

TEMPSTAR

Installation Instructions


NTC5/GNJ NTN5 Upflow/Horizontal Series

SAFETY CONSIDERATIONS

Installing and servicing heating equipment can be hazardous due to gas and electrical components. Only trained and qualified personnel should install, repair, or service heating equipment.

Untrained service personnel can perform basic maintenance functions such as cleaning and replacing air filters. All other operations must be performed by trained service personnel. When working on heating equipment, observe precautions in the literature, on tags, and on labels attached to or shipped with the unit and other safety precautions that may apply.

Follow all safety codes. In the United States, follow all safety codes including the current edition National Fuel Gas Code (NFGC) NFPA No. 54/ANSI Z223.1. In Canada, refer to the current edition of the National Standard Canada CAN/CGA-B149.1- and .2-M91 Natural Gas and Propane Installation Codes (NSCNGPIC). Wear safety glasses and work gloves. Have fire extinguisher available during start-up and adjustment procedures and service calls.

Recognize safety information. This is the safety-alert symbol . When you see this symbol on the furnace and in instructions or manuals, be alert to the potential for personal injury.

Understand the signal word *DANGER*, *WARNING*, or *CAUTION*. These words are used with the safety-alert symbol. *DANGER* identifies the most serious hazards which will result in severe personal injury or death. *WARNING* signifies a hazard that could result in personal injury or death. *CAUTION* is used to identify unsafe practices which would result in minor personal injury or product and property damage.

These instructions cover minimum requirements and conform to existing national standards and safety codes. In some instances, these instructions exceed certain local codes and ordinances, especially those that may not have kept up with changing residential construction practices. We require these instructions as a minimum for a safe installation.

Table of Contents

1. Installation	1	6. Electrical Wiring	10
2. Combustion & Ventilation Air	3	7. Ductwork and Filter	11
3. Gas Vent Installation	5	8. Checks and Adjustments	12
4. Horizontal Venting	6	9. Furnace Maintenance	13
5. Gas Supply and Piping	7		



Manufactured by:
Inter-City Products Corporation (USA)
Lewisburg, TN USA 37091

WARNING

This furnace is not designed for use in mobile homes, trailers or recreational vehicles. Such use could result in property damage, bodily injury and/or death.

1. Installation

WARNING

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation **MUST** conform with local codes or, in the absence of local codes, with codes of the country having jurisdiction.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures and equipped with the proper tools and test instruments.

Failure to carefully read and follow all instructions in this manual can result in furnace malfunction, property damage, personal injury and/or death.

WARNING

Carbon Monoxide Poisoning Hazard.

If this furnace is replacing a previously common-vented furnace, it may be necessary to resize the existing vent line and chimney to prevent over sizing problems for the other remaining appliances(s). See applicable codes and *Venting and Combustion Air Check* in *Gas Vent Installation* section.

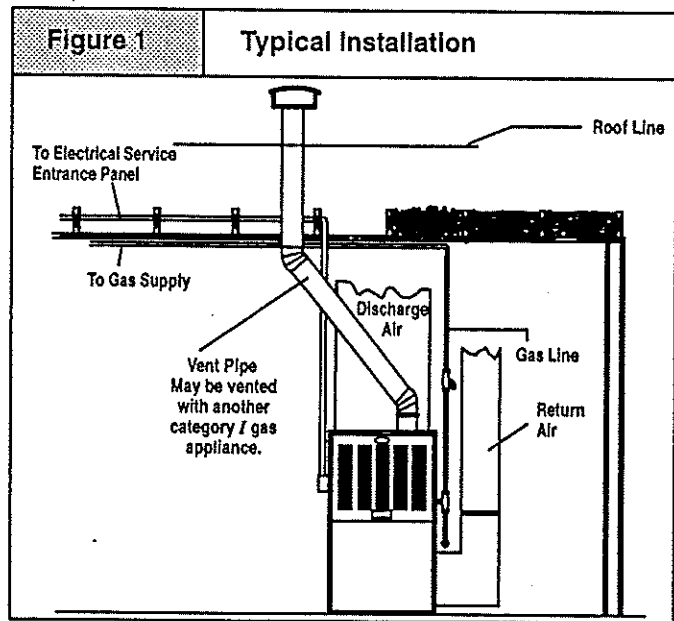
Failure to properly vent this furnace or other appliances can result in property damage, personal injury and/or death.

NOTE: This furnace is design certified by the American Gas Association and the Canadian Gas Association for installation in the United States and Canada. Refer to the appropriate codes, along with this manual, for proper installation.

- This furnace is **NOT** approved for installation in mobile homes, trailers or recreation vehicles.
- Do **NOT** use this furnace as a construction heater.
- Use only the Type of gas approved for this furnace (see Rating Plate on unit). Overfiring will result in failure of heat exchanger and cause dangerous operation.
Note: Furnaces can operate with LP gas when converted with approved conversion kit.
- Do **NOT** use open flame to test for gas leak.
- Ensure adequate combustion and ventilation air is provided to the furnace.
- Seal supply and return air ducts.
- The vent system **MUST** be checked to determine that it is the correct type and size.
- Install correct filter type and size.
- Unit **MUST** be installed so electrical components are protected from direct contact with water.

Location and Clearances

1. Refer to **Figure 1** for typical installation and basic connecting parts required. Supply and return air plenums and duct are also required.



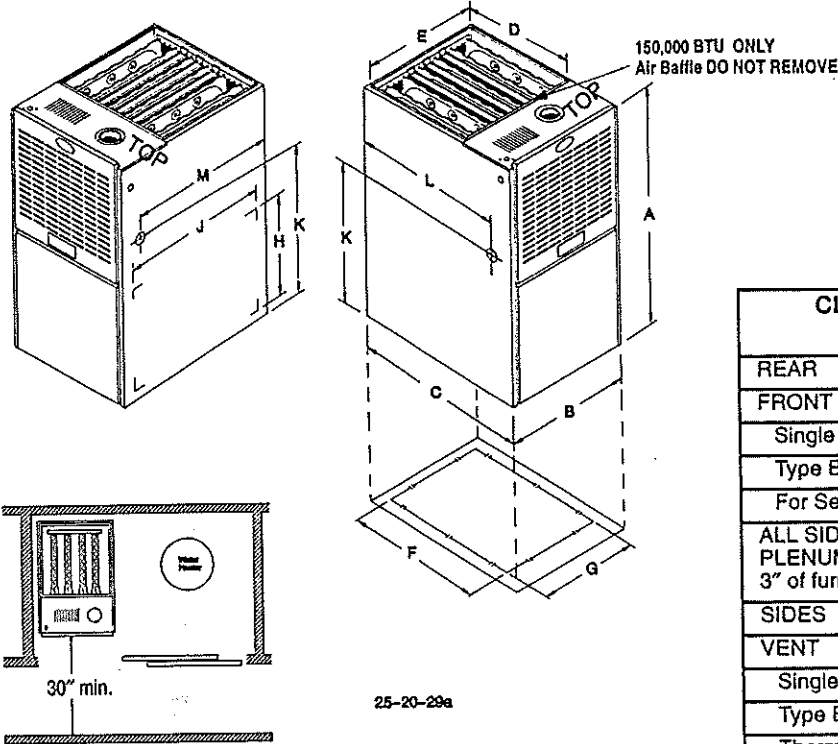
2. If furnace is a replacement, it is usually best to install the furnace where the old one was. Choose the location or evaluate the existing location based upon the minimum clearance and furnace dimensions (Figure 2).

CAUTION

Do NOT operate furnace in a contaminated atmosphere containing chlorine, fluorine or any other damaging chemicals. Refer to Combustion & Ventilation Air section, Contaminated Combustion Air.

Figure 2

Dimensions and Clearances



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CLEARANCES TO COMBUSTIBLE MATERIALS FOR ALL UNITS	
REAR	0
FRONT	3" (75mm)
Single Wall Vent	6" (150mm)
Type B-1 Double Wall Vent	3" (75mm)
For Service	30" (760mm)
ALL SIDES OF SUPPLY PLENUM (recommended within 3" of furnace)	1" (25mm)
SIDES	0
VENT	
Single Wall Vent	6" (150mm)
Type B-1 Double Wall Vent	1" (25mm)
Thermoplastic Pipe	4" (102mm)
TOP OF FURNACE	6" (150mm)

ALL DIMENSIONS IN INCHES

DIMENSIONAL INFORMATION

MODEL	CABINET			SUPPLY AIR		RETURN AIR				GAS CONNECTION		
	A	B	C	D	E	BOTTOM		SIDE		K	L	M
NTC5050 & 075BF GNJ050 & 075N12	40	15 1/2	28 1/2	18 1/2	14	23 1/8	12 5/8	12 1/4	22 1/2	28 1/4	26	23 7/8
NTC5075BH GNJ075N	40	19 1/8	28 1/2	18 1/2	17 5/8	23 1/8	14 3/4	14 1/2	22 1/2	28 1/4	26	23 7/8
NTC5100BF & BJ GNJ100N12 & 16	40	19 1/8	28 1/2	18 1/2	17 5/8	23 1/8	14 3/4	14 1/2	22 1/2	28 1/4	26	23 7/8
NTC5100BK GNJ100N20	40	22 3/4	28 1/2	18 1/2	21 1/4	23 1/8	18 3/4	14 1/2	22 1/2	28 1/4	26	23 7/8
NTC5125 & 150BK GNJ125 & 150N20	40	22 3/4	28 1/2	18 1/2	21 1/4	23 1/8	18 3/4	14 1/2	22 1/2	28 1/4	26	23 7/8
mm Equivalents	40=1016	15 1/2 = 394	19 1/8 = 486	22 3/4 = 578	28 1/2 = 724	18 1/2 = 470	14 = 356	17 5/8=448				
	21 1/4 = 539	23 1/8 = 587	12 5/8 = 311	14 3/4 = 375	18 3/4 = 476	12 1/4 = 311	14 1/2 = 368	17 = 432	22 1/2 = 572			
	28 1/4 = 717	26 = 660	23 7/8 = 606									

Installation Requirements

1. Install furnace level.
2. Install furnace as centralized as practical with respect to the heat distribution system
 - The 150,000 Btuh furnace is manufactured with air baffles to equalize air flow through the heat exchanger. (See Figure 2). DO NOT REMOVE THESE BAFFLES.
3. Install the vent pipes as short as practical. (See *Gas Vent Installation* section).
4. Do NOT install furnace directly on carpeting, tile or other combustible material other than wood flooring.

WARNING

Fire Hazard.

If installing horizontally, place furnace on noncombustible cement board or sheet metal.

Failure to install unit on noncombustible cement board or sheet metal can result in property damage, personal injury and/or death.

5. Maintain clearance for fire safety and servicing. A front clearance of 30" (760mm) is recommended for access to the burner, controls and filter.
6. Use a raised base if the floor is damp or wet at times.

