



MODEL WP20 & WP40 GAS BURNER

FOR YOUR SAFETY

IF YOU SMELL GAS:

1. OPEN WINDOWS.
2. DON'T TOUCH ELECTRICAL SWITCHES.
3. EXTINGUISH ANY OPEN FLAME.
4. IMMEDIATELY CALL YOUR GAS SUPPLIER.

FOR YOUR SAFETY

DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VICINITY OF THIS OR ANY OTHER APPLIANCE.

SPECIFICATIONS

FIRING CAPACITIES — MODEL WP20

Minimum Input 75,000 BTU/Hr.
Maximum Input 200,000 BTU/Hr. Natural Gas
Maximum Input 350,000 BTU/Hr. L.P. Gas

FIRING CAPACITIES — MODEL WP40

Minimum Input 75,000 BTU/Hr.
Maximum Input 400,000 BTU/Hr.

FUELS	WP20	WP40
	Natural & L.P. Gas	Natural Gas Only

ELECTRICAL

Power Supply 115V/60 HZ 1 PH

MOUNTING

Adjustable Flange is standard. Pedestal mount is optional.

THESE INSTRUCTIONS SHOULD BE AFFIXED TO THE BURNER
OR ADJACENT TO THE HEATING APPLIANCE

These instructions were prepared for the guidance of those installing this particular gas conversion burner. While they apply in principle to all installations, they should not be interpreted as meaning the only safe and economical way to install a conversion burner. It may be necessary to deviate from these instructions in some instances in order to comply with local gas company rules or codes in effect in the area in which the installation is made. It is recommended that the installer confer with the local gas company and with proper municipal officials regarding any specific code or regulation governing the installation of gas conversion burners. The installation must conform with local codes or, in the absence of local codes, with the American National Standard Installation of Domestic Gas Conversion Burners, Z21.8-1971, and the National Fuel Gas Code, ANSI Z223.1-1974.

Safe and economical operation of the burner throughout its service life is dependent to a large extent upon its proper installation in the heating appliance. Therefore, may we impress upon the installer that good clean workmanlike installations mean satisfied customers.

VISUAL INSPECTION OF THE HEATING SYSTEM

A conversion burner shall not be installed in an appliance located in a room or basement where facilities for normal air circulation or infiltration are so limited so as to interfere with ready obtainment of all air necessary for proper combustion and draft hood dilution, unless at the time of burner installation special provisions are made for combustion and draft hood dilution air.

- a. In open basements of homes of normal construction (without basement storm windows or tight stair doors) infiltration of combustion air is usually sufficient to replace that drawn up the flue, so special provisions are seldom necessary.
- b. When the heating appliance is installed in a tightly closed room without ventilating openings to outdoors or other rooms, provisions shall be made for supplying air for combustion through special openings, one near the floor line and the other near the ceiling, each to be sized on the basis of one square inch or more of free area for each 1,000 BTU input per hour. See Figure 1.
- c. When the house is of unusually tight construction, has a (kitchen) ventilating fan which may be used for exhausting air to outdoors, or has a vented fireplace, it is recommended that combustion air be supplied to the furnace room through intakes extending to the outside of the building and terminating in down-turned fittings, suitably arranged to prevent obstruction from snow or rain, and including a protecting screen not smaller than 1/4-inch mesh.

The heating system (both the heat exchanger and distribution system) shall be of a size to properly heat the building. Through inquiry it shall be determined that all rooms have been heated adequately without wide variations in temperature, without objectionable drafts, and without excessive fuel costs in the past. If the heating system is deficient with respect to any of the above

determinations, provisions shall be made to correct the deficiency, replace obsolete parts, or (by storm windows, insulation, etc.) to reduce the heat loss to a point where the existing system will provide the proper amount of heat.

