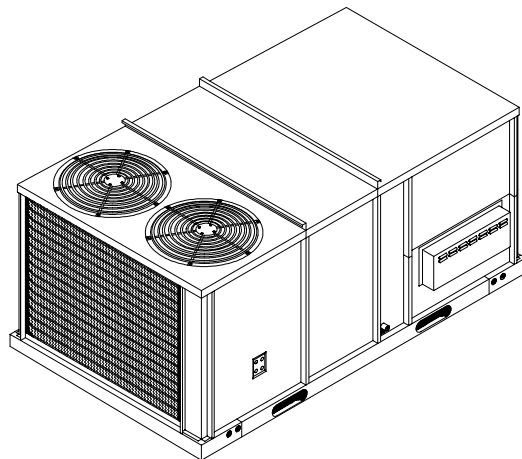


# Installation Instructions

- Safety Labeling & Rules
- Installation Requirements
- Location / Clearances
- Gas Supply / Piping
- Wiring
- Air Distribution
- Ductwork Connections
- Economizer Accessory
- Start-Up
- Maintenance
- Hoisting / Rigging



## **Models**

Three Phase  
208-230, 460, 575 Volt

PGD090H200	GPD090H200
PGD090L200	GPD090L200
PGD090S200	GPD090S200
PGD120H240	GPD120H240
PGD120L240	GPD120L240
PGD120S240	GPD120S240
PGD150H270	GPD150H270
PGD150L270	GPD150L270
PGD150S270	GPD150S270
PGD180H270	GPD180H270
PGD180L270	GPD180L270
PGD180S270	GPD180S270

**COMBINATION UNITS**  
**ELECTRIC COOL / GAS HEAT**

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# 1. Safety Labeling and Signal Words

## Danger, Warning and Caution

The signal words **DANGER**, **WARNING** and **CAUTION** are used to identify levels of hazard seriousness. The signal word **DANGER** is only used on product labels to signify an immediate hazard. The signal words **WARNING** and **CAUTION** will be used on product labels and throughout this manual and other manuals that may apply to the product.

## Signal Words

**DANGER** - Immediate hazards which **WILL** result in severe personal injury or death.

**WARNING** - Hazards or unsafe practices which **COULD** result in severe personal injury or death.

**CAUTION** - Hazards or unsafe practices which **COULD** result in minor personal injury or product or property damage.

## Signal Words in Manuals

The signal word **WARNING** is used throughout this manual in the following manner:

**WARNING**

The signal word **CAUTION** is used throughout this manual in the following manner:

**CAUTION**

## Product Labeling

Signal words are used in combination with colors and/or pictures on product labels. Following are examples of product labels with explanations of the colors used.

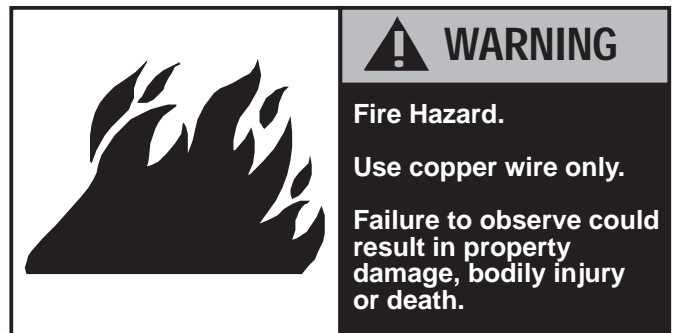
### Danger Label

White lettering on a black background except the word **DANGER** which is white with a red background.



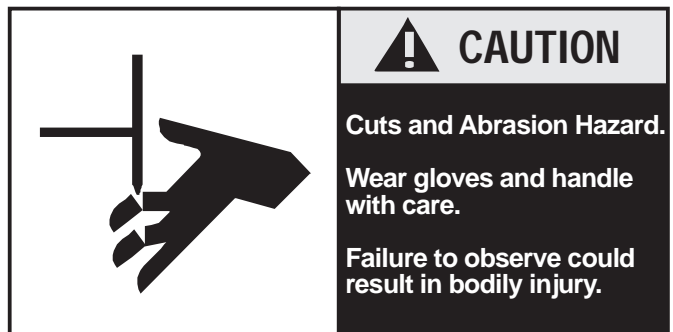
### Warning Label

White lettering on a black background except the word **WARNING** which is black with an orange background.

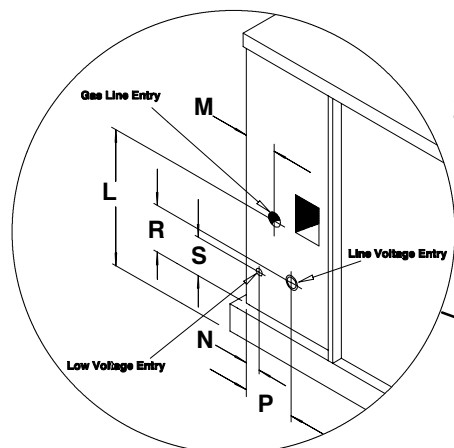


### Caution Label

White lettering on a black background except the word **CAUTION** which is black with a yellow background.



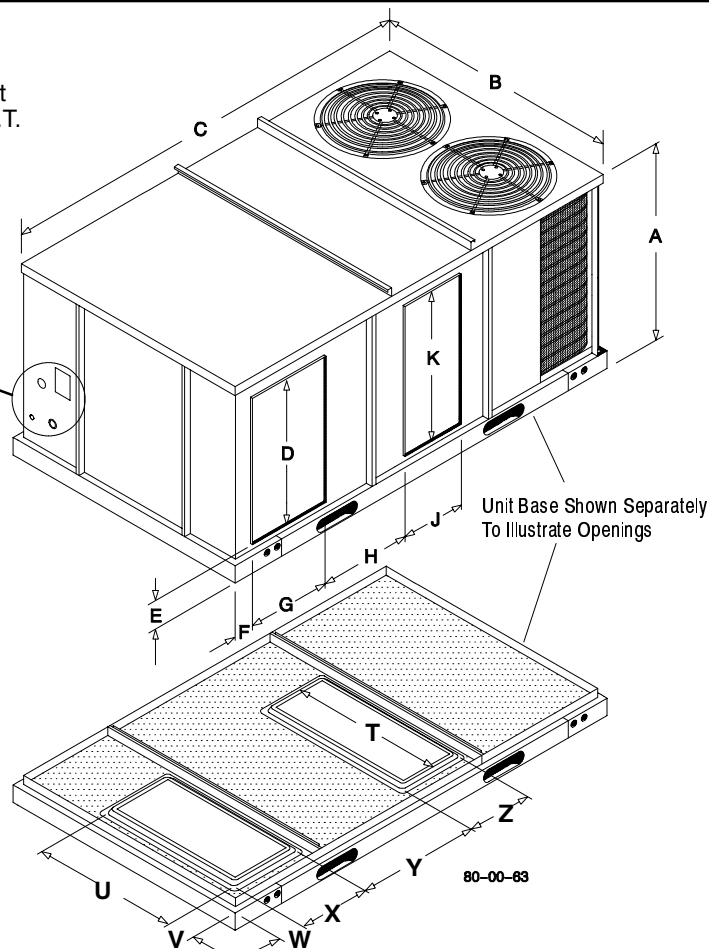
## 2. Unit Dimensions



Gas Pipe Inlet  
3/4" - 14 N.P.T.  
Threaded

**NOTE: For down discharge,  
duct connections to curb only.**

**ALL DIMENSIONS IN INCHES  
DIMENSIONS FROM BASE LEVEL**



Unit Size	A	B	C	D	E
7-1/2 & 10 Ton	44-13/16	57-9/16	90-11/16	32-1/16	5-1/8
12-1/2 & 15 Ton	48-13/16	68-1/8	99-15/16	41-3/16	5-1/8

Unit Size	F	G	H	J	K
7-1/2 & 10 Ton	4-5/16	18-1/4	16-7/16	14-9/16	36-1/16
12-1/2 & 15 Ton	4-1/2	21-9/16	15-1/4	21-9/16	41-3/16

Unit Size	L	M	N	P	R	S	T	U	V	W	X	Y	Z
7-1/2 & 10 Ton	10-1/2	3-9/16	2	5-7/8	4-3/4	3-1/2	39-1/8	35-1/16	3-1/2	3-1/2	21-3/16	12-7/8	17-1/2
12-1/2 & 15 Ton	10-1/2	5-1/2	2	5-7/8	4-3/4	3-1/2	45-1/16	45-1/16	3-1/2	3-1/2	24-1/2	11-13/16	24-1/2

### 3. Safe Installation Requirements

#### **WARNING**

Installation or repairs made by unqualified persons can result in hazards to you and others. Installation must conform with local building codes or, in the absence of local codes, with National Fuel Gas Code NFPA 54/ANSI Z223.1-1988 or current edition and National Electrical Code ANSI/NFPA 70-1990 or current edition. In Canada the National Standard CAN/CGA 1-B149.1 or current edition and CSA C.22.1 - Canadian Electrical Code Part 1 or current edition.

The information contained in this manual is intended for use by a qualified service technician familiar with safety procedures, 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.

- Installation **MUST** conform to the most current version of the following standards or a superseding standard.

In the United States:

- National Fuel Gas Code NFPA 54/ANSI Z223.1-1988
- National Electrical Code ANSI/NFPA 70-1990

In Canada:

- National Standard CAN/CGA 1-B149.1
- CSA C.22.1 - Canadian Electrical Code Part 1.
- Do **NOT** use this furnace as a construction heater.
- Use only the type of gas approved for this furnace (see rating plate).
- Do **NOT** use open flame to test for gas leak.
- Seal supply and return air ducts.

**NOTE:** It is the personal responsibility and obligation of the customer to contact a qualified installer to ensure that the installation is adequate and conforms to governing codes and ordinances.

#### **CAUTION**

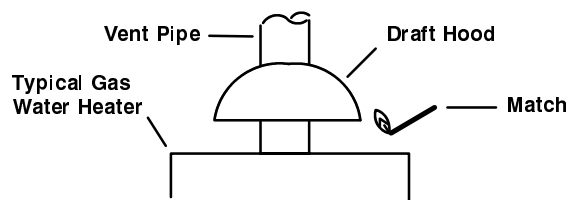
It is recommended that a qualified service technician check the heat exchanger integrity a minimum of every two (2) years.

#### **Check Pre-existing Common Vent From Old Furnace**

If this installation involves removing an existing furnace from a common venting system serving other appliances, the venting system **MUST** be checked according to the following procedure to make sure that there is adequate combustion air for all appliances.

1. Seal any unused openings in the common venting system(s).
2. Visually inspect all venting systems 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 practical, close all doors and windows in the building. Close all doors between the spaces in which the appliances still connected to the common venting system are located and other spaces of the building.
4. Turn on clothes dryers. Turn on 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.
5. Follow the lighting instructions for each appliance and place all appliances in operation. Adjust thermostats or other controls so that appliances will operate continuously.

6. Allow all appliances to operate continuously at least 5 minutes. Use the flame of a match or a candle to test for spillage at each draft hood relief opening (see **Figure 1**). Flame should draw towards vent pipe. **Repeat this procedure for all appliances that have a draft hood opening.**
7. If improper venting is observed during any of the above tests, the common venting system **MUST** be corrected using the appropriate tables in Appendix G in the National Fuel Gas Code, NFPA 54/ANSI Z223.1-1990 (or current edition).
8. After it has been determined that each appliance vents properly when tested as outlined, return doors, windows, exhaust fans, fireplace dampers and all gas-burning appliances to their previous condition of use.

**Figure 1****Vent Check**

Adequate venting is indicated if flame pull is towards underneath of draft hood.

## 4. Location And Set-up

The unit is designed for outdoor installation **ONLY**. The unit may be installed on a level concrete mounting base (or other adequate platform) at ground level or on a flat rooftop with an adequate platform. If using as a downflow model, use a roof curb. Typical installations are shown in **Figures 4 and 5**.

### Access Panels

#### CAUTION

Unit will **NOT** operate properly without all access panels in place. Access panels are shown in **Figure 2**.

Unit **MUST NOT** be moved unless all access panels are in place.

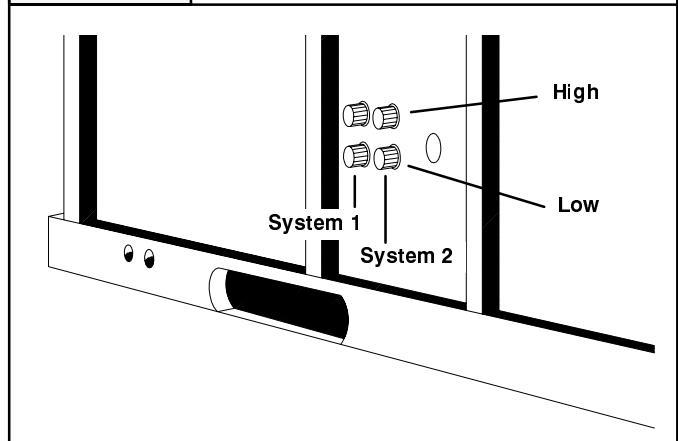
### WARNING

Carbon monoxide poisoning hazard.

Keep blower access panels in place.

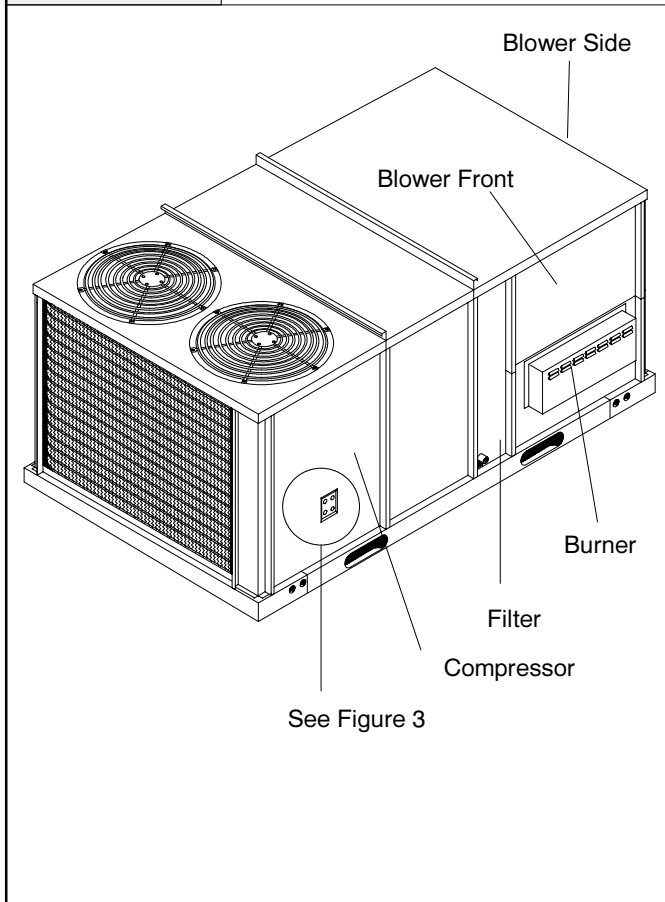
Failure to keep blower access panels in place can result in bodily injury and/or death.

**Figure 3** External Refrigeration Access Ports



**Figure 2**

**Access Panels**



### Clearances

The location **MUST** allow for minimum clearances and should not be adjacent to a patio or other area where the unit's operating sound level might be objectionable.

Minimum clearances, as specified in the following tables and in **Figure 4 and 5**, **MUST** be maintained to provide adequate fire protection, adequate combustion air, and room for service personnel. In addition, local codes **MUST** be observed.

Do **NOT** install the unit in a location that will permit discharged air from the condenser to recirculate to the condenser inlet.

Do **NOT** install the unit in a location that will permit discharged air from the furnace exhaust flue to recirculate into the unit or into the intake vent of any other equipment or ventilation system.

#### CAUTION

Do **NOT** operate unit in a corrosive atmosphere containing chlorine, fluorine, or any other corrosive chemicals.