7. Residential garage installations require:
 - Burners and ignition sources installed at least 18" (457mm) above the floor.
 - Located or physically protected from possible damage by a vehicle.

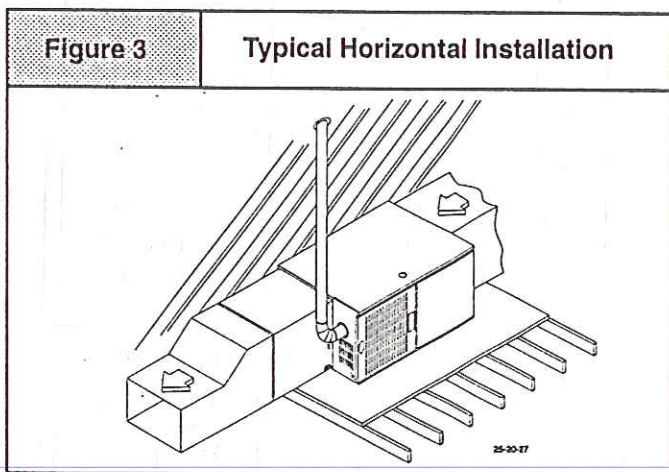
Horizontal Furnace Installation

IMPORTANT

NOTE: Inspect unit rating plate to be certain model number begins with "NTC5, NTN5 or GNJ". This identifies unit as horizontally mountable. If unit does **NOT** bear this designation, you may **NOT** mount this unit horizontally. Horizontal furnace may not be mounted on its back.

If you purchased a horizontally mountable furnace, it can be installed horizontally in an attic, basement, crawl space, alcove, or suspended from a ceiling in a basement or utility room in either a right or left airflow position. See Figure 3.

The minimum clearances listed in Figure 2 to combustibles **MUST** be maintained between the furnace and adjacent construction. As shown in Figure 3, **ONLY** the corner of the cabinet is allowed to contact the rafters. All other clearances **MUST** be observed as shown in Figure 2.



If the furnace is to be suspended from the floor joists in a crawl space or the rafters in an attic, it is necessary to use steel pipe straps or an angle iron frame to attach the furnace. These straps should be attached to the furnace with sheet metal screws and to the rafters or joists with bolts. The preferred method is to use an angle iron frame bolted to the rafters or joists.

2. Combustion & Ventilation Air

WARNING

Carbon monoxide Poisoning Hazard.

Use methods described here to provide combustion and ventilation air.

Failure to provide adequate combustion and ventilation air can result in personal injury and/or death.

Furnaces require ventilation openings to provide sufficient air for proper combustion and ventilation of flue gases. All duct or openings for supplying combustion and ventilation air must comply with the gas and electrical codes, or in the absence of local codes, the applicable national codes.

When the installation is complete, check that all appliances have adequate combustion air and are venting properly. See *Venting And Combustion Air Check* in this manual.

If the furnace is to be installed in a crawl space, consult local codes. A concrete pad 1" to 2" (25 to 50mm) thick is recommended for crawl space installation on the ground.

Keep all insulating materials clear from louvered door. Insulating materials may be combustible.

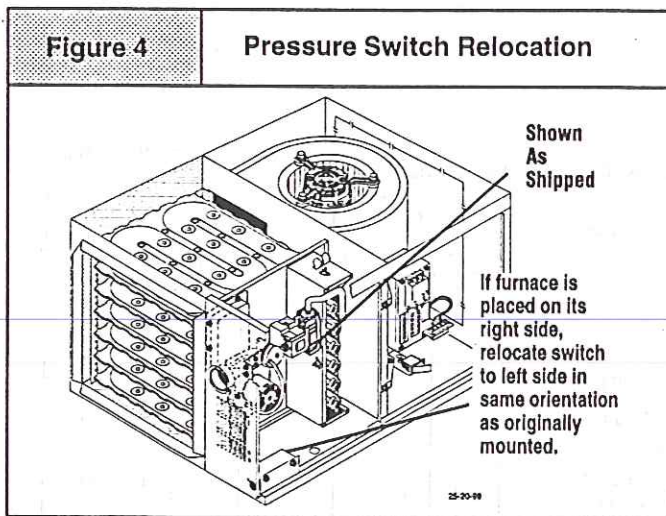
The horizontal furnaces may be installed directly on combustible wood flooring or supports. It is recommended for further fire protection that cement board or sheet metal is placed between the furnace and the combustible wood floor and extend 12" (300mm) beyond the front of the furnace louver door.

This furnace **MUST NOT** be installed directly on carpeting or tile or other combustible material other than wood flooring or supports.

Pressure Switch Relocation

If the furnace is installed in a right to left airflow position (left side of furnace facing down), the pressure switch will remain in the same position as installed by the factory (see Figure 4). If the furnace is installed in a left to right airflow position (right side of furnace facing down), the pressure switch **MUST** be relocated to the left side of the furnace using the holes provided in the top panel. Position the pressure switch in the same orientation as the original location. To prevent possible kinking of the pressure switch hose, trim the hose to remove excess.

Note: Care **MUST** be taken not to cut the tube too short.



Contaminated Combustion Air

Installations in certain areas or types of structures will increase the exposure to chemicals or Halogens which may harm the furnace. These instances must use only outside air for combustion.

The following areas or types of structures may contain or have exposure to the substances listed below. The installation must be evaluated carefully as it may be necessary to provide outside air for combustion.

- Commercial buildings.
- Buildings with indoor pools.
- Furnaces installed in laundry rooms.
- Furnaces installed in hobby or craft rooms.
- Furnaces installed near chemical storage areas.
- Permanent wave solutions for hair.
- 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.
- Sulfuric Acid.
- Solvent cements and glues.
- Antistatic fabric softeners for clothes dryers.
- Masonry acid washing materials.

Confined Space Installation

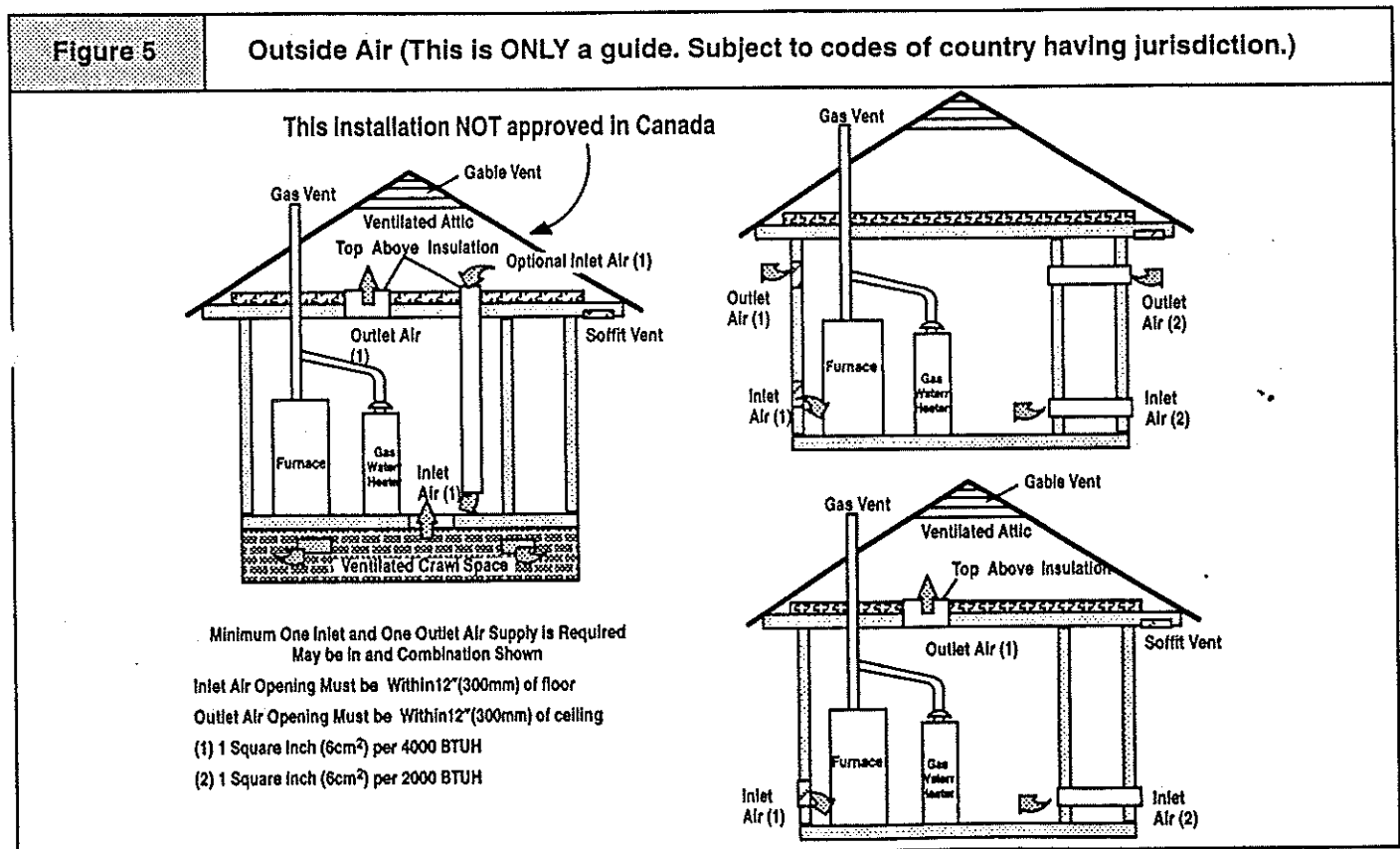
NOTE: A confined space is defined as an area with less than 50 cubic feet (1.4m³) per 1,000 BTUH input rating for all gas appliances installed in the area.

Air Openings and Connecting Ducts

1. Total input rating for all gas appliances **MUST** be considered when determining free area of openings.
2. Connect ducts or openings directly to outside.
3. When screens are used to cover openings, they **MUST** be no less than 1/4" (6mm) mesh.
4. The minimum dimension of rectangular air ducts **MUST NOT** be less than 3" (75mm).
5. When sizing grille or louver, use the free area of opening. If free area is **NOT** stamped or marked on grill or louver, assume a 20% free area for wood and 60% for metal.

Requirements

1. Provide confined space with sufficient air for proper combustion and ventilation of flue gases using horizontal or vertical ducts or openings.
2. **Figure 5** illustrates how to provide combustion and ventilation air. A minimum of two permanent openings, one inlet and one outlet, are required.



3. One opening **MUST** be within 12" (300mm) of the floor and the second opening within 12" (300mm) of the ceiling.
4. Size openings and ducts per Table 1.
5. Horizontal duct openings require 1 square inch (25sq. mm) of free area per 2,000 BTUH of combined input for all gas appliances in area (see Table 1).
6. Vertical duct openings or openings directly to outside require 1 square inch (6.5mm²) of free area per 4,000 BTUH for combined input of all gas appliances in area (see Table 1).