a. Gravity Warm Air System

The supply and return ducts and registers should be sized and arranged so that the house can be heated without excessive furnace temperatures. Reference may be made to the American Society of Heating, Refrigerating and Air-Conditioning Engineers Guide and Data Book series and Handbook of Fundamentals.*

b. Forced Warm Air Systems

Inspection should also show whether the electrical characteristics of the fan and limit switch are satisfactory and whether the air filters and fan are in condition for continued proper service with the gas burner. Reference may be made to the American Society of Heating, Refrigerating and Air-Conditioning Engineers Guide and Data Book series and Handbook of Fundamentals.*

c. Hot Water System

The boiler thermometer and altitude gauge should be in good order. On a closed system, the feed and pressure relief valves shall be in proper operating condition. If there is an expansion tank on a closed system, inspection should show it to be substantially empty of water. When there is an existing water temperature limiting switch, its operating and electrical characteristics shall be checked to determine its suitability to the gas control circuit. For common piping systems reference can be made to the American Society of Heating, Refrigerating and Air-Conditioning Engineers Guide and Data Book series* and to the Hydronics Institute Guides.**

d. Steam or vapor System

The system shall be pressure tight, with pressure gauge and pop safety valve in good condition and with an existing water glass which permits clear observation of boiler water level. When there is a pressure limit switch or a low-water cut-off, inspection shall determine whether either device can be utilized in the gas burner control circuit. Reference should be made to the American Society of Heating, Refrigerating and Air-Conditioning Engineers and Institute of Boiler and Radiator Manufacturers guides. Traps and air vents shall be of adequate capacity, in good condition, and correctly placed in the system. (Coal firing tends to maintain a slight but continuous steam pressure which prevents air from being drawn back into the steam system. Intermittent gas burner operation and resultant intermittent steam supply usually introduces the need for repurging the system of air each time the boiler is steamed if satisfactory heat distribution is to be achieved.)

*Copies may be obtained from the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc., 345 East 47th Street, New York, NY 10017.

**Copies may be obtained from the Hydronics Institute, 35 Russo Place, Berkeley, NJ 07922.

FLUE PIPE AND CHIMNEY

The flue pipe should be carefully inspected and replaced if necessary in connection with installation of a draft hood. All installations must operate with a negative draft overfire. Refer to your local gas company or codes for assistance or to the furnace and/or boiler manufacturer for recommendations.

The flue pipe entrance into the chimney should be at least two feet above the clean-out opening of the chimney.

The chimney should extend high enough above the dwelling or other neighboring obstructions so that wind from any direction will not strike the chimney from any angle above horizontal. Unless the obstruction is of great magnitude, it is the usual experience that a chimney extending two feet above flat roofs or above fire wall parapets, and peaked roofs within 30 feet, will be reasonably free of downdrafts.

Where the chimney is unlined or where local experience indicates that flue gas condensate might be a problem, the local gas company should be consulted.

The chimney should be examined and thoroughly cleaned, if necessary, before installation is made to make sure it will freely conduct the flue gases to the outside.

Flue pipe should extend through the chimney wall to inner face of chimney liner but not beyond, and should be firmly cemented to masonry. A thimble may be used to facilitate removal of flue pipe for cleaning, in which event the thimble should be permanently cemented in place with mortar or other fireproof material that will not crack or check. The flue pipe or thimble, whichever is used, should be sealed into the chimney liner.

Flue connections from two or more appliances should not enter opposing or adjacent sides of the chimney at the same level.

Under no circumstances should the flue pipe be connected into a flue of an open fireplace.

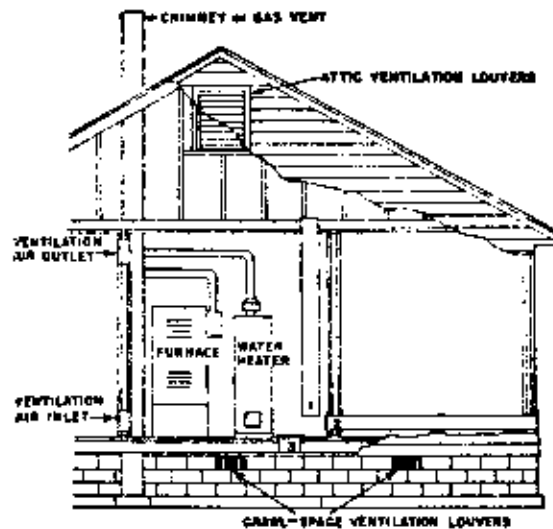
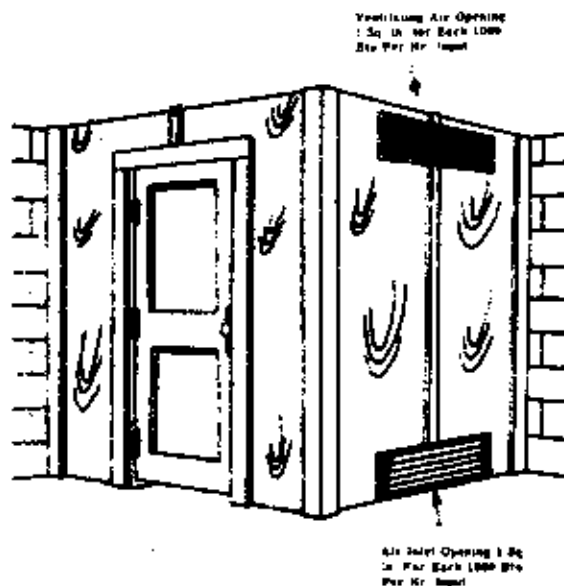
INSPECTION OF HEATING APPLIANCE

