

Installation Guidelines—Procedures

INTRODUCTION

Reference should also be made to the regulations of the serving gas supplier and the local building, heating, plumbing, or other codes in effect in the area in which the installation is made.

Portions of the following instruction have been adopted in part from the "National Fuel Gas Code" (NFPA No. 54-1984/ANSI Z223.1-1984) copyrighted by the National Fire Protection Association and American Gas Association. For further details, consult this publication, or the current edition available from National Fire Protection Association, Inc., Batterymarch Park, Quincy, MA 02269, or American Gas Association, 1515 Wilson Boulevard, Arlington, VA 22209.

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

Never store anything on, or in contact with, the furnace, such as:

Spray or aerosol cans, rags, brooms, dust mops, vacuum cleaners, or other cleaning tools.

Soap powders, bleaches, waxes, or other cleaning compounds, plastic or plastic containers, gasoline, kerosene, cigarette lighter fluid, dry cleaning fluids, or other volatile fluids.

Paint thinners and other painting compounds, paper bags or other paper products.

These instructions have the following sections:

- I. Inspection
- II. Location and Air for Ventilation
- III. Gas Piping
- IV. Combustion-Air, Vent, and Condensate Piping
- V. Electrical
- VI. Startup, Adjustment, and Safety Check
- VII. Accessory Hookup

I. INSPECTION

Check the available power supply to be sure that it meets the specifications on the furnace rating plate and all motors in the equipment.

Check the available gas supply to see that it conforms to the gas specification on the A.G.A. rating plate.

II. LOCATION AND AIR FOR VENTILATION

Locate the furnace as near the center of the air distribution system as possible.

⚠ CAUTION

The furnace must not be installed in an unconditioned space with possible ambient temperatures of 32 degrees F or lower.

NOTE: For proper furnace operation, the furnace must be installed within 1/2 inch of level.

This furnace may be located in a confined space without special provisions for dilution or ventilation air.

Provide ample space for servicing and cleaning. Always comply with the minimum fire protection clearances shown on the unit rating plate. This furnace must NOT be installed directly on carpeting, tile, or any combustible material other than wood flooring.

When a furnace is installed so that the supply ducts carry air to areas outside the space containing the furnace, the return air must also be handled by duct(s) sealed to the furnace casing and terminating outside the space containing the furnace to ensure there will not be a negative pressure condition within the equipment room or space.

A. Furnace Location Relative to Cooling Equipment

The cooling coil must be installed parallel with, or on the downstream side of, the furnace to avoid condensation in the heat exchanger. When installed parallel with a furnace, dampers or other means used to control the flow of air must prevent chilled air from entering the furnace. If the dampers are manually operated, they must be equipped with means to prevent operation of either unit unless the damper is in the full-heat or full-cool position.

B. Special Locations

When the furnace is installed in a residential garage, it must be installed so that it is protected from physical damage by vehicles.

When a furnace is installed in public garages, airplane hangars, or other buildings having hazardous atmospheres, the unit must be installed in accordance with the requirements of the National Fire Protection Association, Inc.

III. GAS PIPING

Gas piping must be installed in accordance with national and local codes.

The gas supply line should be a separate line running directly from the meter to the furnace, if possible. Refer to Table I for the recommended gas pipe sizing. It is best to slope all pipe 1/4 inch in 15 feet to prevent traps. All horizontal runs should slope away from the meter to risers. Risers should be used to connect to the furnace and to the meter.

Joint compounds (pipe dope) should be applied sparingly and only to the male threads of the joints. Consult your local gas supplier for the type of compound to be used. This pipe dope must be resistant to the action of LP (propane) gas.

Install a sediment trap in the riser leading to the furnace. This trap will serve as a trap for dirt and condensate. The trap can be installed by connecting a tee to the riser leading to the furnace, so that the straight-through section of the tee is vertical. Then connect a capped nipple into the lower end of the tee. The capped nipple should extend below the level of the gas controls. See Fig. 1.

Where a gum filter is required by local codes, install it in accordance with their requirements.

An accessible manual shut-off valve must be installed upstream of the furnace. A 1/8-inch NPT plugged tapping, accessible for test gauge connection, must be installed immediately upstream of the gas supply connection to the furnace and downstream of the manual shut-off valve.

⚠ CAUTION

Use a backup wrench when connecting gas pipe to furnace to avoid damaging gas controls.

Place a ground joint union between the gas control manifold and the manual shut-off valve. See Fig. 1.

⚠ WARNING

Use the proper length of pipes to avoid stress on the gas control manifold. A failure to adhere to this warning can cause a gas leak resulting in a fire, explosion, physical injury, or death.

TABLE I

Maximum Capacity of Pipe in Cubic Feet of Gas per Hour for Gas Pressures of 0.5 Psig (14 in. wc) or Less, and a Pressure Drop of 0.5 Inch Water Column (based on a 0.60 Specific Gravity Gas)

Nominal Iron Pipe Size Inches	Internal Diameter Inches	Length of Pipe, Feet				
		10	20	30	40	50
1/2	0.622	175	120	97	82	73
3/4	0.824	360	250	200	170	151
1	1.049	680	465	375	320	285
1-1/4	1.380	1400	950	770	660	580
1-1/2	1.610	2100	1460	1180	990	900

Ref: Table C-4 NFPA 54-1984

Protect all segments of the piping system against physical and thermal damage. Support all piping with appropriate straps, hangers, etc. Use a minimum of one hanger every 6 feet. For pipe sizes larger than 1/2 inch, follow the recommendations of national codes.

⚠ CAUTION

If a flexible connector is required or allowed by the authority having jurisdiction, black iron pipe must be installed at the gas valve and extend a minimum of 2 inches outside the furnace casing.

