

Amana® AIR COMMAND 80

Model GSI-D (Horizontal or Alcove-Upflow)

GAS FIRED WARM AIR FURNACE

installation operation INSTRUCTIONS

IMPORTANT TO THE INSTALLER

Before installing this unit please read this manual to familiarize yourself on the specific items which must be adhered to such as maximum external static pressure to unit, air temperature rise, min. or max. cfm and motor speed connections. Affix these installation instructions adjacent to the furnace.

TO THE OWNER

It is important that you fill out the owner's registration card and mail it today. When filling in the registration card, be sure to include the Model, Manufacturing and Serial Numbers, plus the installation date.

Your warranty certificate is also supplied with the unit. Read the warranty carefully and note what is covered. Keep the warranty certificate in a safe place, so you can find it, if necessary.

If additional operating instructions are required, call the dealer through whom the purchase was made.

Keep this literature in a safe place for future reference.

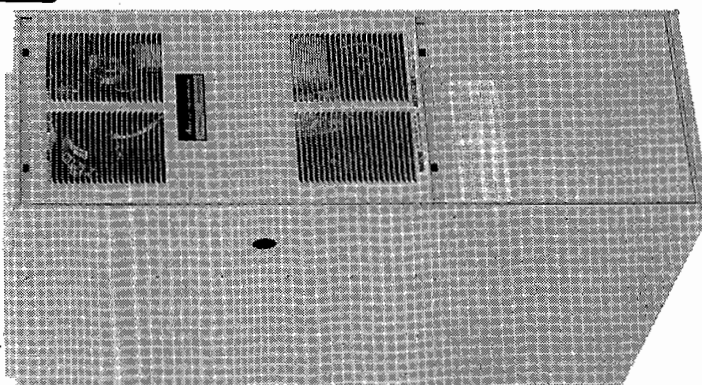


WARNING

Should overheating occur or the gas supply fail to shut off, turn off the manual gas control valve to the furnace before shutting off the electrical supply.



RECOGNIZE THIS SYMBOL AS A SAFETY PRECAUTION



WARNING

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

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- **WHAT TO DO IF YOU SMELL GAS**
 - Extinguish any open flame.
 - 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.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

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Amana Refrigeration, Inc. Amana, IA 52204



Amana Forced Air Central Furnace
Design Complies With Requirements
Embodied In The American National
Standard Shown Below.
ANSI Z21.47 Central Furnaces

I. SAFETY

RECOGNIZE THIS SYMBOL AS A SAFETY PRECAUTION



WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage or death. Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.



WARNING

This product contains or produces a chemical or chemicals which may cause serious illness or death and which are known to the State of California to cause cancer, birth defects or other reproductive harm.

LOCATING THE FURNACE



WARNING

To avoid possible equipment damage, fire, personal injury or death, the following points must be observed when installing the unit.



WARNING

The furnace must be located so that the electrical components are protected from water.



CAUTION

This unit should not be used as a "construction heater" during the finishing phases of construction on a new structure. This type of use may result in premature failure of the unit due to extremely low return air temperatures and exposure to corrosive or very dirty atmospheres.



When suspending the furnace from rafters or joists, use 3/8" threaded rod and 2" x 2" x 3/8" angle as shown on page 6. The length of the rod will depend on the application and clearance necessary.



The furnace must be level. If the furnace is to be set on a floor that may become wet or damp at times, the furnace should be supported above the floor on a concrete base sized approximately 1-1/2" larger than the base of the furnace.



The furnace must be installed with the access doors vertical so that the burners fire horizontally into the heat exchanger. The unit cannot be installed with the access doors on top or bottom. (See Page 4.)



Do not install the furnace where combustion air for the furnace is frequently heavily contaminated with compounds containing chlorine or fluorine. Common sources of such compounds include: indoor swimming pools and chlorine bleaches; paint strippers, adhesives, paints, varnishes, sealers, waxes (which are not yet dried) and solvents used during construction and remodeling. Various commercial and industrial processes may also be sources of chlorine/fluorine compounds.



If the furnace is installed near an area which will be frequently contaminated by chlorine/fluorine compounds, the furnace should be sealed from this area so that little contaminated air can reach the furnace. The furnace must still have an adequate supply of combustion air, either from a neighboring uncontaminated room or from outdoors. For details, see "AIR REQUIREMENTS" Section IV.



The furnace should be as centralized as is practical with respect to the air distribution system.



Provisions must be made for venting combustion products outdoors through a proper venting system as outlined in the Venting Manuals. The length of flue pipe could be a limiting factor in locating the furnace. For details, see the Venting Manuals which are shipped with the furnace.



Allow clearances from the enclosure as shown in TABLE 1 (page 6) for fire protection, proper operation, and service access. These clearances must be permanently maintained. The combustion and ventilating air openings in the front and side panels of the furnace must never be obstructed.



When installed in a residential garage the furnace must be positioned so the burners and ignition source are located not less than 18 inches above the floor and protected from physical damage by vehicles.



Line contact only permissible between lines formed by intersections of the top and two sides of the furnace jacket and the building joists, studs, or framing, horizontal installations only.



Do not install the furnace directly on carpeting, tile or combustible material other than wood flooring.



When the furnace is heating, the temperature of the return air entering the furnace must be between 55°F and 100°F.

II. SPECIFICATIONS

Induced Draft Gas Furnace

Horizontal Model	BTUH		Temp. Rise Range, °F	Number of Burners	F.L.A.*	Blower D x W	Blower HP	Blower Speeds	Max. CFM @ .5 ESP	Pressure Switch Setting **	Net Weight	Approx. Ship Weight
	Input	Output										
GSI045D25A	45,000	36,000	35-65	2	10.1	9x8	1/4	3	1015	-0.54 ± 0.05	132	145
GSI070D35A	70,000	56,000	35-65	3	13.8	10x7	1/3	4	1450	-0.54 ± 0.05	147	160
GSI090D30A	90,000	72,000	45-75	4	13.8	10x8	1/3	4	1225	-0.54 ± 0.05	159	175
GSI090D50A	90,000	72,000	35-65	4	17.4	11x8	3/4	4	1960	-0.54 ± 0.05	159	175
GSI115D35A	115,000	92,000	40-70	5	14.9	10x10	1/2	4	1670	-0.54 ± 0.05	177	195
GSI115D50A	115,000	92,000	45-75	5	17.4	11x8	3/4	4	2080	-0.54 ± 0.05	177	195
GSI140D50A	140,000	112,000	45-75	6	17.4	11x8	3/4	4	2100	-0.54 ± 0.05	187	206

*Full Load Amps (FLA) includes 5 amps drawn by ignitor during 21-second start up cycle.

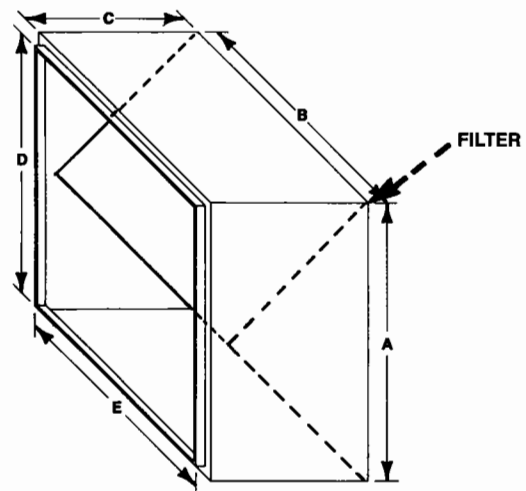
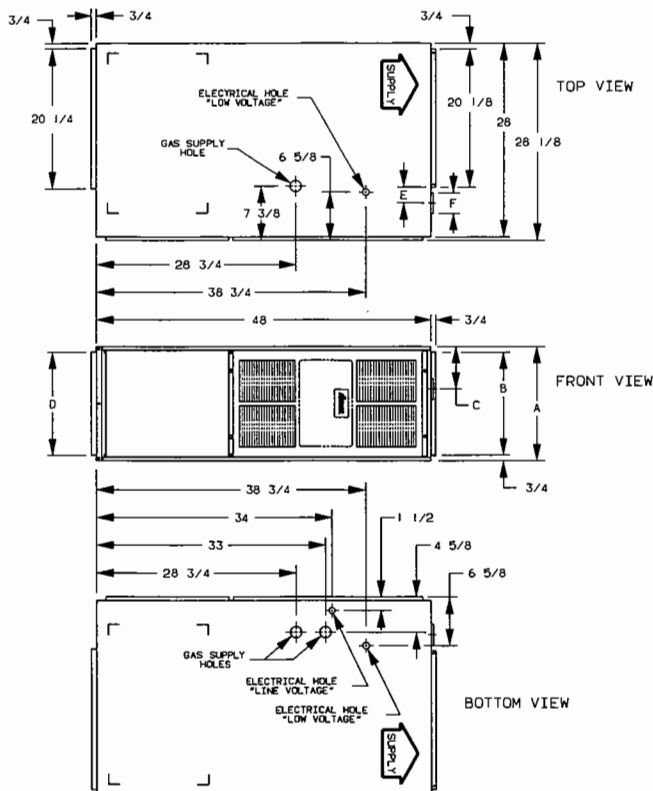
**As shipped for installations below 4000 feet.

Flame sensor output is 1 to 4 microamps at 115 volts.

Dimensions

(All dimensions shown in inches)

HORIZONTAL or ALCOVE-UPFLOW



Horizontal Filter Cabinet

	Used On Models	Dimensions, Inches				
		A	B	C	D	E
HFC16	GSI045, 070	15 ¹ / ₈	20 ³ / ₈	13 ¹ / ₄	13 ⁵ / ₈	18 ¹⁵ / ₁₆
HFC20	GSI090	19 ¹ / ₈	20 ³ / ₈	13 ¹ / ₄	17 ⁵ / ₈	18 ¹⁵ / ₁₆
HFC24	GSI115, 140	23 ¹ / ₈	20 ³ / ₈	13 ¹ / ₄	21 ⁵ / ₈	18 ¹⁵ / ₁₆

NOTES:

1. All furnaces have a redundant gas valve and blower door inter-lock switch.
2. All furnaces are manufactured for use on 120V, 60 Hertz and single phase electrical power supply.
3. **Important:** While the data is presented as a guide, it is very important to electrically connect the unit and properly size fuses and wires in accordance with the National Electrical Code and/or all Existing Local Codes.
4. Performance figures are based on Department of Energy information and requirements under continuous operating conditions. Performance will vary with weather conditions and use.

	A	B	C	D	E	F
GSI045	16 ¹ / ₂	15	6 ¹ / ₈	14 ¹⁵ / ₁₆	2 ⁵ / ₁₆	3
GSI070	16 ¹ / ₂	15	6 ¹ / ₈	14 ¹⁵ / ₁₆	2 ⁵ / ₁₆	3
GSI090	20 ¹ / ₂	19	8 ¹ / ₈	18 ¹⁵ / ₁₆	2 ⁵ / ₁₆	3
GSI115	24 ¹ / ₂	23	10 ¹ / ₈	22 ¹⁵ / ₁₆	2 ¹³ / ₁₆	4
GSI140	24 ¹ / ₂	23	10 ¹ / ₈	22 ¹⁵ / ₁₆	2 ¹³ / ₁₆	4

Horizontal furnaces can be installed as shown or with the flue exiting the left side of the unit. This furnace may also be used in the upflow position in alcove only installations.

CLEARANCES to combustible surfaces (inches)

TABLE 1 Horizontal Installation

Installation with flue exiting to the left side:

Front	Alcove
Right	6
Left	12
Rear	0
Top	6
Flue	6*
Floor	Combustible (Wood Only)

Installation with the flue exiting to the right side:

Front	Alcove
Right	12
Left	6
Rear	0
Top	6
Flue	6*
Floor	Combustible (Wood Only)

Upflow Installation

Alcove installation with bottom return:

Front	Alcove
Right	2**
Left	1
Rear	0
Top	0
Flue	6*
Floor	Combustible (Wood Only)

*May be 1" when Type B vent is used.

