrictions in the duct system, or by adding more supply or return air duct. If the measured temperature rise is below the approved range, the air flow is too much. Use heating speed tap on the integrated control board.

Ideally the measured temperature rise should be in the middle of the range.

FIGURE 20
TEMPERATURE RISE MEASUREMENT



FIGURE 21
FURNACE NAME PLATE



AIR CONDITIONING DIVISION
FORT SMITH, ARKANSAS

DIRECT VENT OR NON DIRECT VENT
FORCED AIR FURNACE FOR INDOOR INSTALLATION
ONLY IN BUILDING CONSTRUCTED ON SITE
ELECTRIC 115V.60HZ. 1-PH., MAX TOTAL INPUT 6.3 AMPS

MAXIMUM OVER CURRENT PROTECTION IS AMPERES.

MODEL NO. SERIAL NUMBER
DCSD702 F1894 0000

EQUIPPED FOR USE WITH
NATURAL GAS

INPUT BTU/HR.
75,000

LIMIT SETTING 220 °F
AUX. LIMIT SETTING °F

MAXIMUM GAS SUPPLY PRESSURE TO FURNACE
MINIMUM GAS SUPPLY PRESSURE FOR PURPOSES
OF INPUT ADJUSTMENT TO FURNACE
MANIFOLD PRESSURE

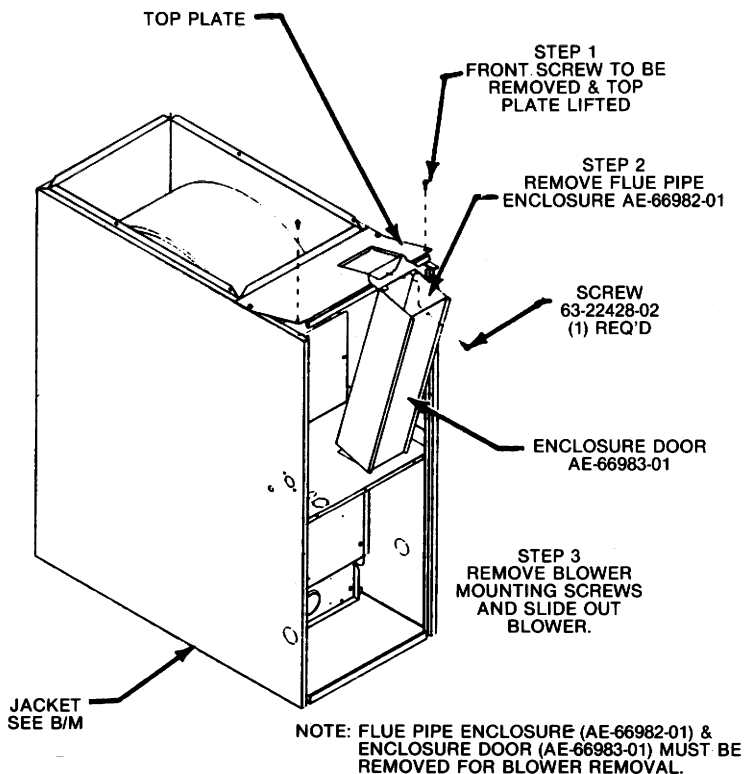
FOR TEMPERATURE RISE OF 45 °F. TO 75 °F

MAX. EXT. STATIC PRESSURE BLOWER MOTOR MIN. H.P.
.12 INCHES W.C. 11-7 1/2
.50 INCHES W.C. 11-7 1/2

THIS IS A CATEGORY IV FORCED AIR FURNACE WHEN USING INDOOR AIR FOR COMBUSTION.

THIS IS A CATEGORY IV TYPE FSP DIRECT VENT FORCED AIR FURNACE WHEN USING OUTDOOR AIR FOR COMBUSTION

**FIGURE 22
DOWNFLOW BLOWER REMOVAL**



SAFETY FEATURES

LIMIT CONTROL

The high limit cut-off is set at the factory and cannot be adjusted. It is calibrated to prevent the air temperature leaving the furnace from exceeding the maximum outlet air temperature. If temperature exceeds the maximum outlet air temperature, the limit will shut the furnace down. Reasons which could cause the outlet temperature to exceed the range are failed indoor blower, dirty filters, etc.