Table 1		Free Area	
BTUH Input Rating	Minimum Free Area Required for Each Opening		
	Horizontal Duct (2,000 BTUH)	Vertical Duct or openings to outside (4,000 BTUH)	Round Duct (4,000 BTUH)
50,000	161 cm ² (25 sq. in.)	81 cm ² (12.5 sq. in.)	4"
75,000	242 cm ² (35.5 sq. in.)	121 cm ² (18.75 sq. in.)	5"
100,000	323 cm ² (50 sq. in.)	161 cm ² (25 sq. in.)	6"
125,000	403 cm ² (62.5 sq. in.)	202 cm ² (31.25 sq. in.)	7"
150,000	484 cm ² (71 sq. in.)	242 cm ² (37.5 sq. in.)	7"

EXAMPLE: Determining Free Area

Furnace Water Heater Total Input
 100,000 + 30,000 = (130,000 + 4,000) = 210 cm²
 (32.5 Sq. In.) Vertical

Furnace Water Heater Total Input
 100,000 + 30,000 = (130,000 + 2,000) = 210 cm²
 (65 Sq. In.) Horizontal

An unconfined space is defined as an area having a minimum volume of 50 cubic feet (1.4m³) per 1,000 Btu/h total input rating for all gas appliances in area.

Adjoining rooms can be considered part of an unconfined area if there are no doors between rooms.

An attic or crawl space may be considered an unconfined space provided there are adequate ventilation openings directly to outdoors. Openings **MUST** remain open and **NOT** have any means of being closed off. Ventilation openings to outdoors **MUST** be at least 1 square inch (25mm²) of free area per 4,000 BTUH of total input rating for all gas appliances in area.

In unconfined spaces, infiltration should be adequate to provide air for combustion, ventilation and dilution of flue gases. However, in buildings with unusually tight construction, additional air **MUST** be provided using the methods described in section titled *Confined Space Installation*:

Unusually tight construction is defined as: Construction with

1. Walls and ceilings exposed to the outside have a continuous, sealed vapor barrier. Openings are gasketed or sealed and
2. Doors and openable windows are weather stripped and
3. Other openings are caulked or sealed. These include joints around window and door frames, between sole plates and floors, between wall-ceiling joints, between wall panels, at penetrations for plumbing, electrical and gas lines, etc.

Unconfined Space Installation

WARNING

Carbon Monoxide Poisoning Hazard.

Most homes will require additional air.

An unconfined space or homes with tight construction may not have adequate air infiltration for proper combustion and ventilation of flue gases.

Failure to supply additional air by means of ventilation grilles or ducts could result in personal injury and/or death.

Ventilation Air

Some provincial codes and local municipalities require ventilation or make-up air be brought into the conditioned space as replacement air. Whichever method is used, the mixed return air temperature across the heat exchanger **MUST** not fall below 60°F (15° c) or flue gases will condense in the heat exchanger. This will shorten the life of the heat exchanger and possibly void your warranty.

3. Gas Vent Installation

WARNING

Carbon monoxide poisoning, fire and explosion hazard.

Read and follow all instructions in this section.

Failure to properly vent this furnace can result in property damage, personal injury and/or death.

Install the vent in compliance with codes of the country having jurisdiction and the GAMA venting tables, local codes or ordinances and these instructions.

These fan assisted combustion furnaces have been classified as Category I appliances which means that they **MUST** operate with a negative vent pressure. Category III classification approval has been obtained for these furnaces if vented horizontally with a combination single wall metal/high temperature plastic venting system.

Category I Safe Venting Requirements

NOTE: The following instructions comply with the United States National Fuel Gas Code.

1. If a Category I vent passes through an attic, any concealed space or floor, use **ONLY** Type B or Type L double wall vent pipe. If vent pipe passes through interior wall, use type B vent pipe with ventilated thimble **ONLY**.

2. Do **NOT** vent furnace into any chimney serving an open fireplace or solid fuel burning appliance.
3. Use the same diameter Category I connector or pipe as the furnace minimum vent size as noted on label adjacent to the flue outlet, except as permitted by the GAMA venting tables.
4. Keep vertical Category I vent pipe or vent connector runs as short and direct as possible.
5. Vertical outdoor runs of type B or **ANY** single wall vent pipe below the roof line are **NOT** permitted.
6. Slope all horizontal runs away from furnace a minimum of 1/4" (6mm) per foot.
7. Support all horizontal vent pipe every 6' (2m) using proper clamps and metal straps.
8. Check existing gas vent or chimney to ensure they meet clearances and local codes.
9. The furnace **MUST** be connected to a factory built chimney or vent complying with a recognized standard. **Venting into a masonry or concrete chimney is only permitted as outlined in the GAMA venting tables or Masonry Chimney section in these instructions.**

WARNING

Carbon Monoxide Poisoning Hazard.

If this furnace is replacing a previously common-vented furnace, it may be necessary to resize the existing chimney liner or vent to prevent over sizing problems for the other remaining appliances(s). See codes of country having jurisdiction.

Failure to properly vent this furnace or other appliances can result in property damage, personal injury and/or death.

Venting and Combustion Air Check

NOTE: If this installation removes an existing furnace from a venting system serving one or more other appliances, and to make sure there is adequate combustion air for all appliances, **MAKE THE FOLLOWING CHECK.**

1. Seal any unused openings in the venting system.
2. Visually inspect the venting system for proper size and horizontal pitch to ensure there is no blockage or restriction, leakage, corrosion or other deficiencies which could cause an unsafe condition.
3. Insofar as is practical, close all doors and windows and all doors between the space in which the appliance(s) remaining connected to the venting system are located and other spaces of the building.
4. Turn on clothes dryers and any appliance not connected to the 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. Horizontal Venting

This section of the installation instructions deal with both Category I and Category III installation.

CAUTION

It is the responsibility of the installer to properly terminate the vent and provide adequate shielding. This is essential in order to avoid water/ice damage to building, shrubs and walk-ways.

Category I Furnaces With External Power Venters

In order to maintain a Category I classification of fan assisted furnaces when vented horizontally with sidewall termination, a power venter is **REQUIRED** to maintain a negative pressure in the venting system. Please consult the Fields Controls Co. or other certified manufacturers for power venters certified for use with our furnaces.

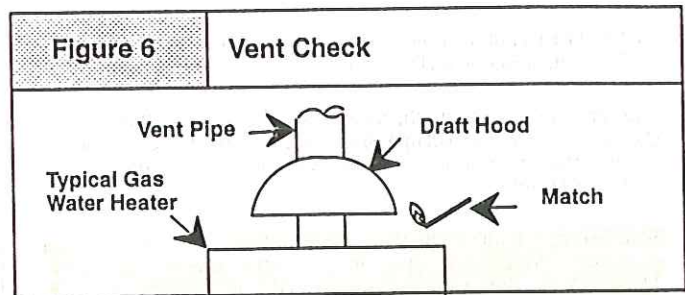
Category III Furnaces Without External Power Venters

A horizontal vent system with side wall termination **WITHOUT** a power venter **MUST** use a combination single wall metal/high temperature plastic venting system and sealants and be installed as shown in this section. Furnaces using this type of venting system have a Category III classification.

Horizontal Venting With Metal/Plastic Materials

When metal/plastic venting materials are used to horizontally vent an induced draft furnace, positive pressure exists throughout the horizontal vent. Special high temperature plastic pipe and fittings must be used and the furnaces using this method of side wall venting have a Category III classification.

5. Follow the lighting instructions for each appliance being inspected. Adjust thermostat so appliance(s) will operate continuously.
6. Allow 5 minutes of main burner operation, then check for spillage at the draft hood relief opening of each appliance. Use the flame of a match or candle (Figure 6).



7. After it has been determined that each appliance vents properly, return doors, windows, appliances etc. to their normal condition.
8. If improper venting is observed, the cause **MUST** be corrected.

NOTE: If flame pulls towards draft hood, this indicates sufficient infiltration air.

Venting to Existing Masonry Chimney

Venting into a masonry or concrete chimney is only permitted as outlined in the GAMA venting tables. Follow all safe venting requirements.

Dedicated venting of one fan assisted furnace into any masonry chimney is prohibited, except with the of the accessory "masonry chimney venting kit". If masonry chimney venting kit is not used, the chimney must use first be lined with either type B vent sized in accordance with tables 1 or 2 or a listed single wall, metal lining system, sized in accordance with the tables used from the "GAMA Venting tables".

Important Installation Requirements for Category III Venting with Thermoplastic Materials

- Install Only in **UNINHABITED** Spaces (i.e.: crawl spaces, attics, vent chases, etc.)
 - Avoid any installation where leakage of flue products can communicate with indoor living areas.
- Use Only Vent System Pipe & Fittings Constructed of Amoco Radel® A-200 Material from the following manufacturers:
 - Only Ultra Vent® (date code 08/01/93 or later), Plex-vent "II"®, & Selvent®, which are manufactured with Radel A-200®.
- Be Thoroughly Familiar with the Vent Manufacturers Current Instructions.
 - Specific instructions may vary. Use only the installation methods prescribed by the manufacturer of the material you are using in accordance with Inter-City Products' restrictions.

WARNING

Carbon monoxide poisoning, fire and explosion hazard.

Approved vent materials listed **MUST** be used.

Failure to use approved vent materials specified can result in property damage, personal injury and/or death.

General Safe Venting Requirements

Do NOT connect this Category III vent directly into a B-Vent or factory-built chimney nor use this vent for appliances burning wood, coal, or oil or incinerators of any kind.

Do NOT insulate vent pipe or fittings.

1. 50,000 thru 125,000 BTU input models are approved for use with 3" dia. vent. 150,000 BTU input models require 4" dia. vent.
2. The maximum vent length, regardless of pipe diameter, is 30' (10m) plus a maximum of up to three(3) 90° long radius or "sweep" elbows. If fewer than three elbows are used, maximum vent length is still 30' (10m).
3. A 12"(300mm) minimum to 18"(450mm) maximum section of single wall 26 gauge(.134"(.86mm)) minimum galvanized or stainless steel is required at the vent collar of the furnace prior to connection of the plastic vent pipe. Use 3" diameter for 50,000 through 125,000 Btuh input models and 4" diameter for 150,000 Btuh input models.
4. Minimum of 18"(450mm) vent from the furnace connector is required before the first 90° elbow.
5. Maintain clearances recommended by vent manufacturer for minimum air space to combustibles from all sections of the vent system, except where a wall thimble is used for horizontal venting, or as allowed by local or national codes.
6. A plastic tee vent outlet with screen for vent termination is required to be spaced a distance of 8" from the exterior wall. If possible, the wall through which the vent will pass should not be exposed to the prevailing wind. If this is not possible, steps to protect the vent termination from strong winds should be considered, such as a fence or a hedge.