**2" clearance for GSI045D25A, GSI070D35A only (May be 1" when Type B is used.) All others may be 1".

WARNING

To avoid the risk of fire, line contact from furnace to combustible material is only permissible between lines formed by intersections of the top and two sides of the furnace jacket and the building joists, studs, or framing, horizontal installations only.

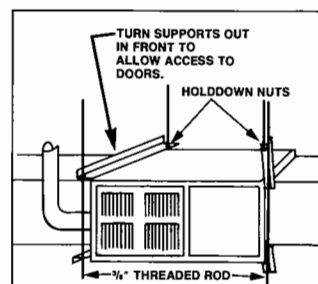
ACCESSIBILITY CLEARANCES (MINIMUM)

36" at front is required for servicing or cleaning.

NOTE: In all cases accessibility clearance shall take precedence over clearances from the enclosure where accessibility clearances are greater.

Furnace Suspension — If necessary to suspend the furnace from rafters or joists, use $\frac{3}{8}$ " threaded rod with angle iron as shown below.

FURNACE SUSPENSION



CFM & Temperature Rise vs. External Static Pressure

Model	Motor Speed	External Static Pressure, Inches Water Column													
		0.2		0.3		0.4		0.5		0.6		0.7		0.8	
		CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise	CFM	Rise
GSI045D25A	LO	730	46	730	46	700	48	675	49	610	53	535	60	390	—
	MED	915	36	900	37	870	38	825	40	760	43	680	48	500	—
	HI	1220	—	1160	—	1090	—	1015	—	930	—	825	39	680	48
GSI070D35A	LO	830	61	825	62	820	62	815	62	800	64	780	—	775	—
	M-LO	1085	47	1080	47	1070	47	1060	48	1050	48	1030	49	990	51
	MED	1365	37	1360	37	1320	38	1290	39	1250	41	1185	43	1130	45
	HI	1620	—	1565	—	1515	—	1450	—	1380	37	1320	38	1240	41
GSI090D30A	LO	740	—	730	—	700	—	675	—	620	—	560	—	460	—
	M-LO	960	69	940	71	900	74	865	—	815	—	750	—	660	—
	MED	1220	55	1170	57	1120	60	1065	63	1000	65	910	72	800	—
	HI	1420	47	1350	49	1285	52	1225	54	1140	57	1040	63	900	72
GSI090D50A	LO	1290	52	1280	52	1255	54	1235	55	1200	56	1150	59	1100	62
	M-LO	1500	45	1490	45	1460	46	1435	47	1400	48	1345	50	1285	53
	MED	1760	38	1725	39	1690	40	1645	41	1580	43	1515	45	1440	47
	HI	2165	—	2110	—	2040	—	1960	—	1885	36	1800	38	1730	39
GSI115D35A	LO	1060	—	1050	—	1040	—	1000	—	955	—	880	—	790	—
	M-LO	1260	68	1250	68	1220	—	1200	—	1145	—	1080	—	990	—
	MED	1580	54	1560	55	1510	56	1460	58	1395	60	1300	64	1150	—
	HI	1920	44	1835	46	1760	48	1670	51	1570	53	1460	57	1320	63
GSI115D50A	LO	1325	65	1300	67	1280	68	1250	69	1230	71	1195	73	1150	—
	M-LO	1560	56	1525	57	1500	58	1470	59	1425	61	1360	64	1300	67
	MED	1800	48	1775	49	1745	50	1700	51	1650	53	1580	55	1520	57
	HI	2285	—	2220	—	2150	—	2080	—	2000	—	1920	—	1835	47
GSI140D50A	LO	1290	—	1270	—	1260	—	1235	—	1190	—	1150	—	1090	—
	M-LO	1510	69	1500	70	1460	70	1445	73	1415	74	1360	—	1300	—
	MED	1780	59	1760	60	1725	61	1680	62	1630	64	1560	67	1485	71
	HI	2315	—	2240	47	2170	48	2100	50	2020	52	1940	54	1850	57

NOTE:

1. INSTALLATION IS TO BE ADJUSTED TO OBTAIN A TEMPERATURE RISE WITHIN THE RANGE SPECIFIED ON THE RATING PLATE.
2. The above chart is for information only. For satisfactory operation, external static pressure should not exceed value shown on rating plate. The shaded area indicates ranges in excess of maximum external static pressure allowable when heating.
3. The above chart is for U.S. furnaces installed at 0-2000 feet. At higher altitudes, a properly derated unit will have approximately the same temperature rise at a particular CFM, while the ESP at that CFM will be lower.

III. GENERAL INFORMATION



WARNING

Property damage, bodily injury, or death from hazards such as fire, explosion, smoke, soot, condensation, electrical shock, or carbon monoxide may result from improper installation, repair, operation, or maintenance on this product.



WARNING

To avoid fire, property damage, and personal injury, do not install this unit in a mobile home, trailer, or recreational vehicle.

This is a horizontal type furnace. It can also be used as an upflow furnace with bottom air return for alcove applications only. To assure that your furnace operates safely and efficiently, it must be installed, operated, and maintained in accordance with these installation and operating instructions, the venting manual, all local building codes and ordinances, or, in their absence, the latest edition of the National Fuel Gas Code, ANSI Z223.1*.

The nominal heating capacity of the furnace should be greater than or equal to the total heat loss of the area to be heated. The total heat loss should be calculated by an approved method or in accordance with "A.S.H.R.A.E. Guide" or "Manual J-Load Calculations" published by the Air Conditioning Contractors of America.

*Obtain from:

American National Standards Institute
1430 Broadway
New York, NY 10018

TRANSPORTATION DAMAGE

All furnaces are securely packed in shipping containers approved by the National Safe Transit Committee. The carton should be checked upon arrival for external damage. If damage is found, a request for inspection by carrier's agent should be made in writing immediately.

The furnace should be carefully inspected upon arrival for damage and bolts or screws which may have loosened in transit. In the event of damage, the consignee should:

1. Make notation on delivery receipt of any visible damage to shipment or container.
2. Notify carrier promptly and request an inspection.
3. In case of concealed damage, carrier should be notified as soon as possible — preferably within 5 days.
4. File the claim with the following supporting documents within the 9-month statute of limitations:
 - a. Original Bill of Lading, certified copy, or indemnity bond.
 - b. Original paid freight bill or indemnity in lieu thereof.
 - c. Original invoice or certified copy thereof, showing trade and other discounts or reductions.
 - d. Copy of the inspection report issued by carrier's representative at the time damage is reported to the carrier.

The carrier is responsible for making prompt inspection of damage and for a thorough investigation of each claim. The distributor or manufacturer will not accept claims from dealers for transportation damage.

LOCATING THE THERMOSTAT

Thermostat should be mounted 4 to 5 feet above the floor, on inside wall of the living room, dining room, or a hallway that has good air circulation from the other rooms being controlled by the thermostat.

Movement of air should not be obstructed by furniture, door, draperies, etc. The thermostat should not be mounted where it will be affected by drafts, hot or cold water pipes or air ducts in walls, radiant heat from fireplace, lamps, the sun, T.V., etc. or on an outside wall. Consult the Instruction Sheet packaged with thermostat for mounting instructions.

IV. AIR REQUIREMENTS

COMBUSTION AND VENTILATION AIR



WARNING

Property damage, bodily injury or death may occur if the furnace and any other fuel-burning appliances are not provided with enough fresh air for proper combustion and ventilation of flue gases. Most homes require outside air to be supplied into the furnace area.

Improved construction and additional insulation in homes has reduced the heat loss and made these homes much tighter around doors and windows so that air infiltration is minimal. This creates a problem to supply combustion and ventilation air for gas fired or other fuel burning appliances. Any use of appliances that pull air out of the house (clothes dryers, exhaust fans, fireplaces, etc.) increases this problem and appliances could be starving for air.

In addition, these energy saving measures mean that your home will retain more water vapor and have a higher relative humidity. High humidity, especially during cold weather, may be damaging to buildings because condensation forms on windows and inside walls.

AIR REQUIREMENTS

Most homes will require that outside air be supplied to the furnace area by means of ventilation grilles or ducts connecting directly to the outdoors or spaces open to the outdoors such as attics or crawl spaces. The following information on air for combustion and ventilation is reproduced from the National Fuel Gas Code NFPA54/ANSI Z223.1 Section 5.3.

5.3.1 General:

(a) The provisions of 5.3 apply to gas utilization equipment installed in buildings and which require air for combustion, ventilation and dilution of flue gases from within the building. They do not apply to (1) direct vent equipment which is constructed and installed so that all air for combustion is obtained from the outside atmosphere and all flue gases are discharged to the outside atmosphere, or (2) enclosed furnaces which incorporate an integral total enclosure and use only outside air for combustion and dilution of flue gases.

(b) Equipment shall be installed in a location in which the facilities for ventilation permit satisfactory combustion of gas, proper venting and the maintenance of ambient temperature at safe limits under normal conditions of use. Equipment shall be located so as not to interfere with proper circulation of air. When normal infiltration does not provide the necessary air, outside air shall be introduced.

(c) In addition to air needed for combustion, process air shall be provided as required for: cooling of equipment or material, controlling dew point, heating, drying, oxidation or dilution, safety exhaust, odor control, and air for compressors.

(d) In addition to air needed for combustion, air shall be applied for ventilation, including all air required for comfort and proper working conditions for personnel.

(e) While all forms of building construction cannot be covered in detail, air for combustion, ventilation and dilution of flue gases for gas utilization equipment vented by natural draft normally may be obtained by application of one of the methods covered in 5.3.3 and 5.3.4.

(f) Air requirements for the operation of exhaust fans, kitchen ventilation systems, clothes dryers, and fireplaces shall be considered in determining the adequacy of a space to provide combustion air requirements.

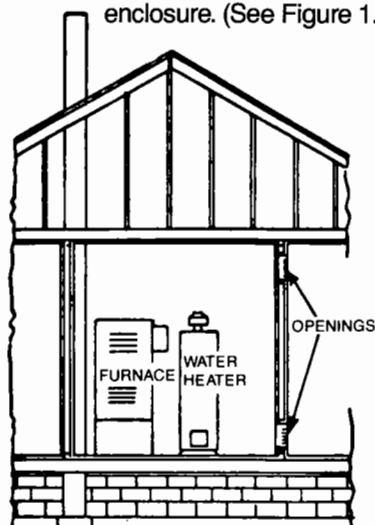
5.3.2 Equipment Located in Unconfined Spaces:

In unconfined spaces (see definition below) in buildings, infiltration may be adequate to provide air for combustion, ventilation and dilution of flue gases. However, in buildings of tight construction (for example, weather stripping, heavily insulated, caulked, vapor barrier, etc.), additional air may need to be provided using the methods described in 5.3.3-b or 5.3.4.

Space, Unconfined. For purposes of this Code, a space whose volume is not less than 50 cubic feet per 1,000 Btu per hour of the aggregate input rating of all appliances installed in that space. Rooms communicating directly with the space in which the appliances are installed, through openings not furnished with doors, are considered a part of the unconfined space.

5.3.3 Equipment Located in Confined Spaces:

(a) *All Air from Inside the Building:* The confined space shall be provided with two permanent openings communicating directly with additional room(s) of sufficient volume so that the combined volume of all spaces meets the criteria for an unconfined space. The total input of all gas utilization equipment installed in the combined space shall be considered in making this determination. Each opening shall have a minimum free area of 1 square inch per 1,000 Btu per hour of the total input rating of all gas utilization equipment in the confined space, but not less than 100 square inches. One opening shall be within 12 inches of the top and one within 12 inches of the bottom of the enclosure. (See Figure 1.)



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.

Fig. 1 Equipment Located in Confined Spaces; All Air from inside the Building. See 5.3.3-a.

