

# Downflow, Direct Vent (Sealed Combustion) Forced Air Gas and Oil Furnaces

## Owners Manual/Installation Instructions

### Series M1B, M1G, M1M and M1S

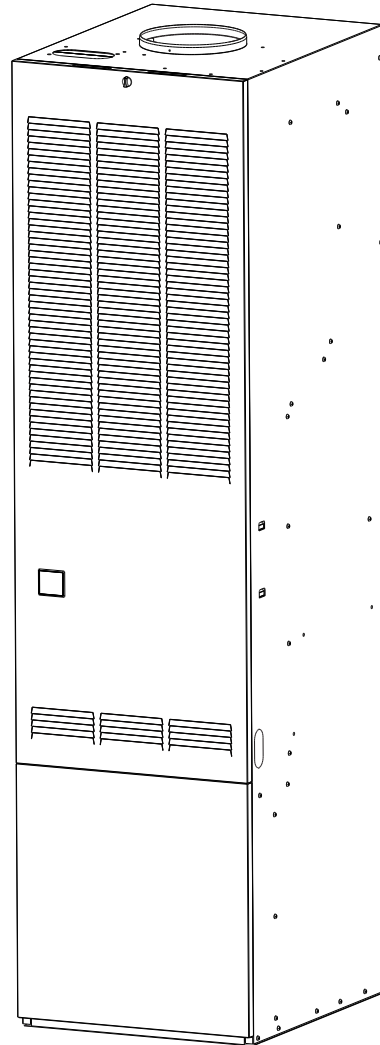
For installation in:

1. Manufactured Homes
2. Recreational Vehicles, Park Models,  
Manufactured Buildings
3. Modular Homes/Buildings

#### **⚠ 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**
  - 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.



#### **⚠ WARNING:**

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

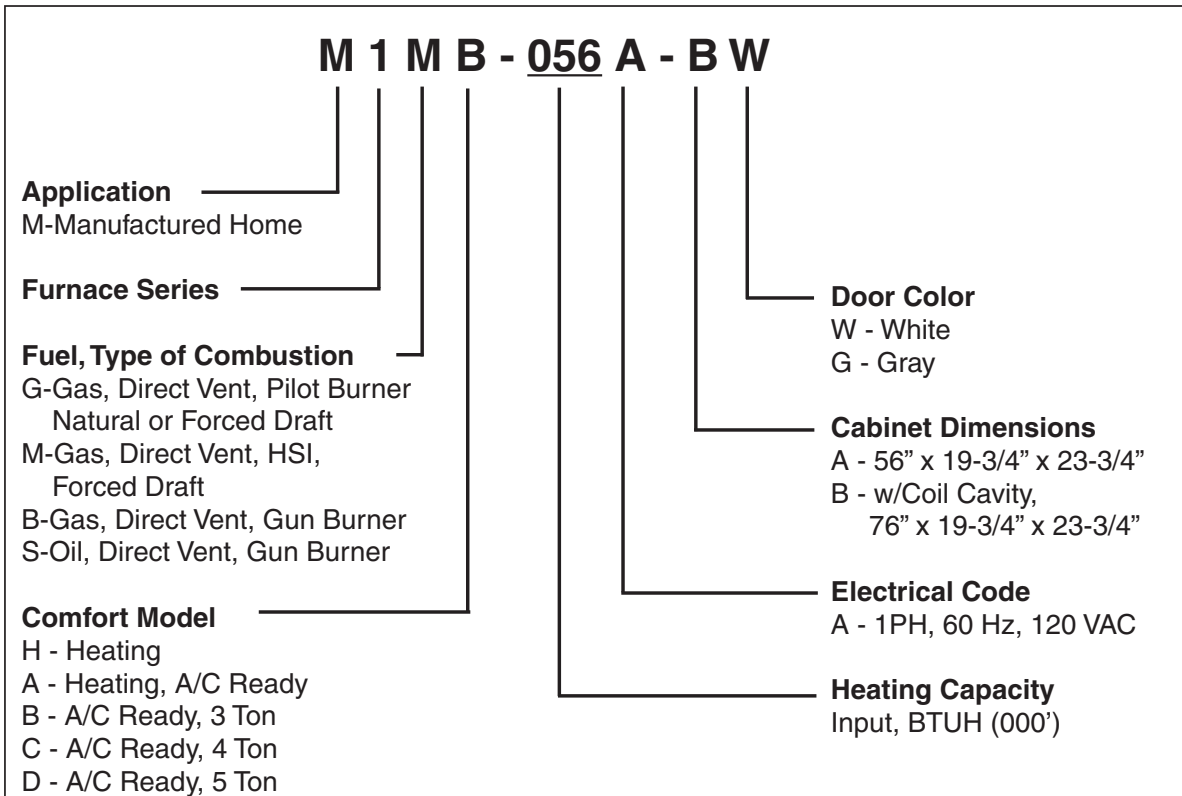
#### **⚠ WARNING:**

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

**LEAVE THESE INSTRUCTIONS WITH THE HOMEOWNER.**

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**Table 1. Model Identification**



## **WARNING:**

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**Do not use this appliance if any part has been submerged under water. Immediately call a qualified service technician to inspect the appliance and to replace any part of the control system and any gas control that has been submerged underwater.**

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### **NOTICE TO INSTALLER**

Installer is advised to follow carefully all instructions and warnings in this manual to insure maximum performance, safety, and operating efficiency of these appliances. Improper installation may create hazardous conditions, and will void the appliance warranty.

## **1. SPECIFICATIONS**

### **General Description**

M1 Series gas and oil furnaces are listed direct vent (sealed combustion), downflow heating appliances for manufactured (mobile) homes, recreational vehicles, and for use in residential/modular/commercial construction. The furnace must be located so that venting can be properly achieved.

Air conditioning may be added to structures with M1 series furnaces using Platinum series air conditioning or conventional units. This Installation Instruction manual includes special requirements for incorporation of air conditioning equipment to the M1 series of furnaces.

Multi-speed blower assemblies as shown in Table 3 have been certified for field installation in M1 Series furnaces. An air conditioner can be easily field installed with M1GH Series furnaces if used in conjunction with certified 2-wire relay box, p/n 903092A or 4/5 wire relay box 902898A.

## **2. OWNER INFORMATION ABOUT YOUR CENTRAL FURNACE SYSTEM**

NORDYNE has been involved in the design of products for the manufactured home industry since the first manufactured home or trailer was built.

NORDYNE originated the sealed combustion system, which separates the furnace combustion system from the living area of the home, now a standard for the manufactured home industry.

NORDYNE engineers developed the first central heating system and the first central air conditioner for manufactured homes.

NORDYNE is dedicated to bringing to its customers the finest heating and cooling comfort possible. NORDYNE constantly seeks to further refine its products to continuously provide exceptional comfort.

Follow the instructions in this booklet carefully and this appliance will provide many years of superior performance.

If you wish to cool your home automatically with a central air conditioning system investigate the excellent NORDYNE cooling systems available from your heating and cooling contractor. These systems are designed to work best with your NORDYNE furnace and have been carefully engineered to deliver optimum performance when mated with NORDYNE manufactured home furnaces.

NORDYNE also offers water heaters, fireplaces and ventilating systems specifically designed for manufactured housing applications. Check with your manufactured home retailer, your heating and cooling contractor or your distributor for information. Write directly to the factory (PO Box 46911, St. Louis, MO 63146) if you are not able to locate a source for NORDYNE manufactured housing products in your area.

## **3. MANUFACTURER WARRANTY, OWNER'S RESPONSIBILITIES**

It is the sole responsibility of the homeowner to make certain the gas furnace has been correctly set up and converted to the proper fuel (L.P. gas or Natural gas) and adjusted to operate properly. All gas furnaces are manufactured for Natural gas and must be field converted when using L.P. gas.

A warranty certificate with full details is included with these instructions. However, NORDYNE will not be responsible for any costs found necessary to correct problems due to improper setup, improper installation, furnace adjustments, improper operating procedure on the part of the user, etc.

Some specific examples of service calls which cannot be included in warranty payments are:

1. Converting the furnace to use another type of gas.
2. Repairing duct work in the home found to be faulty.
3. Correcting wiring problems in the electrical circuit supplying the furnace.
4. Resetting circuit breakers, blown fuses or other switches.
5. Correcting problems due to improper gas supply pressure to the furnace.
6. Providing instructional training on how to light and operate the furnace.
7. Furnace problems caused by installation of an air conditioner, heat pump or other air comfort devices.
8. Adding a Roof Jack extension because of unusual wind and/or snow conditions.
9. Revising installation of the furnace flue assembly (Roof Jack).
10. Adjusting or calibrating of thermostat.
11. Any construction debris which falls into flue system.

Carefully review these responsibilities with your manufactured housing dealer, service company or gas supplier so there will be no misunderstanding at a later time.

Furnace Model No	Input MBtu/h	Output MBtu/h	Orifice No		E.S.P. In WC	Pilot Burner	Ignitor Direct	Comb. Blower	Motor Hp	A/C Ready Tons
			Nat.	LP						
M1GH 056	56	45	29	45	0.3	x			1/8	2*
M1GB 056	56	45	29	45	0.3	x			1/4	3
M1GC 056	56	45	29	45	0.3	x			1/2	4
M1GD 056	56	45	29	45	0.3	x			3/4	5
M1GH 070	70	57	24	42	0.3	x			1/5	2½*
M1GB 070	70	57	24	42	0.3	x			1/4	3
M1GC 070	70	57	24	42	0.3	x			1/2	4
M1GD 070	70	57	24	42	0.3	x			3/4	5
M1GH 077	77	62	21	40	0.3	x		x	1/4	3*
M1GB 077	77	62	21	40	0.3	x		x	1/4	3
M1GC 077	77	62	21	40	0.3	x		x	1/2	4
M1GD 077	77	62	21	40	0.3	x		x	3/4	5
M1GH 090	90	72	17	36	0.3	x		x	1/4	3*
M1GB 090	90	72	17	36	0.3	x		x	1/4	3
M1GC 090	90	72	17	36	0.3	x		x	1/2	4
M1GD 090	90	72	17	36	0.3	x		x	3/4	5
M1MA 056	56	46	29	45	0.3		x	x	1/8	2
M1MB 056	56	46	29	45	0.3		x	x	1/4	3
M1MC 056	56	46	29	45	0.3		x	x	1/2	4
M1MD 056	56	46	29	45	0.3		x	x	3/4	5
M1MA 070	70	57	24	42	0.3		x	x	1/5	2½
M1MB 070	70	57	24	42	0.3		x	x	1/4	3
M1MC 070	70	57	24	42	0.3		x	x	1/2	4
M1MD 070	70	57	24	42	0.3		x	x	3/4	5
M1MB 077	77	62	21	40	0.3		x	x	1/4	3
M1MC 077	77	62	21	40	0.3		x	x	1/2	4
M1MD 077	77	62	21	40	0.3		x	x	3/4	5
M1MB 090	90	72	17	36	0.3		x	x	1/4	3
M1MC 090	90	72	17	36	0.3		x	x	1/2	4
M1MD 090	90	72	17	36	0.3		x	x	3/4	5
M1BA 066	66	53	26	43	0.3		x	x	1/5	2½
M1BB 066	66	53	26	43	0.3		x	x	1/4	3
M1BC 066	66	53	26	43	0.3		x	x	1/2	4
M1BB 086	86	68	18	37	0.3		x	x	1/4	3
M1BC 086	86	68	18	37	0.3		x	x	1/2	4
M1SA 066	66	54	.50 Gph		0.3		x	Burner Model AF-10 Nozzle	1/5	2½
M1SB 066	66	54	.50 Gph		0.3		x		1/4	3
M1SC 066	66	54	.50 Gph		0.3		x	AF-10 Nozzle	1/2	4
M1SB 086	86	71	.65 Gph		0.3		x	Spray Angle	1/4	3
M1SC 086	86	71	.65 Gph		0.3		x	80° A	1/2	4

Electrical Supply - 120 volts, 60HZ, 1 Ph.  
 Fuse or Breaker - 15 amps  
 Temperature Rise - 45° to 75°F  
 High Altitude - See Table 11. For Canadian High Altitude (2,000' to 4,500'), reduce the gas manifold pressure to 3.0" W.C. for natural gas and to 8" W.C. for LP gas.

Thermostat Circuit - 24 volts, 60HZ, 30 vac  
 Normal Anticipator Setting - 0.4  
 Manifold Pressure - Natural Gas: 3.5" w.c.  
 LP Gas: 10" w.c.

\*Blower capacity only - needs relay box for AC

**Table 2. M1 Furnace Specifications**

Part No.	Blower / Motor Assembly		A/C Capacity Ton
	Blower Wheel	Motor-Hp	
903773	10 x 8	1/4	2, 2½ & 3
903413	11 x 8	1/2	2, 2½, 3 & 4
903414	11 x 8	3/4	2, 2½, 3, 4 & 5

Table 3. Field Installation Blower Assemblies

## CAUTION:

- Never attempt to alter or modify this furnace or any of its components.
- Never attempt to repair damaged or inoperable components. Such action could cause unsafe operation, explosion, fire and/or asphyxiation.
- If a malfunction has occurred, or if you feel that the furnace is not operating as it should, contact a qualified service agency or gas utility for assistance.

## 4. INSTALLATION STANDARDS

Installer shall be familiar with and comply with all codes and regulations applicable to the installation of these heating appliances and related equipment. In lieu of local codes, the installation shall be in accordance with the current provisions of one or more of the following standards.

- Federal Manufactured Home Constructions & Safety Standard (H.U.D. Title 24, Part 3280.707[a][2])
- American National Standard (ANSI-119.2/NFPA-501C) for all recreational vehicle installations.

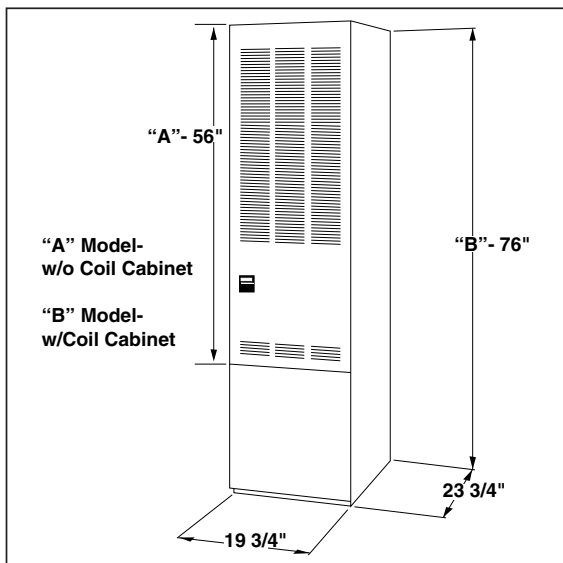


Figure 1. Overall Dimensions

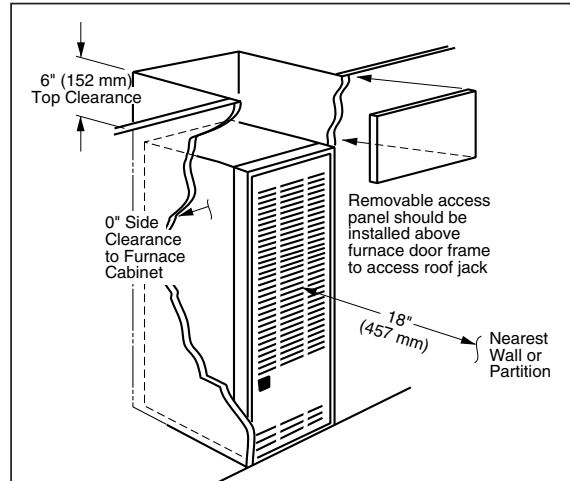


Figure 2. Alcove Installation

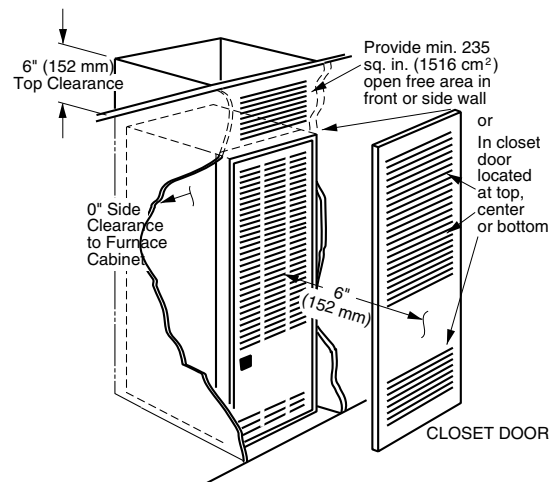


Figure 3. Closet Installation

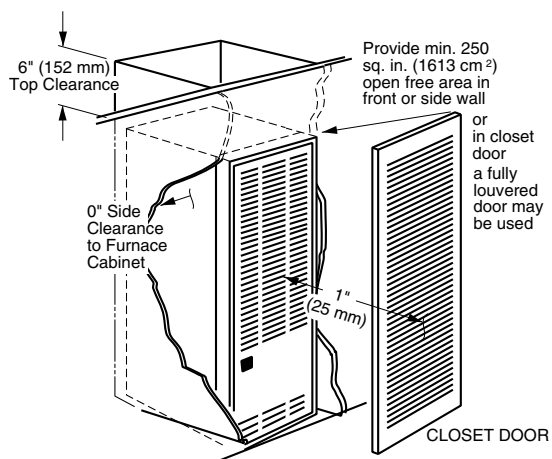


Figure 4. Special 1" Clearance

- c. American National Standard (ANSI-Z223.1/ NFPA-54) and/or CAN/CSA B149 for all gas-fired furnace models.
- d. American National Standard (ANSI-Z95.1/ NFPA-31) and/or CSA B139 for all oil-fired furnace models.
- e. American National Standard (ANSI-C1/NFPA-70) and/or CSA 22.1 Canadian Electric Code Part 1 for all electrical field wiring.
- f. Units have been investigated under standards UL 307A & B, UL727-1999, ANSI 21.47a - CAN/2.3a - 1995, and CSA B140.10.

Ce générateur d'air chaud doit être installé conformément aux instructions du fabricant et aux codes locaux. En l'absence de code local, respecter la norme ANSI Z223.1, intitulé National Fuel Gas Code ou les codes d'installation CAN/CSA-B149.

### 5. UNIT LOCATION

The furnace shall be appropriately located to the supply and return air distribution system. (See "AIR DISTRIBUTION", Page 8) Sides and back of the furnace may be enclosed by wall framing. (See "Minimum Clearances," Table 4, and Figures 2 through 5.)

The furnace installation is only intended for free air return through the furnace door louvers. DO NOT connect a ducted return air system directly to the furnace. Improper installation may create a hazard and damage equipment, as well as void all warranties.

Furnace may be installed on combustible flooring when using NORDYNE Duct Connectors (see Section 10).

When installed in a residential garage, the furnace must be positioned so the burners and the source of the ignition are located no less than 18 inches above the floor and protected from physical damage by vehicles.

ALL MODELS	CLOSET	ALCOVE
Front	6"	18"
Back	0"	0"
Sides	0"	0"
Roof Jack	0"	0"
Top	6"	6"
Top and Sides of Duct	0"	0"
Bottom of Duct		
B Cabinet	0"	0"
A Cabinet (w/ coil box)	0"	0"
A Cabinet (w/o coil box)	1/4"	1/4"

**Table 4. Minimum Clearances**

### 6. MINIMUM CLEARANCES

This heating appliance must be installed with clearances not less than the minimums shown in Table 4. This heating appliance must be installed with ample clearance for easy access to the air filter, blower assembly, burner assembly, controls, and vent connections.