Piping should be pressure-tested in accordance with local and national plumbing and gas codes before the furnace has been attached. If the pressure exceeds 0.5 psig (14 in. wc), the gas supply pipe must be disconnected from the furnace before the pressure test. If the test pressure is equal to or

less than 0.5 psig (14 in. wc), close the manual shut-off valve located on the gas valve before the test. It is recommended that the ground joint union be loosened before pressure testing.

⚠ WARNING

Never purge a line into a combustion chamber. Never use matches, candles, flame, or other sources of ignition to check for gas leakage. Use a soap-and-water solution to check for leaks. A failure to adhere to this warning can cause a fire, explosion, physical injury or death.

After final connection to the furnace has been made, purge the lines and check for leakage with regulated gas supply pressure.

IV. COMBUSTION-AIR, VENT, AND CONDENSATE PIPING

Combustion-air and vent pipes for this unit can be of schedule-40 PVC, PVC-DWV, SDR-21 PVC, SDR-26 PVC, or ABS-DWV pipe and terminate through either the roof or a sidewall. Roof termination is preferable. Sidewall terminations must be located to prevent damage to shrubs and siding materials. See Table II for clearance requirements.

⚠ CAUTION

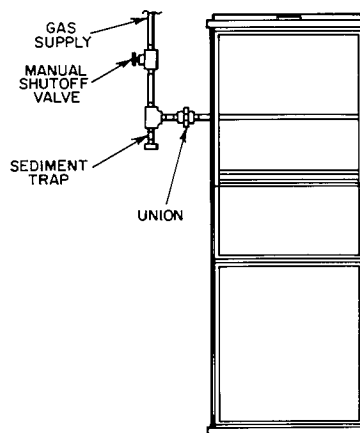
Combustion air must *not* be taken from inside the structure because that air frequently is contaminated by halogens, which include fluorides, chlorides, bromides, and iodides. These elements are found in aerosols, detergents, bleaches, cleaning solvents, salts, air fresheners and other household products. Vapors from these products are highly corrosive to gas-fired furnaces, even in extremely low concentrations (as low as 0.5 ppm).

Maintain a minimum of 36-in. between combustion-air inlet and clothes-dryer vent.

Locate the combustion-air inlet as far as possible from the swimming pool and swimming pool pump house.

TABLE II—COMBUSTION-AIR AND VENT TERMINAL CLEARANCES

Location	Clearance Feet
Dryer vent	3
From plumbing vent stack	3
Gas appliance vent terminal	4
From any opening where vent gases could enter building	1
Above grade and anticipated snow depth	1
Above grade when adjacent to public walkway	7



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Fig. 1—Gas Piping Arrangement

⚠ CAUTION

Keep the combustion-air pipe inlet as far as possible from the swimming pool and swimming pool pump house.

NOTE: When a previously common-vented system (furnace and water heater) is converted to water heater only, the vent system may be drastically oversized for the water heater. Consult the National Fuel Gas Code for proper sizing of the vent and revise the system if necessary.

⚠ CAUTION

When the vent pipe is exposed to temperatures below freezing i.e. when it passes through an unheated space or when a chimney is used as a raceway, the pipe must be insulated with 1/2-inch thick Armaflex-type insulation.

⚠ CAUTION

When the combustion-air pipe is installed above a suspended ceiling, the pipe must be insulated with 1/2-inch Armaflex-type insulation. The combustion-air pipe should also be insulated when it passes through a warm humid space.

A. Combustion-Air and Vent Piping

The combustion-air and vent pipes and fittings must conform to American National Standards Institute (ANSI) standards and American Society for Testing and Materials (ASTM) standards D1785, D2661, D2241, or D2665. The pipe cement and primer must conform to ASTM D2235 or D2564. See Table III for maximum allowable pipe lengths and Figs 2 through 7 for piping arrangements.

⚠ WARNING

Solvent cements are combustible. Keep away from heat, sparks, and open flame. Use only in well ventilated areas. Avoid breathing of the vapor and contact with the skin or eyes. A failure to adhere to this warning can cause a fire, explosion, physical injury, or death.

**TABLE III—MAXIMUM ALLOWABLE LENGTH
USING 2-IN. DIAMETER PIPE***

Altitude (feet above sea level)	Furnace Size	Number of 90 Degree Elbows†‡				
		1	2	3	4	5
0-2000	060	35	35	35	35	35
	080	35	35	35	35	35
2001-3000	060	35	35	35	32	29
	080	35	35	35	32	29
3001-4000	060	35	35	31	28	24
	080	35	35	31	28	24
4001-5000	060	35	33	29	26	22
	080	35	33	29	26	22
5001-6000	060	34	30	26	22	18
	080	34	30	26	22	18
6001-7000	060	32	28	24	20	16
	080	32	28	24	20	16
7001-8000	060	29	25	20	16	11
	080	29	25	20	16	11
8001-9000	060	27	23	18	14	9
	080	27	23	18	14	9
9001-10,000	060	25	20	15	10	5
	080	25	20	15	10	5

*Pipe length applies to both combustion-air and vent pipes.

†Elbows and pipe section supplied in the vent terminal kit should not be included in the count.

‡Two 45-degree elbows are equal to one 90-degree elbow. Long radius elbows are desirable.

⚠ WARNING

All combustion-air and vent pipes must be airtight and watertight. The pipes must also terminate exactly as shown in Figs 2 through 7.

The furnace is shipped from the factory assembled for right-hand vent pipe connection. When left-hand vent connection is desired, interchange the rubber vent pipe connector with the rubber seal cap. Both the vent pipe connector and the seal cap are located on the inducer outlet box. Remove the plastic plug from the left-hand casing side panel and install it in the right-hand casing side panel.