Vent Termination

Vent Termination Clearances

Clearances listed below are from the "National Fuel Gas Codes" consult local codes.

1. The vent termination must be located at least 12" (300mm) above ground or normally expected snow accumulation levels.

5. Gas Supply and Piping

WARNING

Fire and explosion hazard.

Natural Gas

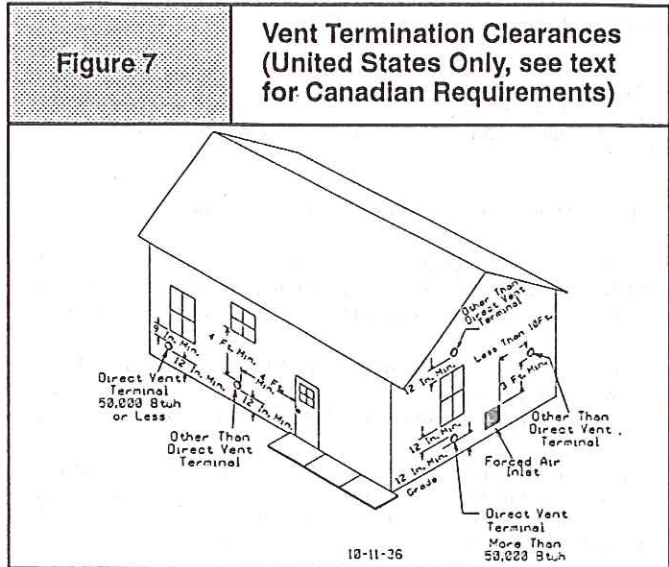
Models designated for Natural Gas are to be used with Natural Gas ONLY.

Failure to follow these instructions can result in property damage, personal injury and/or death.

Gas Supply Requirements

- Use only the Type of gas approved for this furnace. See rating plate for approved gas type.
- Gas input must not exceed the rated input shown on the rating plate. Overfiring will result in failure of heat exchanger and cause dangerous operation.
- Do not allow minimum supply pressure to vary downward. Doing so will decrease input to furnace. Refer to Table 2 for Gas supply and manifold pressures.

2. Do NOT terminate over public walkways. Avoid areas where condensate may cause problems such as above planters, patios, or adjacent to windows where steam may cause fogging.
3. The venting system shall terminate at least 4' (1220mm) below, 4' (1220mm) horizontally from, or 12" (300mm) above any door, window, or gravity air inlet into any building. The vent termination shall be located at least 4' (1220mm) horizontally from any electric meter, gas meter, regulator, and any relief equipment. These distances apply only to U.S. installations.
4. The vent termination shall terminate at least 3' (914mm) above any forced air inlet located within 10' (3.1m). See Figure 7.
5. In Canada, the Canadian Fuel Gas Code B-149 takes precedence over the preceding termination instructions.



Venting Through a Non-Combustible and Combustible Wall

Please consult Thermoplastic vent manufacturer for proper method of venting through a non-combustible and combustible wall.

Gas Type	Supply Pressure			Manifold Pressure
	Recommended	Max.	Min.	
Natural	7" (1.7 kPa)	14" (3.5 kPa)	4.5" (1.1 kPa)	3.5" (0.9 kPa)
Propane	11" (2.7 kPa)	14" (3.5 kPa)	11" (2.7 kPa)	10" (2.5 kPa)

Natural Gas Input Rating Check

The gas meter can be used to measure input to furnace. Rating is based on a natural gas BTU content of 1,000 BTU's per cubic foot. Check with gas supplier for actual BTU content.

1. Turn OFF gas supply to all appliances other than furnace and start furnace.
2. Time how many seconds it takes the smallest dial on the gas meter to make one complete revolution. Refer to Example.
Note: If meter uses a 2 cubic foot dial, divide results (seconds) by two.

Example			
Natural Gas BTU Content	No. of Seconds Per Hour	Time Per Cubic Foot In Seconds	BTU Per Hour
1,000	3,600	48	75,000
$1,000 \times 3,600 \div 48 = 75,000$ BTUH			

3. Relight all appliances and ensure all pilots are operating.

Orifice Sizing

NOTE: Factory sized orifices for natural and LP gas are listed in the furnace Technical Support manual.

Ensure furnace is equipped with the correct main burner orifices. Refer to Table 3 for correct orifice size for a given heating value and specific gravity for natural and propane gas. Note that this chart is **ONLY** for installations *below* 2000 feet in altitude.

Table 3		Orifice Sizes (below 2000 feet)		
Gas Type	Manifold Pressure	Specific Gravity	Heating Value (BTU per Cubic Ft.)	Orifice Size (Drill #)
Natural	3.5" w.c. 0.9kPa w.c.	0.6	800	40
			900	41
			1000	42
			1100	43
Propane	10" w.c. 2.5kPa w.c.	1.53	2500	54

Operation Above 2000 Feet Altitude

WARNING

Fire, Explosion, Carbon Monoxide Poisoning Hazard.

This conversion shall be done by a qualified service agency in accordance with the Manufacturer's instructions and all applicable codes and requirements, or in the absence of local codes, the applicable national codes.

Failure to follow these instructions exactly can result in property damage, personal injury and/or death.

These units may be used at full input rating when installed at altitudes up to 2000'. When installed above 2000', the input must be decreased 4% for each 1000' above sea level. This may be accomplished by a simple adjustment of manifold pressure or an orifice change, or a combination of a pressure adjustment and an orifice change. The changes required depend on the installation altitude and the heating value of the fuel. TABLE 4 & TABLE 5 show the proper furnace manifold pressure and gas orifice size to achieve proper performance based on elevation above sea level for both natural gas and propane.

To use the natural gas table, first consult your local gas utility for the heating value of the gas supply. Select the heating value on the vertical border and follow across the table until the appropriate elevation for the installation is reached. The first value in the box at the intersection of the heating value and elevation will be the manifold pressure required. If a gas orifice change is also required, the box is shaded. The required orifice size is shown at the bottom of the table.

Sea Level
High Altitude Input Rate = Nameplate Input Rate x (Multiplier)

Elevation	High Altitude Multiplier
2000' - 2999'	0.92
3000' - 3999'	0.88
4000' - 4999'	0.84
5000' - 5999'	0.80
6000' - 6999'	0.76
7000' - 8000'	0.72

For installations above 4000', the inlet air restrictor of the combustion air blower **MUST** be changed, whether gas has been derated by the utility or orifices have been changed.

A High Altitude Kit is available which includes restrictors, orifices and installation instructions.

MANIFOLD PRESSURE AND ORIFICE SIZE FOR HIGH ALTITUDE APPLICATIONS

Table 4		NATURAL GAS										
		MEAN ELEVATION FEET ABOVE SEA LEVEL										
HEATING VALUE BTU/CU. FT.	2000 to 2999		3000 to 3999		4000 to 4999		5000 to 5999		6000 to 6999		7000 to 8000	
	800	3.5" wc	3.5" wc	3.5" wc	3.5" wc	3.5" wc	3.5" wc	3.5" wc	3.2" wc	2.9" wc	2.9" wc	2.9" wc
850	3.5" wc	3.5" wc	3.5" wc	3.5" wc	3.5" wc	3.2" wc	2.9" wc	2.9" wc	2.9" wc	2.9" wc	2.9" wc	2.6" wc
900	3.5" wc	3.5" wc	3.4" wc	3.1" wc	3.1" wc	2.8" wc	2.8" wc	2.5" wc	2.5" wc	2.5" wc	2.3" wc	2.3" wc
950	3.3" wc	3.3" wc	3.1" wc	2.8" wc	2.8" wc	2.5" wc	2.5" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc
1000	3.0" wc	3.0" wc	2.8" wc	2.5" wc	2.5" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc
1050	2.7" wc	2.7" wc	2.5" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc
1100	2.5" wc	2.5" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc	2.3" wc
Orifice Size	#42		#42		#45		#45		#45		#45	

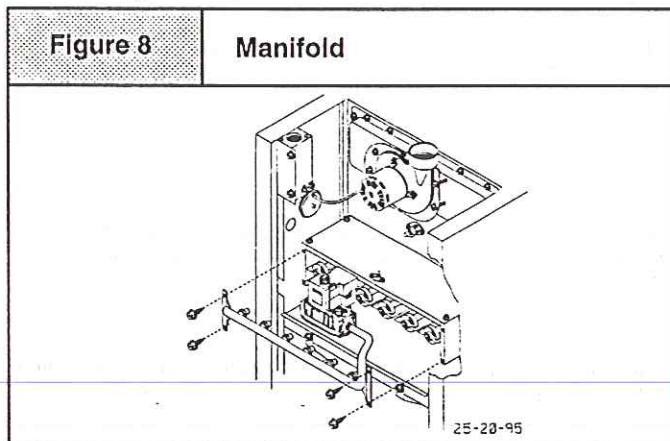
SHADED AREA REQUIRES ORIFICE CHANGE. NO SHADING INDICATES MANIFOLD PRESSURE CHANGE ONLY.

Table 5		PROPANE					
		MEAN ELEVATION FEET ABOVE SEA LEVEL					
HEATING VALUE BTU/CU. FT.	0 to 1999	2000 to 2999	3000 to 3999	4000 to 4999	5000 to 5999	6000 to 6999	7000 to 8000
2500	10.0" wc	10.0" wc	9.4" wc	10.0" wc	9.8" wc	8.8" wc	7.9" wc
Orifice Size	#54	#54	#54	#55	#55	#55	#55

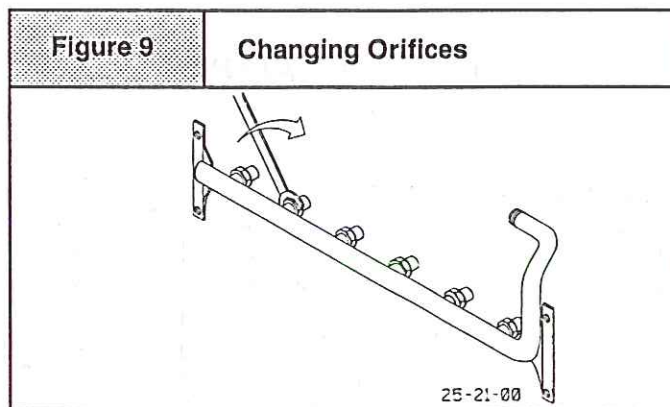
NOTE: NATURAL GAS DATA BASED ON 0.60 SPECIFIC GRAVITY. PROPANE DATA BASED ON 1.53 SPECIFIC GRAVITY. FOR FUELS WITH DIFFERENT SPECIFIC GRAVITY CONSULT THE LATEST EDITION OF THE NATIONAL FUEL GAS CODE, ANSI Z223.1, and CAN B149.