FLAME ROLL-OUT SAFETY SWITCHES

Furnaces are equipped with flame roll-out switches to protect against overtemperature conditions in the control compartment caused by inadequate combustion air supply. In the event of an overtemperature condition, the switch will shut the furnace down. The switch for the DOWNFLOW is located just above the burners on the blower divider panel. Switches for the UPFLOW/ HORIZONTAL ONLY HOT

SURFACE IGNITION FURNACES are located on either side of the burner brackets and just above the burners on the blower divider panel. If a switch is tripped, it must be manually reset. DO NOT jumper this switch. If this switch should trip, a qualified installer, service agency or the gas supplier should be called to check and/or correct for adequate combustion air supply. If this unit is mounted in a closet, the door must be closed when making this check.

A failed inducer motor would be a cause of inadequate combustion air.

DO NOT reset the flame roll-out switch without taking corrective action to assure that an adequate supply of combustion air is maintained under all conditions of operation. Replace this switch only with the identical replacement part.

LUBRICATION

The blower motor and induced draft motor are prelubricated by the manufacturer and do not require further attention.

The motor must be cleaned periodically by a qualified installer, service agency, or the gas supplier to prevent the possibility of overheating due to an accumulation of dust and dirt on the motor exterior. And, as suggested elsewhere in these instructions, the air filters should be kept clean because dirty filters can restrict airflow and the motor depends upon sufficient air flowing across and through it to keep from overheating.

PRESSURE SWITCH

This furnace has a pressure switch for sensing a blocked vent condition. It is normally open and closes when the induced draft blower starts, indicating air flow through the combustion chamber. As stated, a blocked vent condition will cause the pressure switch to remain open as will a failed inducer, a crack in the pressure switch hose, etc.

MAINTENANCE

⚠ WARNING

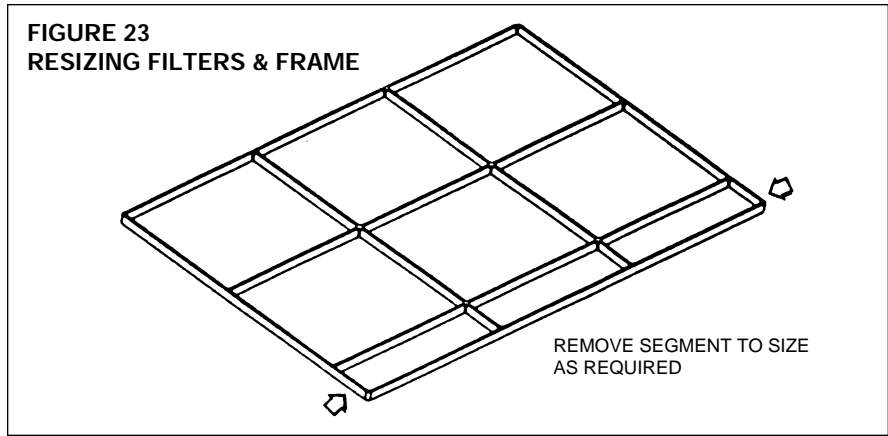
DISCONNECT MAIN ELECTRICAL POWER TO THE UNIT BEFORE ATTEMPTING ANY MAINTENANCE. FAILURE TO DO SO CAN CAUSE ELECTRICAL SHOCK RESULTING IN SEVERE PERSONAL INJURY OR DEATH.

FILTERS

Keep the air filters clean at all times. Vacuum dirt from filter, wash with detergent and water, air dry thoroughly and reinstall.

1. 17½"-50,000 btuh unit requires removal of 3½" segment of filter and frame to get proper width for a bottom filter.
2. 21"-100,000 btuh unit requires removal of 3½" segment of filter and frame to get proper width for a side filter.
3. 24½"-125,000 btuh unit requires removal of 7" segment of filter and frame to get proper width for a side filter.