1. Determine maximum allowable pipe length (for applications from 0 to 10,000 feet above sea level) using Table III.

Example: An 060-size furnace located in Albuquerque requires 13 feet of vent pipe, two 90-degree elbows and two 45-degree elbows for the vent pipe. Using Table III, the maximum allowable pipe length at 5250 feet above sea level with three elbows is 26 feet of 2-in. pipe; therefore, this venting arrangement will be okay.

Consult Application Engineering when pipe length of combustion-air or vent pipe needed is longer than allowed in Table III.

NOTE: Do not count the elbows to which the terminal bracket attaches or any elbow between the bracket and open end of the pipe.

2. Working from furnace to outside, cut pipe to required length(s).
3. Deburr inside and outside of pipe.
4. Chamfer outside edge of pipe for better distribution of primer and cement.
5. Clean and dry all surfaces to be joined.
6. Check "dry fit" of pipe and mark insertion depth on pipe.

NOTE: It is recommended that all pipes be cut, prepared, and preassembled before permanently cementing any joint.

8. After pipes have been cut and preassembled, apply generous layer of cement primer to pipe fitting socket and end of pipe to insertion mark. Quickly apply approved cement to end of pipe and fitting socket (over primer). Apply cement in light, uniform coat on inside of socket to prevent buildup of excess cement. Apply second coat.
9. While the cement is still wet, insert pipe into socket with a 1/4-turn twist. Be sure pipe is fully inserted into the fitting socket.
10. Wipe excess cement from joint. A continuous bead of cement will be visible around the perimeter of a properly made joint.
11. Handle pipe joints carefully until cement sets.
12. Support piping at minimum of every 5 feet (3 feet for SDR-21 or -26 PVC) using perforated metal hanging strap. Slope combustion-air and vent pipes toward furnace a minimum of 1/4 inch per lineal foot with no sags between hangers.
13. Use appropriate methods to seal openings where vent and combustion-air pipes pass through roof or sidewall.

B. Vent Terminal Kit Installation

NOTE: If these instructions differ from those packaged with the vent terminal kit, follow the kit instructions.

The combustion-air and vent pipes must terminate outside

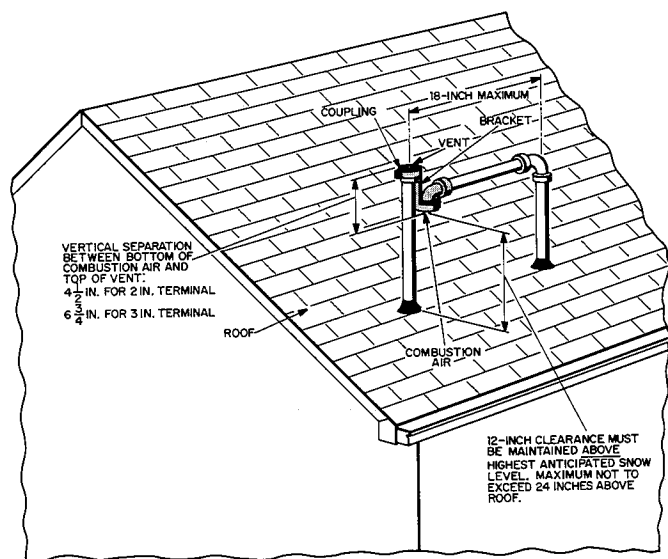
the structure. A factory-supplied termination kit must be installed as in one of the installations shown in Figs. 2 through 7. Roof termination is preferred. See Fig. 2. Two terminal kits are available. The 2-inch kit is for 1-1/2-inch and 2-inch diameter pipe systems. The 3-inch kit is for 2-1/2-inch and 3-inch diameter pipe systems. Each kit will have extra parts. See Figs. 2 through 7 for the different applications.

The shaded parts in Figs. 2 through 7 are provided in the termination kit; therefore, do not count them when determining the pipe diameter.

1. Rooftop terminal installation. See Figs. 2 and 3.
 - a. Remove one 90-degree elbow from elbow-and-bracket assembly provided in kit and loosen screw so other elbow can turn.
 - b. Loosely install elbow with bracket on combustion-air pipe.
 - c. Loosely install pipe coupling, provided in kit, on properly cut vent pipe. The position of the coupling must be so that the bracket will mount as shown in Fig. 2.
 - d. Disassemble loose pipe fittings. Clean and cement using same procedures as used for system piping.
 - e. Install bracket as shown in Fig. 2.
 - f. For applications using combustion-air pipe option as shown in Fig. 3, install 90-degree street ell into 90-degree elbow, making a U-fitting.
 - g. Install open end of street ell on combustion-air pipe.
2. Sidewall terminal installation when combustion-air and vent pipes exit through sidewall 12 inches or more above highest anticipated snow level or grade. See Figs. 4 and 5.

NOTE: The arrangement in Fig. 4 is preferred. The arrangement in Fig. 5 is an option for the vent pipe only.

- a. Loosely install elbow and bracket assembly on combustion-air and vent pipes.
- b. Remove and disassemble elbow and bracket assembly.
- c. Install elbows as shown in Figs. 4 or 5 using same procedures for cementing as used for system piping.
- d. Install bracket as shown in Fig. 4 or 5.



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Fig. 2—Rooftop Termination

- e. Position vent pipe assembly so as to maintain 12-inch separation between vent pipe outlet and combustion-air inlet. Cement vent pipe in elbow as shown in Fig. 4 or 5.
 - f. For applications using vent pipe option as shown in Fig. 5, rotate vent elbow 90 degrees from position shown in Fig. 4.
3. Sidewall terminal installation when combustion-air and vent pipes exit through sidewall below highest anticipated snow level or grade. See Figs. 6 and 7.

NOTE: The arrangement in Fig. 6 is preferred. The arrangement shown in Fig. 7 is an option for the vent pipe only.