Changing Orifices

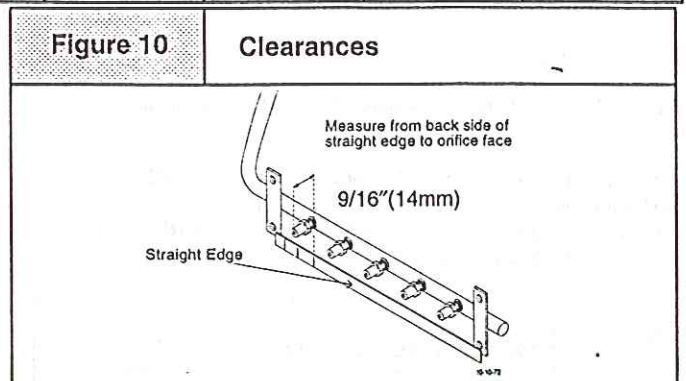
1. After disconnecting power and gas supply to the furnace, remove the access door, exposing gas valve and burner compartment.
2. Disconnect gas line, pilot tubing from gas valve so manifold can be removed.
3. Disconnect wiring at gas valve. Be sure to note the proper location of any and all electrical wiring disconnected.
4. Remove the four (4) screws holding the manifold and gas valve to the manifold supports. Do not discard any screws. See Figure 8.



5. Carefully remove the manifold assembly.
6. Remove the orifices from the manifold and replace them with properly sized orifices. See Figure 9.



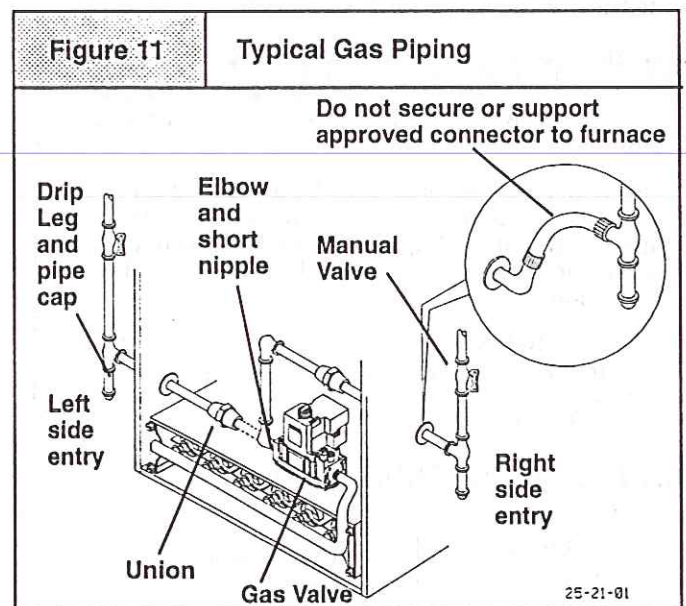
7. Tighten orifices so there is a maximum of $9/16$ " from the face of the orifice to the face of the manifold brackets. To check, place a straight edge across the manifold brackets and measure to the face of orifice as shown in Figure 11. Ensure the orifice is tight.



8. Reassemble all parts in reverse order as removed. Be sure to engage the main burner orifices in the proper opening in the burners.
9. After reassembling, turn gas on and check all joints for gas leaks using a soapy solution. All leaks must be repaired immediately.

Gas Piping Requirements

1. Install gas piping in accordance with local codes, or in the absence of local codes, the applicable national codes.
2. It is recommended that a manual shutoff valve be installed in the gas supply line outside the unit. Locate valve as close to the furnace as possible where it is readily accessible. Refer to Figure 11.



3. Use black iron or steel pipe and fittings or other pipe approved by local code.
4. Use pipe thread compound which is resistant to natural and LP gases.
5. Install a drip leg no less than 3" long to trap dirt and moisture before it can enter gas valve.
6. Use two pipe wrenches when making connections to prevent gas valve from turning.
7. Flexible corrugated metal gas connector may NOT be used inside the furnace or be secured or supported by the furnace or ductwork.
8. Properly size gas pipe to handle combined appliance load or run gas pipe directly from gas meter or LP gas regulator.

- 9. Install correct pipe size for run length and furnace rating.
- 10. Measure pipe length from gas meter or LP second stage regulator.

WARNING

Fire or explosion hazard.

Gas connector must be properly installed, cannot go through the side of the furnace, and can not be used inside the furnace.

Failure to properly install gas connector can result in property damage, bodily injury and/or death.

- Do not use an open flame to test for gas leaks. Fire or explosion could occur.
- If orifices were changed, make sure they are checked for leaks.
- During pressure testing of gas piping system, observe the following:
 - a. If test pressure does not exceed 1/2 PSIG, isolate the furnace by closing its individual manual shutoff valve.
 - b. If test pressure exceeds 1/2 PSIG, the furnace and its individual shutoff valve must be disconnected from the gas supply system.
- To check for leaks apply soap suds or a liquid detergent to each joint. Bubbles forming indicate a leak.
- Correct even the smallest leak at once.

Additional LP Piping Requirements

- Have a licensed LP gas dealer make all connections at storage tank and check all connections from tank to furnace.
- If copper tubing is used, it **MUST** comply with limitations set in Local Codes, or in the absence of local codes, the gas codes of the country having jurisdiction.
- Two-stage regulation of LP gas is recommended.

Final Check

- Test all pipe for leaks.

WARNING

Fire or explosion hazard.

Liquid petroleum (LP) gas is heavier than air and will settle and remain in low areas and open depressions.

Thoroughly ventilate area and dissipate gas. Do NOT use a match or open flame to test for leaks, or attempt to start up furnace before thoroughly ventilating area.

An open flame or spark can result in property damage, personal injury and/or death.

6. Electrical Wiring

Power Supply Wiring

The furnace **MUST** be electrically wired and grounded in accordance with local codes, or in the absence of local codes, the applicable national codes.

Field wiring connections must be made inside the furnace connection box. A suitable strain relief should be used at the point the wires exit the furnace casing.

Copper conductors shall be used. Line voltage wires should be sized for the input amps stated on the rating plate. Furnace should be connected to its own separate circuit.

Thermostat

Thermostat location has an important effect on the operation of the unit. Follow instructions included with thermostat for correct mounting and wiring.

Low voltage connections to furnace must be made on terminal board of the fan control.

If air conditioning is used with this furnace the thermostat "Y" must be connected to the low voltage terminal board "Y" to energize the cooling blower speed. There is a 30 sec. fan on and off delay with the cooling blower.

Set thermostat heat anticipator in accordance with the *Technical Support Manual*.

Optional Equipment

All wiring from furnace to optional equipment **MUST** conform to local codes or, in the absence of local codes, the applicable national codes. Install wiring in accordance with manufacturer's instructions.

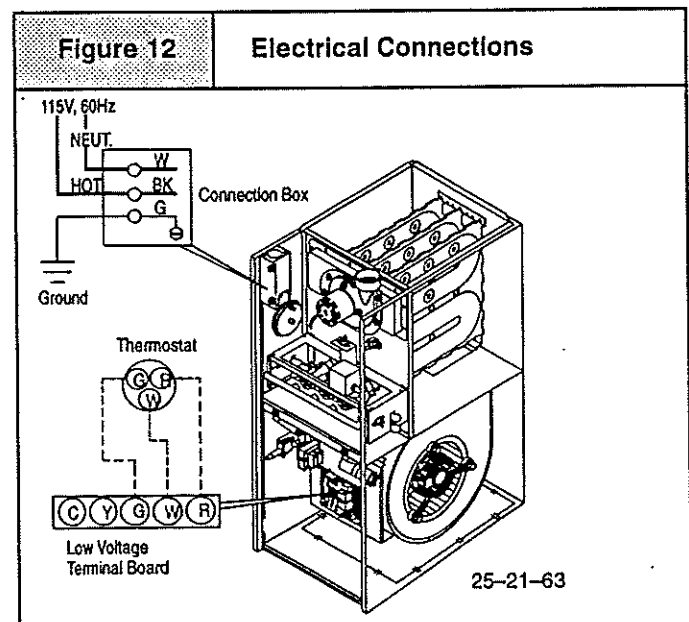
Humidifier/Electronic Air Cleaner

The furnace is equipped with humidifier and/or electronic air cleaner connection.

CAUTION

Do NOT exceed 115V/0.8 amp maximum current load for both the EAC terminal and the HUM terminal combined.

NOTE: The humidifier will be powered on a call from the furnace is fired and the circulating air blower comes on. The electronic air cleaner will be powered with circulating air blower. However, the electronic air cleaner is **NOT** energized during continuous fan operation controlled by the electronic fan control.



7. Ductwork and Filter

WARNING

Carbon monoxide poisoning hazard.

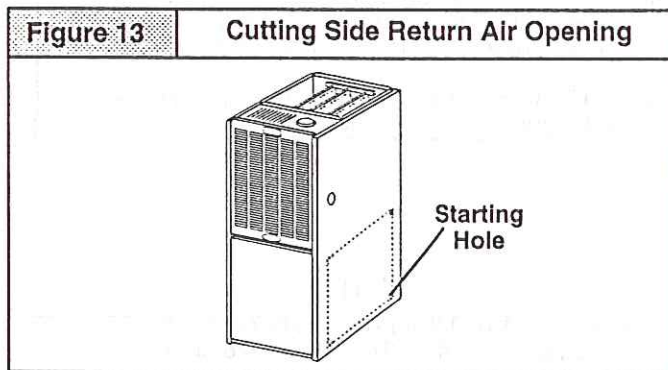
Do NOT draw return air from inside a closet or utility room where furnace is located. Return air duct MUST be sealed to furnace casing.

Failure to properly seal duct can result in personal injury and/or death.

Duct Connections

This furnace may be installed in only a bottom or side return application. Return air through the back of the unit is NOT allowed.

Side connections can be made by cutting out the embossed area shown in Figure 13.



Bottom returns can be made by removing the knockout panel in the furnace base. Do NOT remove knock-out except for a bottom return.

Duct Design

Design and install air distribution system to comply with Air Conditioning Contractors of America manuals or other approved methods that conform to local codes and good trade practices.

When the furnace is located in an area near or adjacent to the living area, the system should be carefully designed with returns to minimize noise transmission through the return air grille. Any blower moving a high volume of air will produce audible noise which could be objectionable when the unit is located very close to a living area. It is often advisable to route the return air ducts under the floor or through the attic.

- Refer to furnace Technical Support Manual (Blower Data) for air flow information.
- Size ductwork to handle air flow for heating and air conditioning.

Duct Installation Requirements

- When furnace supply ducts carry air outside furnace area, seal return air duct to furnace casing and terminate duct outside furnace space.
- When a refrigeration coil is used in conjunction with this unit, it must be installed on the discharge side of the unit to avoid condensation on the heat exchanger.