## Minimum Clearances to Combustible and non-Combustible Construction (Horizontal Flow)

Furnace Supply and Return Air Ducts*	2" (51mm)
Duct Connection Side (no Economizer)	30" (762mm)
Duct Connection Side (with Economizer)	48" (1220mm)
Condenser Side	30" (762mm)
Side Blower Access Panel Side	30" (762mm)
Burner Access Panel Side	30" (762mm)
Top of Unit	60" (1524mm)
..... with 36" (914mm) maximum horizontal overhang from duct connection side	

Combustible Base  
(Wood or Class A, B or C  
roof covering materials) 0" (0mm)

\* Within 6 feet (1829)mm of furnace.

## Minimum Clearances to Combustible and non-Combustible Construction (Downflow)

Furnace Supply and Return Air Ducts*	2" (51mm)
Duct Connection Side (no Economizer)	30" (762mm)
Duct Connection Side (with Economizer)	52" (1321mm)
Condenser Side	30" (762mm)
Side Blower Access Panel Side	30" (762mm)
Burner Access Panel Side	30" (762mm)
Top of Unit	60" (1524mm)
..... with 36" (914mm) maximum horizontal overhang from duct connection side	

Combustible Base  
(Wood or Class A, B or C  
roof covering materials) 0" (0mm)

\* Within 6 feet (1829)mm of furnace.

Figure 4

Minimum Clearances for Typical Platform Installation

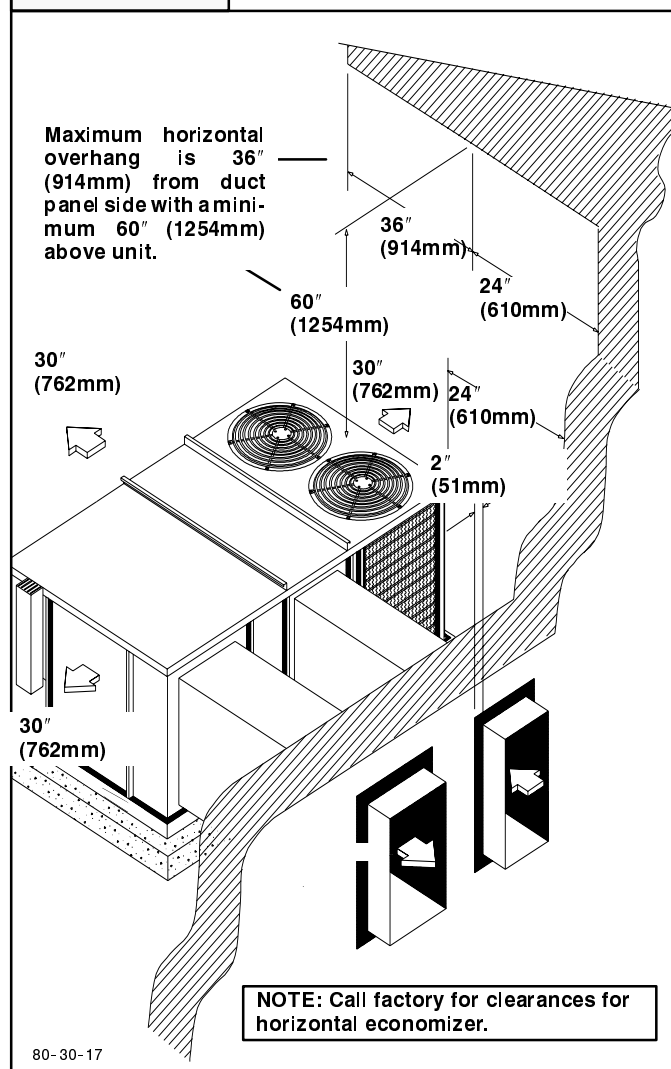
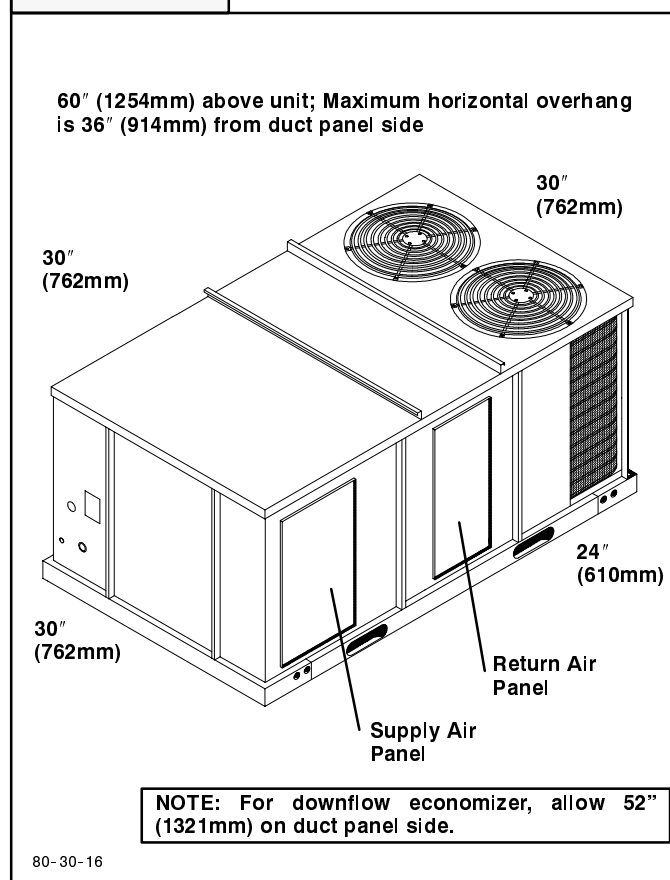


Figure 5

Minimum Clearances for Typical Downflow Installation



## Installation

### CAUTION

Unit will **NOT** operate properly unless it is installed level front to rear and side to side.

The slope **MUST NOT** be greater than  $\frac{1}{8}$ " per foot (10mm per meter). For side to side leveling, the control box side **MUST** always be lower.

### Ground Level Installation

Ground level platform requirements:

- The unit **MUST** be situated to provide safe access for servicing.
- Platform may be made of either concrete or pressure treated wood and **MUST** be level and strong enough to support unit weight.
- Position platform separate from building foundation.
- Install in well-drained area, with top surface of platform above grade level.
- Platform **MUST** be high enough to allow for proper condensate trap installation and drainage. See **Figure 7** and associated text for more information about condensate drainage.

### Rooftop Installation

Rooftop platform requirements:

- The unit **MUST** be situated to provide safe access for servicing.
- The existing roof structure **MUST** be adequate to support the weight of the unit or the roof **MUST** be reinforced.

Check the weight of the unit in relation to the roof structure and local building codes or ordinances and reinforce roof structure if necessary. See the back cover of this manual for unit weights and corner weights.

- Support for the unit **MUST** be level and strong enough to carry unit weight. The support may consist of a platform or a combination of platform and roof beams or curb.

The platform may be constructed of pressure treated wood and may be covered with Class A, B or C roof covering.

- Platform **MUST** allow for proper condensate trap installation and drainage. See **Figure 7** and associated text for more information about condensate drainage.
- See *Hoisting* section below for hoisting instructions.

**NOTE: MAKE SURE DOWNFLOW SUPPLY AND RETURN AIR DUCTS ARE FREE OF OBSTRUCTIONS BEFORE INSTALLING UNIT ON ROOF CURB OR ANY DOWNFLOW APPLICATION. Remove all forklift supports, covers, cardboard, etc., from the downflow return and supply air ducts.**

### Hoisting

**NOTE:** All access panels **MUST** be secured in place before hoisting.

The unit should be hoisted with two lifting slings. Attach the slings to rigging shackles that have been hooked through holes in the base rail.

Two spreader bars **MUST** be placed on top of the unit to protect the unit from damage from the pressure exerted by the slings. Make sure that all equipment is adequate to handle the weight of the unit and that the slings will not allow the unit to shift.

Refer to the back cover of this manual for illustrated rigging instructions and weight chart.

### Air Intake and Flue Exhaust Hoods

#### CAUTION

**The flue exhaust hood and the air intake hood **MUST** be installed for the unit to operate properly.**

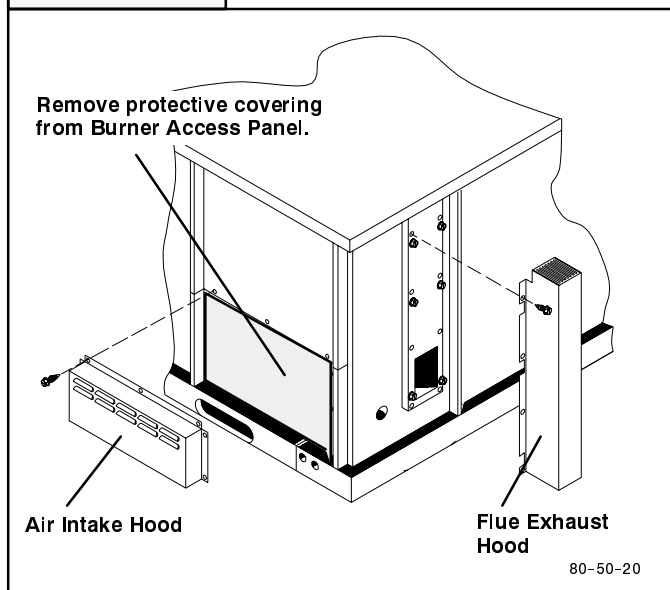
The flue exhaust hood, screws, and the air intake hood are packed in a cardboard box shipped inside the return air compartment. Cardboard box **MUST** be removed and hoods **MUST** be installed prior to firing unit. Refer to **Figure 6** and assemble as shown.

Before installing air intake hood, remove screws fastening the protective covering to the front of the burner access panel.

**NOTE:** You may want to use a screwdriver rather than a nutdriver to install the flue exhaust hood screws due to the narrow clearance between the screws and the flue cover.

Figure 6

## Installing Heat Vent Assembly and Air Intake Hood



The circulating blower and the condenser fan create a negative pressure on the condensate drain line that will prevent the condensate from draining properly without a trap. To combat this negative pressure, a field supplied condensate trap that will allow a standing column of water of at least 2" (50.8mm) **MUST** be installed. Top of outlet from trap **MUST** be at least 1" (25.4mm) below top of outlet from unit. **Install the trap as near to the unit as possible for proper drainage.**

A  $\frac{3}{4}$ " (19.1mm) drain line **MUST** be installed if required by local codes or if location of unit requires it. Run the drain line to an open drain or other suitable disposal point.

## Converting to Horizontal Operation

These units are shipped ready for downflow operation but are adaptable to horizontal use. To convert to horizontal operation, follow these steps:

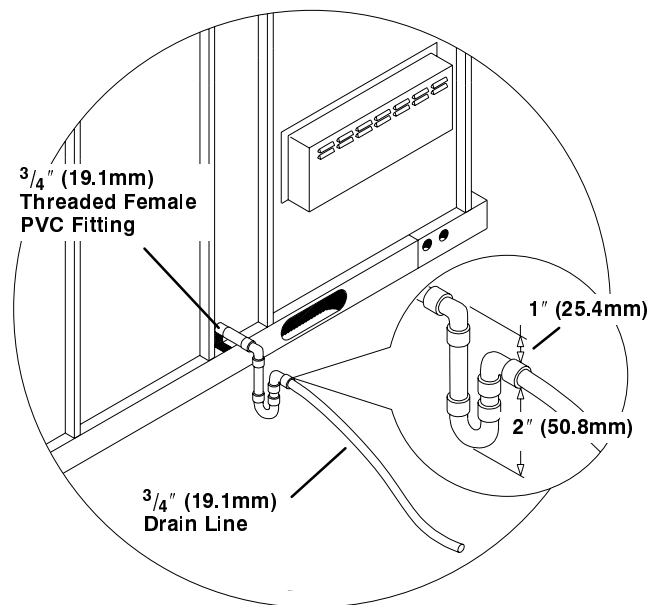
9. Remove horizontal supply and return panels (see **Figure 5**).
10. Remove cardboard covers from downflow supply and return openings.
11. Install horizontal supply and return panels on downflow supply and return openings. Be sure flanges are down and insulation side is up. Install from inside of unit.

## Condensate Drain

The condensate drain outlet is a  $\frac{3}{4}$ " (19.1mm) threaded female PVC connection located at the bottom of the unit to the left of the electrical access panel (see **Figure 7**). Condensate drain outlet **MUST** be held with wrench when installing trap and drain line.

Figure 7

## Condensate Drain Information\*



\* Condensate trap **MUST** be installed.

80-30-27

## 5. Gas Supply and Piping

**NOTE:** There are many types of liquefied petroleum (LP) gases. In this manual, the term LP gas refers to *propane gas only*.

The UL/CSA rating plate located on the side panel of the unit contains the model number, type of gas, gas input rating, and other important information.

### WARNING

**Fire and/or explosion hazard.**

**Make certain the unit is equipped to operate on the type of gas available. Models designated as natural gas are to be used with natural gas only. Models designated for use with liquefied petroleum (LP) gas are shipped with orifices sized for commercially pure propane gas. They **MUST NOT** be used with butane or a mixture of butane and propane unless properly sized orifices are installed by a licensed LP installer.**

**Failure to follow this warning can result in property damage, personal injury, and/or death.**

### Supply Gas Pressures

Supply pressure is checked during the *Start-up Procedure*. If the supply gas pressure is not correct, contact your gas supplier.

The minimum gas supply pressure for natural gas and LP gas **MUST NOT** be allowed to fall below the minimums listed in **Figure 8**, since this would decrease the input to the unit and affect product performance.

Do **NOT** allow the maximum gas supply pressure to exceed the maximum limits listed in Figure 8.

Figure 8	Supply Gas Pressures	
	Natural Gas	LP Gas
<b>Minimum</b>	4.5" W.C. (1120 Pa)	11" W.C. (2740 Pa)
<b>Recommended</b>	7" W.C. (1740 Pa)	11" W.C. (2740 Pa)
<b>Maximum</b>	13" W.C. (3230 Pa)	13" W.C. (3230 Pa)

### Manifold Pressures

Manifold pressures are checked during the *Start-up Procedure* in *Section 10*.

Figure 9	Manifold Gas Pressures	
	Natural Gas	LP Gas
<b>Low Heat*</b>	*1.6" W.C. $\pm$ 0.3 (400 Pa $\pm$ 75)	*4.4" W.C. $\pm$ 0.3 (1090 Pa $\pm$ 75)
<b>High Heat</b>	3.5" W.C. $\pm$ 0.3 (870 Pa $\pm$ 75)	10" W.C. $\pm$ 0.3 (2490 Pa $\pm$ 75)

**\*Note:** Manifold gas pressure for low heat is **NOT** adjustable. Manifold gas pressure for high heat *is* adjustable.

### Orifices

#### Orifice Sizes

Orifice sizes **MUST** be matched to the heating value of the gas (see **Figure 10** & **Table 1**). Check with your gas supplier.

**NOTE:** This unit has a two-stage gas valve and **MUST NOT** be derated. Orifice changes should **ONLY** be made if necessary for conversion to LP gas and/or for high altitude.

**NOTE:** An LP Conversion Kit is available through unit supplier. The kit contains pilot and burner orifices, a two-stage LP gas valve and an instruction manual, **MUST** be used for conversion to LP gas.

**NOTE:** For elevations above 2000 feet (610 meters), the Btu (kJ) input rating **MUST** be reduced by 4% for each 1000 feet (305 meters) above sea level. **See Table 1.**

Figure 10	Orifice Sizes, Specific Gravities, and Heating Values		
Type Gas	Specific Gravity	Btu/ft <sup>3</sup> (kJ/L)	Pilot
<b>Natural</b>	0.60	1000 (37.2)	#64 (.036")
<b>LP</b>	1.53	2500 (93.1)	#71 (.026")

**TABLE 1: Equivalent Orifice Sizes at High Altitudes**  
(Includes 4% input reduction for each 1,000 ft.)

Natural Gas Manifold Orifice Size Required by Elevation								
BTU INPUT	0' - 2000'	2000' - 4000'	4500' - 5000'	6000'	7000'	8000'	9000'	10000'
200,000 to 270,000	34	36	37	37	38	39	40	42
LP Gas Manifold Orifice Size Required by Elevation								
200,000 to 270,000	51	52	52	52	53	53	53	54

## Changing Orifices

### WARNING

Electrical shock, fire and/or explosion hazard.