A careful inspection of furnace or boiler should be made. If cracked heating sections, leaking soft plugs or any other condition which might make the unit unsatisfactory for gas conversion is found, proper arrangements should be made for replacement or repair before proceeding with the burner installation. Cracked heating sections should be replaced.

A neutral pressure point adjuster, similar to the one shown in Figure 2 may be installed in the flue pipe between the furnace and a conventional type AGA draft hood. The neutral pressure point adjustment should be left in the fully open position until after the burner rating has been established. The material used for flue pipe should be resistant to corrosion.

The necessity for installing a neutral pressure point adjuster as outlined above, may be eliminated by reducing the flue pipe and draft hood to the sizes shown in the table.

NOTE: For oil fired conversions consult boiler or furnace manufacturer. Appliance must maintain negative draft overfire.



NOTE: Ducts used for make-up air may be connected to the cold air return of the heating system only if they connect directly to outdoor air.

Attic Ventilation Louvers are required at each end of attic with alternate air inlet No. 1.

1, 2, and 3 mark alternate locations for air from outdoors. Free area shall be not less than 1 square inch per 1,000 Btu per hour of the total input rating of all appliances in the enclosure.

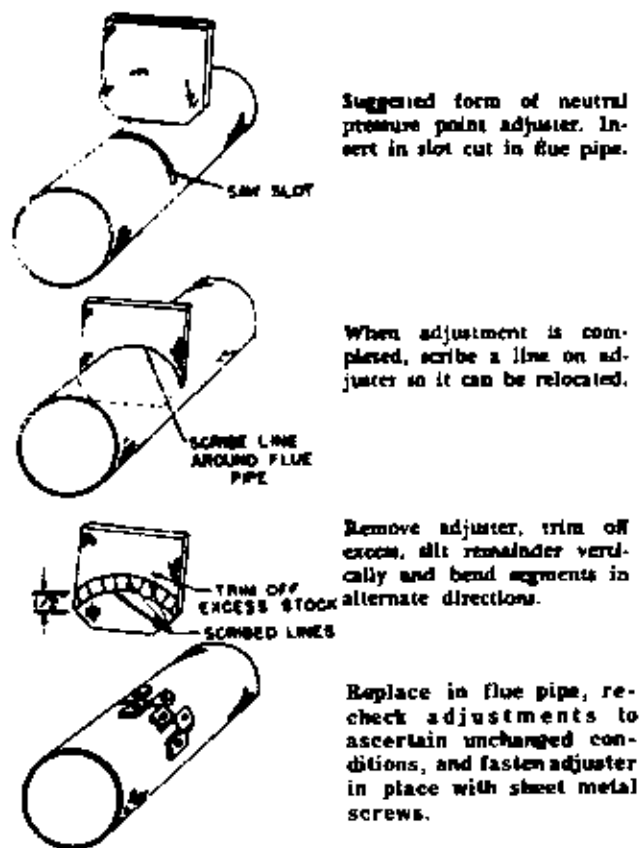
Crawl-Space Ventilation Louvers for unheated crawl space are required with alternate air inlet No. 3.

Each Ventilation Air Opening from inside the building shall have a free area of not less than 1 square inch per 1,000 Btu per hour of the total input rating of all appliances in the enclosure.