- If separate evaporator and blower unit is used, install good sealing dampers for air flow control. Chilled air going through the furnace could cause condensation and shorten furnace life. Dampers (purchased locally) can be either automatic or manual. Manually operated dampers MUST be equipped with a means to prevent furnace or air conditioning operation unless damper is in the full heat or cool position.

WARNING

Carbon monoxide poisoning hazard.

Cool air passing over heat exchanger can cause condensate to form resulting in heat exchanger failure.

This could result in personal injury and/or death.

- Installation of locking-type dampers are recommended in all branches, or in individual ducts to balance system's air flow.
- Non-combustible, flexible duct connectors are recommended for return and supply connections to furnace.
- It is recommended if air return grille is located close to the fan inlet, install at least one, 90 degree air turn between fan and inlet grille to reduce noise.
- It is recommended when ductwork installed in attic, or exposed to outside temperatures require 2" of insulation with outdoor type vapor barrier.
- It is recommended when ductwork installed in an indoor unconditioned space requires a minimum of 1" of insulation with indoor type vapor barrier.

Inspection Panel

A removable access panel should be provided in the outlet duct when the furnace is installed without a cooling coil. This will allow smoke or reflected light to be observable inside the casing to indicate the presence of leaks in the heat exchanger. This access cover shall be attached in such a manner as to prevent air leaks.

Filters

The 50,000, 75,000 and 100,000 BTUH input furnaces are supplied with a 16" x 25" high velocity filter and rack. On these models, the supplied filter rack may be mounted internally for bottom return or externally for side return.

The 100,000, 125,000 and 150,000 BTUH input furnaces with 5 ton drive blowers requires that both left and right side returns are used in side return applications. Two 16" x 25" high velocity filters and racks are provided with furnace. Filter racks must be mounted externally. If return air must be on one side only, an optional 20" x 25" filter standoff rack kit can be used. For bottom return, an optional 20" x 25" filter rack kit can be mounted internally.

NOTE: All California (NOx) 5 ton models come with a 20" x 25" bottom return filter.

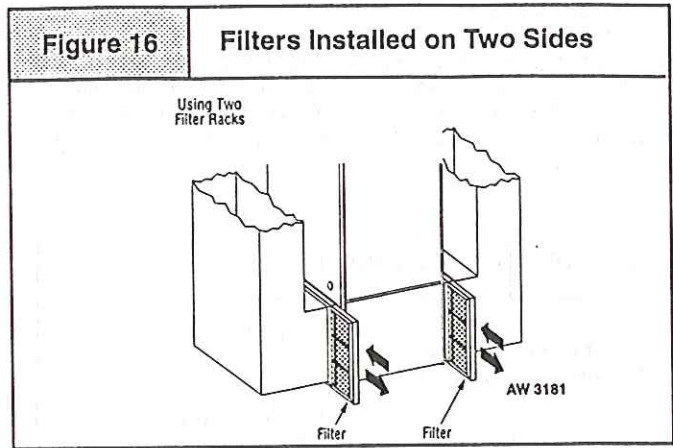
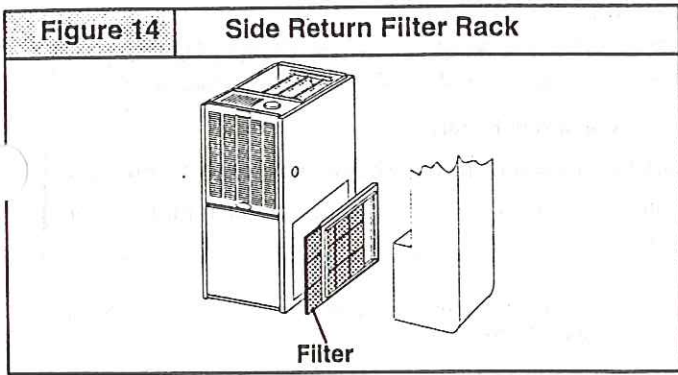
Filter Rack Installation

Side Return

Center the filter rack on the side panel, flush with the bottom edge of the furnace. Mark the fastening holes. Drill the fastening holes in the side panel and fasten the filter rack in place with sheet metal screws. See Figure 14.

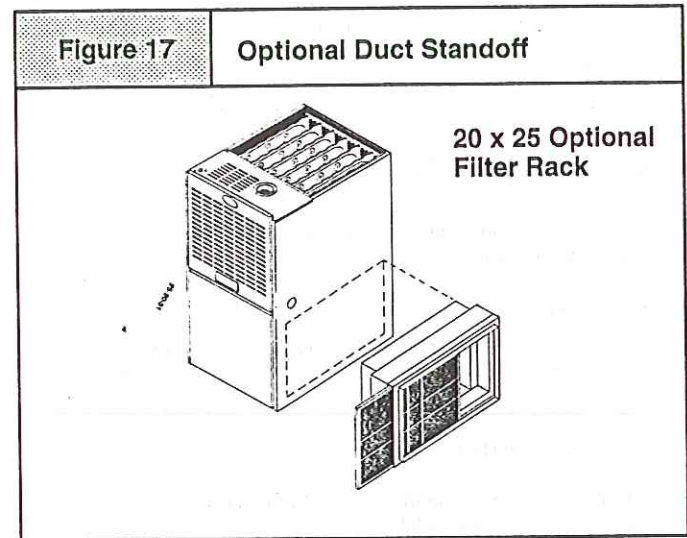
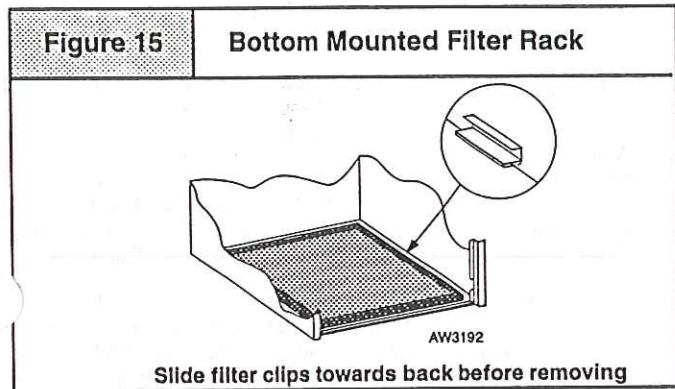
CAUTION

If filters are only suitable for heating application, advise homeowner that filter size may need to be increased if air conditioning is added.



Bottom Return

When installing a bottom mounted filter rack, slide the two side filter clips to the back of the furnace **BEFORE** installing. This will allow the rack to clear the front raised edge of the furnace. Insert rack into side clips first and push rack back until it is fully engaged into back clip. When rack is in place, slide clips back into place midway on rack as shown in Figure 15.



8. Checks and Adjustments

Startup

NOTE: Refer to startup procedures in the *Users Information Manual*.

CAUTION

If any sparks, odors or unusual noises occur, immediately shut OFF power to furnace. Check for wiring errors or obstruction to blower.

Gas Supply Pressure

Gas supply pressure should be within minimum and maximum values listed on rating plate. Pressures are usually set by gas suppliers.

Manifold Gas Pressure Adjustment

NOTE: Make adjustment to manifold pressure with burners operating.

WARNING

Fire or explosion hazard.

Turn OFF gas at shut off before connecting U-tube manometer.

Failure to turn OFF gas at shut off before connecting U-tube manometer can result in personal injury and/or death.

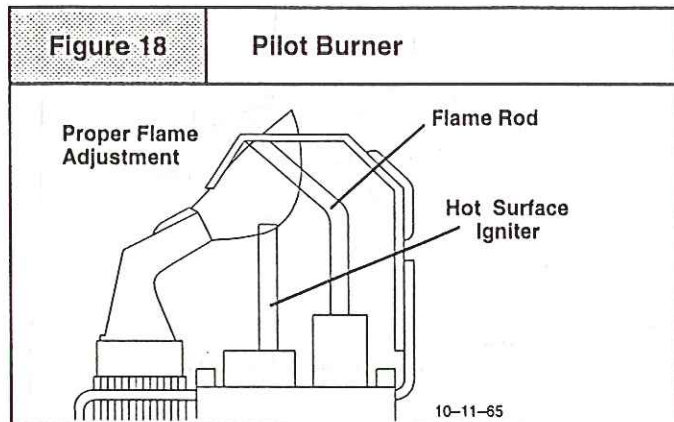
1. With gas OFF, Connect U-Tube manometer to tapped opening on gas valve. Use manometer with a 0 to min. 12" water column range.
2. Turn gas ON and remove adjustment screw cover on gas valve. Turn counterclockwise to decrease pressure and clockwise to increase.

NOTE: Adjustment screw cover **MUST** be placed on gas valve before reading manifold pressure and operating furnace.

3. For altitudes up to 2000', set pressure to value shown in Table 2. For altitudes from 2000' to 8000', see Section 5 Tables 3 & 4 for correct pressure value.

Adjust Pilot Burner

The furnace has a pilot flame to light the main burner. The flame should surround $\frac{3}{8}$ " to $\frac{1}{2}$ " of the flame rod. See Figure 18. To adjust, remove cap from pilot adjusting screw on gas valve. Turn screw counterclockwise to increase or clockwise to decrease flame as required. Replace cap after adjusting screw.



Main Burner Flame Check

Allow the furnace to run approximately 10 minutes then inspect the main burner and pilot flames.

Check for the following :

- Stable and blue flames. Dust may cause orange tips or wisps of yellow, but flames **MUST NOT** have solid, yellow tips.
- Flames extending directly from burner into heat exchanger.
- Flames do **NOT** touch sides of heat exchanger

If any problems with main burner flames are noted, it may be necessary to adjust gas pressures, or check for drafts.

Temperature Rise Check

The blower speed **MUST** be set to give the correct air temperature rise through the furnace as marked on the rating plate. Temperature rise is the difference between supply and return air temperatures.

To check temperature rise, use the following procedure:

1. Place thermometers in supply and return air registers as close to furnace as possible, avoiding direct radiant heat from heat exchangers.
2. Operate furnace continuously for 15 minutes with all registers and duct dampers open.
3. Take reading and compare with range specified on rating plate.
4. If the correct amount of temperature rise is **NOT** obtained, it may be necessary to change blower speed. A higher blower speed will lower the temperature rise. A lower blower speed will increase the temperature rise.

9. Furnace Maintenance

CAUTION

It is recommended that the furnace be inspected and serviced on an annual basis (before the heating season) by a qualified service technician.

Changing Blower Speed

WARNING

Electrical shock hazard.

Turn OFF power to furnace before changing speed taps.

Failure to do so can result in personal injury and/or death.

The blower is factory set for heating and cooling. If it is necessary to change speeds, refer to steps below.

1. Refer to *Furnace Wiring Diagram* for location of the heating and cooling speed taps located on the electronic fan control as well as location of unused blower motor speed leads. Use the chart (Table 6) to determine the blower motor speed settings.