Shut off electric power at unit disconnect or service panel and shut off gas at manual shut off valve before beginning the following procedure.

Changing orifices requires a qualified service technician.

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

1. Shut **OFF** gas at manual shut off valve. If circulating blower is running, wait 2.5 minutes before shutting off electric power.
2. Shut **OFF** electric power at unit disconnect or service panel.
3. Remove the burner access panel.
4. Disconnect the gas line from the gas valve.
5. Disconnect the wires from the gas valve.
6. Disconnect the pilot tubing from the gas valve.
7. Remove the four screws holding the manifold to the manifold brackets.
8. Carefully remove the manifold with the gas valve attached.
9. Remove the orifices from the manifold with a  $\frac{7}{16}$ " box end or socket wrench.
10. Check to be sure that the size of each orifice is correct for the Btu input desired (see **Figure 10**).
11. Install the correct orifices. Gauge the size of the orifices with a new twist drill bit of the correct size.

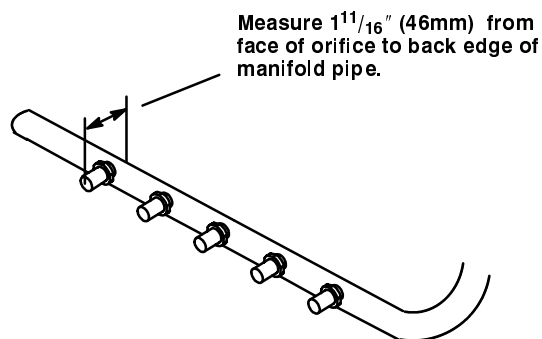
Make sure that the orifices go in straight so that they form a right angle (90°) to the manifold pipe.

Tighten the orifices so that there is a  $1\frac{11}{16}$ " (46mm) distance between the faces of the orifices to the back of the manifold pipe (see **Figure 11**).

Measure the distance with a set of calipers. If you do not have a calipers, you can use an adjustable wrench and measure between the face of the jaws.

Figure 11

Manifold/Orifice Measurement



12. Reassemble in reverse order.

**NOTE:** If this is not a new installation, all pipes and the pilot tube and burner orifices **MUST** be checked for leaks. See **Leak Checks** on page 14. On a new installation, leak checks are made at the end of the **Piping At Unit** section.

## Gas Piping

The gas supply line **MUST** be of adequate size to handle the Btu/hr requirements and length of the run for the unit being installed. Determine the minimum pipe size from the tables in **Figures 12 and 13**. Base the length of the run from the gas meter or source to the unit.

Btu ratings of all other gas appliances **MUST** be considered for sizing of main gas line. Check gas line to installation for compliance with local codes or, in the absence of local codes, with the National Fuel Gas Code NFPA/ANSI Z223.1-1990 (or current edition) or in Canada the National Standard CAN/CGA 1-B149.1 (or current edition).

## Gas Pipe Size

### English Measurements

Figure 12		Gas Pipe Size, Length and Btu/hr Capacity for Schedule 40 Iron Pipe				
NATURAL GAS						
Pipe Length (Includes Fittings)	Btu/hr (in thousands)					
	3/4"	1"	1 1/4"	1 1/2"	2"	
20'	--	350	730	1,100	2,100	
40'	--	245	500	760	1,450	
60'	--	--	400	610	1,150	
80'	--	--	350	530	990	
100'	--	--	305	460	870	
125'	--	--	275	410	780	
150'	--	--	250	380	710	
175'	--	--	225	350	650	
200'	--	--	210	320	610	
LP GAS*						
Pipe Length (Includes Fittings)	Btu/hr (in thousands)					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	
20'	--	393	732	1,496	2,299	
40'	--	267	504	1,039	1,559	
60'	--	217	409	834	1,275	
80'	--	--	346	724	1,086	
100'	--	--	307	630	976	
125'	--	--	275	567	866	
150'	--	--	252	511	787	
<p>* If copper tubing is used, see the following applicable publications to determine type and size requirements:</p> <p>In the United States, the National Fuel Gas Code NFPA 54/ANSI Z223.1-1988 (or current edition).</p> <p>In Canada, the National Standard CAN/CGA 1-B149.1 (or current edition).</p>						

### Metric Measurements

Figure 13		Gas Pipe Size, Length and kW** Capacity for Schedule 40 Iron Pipe				
NATURAL GAS						
Pipe Length (Includes Fittings)	kW**					
	3/4"	1"	1 1/4"	1 1/2"	2"	
6.1m	--	103	214	322	615	
12.2m	--	72	147	223	425	
18.3m	--	--	117	179	337	
24.4m	--	--	103	155	290	
30.5m	--	--	89	135	255	
38.1m	--	--	81	120	229	
45.7m	--	--	73	111	208	
53.3m	--	--	66	103	191	
61.0m	--	--	62	94	179	
LP GAS*						
Pipe Length (Includes Fittings)	kW**					
	1/2"	3/4"	1"	1 1/4"	1 1/2"	
6.1m	--	115	215	438	674	
12.2m	--	78	148	305	457	
18.3m	--	64	120	244	374	
24.4m	--	--	101	212	318	
30.5m	--	--	90	185	286	
38.1m	--	--	81	166	254	
45.7m	--	--	74	150	231	
<p>* If copper tubing is used, see the following applicable publications to determine type and size requirements:</p> <p>In the United States, the National Fuel Gas Code NFPA 54/ANSI Z223.1-1988 (or current edition).</p> <p>In Canada, the National Standard CAN/CGA 1-B149.1 (or current edition).</p> <p>**kW (kilowatts) is the metric equivalent of Btu/hr.</p>						

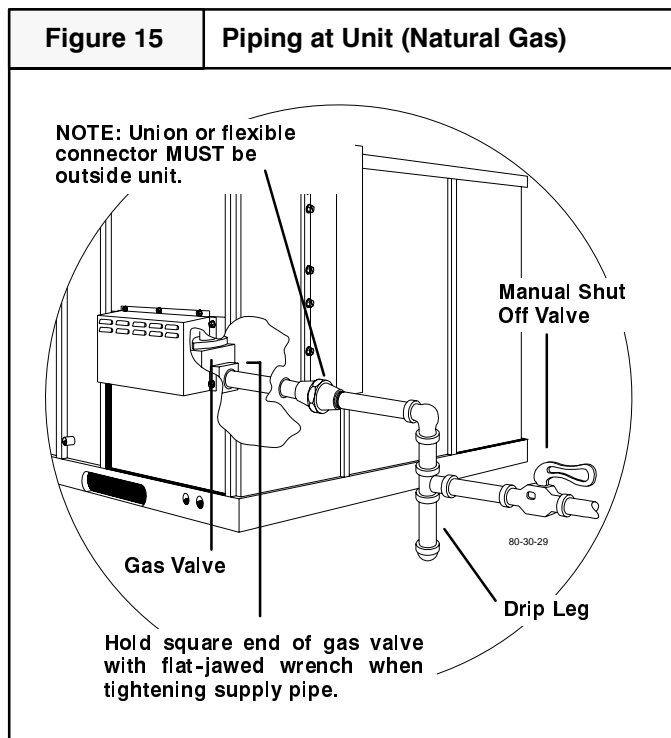
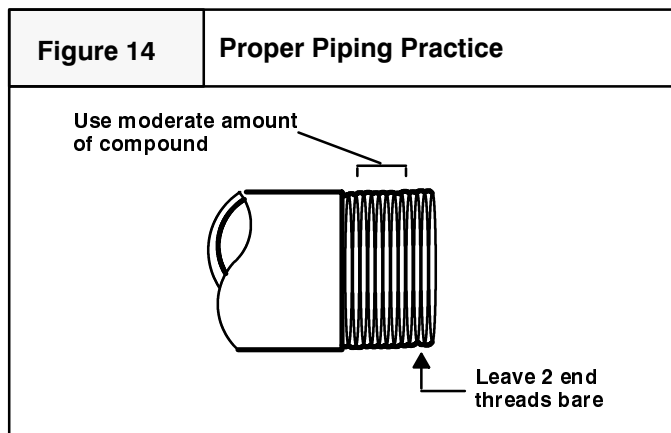
## Piping At Unit

### Connecting the Gas Piping

Refer to **Figure 15** for the general layout of the unit. It shows the basic fittings needed.

The following rules apply:

1. Use black iron pipe and fittings for natural gas.
2. Use pipe joint compound on male threads only. Pipe joint compound **MUST** be resistant to the action of LP gases. Do **NOT** use teflon tape or similar materials. See **Figure 14**.



3. Use ground joint unions.

**NOTE:** If a flexible gas connector is used, it **MUST** be acceptable to local authority. Connector **MUST NOT** be used inside the furnace or be secured or supported by the furnace or ductwork. Connectors **MUST** comply with one of the following standards or a superseding standard:

- ANSI Z21.24a-1983, *Metal Connectors for Gas Appliances*.
- ANSI Z21.45b-1983, *Flexible Connectors of Other Than All-Metal Construction for Gas Appliances*.

## WARNING

**Fire and/or explosion hazard.**

**Gas connector MUST be properly installed and can NOT be used inside the furnace.**

**Failure to do so can result in property damage, bodily injury, and/or death.**

4. Install a drip leg to trap dirt and moisture before it can enter the gas valve. Drip leg **MUST** be a minimum of 3" (76mm) long.
5. Install a manual shut off valve.
6. Provide a 1/8" NPT test gauge connection immediately upstream of the gas supply connection to the furnace.
7. If installation is for LP gas:
  - a. Have a licensed LP gas dealer make all connections from storage tank to unit.
  - b. **TWO-STAGE REGULATION** is required.
  - c. If copper tubing is used, usage **MUST** comply with limitations set forth in National Fuel Gas Code NFPA 54/ANSI Z223.1-1990 (or latest edition) or in Canada the National Standard CAN/CGA 1-B149.1 (or latest edition).
8. Hold a flat-jawed wrench on the squared end of the gas valve when tightening the supply pipe going into the gas valve (see **Figure 15**). This will prevent turning or damaging the gas valve and wiring and/or misaligning the burners.

## CAUTION

**Overtightening assembly may cause damage to the gas valve and/or wiring and may misalign the burners.**

9. Tighten all joints securely.

## Leak Checks

1. Gas pressure **MUST NOT** exceed 1/2 PSIG (3450 Pa). If gas piping is to be checked with pressures above 1/2 PSIG (3450 Pa), the gas valve and the manual shut off valve **MUST** be disconnected from the line during testing.
2. Before pressure checking the gas piping to the furnace, shut **OFF** the manual shut off valve for the furnace.
3. Test all pipes for leaks.
4. Apply soap suds or a liquid detergent to each joint. A leak is indicated when bubbles form.

### **WARNING**

**Fire and/or explosion hazard.**

**Never exceed specified pressures. Higher pressures may damage the gas valve. Such damage may result in overfiring and possible heat exchanger failure.**

**Failure to follow this warning can result in property damage, personal injury, and/or death.**

### **WARNING**

**Fire and/or explosion hazard.**

**Do NOT use a match or open flame to test for leaks.**

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

5. Be sure to check pilot tube and burner orifices for leaks.
6. Correct even the smallest leak at once.



## 6. Electrical Wiring

### WARNING

**Electrical shock hazard.**

**Shut off electric power at unit disconnect or service panel before making any electrical connections.**

**Unit MUST be grounded to electrical service panel.**

**Failure to follow this warning can result in property damage, personal injury, and/or death.**

**NOTE:** All electrical work **MUST** conform with the requirements of local codes and ordinances and in the United States the National Electrical Code ANSI/NFPA70-1990 (or current edition) and in Canada CSA C.22.1 - Canadian Electrical Code Part 1 (or current edition). Provide line voltage power supply from a separate protected circuit with a disconnect switch (when required) located within sight of the unit. Supply voltage, amperage, wire, fuse and disconnect switch sizes **MUST** conform with specifications on the unit rating plate.

Wiring **MUST** be protected from possible mechanical damage and **MUST NOT** interfere with removal of access panels, filters, etc.

All exposed wiring or connections **MUST** be made with weatherproof cable or wire unless installed in conduit.

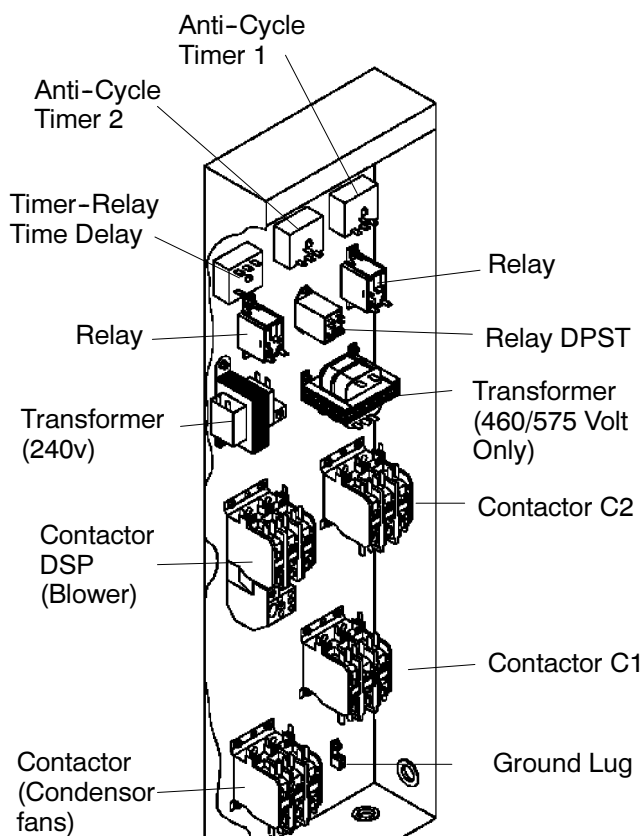
Connections for line voltage are made in the burner section. Low voltage connections are made at the terminal board in the burner section on the right hand side (see **Figure 17**).

For access to high and low voltage connections, remove the burner access panel. (see **Figure 2**).

### Line Voltage Wiring

Line voltage wires enter the unit through the double knockout on the end of the unit next to the burners. (see **Figure 17**). Do **NOT** complete line voltage connections until unit is permanently grounded. All line voltage connections and the ground connection **MUST** be made with copper wire.

**Figure 16 Control Box**



### Line Connections

Complete the line service connections to the terminal block in the burner section. Refer to applicable wiring diagram. Check all screw terminals to ensure they are tight.

### Converting 230V Units to 208V

To convert 230V units to 208V:

1. Turn electric power **OFF**.
2. Remove control box access panel and open control box. Locate the 24V control transformer.
3. Remove wires from the terminal labeled '240V' on the 24V control transformer and reconnect them to the 208V terminal of the 24V control transformer.
4. Close control box and replace control box access panel.

## Field Installed Equipment

All wiring done in the field between the unit and other devices, or between separate devices that are field installed and located, **MUST** not exceed the temperature limitations for type T wire and **MUST** be installed according to the manufacturer's instructions for the devices.

## Low Voltage Wiring

Low voltage wiring connections for the thermostat are made at the 24V terminal board which is located in the burner section. For access, remove the burner access panel. Refer to the wiring diagram and the instructions included with the thermostat.

## Low Voltage Wiring With Economizer Option

The economizer electrical harness taps into **Y1** and **Y2** on the low voltage terminal board. Low voltage wires from the thermostat are connected to **Y1** and **Y2** with or without an economizer.