- a. Alcove installations (see Figure 2): minimum 18" clearance at front of furnace shall be provided for future servicing. A removable access panel should be installed between top of the furnace door frame and the ceiling.
- b. Closet installations must use a louvered door having a minimum free area of 235 sq. in. when located 6" from furnace (See Figure 3) or 390 sq. in. for 5 ton ready M1 furnaces. For special clearance between 1" and 6", requirements are a louvered door with a minimum of 250 sq. in. free area, with the openings in the closet door in line with the louvered openings in the furnace door. A fully louvered closet door may be used (See Figure 4 and section 7.i. to evaluate compliance with this requirement).

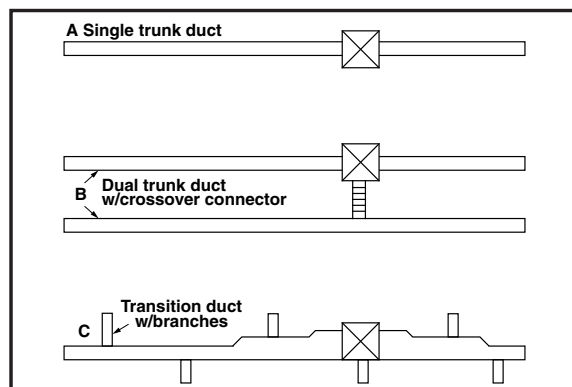
### 7. RETURN AIR PROVISIONS

U.S.A. home manufacturers shall comply with all of the following conditions to have acceptable return air systems for closet installed forced air heating appliances:



## CAUTION:

**HAZARD OF ASPHYXIATION: Negative pressure inside the closet, with closet door closed and the furnace blower operating on high speed, shall be no more negative than minus 0.05 inch water column.**



**Figure 5. Non-Platinum Supply Duct System**

- a. Regardless of the location, the return air opening into the closet shall not be less than specified in the appliance's listing.
- b. Means shall be provided to prevent inadvertent closure by a flat object placed over the return air opening when it is located in the floor of the closet (versus the vertical front or side wall).
- c. The cross-sectional area of the return duct system leading into the closet, when located in the floor or ceiling shall not be less than 235 square inches (or 390 square inches for 5 ton ready M1 Furnaces).
- d. The total free area of openings in the floor or ceiling registers serving the return air duct system must be at least 235 sq. in. At least one register should be located where it is not likely to be covered by carpeting, boxes and other objects.
- e. Materials located in the return duct system must have a flame spread classification of 200 or less. This includes a closet door if the furnace is in a closet.
- f. Noncombustible pans having 1" upturned flanges are located beneath openings in a floor duct system.
- g. Wiring materials located in the return duct system shall conform to Articles 300-22 of the National Electrical Code (ANSI C1/NFPA-70).

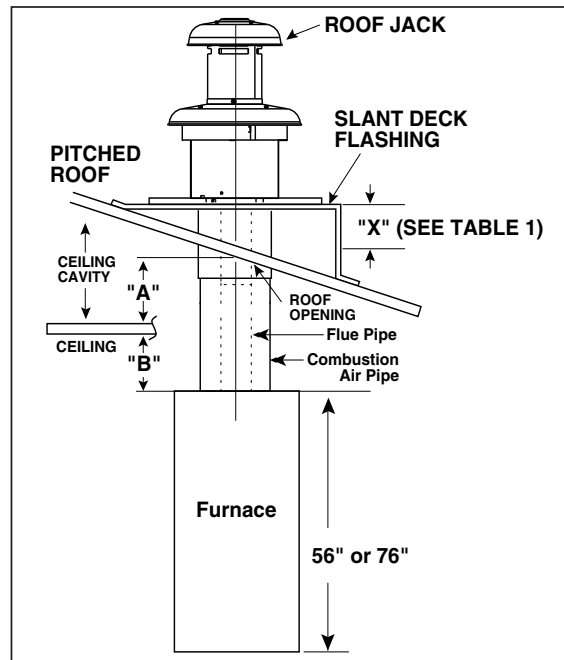


Figure 6. Roof Jack Assemblies

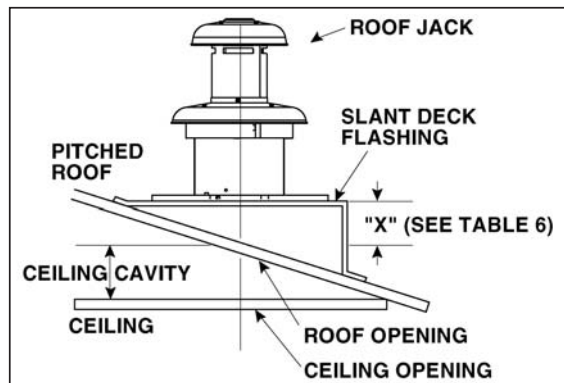


Figure 7. Example of Flat Jack with Flashing

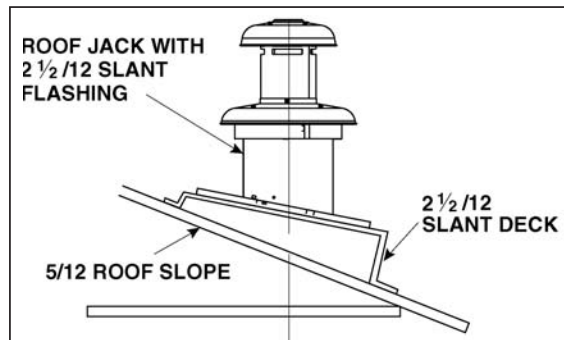


Figure 8. Example of 2 1/2/12 Slant Jack with Flashing

MODEL NUMBER	APPROX. LENGTH BELOW FLASHING
(F,S)AW(T)1523-(0,2,4)(A,S)	15" - 23"
(F,S)AW(T)2135-(0,2,4)(A,S)	21" - 35"
(F,S)AW(T)2747-(0,2,4)(A,S)	27" - 47"
(F,S)AW(T)3563-(0,2,4)(A,S)	35" - 63"
(F,S)AW(T)5195-(0,2,4)(A,S)	51" - 95"

<b>S</b>	<b>AW</b>	<b>T</b>	<b>27</b>	<b>47</b>	<b>- 2</b>	<b>S</b>
F= FLAT FLASHING S= SLANT FLASHING	AW= ALL WEATHER	TYPE: BLANK=NON-TRANSIT T= TRANSIT MODE	MIN. ADJ. LENGTH	MAX. ADJ. LENGTH	FLASHING PITCH/12" RISE 0=FLAT 2=2.5/12 4=4/12	FLUE STEEL TYPE A= ALUMINIZED S=STAINLESS

**All Weather Roof Jack Assemblies**

MODEL NUMBER	APPROX. ADJ. LENGTHS BELOW FLASHING
FO 1323-5	13' - 23'
FO2343-5	23' - 43'
SO1835-5	18' - 35'
SO2447-5	24' - 47'
SO3263-5	32' - 63'
SO4895-5	48' - 95'
SOT2442-5	24' - 42'
SOT2745-5	27' - 45'
SOT4581-5	45' - 81'
SOT2846-5	28' - 46'

<b>S</b>	<b>O</b>	<b>T</b>	<b>27</b>	<b>45</b>	<b>- 5</b>
S= SLANT FLASHING F= FLAT FLASHING	O= TYPE: STANDARD H= HIGH WIND A= ARCTIC ROOF JACK	T= TRANSIT MODE TYPE	MIN. ADJ. LENGTH	MAX. ADJ. LENGTH	5 = 5" FLUE DIA.

Table 5. Roof Jack Assemblies

- h. Gas piping is not run in or through the return duct system.
- i. Test the negative pressure in the closet with the air-circulating fan operating at high speed and the closet closed. The negative pressure is to be no more negative than minus 0.05 inch water column.
- j. Air conditioning systems may require more duct register and open louver area to obtain necessary airflow. Use NORDYNE's certiduct program to determine proper duct size for A/C.

## 8. AIR DISTRIBUTION SYSTEMS

For proper air distribution, the supply duct system must be designed so that the static pressure measured external to the furnace does not exceed the listed static pressure rating shown on the furnace rating plate.

Location, size, and number of registers should be selected on the basis of best air distribution and floor plan of the home.



## CAUTION:

**HAZARD OF ASPHYXIATION: Do not cover or restrict return air opening.**

## 9. ROOF JACK SELECTION

Note: Install only Roof Jack Assemblies listed in Table 5 on this heating appliance.

- a. Determine depth of ceiling cavity from center of roof opening to center of ceiling opening. (See Dimension "A" in Figure 6.)
- b. Determine ceiling height and subtract height of furnace. (See Dimension "B" in Figure 6.)
- c. Add dimensions A + B (and X from Table 6 and Figure 7 if slant deck flashing is used). The total length of (A + B + X) must be within the minimum and maximum range of one of the Roof Jacks listed in Table 5.

### APPLICATION NOTES:

- a. FAW, FAWT, SAW and SAWT Series Roof Jacks with a 5" diameter inner vent pipe may be used with all models of M1 Series gas and oil furnaces.
- b. F=Flat Flashing; flexes from 0/12 to 1/12 roof slope.
- c. S=Slant Flashing. 2.5/12 Slope flexes from 1/12 to 4/12 roof slope, 4/12 flexes from 3/12 to 5/12.
- d. Stainless steel roof jacks are available.

- e. If the roof jack crown is covered or blocked with snow, the furnace will not operate properly. If the home is located in regions where snow accumulation exceeds 7" (HUD snowload zones) use an external roof jack extension p/n 901937.
- f. M1 furnaces may be used with roof jacks as tall as 170" (except M1M 056 & M1B 066 models, which are limited to 120"). An internal roof jack extension (p/n 901935 - 10", p/n 903107 - 18") can be used to increase roof jack height. All connections inside the home must be made below the ceiling.

These extensions are available as optional accessories and may be purchased through your NORDYNE distributor.

## 10. DUCT CONNECTOR SELECTION PLATINUM SERIES

- a. For Platinum ready construction use the 14" round duct connector, p/n: 903896.

## NON-PLATINUM SERIES

- a. Determine depth of floor cavity from surface of floor to top of supply air duct (See Figure 9).

IF ROOF PITCH IS:	USE SLANT DECK FLASHING NO.	"X" FACTOR IS:
<b>"F Series Roof Jack</b>		
2" in 12"	903893 (2.5/12)	2-1/8"
2-1/2" in 12"	903893 (2.5/12)	2-1/2"
3" in 12"	903894 (3/12)	2-7/8"
3-1/2" in 12"	903894 (3/12)	3-1/4"
4" in 12"	903895 (4/12)	3-5/8"
<b>"S" Series Roof Jack (2.5/12 Pitch only)</b>		
4-1/2" in 12"	903895 (2.5/12)	2-1/8"
5" in 12"	903895 (2.5/12)	2-1/2"
5-1/2" in 12"	903894 (3/12)	2-7/8"
6" in 12"	903894 (3/12)	3-1/4"
6-1/2" in 12"	903895 (4/12)	3-5/8"

**Optional Deck Flashings for Flat and 2.5/12 Pitch Roof Jacks.**

**(4/12 Pitch Roof Jacks not applicable.)**

**Table 6. Slant Deck Flashings**

If "X" (Floor Cavity) is:		Use Duct Connector Model Part Number:	
English	Metric (mm)	Finger Tab	Screw Down
7/8"	22	901987	904008
2"	51	901988	904009
4-1/4"	108	901989	904010
6-1/4"	159	901990	904011
8-1/4"	210	901991	904012
10-1/4"	260	901992	904013
12-1/4"	311	901993	904014

**Table 7. Floor Cavity Sizes**



- b. Select appropriate model from Table 7 which matches X-dimension of the floor cavity. To maximize air delivery, remove reducer "C" (see Figure 11) to obtain the largest open area that will fit the duct/floor construction. Screw down duct connector opening to duct without reducer is 13" x 13". With reducer it is 13" x 10-1/8".

13). Installation procedures are suggested for typical furnace installations and need not be followed in the exact listed sequence.

**CUT OUT FLOOR OPENING & FUEL LINE HOLE**

- a. Determine center of closet or alcove (Figure 13).  
 b. Locate center of the floor opening, measured 10" from the rear wall, and mark cut-out measuring approximately 14-1/2" by 14-1/2" ( $\pm 1"$ ) for model duct connector used (refer to Figures 10 & 11).

**11. INSTALLATION**

Required floor, ceiling, and roof cut-out openings must be carefully located to avoid misalignment of the furnace and Roof Jack (see Figures 12 &

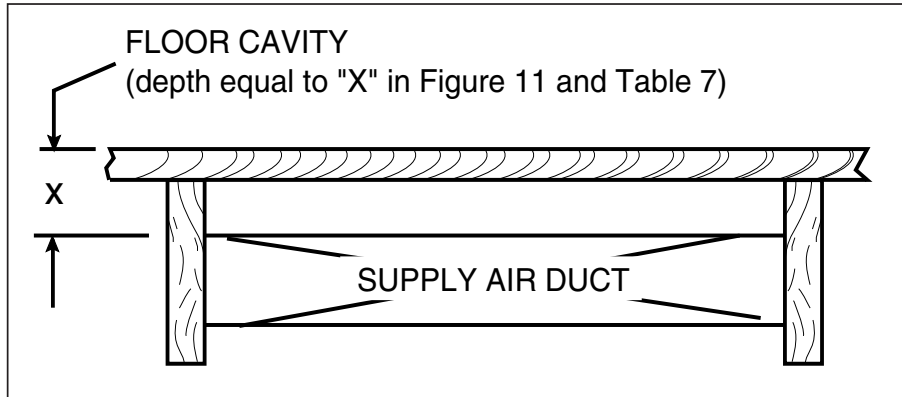


Figure 9.

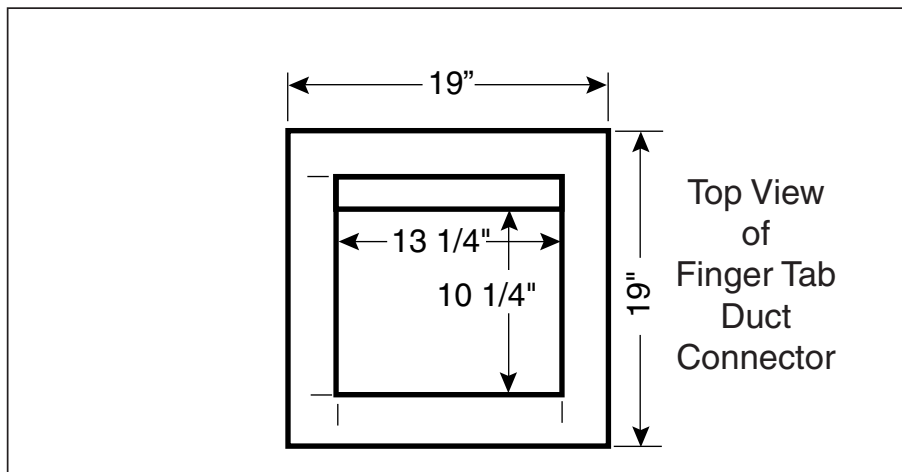


Figure 10.

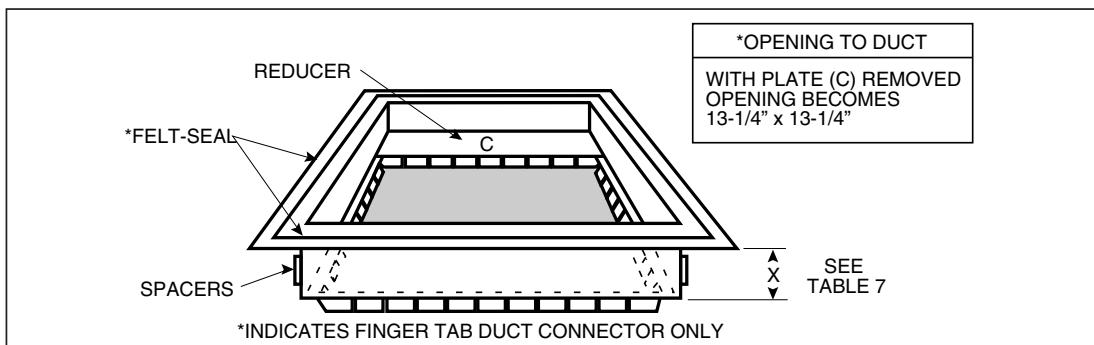
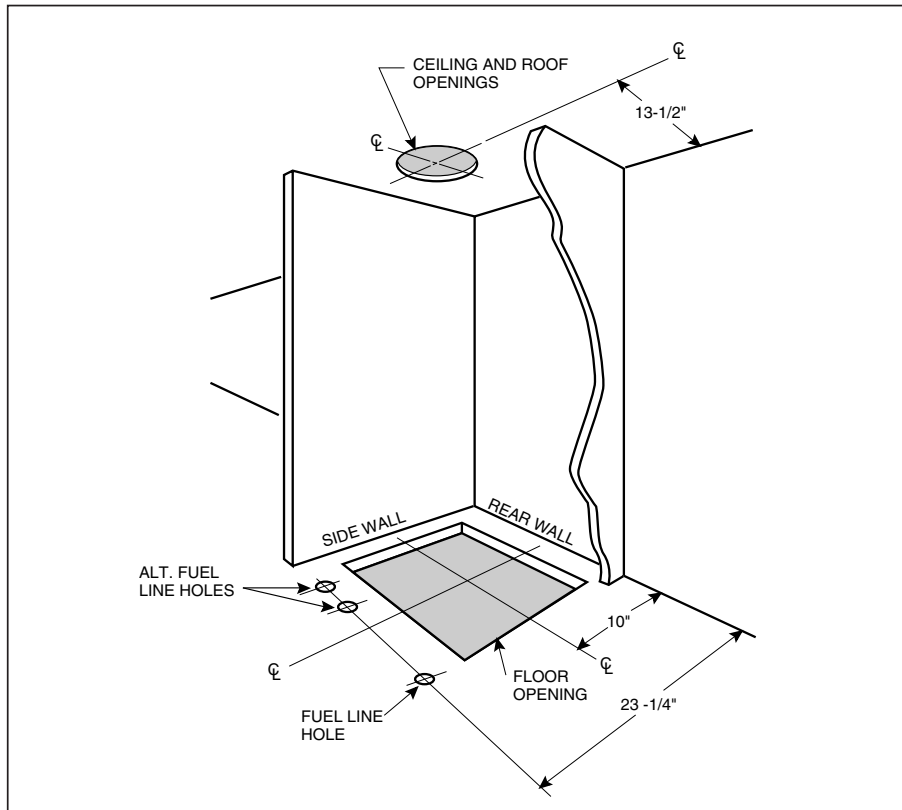
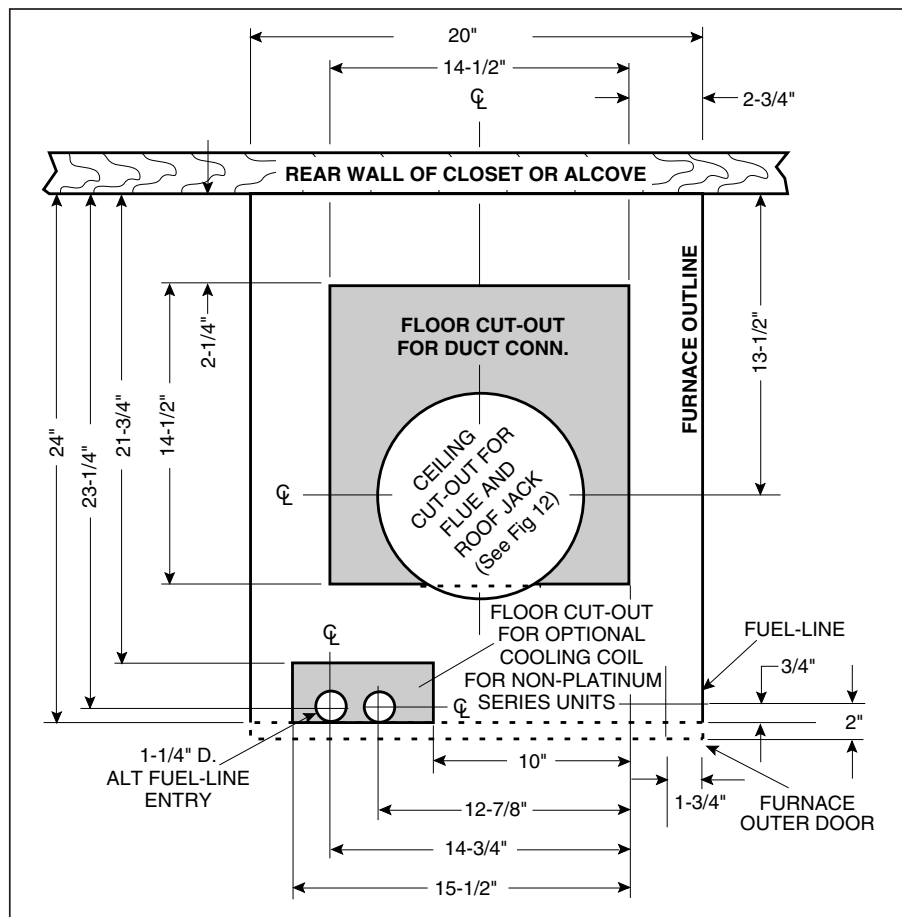


Figure 11.