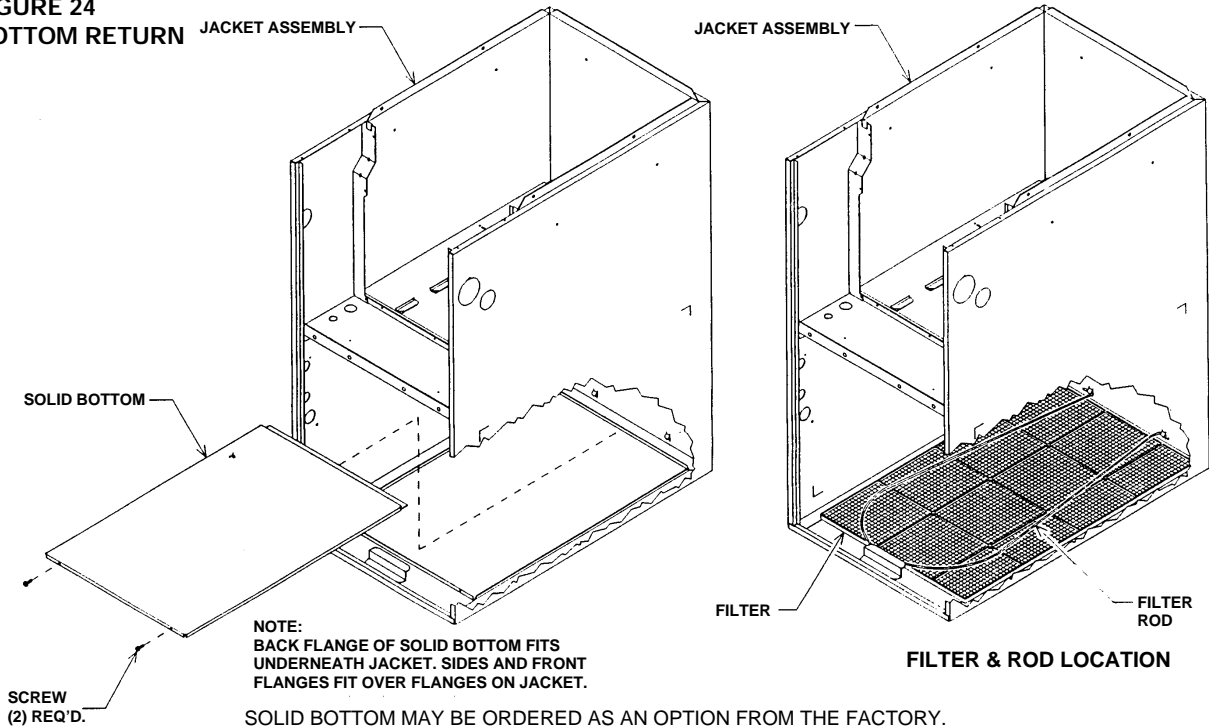
**FIGURE 23
RESIZING FILTERS & FRAME**



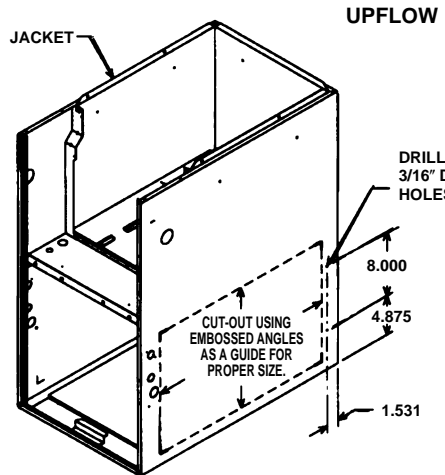
| TABLE 10 FILTER SIZES | | | | | |
|-----------------------|------------|-----------------------------|-----------------------------|-------------|-------------|
| UPFLOW FILTER SIZES | | | | | |
| FURNACE WIDTH | INPUT BTUH | BOTTOM SIZE | SIDE SIZE | QUANTITY | |
| 17½" | 50 | 15¾" X 25" | 15¾" X 25" | 1 | |
| 21" | 75 & 100 | 19¾" X 25" | 15¾" X 25" | 1 | |
| 24½" | 125 | 22¾" X 25" | 15¾" X 25" | 1 | |
| DOWNFLOW FILTER SIZES | | | | | |
| FURNACE WIDTH | INPUT BTUH | SIZE | QUANTITY | | |
| 17½" | 50 | 12" X 20" | 2 | | |
| 21" | 75 & 100 | 12" X 20" | 2 | | |
| 24½" | 125 | 14" X 20" | 2 | | |
| Unit Size | Unit Width | Filter Rod 20¾" AE-61659-02 | Filter Rod 24¼" AE-61659-03 | Bottom | Side |
| 50,000 | 17½" | 1 | | Cut Off 3½" | As is |
| 75,000 | 21" | 1 | | As is | Cut Off 3½" |
| 100,000 | 21" | 1 | | As is | Cut Off 3½" |
| 125,000 | 24½" | | 1 | As is | Cut Off 3½" |

*NOTE: Some filters must be resized to fit certain units and applications.