- a. Remove one elbow from bracket assembly.
- b. Install 90-degree street ell into elbow remaining in bracket, making U-fitting.
- c. Loosely install coupling on end of vent pipe.
- d. Loosely install U-fitting and bracket as shown in Fig. 6. Position U-fitting so open end is against structure wall.
- e. Loosely install vent pipe assembly in coupling as shown in Fig. 6 or 7.
- f. Check required dimensions as shown in Fig. 6 or 7.
- g. Disassemble loose pipe fittings. Clean and cement using same procedures as used for system piping.
- h. Install bracket as shown in Fig. 6 or 7.

C. Condensate Drain

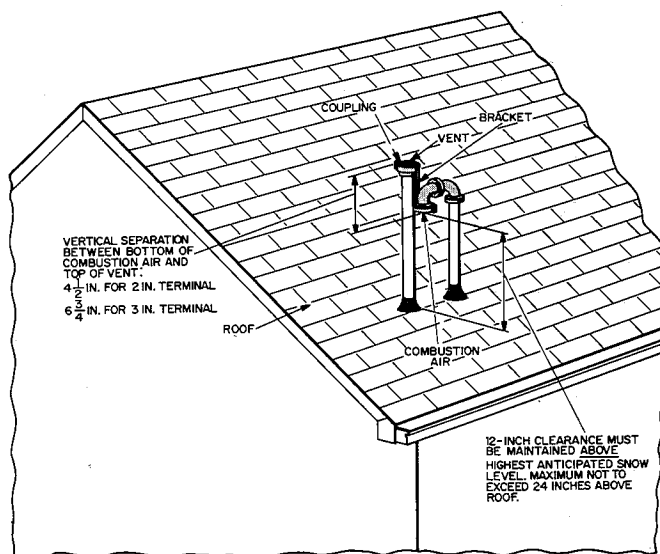
The 1/2-inch diameter schedule 40 PVC or CPVC condensate drain pipe fittings must conform to ANSI standards and ASTM D1785 and D2846. The schedule 40 PVC or CPVC cement and primer must conform to ASTM F493 or D2564.

For proper condensate drainage from the furnace, the furnace must be within 1/2 inch of level. That is, the highest corner of the furnace must not be more than 1/2 inch higher than the lowest corner.

When a condensate pump is required to dispose of condensate, use a pump with parts that are resistant to acidic water.

NOTE: The furnace contains an internal condensate trap; an external trap must not be installed.

1. Determine which side of furnace drain will exit, then



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Fig. 3—Rooftop Termination

cut and preassemble drain piping (not provided) directly to an open drain. Refer to Section IV A, "Combustion-Air and Vent Piping", for instructions on preparing and cementing plastic pipe.

2. Cement elbow on pipe assembly (provided) to condensate trap mounted on blower housing.
3. Using backup wrench, attach first section of drain pipe to compression coupling (provided).
4. When using schedule 40 PVC drain pipe, connect adapter (provided) to end of pipe installed in compression fitting.
5. Attach schedule 40 PVC adapter (field-supplied) to threaded factory adapter.
6. Cement remaining pipe joints.

V. ELECTRICAL

IMPORTANT: Before proceeding with the electrical con-

nections, make certain that voltage, frequency, and phase correspond to that specified on the unit rating plate. Also, check to be sure that the service provided by the utility is sufficient to handle the load imposed by this equipment. Refer to the unit rating plate for equipment electrical requirements.

The specific furnace Installation Instructions contain wiring diagrams which show the proper field high- and low-voltage wiring. Make all connections in accordance with the National Electrical Code and any local codes and ordinances that might apply.

⚠ WARNING

The cabinet must have an uninterrupted or unbroken ground according to the National Electrical Code, ANSI/NFPA 70-1987, and local codes to minimize personal injury if an electrical fault should occur. The ground may consist of electrical wire or metallic conduit approved to electrical ground when installed in accordance with existing electrical codes. **DO NOT** use gas supply piping as an electrical ground.

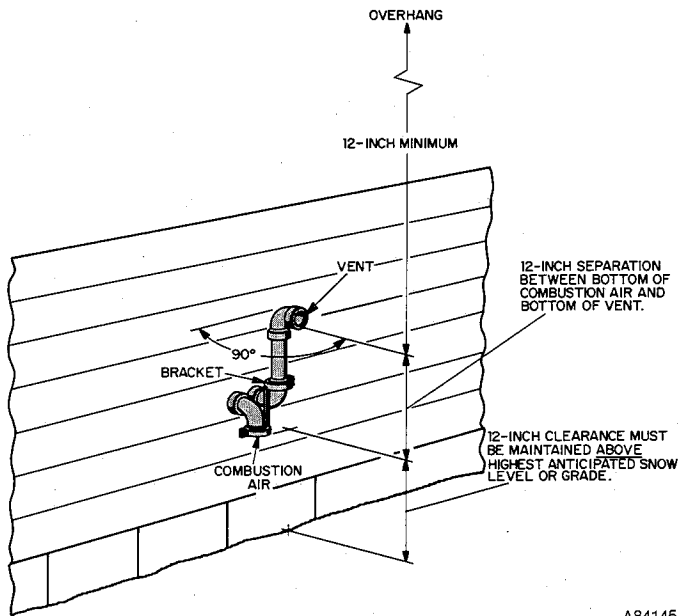


Fig. 4—Sidewall Termination Above Snow Level or Grade (Preferred)