Appliances Located in Confined Spaces. Ventilation Air From Inside Building — Combustion and Draft Hood Dilution Air from Outside, Ventilated Attic or Ventilated Crawl Space.

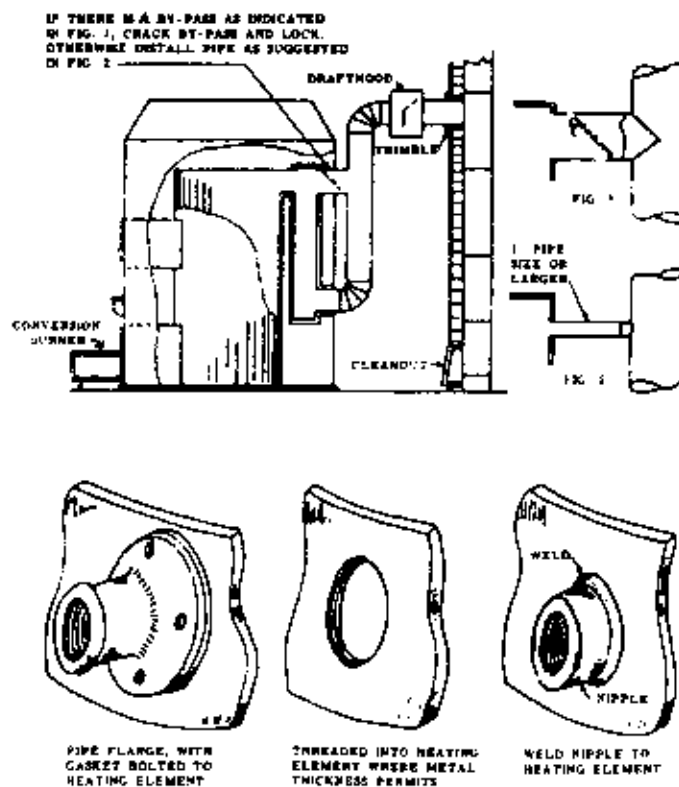
Illustration Showing Air Openings Necessary to Supply Air for Combustion When Heating Appliance is Installed in an Enclosed Room.

Figure 1



Suggested Construction of a Neutral Pressure Point Adjuster.