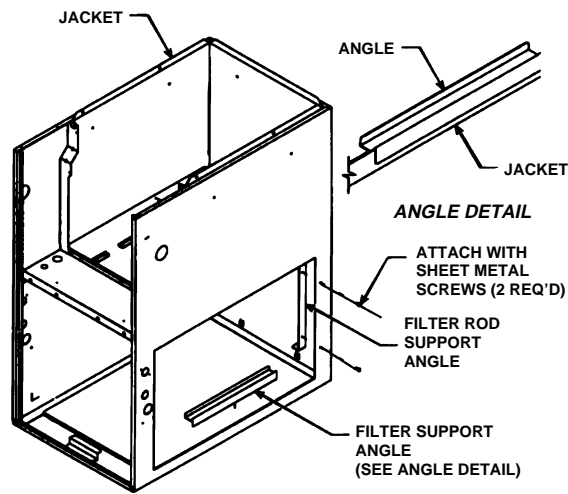
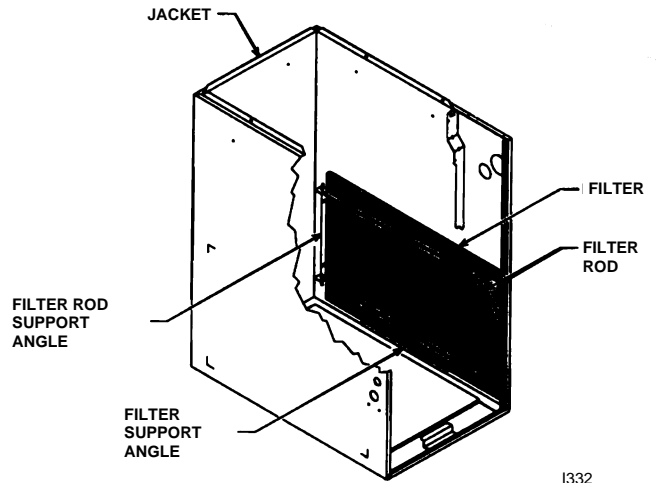
**FIGURE 24
BOTTOM RETURN**



**FIGURE 25
FILTER RETAINING RODS (SIDE RETURN)**

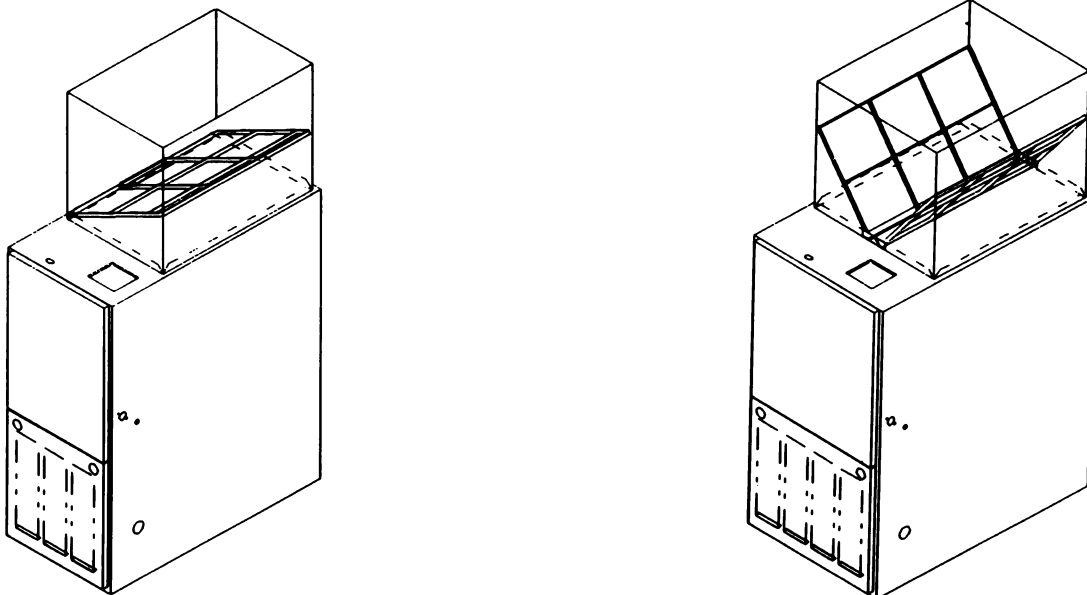


CUT-OUT AND DRILL DETAIL



ROD & FILTER SUPPORT ANGLE ASSEMBLY

**FIGURE 26
DOWNFLOW FILTER INSTALLATION**



IMPORTANT: Do not operate the system for extended periods without filters. A portion of the dust entrained in the air may temporarily lodge in the air duct runs and at the supply registers. Any recirculated dust particles will be heated and charred by contact with the furnace heat exchanger. This residue will soil ceilings, walls, drapes, carpets, and other household articles.