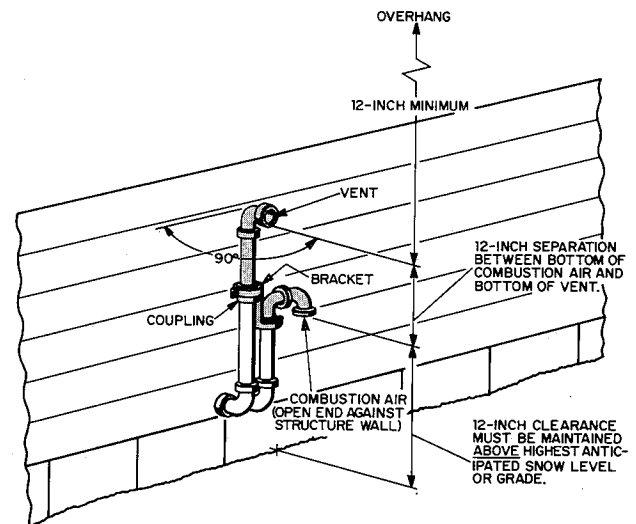


Fig. 6—Sidewall Termination Below Snow Level or Too Close to Grade (Preferred)

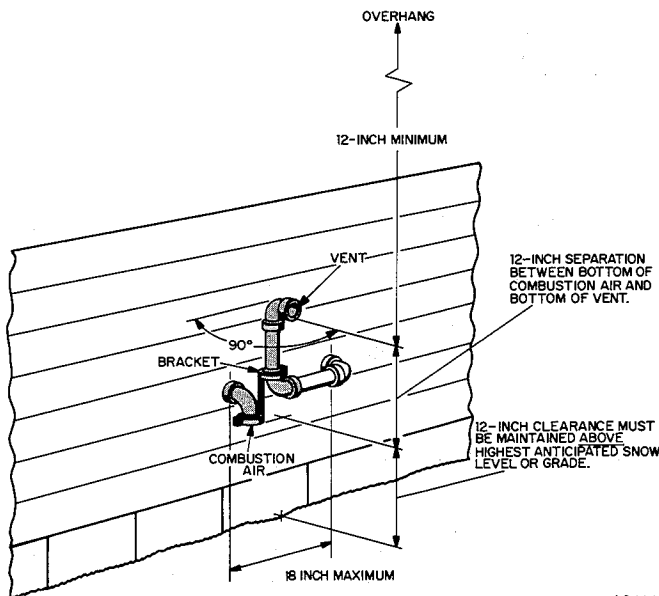


Fig. 5—Sidewall Termination Above Snow Level or Grade (Option)

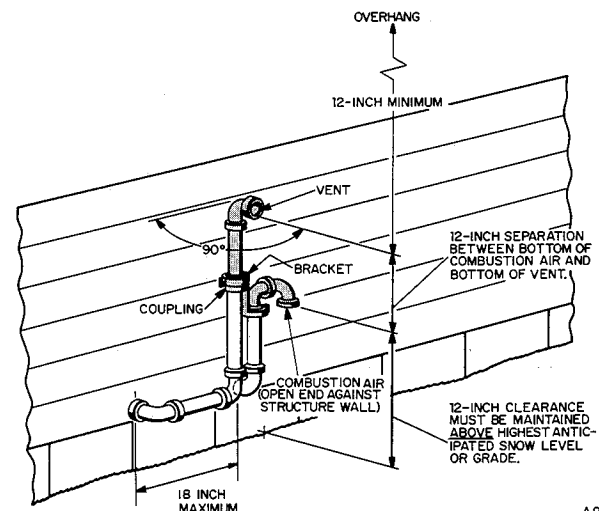


Fig. 7—Sidewall Termination Below Snow Level or Too Close to Grade (Option)

▲ CAUTION

If a manual disconnect switch is to be mounted on the furnace, select a location where a drill or fastener will not contact electrical or gas components.

NOTE: Use only copper conductors between the disconnect switch and the furnace.

Check all electrical connections (both factory and field) for tightness. This check should also be done after the unit has reached operating temperatures.

VI. STARTUP, ADJUSTMENT, AND SAFETY CHECK

A. Fill condensate trap with water.

1. Disconnect condensate drain tube from inducer outlet box.
2. Insert funnel into tube and pour one quart of water into tube. This should overflow the trap and flow into an open drain.
3. Reconnect drain tube to inducer outlet box.

B. Ignition System Check

Check to be sure that all connections have been properly made, then proceed as follows:

Start the furnace using the procedure outlined on the Lighting Instructions attached to the furnace; however, when starting the furnace for the first time, perform the following additional steps:

1. If the gas supply were not purged before connecting the furnace, the line will be full of air. It is recommended that the ground joint union be loosened, and the supply line be allowed to purge until the odor of gas is detected. Never purge gas lines into a combustion chamber. Immediately upon detection of a gas odor, retighten the union. Allow 5 minutes to elapse, then start the furnace in accordance with the instructions on the furnace lighting instructions.
2. After the pilot lights, the main burners should light in 25 to 75 seconds. If the main burners do not light within the prescribed time period, adjust the pilot flame, allow the pilot to cool for 5 minutes, and repeat the time check.
3. Locate pilot adjusting screw on top of valve:
 - a. Remove cap screw; turn pilot adjust screw counterclockwise to decrease burner-on time delay, clockwise to increase burner-on time delay.
 - b. Replace cap screw.

C. Gas Input

1. Determine gas input rates during low- and high-fire operation.

NOTE: Be sure all pressure tubing, combustion-air and vent pipes, and burner enclosure front are in place when clocking the gas meter.

- a. Turn off all other gas appliances and pilots.
- b. Measure time (in seconds) for gas meter test dial to complete one revolution.
- c. Refer to Table V for cubic ft of gas per hour.
- d. Multiply cfm x Btu/cu ft. Obtain heating value from local gas utility.
- e. Measured gas input must not exceed gas input on unit rating plate.
2. To adjust input rate:
 - a. Remove burner enclosure front and, using Allen key, loosen Allen-head screw that locks high-fire solenoid in place. See Fig. 10.

- b. Put setup switch No. 3 on microprocessor control board in ON position to provide continuous high-fire operation. See Fig. 11.
- c. Turn high-fire solenoid either counterclockwise (out) to decrease high-input rate or clockwise (in) to increase high-input rate, DO NOT change manifold pressure more than 0.3 in. wc. Make any major adjustments by changing main burner orifices.