Figure 2



SUGGESTED METHOD FOR INSTALLING BY-PASS CONNECTION

Figure 3

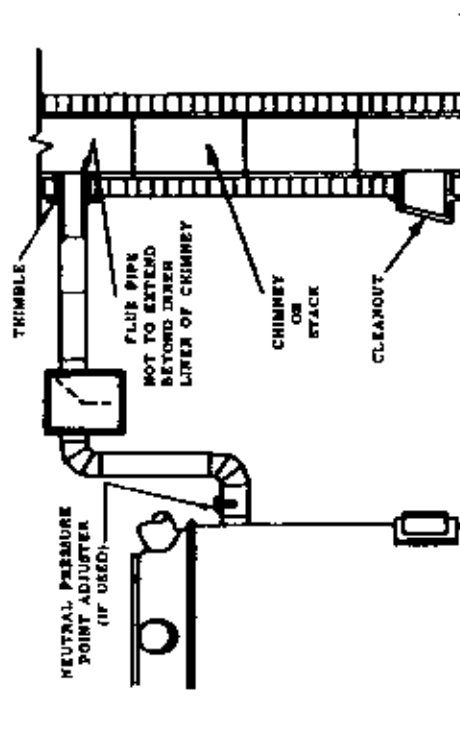
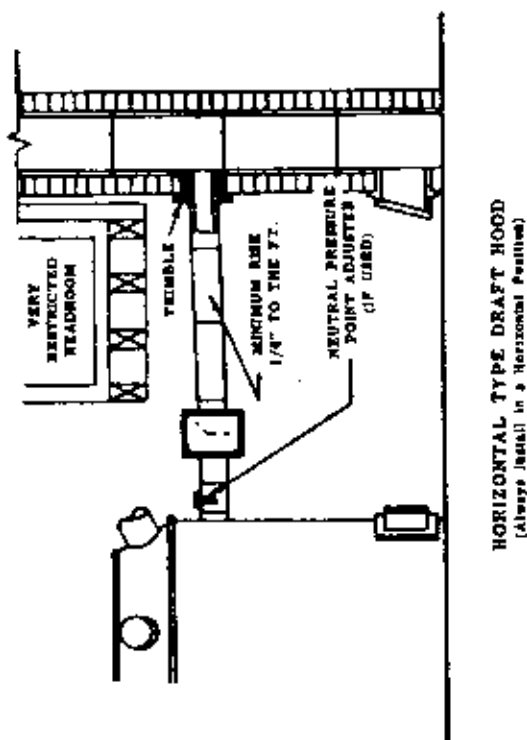
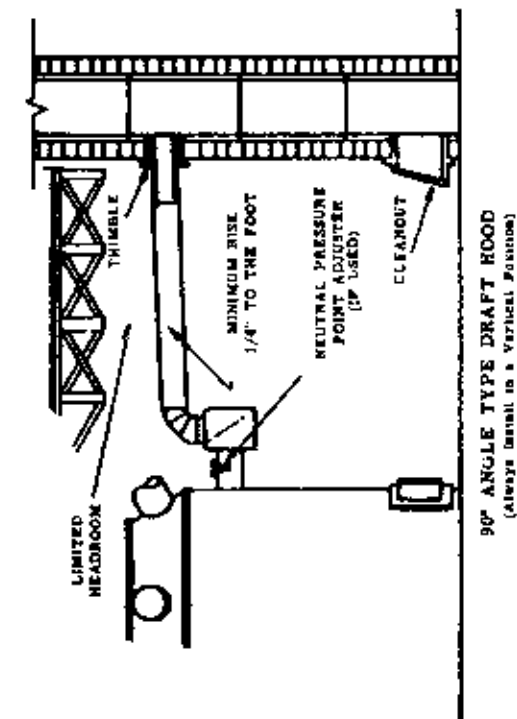
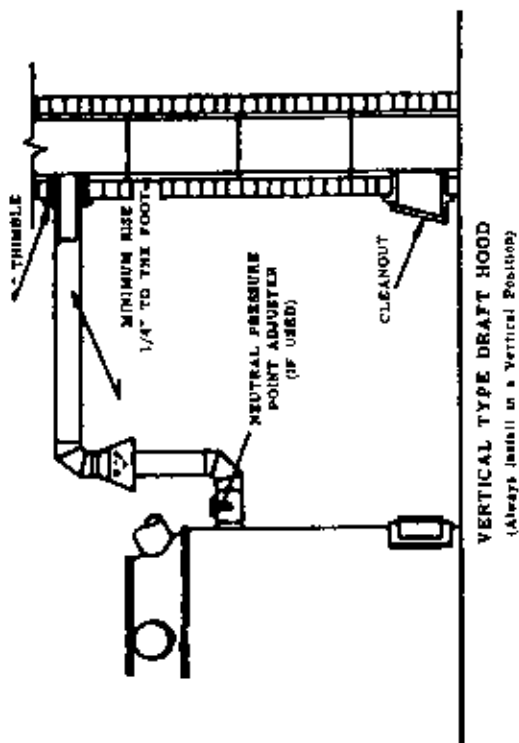


Figure 4

Recommended Location for Draft Hoods in Flue Pipes for Updraft Type Appliances.

Recommended Locations for a Horizontal Type Draft Hood.

PREPARATION OF FURNACE OR BOILER

Clean combustion chamber thoroughly. Scrape and brush all heating surfaces and flue ways. Soot and fly ash are excellent insulators and unless removed the efficiency of the heating plant will be impaired. Plugged or restricted flue passages will prevent burner from operating properly.

Be sure water column and gauge glass on boiler is clean and water level is visible. In all cases make sure the pigtail to limit control is clear. Safety pop valves on steam boilers and automatic relief valves on closed water systems should be thoroughly checked to make sure they are in good working condition.

FLUE PIPE AND DRAFT HOOD

An AGA type draft hood or its equivalent shall be placed in and made part of the flue pipe from the appliance. At no time should the draft hood be located at a point lower than the highest flue passage in the appliance. The draft hood should be installed in the position for which it was designed and in no case installed in a false ceiling, separate room from the heating appliance, or in any other manner that will permit a difference in pressure between the draft hood relief opening and the combustion air supply. On sealed type appliances where all combustion air is taken from the outside, a cap should be installed on end of flue pipe to prevent back drafts. In such cases no draft hood or diverter should be installed inside. See Figure 4.