(b) **All Air From Outdoors:** The confined space shall be provided with two permanent openings, one commencing within 12 inches of the top and one commencing within 12 inches of the bottom of the enclosure. The openings shall communicate directly, or by ducts, with the outdoors or spaces (crawl or attic) that freely communicate with the outdoors.

1. When directly communicating with the outdoors, each opening shall have a minimum free area of 1 square inch per 4,000 Btu per hour of total input rating of all equipment in the enclosure. (See Fig. 2.)

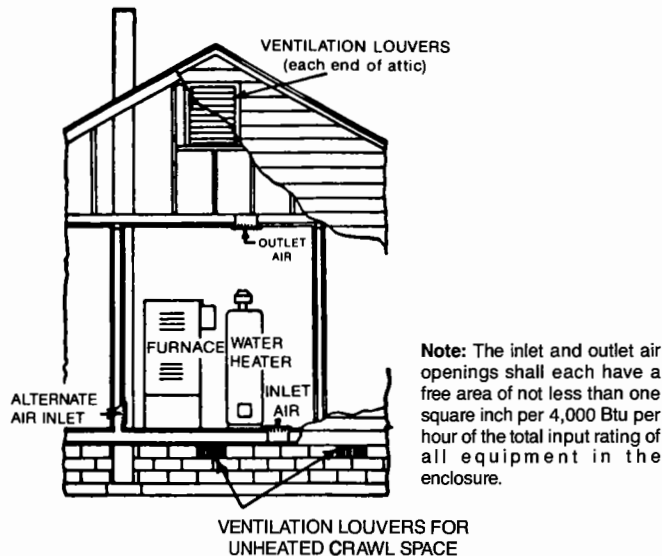


Fig. 2. Equipment Located in Confined Spaces; All Air from Outdoors — Inlet Air from Ventilated Crawl Space and Outlet Air to Ventilated Attic. See 5.3.3-b.

2. When communicating with the outdoors through vertical ducts, each opening shall have a minimum free area of 1 square inch per 4,000 Btu per hour of total input rating of all equipment in the enclosure. (See Fig. 3.)

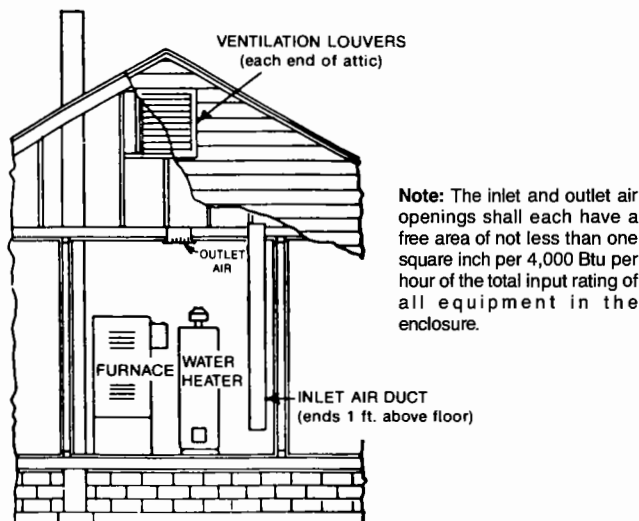
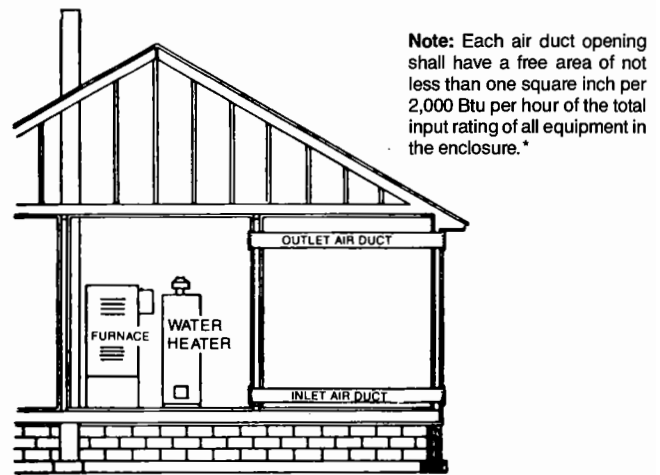


Fig. 3. Equipment Located in Confined Spaces; All Air from Outdoors Through Ventilated Attic. See 5.3.3-b.

3. When communicating with the outdoors through horizontal ducts, each opening shall have a minimum free area of 1 square inch per 2,000 Btu per hour of total input rating of all equipment in the enclosure. (See Fig. 4.)



*If the appliance room is located against an outside wall and the air openings communicate directly with the outdoors, each opening shall have a free area of not less than one square inch per 4,000 Btu per hour of the total input rating of all appliances in the enclosure.

Fig. 4. Equipment Located in Confined Spaces; All Air from Outdoors. See 5.3.3-b.

4. When ducts are used, they shall be of the same cross-sectional area as the free area of the openings to which they connect. The minimum dimension of rectangular air ducts shall be not less than 3 inches.

5.3.4 Specially Engineered Installations:

The requirements of 5.3.3 shall not necessarily govern when special engineering, approved by the authority having jurisdiction, provides an adequate supply of air for combustion, ventilation, and dilution of flue gases.

5.3.5 Louvers and Grilles:

In calculating free area in 5.3.3, consideration shall be given to the blocking effect of louvers, grilles or screens protecting openings. Screens used shall not be smaller than $\frac{1}{4}$ inch mesh. If the free area through a design of louver or grille is known, it should be used in calculating the size opening required to provide the free area specified. If the design and free area is not known, it may be assumed that wood louvers will have 20-25 percent free area and metal louvers and grilles will have 60-75 percent free area. Louvers and grilles shall be fixed in the open position or interlocked with the equipment so that they are opened automatically during equipment operation.

5.3.6 Special Conditions Created by Mechanical Exhausting or Fireplaces:

Operation of exhaust fans, ventilation systems, clothes dryers, or fireplaces may create conditions requiring special attention to avoid unsatisfactory operation of installed gas utilization equipment.

V. VENTING

For information on venting, please consult the venting manuals which are shipped with the furnace.



WARNING

This furnace is not recommended for common venting application with other induced draft appliances. Failure to follow these instructions can result in bodily injury or death from asphyxiation. Therefore, carefully read and follow all instructions given in this section and the Venting Manual(s) shipped with the furnace.

WHEN AN EXISTING FURNACE IS REMOVED FROM A VENTING SYSTEM SERVING OTHER APPLIANCES, the venting system may be too large to properly vent the remaining attached appliances.

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

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

- Insofar as is practical, close all building doors and windows and all doors between the space in which the appliances remaining connected to the common venting system are located and other spaces of the building. Turn on clothes dryers and any 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.
- Follow the lighting instructions. Place the appliance being inspected in operation. Adjust thermostat so appliance will operate continuously.
- 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.
- After it has been determined that each appliance remaining connected to the common venting system properly vents when tested as outlined above, return doors, windows, exhaust fans, fireplace dampers and any other gas-burning appliance to their previous conditions of use.
- If improper venting is observed during any of the above tests, the common venting system must be corrected in accordance with the latest edition of the National Fuel Gas Code, ANSI Z223.1.

If resizing any portion of the common venting system, use the appropriate table in Appendix G in the latest edition of the National Fuel Gas Code, ANSI Z223.1. Also consult the venting manual shipped with the furnace.

VI. GAS PIPING

The rating plate is stamped with the model number, type of gas and gas input rating. Make sure the furnace is equipped to operate on the type of gas available.

INLET GAS PRESSURE	
NATURAL	MIN. 5.0", MAX. 10.0"
PROPANE	MIN. 11.0", MAX. 14.0"

Inlet Gas Pressure Must Not Exceed the Maximum Value Shown in Table Above.

The minimum supply pressure must not be varied downward because this could lead to unreliable ignition. In addition, gas input to the burners must not exceed the rated input shown on the rating plate. Overfiring of the furnace could result in premature heat exchanger failure.

HIGH ALTITUDE DERATE

When this furnace is installed at altitudes above 2,000 feet the furnace input must be derated 4% for each 1,000 feet above sea level because the density of the air is reduced.

In some areas the gas supplier will derate the gas at a rate of 4% for each 1,000 feet above sea level. If he does not do so, smaller orifices will be required at altitudes above 3,500 feet (non-derated natural gas) or 4,500 feet (non-derated propane).

A different pressure switch is required at altitudes more than 4,000 feet above sea level. This is required regardless of the heat content of the fuel used.

High altitude kits can be purchased depending upon the altitude and the usage of propane or natural gas. Refer to the high altitude instruction manual included with this furnace to determine which high altitude components to use and also for detailed installation instructions.

Adjustment of the manifold pressure to a lower pressure reading than what is specified on the furnace nameplate is not a proper derate procedure. With a lower density of air and a lower manifold pressure at the burner orifice, the orifice will not aspirate the proper amount of air into the burner. This can cause incomplete combustion of the gas, flashback, and possible yellow tipping.

GAS PIPING



CAUTION

To avoid possible unsatisfactory operation or equipment damage due to underfiring of equipment, do not undersize the natural gas/propane piping from the meter/tank to the furnace. When sizing a trunk line per the tables, include all appliances on that line that could be operated simultaneously.

The gas pipe supplying the furnace must be properly sized based on the cubic feet per hour of gas flow required, specific gravity of the gas and length of the run. The gas line installation must comply with local codes, or in the absence of local codes, with the latest edition of the National Fuel Gas Code ANSI Z223.1.

NATURAL GAS CAPACITY OF PIPE IN CUBIC FEET OF GAS PER HOUR (CFH)

Length of Pipe in Feet	Nominal Black Pipe Size				
	1/2"	3/4"	1"	1 1/4"	1 1/2"
10	132	278	520	1,050	1,600
20	92	190	350	730	1,100
30	73	152	285	590	980
40	63	130	245	500	760
50	56	115	215	440	670
60	50	105	195	400	610
70	46	96	180	370	560
80	43	90	170	350	530
90	40	84	160	320	490
100	38	79	150	305	460

(Press. .5 Psig or less and Pressure Drop of 0.3" W.C.; Based on 0.60 Specific Gravity Gas)

$$\text{CFH} = \frac{\text{BTUH FURNACE INPUT}}{\text{CALORIFIC VALUE OF GAS}}$$

CONNECTING THE GAS PIPING - NATURAL GAS

Refer to Figure 5 for the general layout of the furnace. The following rules apply:

1. Use black iron or steel pipe and fittings for the building piping.
2. Use pipe joint compound on male threads only. Pipe joint compound must be resistant to the action of the fuel used.
3. Use ground joint unions. (Inside or outside of furnace.)
4. Install a drip leg to trap dirt and moisture before it can enter the gas valve. The drip leg must be a minimum of three inches long.
5. Use two pipe wrenches when making connection to the gas valve to keep it from turning. **The orientation of the gas valve on the manifold must be the same as shipped from the factory.**
6. Install a manual shutoff valve. This shutoff valve should be conveniently located within (6) six feet of the unit, and between the meter and unit.
7. Tighten all joints securely.
8. The furnace shall be connected to the building piping by one of the following:
 - a. Rigid metallic pipe and fittings.

- b. Semirigid metallic tubing and metallic fittings. Aluminum alloy tubing shall not be used in exterior locations.
- c. Listed gas appliance connectors used in accordance with the terms of their listing that are completely in the same room as the equipment.
- d. In "b" and "c" above, the connector or tubing shall be installed so as to be protected against physical and thermal damage. Aluminum-alloy tubing and connectors shall be coated to protect against external corrosion where they are in contact with masonry, plaster or insulation or are subject to repeated wettings by such liquids as water (except rain water), detergents or sewage.