## Thermostat

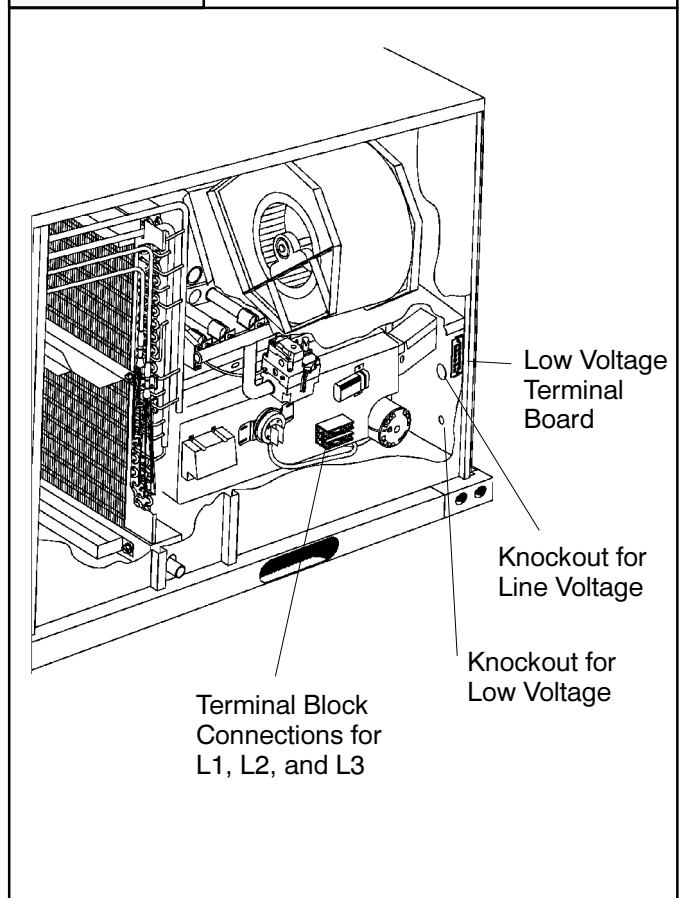
**NOTE: Do NOT attempt to use a thermostat designed for electric heat or heat pump use. Such thermostats will NOT control the unit properly.**

The thermostat **MUST** be a field supplied 2 stage cooling, 2 stage gas heating thermostat.

The location of the thermostat has an important effect on the operation of the unit. **FOLLOW THE INSTRUCTIONS INCLUDED WITH THE THERMOSTAT FOR CORRECT LOCATION, MOUNTING AND WIRING.**

1. Run the thermostat wire into the unit through the port located at the end of the unit at the right side of the burner access panel (see **Figure 17**).
2. Run wire through strain relief to low voltage terminal board.

3. Tighten strain relief.

**Figure 17****Wiring Thermostat to Unit**

## Heat Anticipator

Set the thermostat heat anticipator to 0.20 for the first stage and 0.50 for the second stage in accordance with the thermostat instructions.

## Final Check

Make a final wiring check to be sure system is correctly wired. Inspect field installed wiring and the routing to ensure that rubbing or chafing due to vibration will not occur.

## 7. Air Distribution System

### Ductwork

**NOTE:** The total heat loss from the structure as expressed in total Btu/hr **MUST** be calculated by manufacturer's method or in accordance with "A.S.H.R.A.E. Guide" or "Manual N - Load Calculations" published by the Air Conditioning Contractors of America or in Canada H.R.A.I. "Manual N". The total heat loss calculated should be equal to or less than the heating capacity. Output based on D.O.E. test procedures, steady state efficiency times input.

Ductwork, supply registers, and return air grilles **MUST** be designed and sized to handle the greater of the units heating or cooling air volume requirements. If the unit is connected to an existing system, the ductwork **MUST** be checked to make sure it is adequate. Extra runs or larger duct sizes may have to be installed. **Use only non-combustible type insulation on supply plenum or supply ductwork within 6 feet of unit.**

Maximum recommended velocity in trunk ducts is 1000 feet per minute (5.08 m/s). Velocity in branches should not exceed 800 feet per minute (4.06 m/s).

Ductwork installed outdoors should have a minimum of 2" (50.8mm) of fiberglass insulation and a weatherproof vapor barrier. It should also be protected against damage. Caulk and flashing, or other means adequate to provide a permanent weather seal should be used.

Ductwork installed in attics or other areas exposed to outside temperatures should be installed with a minimum of 2" (50.8mm) fiberglass insulation and have an indoor type vapor barrier.

### Ductwork Connections

The use of flexible, **non-combustible** connectors between main trunk ducts and supply and return air plenums is recommended to minimize vibration transmission.

**NOTE:** Connect supply and return air plenums to unit in a manner that will allow the top of the unit to be removed without removing plenums. Plenums **MUST** be individually sealed to unit casing.

### Filters

#### CAUTION

**Do NOT operate the unit without all filters in place.**

All air **MUST** pass through a filter before entering the unit. Electronic air cleaner, optional filter racks, or other accessible filter arrangements **MUST** be installed in the return air ductwork.

**NOTE:** If the unit has an economizer or any other type of outdoor air damper, disposable filters **MUST** be used in the internal filter racks.

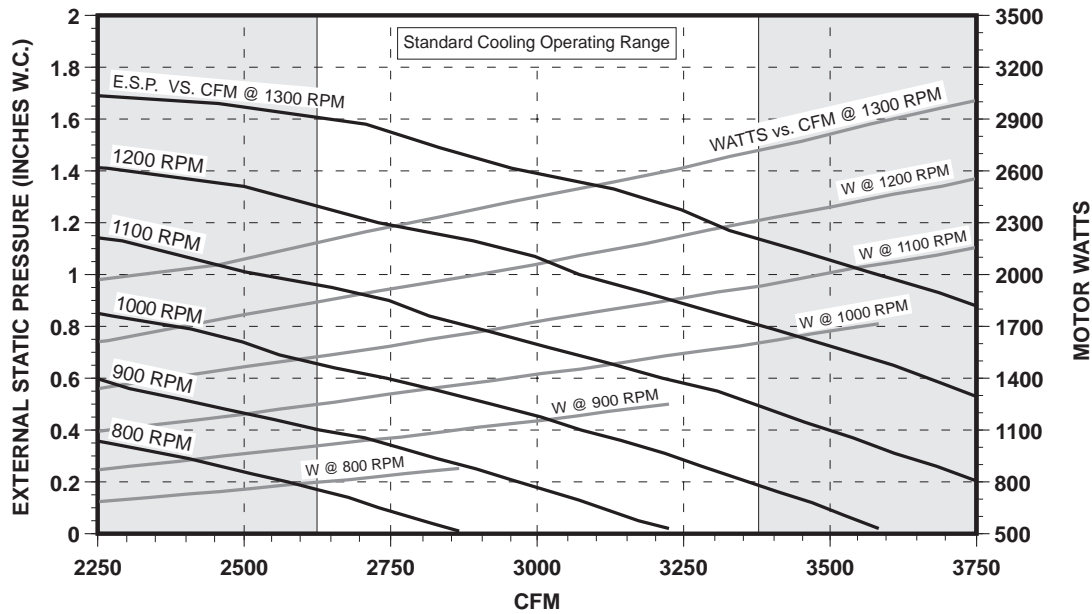
For replacement filter sizes and instructions, see *Air Filters* on **Page 33**.

### Circulating Blower

#### Determining Blower Speed

1. From the system design, determine the external static pressure (ESP) for the supply ducts, return ducts and registers, diffusers, grilles, dampers, heaters and special filters (if any).
2. If unit is to be set up in cooling mode, add .08" W.C. (20 Pa) for wet coil operation to the total ESP determined in Step 1.
3. For data on static additions due to installation of an economizer or manual air dampers, see **Notes** below the unit's airflow chart.
4. From the system design, determine the desired airflow in CFM (L/s). See **Figure 18** for CFM to L/s conversion table.
5. To determine the blower speed necessary to obtain the desired CFM (L/s), see the Circulating Blower Performance Data graph for the unit located on the pages that immediately follow.
6. Locate the total ESP value on the graph and draw a horizontal line across the graph.
7. Locate the correct CFM (L/s) value on the graph and draw a vertical line.
8. Mark the intersection of the horizontal and vertical lines. From the RPM curves, determine the blower RPM's needed to obtain the desired CFM (L/s).
9. Compare required RPM to unit's factory setting for blower RPM (see Blower Performance Tables). If it is different from the RPM your installation requires, the blower speed will need to be changed.
10. Below each unit's Circulating Blower Performance Data table is a table that shows how many turns open the adjustable blower motor pulley needs to be to obtain the required RPM.
11. To change the blower speed, see pages 19 thru 22.

Figure 18		Metric Conversions: Cubic Feet per Minute (CFM) to Liters per Second (L/s); Inches of Water Column (In. W.C.) to Pascals (Pa)													
CFM	L/s	CFM	L/s	CFM	L/s	In. W.C.	Pa	In. W.C.	Pa	In. W.C.	Pa	In. W.C.	Pa	In. W.C.	Pa
50	24	2550	1203	5050	2383	0.01	2	0.51	127	1.01	251	1.51	376	2.01	501
100	47	2600	1227	5100	2407	0.02	5	0.52	130	1.02	254	1.52	379	2.02	503
150	71	2650	1251	5150	2430	0.03	7	0.53	132	1.03	257	1.53	381	2.03	506
200	94	2700	1274	5200	2454	0.04	10	0.54	135	1.04	259	1.54	384	2.04	508
250	118	2750	1298	5250	2477	0.05	12	0.55	137	1.05	262	1.55	386	2.05	511
300	142	2800	1321	5300	2501	0.06	15	0.56	139	1.06	264	1.56	389	2.06	513
350	165	2850	1345	5350	2525	0.07	17	0.57	142	1.07	267	1.57	391	2.07	516
400	189	2900	1369	5400	2548	0.08	20	0.58	144	1.08	269	1.58	394	2.08	518
450	212	2950	1392	5450	2572	0.09	22	0.59	147	1.09	271	1.59	396	2.09	521
500	236	3000	1416	5500	2595	0.10	25	0.60	149	1.10	274	1.60	399	2.10	523
550	260	3050	1439	5550	2619	0.11	27	0.61	152	1.11	276	1.61	401	2.11	526
600	283	3100	1463	5600	2643	0.12	30	0.62	154	1.12	279	1.62	404	2.12	528
650	307	3150	1486	5650	2666	0.13	32	0.63	157	1.13	281	1.63	406	2.13	531
700	330	3200	1510	5700	2690	0.14	35	0.64	159	1.14	284	1.64	408	2.14	533
750	354	3250	1534	5750	2713	0.15	37	0.65	162	1.15	286	1.65	411	2.15	536
800	378	3300	1557	5800	2737	0.16	40	0.66	164	1.16	289	1.66	413	2.16	538
850	401	3350	1581	5850	2761	0.17	42	0.67	167	1.17	291	1.67	416	2.17	541
900	425	3400	1604	5900	2784	0.18	45	0.68	169	1.18	294	1.68	418	2.18	543
950	448	3450	1628	5950	2808	0.19	47	0.69	172	1.19	296	1.69	421	2.19	545
1000	472	3500	1652	6000	2831	0.20	50	0.70	174	1.20	299	1.70	423	2.20	548
1050	495	3550	1675	6050	2855	0.21	52	0.71	177	1.21	301	1.71	426	2.21	550
1100	519	3600	1699	6100	2879	0.22	55	0.72	179	1.22	304	1.72	428	2.22	553
1150	543	3650	1722	6150	2902	0.23	57	0.73	182	1.23	306	1.73	431	2.23	555
1200	566	3700	1746	6200	2926	0.24	60	0.74	184	1.24	309	1.74	433	2.24	558
1250	590	3750	1770	6250	2949	0.25	62	0.75	187	1.25	311	1.75	436	2.25	560
1300	613	3800	1793	6300	2973	0.26	65	0.76	189	1.26	314	1.76	438	2.26	563
1350	637	3850	1817	6350	2997	0.27	67	0.77	192	1.27	316	1.77	441	2.27	565
1400	661	3900	1840	6400	3020	0.28	70	0.78	194	1.28	319	1.78	443	2.28	568
1450	684	3950	1864	6450	3044	0.29	72	0.79	197	1.29	321	1.79	446	2.29	570
1500	708	4000	1888	6500	3067	0.30	75	0.80	199	1.30	324	1.80	448	2.30	573
1550	731	4050	1911	6550	3091	0.31	77	0.81	202	1.31	326	1.81	451	2.31	575
1600	755	4100	1935	6600	3115	0.32	80	0.82	204	1.32	329	1.82	453	2.32	578
1650	779	4150	1958	6650	3138	0.33	82	0.83	207	1.33	331	1.83	456	2.33	580
1700	802	4200	1982	6700	3162	0.34	85	0.84	209	1.34	334	1.84	458	2.34	583
1750	826	4250	2006	6750	3185	0.35	87	0.85	212	1.35	336	1.85	461	2.35	585
1800	849	4300	2029	6800	3209	0.36	90	0.86	214	1.36	339	1.86	463	2.36	588
1850	873	4350	2053	6850	3233	0.37	92	0.87	217	1.37	341	1.87	466	2.37	590
1900	897	4400	2076	6900	3256	0.38	95	0.88	219	1.38	344	1.88	468	2.38	593
1950	920	4450	2100	6950	3280	0.39	97	0.89	222	1.39	346	1.89	471	2.39	595
2000	944	4500	2124	7000	3303	0.40	100	0.90	224	1.40	349	1.90	473	2.40	598
2050	967	4550	2147	7050	3327	0.41	102	0.91	227	1.41	351	1.91	476	2.41	600
2100	991	4600	2171	7100	3350	0.42	105	0.92	229	1.42	354	1.92	478	2.42	603
2150	1015	4650	2194	7150	3374	0.43	107	0.93	232	1.43	356	1.93	481	2.43	605
2200	1038	4700	2218	7200	3398	0.44	110	0.94	234	1.44	359	1.94	483	2.44	608
2250	1062	4750	2242	7250	3421	0.45	112	0.95	237	1.45	361	1.95	486	2.45	610
2300	1085	4800	2265	7300	3445	0.46	115	0.96	239	1.46	364	1.96	488	2.46	613
2350	1109	4850	2289	7350	3468	0.47	117	0.97	242	1.47	366	1.97	491	2.47	615
2400	1133	4900	2312	7400	3492	0.48	120	0.98	244	1.48	369	1.98	493	2.48	618
2450	1156	4950	2336	7450	3516	0.49	122	0.99	247	1.49	371	1.99	496	2.49	620
2500	1180	5000	2360	7500	3539	0.50	125	1.00	249	1.50	374	2.00	498	2.50	623

CIRCULATING BLOWER PERFORMANCE DATA - 7<sup>1</sup>/<sub>2</sub> TON UNITS

- NOTES: 1) Maximum motor Watts is 3200 Watts for 2 HP.  
 2) Maximum blower wheel speed is 1800 RPM.  
 3) Contact factory for applications requiring operation outside standard cooling operating range.  
 4) Airflow data based on dry coil with filters. For wet coil add 0.08 inches to ESP. Downflow has the same ESP as horizontal flow.  
 5) Add 0.05 inches to ESP for horizontal economizer, downflow economizer, or manual air dampers.  
 6) Pulley turns refers to turns out. In other words, 0 turns is a *narrower* sheave than 5 turns.  
 7) Blower speed **MUST** be set to give the correct air temperature rise through the unit as marked on the Rating Plate or in the *Technical Support Manual*.

CFM	EXTERNAL STATIC PRESSURE IN INCHES WATER COLUMN																			
	.25		.5		.75		1.0		1.25		1.50		1.75		2.0		2.25		2.5	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
2500					1000	1250	1100	1500	1175	1700	1260	2000	1340	2250						
2750			960	1250	1050	1400	1140	1750	1224	2000	1290	2250	1360	2500						
3000	945	1250	1010	1500	1100	1750	1190	2000	1250	2250	1325	2600								
3250	1000	1550	1075	1800	1160	2100	1240	2400	1300	2600	1391	3050								
3500	1050	1800	1125	2150	1200	2250	1290	2600	1350	2800										

W = Watts

High Static Data

PULLEY TURNS OPEN		0	1	2	3	4	5
FAN RPM	2 HP/STD PULLEY	1224	1139	1113	1057	1001	945
	2 HP/Hi STATIC PULLEY	1391	1335	1280	1224	1169	1113

NOTE: High static pulleys are field installed and **MUST** be adjusted by the installing technician.