NOTE: Manifold pressure must always be measured with the burner enclosure front removed. The gas meter must always be clocked with the burner enclosure front installed.

- d. Tighten Allen-head screw for locking high-fire solenoid in place and return setup switch No. 3 on microprocessor control board to OFF position.
- e. Put setup switch No. 2 on microprocessor control board in ON position to provide continuous low-fire operation.
- f. Locate Allen-head screw in center of high-fire solenoid. See Fig. 10.
- g. Using Allen key turn Allen-head screw either clockwise (in) to increase low-fire input rate or counterclockwise (out) to decrease low-fire input rate.
- h. Return setup switch No. 2 on microprocessor control board to OFF position.
- i. Replace burner enclosure front and recycle furnace before measuring adjusted gas input using method outlined in step 1.

TABLE IV—GAS RATE—CU FT/HR

Seconds for One Revolution	SIZE OF TEST DIAL			Seconds for One Revolution	SIZE OF TEST DIAL		
	1 cu ft	2 cu ft	5 cu ft		1 cu ft	2 cu ft	5 cu ft
10	360	720	1800	50	72	144	360
11	327	655	1636	51	71	141	355
12	300	600	1500	52	69	138	346
13	277	555	1385	53	68	136	340
14	257	514	1286	54	67	133	333
15	240	480	1200	55	65	131	327
16	225	450	1125	56	64	129	321
17	212	424	1059	57	63	126	316
18	200	400	1000	58	62	124	310
19	189	379	947	59	61	122	305
20	180	360	900	60	60	120	300
21	171	343	857	62	58	116	290
22	164	327	818	64	56	112	281
23	157	313	783	66	54	109	273
24	150	300	750	68	53	106	265
25	144	288	720	70	51	103	257
26	138	277	692	72	50	100	250
27	133	267	667	74	48	97	243
28	129	257	643	76	47	95	237
29	124	248	621	78	46	92	231
30	120	240	600	80	45	90	225
31	116	232	581	82	44	88	220
32	113	225	563	84	43	86	214
33	109	218	545	86	42	84	209
34	106	212	529	88	41	82	205
35	103	206	514	90	40	80	200
36	100	200	500	92	39	78	196
37	97	195	486	94	38	76	192
38	95	189	474	96	38	75	188
39	92	185	462	98	37	74	184
40	90	180	450	100	36	72	180
41	88	176	439	102	35	71	178
42	86	172	429	104	35	69	173
43	84	167	419	106	34	68	170
44	82	164	409	108	33	67	167
45	80	160	400	110	33	65	164
46	78	157	391	112	32	64	161
47	76	153	383	116	31	62	155
48	75	150	375	120	30	60	150
49	73	147	367				

▲ CAUTION

Be sure burner enclosure front is in place after adjustments have been made.

3. Look through sight glass in burner enclosure and check burner and pilot flame. The main burner flame should be clear blue, almost transparent. The pilot flame should be well defined. See Fig. 8.

4. High Altitude

Input ratings are for altitudes up to 2000 feet. Ratings for altitudes over 2000 feet must be 4% less for each 1000 feet above sea level. To obtain the altitude adjusted rating, adjust the manifold pressure and replace the main burner orifices.

D. Temperature Rise

The furnace must not be operated outside the range of temperature rise specified on the unit rating plate. Determine the air temperature rise as follows:

1. Place thermometers in return and supply ducts as near furnace as possible. Be sure thermometers do not "see" heating element so that radiant heat does not affect readings. This practice is particularly important with straight-run ducts.
2. When thermometer readings stabilize, subtract return-air temperature from supply-air temperature to determine air temperature rise.

NOTE: Temperature rise can be determined for low-fire operation by placing setup switch No. 2 on microprocessor control board in the ON position. For high-fire operation return setup switch No. 2 to the OFF position and place setup switch No. 3 in the ON position. DO NOT forget to return setup switches to OFF position upon completion. See Fig. 11.

3. This furnace is capable of automatically providing the proper airflow to maintain the temperature rise within the range specified on the unit rating plate. If the temperature rise is outside this range do the following:
 - a. Check gas input for low- and high-fire operation.
 - b. Check derate for altitude if applicable.
 - c. Check all return and supply ducts for excessive restrictions causing static pressure greater than 0.5 in. wc.

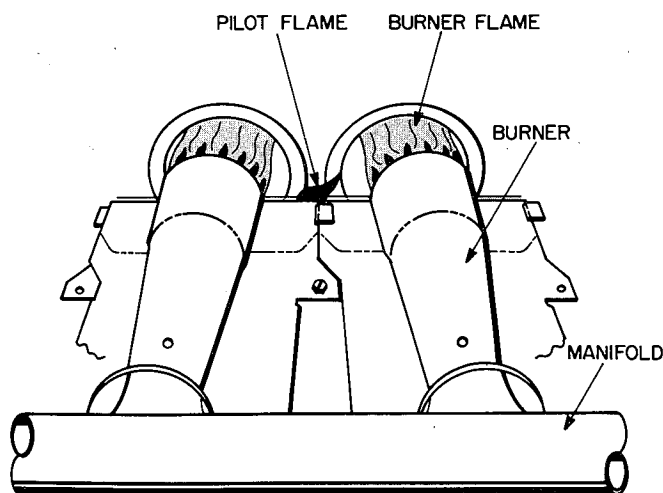


Fig. 8—Pilot and Burner Flame

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- d. Check to make sure bypass humidifier switch on microprocessor control board is in ON position when a bypass humidifier has been installed. See Fig. 11.

- e. Check "Troubleshooting Guide for Deluxe Gas-Fired Condensing Furnace."