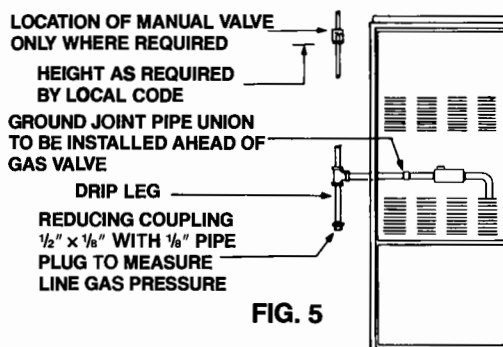


FIG. 5

When the gas piping enters through the top side of the furnace (see section II. for the gas inlet hole locations), the installer must supply the following fittings (starting from the gas valve):

- 90 degree elbow
- 1 1/2" closed nipple
- 90 degree elbow
- Straight pipe to reach the exterior of the furnace. See Fig. 5A.

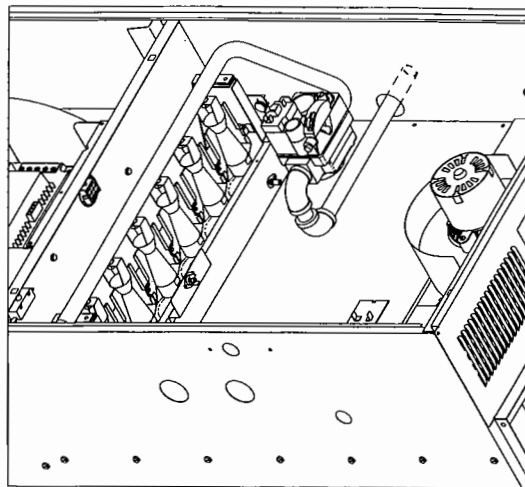


Fig. 5A - Gas Inlet Through Furnace Top Side

A ground joint union, drip leg, and manual shutoff valve must also be supplied by the installer. In some cases, the installer may also need to supply a transition piece from 1/2" to another pipe size.

When the gas piping enters through the bottom side of the furnace (see section II. for the gas inlet hole locations), the installer must supply the following fittings (starting from the gas valve):

- Straight pipe to reach the exterior of the furnace. See Fig. 5B.

To avoid the possibility of vibration or noise, the gas piping should not come in contact with the flue pipe. A ground joint union, drip leg, and manual shutoff valve must also be supplied by the installer. In some cases, the installer may also need to supply a transition piece from $\frac{1}{2}$ " to another pipe size.

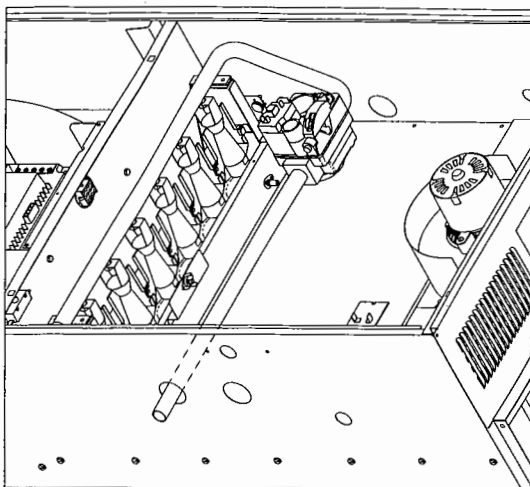


Fig. 5B - Gas Inlet Through Furnace Bottom Side

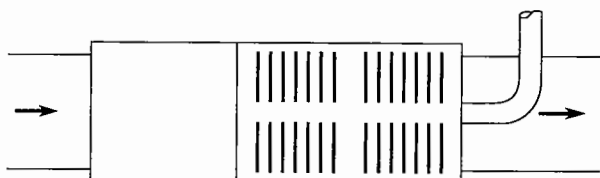


Fig. 5C - Horizontal Furnace (R.H. Discharge)

The gas piping connection descriptions listed above are for a furnace equipped for a right hand discharge (See Fig. 5C).

CHECKING THE GAS PIPING



CAUTION

To avoid the possibility of property damage, personal injury or fire, the following instructions must be performed regarding gas connections and pressure testing.



The unit and its gas connections must be leak tested before placing in operation. Because of the danger of explosion or fire, never use a match or open flame to test for leaks. Never exceed specified pressures for testing. Higher pressure may damage the gas valve and cause overfiring which may result in heat exchanger failure.



This unit and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of that system at test pressures in excess of $\frac{1}{2}$ psig (3.48 kPa).



This unit must be isolated from the gas supply system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than $\frac{1}{2}$ psig (3.48 kPa).

TANKS AND PIPING — PROPANE UNITS



WARNING

PERSONAL INJURY HAZARD

Iron oxide (rust) can reduce the level of odorant in propane gas. A gas detecting device is the only reliable method to detect a propane gas leak. Contact your local propane supplier about installing a gas detecting warning device to alert you in the event that a gas leak should develop.

Failure to detect a propane gas leak could result in an **EXPLOSION** or **FIRE** which could cause **SERIOUS PERSONAL INJURY** OR **DEATH**.

All propane gas equipment must conform to the safety standards of the National Board of Fire Underwriters (See NBFU Manual 58).

For satisfactory operation, propane gas pressure must be 10 inch W.C. at the furnace manifold with all gas appliances in operation. Maintaining proper gas pressure depends on three main factors:

1. Vaporization rate, which depends on (a) temperature of the liquid, and (b) "wetted surface" area of the container or containers.
2. Proper pressure regulation. (Two-stage regulation is recommended from the standpoint of both cost and efficiency.)
3. Pressure drop in lines between regulators, and between second stage regulator and the appliance. Pipe size required will depend on length of pipe run and total load of all appliances.

Complete information regarding tank sizing for vaporization, recommended regulator settings, and pipe sizing is available from most regulator manufacturers and propane gas suppliers.

Propane is an excellent solvent, and special pipe dope must be used when assembling piping for this gas as it will quickly dissolve white lead or most standard commercial compounds. Shellac base compounds resistant to the actions of liquified petroleum gases such as Gasolac, Stalactic, Clyde's or John Crane are satisfactory.

Refer to Fig. 6 for typical propane gas installations.



WARNING

If your propane gas furnace is installed in a basement, an excavated area or a confined space, we strongly recommend that you contact your propane supplier about installing a warning device that would alert you to a gas leak.

... Propane gas is heavier than air and any leaking gas can settle in any low areas or confined spaces.

... Propane gas odorant may fade, making the gas undetectable except with a warning device.

An undetected gas leak would create a danger of explosion or fire. If you suspect the presence of gas, follow the instructions on the cover of this manual. Failure to do so could result in **SERIOUS PERSONAL INJURY OR DEATH.**

TYPICAL PROPANE PIPING

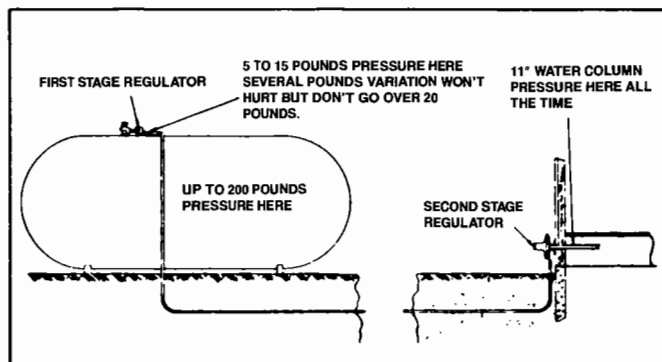


Fig. 6

PROPANE PIPING CHARTS

Sizing Between First and Second Stage Regulator

Maximum Propane Capacities listed are based on 2 PSIG Pressure Drop at 10 PSIG Setting. Capacities in 1,000 BTU/HR

PIPE OR TUBING LENGTH, FEET	TUBING SIZE, O.D., TYPE L						NOMINAL PIPE SIZE, SCHEDULE 40
	3/8"	1/2"	5/8"	3/4"	7/8"	1"	
10	730	1,700	3,200	5,300	8,300	3,200	7,500
20	500	1,100	2,200	3,700	5,800	2,200	4,200
30	400	920	2,000	2,900	4,700	1,800	4,000
40	370	850	1,700	2,700	4,100	1,600	3,700
50	330	770	1,500	2,400	3,700	1,500	3,400
60	300	700	1,300	2,200	3,300	1,300	3,100
80	260	610	1,200	1,900	2,900	1,200	2,600
100	220	540	1,000	1,700	2,600	1,000	2,300
125	200	490	900	1,400	2,300	900	2,100
150	190	430	830	1,300	2,100	830	1,900
175	170	400	780	1,200	1,900	770	1,700
200	160	380	730	1,100	1,800	720	1,500

To Convert to Capacities at 15 PSIG Settings — Multiply by 1.130

To Convert to Capacities at 5 PSIG Settings — Multiply by 0.879

Sizing Between Single or Second Stage Regulator and Appliance*

Maximum Propane Capacities Listed are Based on 1/2" W.C. Pressure Drop at 11" W.C. Setting. Capacities in 1,000 BTU/HR

PIPE OR TUBING LENGTH, FEET	TUBING SIZE, O.D., TYPE L										NOMINAL PIPE SIZE, SCHEDULE 40
	3/8"	1/2"	5/8"	3/4"	7/8"	1"	1 1/8"	1 1/4"	1 3/4"	2"	
10	39	92	199	329	501	935	275	567	1,071	2,205	3,307
20	26	62	131	216	346	630	189	393	732	1,496	2,299
30	21	50	107	181	277	500	152	315	590	1,212	1,858
40	19	41	90	145	233	427	129	267	504	1,039	1,559
50	18	37	79	131	198	376	114	237	448	913	1,417
60	16	35	72	121	187	340	103	217	409	834	1,275
80	13	29	62	104	155	289	89	185	346	724	1,086
100	11	26	55	90	138	255	78	162	307	630	976
125	10	24	48	81	122	224	69	146	275	567	866
150	9	21	43	72	109	202	63	132	252	511	787
200	8	19	39	66	100	187	54	112	209	439	665
250	8	17	36	60	93	172	48	100	185	390	590

*DATA IN ACCORDANCE WITH NFPA PAMPHLET NO. 54

VII. ELECTRICAL WIRING



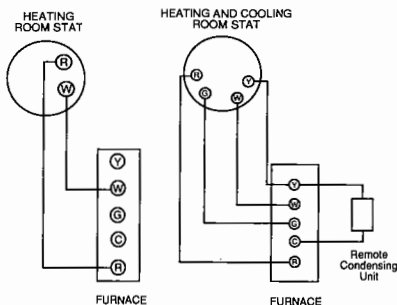
WARNING

To avoid electrical shock, injury or death, disconnect electrical power before changing any electrical wiring.

The wiring harness on this unit is furnished as an integral part of the furnace. Field alteration to comply with electrical codes should not be required.

Power supply to the furnace must be N.E.C. Class 1, and must comply with all applicable codes. The furnace must be electrically grounded in accordance with the local codes or, in their absence, with the latest edition of the National Electrical Code, ANSI/NFPA No. 70. A fused disconnect should be provided and sized in accordance with the unit minimum circuit ampacity.

TYPICAL FIELD WIRING (24V CONTROL CIRCUIT)



A 40VA transformer and auxiliary fan relay are built into the furnace so that it may be used with most cooling equipment.



CAUTION

To avoid the risk of electrical shock, wiring to the unit must be properly polarized and grounded.

Line voltage wiring must enter through the left side of the furnace. See Section II for hole location. Use washers to connect field-supplied conduit to the junction box in accordance with NEC and local codes. Connect hot, neutral, and ground wires as shown in the wiring diagram located on the blower door of the unit. The ground screw is located inside of the junction box. See Figure 7A.

Low voltage wiring may enter through the right or left side of the furnace. See Section II for hole locations. Run the thermostat wires through either hole, through a grommet in the blower deck, and through a hole provided in the ignition control box (top or right side). See Figure 7B.

Low voltage wires may be connected to the terminal strip as shown in Figure 7B.



CAUTION

To avoid possible equipment malfunction, be careful to route the low voltage wires so as not to interfere with filter removal or other maintenance.