**Figure 12. Closet or Alcove**



**Figure 13. Cut-Out Locations**

- c. Locate center of fuel line hole, measured 23-1/4" from the rear wall and 6-5/8" to the left of center of the floor cut-out (See Figure 12) or 5-1/4" to the left of center of the floor cut-out, or for entry through right-side of furnace measured 9" to the right of center of the floor cut-out.
- d. Cut out floor opening and one fuel line hole.

**! IMPORTANT:**

Refer to the installation instructions provided with optional air conditioning packages when installing furnaces with optional cooling coil cabinet or with optional C\*\*\*-series indoor coils.

**CUT OUT CEILING AND ROOF OPENINGS**

- a. Locate center of Roof Jack opening, measured 13 1/2" from the rear wall of closet or alcove

along the center line of furnace and floor opening. (See Figure 13)

- b. Cut ceiling and roof holes as follows:  
Ceiling Hole = 8-3/4" (222 mm) diameter  
Roof Hole = 9-3/8" (238 mm) diameter
- c. **DO NOT ALLOW DEBRIS TO FALL INTO THE FURNACE. THIS COULD CAUSE UNSAFE OPERATION AND VOIDS THE FURNACE WARRANTY.** Use the top cap that comes with the furnace packaging (or alternate protector) to prevent debris from falling into the furnace before the final roof jack connection is made.

**CUT DUCT OPENING (FINGER TABBED ONLY)**

- a. Place duct connector through the floor opening with bottom tabs resting on top of the supply air duct.
- b. Center duct connector and push back against rear edge of floor opening.
- c. Mark cut-out location (tab area) and remove duct connector.

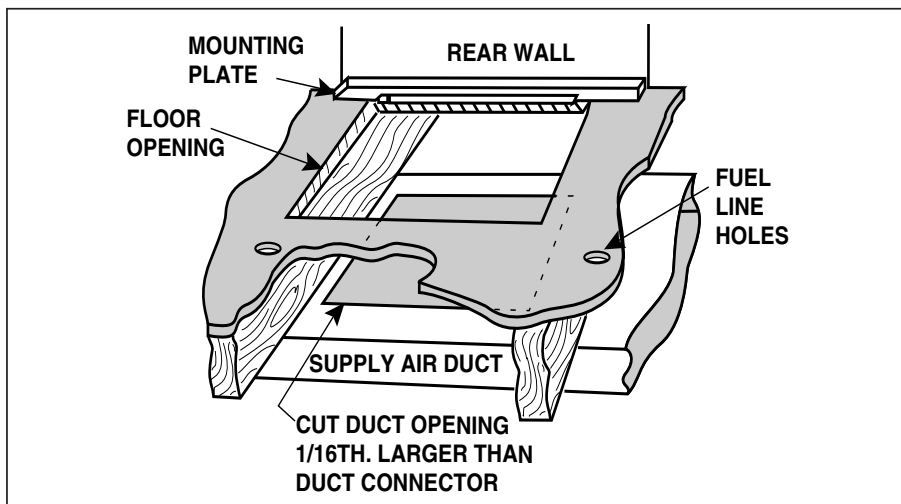


Figure 14. Mounting Plate

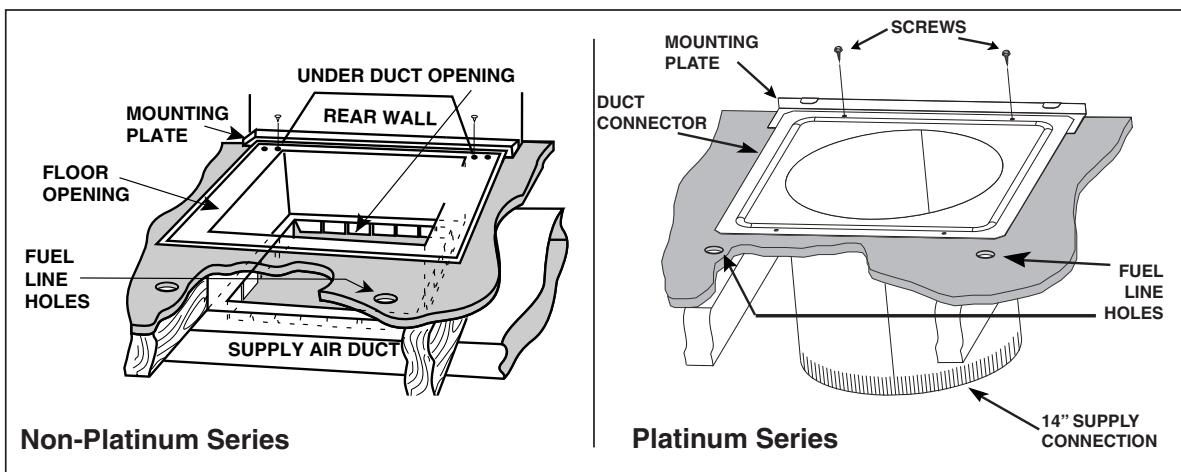


Figure 15. Duct Connector

- d. Cut out duct opening 1/4" larger than area marked.

#### INSTALL FURNACE MOUNTING PLATE

- a. Place mounting plate (supplied within duct connector) at rear of the floor opening (See Figure 15).

#### INSTALLING PLATINUM SERIES 14" ROUND DUCT CONNECTOR

- a. Place duct connector through the floor opening. (See Figure 15).
- b. Secure duct connector to floor.

#### INSTALLING SCREW DOWN DUCT CONNECTOR

- a. Apply a bead of caulking, mastic, or other approved sealant around bottom side of 1/2" flange and restrictor plate, when applicable.
- b. Locate the duct connector over duct and carefully lower screw down duct connector into place.
- c. Once duct connector is located on duct, temporarily hold in place while fastening duct connector to the floor using flat head screws or nails. Be sure flanges of duct connector stay in contact with the duct.
- d. Screw plenum to duct making sure a seal is made between the duct and the duct connector. Additional screws may be added if required.
- e. Cut away duct along edge of flange allowing the center to drop into the duct. Remove section of duct with caution, as edges will be sharp.

#### INSTALLING FINGER TABBED DUCT CONNECTORS

- a. Place duct connector through the floor opening with bottom tabs extending through the duct opening. (See Figure 15)
- b. Secure duct connector to floor.
- c. Bend bottom tabs under and up tightly against the supply air duct (See Figure 16).

NOTE: The duct connector is designed for use on ducts 12" in width. When using the connector on 12" wide ducts, there may be insufficient clearance to bend the tabs on two sides of the duct connector. In such cases the tabs may be attached to the sides of the duct by using sheet metal screws or other suitable fasteners. (See Figure 17).

If sealant, mastic, or tape is used to provide a better seal, it should be approved by applicable national or local codes.

### ALTERNATE ATTACHMENT METHODS

This procedure may also be used to install a furnace duct connector to narrow metal ductwork where insufficient clearance prevents bending of the duct connector tabs at the side(s) of the duct. (See Figure 18).

1. Score and cut the top of the metal duct as indicated in Step 1 or Step 2. With Step 1 choice, also cut out the metal from the shaded area "A".
2. Fold the duct flap "B" up, (See Step 3).
3. At the front-to-back of duct run (Area "A"), bend the duct tabs and secure them directly to the duct.
4. At Area "B", bend the duct tabs up and back over, around the duct connector, (See Step 3).
5. Fold/form the duct flap against the side of the duct connector and attach as shown, (See Step 4). Use three (3) staples (minimum) on each duct flap OR, if a 2X block/joist is not provided, use two (2) sheet metal screws (minimum) on each duct flap. An alternate attachment method is acceptable, as long as the duct connector is securely attached.
6. Tape the duct flap edges with an approved tape for a leak-free joint.

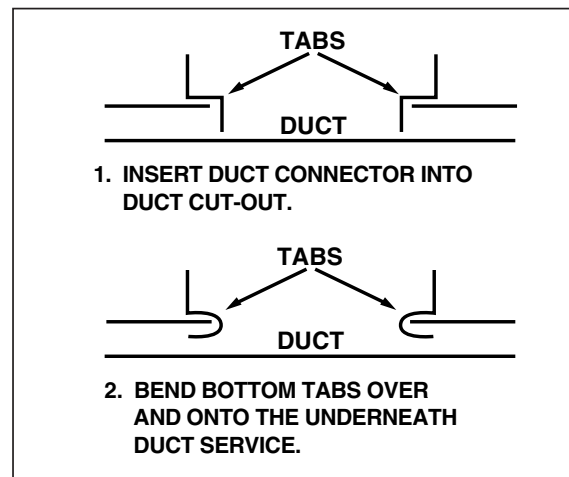


Figure 16. Installation of Duct Connector

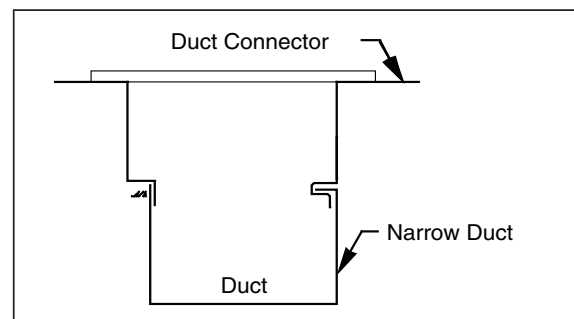


Figure 17.

## INSTALL FURNACE

- Remove furnace outer door(s) and bottom fuel line knockout.
- Place furnace onto duct connector and center with floor opening.
- Slide onto mounting plate. (Bottom rear slots on furnace should engage with mounting plate tabs.)
- Secure front with one (1) fastener at each corner (See Figure 19 or 20).

**NOTE:** Additional fasteners may be used at rear, sides or through door frame, as desired, to secure furnace to closet or alcove framing.

## INSTALL ROOF JACK

Apply caulking compound on underside of roof flashing to form a continuous strip at least 3/8" wide (see Figure 21) around the underside of the perimeter of the flashing. Connect Roof Jack Assembly to the furnace. Insert telescoping Roof Jack Assembly through the opening cut on the roof. Connect flue pipe to flue collar of furnace. Connect combustion air pipe to furnace collar with sheet metal screw (See Figure 22). It is recommended that the connection of the combustion air pipe to the furnace be made before the flashing is secured to the roof to maintain alignment of roof jack and furnace connections.

**NOTE:** For replacement furnaces, be sure the inner flue pipe connects over the furnace vent collar. **DO NOT use a smaller diameter inner flue pipe which could slide inside the furnace**

## vent collar and restrict the flow of furnace flue products.

**Attach Roof Flashing:** If necessary, shift roof flashing slightly in the roof opening so that assembly is in good alignment with furnace. Press down firmly over caulking on roof flashing to make the seal with roof water tight. Secure flashing with appropriate fasteners. As an added protection against leaks, coat the flashing plate and fasteners with approved roofing compound.

If flashing mounted on 12 degree angle is used it may be necessary to adjust the angle to match the roof pitch; (1/12 - 4/12 maximum).

## 12. INSTALLATION OF TRANSIT-MODE VENTING SYSTEM

### MANUFACTURED HOME FACTORY

- Furnace to be installed per furnace installation manual.
- Roof Jack to be selected from Table 5 of these instructions.
- Roof Jack (less upper Roof Jack crown), with weather cap to be installed as described under **Install Roof Jack**.
- Upper Roof Jack crown to be stored in a prominent location inside manufactured home until on-site installation.
- The four warning tags supplied must be installed as follows:
  - To weather cap
  - To fuel line connection point (Gas) or furnace burner (Oil)

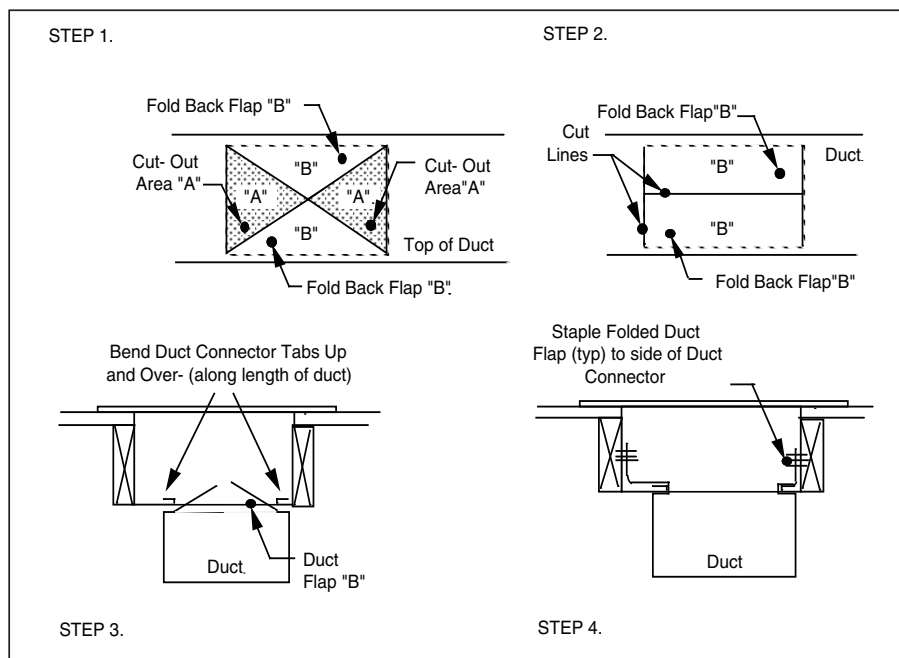
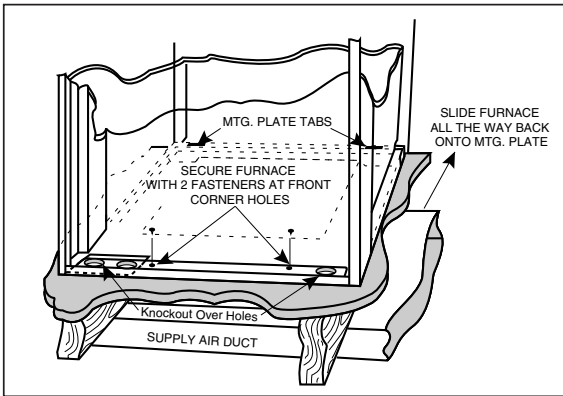
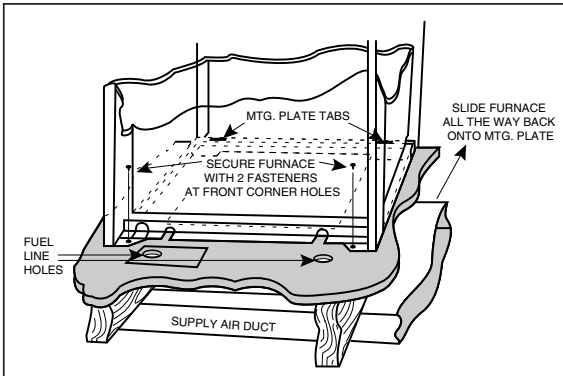


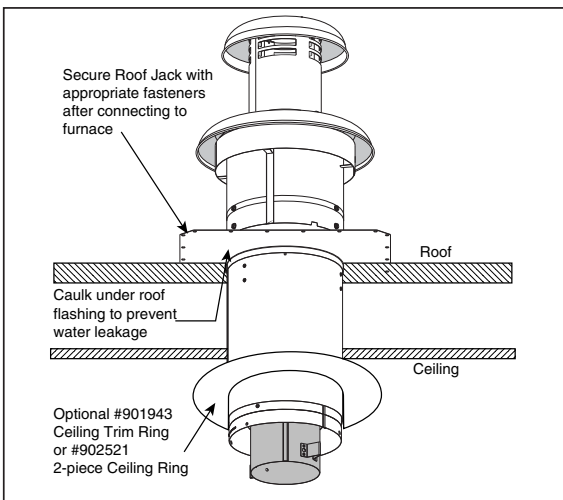
Figure 18.



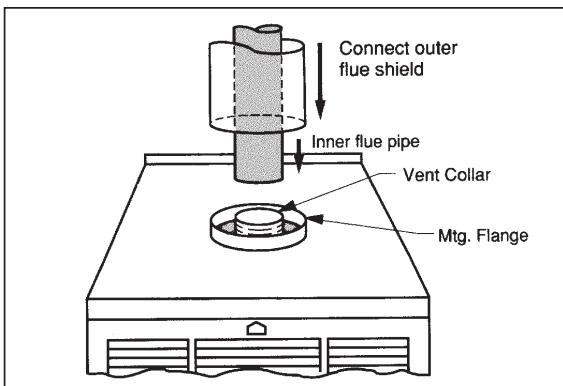
**Figure 19. "A", "B", & Platinum Cabinet Furnaces**



**Figure 20. "A" Cabinet Furnace on 911969 Coil Cabinet (Non-Platinum Series)**



**Figure 21. Flat Roof**



**Figure 22.**

- To furnace flame observation door (Gas or Oil)
- To furnace wall thermostat

**MANUFACTURED HOME SITE**

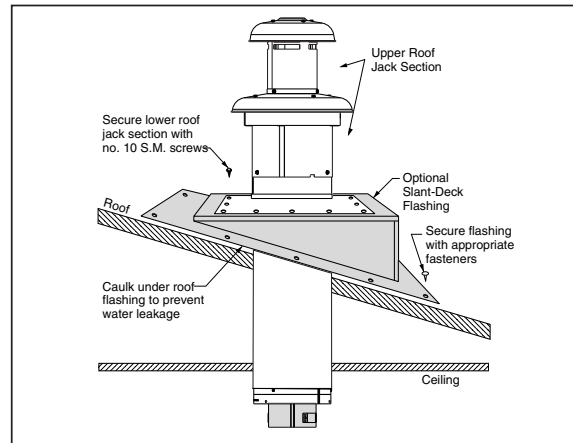
- Transit-mode weather cap to be removed and upper Roof Jack crown installed (See Figure 24).
- Place upper Roof Jack (crown) on to the flue pipe assembly. Be sure inside flue pipe attaches over inner flue pipe. Be sure outer Roof Jack pipe fits over outer pipe. Secure in place using three (3), #10, 1/2" sheet metal screws removed in step #a. Do not use the same holes which secured the rain cap in place.
- Venting system warning tags to be removed and discarded.