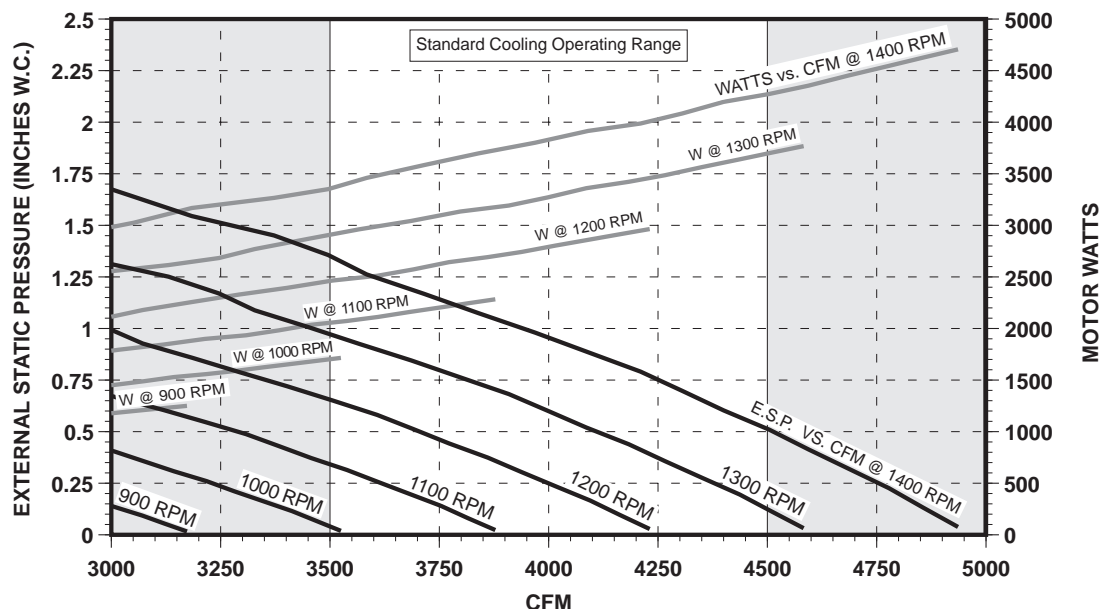
FACTORY SETTING TURNS OPEN	
2 HP/STANDARD PULLEY	4
2 HP/Hi STATIC PULLEY *	(See NOTE)

## AIRFLOW CORRECTION FACTORS - 7 1/2 TON

CFM - ACTUAL	2600	2800	3000	3200	3400
TOTAL MBH	0.97	0.98	1.00	1.02	1.03
SENSIBLE MBH	0.93	0.97	1.00	1.03	1.07
POWER KW	0.99	0.99	1.00	1.01	1.01

- NOTES: 1. Multiply correction factor times gross performance data.  
 2. Resulting sensible capacity cannot exceed total capacity.

## CIRCULATING BLOWER PERFORMANCE DATA - 10 TON UNITS



- NOTES: 1) Maximum motor Watts is 4250 Watts for 2 HP and 4900 Watts for 3 HP.  
 2) Maximum blower wheel speed is 1800 RPM.  
 3) Contact factory for applications requiring operation outside standard cooling operating range.  
 4) Airflow data based on dry coil with filters. For wet coil add 0.08 inches to ESP. Downflow has the same ESP as horizontal flow.  
 5) Add 0.10 inches to ESP for horizontal economizer, downflow economizer, or manual air dampers.  
 6) Pulley turns refers to turns out. In other words, 0 turns is a *narrower* sheave than 5 turns.  
 7) Blower speed **MUST** be set to give the correct air temperature rise through the unit as marked on the Rating Plate or in the *Technical Support Manual*.

CFM	EXTERNAL STATIC PRESSURE IN INCHES WATER COLUMN																			
	.25		.5		.75		1.0		1.25		1.50		1.75		2.0		2.25		2.5	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
3500			1150	2250	1225	2600	1310	3000	1380	3250	1440	3625	1525	4000						
3750	1140	2375	1210	2700	1290	3000	1360	3350	1425	3750	1500	4200	1558	4400						
4000	1200	2800	1275	3125	1350	3600	1420	3850	1475	4250	1540	4550								
4250	1260	3250	1325	3625	1390	3900	1475	4500	1525	4650										
4500	1325	3850	1390	4250	1460	4600	1520	4900												

W = Watts

High Static Data

PULLEY TURNS OPEN		0	1	2	3	4	5
FAN RPM	2 HP/STD PULLEY	1391	1335	1280	1224	1169	1113
	3 HP/HI STATIC PULLEY	1558	1502	1446	1391	1335	1280

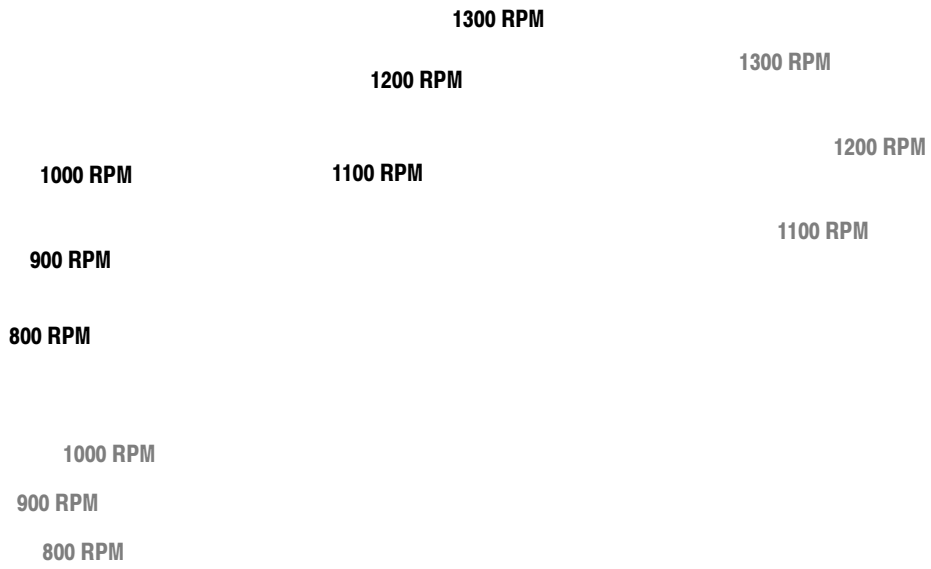
NOTE: High static pulleys are field installed and **MUST** be adjusted by the installing technician.

FACTORY SETTING TURNS OPEN	
2 HP/STANDARD PULLEY	4
3 HP/HIGH STATIC PULLEY*	(See NOTE)

## AIRFLOW CORRECTION FACTORS - 10 TON

CFM - ACTUAL	3200	3600	4000	4400	4800
TOTAL MBH	0.95	0.97	1.00	1.03	1.05
SENSIBLE MBH	0.89	0.95	1.00	1.05	1.11
POWER KW	0.98	0.99	1.00	1.01	1.02

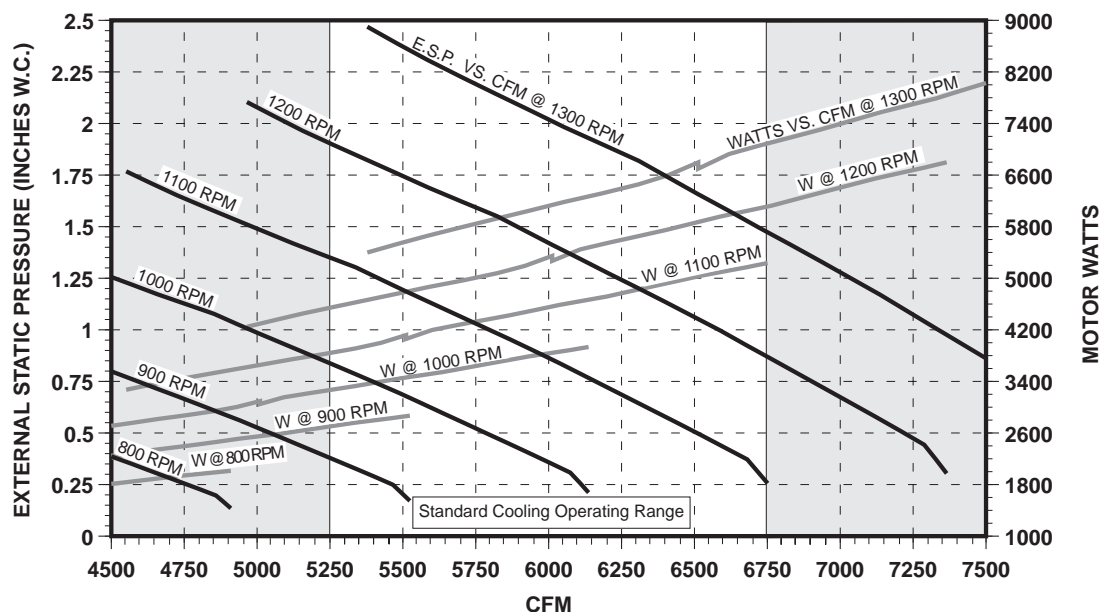
- NOTES: 1. Multiply correction factor times gross performance data.  
 2. Resulting sensible capacity cannot exceed total capacity.



WATTS VS CFM

ESP VS CFM

## CIRCULATING BLOWER PERFORMANCE DATA - 15 TON UNITS



- NOTES: 1) Maximum motor Watts is 5200 Watts for 3 HP; 6200 Watts for 5 HP.  
 2) Maximum blower wheel speed is 1550 RPM.  
 3) Contact factory for applications requiring operation outside standard cooling operating range.  
 4) Airflow data based on dry coil with filters. For wet coil add 0.08 inches to ESP. Downflow has the same ESP as horizontal flow.  
 5) Add 0.20 inches to ESP for horizontal economizer, downflow economizer, or manual air dampers.  
 6) Pulley turns refers to turns out. In other words, 0 turns is a *narrower* sheave than 5 turns.  
 7) Blower speed **MUST** be set to give the correct air temperature rise through the unit as marked on the Rating Plate or in the *Technical Support Manual*.

CFM	EXTERNAL STATIC PRESSURE IN INCHES WATER COLUMN																			
	.25		.5		.75		1.0		1.25		1.50		1.75		2.0		2.25		2.5	
	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W	RPM	W
5250	875	2500	925	2875	975	3075	1025	3450	1075	3625	1125	4000	1175	4375	1220	4750				
5500	900	2875	960	3150	1010	3525	1060	3825	1110	4250	1150	4375	1200	4750	1236	5000				
5750	950	3250	1000	3625	1050	3900	1100	4375	1140	4600	1180	4825	1230	5125						
6000	990	3625	1025	4000	1075	4375	1125	4750	1160	4900	1215	5500								
6250	1025	4200	1060	4475	1110	4850	1160	5200	1200	5600										
6500	1060	4700	1100	5025	1150	5450	1190	5800	1236	6000										
6750	1100	5125	1140	5500	1180	5875														

W = Watts

High Static Data

PULLEY TURNS OPEN		0	1	2	3	4	5
FAN RPM	3 HP/STD PULLEY	1150	1097	1045	993	940	888
	5 HP/Hi STATIC PULLEY	1236	1172	1107	1042	977	911

NOTE: High static pulleys are field installed and **MUST** be adjusted by the installing technician. 5 HP motor requires a *blower* pulley change.

FACTORY SETTING TURNS OPEN	
3 HP/STANDARD PULLEY	4
5 HP/Hi STATIC PULLEY *	(See NOTE)

## AIRFLOW CORRECTION FACTORS - 15 TON

CFM - ACTUAL	4800	5400	6000	6600	7200
TOTAL MBH	0.95	0.98	1.00	1.02	1.05
SENSIBLE MBH	0.90	0.95	1.00	1.05	1.10
POWER KW	0.98	0.99	1.00	1.01	1.02

- NOTES: 1. Multiply correction factor times gross performance data.  
 2. Resulting sensible capacity cannot exceed total capacity.



## 8. Adjustable Belt Drive Blower

### WARNING

**Personal injury hazard.**

**Use extreme care during the following procedures and obey Safety Information.**

**Failure to do so may result in personal injury.**

The following safety rules **MUST** always be followed when working near belt drive.

### Always Turn The Power Off

Turn electric power to the unit **OFF** before you begin working on it.

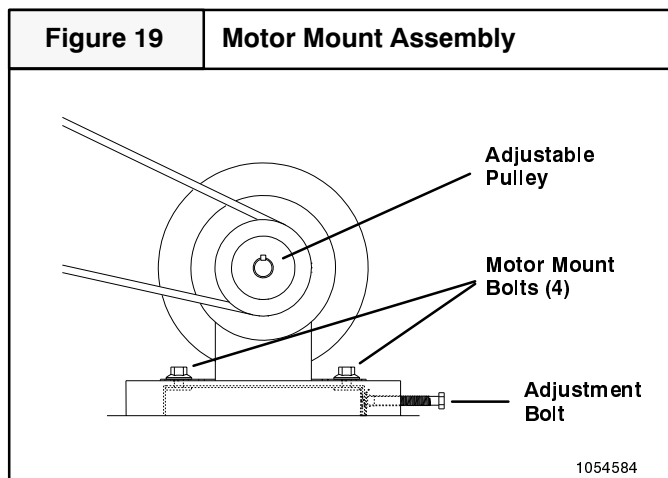
### Always Wear Protective Clothing

**NEVER** wear loose or bulky clothes, such as neckties, exposed shirttails, loose sleeves, or lab coats around belt drives. Wear gloves while inspecting sheaves to avoid nicks, burrs, or sharply worn pulley edges.

The blower speed is changed by adjusting the variable speed pulley mounted on the blower motor.

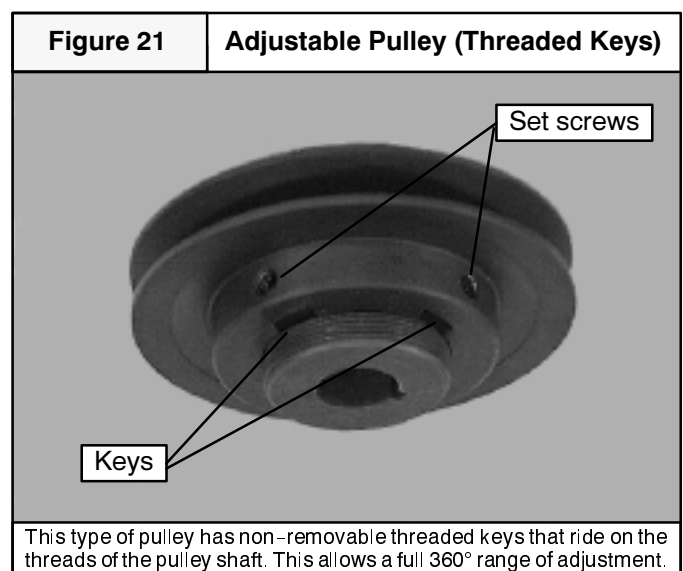
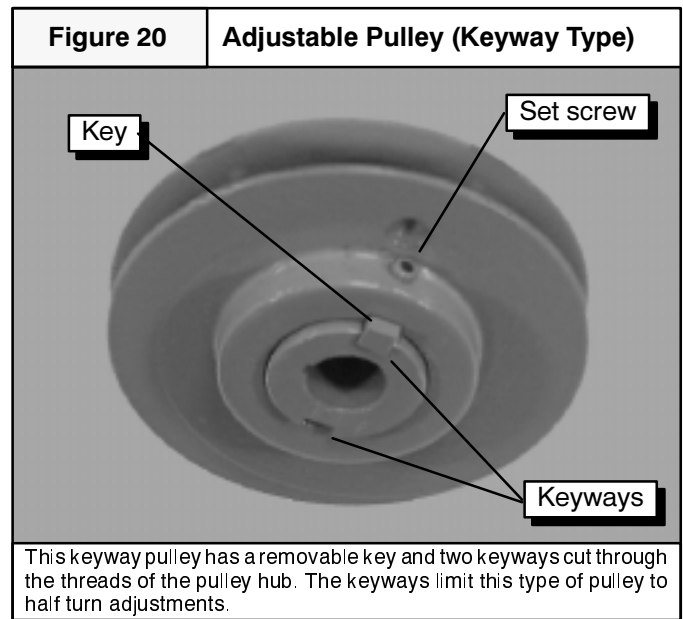
If the blower speed needed is different than the speed of the blower as shipped, follow the steps below to change the blower speed. Before changing the blower speed, read the above safety rules first.

1. Turn electric power **OFF**.
2. Remove the side blower access panel (see **Figure 2**).



3. Loosen the four motor mount bolts.
4. Turn the motor adjustment bolt counterclockwise until the belt is slack enough to come off easily (see **Figure 19**).
5. Remove the belt. Do **NOT** attempt to pry off belt with tools or fingers.
6. Loosen set screw(s) on the outer half of the adjustable pulley.