SYSTEM OPERATION INFORMATION

Advise The Customer

1. Keep the air filters clean. The heating system will operate better, more efficiently and more economically.
2. Arrange the furniture and drapes so that the supply air registers and the return air grilles are unobstructed.
3. Close doors and windows. This will reduce the heating load on the system.
4. Avoid excessive use of kitchen exhaust fans.
5. Do not permit the heat generated by television, lamps or radios to influence the thermostat operation.
6. Except for the mounting platform, keep all combustible articles three feet from the furnace and vent system.
7. **IMPORTANT:** Replace all blower doors and compartment covers after servicing the furnace. Do not operate the unit without all panels and doors securely in place.
8. Proper operation of the system with constant air circulation.

ANNUAL INSPECTION

The furnace should operate for many years without excessive scale build-up in the flue passageways, however, it is recommended that a qualified installer, service agency, or the gas supplier actually inspect the flue passageways, the vent system and the main and pilot burners for continued safe operation paying particular attention to deterioration from corrosion or other sources.

▲ WARNING

HOLES IN THE VENT PIPE OR HEAT EXCHANGER CAN CAUSE TOXIC FUMES TO ENTER THE HOME RESULTING IN CARBON MONOXIDE POISONING OR DEATH. THE VENT PIPE OR HEAT EXCHANGER MUST BE REPLACED IF THEY LEAK.

If during inspection the flue passageways and vent system are determined to require cleaning, the following procedures should be followed (**by a qualified installer, service agency, or gas supplier**):

1. **Turn off electrical power to the furnace and set the thermostat lever to the lowest temperature.**
2. **Shut off the gas supply to the furnace either at the meter or at a manual valve in the supply piping.**
3. Remove burner door. On downflow models, the blower door and burner door flange must also be removed.
4. Disconnect gas supply piping from gas valve.
5. Remove screws (4) connecting the burner tray to the center panel.
6. Disconnect wiring to the gas valve. **Make sure to mark all wires disconnected for proper reconnection.**
7. Remove burner tray and manifold assembly from the unit.
8. Remove all screws in the unit top plate. Remove the top plate along with connecting pressure switch from the unit.
9. Remove screws connecting draft inducer to center panel. Also remove wiring to draft inducer at this time.
10. Remove screws (11) on perimeter of heat exchanger. If hot surface ignition is present, remove the connecting screws along with associated wiring at this time.
11. In an upward and forward motion, lift heat exchanger from the unit.

12. Flush each heat exchanger tube with water from a hose and blow out with air to remove excessive moisture. If heat exchanger is blocked, especially with soot, and cannot be flushed, it must be replaced.
13. Reassemble (steps 1 through 11 in reverse order).

It is recommended that at the beginning of the heating season and approximately midway in the heating season a visual inspection be made of the main burner flames and pilot flame on standing pilot models for the desired flame appearance by a qualified installer, service agency, or the gas supplier.

It is also recommended that at the beginning of the heating season, the flame sensor on hot surface ignition models be cleaned with steel wool by a qualified installer, service agency, or the gas supplier.

REPLACEMENT PARTS

Contact your local distributor for a complete parts list. See enclosed sheet.

TROUBLESHOOTING

Refer to Figure 27 for determining cause of unit problems.

WIRING DIAGRAM

Figure 28 is a complete wiring diagram for the furnace and power sources.

FIGURE 27
INTEGRATED FURNACE CONTROL (IFC) TROUBLESHOOTING GUIDE
FOR UTEC 1012-922 (115 VAC IGNITER)

WARNING

DISCONNECT POWER BEFORE SERVICING.
 SERVICE MUST BE BY A TRAINED, QUALIFIED SERVICE TECHNICIAN.