**! WARNING:**

**Failure to properly secure the flue pipe to the furnace may result in fire, explosion or asphyxiation when operating the furnace.**

**13. ELECTRICAL WIRING**

Refer to the wiring diagram in these instructions or affixed to the inside of the control box cover for the wiring of your particular unit.



**Figure 23. Pitched Roof**

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**! CAUTION:**

---

Label all wires prior to disconnection when servicing controls. Wiring errors can cause improper and dangerous operation. Verify proper operation after servicing.

---

---

**! ATTENTION:**

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Lors des opérations d'entretien des commandes, étiqueter tout les files avant des les déconnecter. Toute erreur de câblage peut être une source de danger et de panne. S'assurer du bon fonctionnement de l'appareil après tout entretien.

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ELECTRICAL BRANCH SUPPLY CIRCUITS. Route all electrical wiring to the left side of the furnace. For installation of "A" Cabinet furnaces, allow sufficient slack in the wiring if an optional cooling coil cabinet is added at a later time. *Use of copper conductors is recommended.*

---

**! WARNING:**

---

Any attempt to operate furnace before replacing transit-mode weather cap with upper roof jack section may result in hazard of fire, explosion or asphyxiation.

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Power supply circuit to the furnace must be installed and grounded in accordance with the National Electrical code (ANSI-C1/NFPA-70), or Canadian Electric Code Part 1 (CSA 22-1) and all local codes having jurisdiction.

**CONNECT POWER SUPPLY WIRES**

- Remove the furnace control panel cover.
- Insert 115 volt wires through the strain relief on the left side of the furnace control box (see Figure 25).
- Connect the "hot" wire to the BLACK pigtail lead, and the "neutral" wire to the WHITE pigtail lead. Secure all connections with suitable wire nuts.
- Connect the "ground" wire to the grounding screw.
- Reinstall the control panel cover and secure with the original mounting screws.

**CONNECT THERMOSTAT WIRES**

- Insert 24 volt wires through the plastic grommet just above the control panel.
- Connect the thermostat wires to the furnace low voltage pigtails (see Figure 25).
- Connect low-voltage circuit to the wall thermostat.
- A hole may be made in the furnace cabinet to ease thermostat wiring. Make sure that the wiring is protected from the sharp edge of the added hole.

**NOTE:** The thermostat should be installed 4 to 5 feet above the floor on an inside wall which is relatively free from direct sources of heat or cold drafts. The nominal anticipator setting is 0.4. (Refer to the thermostat literature for additional information.)

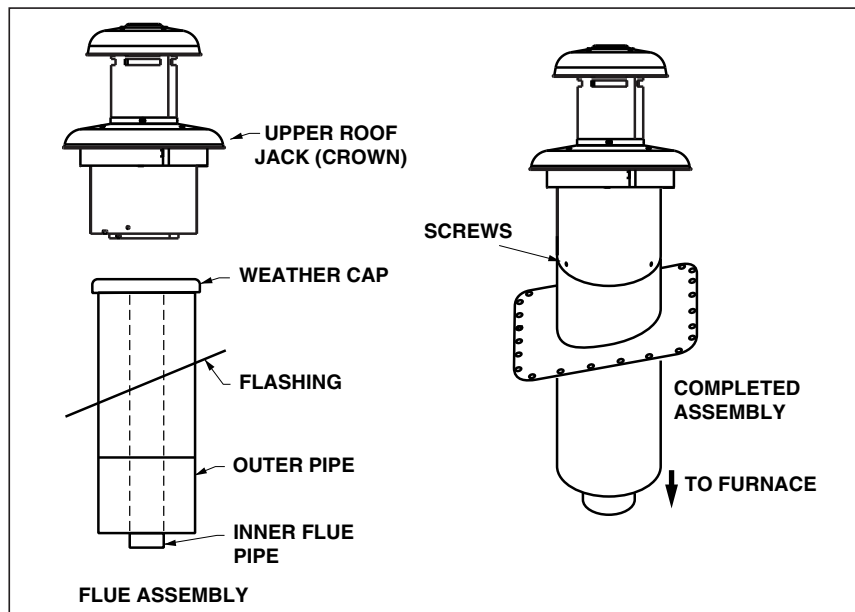


Figure 24.

Five-conductor thermostat wire is recommended for 24 volt low-voltage circuit (2-wire is required for furnace only; 5-wire for heating and optional cooling systems).

**For Platinum-ready Construction:**

- a. Use a heat/cool thermostat.
- b. Run thermostat wire from the Thermostat to the Furnace (see Figure 39).
- c. Using thermostat wire with at least two wires (four wire is recommended), run thermostat wire from the Furnace to the intended location of the Platinum-series unit. Leave at least six feet of extra thermostat wire at the intended location for future hook-up. Coil remaining six feet of wire and attach to the home's undercarriage.

Once the furnace is installed check the thermostat anticipator against the nominal setting of 0.4:

1. Connect the milliamp meter in series with one of the gas valve's low voltage terminals.
2. Energize the gas valve.
3. Read the value of the milliamps.
4. Adjust the heat anticipator of the thermostat to the value read on the milliamp meter.

If the heat anticipator is set too high, the furnace may delay in coming on.

If the heat anticipator is set too low, the furnace may cycle frequently and not provide comfort to the homeowner.

**14. FUEL PIPING**

Sizing and installation of fuel lines must be in accordance with federal, state and local regulations. All piping shall be black iron pipe, or equivalently sized steel tubing. Internally tinned copper tubing may be used for gas supply systems.

Fuel line installations other than typical installations shown in Figures 26 and 27 must comply with the fuel piping provisions stated in the Federal Manufactured Home Standard (H.U.D. TITLE 24, PART 280) and the National Fuel Gas Code (ANSI-Z223.1/NFPA-54).

- a. Optional fuel inlet lines are available for all gas furnace models to permit the addition of a 1/2" F.P.T. shut-off valve above the floor.

NOTE: Shut-off valve must be designed and listed for use with liquid petroleum (L.P. gas).

The gas supply to your home will either be Natural Gas or L.P. (bottle gas). Your furnace is factory equipped to operate on Natural Gas. If your gas supply is L.P. (bottle gas), you must contact a qualified serviceman or gas supplier to convert the furnace. The necessary instructions for the gas conversion are found on the lighting instruction label attached to the furnace in Section 16, Service Guide.

For natural gas operation, the furnace is designed for 7" W.C. inlet pressure. Pressure is reduced

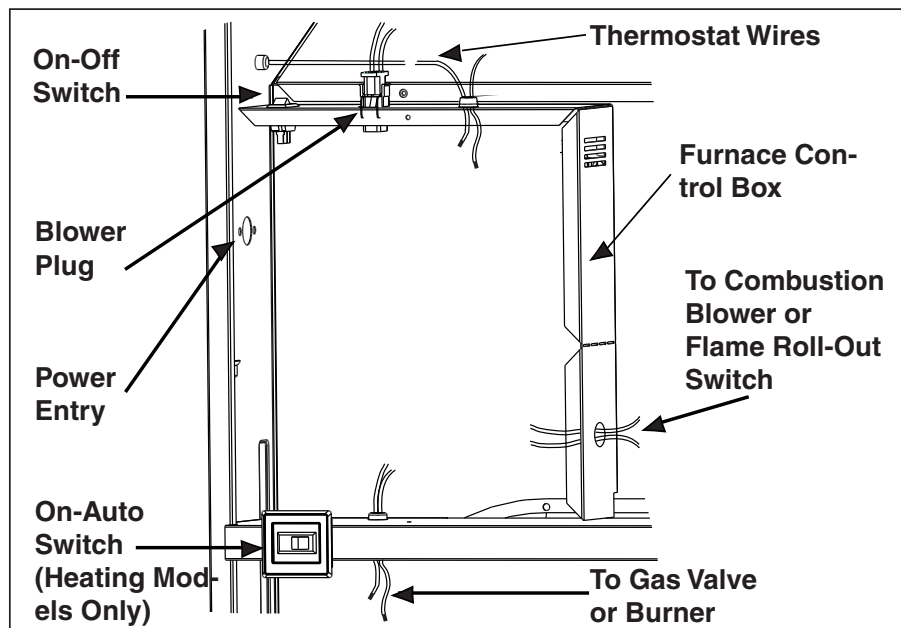


Figure 25. Control Panel (All Models)



to 3-1/2" W.C. by the pressure regulator in the gas valve. The maximum inlet pressure for the valve is 13" W.C.

For L.P. gas, pressure to the gas valve must be more than 11" W.C. but not more than 13" W.C. Pressure is reduced to 10" W.C. by the pressure regulator in the gas valve.

T'STAT Wire Gauge	Recommended T'STAT Wire Length (Unit to T'STAT)	
	2-Wire (Heating)	5-Wire (Heating/Cooling)
24	55	25
22	90	45
20	140	70
18	225	110

**Table 8. Thermostat Wire Gauge**

The tank must be clean inside before filling. All water, rust, sediment and other foreign matter must be flushed out.

A fuel or tank gauge is recommended for easy checking of the fuel level. Check the gauge reading with a dipstick.

Locate the storage tank conveniently near the home. For above ground fuel tank installations, the tank may rest three to four inches off the ground. Fuel tanks may also be buried if properly coated to resist corrosion. For below ground fuel tank installations, the vertical dimension from the bottom of the fuel tank to the fuel pump must not exceed ten feet. Keep the tank filled, especially in the summer to reduce the accumulation of condensation.

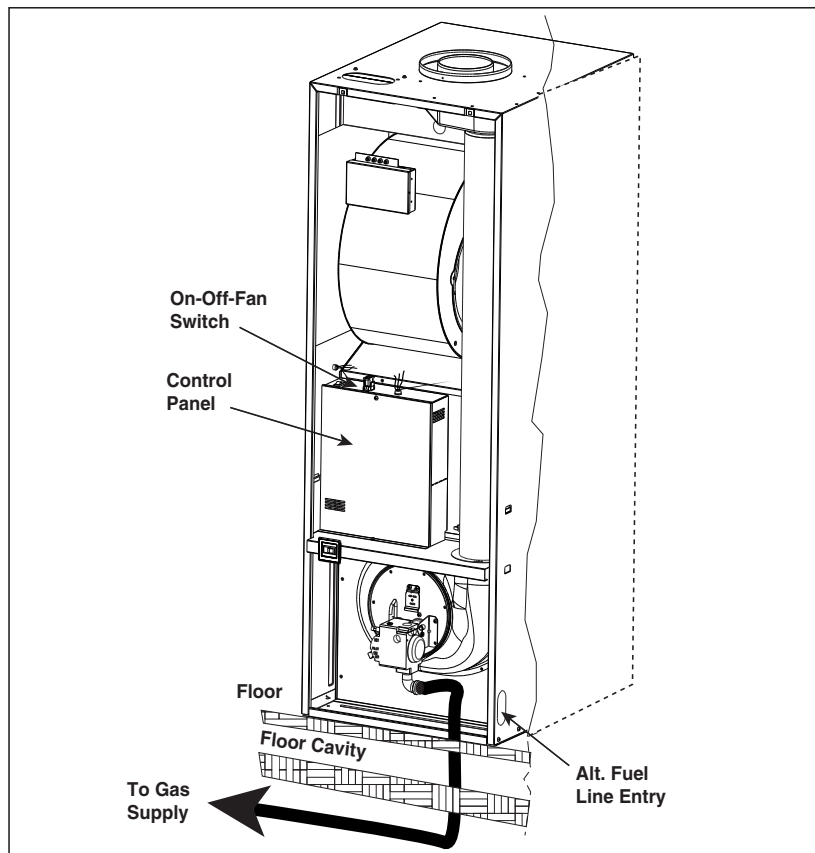
**! CAUTION:**

**The furnace must be converted by a qualified technician. Improper conversion can cause unsafe operation, explosion, fire and/or asphyxiation.**

**Oil Tank and Piping Installation**

The following procedures are recommended as good practice. However, requirements of local codes and ordinances, H.U.D. Manufactured Home and Safety Standards or National Fire Protection Association must be satisfied, where they apply, for an approved installation.

Use a tank capacity suitable for the application with a weatherproof, capped fill opening and a shielded vent to let in air as fuel is used.



**Figure 26. Typical Gas Piping**

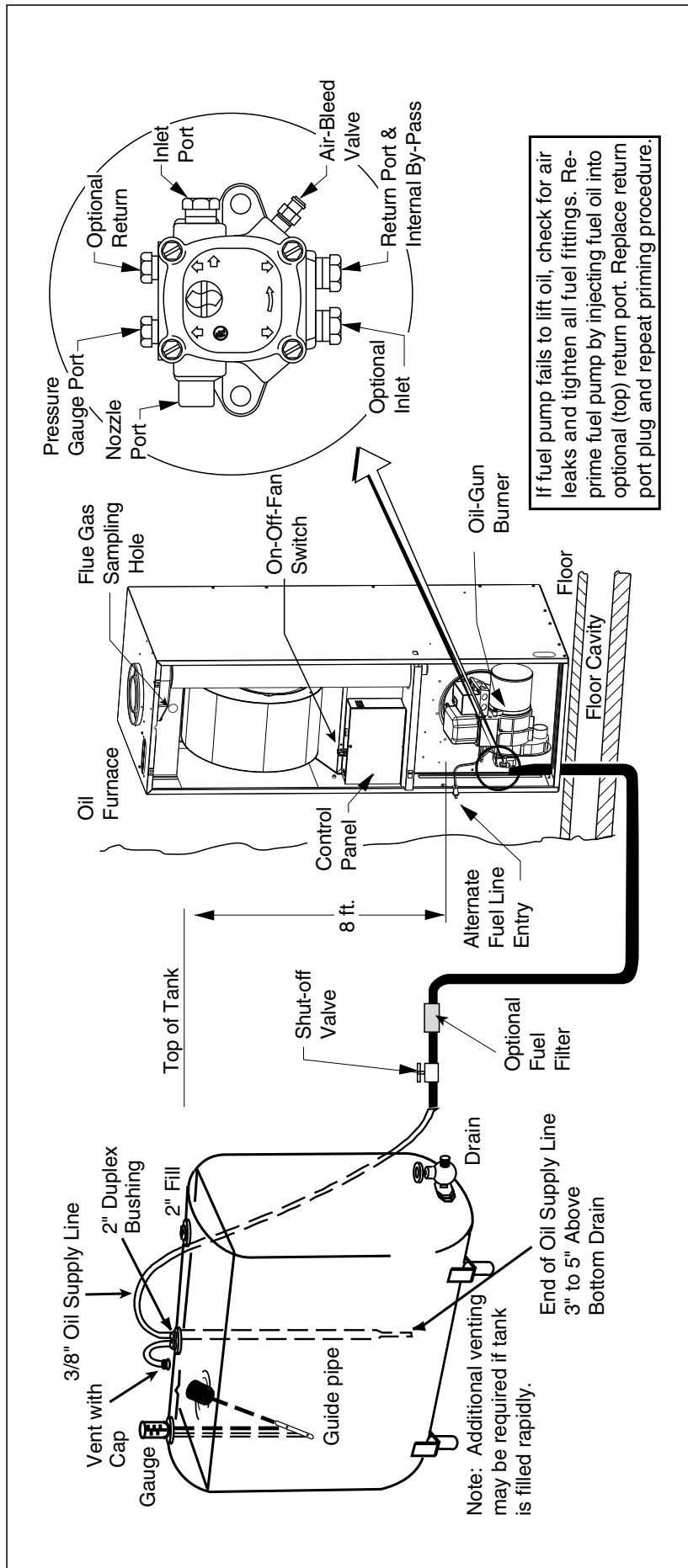


Figure 27. Typical Oil Piping for Above Ground (Single-Line) Supply

### **Fuel Line Hook-Up: One Line System**

The one line system is highly recommended where vertical lift, from bottom of tank to pump, is not more than eight feet. A single line hookup has the advantage of costing less and giving quieter operation.

### **Fuel Line Hook-Up: Two Line System**

Use a two line system only if the vertical lift exceeds 8 feet.

1. Install the oil feed line as outlined in steps 1-6 below.
2. Install the oil pump bypass plug in the bottom return port.
3. Run the return line up through the furnace base to the return port of the pump. Run the other end of the line to the tank, using 3/8" O.D. copper tubing or 1/4" pipe with the ends capped, and routing the line so it stays clean.
4. Insert the return line through the second opening in the duplex bushing. If the bottom of the tank is lower than the pump intake, the tube should be inserted three or four inches from the tank bottom. If the bottom of the tank is higher than the pump intake, the return line should extend not more than 8" inside the tank.

If a two pipe system is used or if oil is taken from the bottom of the tank, a filter is recommended.

### **Hook-Up Procedure (See Figure 27)**

1. Use a 3/8" O.D. copper tubing for the fuel line. Cap the end with tape to keep out dirt while the line is being routed.
2. Install duplex bushing for two 3/8" lines in the top fitting of the tank.
3. Insert one end of the tubing through the duplex bushing until it is three to five inches from the bottom drain. Tighten the bushing.
4. Run the line where it will not be subject to damage. Also, make bends gradually and avoid kinks which might restrict oil flow.
5. Open the furnace door. Connect the oil line to the intake port on the pump. Tighten other port plugs on the pump.
6. Be sure oil line is airtight! Air leaks can cause the pump to lose prime and will create other problems such as nozzle failure, odors, rumbling noise, and false safety shutdown.
7. Insert the short length of the copper tube level with the bottom of the duplex bushing. Form the tube into an inverted "U" to serve as a vent.

### **How to Eliminate Air Leaks**

To eliminate problems caused by air in the oil line, all connections in the oil supply line and all plugs, nuts, and fittings on the pump must be airtight. This includes the nut that covers the pressure adjustment. It is important that the hook-up be done carefully and with a good flaring tool.

Prepare the burner for priming by attaching a clear plastic hose over the bleed port fitting and fully opening the pump bleed port. Use a suitable container to collect purged oil.

To assure continuous operation, use a wire to jump terminals T-T (or F-F) on the primary control while burner is running. If furnace is equipped with the Honeywell R7184 primary control, priming oil pump procedure is as follows:

1. While the ignition is on, press, for 1/2 second or less, and release the reset button. The lockout time will be extended to 4 minutes.
2. If prime is not established within the 4 minutes, the control will lock out. Press the reset button to reset the control.
3. Repeat steps "1" and "2", if needed, until the pump is fully primed.

If furnace is equipped with the Beckett 7505 primary control, priming the oil pump procedure is as follows:

1. After the burner starts, press and hold the reset button for 15 seconds until the yellow light turns on. This indicates that the button has been held long enough.
2. Release the reset button. The yellow light will turn off and the burner will start up again.
3. At burner start up, click the reset button while the igniter is still on. This will transition the control to a dedicated Pump Prime mode, during which the motor, igniter and valve are powered for four minutes. The yellow light will be on.
4. If the prime is not established during the four minute pump prime mode, repeat step 3 until the pump is fully primed.

When oil flow is clear and free of air bubbles, close air-bleed valve and tighten. (Time to bleed air out will vary depending on length of oil line, number of bends, etc.)