The unit has one of two different types of adjustable pulleys (see **Figure 20 or 21**).



7. Remove key if unit has a keyway type pulley.

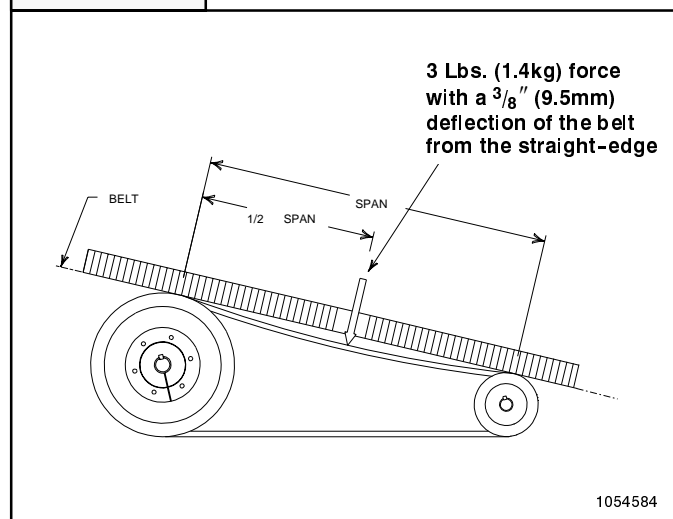
8. To set the blower for a desired CFM (L/s), first turn the outer half of the adjustable pulley clockwise until it meets the inner half of the pulley.
9. Turn the outer half of the adjustable pulley counter-clockwise the correct number of turns to obtain the desired CFM (L/s).

**NOTE:** To increase the blower speed, turn the outer half of the adjustable pulley clockwise. To decrease the blower speed, turn the outer half of the adjustable pulley counter-clockwise.

10. Replace key if unit has keyway type pulley.
11. Tighten set screw(s).
12. Put on belt.

Figure 22

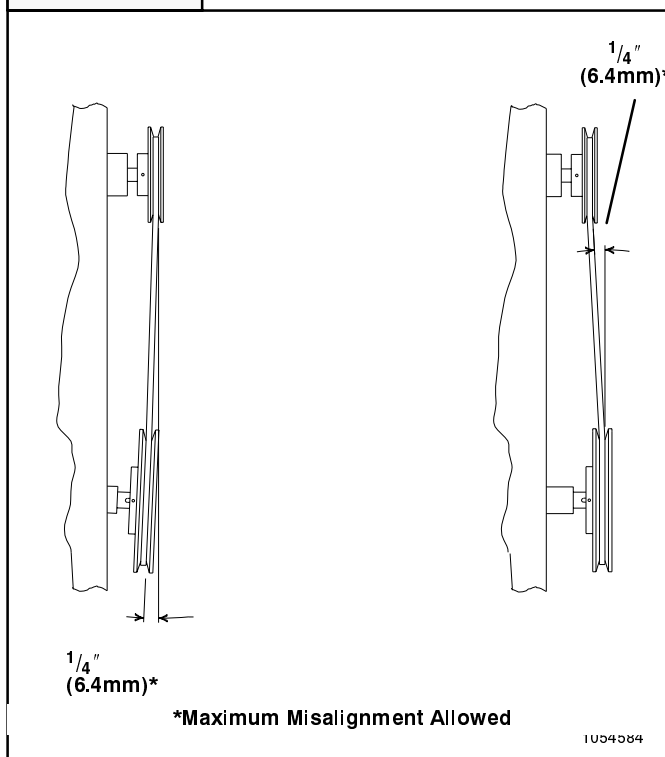
## Checking Tension and Deflection



13. Turn motor adjustment bolt clockwise until the belt has enough tension at the proper deflection. Use one of the commercially available belt tension gauges to set the correct tension at the proper deflection (see **Figure 22**).

Figure 23

## Checking Pulley Alignment



14. Use a straight-edge (angle iron, straight piece of board or anything with a good straight surface or edge) to check the alignment of the blower pulley with blower motor pulley (see **Figure 23**).

It may be necessary to back the tension off the belt temporarily and tighten one of the motor mount bolts before it is possible to adjust the angle of the blower motor.

15. Tighten all four blower motor mount bolts.
16. Ensure that all bolts, nuts and screws are tightened and ensure that all tools, gloves, etc. are removed from unit.
17. Replace side blower access panel before Start-up.
18. During Start-up, listen for any unusual noises or vibrations.
19. Shut down the unit after it runs for a while and check the bearings and motor. If they feel hot, the belt tension may be too tight, bearings may be misaligned or not lubricated correctly, etc.
20. It is a good idea to retension a new belt after a run-in period of about 24 hours. A run-in period of overnight or during a lunch break is better than no run-in period at all.

## 9. Economizer Accessory

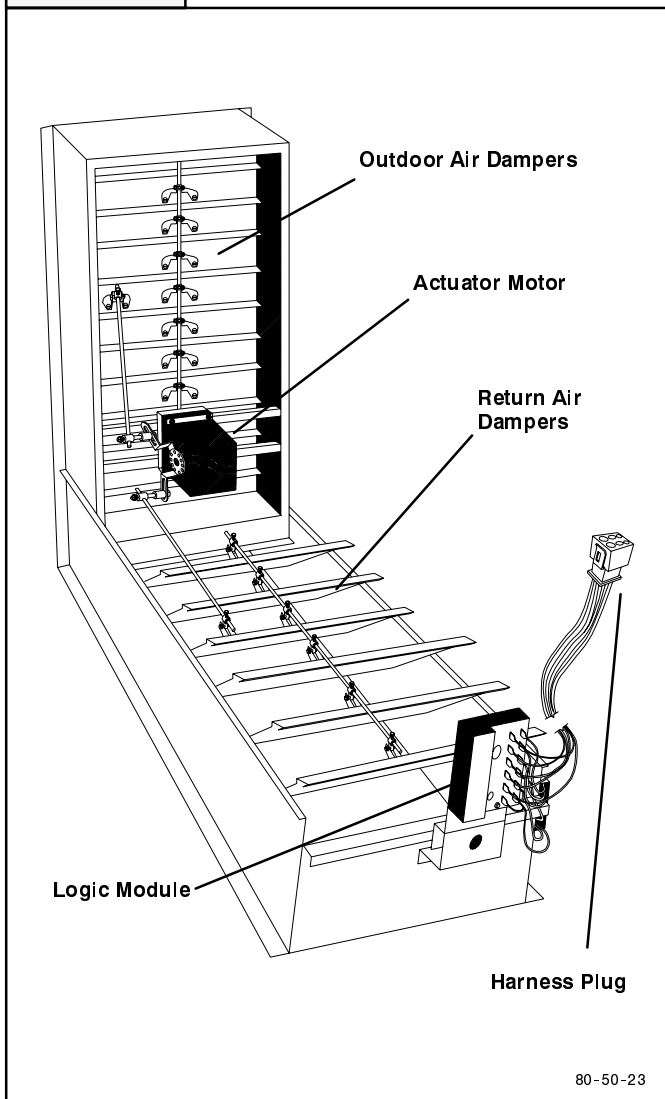
The purpose of an economizer is to:

- Provide cool outside air to the conditioned space during the cooling cycle to minimize the use of the compressors.
- Bring outside air into the conditioned space to meet minimum ventilation air requirements whenever the circulation blower is running.

### Theory of Operation

The economizer has two sets of dampers that are mechanically linked together. The outdoor air dampers regulate the intake of outside air and the return air dampers regulate the flow of return air (see **Figure 24**). When the outdoor air dampers modulate open, the linkage causes the return air dampers to modulate closed.

**Figure 24** Downflow Economizer



The economizer is controlled by a logic module which field connects to the unit controls through a harness plug. The logic module also controls the compressor staging based on the thermostat input.

The minimum opening position of the outdoor air dampers is field adjustable. It is set on the logic module of modulating economizers or on the actuator motor of three-position economizers.

The enthalpy sensor is factory installed on the outdoor air dampers. The enthalpy change-over point is adjustable on the logic module.

A mixed air sensor is field installed in the blower inlet. The mixed air sensor keeps the mixed air above 56°F (13.3°C). See the economizer installation instructions for the location of the air sensor.

A positive pressure is created in the building when the outdoor air dampers open and the return dampers close. This pressure must be vented or the air will not circulate properly. This is the function of the barometric relief dampers. A positive pressure forces the passive exhaust dampers to swing open.

The outdoor air dampers open to the minimum position for outside air whenever the circulation blower is ON.

When the thermostat is in the FAN AUTO position, the outdoor air dampers will close completely whenever heating or cooling is not called for.

## Sequence of Operation

**NOTE:** For correct low voltage wiring when economizer option is being used, see **Low Voltage Wiring With Economizer Option** on **Page 16**.

When the thermostat is in the FAN ON position:

1. The outdoor air dampers will open to the minimum position for outdoor air.
2. On a call for cooling, if the economizer's outdoor enthalpy sensor determines that the outside air conditions are correct, the outdoor air dampers will modulate open and the return air dampers will modulate closed.
3. On demand for cooling the thermostat completes Circuit 1 between thermostat terminals **R** and **G** and **Y1** for first stage cooling. Second stage cooling begins when the thermostat completes Circuit 2 between thermostat terminals **R** and **G** and **Y2**.

Both circuits have a low voltage safety circuit consisting of a high pressure switch, a low pressure switch and an anti-cycle delay timer.

4. When Circuit 1 is made, the economizer logic module is energized at low voltage terminal board terminal **Y1**. If the outside temperature is cool enough, the outdoor air dampers will open and the return air dampers will close.

5. The mixed air sensor at the blower inlet modulates the economizer dampers to prevent the mixed air from falling below 56°F (13.3°C). The mixed air sensor modulates the outdoor air dampers between the full open and minimum outdoor air positions.

If the conditioned space is not being maintained at the selected temperature, the thermostat will make Circuit 2 and call for second stage cooling by energizing the economizer logic module at low voltage terminal board terminal **Y2**. This energizes the Y1 anti-cycle delay and contactor C1 which energizes the condenser fan(s) and compressor 1 for cooling to assist the economizer.

**NOTE:** Contactor C2 cannot be energized to operate compressor 2 while the economizer is still energized since Circuit 1 is activating the economizer and Circuit 2 is activating compressor 1.

6. If the thermostat is still calling for cooling and the outside air warms to above the setting for economizer operation:
  - a. The economizer dampers will close to the minimum position for outside air and remain there.
  - b. Contactor C1 will remain energized and compressor 1 will continue to run.
  - c. Contactor C2 will close and compressor 2 will start.

## 10. Start-up Procedure

### WARNING

Electrical shock, fire and/or explosion hazard.

Use extreme care during all of the following checks and procedures.

Make sure Electric Power and/or Gas supply is turned OFF as instructed in appropriate steps.

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

**NOTE:** For correct low voltage wiring when economizer option is being used, see **Low Voltage Wiring With Economizer Option** on Page 16.

Check the unit's operation as outlined in the following instructions.

### Blower and Phasing Check

1. Shut **OFF** electric power at unit disconnect.
2. Shut **OFF** gas valve and manual shut off valve (see **Figure 25**).
3. Check to see that clean, properly sized air filters are installed.
4. Check to see that everything inside the unit is clear and ready to operate safely. Ensure that there are no objects in, on or around the motor, belt or blower wheel.
5. Set thermostat Heat-Cool selector to **OFF**.
6. Set thermostat fan switch to **AUTO**.

### WARNING

Moving parts hazard.

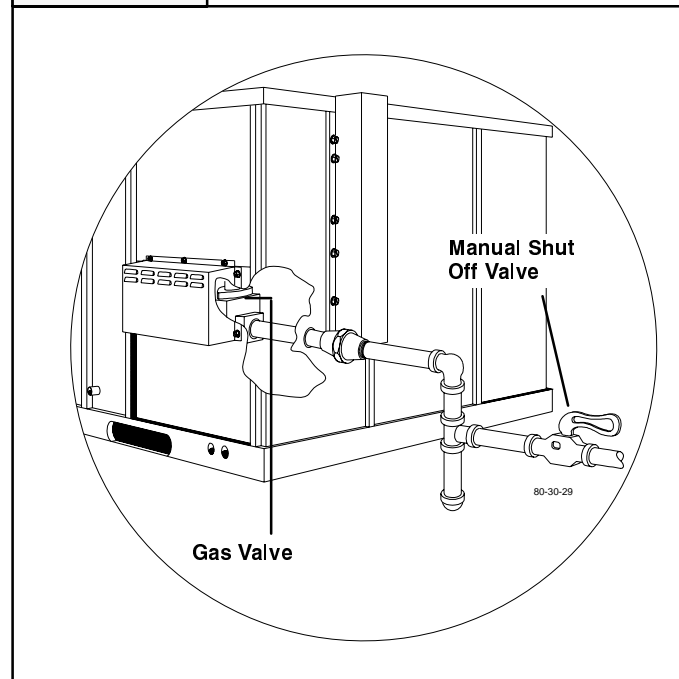
Do **NOT** put hands or any other object in, on or around the motor, belt or blower wheel. Ensure that there are no objects in, on or around the motor, belt or blower wheel before turning electric power on.

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

7. Turn **ON** electric power. Nothing should start running. If any unusual arcing, odors or noises are encountered, shut **OFF** electric power immediately and check for wiring errors.

**NOTE:** The circulation blower motor and compressor(s) are three phase and are factory synchronized for proper rotation. *Even if the circulation blower motor comes on and air seems to be circulating, it is possible that the blower motor rotation is incorrect due to improper phasing.* The scroll compressor(s) (if equipped) will run backwards under this condition and be damaged. It is therefore necessary to check for proper rotation.

**Figure 25** Piping at Unit (Natural Gas)



### CAUTION

Do **NOT** operate the unit with the compressor(s) running until proper blower rotation has been confirmed by running the following test.

8. Set thermostat fan switch to **ON**. The circulating air blower should come **ON**.
9. Shut **OFF** electric power at unit disconnect and visually observe the direction of the blower rotation as it slows down. Do **NOT** put hands or any other object in, on or around the belt, motor or blower wheel. If blower wheel rotation is the same as the directional arrow on the blower housing, proceed to the next step.

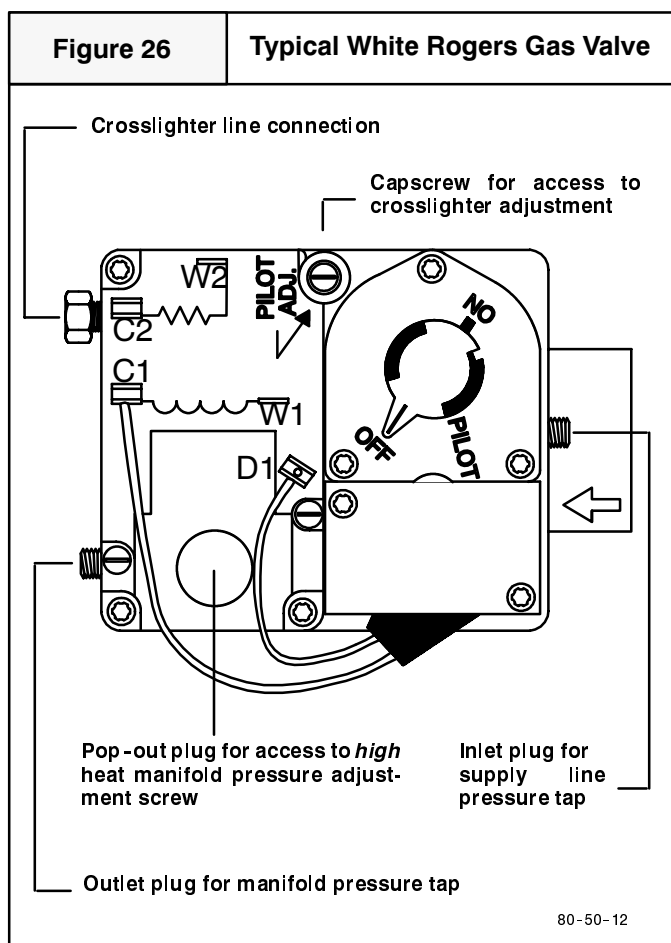
### CAUTION

If blower rotation is incorrect, shut electric power **OFF** at unit disconnect and reverse any two supply wires at field connections **ONLY**. Do **NOT** reverse the blower and/or compressor leads or rewire any internal wiring. After rewiring is done, repeat blower rotation check to ensure that blower rotation is now correct.