CAUTION

Wiring to the unit must be properly polarized and grounded.

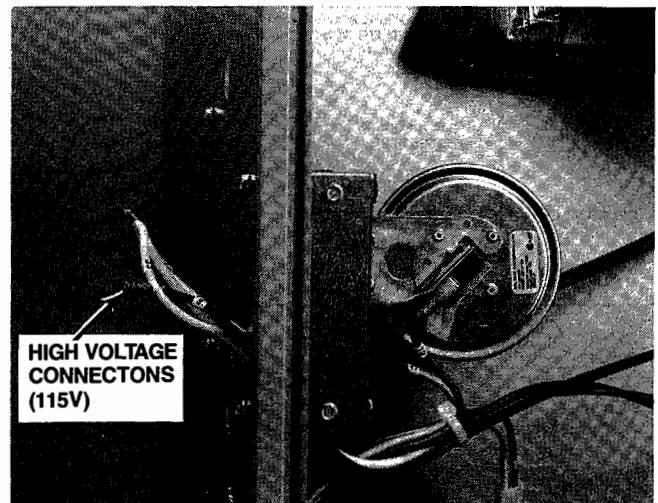


**Fig. 7A — Field Wiring Connections
(Line Voltage)**

ROUTE THERMOSTAT WIRES HERE

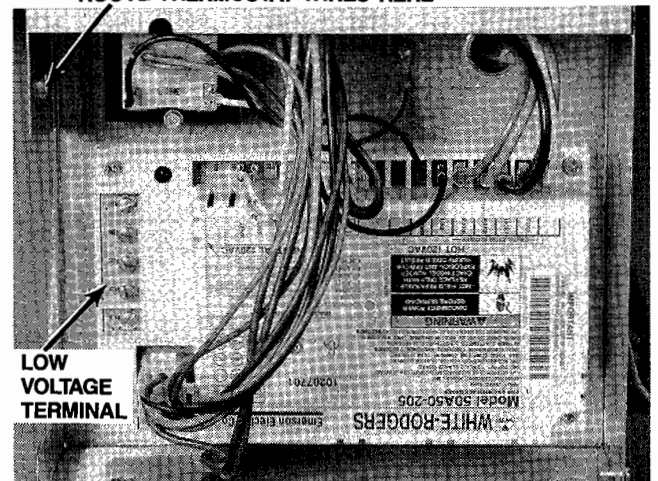


**Fig. 7B — Field Wiring Connections
(Low Voltage)**

LINE VOLTAGE CONNECTION OF OPTIONAL HUMIDIFIER AND ELECTRONIC AIR CLEANER

The control module in this furnace is equipped with line voltage accessory terminals to be used for controlling the power to an optional field-supplied humidifier and/or electronic air cleaner.

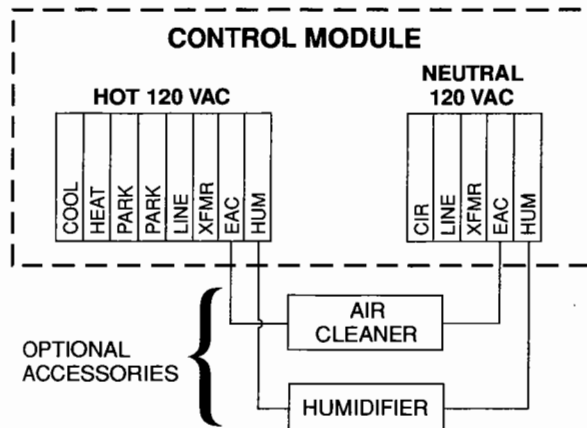
Accessory Load Specifications.

Air Cleaner: 1.0 Amp max. at 120 VAC

Humidifier: 1.0 Amp max. at 120 VAC

Accessory Installation. Follow the electronic air cleaner and humidifier manufacturers' instructions for mounting and electrically grounding these accessories. Check that the power supply to the furnace has been disconnected. Wire the accessories to the furnace control module as shown below. All connections to the control module are to be made through $\frac{1}{4}$ (.250") receptacle (female) terminals.

If it is necessary for the installer to supply additional line voltage wiring to the inside of the furnace, the wiring must comply with all local codes. This wiring must have a minimum temperature rating of 105°C and must be routed away from the burner compartment. All line voltage wire splices must be made inside the furnace junction box.



Accessory Operation. The furnace control module energizes the humidifier whenever the combustion blower is energized (if there is an optional air cleaner on the system, the humidifier is **not** energized until the air cleaner is energized). The control module energizes the air cleaner whenever the air circulation blower is energized.

VIII. CIRCULATING AIR AND FILTERS

DUCTWORK — AIR FLOW

Duct systems and register sizes must be properly designed for the C.F.M. and external static pressure rating of the furnace. Ductwork should be designed in accordance with the recommended methods of "Air Conditioning Contractors of America" Manual D.

A duct system should be installed in accordance with Standards of the National Board of Fire Underwriters for the Installation of Air Conditioning, Warm Air Heating and Ventilating Systems, Pamphlets No. 90A and 90B.

The return air duct must be connected to the opening provided.

It is a must that a closed return duct system be used, with the return duct connected to the furnace. Supply and return duct connections to the unit may be made with flexible joints to minimize noise transmission. If a central return is used, a connecting duct must be installed between the unit and the utility room wall so that the furnace blower will not interfere with combustion air or draft. The room, closet or alcove must not be used as a return air collecting chamber.

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

FILTERS (NOT INCLUDED WITH FURNACE)

Filters must be used with the furnace and must be installed external to the furnace casing. For most installations it is preferable to use a central return with filters installed in the duct behind the return grill. In this way filter replacement is relatively simple by merely removing the grille, rather than going into the attic or crawl space. The following chart shows minimum filter sizes for each furnace which will be run at high speed, whether heating or cooling. If the furnace will never be operated at high speed, smaller filters may be adequate. Throw-away filters should be sized for a maximum face velocity of 300 feet per minute.

FURNACE MODEL	HIGH-VELOCITY PERMANENT TYPE	THROW-AWAY TYPE
GSI045D25A	1 — 16 x 20 x 1	1 — 20 x 25 — 1
GSI070D35A	1 — 16 x 25 x 1	2 — 16 x 20 x 1
GSI090D30A	1 — 16 x 25 x 1	2 — 16 x 20 x 1
GSI090D50A	2 — 16 x 20 x 1	2 — 20 x 25 x 1
GSI115D35A	1 — 20 x 25 x 1	2 — 20 x 20 x 1
GSI115D50A	2 — 16 x 20 x 1	2 — 20 x 25 x 1
GSI140D50A	2 — 16 x 20 x 1	2 — 20 x 25 x 1

An optional filter cabinet is available using a semi-permanent filter. This filter cabinet may be installed in the return air duct as shown below.

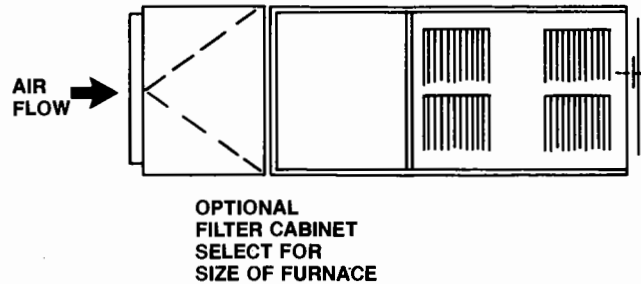


Fig. 8

HFC16 for GSI045, 070

HFC20 for GSI090

HFC24 for GSI115, 140

NOTE: If the GSI furnace is used in the alcove-upflow position and the HFC cabinet is used, a field-supplied framework must be used to support the furnace. The weight of the furnace must not rest on the HFC cabinet.

IX. SEQUENCE OF OPERATION

NORMAL SEQUENCE

1. Thermostat calls for heat.
2. The vent blower is energized.
3. The ignitor is energized and allowed to preheat for 17 seconds.
4. The gas valve is energized delivering gas to the burners and starting combustion.
5. The control checks for a signal from the flame sensor within seven seconds after the gas valve is energized. Gas will only continue to flow if a signal is present.
6. The control waits 30 seconds and turns on the air circulation blower to the speed that was selected for heating operation.
7. The thermostat is satisfied and opens.
8. The control de-energizes the gas valve.
9. There is a 15 second delay while flue products are purged from the furnace heat exchanger and then the vent blower motor is de-energized.
10. There is another 75 second delay to allow heat in the heat exchanger to be transferred to the conditioned space and then the air circulation blower will stop.

ABNORMAL OPERATION

1. **Internal Control Failure with White-Rodgers Control**
If the control during one of its self test cycles determines it has an internal fault, it stops and the diagnostic light will **light continuously**. The control should be replaced.
2. **System Lockout**
If a flame was not sensed during the first 7 seconds after the gas valve was energized, the control turns off the gas. There will then be a 60 second delay with the combustion blower energized to purge the heat exchanger. The ignitor will next be energized and preheated for 27 seconds. The gas valve will be energized. If flame is not sensed in 7 seconds the gas valve will be de-energized and another purge will occur. The control will cycle the gas valve a total of three tries before it determines it cannot establish measurable combustion and enters a locked out state. If flame is sensed but lost after 10 seconds, the control will recycle this series of three tries four more times before locking out. The diagnostic light will indicate this condition with **one short flash** followed by a longer pause. The control can be reset and brought out of lockout mode by turning the thermostat off and then back on.

3. Pressure Switch Stuck Closed

If the control senses the pressure switch is closed when the vent blower is off, it waits until the fault is corrected. The light code for this problem is **two short flashes** followed by a longer pause. The probable cause is faulty pressure switch or wiring.

4. Pressure Switch Stuck Open

If, after the vent blower is energized, the pressure switch does not close, the control will keep the blower on and wait for the switch to close. The diagnostic light code for this problem is **three short flashes** followed by a pause. The probable cause is either: disconnected hose to the pressure switch, faulty pressure switch or wiring, or restricted air intake or flue piping.

5. Open Limit Control

If the limit control opens, the air circulation and vent blower will be turned on until the limit closes. The diagnostic light code for this is **four short flashes** followed by a pause. The probable cause is either: low conditioned air flow due to dirty filter or resistance in duct work, faulty limit, faulty blower, or blower speed set too low.

6. Missing Jumper Wire

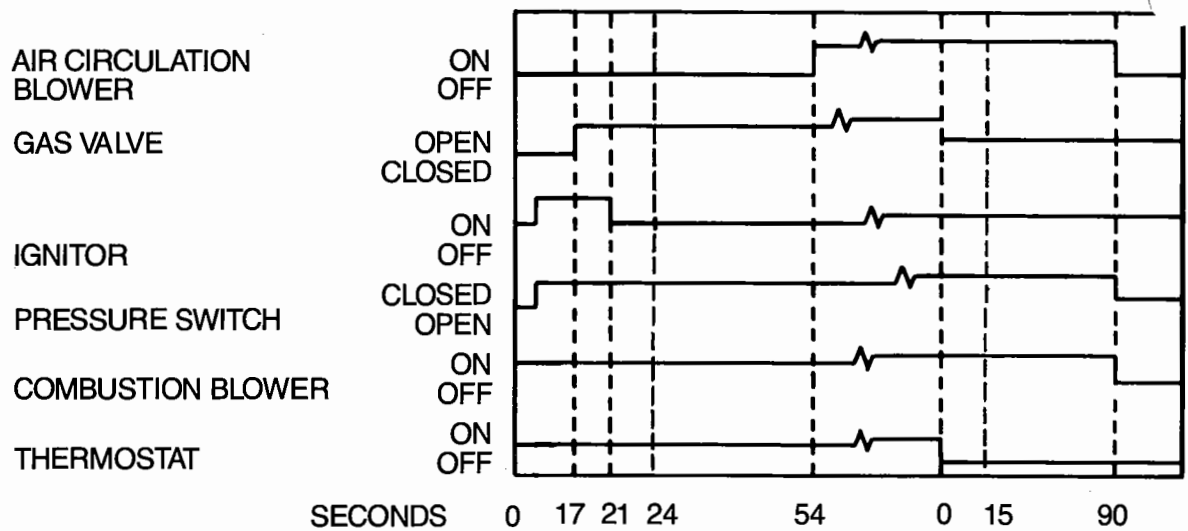
If the jumper between R01 and R02 is not present, the air circulation blower and vent blower will be energized all the time. The diagnostic light code for this is **five flashes** followed by a pause. Probable cause is a missing jumper.