### **Fuel Oil Type**

Do not use fuel oil heavier than Grade No. 2. Grade No. 1 may be used where the oil supply is subject to low temperatures.

**DO NOT USE GASOLINE, CRANKCASE OIL, OR ANY OIL CONTAINING GASOLINE.**

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**WARNING:**

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**Failure to keep supply of oil clean by various procedures described above may cause failure of certain components such as the fuel pump gears, check valve, shaft seal, or burner nozzle which may result in a burner fire.**

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## **15. FLUE GAS SAMPLING**

It may be necessary to take flue gas sampling from oil and gas gun furnaces (M1S and M1B Series Models) in order to check the performance after furnace installation. A flue gas sample may be taken from the heat exchanger, which is located behind the hole of the top-front of blower compartment.

1. **STOP!** Read the SAFETY INFORMATION.
2. Turn off all electric power to the appliance.
3. Remove the black plastic cap located above the blower and save.
4. Through the top of the blower compartment hole, drill a hole for your sampling tube into the heat exchanger.
5. Insert sampling tube through the drilled hole.
6. After a complete check and adjustment of furnace performance, fill the drilled hole with a screw that is larger than the hole.
7. Put silicon sealant (rated at least 500° F) around the screw.
8. Plug the outside hole with the plastic cap you removed in step 3.

---

**WARNING:**

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

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## **16. LIGHTING AND SHUTDOWN GENERAL-ALL MODELS**

Read the safety information on the front page of these installation instructions before lighting furnace. **DO NOT ATTEMPT TO LIGHT FURNACE IF YOU SMELL GAS.**

## **SAFETY INFORMATION**

**FOR YOUR SAFETY READ BEFORE LIGHTING.**

- a. **The first lighting of the furnace after any home setup must be performed by a qualified service technician.**
- b. If this appliance has a pilot that must be lit by hand, follow these instructions exactly.
- c. **BEFORE LIGHTING** smell all around the furnace for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor.
- d. **WHAT TO DO IF YOU SMELL GAS:** Do not try to light any appliance. Do not touch any electric switch and 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.
- e. Use only your hand to push in the gas control lever. Never use tools. If the lever will not push in by hand, don't try to repair it. Call a qualified service technician. Force or attempted repair may result in a fire or explosion.
- f. Do not use this furnace if any part has been under water. Immediately call a qualified service technician to inspect the furnace and to replace any part of the gas valve or control system which has been under water.

### **LIGHTING INSTRUCTIONS FOR STANDING PILOT MODELS.**

- a. Stop! Read the safety information.
- b. Set the thermostat to the lowest setting.
- c. Turn off all electric power to the appliance.
- d. Push in the gas control lever slightly and move left to "OFF" **DO NOT FORCE.**
- e. Wait **ten (10) minutes** to clear out any gas. If you then smell gas, **STOP!** Follow step "d" in the SAFETY INFORMATION. If you don't smell gas, go to the next step.
- f. Find pilot - follow metal tube (pilot tube) from gas control valve. Open hinged fire observation door. The pilot is found at the end of the pilot tube just left of the pilot shield.
- g. Slightly depress the gas control lever and move it right to the "ON" position and release; then move it to the "PILOT" position.
- h. Move the control lever to "SET" and hold. Immediately light the pilot with a match. Continue to hold the control lever for about one (1) minute after the pilot is lit. Release the lever and it will spring back to the "PILOT" position. Pilot should remain lit. If it goes out, repeat

steps “d” through “h” above. If the lever does not spring back when released, stop and immediately call your service technician or gas supplier. If the pilot will not stay lit after several tries, move the gas control lever to “OFF” and call your service technician or gas supplier.

- i. Move the gas control lever left to “ON”.
- j. Turn on all electric power to the furnace. Set the thermostat to “Heat” and/or the desired temperature setting. Set the On-Off-Fan switch to “ON”.
- k. Replace the furnace door.

In the event of any flashback or explosion, immediately shut off the furnace and call your service technician.

**TO TURN OFF GAS TO APPLIANCE:**

- a. Set the thermostat to the lowest setting.
- b. Turn off all electric power to the appliance at breaker or fuse box, before servicing.
- c. Remove the furnace door.
- d. Push in the gas control lever slightly and move to the left to “OFF.” DO NOT FORCE.
- e. Replace the furnace door.

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**! WARNING:**

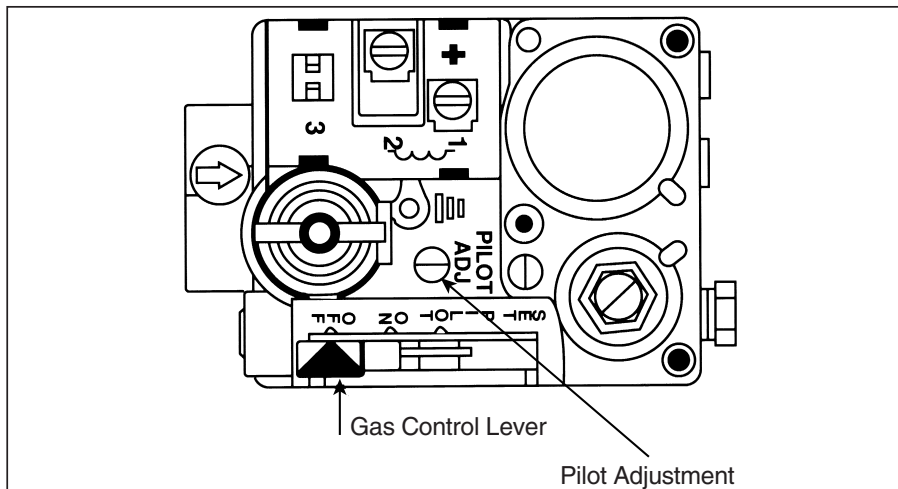
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**Close hinged fire door. If fire door is open or spring is broken it may allow products of combustion into the living space by the furnace blower resulting in possible asphyxiation.**

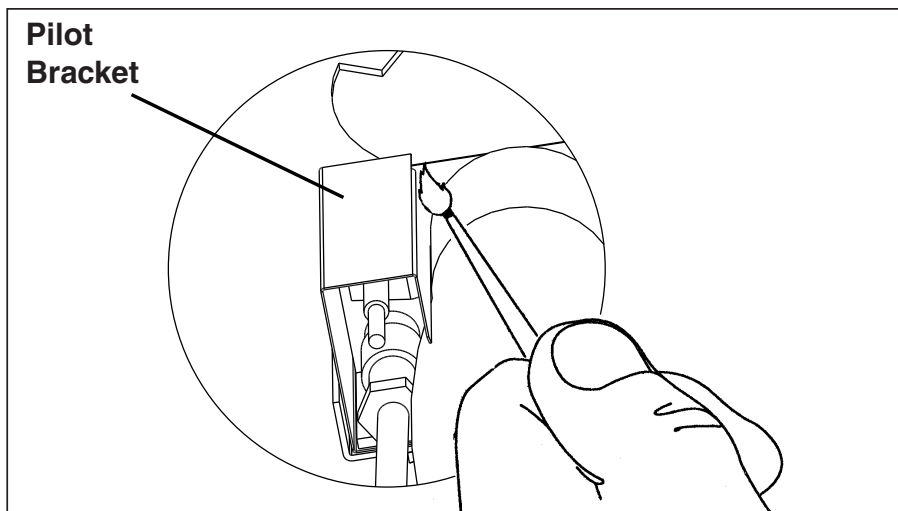
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**SEQUENCE OF OPERATION FOR STANDING PILOT**

- a. On a call for heat, the thermostat contacts close, supplying 24 VAC to the gas valve.
- b. When the gas valve is energized it steps open at a reduced flow and opens fully after approximately 14 seconds.
- c. When the call for heat is satisfied the thermostat contacts open, the gas valve shuts off gas flow.



**Figure 28. Standing Pilot Valve**



**Figure 29. Lighting Furnace**

## SEQUENCE OF OPERATION FOR STANDING PILOT W/INDUCED DRAFT BLOWERS MODELS

- On a call for heat, the thermostat contacts close, supplying 24 VAC to the relay.
- The relay contacts close and energize the induced draft motor.
- When the inducer starts, the air pressure switch closes at -0.20"WC differential pressure and energizes the gas valve.
- When the gas valve is energized it steps open at a reduced flow and opens fully after approximately 14 seconds.
- When the call for heat is satisfied the thermostat contacts open, the gas valve shuts off gas flow, and the induced draft blower stops.

## GENERAL-DIRECT IGNITION MODELS

Read safety information on front page of these installation instructions before operating furnace. **DO NOT ATTEMPT TO OPERATE FURNACE IF YOU SMELL GAS.**

### Operating instructions for M1M — MODELS WITH DIRECT IGNITION:

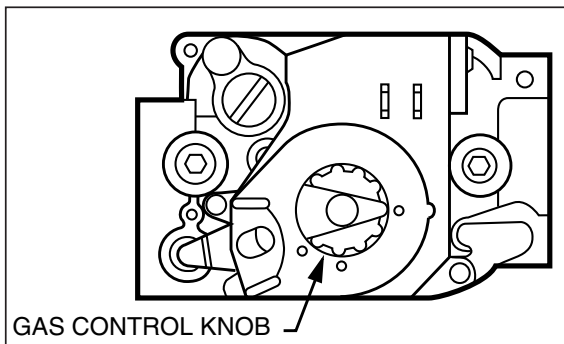


Figure 30. Direct Ignition Gas Valve - Honeywell

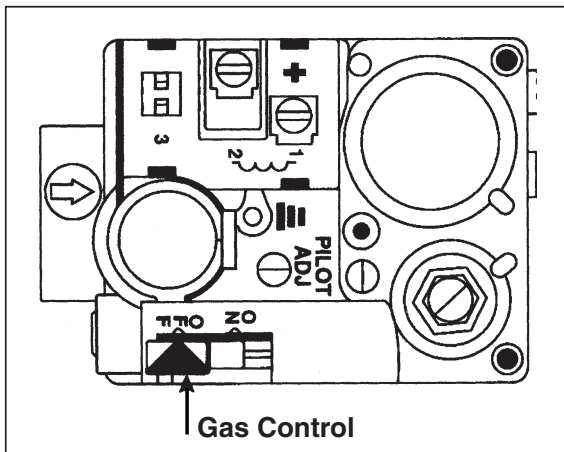


Figure 31. Direct Ignition Gas Valve - Robertshaw

- STOP! Read the SAFETY INFORMATION.
- Set the thermostat to the lowest setting.
- Turn off all electric power to the appliance.
- This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
- Honeywell - push in the gas control knob and turn clockwise to "OFF." Robertshaw - push the gas control lever to "OFF." NOTE: The lever cannot be placed in the "OFF" position unless it is pushed in slightly. DO NOT FORCE (See Figures 30 & 31).
- Wait ten (10) minutes to clear out any gas. If you smell gas, STOP! and follow step "d" in the SAFETY INFORMATION section. If you do not smell gas, go to the next step.
- Set the On-Off switch to the "ON" position.
- Honeywell - turn knob on gas control counter clockwise to "ON." Robertshaw - push the gas control lever to "ON."
- Turn on all electric power to the appliance.
- Replace the furnace door.
- Set the thermostat to "HEAT" and the desired temperature setting. The furnace should light after approximately 75 seconds. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

In the event of any flashback or explosion, immediately shut off the furnace and call your service technician.

### TO TURN OFF GAS APPLIANCE:

- Set the thermostat to the lowest setting.
- Turn off all electric power to the appliance before servicing unit.
- Set the ON-OFF switch to "OFF"
- Honeywell - push in the gas control knob and turn clockwise to "OFF." Robertshaw - push the gas control lever to "OFF."
- Replace the furnace door.

## SEQUENCE OF OPERATION FOR M1M MODELS WITH DIRECT IGNITION

Direct ignition model furnaces do not have a pilot. Ignition is accomplished automatically by a silicon carbide hot surface ignitor. A control module takes care of all timing functions. After lighting, the control module uses the ignitor as a flame sensor, shutting off gas should the flame go out. There are no external relays or timing devices.

**Do not try to light this furnace manually. The control module is not field serviceable.**

- On a call for heat, the thermostat contacts

close, supplying 24 VAC between terminals “C” and “W” of the control module, which starts combustion motor.

- b. When the inducer starts, the air pressure switch closes at -0.20”WC differential pressure and energizes the control.
- c. After a 45 second purge period, the ignitor is energized for a 30 second warm-up period, after which the gas valve opens.
- d. The trial period for ignition is approximately 6 seconds, after which the gas valve either remains open if flame is sensed, or closes if flame is not sensed.
- e. If flame is not sensed, the entire sequence is repeated four more times before “lockout” occurs. To reset, wait 30 seconds and then interrupt the 24 VAC power by turning the room thermostat below room temperature, then returning it to the original set point.
- f. If flame is not established on the fifth trial for ignition (initial try + 4 re-tries), the control de-energizes the gas valve, flashes “4” on the Status LED, and lockouts out heat operation for 1 hour.
- g. If a flame is present, the control energizes the main blower on heat speed 30 seconds after the gas valve opens.
- h. When call for heat is satisfied the thermostat contacts open, the gas valve shuts off gas flow and the combustion blower remains on for a 30 second post-purge period.
- i. The main blower is de-energized after a 120 second blower off delay.

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**WARNING:**

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**FOR YOUR SAFETY; WHAT TO DO IF YOU SMELL GAS:**

- **Do not try to light any appliance.**
- **Do not touch any electrical switch; do not use any phone in your building.**
- **Immediately call your gas supplier from a neighbor’s phone. Follow the gas supplier’s instructions.**
- **If you cannot reach your gas supplier, call the fire department.**

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**WARNING:**

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**Should overheating occur, or the gas supply fail to shut off, shut off the manual gas valve to the furnace before shutting off the electrically supply.**

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**AVERTISSEMENT:**

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**En case de température excessive, ou s'il est impossible de couper l'alimentation en gaz, fermer le robinet manuel d'alimentation en gaz du générateur d'air chaud avant de couper l'alimentation électrique.**

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**OPERATING INSTRUCTIONS FOR OIL AND GAS GUN FURNACE:****Oil Gun Model**

M1 oil gun furnaces may be converted to gas gun in the field by using the proper conversion kit listed in the RPL.

If your furnace model number begins with M1S\*, the furnace is equipped with an ignition device which automatically lights the burner.

***Do not try to light this furnace manually.***

- a. Open all valves in the oil line.
- b. Be sure the fire door is closed.
- c. Set the On-Off switch to “ON”.
- d. Set the thermostat to the desired setting.

**SEQUENCE OF OPERATION FOR OIL GUN MODELS****Oil Furnace - Honeywell R7184 / Beckett 7505 Control**

1. When a call for heat is initiated, there is a 2-6 second delay while the control performs a safe start check.
2. The ignition and motor are turned on and a flame should be established within the 15-second lockout time. **NOTE:** Burner will prepurge for 15 seconds if equipped with Honeywell R7184B or Beckett 7505 Control.
3. If flame is not sensed within the 15-second lockout time, the control shuts down on safety lockout and must be manually reset by pushing the reset button on the control. If control locks over three times in a row, the control enters restricted lockout. To reset Honeywell R7184: Hold down the reset button for 30 seconds until the LED flashes twice. Beckett 7505: Hold down reset button for 15 seconds until the red light turns off and the yellow light turns on.
4. Once flame is established, the ignition remains on 10 seconds to ensure flame stability. It then turns off.

5. The circulating air blower will energize after the temperature fan switch closes.
6. The furnace runs until the call for heat is satisfied.
7. The circulating air blower will de-energize when the temperature fan switch opens.



## **WARNING:**

**If furnace still does not light, turn the furnace off (described above) and call your technician. In the event of any flashback or explosion, immediately shut off furnace and call your service technician.**

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### **Gas Gun Models**

M1 gas gun furnaces may be converted to oil gun in the field by using the proper conversion kit listed in the RPL.

If your furnace model number begins with M1B\*, the furnace does not have a pilot. Ignition is accomplished automatically by a silicon carbide hot surface ignitor. A control module takes care of all lighting and timing functions. There are no external relays or timing devices.

***Do not try to light this furnace manually. The control module is not field serviceable.***

1. Before operation, smell all around the furnace for gas. Be sure to smell next to the floor because some gas is heavier than air and will settle on the floor. If you smell gas, STOP! and follow the safety instructions below. If you don't smell gas, go to the next step.
2. Set the thermostat to the lowest setting.
3. Turn off all electric power to the appliance.
4. This appliance is equipped with an ignition device which automatically lights the burner. Do not try to light the burner by hand.
5. Honeywell - push in the gas control knob and turn clockwise to "OFF." Robertshaw - push the gas control lever to "OFF." NOTE: The lever cannot be placed in the "OFF" position unless it is pushed in slightly. DO NOT FORCE (See Figures 30 & 31).
6. Wait ten minutes to clear out any gas. If you then smell gas, STOP! and follow the safety information on the preceding page. If you don't smell gas, go to the next step.
7. Set the On-Off switch to the "ON" position.

8. Honeywell - turn knob on gas control counter clockwise to "ON." Robertshaw - push the gas control lever to "ON."
9. Turn on the electric power to the appliance.
10. Set the thermostat to "Heat" and/or the desired temperature setting. The furnace should light in approximately 45 seconds. If the appliance will not operate, follow the instructions "To Turn Off Gas To Appliance" and call your service technician or gas supplier.

***In the event of any flashback or explosion, immediately shut off the furnace and call your service technician.***

### **SEQUENCE OF OPERATION FOR GAS GUN MODELS**

- a. On a call for heat, the furnace control begins an ignition sequence which lasts approximately 45 seconds.
- b. After this sequence, the control module tests to see if flame is sensed. If it has, the furnace continues to heat until the thermostat is satisfied.
- c. If the burner has not lit, the ignition sequence is repeated a maximum of two more times. If flame is not sensed after three attempts, the control enters "Lockout" and no further attempts to light the burner will occur. If "Lockout" occurs, contact a qualified service technician for assistance.



## **DANGER:**

**Before placing the furnace in service it must be checked to make sure it is equipped for the type of gas being used. The burner flame must also be observed and adjusted if necessary. Failure to observe this caution may result in unsafe operation, explosion and/or fire, or asphyxiation. See the following sections "Gas Supply" and "Combustion Air."**

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- d. When call for heat is satisfied, the thermostat contacts open and the gas valve shuts off gas flow.

### **TO TURN OFF GAS/OIL APPLIANCE:**

- a. Set the thermostat to the lowest setting.
- b. Turn off all electric power to the appliance before servicing unit.



- c. Set the On-Off Switch to "OFF"
- d. Honeywell - turn gas control knob clockwise to "OFF" Robertshaw - Push the gas control lever to "OFF"
- e. For oil, shut off all valves.
- f. Replace the furnace door.