E. Thermostat Heat Anticipator Adjustment

The thermostat heat anticipator must be set to match the amp draw of the components in the R-W circuit while operating in low heat. Accurate amp draw measurements can be obtained at the thermostat subbase terminals R & W.

Fig. 9 illustrates an easy method of obtaining these measurements. The amp reading should be taken while the furnace is operating in the low-heat mode.

F. Safety Check of Limit Control

The control shuts off the combustion gas supply and energizes the circulating-air blower motor if the furnace overheats.

The recommended method of checking this limit control is to gradually block off the return air after the furnace has been operating for a period of at least 5 minutes. As soon as the limit control functions, the return-air opening should be unblocked to permit normal air circulation. By using this method to check the limit control, it can be established that the limit is functioning properly and the furnace will "fail-safe" if there is a restricted circulating air supply or motor failure. If the limit control does not function during this test, the cause must be determined and corrected.

G. Safety Check of Flow-Sensing Switch

This control proves operation of the draft inducer.

Check switch operation as follows:

1. Turn off 115-volt power to furnace.
2. Remove control access panel and disconnect ECM inducer motor leads at 6-circuit connector on ECM inducer control box.
3. Turn on 115-volt power to furnace.
4. Set thermostat to "call for heat." When the flow-sensing switches are functioning properly, fault 42 will flash on the LED fault display 10 seconds after the thermostat switch is closed. If either fault 31 or 32 is flashed when the ECM inducer motor is disconnected, the furnace will shut itself down immediately. Determine the reason the flow-sensing switches did not function and correct the condition.

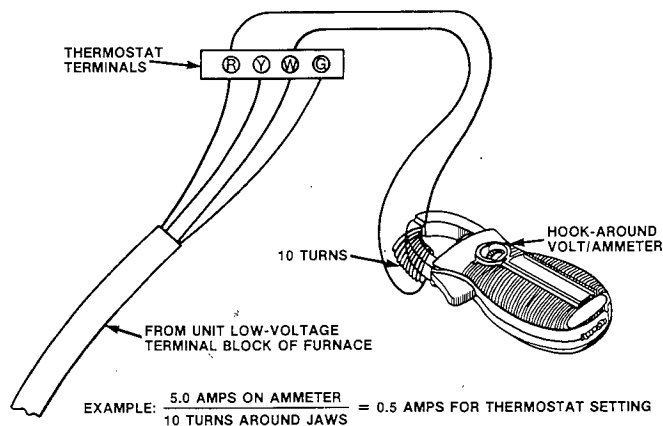


Fig. 9—Amp Draw Check With Ammeter

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5. Turn off 115-volt power to furnace.
6. Reconnect inducer motor leads, reinstall control access panel, and turn on 115-volt power supply.

VII. ACCESSORY HOOKUP (Electronic Air Cleaner and/or Humidifier)

An isolated set of normally open contacts (not connected to 24VAC or 120VAC) are available to operate any accessory such as an electronic air cleaner or humidifier. The relay contact will close whenever the blower motor is operating. These contacts are accessible by two 1/4-inch quick-connects mounted directly on the relay as shown in Fig. 11. Wire leads with quick-connects have been supplied as part of the control box wiring to simplify hookup per the three possible combinations shown in Figs 12, 13, or 14.

A. Wiring Procedure

The following steps should be performed by a qualified service person.

1. Turn off power at main disconnect.
2. Remove control and blower access panels.
3. Remove control box cover from control box.
4. Snip wire tie that surrounds accessory hookup leads shown in Fig. 11.

NOTE: See steps 5 thru 11 for 120-volt accessory hookup. See steps 12 thru 17 for 24-volt accessory hookup.

5. Locate black pigtail lead from 120-volt terminal block (TB) and cut off tip of insulator, allowing 1/4-inch quick-connect to be used.
6. Attach black pigtail to COM terminal on accessory relay ACCR.
7. Cut black wire connected to NO terminal on ACCR and discard loose end.
8. Strip loose end of wire connected to NO terminal on ACCR.
9. Using field-supplied wirenut, connect 120-volt accessory power lead to black wire connected to NO terminal of ACCR.

10. Connect other 120-volt accessory power lead to white pigtail lead from 120-volt TB. Use either butt connector supplied on end of pigtail or cut and strip pigtail end and wirenut, together.

NOTE: If accessory has an internally grounded power lead, it must be connected as in step 10.

11. Go to step 18 for remaining 120-volt procedures.

Steps 12 thru 17 detail the connection of 24-volt to the ACCR. See Fig. 14.

12. Cut black wire connected to ACCR NO terminal approximately 3 inches from relay end.
13. Connect loose wire to ACCR COM terminal.
14. Strip loose ends of both black leads connected to ACCR.
15. Connect longer lead to control board thermostat R terminal.
16. Using field-supplied wirenut, connect 24-volt accessory power lead to short lead connected to ACCR NO terminal.
17. Connect 24-volt accessory lead to control board thermostat C terminal.

NOTE: If accessory has an internally grounded power lead, it must be connected as in step 17.

18. Reinstall control box cover.
19. Reinstall blower access panel.
20. Turn on gas and electrical supplies to unit.
21. Check unit for proper operation through two complete cycles.
22. Reinstall control access panel.

NOTE: If a bypass humidifier is used, bypass humidifier switch on the microprocessor control board must be put in ON position to increase the low-heat blower motor speed. This prevents nuisance limit trips caused by the increase in return-air temperature caused by the bypass from the humidifier. See Fig. 11 for location of BHP setup switch.