7. Flame Sensed with No Call for Heat

If the control senses a flame when the gas valve is de-energized it will run the air circulation blower and the vent blower continuously. The diagnostic light code for this is **continuous light flashing**. Probable cause is miswiring.

IX. SEQUENCE OF OPERATION (cont.)

TIMING CHART FOR NORMAL WHITE-RODGERS 50A50 OPERATION



WHITE RODGERS 50A50 CONTROL DIAGNOSTIC LIGHT SIGNAL MEANINGS

LIGHT SIGNAL	REFER TO ABNORMAL OPERATION NUMBER
Continuous Light	1. Internal Control Failure
1 Flash	2. System Lockout
2 Flashes	3. Pressure Switch Stuck Closed
3 Flashes	4. Pressure Switch Stuck Open
4 Flashes	5. Open Limit Control
5 Flashes	6. Missing Jumper Wire on control connector
Continuous Flashing	7. Flame Sensed No Call For heat

Thermostat ON
Gas Valve Opens

End of trial for ignition.
Gas valve would close
if flame is not proven.

Air Blower ON

Thermostat OFF
Combustion products
purge ends.

Air Blower OFF

X. START-UP AND ADJUSTMENT

GENERAL OPERATION

This furnace is equipped with an electronic ignition device which lights the burners. It also has an induced draft blower to draw combustion air into the heat exchanger.

Keep the access doors in place except for inspection and maintenance. An interlock switch prevents furnace operation if the blower door is not in place.

On new installations, or if a functional part such as the gas valve, pressure switch, or fan/limit control has been replaced, the operation of the furnace should be checked.

Check furnace operation as outlined in the following instructions. If any sparking, odors, or unusual noises are encountered, shut off electrical power and recheck for wiring errors, or obstructions in or near the blower motor. Various shipping materials must be removed before the blower motor is operated.

HEAT ANTICIPATOR SETTING

The heat anticipator in the room thermostat must be correctly adjusted to obtain the proper number of heating cycles per hour and to prevent the room temperature from "overshooting" the room thermostat setting. Heat anticipator must be set at 0.7 amps.

ELECTRONIC CONTROL MODULE

This furnace is equipped with a self-diagnosing electronic control module. In the event a furnace component is not operating properly, the control module will repeatedly flash a red light on and off in a factory-programmed sequence, depending on the problem encountered.

If you suspect the furnace is not operating properly, look through the observation window in the blower access door (see Fig. 9) and make note of the number of flashes in the sequence. Then see Section IX, Sequence of Operation, for further information.

RESET AFTER CONTROL LOCK-OUT

If ignition has not been achieved for any reason after three ignition cycles, the electronic control module will lock-out the furnace. A lock-out causes both the air blower and the vent blower to run continuously, and ignition is no longer attempted. The control's diagnostic light will then repeatedly flash once and then pause. When this occurs, it may be necessary to reset the control by turning the thermostat setting below room temperature for thirty seconds and then returning the setting to the desired temperature. The control may also be reset after a lock-out by turning off the electrical disconnect switch to the furnace for thirty seconds.

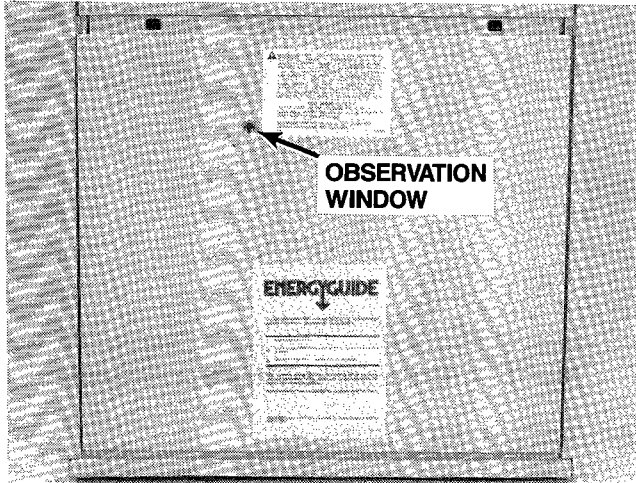


Fig. 9 — Observation Port

AUXILIARY LIMIT CONTROL



WARNING

To avoid possible property damage, this unit is equipped with a device to prevent furnace operation if the main blower fails. This furnace is shipped with a device located to protect a furnace installed with a right discharge. If the unit is installed with a left discharge, this device must be relocated.

On horizontal furnaces, a second limit control is placed on the blower housing. (After disconnecting the electrical power, remove the furnace non-louvered door for access.) This control is in addition to the main limit control, and shuts the furnace off in case of blower failure. **This control must always be placed on the top side of the unit.**

If you are installing the furnace for a left hand installation, the auxiliary limit will need to be relocated as described below:

1. Remove the two screws holding the auxiliary limit mounting bracket to the bottom side of the blower housing, as shown in Figure 10A.
2. Re-attach the auxiliary limit mounting bracket to the top side of the blower housing with the two screws removed in step #1, as shown in Figure 10B.

This is a manual reset thermostat, reset only once. If the furnace goes off on limit again, the problem which

caused the control to open must be determined and corrected by a qualified servicer. See Figure 10.

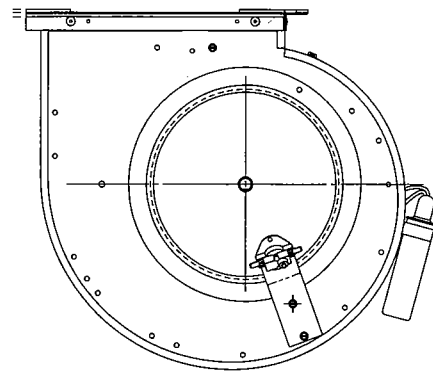


Fig. 10A — As Shipped From Factory
Right Hand Installation

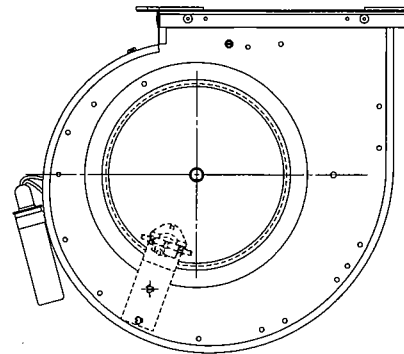


Fig. 10B — Left Hand Installation

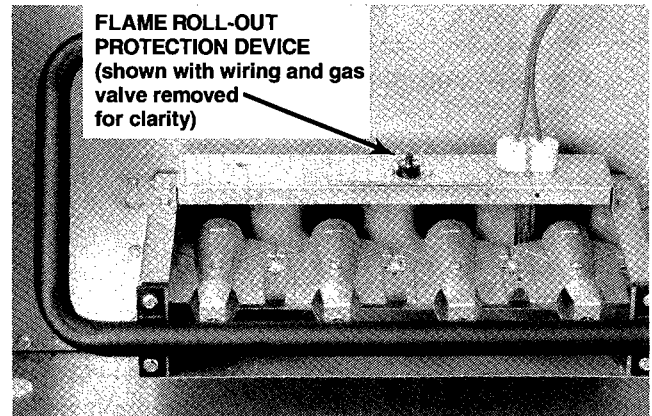


Fig. 11 — Roll-Out Protection Device
for Alcove — Upflow Installations

UPFLOW ROLL-OUT PROTECTION CONTROL (Fig. 11)

If the flames from the burners are not properly drawn into the heat exchanger, a protection device will open causing the gas valve to close. The protection device is located on the manifold assembly. (See Fig. 11) The device shown in Fig. 11 is for alcove/upflow installations.



CAUTION

The cause must be investigated by a qualified servicer before any attempt is made to engage either roll-out protection device and turn the furnace back on.

HORIZONTAL ROLL-OUT PROTECTION (Fig. 12)



CAUTION

To avoid possible property damage, this unit is equipped with a device to prevent furnace operation if burner flames are not drawn into the heat exchanger. This furnace is shipped with the device located to protect a furnace installed with right discharge. If this unit is installed with left discharge, this device must be relocated.

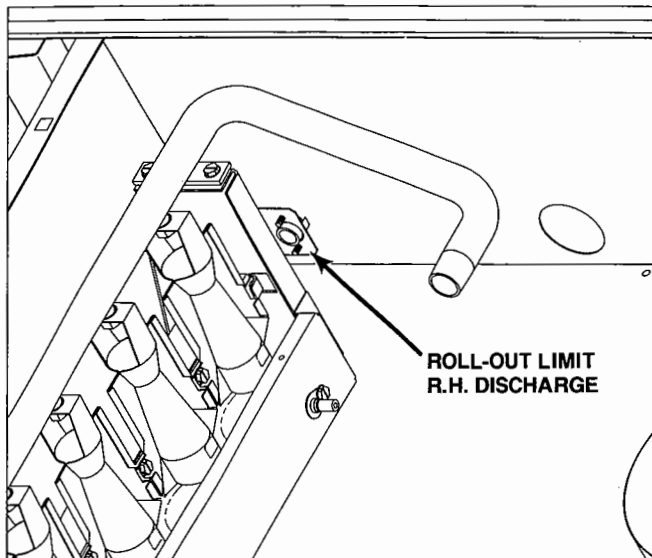
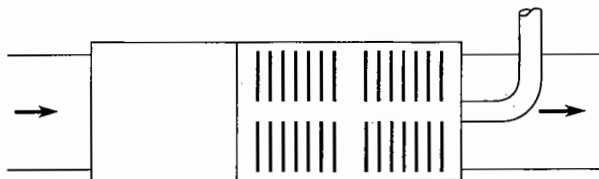


Fig. 12 — Horizontal Right Roll-Out Protection



RIGHT DISCHARGE

Figure 12 shows the flame Roll-Out Device as shipped for right discharge installations. For left discharge installations, relocate the device and mounting bracket as shown in Figure 13.



WARNING

To avoid electrical shock, injury or death, disconnect electrical power before servicing.

1. Remove wire ties from gas manifold.
2. Remove the two screws holding roll-out bracket to the lower manifold bracket.
3. Remove the wires from the secondary roll-out limit, and move the roll-out bracket and device to the upper manifold bracket and attach with screws. See Fig. 13.
4. Re-secure the wires as follows:
 - a) BR-27 should run from the primary roll-out limit to the auxillary roll-out limit.

b) BR-28 should run from the auxillary roll-out limit to the gas valve, terminal #2.

The wires must be routed so they can't contact hot surfaces such as the burners or manifold brackets. After the routing is completed, secure the wires using the two wire ties removed in step #1.