## THE FURNACE CONTROLS AND FUNCTIONS

1. On-Off Switch - This switch turns electrical power to the furnace on and off. The switch must be set in the "On" position for the furnace to operate. For M1G\* models, in warm weather there is a possibility of the blower coming on periodically or operating continuously due to a heat buildup within the furnace by a combination of warm weather and heat from the pilot. This is normal operation as long as there is power to the furnace and the On-Off switch is at the "ON" position. If blower operation is not desired, the On-Off switch may be set in the "OFF" position to cut the electrical power to the furnace.
2. Limit Control - This furnace is protected by two high temperature safety limit switches. The auxiliary (upper) limit switch and the high temperature (lower) limit switch are automatic reset types. If either limit trips, the burner will shut off. If either limit switch trips off again soon after resetting, set the furnace On-Off switch to the "OFF" position and call your authorized serviceman.
3. Gas Valve - The gas valves for the gas furnaces are a 100% shut-off type and will fail safe if for some reason the gas is turned off. The valve is a "step-open" type for M1G\*-models and "slow-open" for M1M\*- and M1B\*-models which means it opens to a "low-fire" position, and after a few seconds, "steps-open" to "high-fire."
4. Roll Out Switch - (M1G\* - 056 & 070) The furnace is protected by a manual reset safety switch located on the bottom left hand side of the combustion pipe.
5. Oil Burner Primary Control - The primary control for oil gun furnaces starts the burner, monitors a safe operating cycle, and shuts the burner off at the end of a heating cycle. The control uses a light sensing transducer to determine if fuel ignition has been successfully attained. If ignition is not attained by the end

of the safety ignition timing period, the control shuts the burner off and enters "lock-out."

6. a. Summer Cooling - (H Series): Your furnace is equipped to operate the circulating fan only. Turn the Fan On-Auto switch to the "ON" position during warm weather. The blower will now operate to circulate air in your home through the duct system.

b. Summer Cooling - (A, B, C, & D Series): Your furnace is A/C ready, equipped with A/C relay and transformer. The unit is equipped to use a 4-wire thermostat. When using a 5-wire thermostat, RC and RH should be jumped (see instructions included with thermostat).

## 17. SERVICE GUIDE BURNER ADJUSTMENTS

Burner settings and adjustments are made at the factory. However, these settings may change during shipping, handling, and installation. Therefore the following items should be checked and readjusted if necessary.

Atmospheric Gas with Standing Pilot and Direct Ignition Furnaces, Including Gas Gun.

### a. Gas Pressure

The gas pressure can be checked with a manometer at the pressure tap located on the side of the gas valve. The gas valve pressure regulator can be adjusted by removing the regulator selector stack and turning the slotted insert located directly under the selector stack. The regulator selector stack must be secured in place before each pressure reading is taken. Natural gas manifold pressure should be 3.5" W.C. and L.P. gas manifold pressure should be 10" W.C. Replace the gas pressure tap plug on the gas valve.

### b. Pilot Flame (Standing Pilot Only)

The pilot flame can be adjusted by turning the pilot adjustment screw, located on top of the gas valve (See Figure 29). The pilot flame height should be between 3/4" and 1." The flame tip should be visible just above the pilot bracket when viewed through the observation door. The same pilot orifice is used with both natural and L.P. gas.

Model	Nat. Gas	LP Gas	Oil
66,000	3.5	3.5	3
86,000	5.3	6	5

**Table 9. Factory Combustion Air Settings**

## COMBUSTION AIR

In order for the flame to burn efficiently, it must receive adequate combustion air. The amount of combustion air required will vary depending on altitude, actual B.T.U. content of the fuel being used, gas pressure, conversion to another gas and other factors. The burner flame should be observed and any necessary adjustments made before the furnace is placed into service. See Table 9 for Factory Air settings.

### Gas Gun

Combustion air box adjustment is made to the main burner by loosening the two lock nuts on the plastic air shutter, located on the left side of the burner blower housing. Air shutter adjustment line is located on the same side of the blower housing. Turn the plastic shutter to a smaller number (counter clockwise) for less air to a larger number (clockwise) for more air. Gently tighten the lock nuts after completing the adjustment. For best results, use instrument to measure between 8-9% CO<sub>2</sub>, after the combustion air has been adjusted. Note: Do not over-tighten the lock nuts, otherwise the plastic air shutter may be damaged.

### Oil Gun Only

It is recommended that the CO<sub>2</sub> and Smoke levels should be measured for maximum performance. CO<sub>2</sub> readings should be 10-11% for 66,000 BTUH furnaces and 12-13% for 86,000 BTUH furnaces. The Smoke should be NO. 0 on the Bacharach Scale, and 0 to 0.02 negative draft over fire.

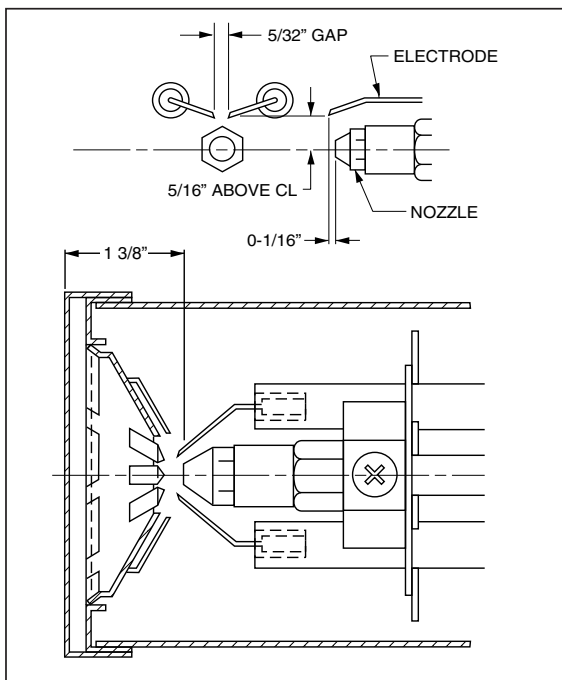


Figure 32. Oil Gun electrode Position

### Electrode Setting (Oil Gun Only)

Poor ignition of the oil spray may result if the electrodes are not adjusted as shown in Figure 32. Do not permit any electrodes to be grounded to any surface.

### Switching the Honeywell R7184 Ignition Control between Interrupted and Intermittent Duty (Oil Gun Only)

The Honeywell oil primary control can be switched between interrupted and intermittent ignition control. To switch from interrupted duty (Factory set) to intermittent duty, remove the igniter wire from the blue control wire. Attach the burner motor and igniter wire to the orange control wire. Cap and reseal the orange control wire. Cap and isolate the blue control wire.

## CAUTION:

- **Combustion air adjustment must be made only by a qualified technician. Improper air adjustment may cause unsafe operation, explosion and/or fire asphyxiation.**
- **If the input to the furnace is too great because of excessive gas pressure, wrong size nozzle or orifice, high altitude, etc., the burner flame will be sooty and can produce carbon monoxide, which could result in unsafe operation, explosion and/or fire or asphyxiation.**

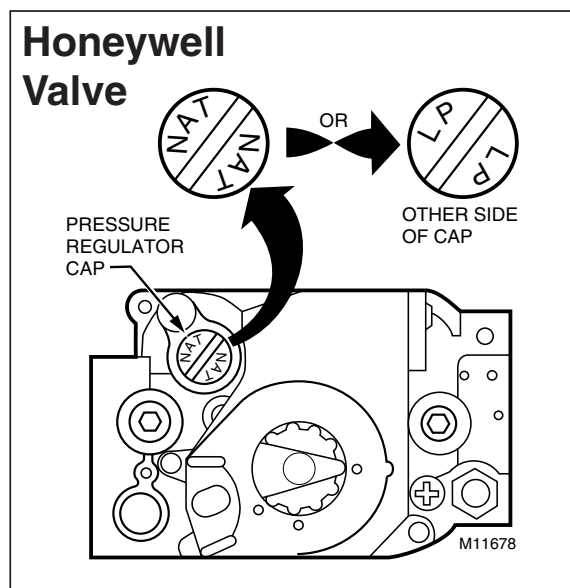
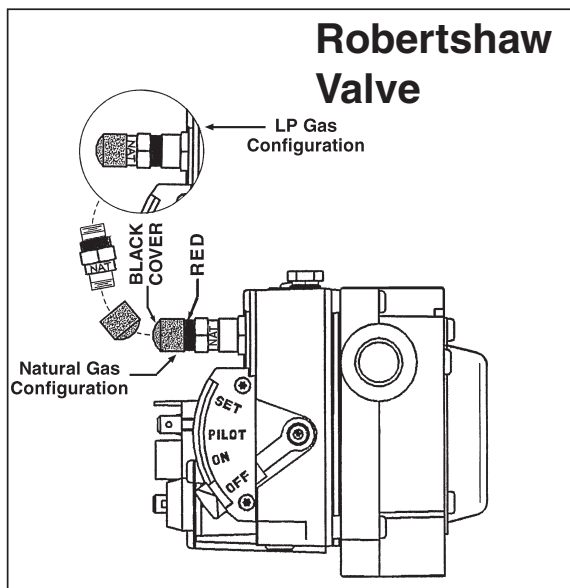


Figure 33. Convertible Pressure Regulator Cap



**Figure 34. Convertible Pressure Regulator**

## GAS CONVERSION

This gas fired heating appliance was shipped from the factory for use with natural gas. However, the appliance can be converted for use with LP gas. Use the following procedure for gas conversion of the burner.

### ATMOSPHERIC AND DIRECT IGNITION FURNACES

- Follow the instructions to "Turn Off Gas to the Appliance."
- Disconnect the gas pipe union and the electrical wires connected to the gas valve.
- Remove the pilot tube and thermocouple from the gas valve (M1G\*).
- To remove the gas valve assembly, remove screw(s) from gas valve bracket. Gas valve and spud may be removed. Orifice is located at the end of the spud (M1G\*, M1M\*), or remove three (3) bolts from U-shaped manifold plate and orifice assembly (M1B\*).
- Replace the main orifice with the L.P. gas orifice supplied in the envelope located by the gas valve. Check to insure the orifice size matches the nameplate.
- It is not necessary to convert the pilot orifice.
- For Honeywell gas valves with the regulator converter (Figure 33), check for the letters NAT or LP on the pressure regulator cap. Unscrew the cap, invert it, replace, and tighten until snug.
- For the Robertshaw gas valve with the regulator converter (Figure 34), remove the black cover and unscrew the converter located on

top of the gas valve. Invert the converter. (For "LP" the red ring will be located at the bottom and the "LP" stamping on the converter will appear right side up.) Then screw converter back into the regulator, hand tight plus 1/8 turn, and replace the black cover onto the converter top to protect the threads.

- Reassemble the burner assembly into the furnace.
- Reconnect the gas piping and electrical wires to the gas valve.
- Open the manual shut-off valve and follow the FURNACE START-UP procedure as outlined previously in this manual to put the furnace into operation.

NOTE: The pilot flame is adjustable by turning the adjustment screw located on the gas valve with a small screwdriver. (See Figure 29)

## TROUBLESHOOTING - STANDING PILOT MODELS

### *Main Burner Does Not Come On*

- Check the electrical supply to the furnace.
- Be sure the furnace On-Off switch is in the "ON" position.
- Check for proper thermostat operation.
- Check for broken or open thermostat wires.
- Check to make sure the insulation located on the inside of the front panel is glued securely around the fan switch and the limit switch.
- Shut off the electrical supply to the furnace and remove the electrical box cover.
- Check for a defective transformer or blown fuse.
- Check electrical circuit for proper grounding, polarity, and make sure the electrical connections are tight.
- Check to see if limit switches may have failed to close.
- Replace the electrical box cover and restore electrical power to the furnace. Turn the On-Off switch to "ON" and raise the thermostat setting above room temperature.
- Check for 24 volts at the gas valve.
- Replace the gas valve if the pilot is established and it does not open when powered with 24 volts.

### *Gas Valve Powered (24 volts)– No Main Flame*

- The manual shut-off valve must be on.
- The pilot flame must be established.
- The gas valve control lever must be in the "ON" position.

## **Control Module Status Indicators - M1M Series**

### **Control Status**

The Red LED labeled "STATUS" is provided to indicate system faults.

Steady ON:	Control OK
Steady OFF:	No power
Rapid flash:	False flame or internal control fault
One flash:	Limit switch is open
Two flashes:	Pressure switch is open
Three flashes:	Pressure switch is stuck closed
Four flashes:	Lockout due to failed ignition
Five flashes:	L1 neutral reversed or L1 voltage not present on L1

### **Flame Status**

A Yellow LED labeled "Flame" is provided to indicate flame status. When flame is sensed, the flame LED is lit. If flame sense is weak, yellow LED will flash.

## **Control Module Status Indicator - M1B**

- One flash-the control is in lock-out because the inducer centrifugal switch is or was stuck closed.
- Two flashes-the control is in lockout because the signal was not received by the control that the inducer centrifugal switch had closed within the time.
- Three flashes-the control is in lockout because a failed ignition attempt, a gas valve error, or a false flame sensed during the warm up period. If false flame has been sensed, the control will return to normal operation, and repeat ignition sequence when the false flame is not present.
- Four flashes-the control is in lockout due to a failure within the control board.

## **Control Module Status Indicator - M1S\* Series**

The indicator light(s) on the oil primary control provides lockout, recycle and cad cell indications as follows:

### **Honeywell R7184 Control:**

Indicator LED	Status
On	Cad cell is sensing flame (could be flame or stray light)
Off	Cad cell is not sensing flame
Flashing (1/2 sec. on, 1/2 sec. off)	Lockout/Restricted Lockout
Flashing (2 sec. on, 2 sec. off)	Recycle

### **Beckett 7505 Control:**

Light Color	On Continuously	Flashing
Red	Restricted (Hard) Lockout	Soft Lockout
Green	Cad cell is sensing flame (could be flame or stray light)	Recycle
Yellow	Pump Prime mode or Reset button currently held for 15+ sec.	Cad cell resistance (see table 10)

- Check gas pressure coming to the gas valve.
  - Replace the gas valve if the main burner does not come on under the above conditions.
- Pilot Will Not Light or Goes Out**
- Check the incoming gas pressure.
  - Check for the proper pilot orifice. See the nameplate SPECIFICATION.
  - Check for proper pilot flame adjustment. See "BURNER ADJUSTMENTS."
  - Check the thermocouple millivoltage.
    - Millivoltage should read between 18 and 30 mv.
    - If the closed millivolt reading is not between 18 and 30 mv., the gas valve electromagnet may be defective. Replace the gas valve if necessary.
  - Be sure the pilot shield is in place.
  - Check for gas leaks in the pilot line or the pilot assembly.
  - Check the flue assembly to make sure all connections are tight.
  - See the FURNACE START-UP procedure for lighting details.

### **Main Flame Is Not Burning Properly**

- a. Check the manifold gas pressure.
- b. Check for the correct main burner orifice.
  - See the nameplate SPECIFICATION.
- c. Check the flue for any blockages or loose connections.
- d. Check the combustion air passages for blockage.

### **High Gas Bills**

- a. Be sure the proper orifices are being used.
- b. Be sure the return air system is clear and free of blockage.
- c. Be sure the furnace filter is clean.
- d. Be sure the home is insulated, that windows and doors fit tightly, and that there are no leaks in the heating duct system.
- e. Check the room thermostat to be sure the setting is not higher than necessary. Low humidity requires higher temperatures for the same level of comfort. Check for proper humidity level in the home.

## **TROUBLESHOOTING - DIRECT IGNITION FURNACES INCLUDING GAS GUN**

### **Burner Motor Does Not Run— Thermostat Calls For Heat**

- a. Check the electrical supply to the furnace.
- b. Be sure the furnace On-Off switch is in the "ON" position.
- c. Defective thermostat circuit - white and red thermostat low voltage leads (M1M\*, M1B\* models). If the burner motor or combustion fan runs, check:
  - Thermostat connections
  - Thermostat
- d. No voltage to control module - determine if 24 volts (or 120 volts) is available to the control module. If voltage is not available check for:
  - Blown fuse, defective transformer, circuit breaker, no electrical supply.
  - Limit switch open.
  - Loose connections.

### **Combustion Blower Does Run - No Flame**

- a. Defective centrifugal switch (M1B\* Model).
  - Check the operation of centrifugal switch by removing end bell of the burner motor.
  - Clean contacts of motor.
  - If the contacts are closed, replace the motor.
- b. Defective pressure switch (M1M\* and M1G\* 077, 090 Models) - check air tube and electrical connections.
- c. Burner in purge mode - allow 75 seconds for flame establishing period.
- d. Check for proper electrical connections at purge timer, control box, or gas valve.

- e. Check for gas supply - gas line valve on, control lever on.

### **Control Module Is Powered— Ignitor Does Not Heat Up**

- a. Disconnect ignitor leads at AMP receptacle and check for 120 volts at the plug during ignition sequence.
- b. Replace ignition control if 120 volts is not available at AMP plug during ignition sequence.

### **120 Volts Is Available At AMP Plug— Ignitor Does Not Heat Up**

- a. Disconnect power to the furnace.
- b. Disconnect AMP plug to the ignitor, and check ignitor resistance with an ohm meter. Set on RX1 scale.
  - Normal reading should be 40 - 75 ohms.
  - If above or below this rating at room temperature change ignitor.
- c. Check for continuity from ignitor receptacle to burner.

### **Main Flame Ignites— Burner Locks Out**

- a. Ignition control is not properly grounded.
- b. Defective ignition control.
- c. Improper polarity of 120 volt power supply.
- d. Ignitor has hairline crack.
- e. Improper gas pressure or burner air adjustment is not allowing flame to contact ignitor tip for flame rectification.
- f. Misaligned ignitor does not allow flame to contact ignitor tip for flame rectification.

### **Burner Short Cycling — Thermostat Calls for Heat, Limit Switches Closed**

- a. Check for polarity.
- b. Check ground.
- c. Check flue.
- d. Check combustion air.
- e. Check gas pressure.
- f. Check orifice.
- g. Check the position of ignitor, a normal reading should be 40-75 ohms.

### **24 Volts Supplied To Gas Valve During Ignition — No Main Gas Flow**

- a. Gas valve may be defective. Replace if necessary.
- b. Gas piping may be plugged. Check for adequate gas supply to gas valve at union.

### **Burner Operates— Insufficient Heat**

- a. Check thermostat for proper setting and location. Thermostat should not be located where

- it will be affected by another heat source.
- b. Check for clean filter and proper air flow.
- c. Check burner for proper gas firing rate.
- d. Be sure unit is not undersized for its thermal load.
- e. Check thermostat anticipator. The nominal anticipator setting is 0.4.

**Burner Flame Without Motor Running**

- a. Gas valve stuck open, check gas valve for proper operation (replace if necessary) and inspect heat exchanger.
- b. Check for 115 volts to the combustion blower motor; replace if necessary.
- c. If no power to combustion blower then check wiring and control module; replace if necessary.

**Circulation Air Blower Will Not Operate Even Though The Burner Does Operate**

- a. Check thermostat "G" wiring.
- b. Check wiring to motor.
- c. Check for a defective motor.

**TROUBLESHOOTING - OIL GUN**

**Honeywell R7184 or Beckett 7505 controls only.**

**Burner does not start with a call for heat.**

1. Check the electrical supply to furnace.
2. Be sure the furnace door switch is in the on position.
3. Check for line voltage at the oil primary control. The voltage should be 115 VAC.
4. Check indicator light with burner off, no call for heat (no flame).
  - a. If indicator light/green light is on, the cad cell is seeing stray light or the cad cell of controller is defective.
  - b. If indicator light/green light is off, go to step 5.
  - c. If light is flashing (red or green light on Beckett7505 control), refer to the next section: 1. Reset primary control.
5. Jumper T to T terminals on primary control.
  - a. If burner starts, check thermostat or limit wiring connections.
  - b. If burner does not start, turn off power. Check all wiring connections.
  - c. If burner does not start, replace primary control.