Wire Color	Motor Speed
Black	High
Orange*	Med-High
Blue	Medium
Red	Low

* Med-High speed may not be provided on all models.

2. Change the heat or cool blower motor speed by removing the motor lead from the "Heat" or "Cool" terminal and replace it with the desired motor speed lead from the "Unused Motor Lead" location. Connect the wire previously removed from the "Heat" or "Cool" terminal to the vacated "Unused Motor Lead" terminal.
3. If the same speed must be used for both heating and cooling, remove the undesired motor speed lead from the "Heat" or "Cool" terminal and connect that lead to the open terminal at "Unused Motor Lead" location. Attach a jumper between the "Heat" and "Cool" terminals and the remaining motor speed lead.

Note: For motors with (4) speed leads, it will be necessary to tape off the terminal of the motor speed lead removed from the "Heat" or "Cool" terminal with electrical tape since an open terminal will not be available at the "Unused Motor Lead" location. Recheck temperature rise after speed modification.

Continuous Fan Operation

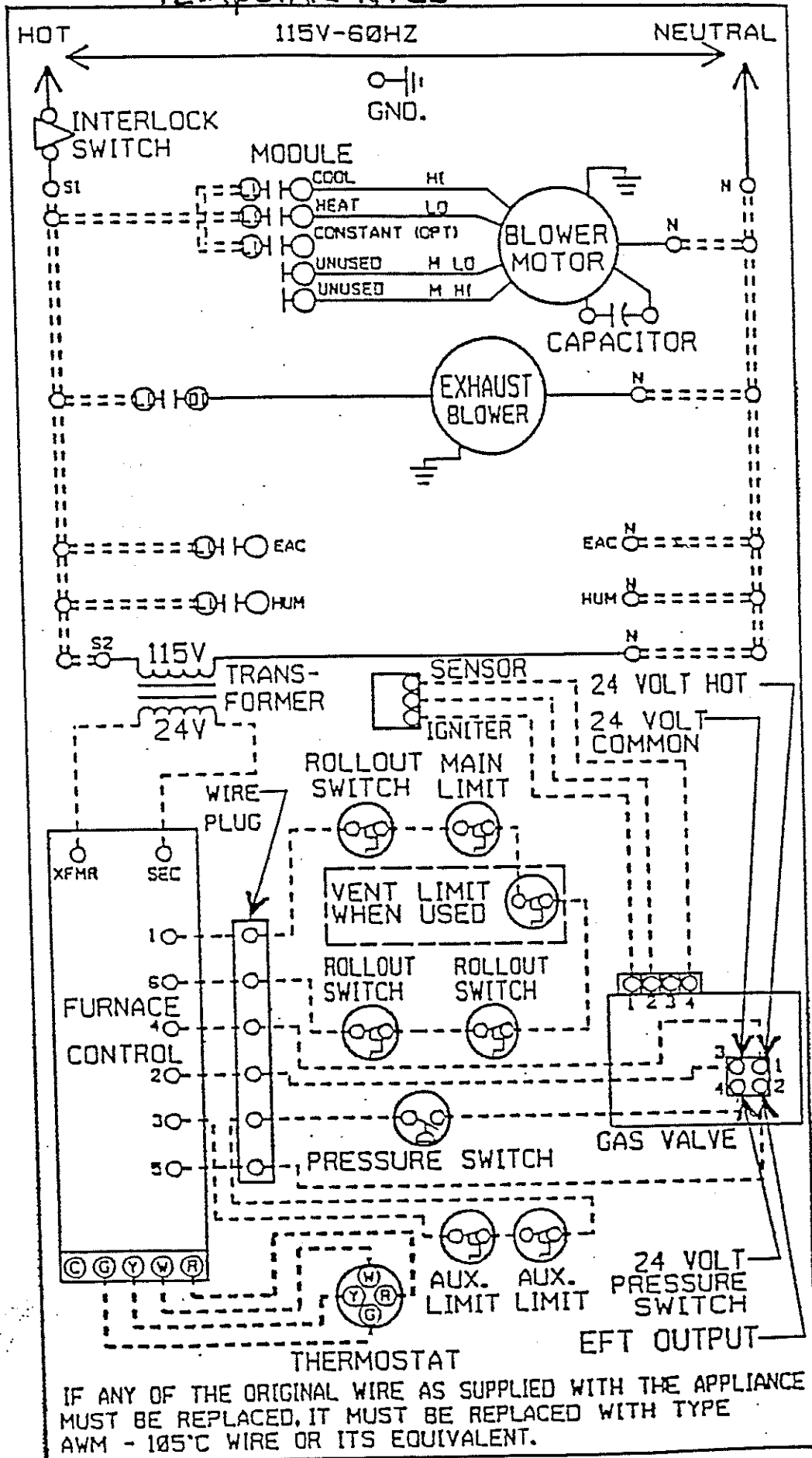
A terminal is provided on the electronic fan control located in the circulating blower compartment for operation of the continuous fan option. This connection is intended for the low speed motor tap, and has a lower contact rating (8 amps) than the heat and cool taps. When the low speed blower lead is connected to this terminal, this will provide low speed blower operation whenever the other two speeds (Heat or Cool) are not energized.

If it is necessary to operate the heating speed and continuous blower speed using the same blower speed, connect a jumper between the "Heat" and "Cont" terminals on the electronic fan control.

Thoroughly check the system after modification to ensure the proper operation of the circulating air blower in all modes of operation.

See "User's Information Manual".

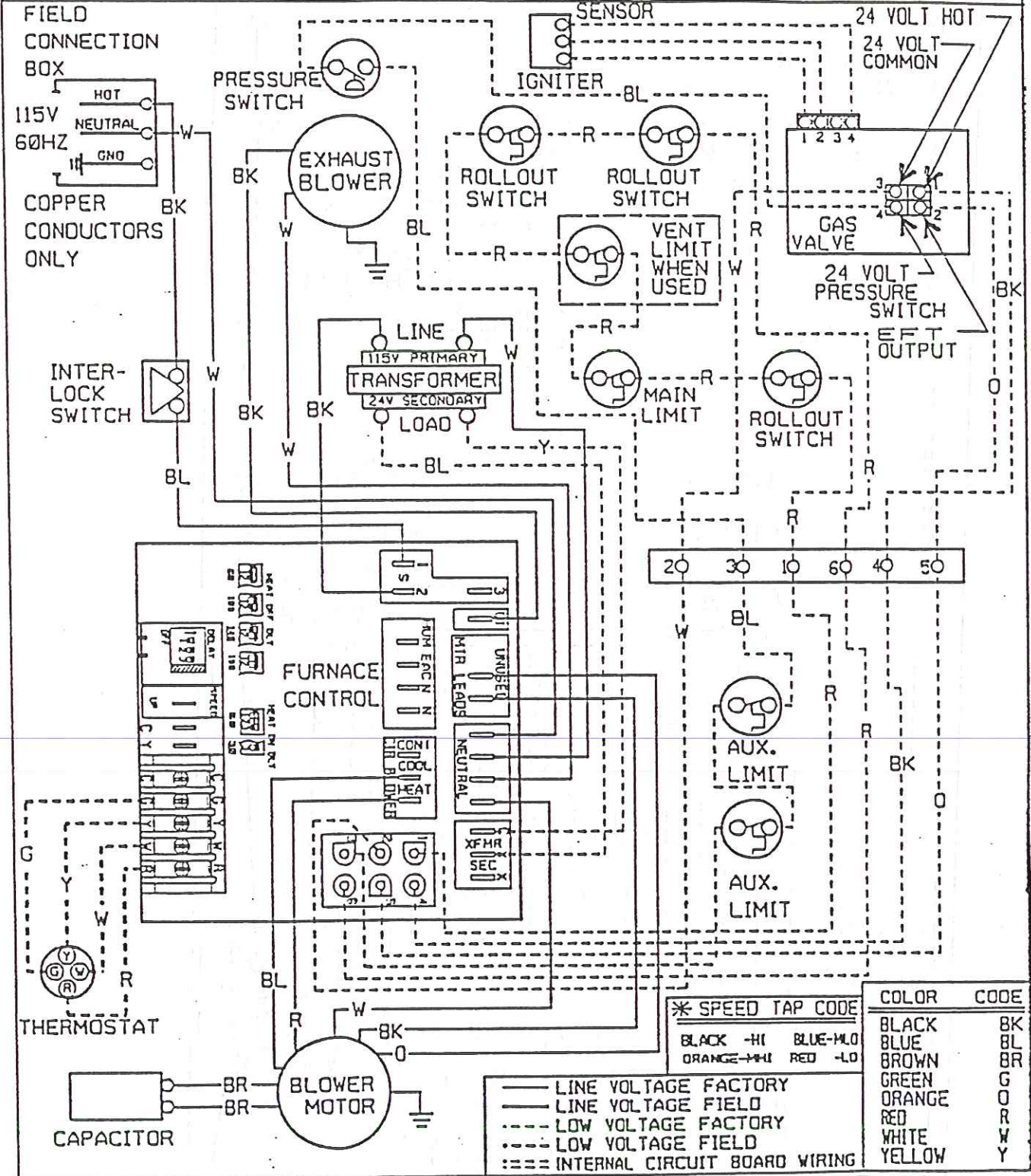
TEMPSTAR NTC5



TEMPSTAR NTC5

CONNECTION DIAGRAM

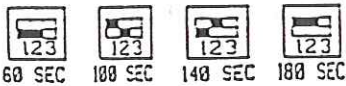
**DANGER: ELECTRICAL SHOCK HAZARD
DISCONNECT BEFORE SERVICING**



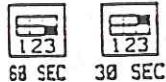
FAN CONTROL MODULE

COOL ON DELAY: 30 SEC.
COOL OFF DELAY: 30 SEC.

HEAT OFF DELAY



HEAT ON DELAY



EAC + HUM: 0.8 A MAX. COMBINED

FIELD TWINNING CONNECTIONS ARE ON EDGE OF CIRCUIT BOARD. USE TWINNING KIT NAH003WK01. MATCH Z1 AND Z2 CONNECTIONS TO SAME POINTS ON 2ND FURNACE CONTROL. ADD LOW VOLTAGE WIRING AND RELAY PER TWINNING KIT INSTRUCTION MANUAL.

GAS VALVE/IGNITION CONTROL (HONEYWELL SV9500)

The system consists basically of only two (2) components. The Ignition System Control and the Pilot Hardware. They operate on Two (2) 24 volt power circuits received from the ST9120G Fan Timer/Furnace Control. One is the power supply for the ignitor, the second is to activate the ignition sequence.

The Ignition System Control manages the Ignition Sequence, and the flow of gas to the pilot and main burners. It is in essence a combination Gas Valve and Ignition control. It contains sophisticated electronic components (internally) and has **NO USER SERVICEABLE COMPONENTS**. Should a problem be

verified internally within the device, IT IS NOT FIELD REPAIRABLE, and must be replaced.