10. If blower rotation is correct, reset thermostat fan switch to **AUTO**. The circulating air blower should go **OFF**. Nothing should be running.
11. Shut **OFF** electric power at unit disconnect.

## Low and High Heat Checks

12. Be sure that gas valve and manual shut off valve are **OFF**.
13. Be sure that electric power is **OFF**.
14. Remove inlet plug from gas valve (see **Figure 26**). Insert  $\frac{1}{8}$ " NPT barbed fitting into inlet for use as supply line pressure tap.
15. Connect U-Tube manometer to barbed fitting. Use a manometer with a 0-12" (0-3 Pa) range.
16. To check the supply gas pressure at high heat, place a jumper between the **R** and **W1** and **W2** terminals on the low voltage terminal board.
17. Turn **ON** electric power. The combustion blower should come **ON**.



## WARNING

**Fire and/or explosion hazard.**

**Never exceed specified pressures. Higher pressures may damage the gas valve. Such damage may result in overfiring and possible heat exchanger failure.**

**Failure to follow this warning can result in property damage, personal injury, and/or death.**

1. Turn **ON** gas valve (see **Figure 26**).
2. Turn **ON** the manual shut off valve (see **Figure 25**). The unit will fire at high heat.

**NOTE:** On a call for heat, the ignition system will send a spark to the ignitor for 90 seconds. If the crosslighter does not light within 90 seconds, the system will shut off for 5 minutes and then it will try again for 90 seconds. It will continue to cycle indefinitely (90 seconds **ON** - 5 minutes **OFF**).

It may take several minutes to purge the air out of the gas lines on initial start-up. If the crosslighter does not light after three complete cycles (approximately 20 minutes), shut gas valve, manual shut off valve and electric power **OFF** and call a qualified service agency.

**NOTE:** Supply line pressures **MUST** be checked with main burners operating and all other gas appliances on same gas line fired at high heat.

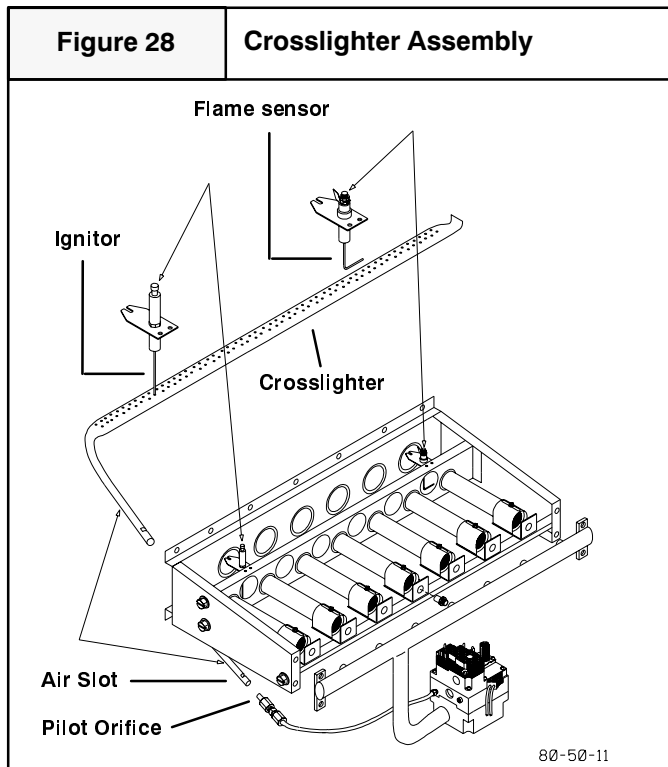
3. Manometer reading **MUST** be within the minimum and maximum supply gas pressure values listed in **Figure 27**.

If supply gas pressure is not within the minimum and maximum values, turn manual shut off valve **OFF** and contact gas supplier.

<b>Figure 27</b>		<b>Supply Gas Pressures</b>	
		<b>Natural Gas</b>	<b>LP Gas</b>
<b>Minimum</b>	4.5" W.C. (1120 Pa)	11" W.C. (2740 Pa)	
<b>Recommended</b>	7" W.C. (1740 Pa)	11" W.C. (2740 Pa)	
<b>Maximum</b>	13" W.C. (3230 Pa)	13" W.C. (3230 Pa)	

4. Shut manual shut off valve **OFF**.
5. Shut gas valve **OFF**. Allow circulating blower to run 2.5 minutes before turning electric power off.
6. Shut electric power **OFF** at unit disconnect.
7. Remove barbed fitting from inlet and replace inlet plug.

8. Remove outlet plug from gas valve. Insert  $\frac{1}{8}$ " NPT barbed fitting into outlet for use as manifold pressure tap.
9. Connect U-Tube manometer to barbed fitting.
10. Remove the jumper wire from the **W2** terminal on the low voltage terminal board so that the unit will start on low heat.
11. Turn **ON** electric power. The combustion blower should come **ON**.
12. Turn **ON** manual shut off valve.
13. Turn gas valve to **PILOT**.
14. The ignition spark from the ignitor should light the crosslighter (see **Figure 28**). The circulating air blower should come **ON** 30 seconds after the crosslighter flame sensor is satisfied.
15. Check the crosslighter flame. A small mirror on an extension handle will be needed to view the flame. The flame should be continuous along the crosslighter and should surround the horizontal portion of the flame sensor (see **Figure 28**).
16. Turn **ON** gas valve.



**NOTE:** Manifold pressures **MUST** be checked with main burners operating.

17. Check low heat manifold pressure on manometer. Manifold pressure on low heat is **NOT** adjustable. Manometer reading **MUST** be within the values for low heat listed in **Figure 29** or the valve **MUST** be replaced.

Figure 29	Manifold Gas Pressures	
	Natural Gas	LP Gas
Low Heat*	*1.6" W.C. $\pm$ 0.3 (400 Pa $\pm$ 75)	*4.4" W.C. $\pm$ 0.3 (1090 Pa $\pm$ 75)
High Heat	3.5" W.C. $\pm$ 0.3 (870 Pa $\pm$ 75)	10" W.C. $\pm$ 0.3 (2490 Pa $\pm$ 75)

**\*Note:** Manifold gas pressure for low heat is **NOT** adjustable. Manifold gas pressure for high heat *is* adjustable.

## WARNING

**Fire and/or explosion hazard.**

**Manifold pressure MUST be set correctly to obtain rated input.**

**Failure to properly set input pressure can result in property damage, personal injury, and/or death.**

18. Inspect main burner flames (see **Figure 32**). Flames should be stable and blue.
19. Shut **OFF** gas valve and manual shut off valve. Allow circulating blower to run 2.5 minutes before turning electric power off.
20. Shut **OFF** electric power at unit disconnect.
21. To check the manifold gas pressure at high heat, replace jumper to **W2** terminal on the low voltage terminal board.
22. Turn **ON** electric power. The combustion air blower should come **ON**.
23. Turn **ON** manual shut off valve.
24. Turn **ON** gas valve.
25. The ignitor should light the crosslighter.
26. When the crosslighter flame sensor is satisfied, gas is sent to the main burners and the crosslighter flame ignites the main burners. After 30 seconds, the circulating air blower should come **ON**.
27. Check manifold pressure on manometer. Manometer reading **MUST** be within the range for high heat values listed in **Figure 29**. If the manometer reading is correct, go to Step 28.

If the manometer reading is not within the range for high heat listed in **Figure 29**, an adjustment **MUST** be made. To adjust the high heat manifold pressure:

- a. Remove the pop-out plug from the top of the gas valve (see **Figure 26**) to access the high heat manifold pressure adjustment screw.

- b. To increase the manifold pressure, turn the adjustment screw clockwise. To decrease the manifold pressure, turn the adjustment screw counterclockwise.
  - c. When the manifold pressure is correct, replace pop-out plug.
28. Inspect main burner flames. Flames should be stable and blue.
  29. Shut **OFF** gas valve and manual shut off valve. Allow circulating blower to run 2.5 minutes before turning electric power off.
  30. Shut **OFF** electric power at unit disconnect.
  31. Remove barbed fitting from outlet and replace outlet plug.
  32. Remove jumpers from low voltage terminal board.

## Heating Operation/Temperature Rise Check

1. Open **ALL** registers and duct dampers.
2. Set thermostat Heat-Cool selector to **HEAT**.
3. Set the thermostat as high as it will go.
4. Turn **ON** electric power.
5. Turn **ON** manual shut off valve.
6. Turn gas valve **ON**. Unit should come on at high heat.
7. Operate unit **AT LEAST** 15 minutes, then check temperature rise.
8. To check the temperature rise through the unit, place thermometers in the supply and return air ducts as close to the unit as possible.

Keep the economizer dampers (if equipped) completely closed while checking the temperature rise.

**NOTE:** Temperature rise is the difference between the supply and return air temperatures. If the air distribution system is designed properly, the correct temperature rise is usually obtained when the unit is operating at rated input with the recommended blower speed.

**NOTE:** The temperature rise must be within the specifications marked on the unit rating plate.

**NOTE:** The maximum outlet air setting for all models is 160°F (71°C).

**NOTE:** It may be necessary to change the blower speed if the correct temperature rise is not obtained. A faster blower

speed will decrease the temperature rise. A slower blower speed will increase the temperature rise. To change the blower speed, see Air Distribution system and blower chart.

9. After the correct temperature rise has been obtained, check the limit control function by blocking the return air grille(s).

After several minutes the crosslighter and main burners should go **OFF**. The circulating air blower should continue to run.

Remove air restrictions. Crosslighter and main burners should relight after a cool down period of a few minutes.

10. Adjust the thermostat setting below room temperature.

Crosslighter, main burners, and combustion air blower should go **OFF**.

The circulation air blower should continue to run for approximately 150 seconds.

## Cooling Checks

The compressors have a five minute anti-cycle delay that is activated whenever the compressors turn off. For instance, if the unit is manually shut off when the compressors are running and the unit is turned back on two minutes later, it will be an additional three minutes before the compressors will restart.

**NOTE:** For correct low voltage wiring when economizer option is being used, see **Low Voltage Wiring With Economizer Option**.

### CAUTION

**Do NOT operate the unit with the compressor(s) running until proper blower rotation has been confirmed during the Blower and Phasing Check in the previous section. If the phasing is incorrect, the scroll compressor(s) (if equipped) will run backwards and they will be damaged.**

1. Be sure that electric power is **OFF**.
2. To check cooling Stage 1, place jumper wires across low voltage terminal board terminals **R** to **G**, **R** to **Y1**.
3. Turn electric power **ON**. Check to see that the following occurs:
  - a. Compressor 1 - **ON**
  - b. Condenser fan motor(s) - **ON**
  - c. Circulation air blower - **ON** with correct rotation and adequate airflow from ductwork.
4. Shut **OFF** electric power at unit disconnect.



5. To check cooling Stage 2, remove jumper wires from **Y1** and place it on **Y2**.

**NOTE:** Allow 5 minutes between Steps 4 and 6.

6. Turn **ON** electric power. Check to see that the following occurs:
  - a. Compressors 1 & 2 - **ON**
  - b. Condenser fan motor(s) - **ON**
  - c. Circulation air blower - **ON**

**NOTE:** If **Y2** only is jumpered, condenser fans will not come on.

7. Shut **OFF** electric power at unit disconnect. Begin timing the five minutes for the anti-cycle delay.
8. Remove jumpers from low voltage terminal board.
9. Set Thermostat to COOL and temperature to call for Cooling.
10. Turn **ON** electric power. At the end of the five minute anti-cycle delay, the unit should start and run.
11. Shut **OFF** electric power at unit disconnect.
12. Replace all service access panels.

## 11. Operation And Maintenance Instructions

### **WARNING**

**Electrical shock hazard.**

Turn off electric power supply at disconnect switch or service panel before removing any access or service panel from unit.

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

### Turning Off the Unit

#### Heating

**Note:** If the furnace overheats or fails to shut off during operation, close the manual shut off valve for the furnace then wait 2.5 minutes before turning **OFF** electric power at disconnect switch or service panel.

1. Set thermostat selector to **OFF** and fan switch to **AUTO**.
2. To shut the furnace down completely, shut **OFF** the manual shut off valve. If furnace is running at time of shut-down, wait 2.5 minutes then shut **OFF** electric power supply at disconnect switch or service panel. (No wait is necessary if furnace was not running within 2.5 minutes prior to shut-down.)

#### Cooling

1. Set thermostat selector to **OFF** and fan switch to **AUTO**.

2. To shut the unit down completely, shut **OFF** electric power supply at disconnect switch or service panel.

### Starting the Unit After Shutdown

### **WARNING**

**Carbon monoxide, fire, and/or explosion hazard.**

Do not operate the unit on heating (except during service checks) unless all access panels are securely fastened in place. Abnormal and possibly hazardous burner operation could result.

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

#### Heating

1. Set the thermostat to **OFF**.
2. Remove the burner access panel. Shut **OFF** gas valve. Wait 5 minutes.
3. Turn **ON** gas valve (White Rogers valve knobs must be pressed down before turning). Replace burner access panel. Turn **ON** manual shut off valve.
4. Turn **ON** electric power.
5. Set thermostat to desired temperature and set selector to **HEAT**. Unit will come on and operate automatically under control of the thermostat.

**NEVER** attempt to light the crosslighter manually.

## Cooling

### CAUTION

To prevent possible damage to the compressor(s), do **NOT** operate on cooling when outdoor temperature is below 35°F (2°C).

**NOTE:** An optional low ambient kit is available that allows the unit to operate at temperatures down to 0°F (-18°C).

1. Turn **ON** electric power.
2. Set thermostat to desired temperature and set system switch to **COOL**. The unit will come on and operate automatically under control of the thermostat.

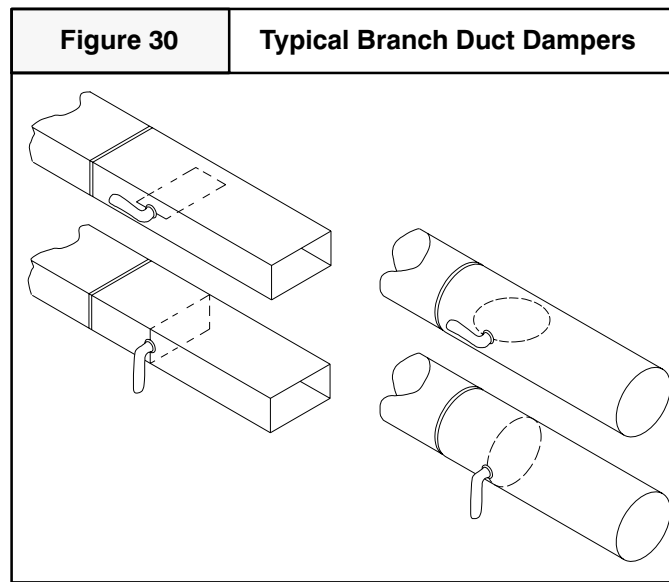
Close all doors and windows. The unit may run continuously for several hours or longer on the initial run because of residual heat and moisture in the building. This is normal for any air conditioning system.

## Thermostat Fan Switch Operation

The circulating air blower will run continuously with the fan selector switch in the **ON** position. When the fan selector switch is in the **AUTO** position, the blower will run during each heating or cooling cycle.

## Adjusting Room Temperatures

If the temperature in individual rooms is not as desired, balance the system by adjusting the dampers in the branch ducts (see **Figure 30**). Adjust a little at a time and wait a day after each change to judge the effect. Once the dampers are adjusted for normal weather conditions, it is best to leave them that way. Compensate for temporary weather changes by adjusting the thermostat setting.



## Monthly Maintenance and Inspection Checks

### Air Filters (Factory Installed)

#### CAUTION

**Do NOT operate unit without all air filters installed in the unit.**

Dirty filters are the most common cause of compressor failures and inadequate heating and cooling performance.