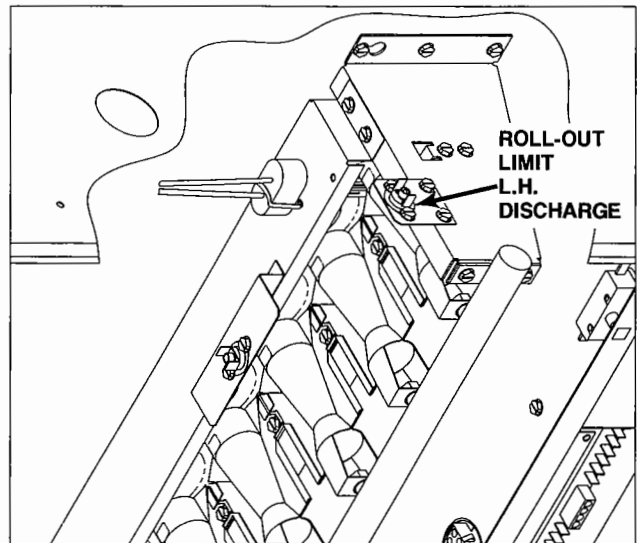


Fig. 13 — Horizontal Left Roll-Out Protection

OPERATING INSTRUCTIONS

1. Close the manual gas valve external to the furnace.
2. Turn off the electrical power supply to the furnace.
3. Set room thermostat to lowest possible setting.
4. Remove the louvered door on the front of the furnace.
5. This furnace is equipped with an ignition device which automatically lights the burner. Do not try to light burner by hand.
6. Turn the gas control knob clockwise to the "Off" position for either the White Rodgers 36-E gas valve (Fig. 14B) or the Honeywell VR-8205 gas valve (Fig. 14A), for the Robertshaw 7200 gas valve push in and slide the lever to the "Off" position (Fig. 14C). Do not force.
7. Wait five (5) minutes to clear out any gas. Then smell for gas, including near the floor.
8. If you smell gas following the 5 minute waiting period in Step 7, follow the instructions on the cover of this manual. If you do not smell gas, then turn the gas control knob counterclockwise to the "On" position for either the White Rodgers 36-E gas valve (Fig. 14B) or the Honeywell VR-8205 gas valve (Fig. 14A), for the Robertshaw 7200 gas valve push in and slide the lever to the "On" position (Fig. 14C). Do not force.
9. Replace the door on the front of the furnace.
10. Open the manual gas valve external to the furnace.
11. Turn on the electrical power supply to the furnace.
12. Set thermostat to desired setting.

NOTE: There is an approximate 20 second delay between thermostat energizing and burner firing.

GAS VALVES

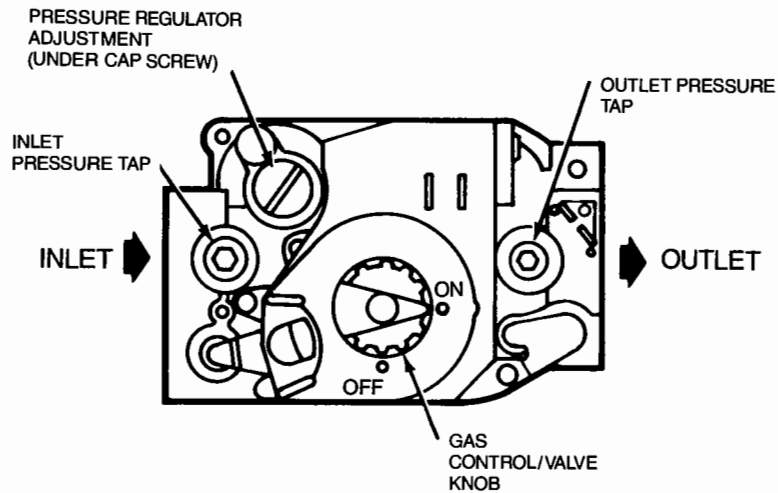


**FIG. 14A — HONEYWELL
Model: VR-8205**

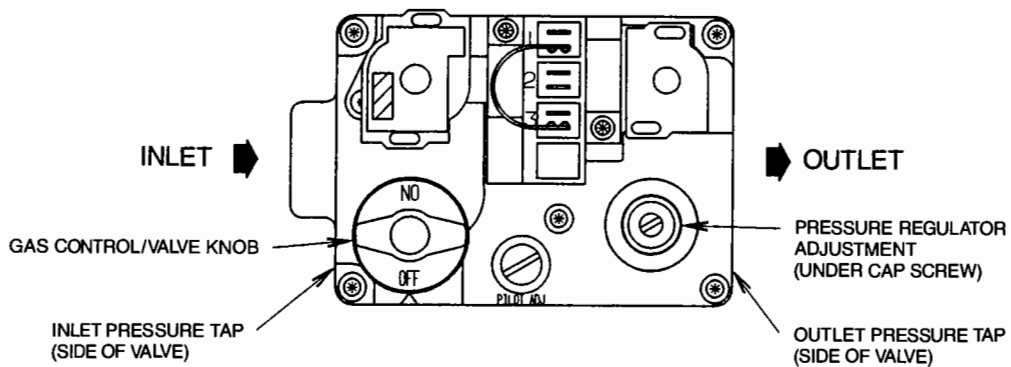


**FIG. 14B — WHITE RODGERS
Model: 36E36 Type 230**

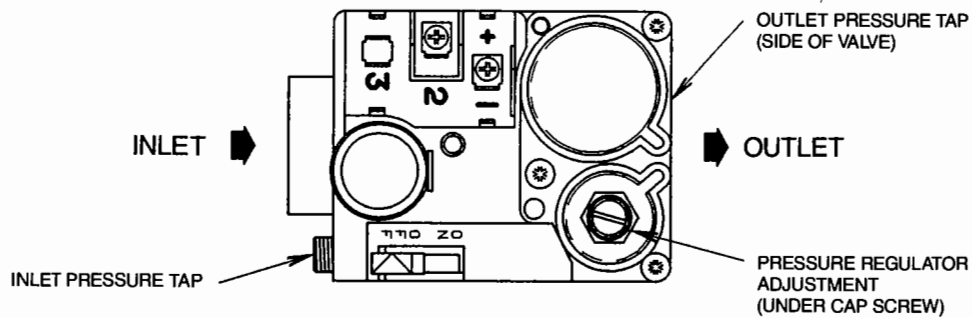


**FIG. 14C — ROBERTSHAW (GRAYSON)
Model: 7200**

CHECK GAS INPUT AND PRESSURES

Gas supply pressure and manifold pressure with the burners operating must be as specified on the rating plate.

CHECKING GAS PRESSURE

Gas inlet pressure should be checked and adjusted in accordance to the type of fuel being consumed.

WITH POWER AND GAS OFF:

1. Connect a water manometer or adequate gauge to the "inlet gas pressure" tap of the gas valve. (See Fig. 11).

As an alternative method, inlet gas pressure can also be measured by removing the cap from the drip leg and installing a predrilled cap with a hose fitting. (See Fig. 15).

WITH POWER AND GAS ON:

2. Put furnace into heating cycle and turn on all other gas consuming appliances.

INLET GAS PRESSURE	
NATURAL	MIN. 5.0", MAX. 10.0"
PROPANE	MIN. 11.0", MAX. 14.0"

Inlet Gas Pressure Must Not Exceed the Maximum Value Shown in Table Above.

If operating pressures differ from above, make necessary pressure regulator adjustments, check piping size, etc., and/or consult with local utility.

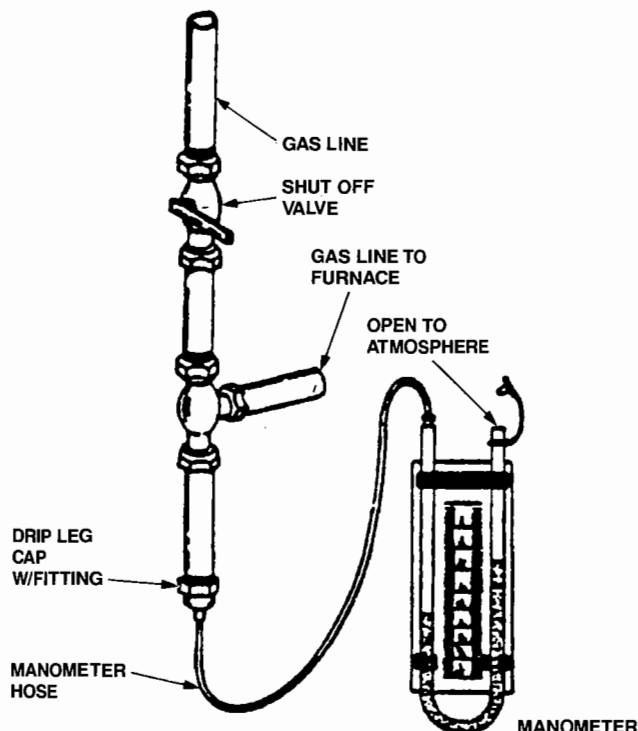


Fig. 15 — Measuring Inlet Gas Pressure (Alternate Method)

CHECK THE MANIFOLD PRESSURE

A tapped opening is provided in the gas valve to facilitate measurement of the manifold pressure. See the "Outlet Pressure Tap" in Fig. 14A, 14B and 14C. A "U Tube" manometer having a scale range from 0 to 12 inches of water should be used for this measurement. The manifold pressure must be measured with the burners operating.

To adjust the pressure regulator, remove the adjustment screw or cover on the gas valve. Turn out (counterclockwise) to decrease pressure, turn in (clockwise) to increase pressure. Only small variations in 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 inches water column from the specified pressure. Any major changes in flow should be made by changing the size of the burner orifice.

CHECK THE GAS INPUT

To measure the gas input using the gas meter proceed as follows:

1. Turn off gas supply to all other appliances except the furnace.
2. With the furnace operating, time the smallest dial on the meter for one complete revolution. If this is a 2 cubic foot dial, divide the seconds by 2; if it is a 1 cubic foot dial, use the seconds as is. This gives the seconds per cubic foot of gas being delivered to the furnace.
3. $\text{INPUT} = \text{GAS HTG VALUE} \times 3600 \div \text{SEC. PER CUBIC FOOT}$

Example: Natural gas with a heating value of 1000 BTU per cubic foot and 34 seconds per cubic foot as determined by Step 2, then:

$$\begin{aligned}\text{Input} &= 1000 \times 3600 \div 34 \\ &= 106,000 \text{ BTU per Hour}\end{aligned}$$

NOTE: BTU content of the gas should be obtained from the gas supplier.

This measured input must not be greater than the input indicated on the rating plate of the furnace.

4. Relight all other appliances turned off in step 1 above. Be sure all pilot burners are operating.

CHECK MAIN BURNER FLAME

Flames should be stable, soft and blue, (dust may cause orange tips but they must not be yellow). They should extend directly outward from the burner without curling, floating or lifting off. (Fig. 16)

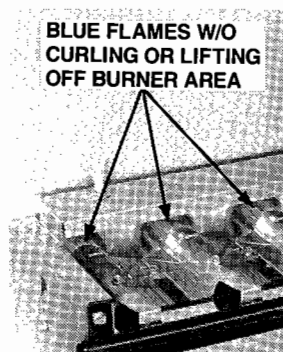


Fig. 16 — Burner Flame

CHECK TEMPERATURE RISE

Check the temperature rise through the unit by placing thermometers in supply and return air registers as close to the furnace as possible. Thermometers must not be able to "see" the furnace's heat exchangers, or false readings could be obtained.

1. All registers must be open; all duct dampers must be in their final (fully or partially open) position, and the unit operated for 15 minutes before taking readings.
2. The temperature rise must be within the range specified on the rating plate.

NOTE: Air temperature rise is the temperature difference between supply and return air.

With a properly designed system, the proper temperature rise will normally be obtained when the unit is operated at rated input with the recommended blower speed.

If the correct temperature rise is not obtained, it may be necessary to change the blower speed. A higher blower speed will lower the temperature rise. A slower blower speed will increase the temperature rise.

NOTE: Blower speed must be set to give the correct air temperature rise through the furnace as marked on the rating plate.

CHANGING BLOWER SPEEDS



WARNING

To avoid electrical shock, injury or death, when changing speed taps turn off power to the furnace.

A multi-speed motor is used in the furnace blower. It provides easy speed selection for both heating and cooling air flow. Page 5 shows the CFM and E.S.P. relationship for proper selection of heating and cooling speeds.

Refer to the WIRING DIAGRAM on the furnace to connect the proper wires to the correct motor leads. All unused motor leads must have wirenuts.