The Pilot Hardware includes the pilot burner, the hot surface element that lights the pilot burner, the flame rod that senses pilot flame, and the cable that attaches to the system control. The hot surface element is made of a tough *break resistant* ceramic composite material. It operates on 24 Volts A.C. The Igniter/Flame Rod assembly can be replaced independently from the pilot burner assembly.

The system operation is quite simple, and forgiving. (I.E. nuisance lockouts are eliminated)

SV9500 SYSTEM OPERATION

Connecting the furnace to the line voltage supply with the blower door interlock switch closed provides 24 volts to power the system. (this is accomplished by the connections from terminals [pins] #4 & #2 from the T9120 fan timer to terminals #1 & #3 of the SV9500 gas valve)

When the thermostat calls for heat, (the combustion blower starts, causing the pressure switch to close completing the circuit to the ignition system control) there will be approximately a two (2) second delay, while the ignition system control runs a self check

Part of that self check is to see if a flame signal is detected. If a flame signal is detected upon a call for heat (and naturally there shouldn't be), the ignition system control will energize the electronic fan timer output (causing the conditioned air blower to start after the fixed 60 second "ON" delay) and will keep the valve and ignitor circuits off.

Assuming that no flame signal is detected upon the call for heat, (Normal operation), the ignition system control will power the ignitor circuit (24 Volts) causing the ignitor to heat up.

If the ignitor circuit is not proven (I.E. the ignitor is missing, broken, or the connections are loose) there will be no response from the ignition system control. (Lockout)

Once the ignitor circuit has been proven, and the ignitor begins to heat up, the pilot valve will be energized allowing gas to flow to the pilot burner.

With the ignitor now hot, and gas flowing to the pilot, the pilot should light, and the sensor should sense flame.

If no flame is sensed, (I.E. no gas, pilot not lit, flame not enveloping sensor, etc.) the ignitor will stay on, and the pilot valve will remain open until it does sense flame, or until the call for heat is satisfied. **THE SYSTEM WILL NOT LOCK OUT** under this condition.

Assuming that the pilot does light, and flame is sensed, (normal operation) the ignition system control will turn the ignitor off, while energizing the main valve. This will allow the pilot to light the main burner. It will also energize the electronic fan timer output (causing the conditioned air blower to start after the fixed 60 second "ON" delay).

If a flame outage (I.E. loss of gas supply, blown out, etc.) should occur during a run cycle (Main burner operation), the ignition system will immediately de-energize the main valve and re-power the ignitor circuit placing the system back in to the "Trial For Ignition" mode.

As previously, it will remain in this "Trial For Ignition" mode (Ignitor powered and pilot valve open) either until the pilot lights and flame is sensed, or until the call for heat ends.

If, during main burner operation, the ignitor circuit opens, (I.E. ignitor breaks, or wiring becomes disconnected or loose from control) the pilot and main valve will close and the system will shut down. (Lockout)

Consequently, as you can see, the only condition that will cause a lockout in this system is an unproven ignitor circuit.

With any other type of condition, (loss of gas, loss of power, etc.) the system will reset itself, and revert to a "Trial For Ignition" mode until it either lights and resumes main burner operation, or the call for heat ends.

The SV9500 system is not sensitive to furnace grounding or line voltage polarity. Accordingly, you cannot experience a lockout due to those reasons.

Assuming that the main burner did not experience any problems during the run cycle (normal operation) it would continue to operate as long as the call for heat remained.

Once the call for heat ended, the ignition system control would immediately close the main and pilot valves, and de-energize the electronic fan timer output.

De-energizing the electronic fan timer output causes the "OFF" delay timing to begin, and when the pre-selected time (60,90,120, or 150 seconds) expires, the blower will turn off.

TROUBLESHOOTING

Malfuncions of the HONEYWELL SV9500 "Smart Pilot" system may be easily diagnosed using a voltmeter and a spare igniter/flame rod assembly. The igniter itself can also be checked using an Ohmmeter. Resistance of a "Good" igniter should be 10 Ohms or less. See the troubleshooting flow chart and the sequence of operation flow chart in the back pages of this manual for additional information on operation and troubleshooting.

HONEYWELL S8600M (SPARK -to- PILOT) IGNITION SYSTEM

Earlier models used a HONEYWELL S8600M spark to pilot ignition system in conjunction with a VR8204 gas valve,

OPERATION

On a call for HEAT, the S8600M is energized (once the pressure switch closes) and provides a 90 second "Trial For Ignition". This "Trial for Ignition" provides a high voltage spark (approximately 20,000 Volts) to the ignitor, and energizes the pilot circuit of the gas valve.

With spark and gas now available at the pilot burner, the pilot should light and prove flame by flame rectification on the flame sensor.

When the S8600M detects the flame rectification of the proven pilot flame, it will simultaneously turn off the spark, and energize the main valve. This will allow the pilot light to light the main burner.

If for some reason the pilot does not light, (I.E. no gas or no spark) or if it lights but does not prove flame (rectification) within the 90 second "Trial for Ignition", the pilot circuit and spark will be de-energized for a "Wait Cycle" of approximately five (5) minutes.

The purpose of the "Wait Cycle" is to allow any unburned gasses to be vented out the flue before once again

providing a "Trial for Ignition". During this five (5) minute "Wait Cycle", apparently nothing will be happening. The combustion blower, however, will be running, and (assuming the pressure switch is closed), the the S8600M will remain energized. The gas valve and/or spark, however, will not be energized during this "Wait Cycle" period.

Once the "Wait Cycle" is complete, the S8600M will provide another 90 seconds "Trial for Ignition". The S8600M will continually repeat this sequence (I.E. 90 second "Trial for Ignition" followed by a Five (5) minute "Wait Cycle") until the pilot and main burner light, or the call for HEAT ends.

During troubleshooting, the "long" five (5) minute "Wait Cycle" can be eliminated by simply satisfying the call for HEAT, and recalling, or by breaking and remaking the line voltage power to the unit. This will reset the S8600M, and immediately provide another 90 second "Trial for Ignition". Simply removing and reinstalling the blower door of the furnace will accomplish this reset.

TROUBLESHOOTING

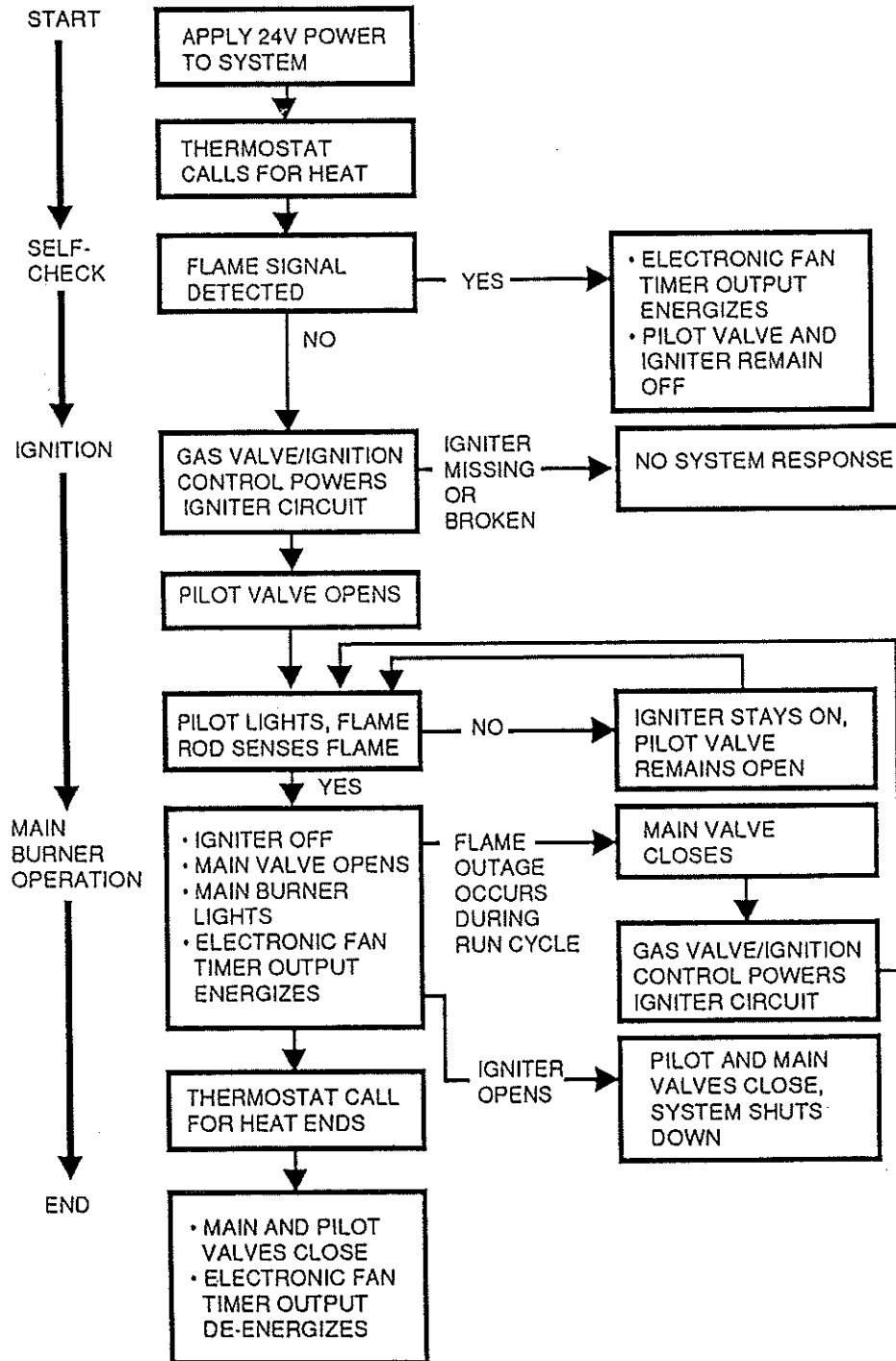
Malfuncions of the HONEYWELL S8600M "Spark to Pilot" may be easily diagnosed using a Volt-Ohmmeter. See the troubleshooting flow chart in the back pages of this manual.

HONEYWELL VR8200 (STANDING PILOT) IGNITION SYSTEM

Standing Pilot models use a Honeywell VR8200A gas valve in conjunction with a Q350 pilot burner assembly. The VR8200A provides a 3-position (OFF-PILOT-ON)

manual control of gas flow. The OFF position prevents gas flow to both the pilot and main burner. The PILOT position allows gas flow to the pilot burner only. The ON

Honeywell SV9500M "SMART VALVE" Sequence of Operation



Honeywell SV9500M "SMART VALVE" Troubleshooting Chart