Inspect filters at least monthly and replace or clean as required.

Washable filters may be cleaned by soaking in mild detergent and rinsing with cold water. Install filters so that the arrows on the side point in the direction of air flow.

Filter racks are accessible through the filter access panel.

### Disposable Replacement Filters

For 7-1/2 & 10 ton units: 4 filters 20" x 25" x 2"

For 12-1/2 & 15 ton units: 4 filters 20" x 30" x 2"

To replace disposable filters:

1. Remove filter access panel.
2. Remove the bottom filters.
3. The front of the center rail is attached to the unit by a keyhole/screw connection. Unhook the front of the center rail, swing it down approximately four inches (100mm), and hook the keyhole on the screw provided.
4. Remove the bottom filters.
5. Replace bottom filters, center rail, and top filters.
6. Replace filter access panel.

## Heating Season Checks (Monthly)

### Vent Assembly

#### **WARNING**

**Burn Hazard.**

**Flue cover may be hot! Allow adequate time for flue cover to cool.**

**Failure to follow this warning can result in personal injury.**

Inspect the inside of the vent hood and the inlet air opening in the burner compartment using a light and mirror as necessary. Look for soot and severe rust or corrosion and any obstructions due to leaves, spider webs, etc. Clean as required.

### Crosslighter

To check crosslighter operation:

1. Turn the gas valve knob to the **PILOT** position.
2. Set the thermostat to call for **HEAT**. The ignitor should light the crosslighter.
3. Use a long-handled mirror to inspect the crosslighter flame. The flame **MUST** be continuous across the crosslighter and **MUST** surround the horizontal part of the flame sensor.

To adjust the crosslighter flame, turn the adjustment screw beneath the capscrew on the gas valve (see **Figure 26**).

4. When finished, turn **ON** gas valve to check main burner flame (see below).

### Main Burner Flame

5. Use a long-handled mirror to inspect the main burner flame.

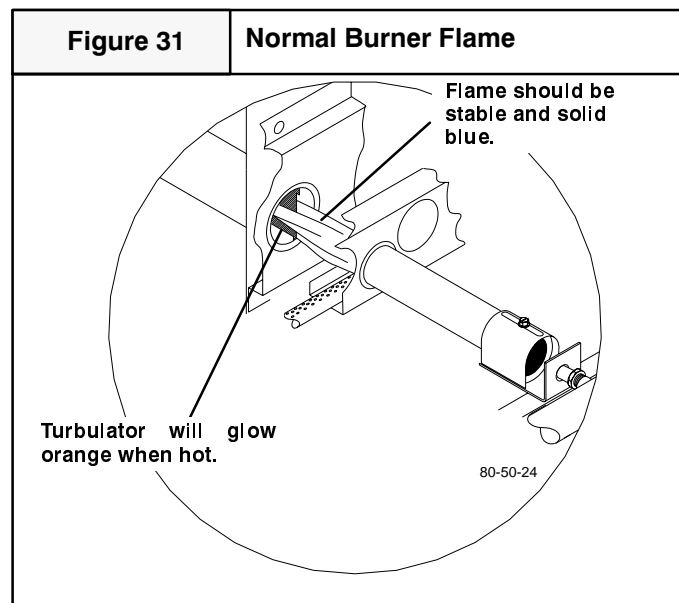
Flames should extend directly into the heat exchanger tubes. Flames should be stable and solid blue (dust may cause momentary specs of orange or yellow).

The turbulators should glow orange after about five minutes of operation.

6. When finished, set thermostat to normal operating setting.

**Figure 31**

**Normal Burner Flame**



## Cooling Season Checks (Monthly)

### Condenser Coil

Keep the condenser inlet and outlet area clean and free of leaves, grass clippings and other debris. Grass should be kept short in front of the condenser inlet. Shrubbery **MUST** be trimmed back so it is no closer than 30 inches (762 mm) to condenser coil.

### Condensate Drain

Check for condensate drainage. Clean as required.

**NOTE:** Condensate may form in the burner compartment and may drip from the front of the compartment when the unit is operating in cooling mode under high humidity ambient conditions. This condition is normal.

## Annual Maintenance and Inspection

### **WARNING**

**Electrical Shock, Fire and Explosion Hazards.**

**Turn off electric power supply at disconnect switch or service panel and gas supply at manual shutoff valve before removing any access or service panel from unit.**

**Failure to follow this warning can result in property damage, personal injury, and/or death.**

The annual inspection should include cleaning as required to ensure efficient operation of the unit.

**NOTE:** All bearings are sealed and no lubrication is required.

### Circulating Air Blower

Visually inspect the blower wheel for accumulations of dirt or lint. Clean the compartment and the blower wheel. If accumulation is excessive on blower wheel or does not remove easily, it will be necessary to remove the blower assembly.

### Inspection And Cleaning Of Burner Assembly/Heat Exchangers/Flue Gas Passages

#### For Qualified Service Technicians Only

See **Figures 32, 33, and 34** for identification of parts.

1. Shut **OFF** gas at gas valve and at manual shut off valve. Turn **OFF** electric power at unit and/or main disconnect box.
2. Remove the burner access panel.
3. Remove the flue exhaust hood.
4. Disconnect gas pipe at union.
5. Put a flat-jawed wrench on the flat section at the end of the gas valve to prevent the gas valve from turning. Unscrew the pipe from the gas valve.
6. Disconnect wires from gas valve, note connections.
7. Disconnect the pilot (crosslighter) line from the gas valve. Remove the screws that secure the flame shield. Remove gas valve, manifold and burners as an assembly. If an orifice needs replacement see **Figure 10** on **Page 10** for the proper orifice size.
8. Remove collector box, injector plate, restrictor plate, and gaskets (see **Figure 34**).
9. Hold the burners vertically and lightly tap them against a wood block. Clean with a stiff brush. Severe cases of lint clogging may require washing the burners in hot water.
10. Remove turbulators and clean with small brush. Reinspect after cleaning and replace turbulators if defective.
11. Check and clean pilot orifice and air slot in crosslighter at pilot orifice before reassembly. During reassembly, seat pilot orifice fully into crosslighter tube.
12. Inspect and clean combustion blower wheel.
13. Carefully disconnect hose from combustion blower tap. Using fine wire, paper clip, etc., run wire through center hole of tap to clean any obstruction from far end of tap.
14. Remove air pressure switch. Check and clean vent hole on back of air pressure switch.
15. Use a light and a small mirror on an extension handle to inspect the flue gas passages for scaling or sooting or any evidence of deterioration due to corrosion, cracking, or other causes.
16. Clean by using small brushes and a vacuum cleaner. It may be necessary to fabricate handle extensions for the brushes to reach the areas that require cleaning. Reinspect after cleaning.
17. Reinstall parts and gaskets in reverse order. On spark to pilot models check the spark gap. A  $\frac{1}{8}$ " (3.2mm) gap is required between the ignitor and the pilot hood.
18. Turn **ON** gas and check for leaks.
19. Ensure that all tools, etc. are clear. Install all access panels, turn **ON** electric power, check for normal operation.

Figure 32

Access to Burners

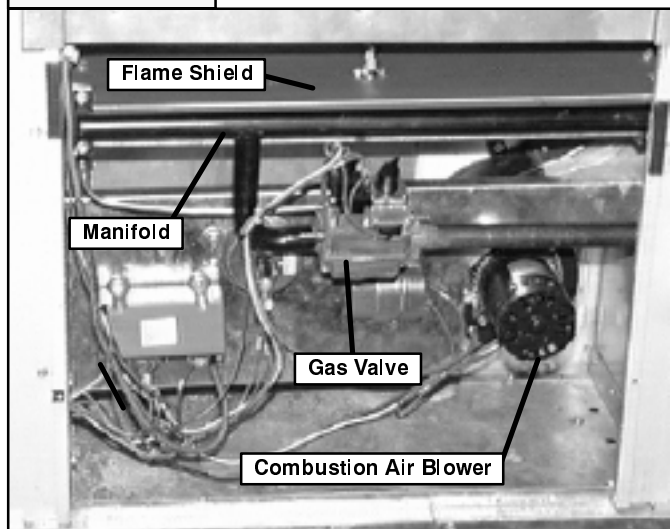


Figure 33

Cleaning Blower Tap and Pressure Switch

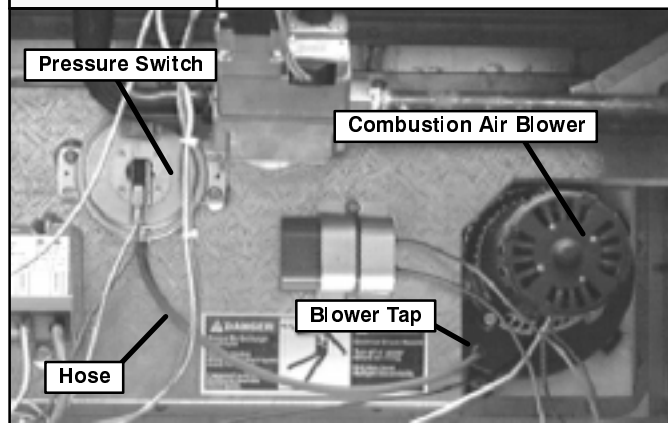
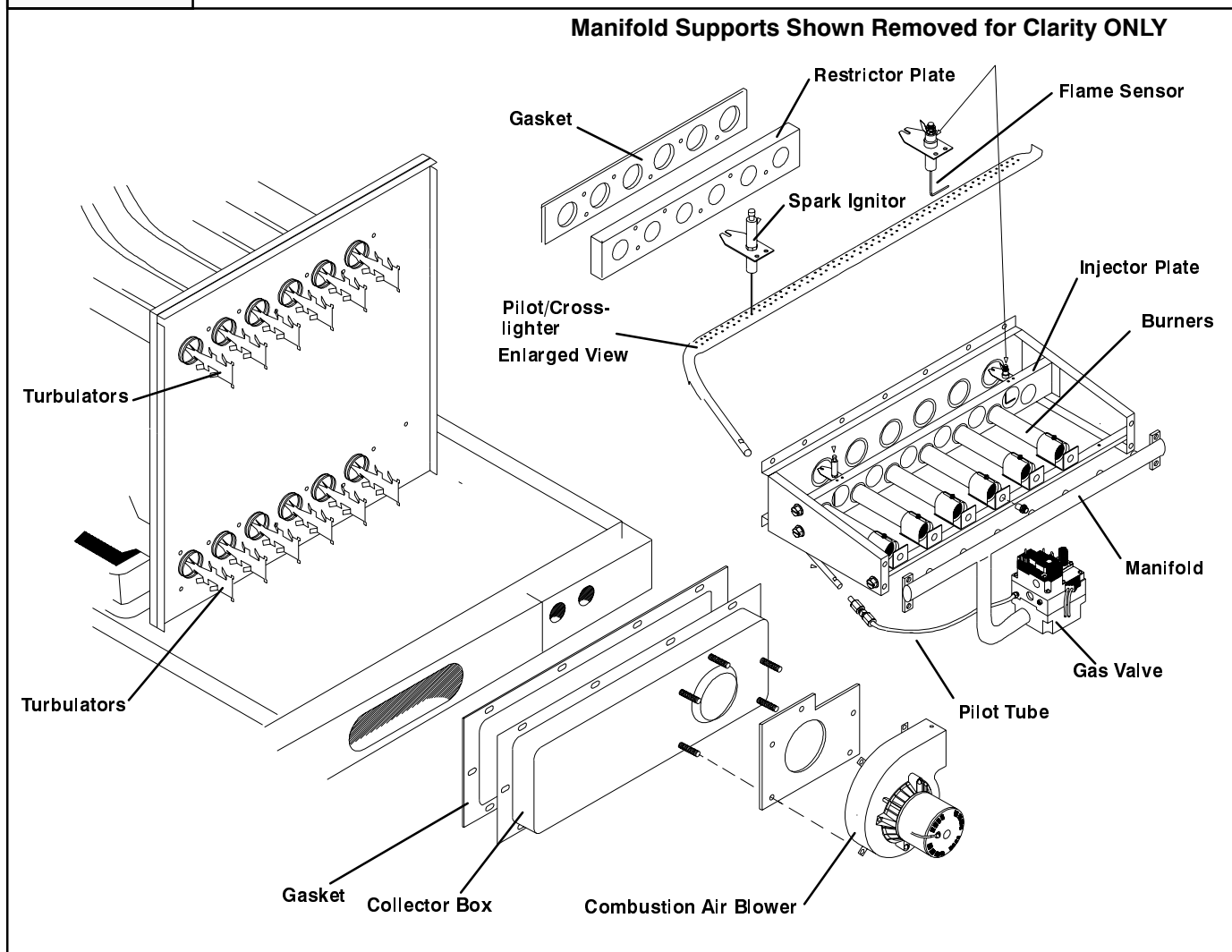


Figure 34

Cleaning Heat Exchanger



## 12. Rigging Instructions

Figure 35

### Rigging Instructions

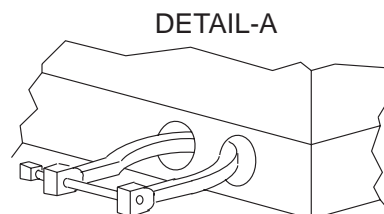
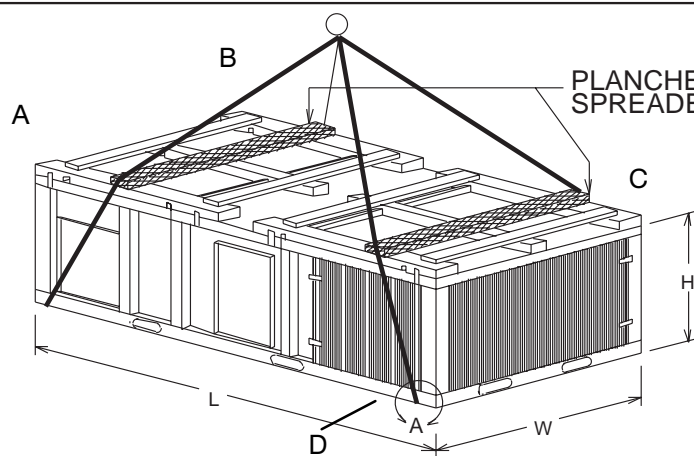
#### INSTRUCTIONS DE SOULEVAGE



#### AVERTISSEMENT

SI CET AVERTISSEMENT N'EST PAS RESPECTÉ, IL PEUT EN RÉSULTER DES DÉGÂTS MATÉRIELS, DES DOMMAGES CORPORELS OU LA MORT.

- TOUS LES PANNEAUX DOIVENT ÊTRE EN PLACE AU MOMENT DU MONTCHARGE ET SOULEVAGE.
- ACCROCHEZ LES CHÂÎNES DE SOULEVAGE À TRAVERS LES TROUS DE LA BARRE DE BASE, COMME LE MONTRE DETAIL-A.
- UTILISEZ DES PLANCHES D'ÉLARGISSEMENT AU MOMENT DU SOULEVAGE POUR ÉVITER DES DOMMAGES À L'APPAREIL.
- ASSUREZ QUE LE MONTECHARGE ET LES CHÂÎNES DE SOULEVAGE SONT SUFFISANT POUR MANOEUVRER LES POIDS ÉNUMÉRER.



#### RIGGING INSTRUCTIONS



#### WARNING

FAILURE TO FOLLOW THESE INSTRUCTIONS CAN RESULT IN PROPERTY DAMAGE, BODILY INJURY OR DEATH.

- ALL PANELS MUST BE IN PLACE WHEN RIGGING AND LIFTING.
- HOOK RIGGING SHACKLES THROUGH HOLES IN BASE RAIL, AS SHOWN IN DETAIL-A.
- USE SPREADER BARS, WHEN RIGGING, TO PREVENT UNIT DAMAGE.
- BE SURE RIGGING AND SHACKLES ARE SUFFICIENT TO HANDLE WEIGHT LISTED.

1071210

#### CORNER WEIGHTS in LBS.

UNIT	OPERATING WEIGHT	CORNER WEIGHTS			
		A	B	C	D
7-1/2 TON	1023	222	317	316	220
10 TON	1090	232	332	330	231
12-1/2 TON	1267	253	362	359	251
15 TON	1305	264	376	373	262