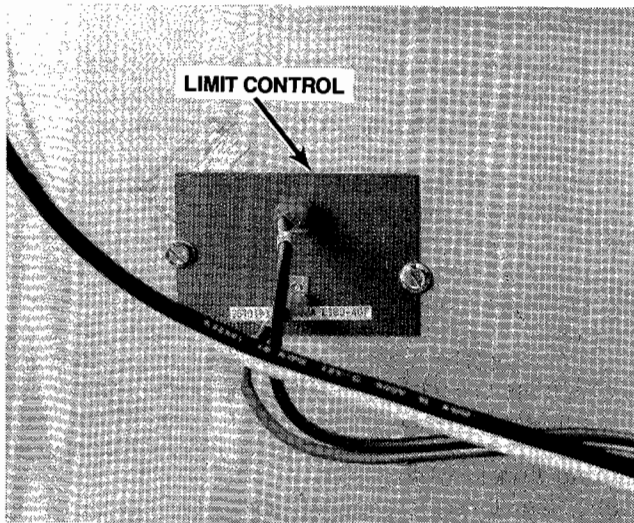


Fig. 17 — Limit Control

CHECK LIMIT CONTROL



WARNING

To avoid premature failure of heat exchanger or possible property damage, injury or fire, do not adjust the limit control, which is factory preset.

Check limit control operation after 15 minutes of operation by blocking the return air grille(s).

1. After several minutes the main burners must go OFF. Blower will continue to run.
2. Remove air restrictions, and main burners will relight after a cooldown period of a few minutes.

Adjust the thermostat setting below room temperature.

1. Main burners must go off.
2. Circulating blower should continue to run for 90 seconds.



CAUTION

This unit should not be used as a "construction heater" during the finishing phases of construction on a new structure. This type of use may result in premature failure of the unit due to extremely low return air temperatures and exposure to corrosive or very dirty atmospheres.

TO TURN OFF FURNACE

1. Set the thermostat to lowest setting.
2. Turn off the electrical power supply to the furnace.
3. Turn the gas control knob clockwise to the "Off" position for either the White Rodgers 36-E gas valve (Fig. 14B) or the Honeywell VR-8205 gas valve (Fig. 14A). For the Robertshaw 7200 gas valve, push in and slide the lever to the "Off" position (Figure 14C). Do not force.
4. Close manual gas shutoff valve external to the furnace.
5. Replace the door on the unit.

XI. MAINTENANCE



DANGER

To avoid electrical shock, injury or death, disconnect electrical power before servicing.



CAUTION

If you must handle the ignitor, handle with care. Touching the ignitor body with bare fingers, rough handling, or vibration could result in early ignitor failure. Only a qualified servicer should ever handle the ignitor.

Have the furnace checked at least once every year, before the heating season begins, to be sure that there is adequate combustion air and that the vent system is working properly.

Have the venting system checked to be sure it is not blocked by debris, which could permit fumes to enter the house. Replace any rusted out vent pipe.

AIR FILTER (Optional Filter Cabinet)



WARNING

Never operate furnace without a filter installed as dust and lint will build up on internal parts resulting in loss of efficiency, equipment damage and possible fire.

The filter in the furnace accessory filter cabinet is designed for heating and/or cooling applications. Filter is of the washable type. After the filter is dry it should be sprayed with an adhesive for best efficiency. (Type may be shown on the filter frame.)

The filter should be inspected, cleaned or changed every two months or as required.

Remember that dirty filters are the most common cause of inadequate heating or cooling performance.

Remove filter as follows:

1. Remove two front access doors by turning the two quarter turn plastic fasteners that secure the doors to the filter cabinet.
2. To remove filter for cleaning, fold the filter sections flat and slide out past flue pipe.
3. Insert filter through the cabinet front with front and back edges resting on filter support channels. Stretch filter out to cover furnace discharge completely to each side. See page 4 for illustration of filter cabinet.
4. Install two front access panels using plastic quarter turn fasteners to secure doors.

BLOWER MOTOR (QUALIFIED SERVICER ONLY)

If desired, the blower motor may be oiled by adding 4 to 6 drops of SAE #20 oil to each oil port once a year. **TO AVOID PREMATURE MOTOR FAILURE, DO NOT OVER OIL.**

(NOTE: Some blower motors which are permanently lubricated do not have oil ports. Oil cannot be added to these motors.)

VENT BLOWER MOTOR (QUALIFIED SERVICER ONLY)

If desired, the vent blower motor may be oiled annually with 6 drops of Anderoil 465 oil. (3 drops in each oil port — Fig. 18.)

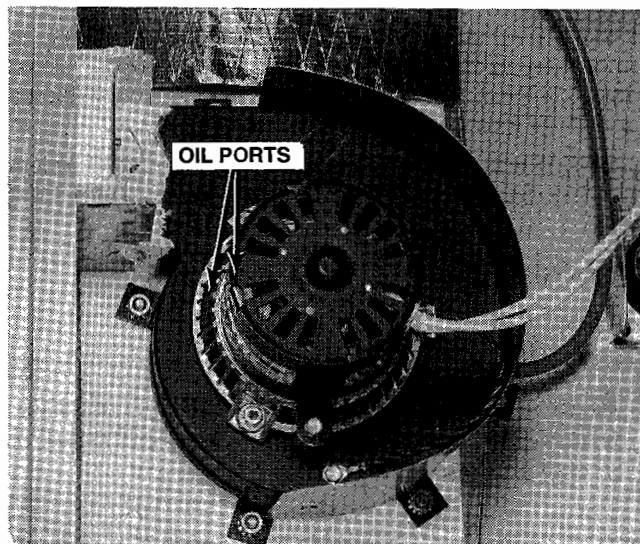


Fig. 18 — Vent Blower Motor

FLUE PASSAGES

At the start of each heating season, inspect and, if necessary, clean the furnace flue passages.

CLEANING FLUE PASSAGES (QUALIFIED SERVICER ONLY)

1. Shut off electric power and gas supply to the furnace.
2. Remove burner assembly by disconnecting the gas line and removing the manifold brackets from the partition panel.
3. Remove the flue from the induced draft blower and the collector box from the partition panel.
4. The primary heat exchanger tubes can be cleaned using a round wire brush attached to a length of high grade stainless steel cable, such as drain cleanout cable. Attach a variable speed reversible drill to the other end of the spring cable. Slowly rotate the cable with the drill and insert it into one of the primary heat exchanger tubes. While reversing the drill, work the cable in and out several times to obtain sufficient cleaning. Repeat for each tube.
5. When all heat exchanger tubes have been cleaned, replace the parts in the reverse order in which they were removed.
6. To reduce the possibility of repeated fouling of the flue passages, perform the steps listed in "Start up and Adjustment", section X.

BURNERS



WARNING

Electrical components are contained in both compartments. To avoid electrical shock, injury or death, do not remove any internal compartment covers or attempt any adjustment. Contact a qualified servicer at once if an abnormal flame appearance should develop.

Periodically during the heating season make a visual check of the burner flames. Turn the furnace on at the thermostat. Wait a few minutes, since any dislodged dust will alter the normal flame appearance. Flames should be stable, quiet, soft and blue with slightly orange tips. They should not be yellow. They should extend directly outward from the burner ports without curling downward, floating or lifting off the ports. (See Fig. 16.)

XII. FUNCTIONAL PARTS LIST

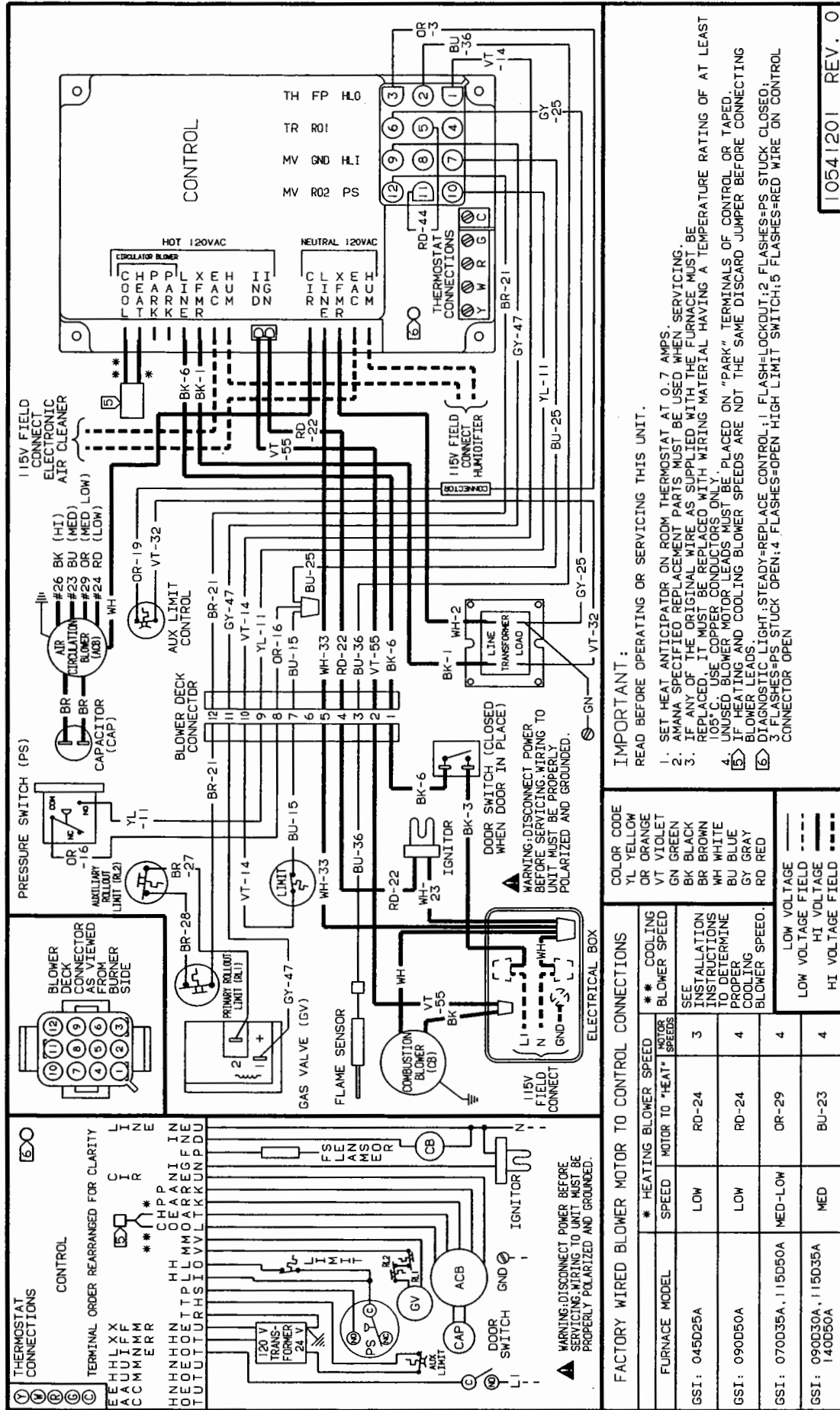
GENERAL INFORMATION

1. When ordering any of the listed functional parts, be sure to provide the furnace model, manufacturing, and serial numbers with the order.
2. Although only functional parts are shown in the parts list, all sheet metal parts, doors, etc. may be ordered by description.
3. Functional parts are available from your Amana distributor.

Gas Valve
Gas Orifice, Natural
Gas Orifice, Propane
Burner
Ignitor
Flame Sensor
Ignitor Clip
Gas Manifold
Ignition Control
Limit Control
Pressure Switch
Pressure Switch Hose
Induced Draft Blower
Collector Box
Blower/Box Gasket

Heat Exchanger
Door Switch
Transformer
Blower Relay
Combustion Relay
Terminal Board
Blower Wheel
Blower Housing
Blower Cutoff
Blower Motor
Motor Mount Bracket
Capacitor
Auxiliary Limit
Flame Roll-Out Switch

XIII. WIRING DIAGRAM



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