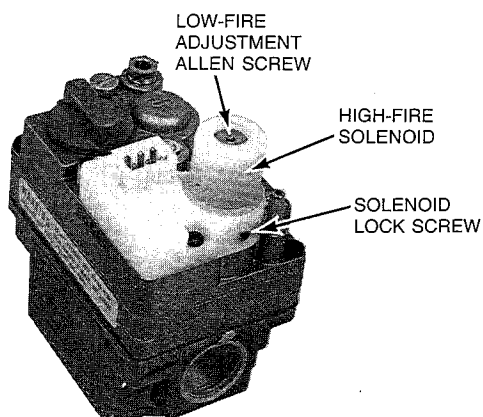


Fig. 10—Gas Valve

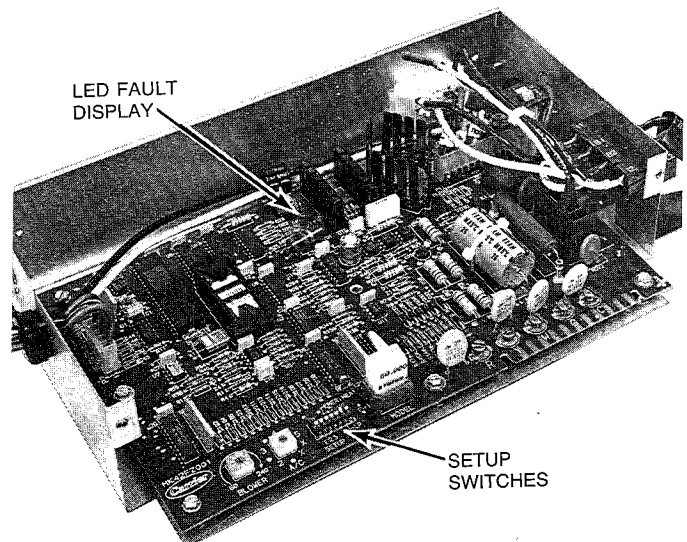


Fig. 11—Microprocessor Control Center

B. MODULATING Damper System

For proper furnace operation, follow the installation, startup, and adjustment instructions provided by the modulating damper system manufacturer. In addition, the multi-zone switch (labeled MZ on the microprocessor control board) must be put in the ON position so that the microprocessor can vary the blower speed to compensate for dampers that may have modulated closed during any given heating or cooling cycle. See Fig. 11 for location of multi-zone setup switch MZ.

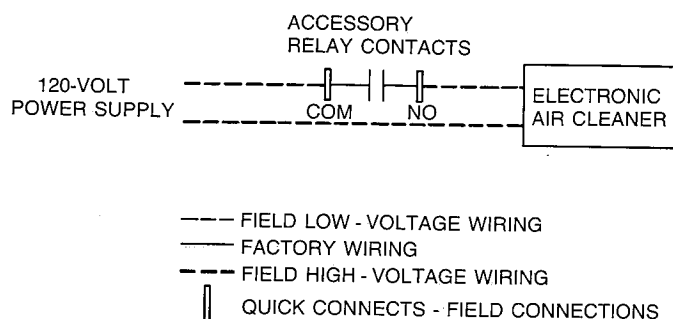
C. Electrical Noise and Interference

This equipment generates and uses radio frequency energy and, if not installed and used properly (that is, in strict accordance with the manufacturer's instructions), may cause interference to radio and television reception. It has been tested and found to comply with the limits for a Class B computing device in accordance with the specifications in Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference in a residential installation. However, there is no guarantee that

interference will not occur in an installation. If this equipment does cause interference to radio or television reception (which can be determined by turning the equipment off and on), the user is encouraged to try to correct the interference by one or more of the following measures:

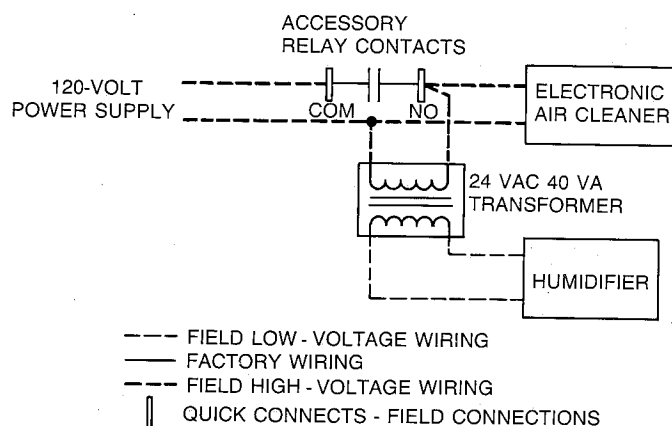
1. Reorient receiving antenna.
2. Relocate receiver with respect to equipment.
3. Move receiver away from equipment.
4. Plug receiver into different outlet so that equipment and receiver are on different branch circuits.

If necessary, the user should consult the dealer or an experienced radio/television technician for additional suggestions. The following booklet prepared by the Federal Communications Commission may be helpful: *"How to Identify and Resolve Radio-TV Interference Problems."* This booklet is available from the U.S. Government Printing Office, Washington, DC 20402, Stock No. 004-000-00345-4.



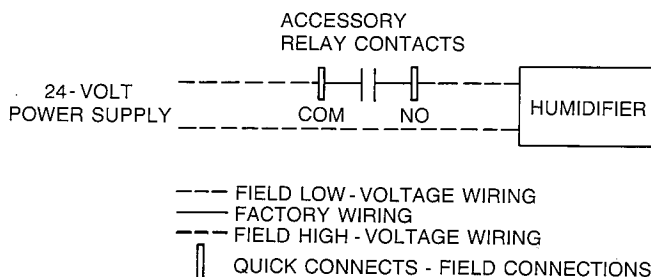
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Fig. 12—Electronic Air Cleaner



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Fig. 13—Electronic Air Cleaner and Humidifier



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Fig. 14—Humidifier

Manufacturer reserves the right to discontinue, or change at any time, specifications or designs without notice and without incurring obligations.

Book 1
Tab 16a

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