**Burner starts and then locks out on safety with Honeywell R7184 indicator light flashing ½ second on, ½ second off. For Beckett 7505 control, the red light will flash.**

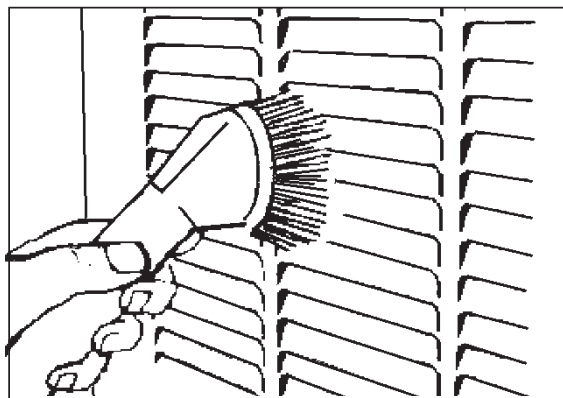
LED Flashes Ohms	Cad Cell Resistance
1	0-400
2	400-800
3	800-1600
4	>1600

**Table 10. Cad Cell Resistance when sensing flame**

1. Reset primary control: To reset the control from (soft) lockout, the button needs only to be pressed and released. For R7184 control, if it is in restricted mode, the button should be held in for 30 seconds (until the light flashes twice). For 7505 control, if it is in restricted mode, the button should be held in for 15 seconds until the red light turns off and the yellow light turns on.

**NOTE: Restricted Lockout:** If the control locks out three times in a row without a complete heat cycle between attempts, the lockout becomes a restricted (hard) lockout.

- a. If the lights mentioned above stop flashing and the ignition remains off, the primary control could be defective. If line voltage is present at the igniter terminals, there is no ignition, the igniter is likely defective and needs to be replaced.
- b. If the light stops flashing, burner turns on, but the control locks out again, check the cad cell. If the cad cell is operational, replace the primary control.
- c. If the light continues to flash at the interval listed above, verify that the control is not in restricted mode. If in restricted mode, reset it. If not in restricted mode, replace the control.



**Figure 35. Periodic Cleaning**

- d. If the light (indicator light for R7184 control; green light for 7505 control) stays off while the flame is on, check the cad cell sighting for view of the flame.
- e. If the burner locks out, check the cad cell resistance. (See Table 10)
- f. If the burner stays running, the system is operational.
- g. If the light (indicator light for R7184 control; green light for 7505 control) is off, check the cad cell assembly after disconnecting the line voltage.

**Burner will not start and the indicator light is flashing at 2 seconds on, 2 seconds off (for R7184) or the green light is flashing (for 7505).**

1. Hold the reset button down for 1 – 2 seconds. If indicator light continues to flash, wait for 60 – 70 seconds. If it still continues to flash, replace the primary control.

**To check cad cell resistance:** Press and release the button during the run mode, with the igniter off. The light (yellow light for 7505 control) will flash to indicate the cad cell resistance. For proper burner operation, it is important that the cad cell resistance is under 1600 Ohms. For cad cell resistance, see Table 10.

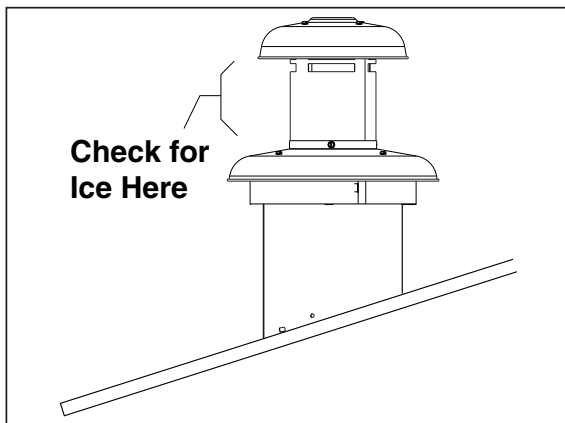


Figure 36. Roof Jack

**! WARNING:**

**Do not obstruct any return air openings, including the grille on the furnace. To do so may cause the furnace to activate the high limit and shut down, or it may cause asphyxiation.**

## 18. MAINTENANCE

### By Homeowner

1. Return Air - On some closet installations the return air opening to the furnace may be on the floor, on the door, on the side wall of the closet, or some combination of these. The upper grille on the front of the furnace admits return air to the blower. Return air must be provided back to the circulating blower in order to provide air distribution.
2. Filters - At least twice each season (more often in dusty areas) remove and clean the air filters with a vacuum or with warm water and soap. Reinstall when dry. Also clean dust and lint around furnace and in the furnace vestibule. (Figure 35.)
3. Seasonal Service Information - During extremely cold weather, ice may form on the furnace roof jack. Small amounts of ice forming on the roof jack will present no problems to proper furnace operation. Excessive ice formation could restrict the combustion air supply to the burner, causing inefficient burner operation. If excessive ice has formed on the air inlet or exhaust portions of the roof jack, it must be carefully removed (Figure 36).

### By Serviceman

All furnaces need periodic service at the beginning of each heating season. Call your serviceman to:

- a. Remove the air circulator and clean all dust and lint from the unit with a stiff bristle brush.
- b. Inspect the combustion chamber blower compartment, flue collar and Roof Jack.
- c. Check the gas valve (if applicable) and fuel line connections for leaks.
- d. Make any adjustments necessary for good operation.

**! WARNING:**

**Use of furnace or air conditioning components that are not included in the certification of this appliance may create a hazard, invalidate the certification, and in many states, make installations illegal. Listed NORDYNE air conditioning components are specified on the furnace label.**

### ADDITIONAL OIL FURNACE MAINTENANCE

In addition to the preceding, the following should be performed by a qualified service contractor at least once each season for oil-fired furnaces:

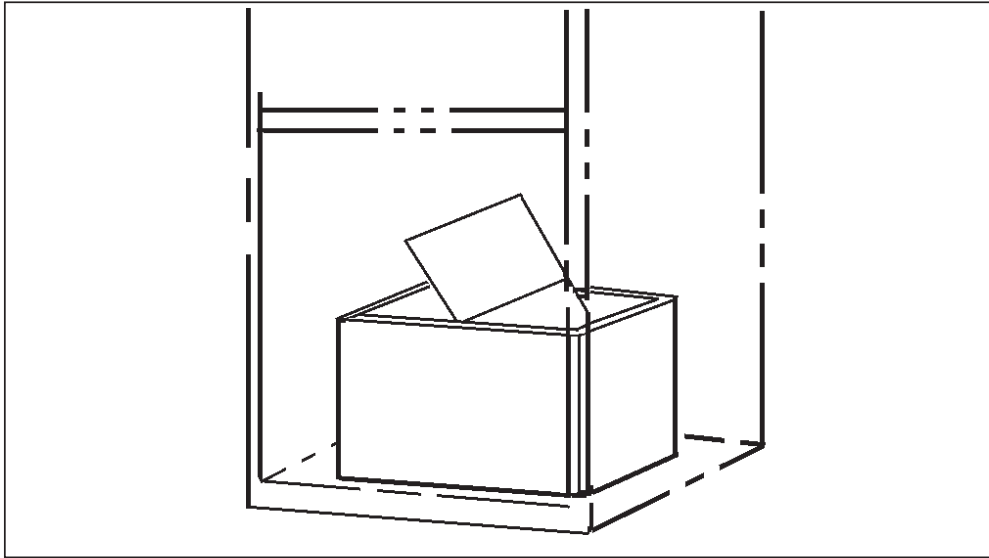


Figure 37. Coil Cavity Damper (Non-Platinum Series Only)

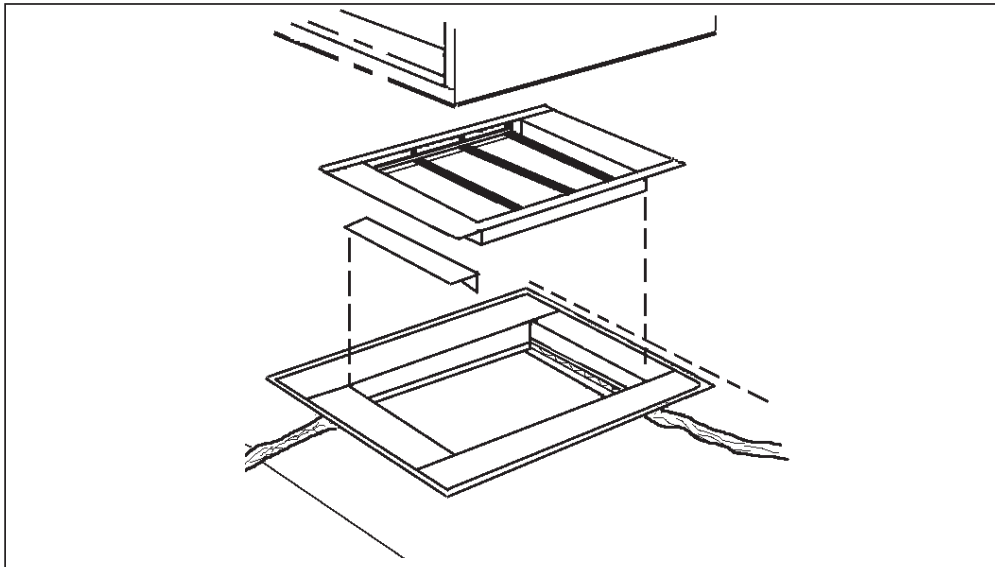


Figure 38. Damper without Coil Cavity (Non-Platinum Series Only)

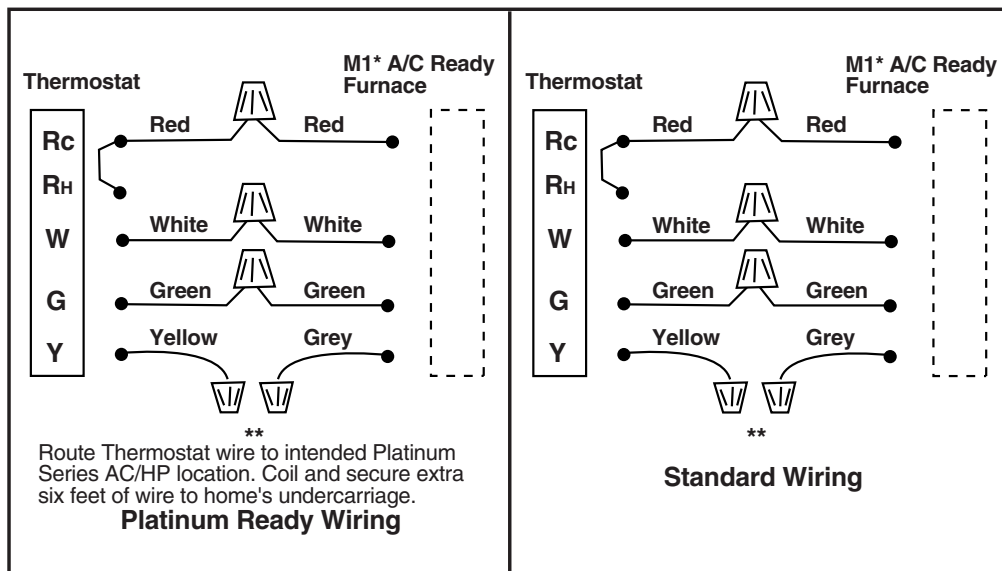


Figure 39. Thermostat Wiring A/C Ready Models



Blower Speed Selection Chart for M1*B Models and for use with Blower Kit No. 903773 1/4 Hp 3 Speed				
Furnace Input	Heating Speed Setting	Cooling Speed/ Evap Coil		
		2 Ton	2-1/2 Ton	3 Ton
086, 090	H	L	M	H
066, 070, 077	M	L	M	H
56	L	L	M	H

Blower Speed Selection Chart for M1*C Models and for use with Blower Kit No. 903413 1/2 Hp 4 Speed					
Furnace Input	Heating Speed Setting	Cooling Speed/ Evap Coil			
		2 Ton	2-1/2 Ton & 3 Ton	3-1/2 Ton	4 Ton
077, 086, 090	ML	L	ML	MH	H
056, 066, 070	L	L	ML	MH	H

Blower Speed Selection Chart for M1*D Models and for use with Blower Kit No. 903414 & 903890 3/4 Hp 4 Speed					
Furnace Input	Heating Speed Setting	Cooling Speed/ Evap Coil			
		2 Ton	2-1/2 Ton & 3 Ton	3-1/2 Ton & 4 Ton	5 Ton
077, 086, 090	ML	L	ML	MH	H
056, 066, 070	L	L	ML	MH	H

**Table 11. A/C Blower Selection**

- Replace the oil nozzle with the type nozzle specified for your furnace.
- Clean, adjust and replace if necessary the spark electrodes.
- Reset the nozzle/drawer assembly to factory specifications.
- Clean the inside of the furnace heat exchanger and replace the combustion liner if necessary.
- Clean or replace the oil filter element at the oil tank.
- Adjust the burner for top efficiency and check to make sure all fittings are leak-tight.

## 19. OPTIONAL ACCESSORIES

### Necessary when the Furnace is Used with Some Central Air Conditioners

If an air conditioner is installed that does not use the furnace blower for air distribution and that operates independently of the furnace, the thermostat system must have an interlock to prevent the furnace and air conditioner from operating at the same time. This interlock system usually contains either a "Heat-Cool" switch which must be turned to the "Heat" or "Cool" position to activate either heating or cooling operation, or a positive "OFF" switch on the cooling thermostat.

The furnace must also be equipped with an automatic damper (See Figures 37 or 38, NORDYNE p/n 901996 for furnaces without coil cavity, or p/n 901083 with coil cavity) to prevent cold air from being discharged up around the

heat exchanger. Cold air may cause condensation inside the heat exchanger which can lead to rust and early failure.

### OPTIONAL ADD-ON AIR CONDITIONING

Ask your dealer or contractor about NORDYNE add-on central air conditioning systems. There is a split-system or package air conditioner designed for your total comfort needs. Whether split system or single package, an energy-saving NORDYNE unit is available that has been designed specifically for manufactured housing applications and can best handle your home comfort needs.

Listed and ARI Certified, all models are protected by the NORDYNE Air Conditioner Limited Warranty.

Platinum series units are self contained package units with compressor and cooling coils. They are designed as a drop in system when used with the AC ready M1.

Single package unit includes cooling coils, compressor, and vertical discharge fan. This type of unit connects with the existing home air duct system (an optional close-off damper is required with the furnace).

Split system unit with vertical discharge for quiet operation connects with NORDYNE cooling coil furnace (optional coil cavity required with "A" model furnaces).