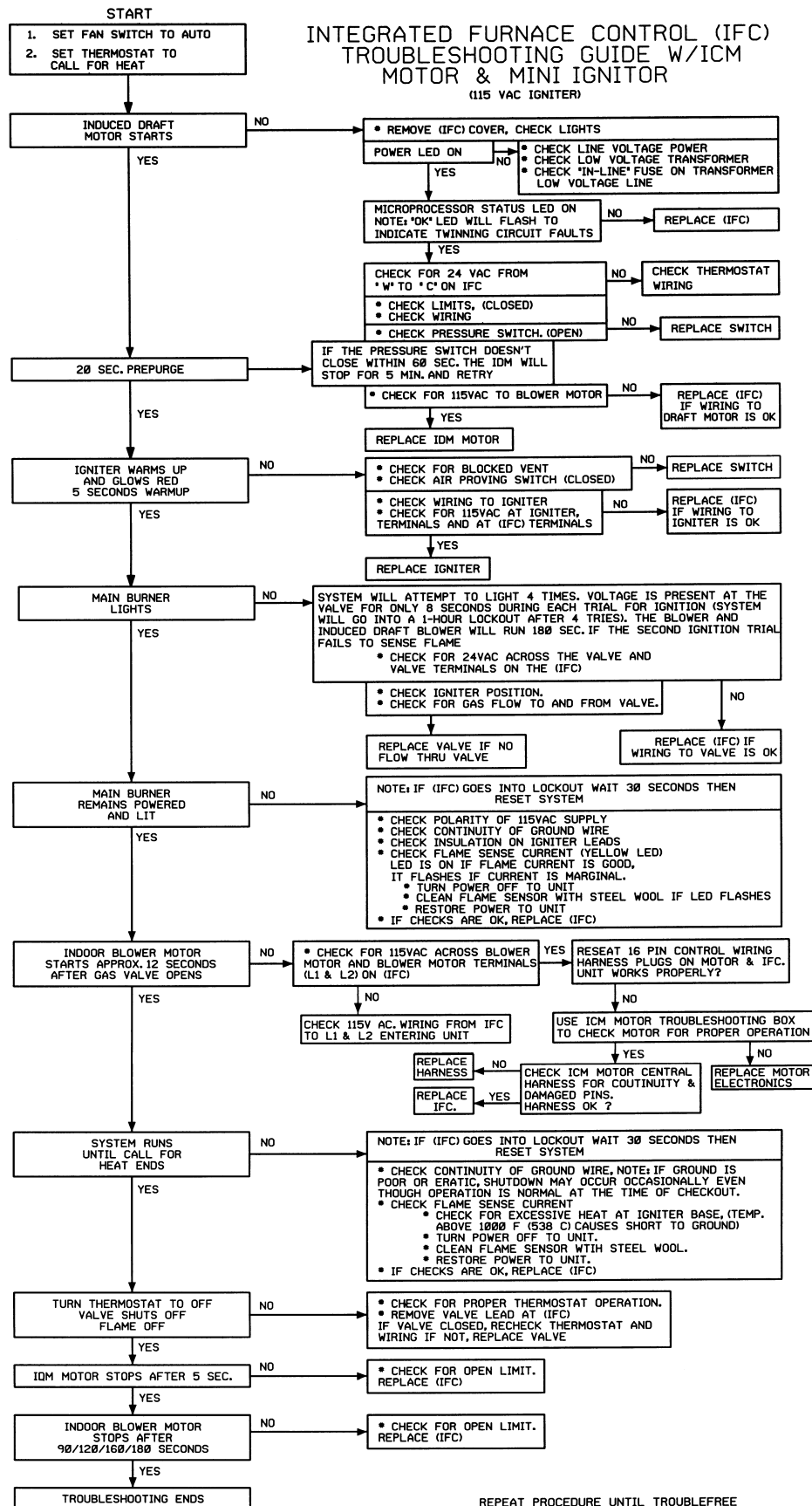
HAZARDOUS VOLTAGE
 LINE VOLTAGE CONNECTIONS



NOTES:

STATIC DISCHARGE CAN DAMAGE INTEGRATED FURNACE CONTROL (IFC)
 FLASHING MOTOR LIGHT - OUT OF RANGE SIGNAL IF MOTOR IS RUNNING
 - LOCK OUT DUE TO MOTOR IF MOTOR IS NOT RUNNING

OFF - NO MOTOR FEEDBACK.
 ON - GOOD MOTOR FEEDBACK.



REPEAT PROCEDURE UNTIL TROUBLEFREE OPERATION IS OBTAINED.
 92-22744-14-00

FIGURE 28