## 20. WIRING DIAGRAMS

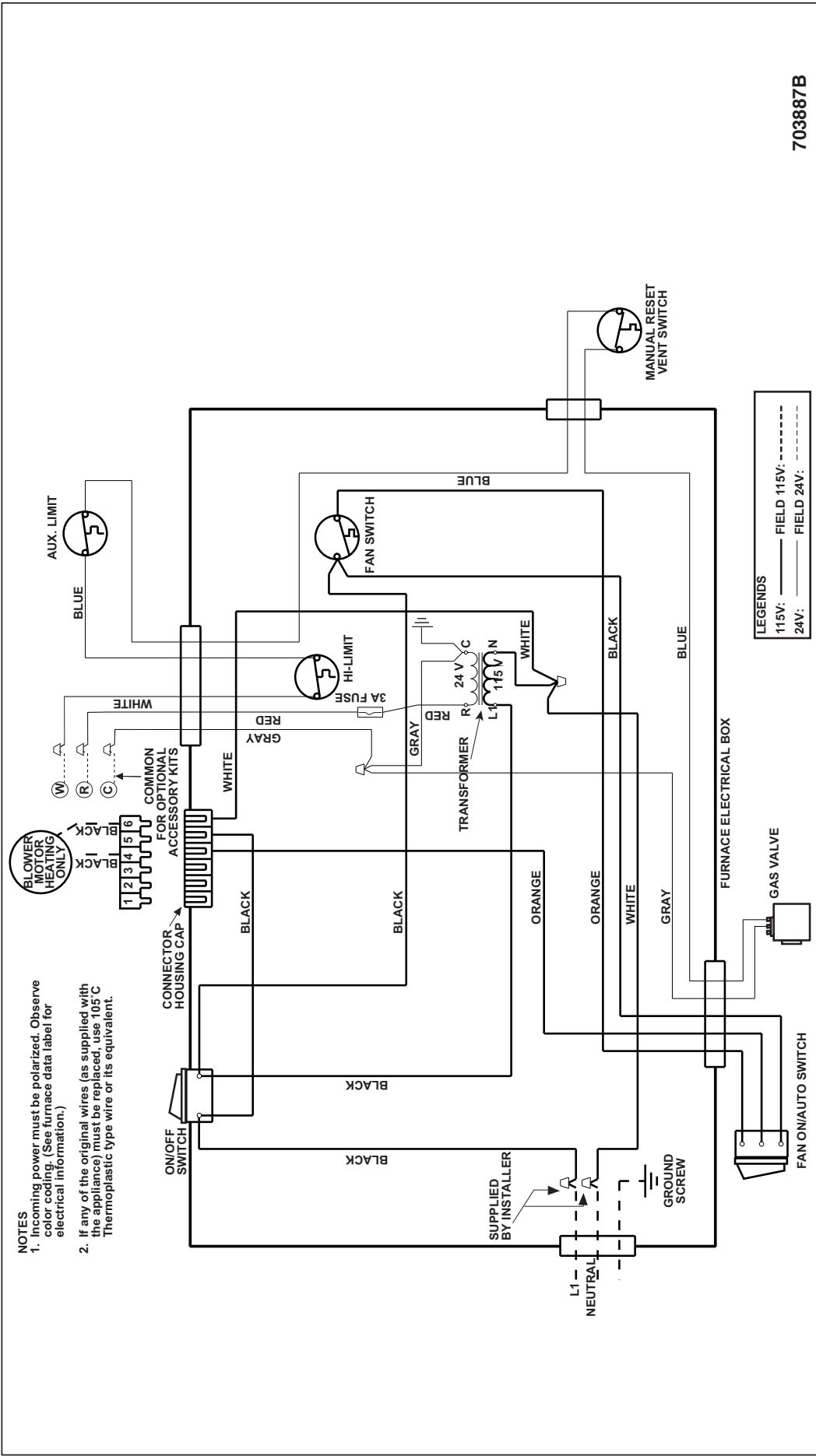


Figure 40. Gas Atmospheric Furnace, M1GH 056, 070 Models

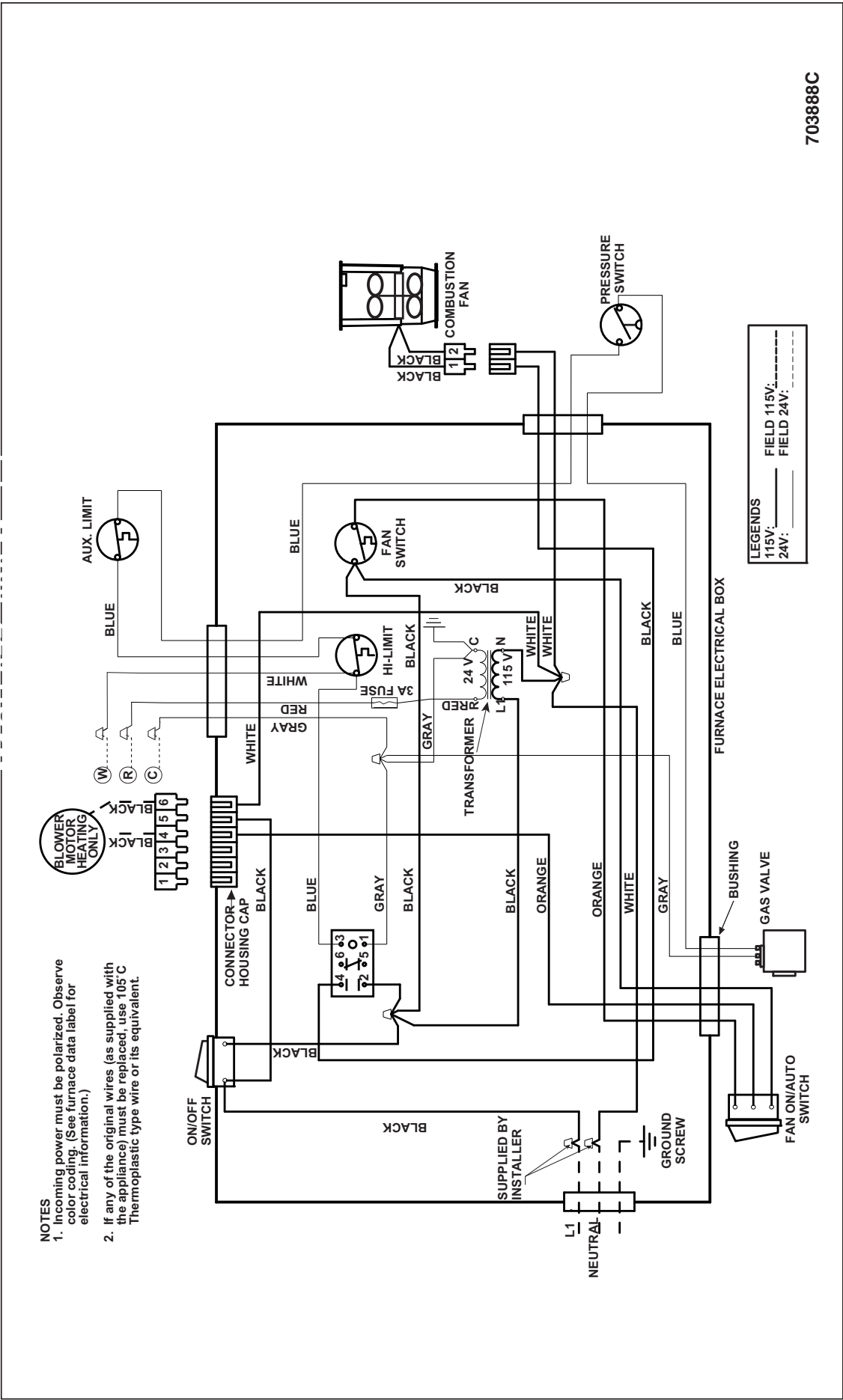


Figure 41. Standing Pilot with Induced Draft Furnace, M1GH 077, 090 Models

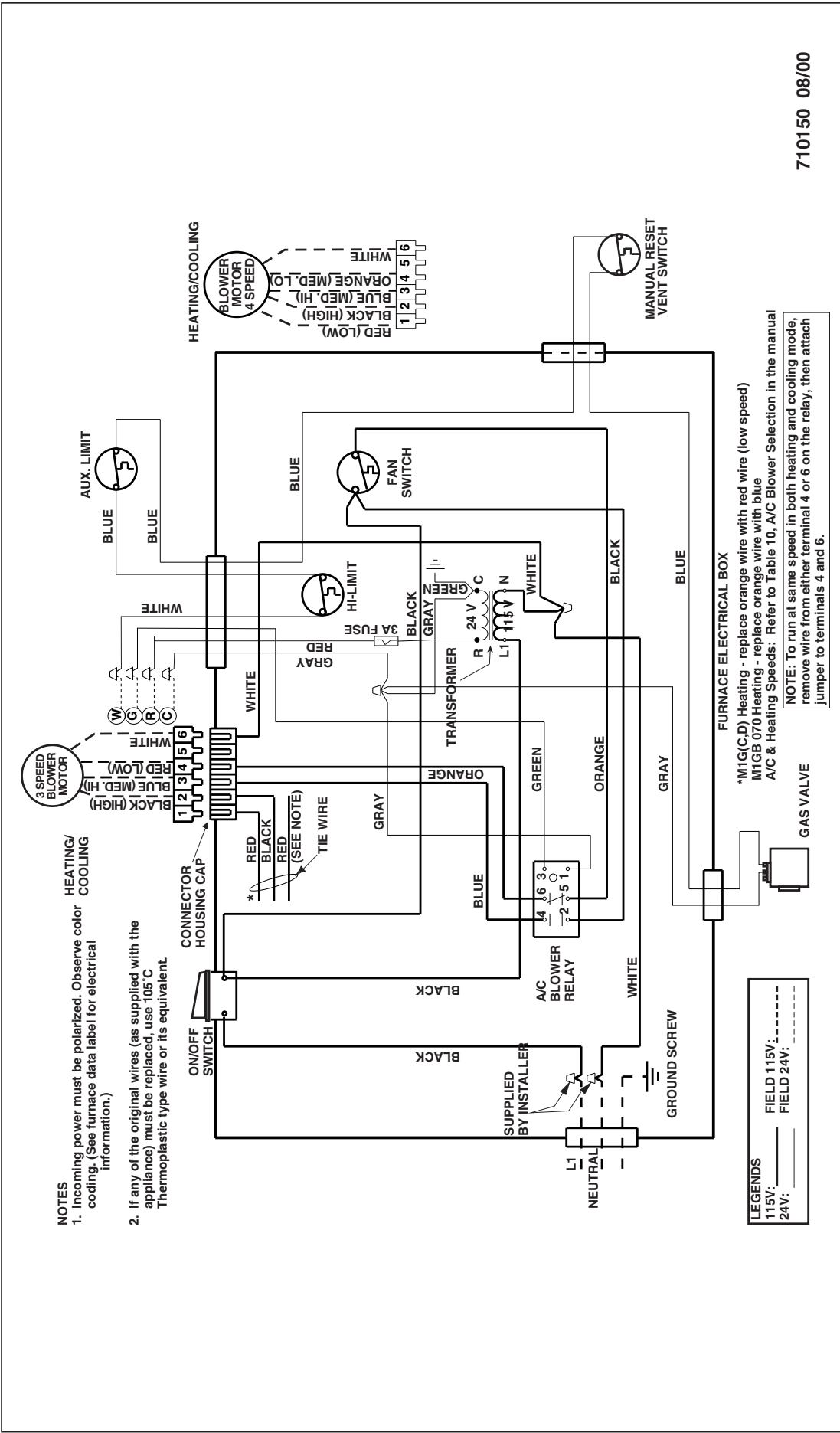


Figure 42. Gas Atmospheric Furnace, A/C Ready, M1G (B, C, D) 056, 070 Models

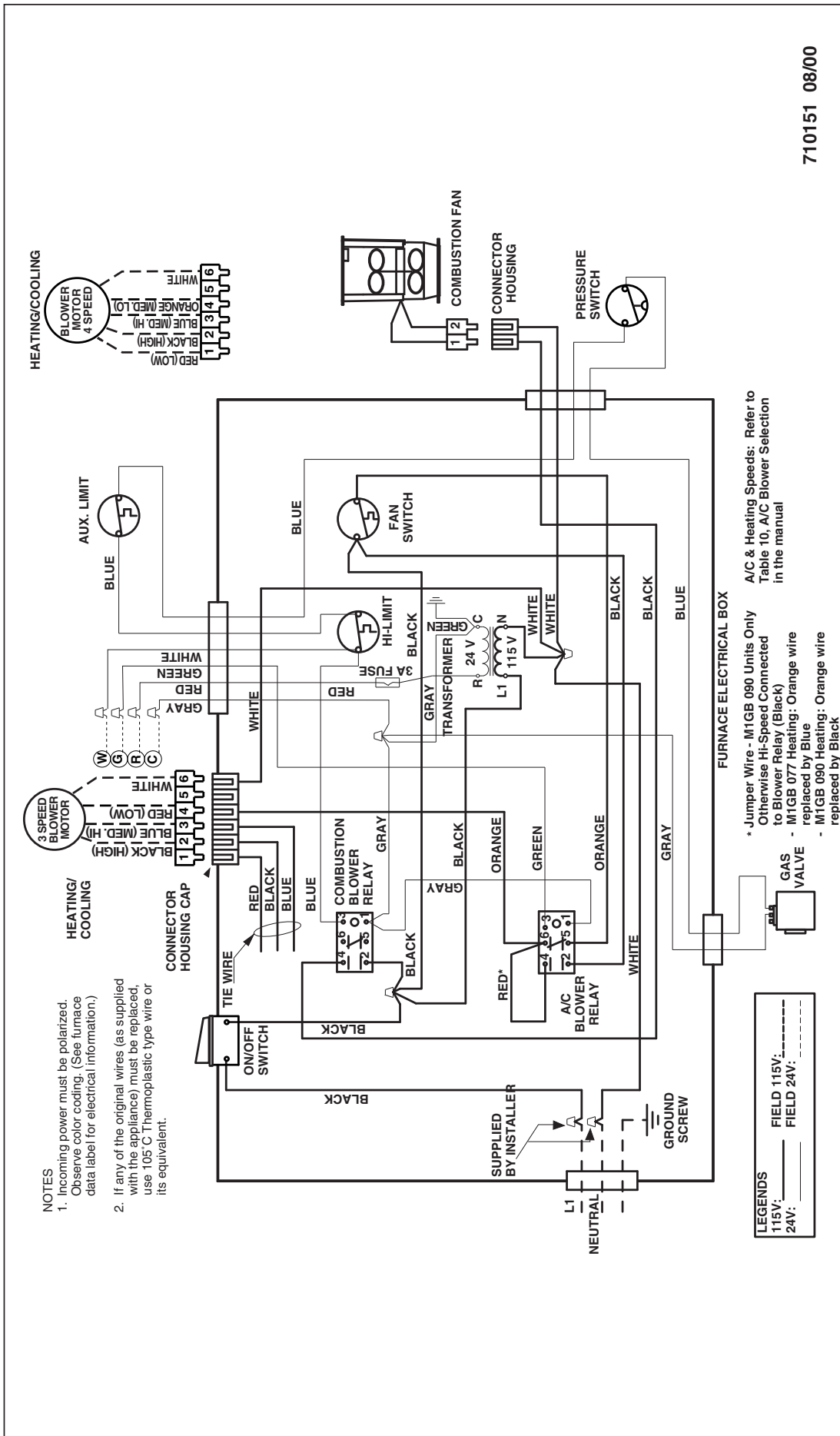
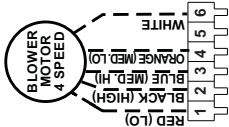


Figure 43. Standing Pilot with Induced Draft Furnace, A/C Ready M1G (B, C, D) 077, 090 Models

- NOTES**
1. Incoming power must be polarized. Observe color coding. (See furnace data label for electrical information.)
  2. If any of the original wires (as supplied with the appliance) must be replaced, use 105 C Thermoplastic type wire or its equivalent.

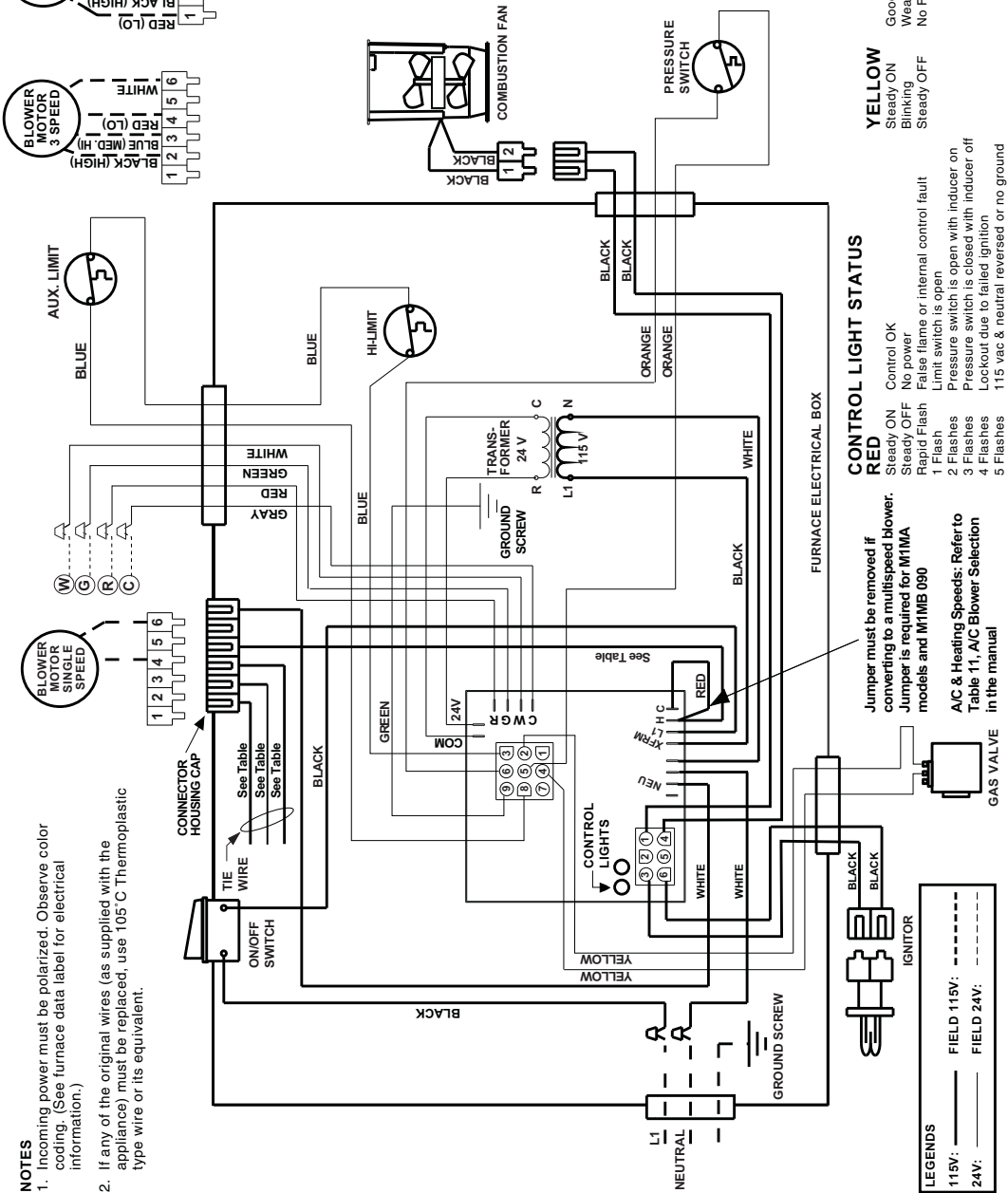


**Blower Wire Connections**

Furnace Model	Wire #1	Wire #2	Wire #3	Wire #4
M1MA 056/070/071/090	Red	Black	Blue	Orange
M1MB 056	Tie	Tie	Tie	Control Board "H"
M1MB 070/077	Tie	Control Board "C"	Control Board "H"	Control Board "H"
M1MB 90	Tie	Control Board "H"	Control Board "H"	Tie
M1M(C,D) 056/070	Control Board "H"	Control Board "H"	Control Board "C"	Control Board "C"
M1M(C,D) 077/090	Control Board "H"	Control Board "H"	Control Board "H"	Control Board "H"

**Blower Wire Table**

710152B



**CONTROL LIGHT STATUS**

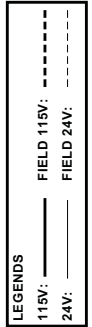
- RED**  
Steady ON Control OK  
Steady OFF No power  
Rapid Flash False flame or internal control fault  
1 Flash Limit switch is open  
2 Flashes Pressure switch is open with inducer on  
3 Flashes Pressure switch is closed with inducer off  
4 Flashes Lockout due to failed ignition  
5 Flashes 115 vac & neutral reversed or no ground

**YELLOW**

- Good Flame Signal  
Blinking Weak Flame Signal  
Steady OFF No Flame Signal

Jumpers must be removed if converting to a multispeed blower. Jumper is required for M1MA models and M1MB 090

A/C & Heating Speeds: Refer to Table 11, A/C Blower Selection in the manual



**Figure 44. Gas Direct Ignition Furnace, Heating & A/C Ready - All M1M Models**



## 21. EQUIVALENT ORIFICE SIZES AT HIGH ALTITUDES

(Includes 4% Input Reduction for Each 1,000 Feet)

FURNACE MODEL	ORIFICE SIZE AND OUTPUT CAPACITY	ALTITUDE - FEET									
		SEA LEVEL	2000	3000	4000	5000	6000	7000	8000	9000	10000
M1M/G 056	ORIFICE SIZE - NAT. GAS	29	29	30	30	30	30	31	31	31	32
	ORIFICE SIZE - LP	45	46	47	47	47	48	48	49	49	50
	OUTPUT- MBTUH	45.4	41.8	40.1	38.5	37.0	35.5	34.1	32.7	31.4	30.2
M1M/G 070	ORIFICE SIZE - NAT. GAS	24	25	26	27	27	28	28	29	29	30
	ORIFICE SIZE - LP	42	42	43	43	43	44	44	45	46	47
	OUTPUT- MBTUH	56.7	52.3	50.2	48.2	46.2	44.4	42.6	40.9	39.3	37.7
M1M 077	ORIFICE SIZE - NAT. GAS	21	23	23	24	25	26	27	28	28	29
	ORIFICE SIZE - LP	40	41	42	42	42	43	43	44	44	45
	OUTPUT- MBTUH	61.7	56.9	54.6	52.4	50.3	48.3	46.4	44.5	42.7	41.0
M1G 077	ORIFICE SIZE - NAT. GAS	21	23	23	24	25	26	27	28	28	29
	ORIFICE SIZE - LP	40	41	42	42	42	43	43	44	44	45
	OUTPUT- MBTUH	59.9	55.2	53.0	50.9	48.9	46.9	45.0	43.2	41.5	39.8
M1M 090	ORIFICE SIZE - NAT. GAS	17	18	19	19	20	21	22	23	24	26
	ORIFICE SIZE - LP	36	37	38	38	39	40	41	41	42	43
	OUTPUT- MBTUH	71.7	66.1	63.5	60.9	58.5	56.1	53.9	51.7	49.7	47.7
M1G 090	ORIFICE SIZE - NAT. GAS	17	18	19	19	20	21	22	23	24	26
	ORIFICE SIZE - LP	36	37	38	38	39	40	41	41	42	43
	OUTPUT- MBTUH	69.7	64.2	61.7	59.2	56.8	54.6	52.4	50.3	48.3	46.3
M1B 066	ORIFICE SIZE - NAT. GAS	26	27	28	28	28	29	29	30	30	30
	ORIFICE SIZE - LP	43	44	44	44	45	45	46	47	47	48
	OUTPUT- MBTUH	52.6	48.5	46.6	44.7	42.9	41.2	39.6	38.0	36.5	35.0
M1B 086	ORIFICE SIZE - NAT. GAS	18	19	19	20	21	22	23	24	26	27
	ORIFICE SIZE - LP	37	38	39	39	40	41	42	42	43	43
	OUTPUT- MBTUH	68.2	62.9	60.3	57.9	55.6	53.4	51.2	49.2	47.2	45.3

Table 12. High Altitude

Reference Sources: ANSI Z233.1 & NFPA 54, National Fuel Gas Code.

For Canadian high altitude (2,000 - 4,500'), reduce gas manifold pressure to 3.0" W.C. for natural gas and 9" W.C. for LP gas.

**NOTE:** Do not attempt to change the size of an orifice by drilling it out. To do so will void the manufacturer's warranty

**INSTALLER:** Please leave these installation instructions with the homeowner.



708672A

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O'Fallon, MO

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COMPLETE COMFORT. GENUINE VALUE.

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