When converting oil fired appliances the flue pipe and draft hood or diverter used should be the same size as the furnace flue collar. It is recommended that a rise as great as possible or at least 1/4 inch to the foot (horizontal length) be maintained in the flue pipe from the appliance to the chimney. The flue pipe should be relocated where possible to avoid sharp turns.

DRAFT HOOD & FLUE PIPE SIZES FOR GAS CONVERSION
BURNERS IN UP-DRAFT COAL FURNACES AND BOILERS

Not more than 6,500 BTU per square inch of flue area	
Input - BTU Per Hour	Draft Hood and Flue Pipe Size
Up to --- 120,000	5 inch
120,000 --- 180,000	6 inch
180,000 --- 250,000	7 inch
250,000 --- 320,000	8 inch
320,000 --- 410,000	9 inch

NOTE: If the flue pipe exceeds 10 ft. in length, or contains more than two elbows, use next size larger pipe and draft hood.

NO MOVABLE FLUE PIPE DAMPER SHOULD BE USED ON ANY INSTALLATION.

NOTE: All installations must operate with negative draft overfire. Refer to your local gas company and codes for assistance.

REVERTIBLE FLUE (DOWN DRAFT OR DIVING FLUE TYPE) FURNACES OR BOILERS

When installing the burner in the above type furnace or boilers, the draft

hood (or draft diverter) should be located at least one foot higher than the top of the highest point of the appliance flue passage or combustion chamber. It is also recommended that a vent pipe, not less than one inch in diameter, be provided from the highest point in the flue passage, directly to the flue pipe. This vent is not necessary on appliances with built in up draft bypass. (See Figure 2.) The gas company serving the area should be consulted in regards to their recommendations for converting this type of furnace or boiler.

The flue pipe should be securely supported and the joints fastened with sheet metal screws or riveted to prevent sagging, and in no case should it be located in a manner that will present a hazard to combustible building material. (Refer to local building code.)

PREPARATION OF COMBUSTION CHAMBER

THE POWER GAS BURNER IS DESIGNED FOR "INSHOT" FIRING INTO A REFACTORY LINED COMBUSTION CHAMBER CONSTRUCTED IN THE ASHPIT OF ANY BOILER OR FURNACE ORIGINALLY DESIGNED FOR COAL OR OIL FIRING. THE SIZE, SHAPE AND CONSTRUCTION OF THE CHAMBER SHOULD BE GIVEN SUCH CONSIDERATION AS WILL RESULT IN THE MAXIMUM EFFICIENCY OF EACH INSTALLATION.

On smaller inputs precast chambers may be used if the firing door and ash pit are large enough to insert the chambers and assemble.

When converting oil designed boilers and furnaces, it is recommended that the same combustion chamber be used with the gas burner. If the blast tube opening into the combustion chamber is larger than the 4" diameter, high temperature cement should be used to reduce the opening to a 4" diameter.

IN NO CASE SHOULD THE TUBE BE ALLOWED TO EXTEND INTO THE CHAMBER PROPER. IT MUST BE SET AT LEAST 1/8" SHORT OF THE INSIDE SURFACE OF THE COMBUSTION CHAMBER.

COMBUSTION CHAMBERS

The combustion chamber sizes given in Figure 5 are based on the maximum rated BTU capacity. If the input is to be permanently set at a reduced rate, the combustion chamber floor area can be reduced proportionately to the proposed input, allowing 200,000 BTU per square foot of combustion chamber floor area and proportioning the length about 70% greater than the width.

The height of the walls of the combustion chamber is generally determined by the grate line. The side and front walls should be built about 2" above the grate line, covering the grate lugs and covering the bases of the water legs of boilers about 3" or 4" to avoid heating sections that may be filled with sediment. The back wall should be carried one to two courses higher and overhung to deflect hot gases from direct impingement on the rear heat exchanger surfaces. Hard firebrick should be used for the overhung section to prevent erosion of the brick at this point by the high velocity gases moving over it.

The remaining open spaces between the combustion chamber and ashpit walls should be filled with loose insulation. Since this insulation may not stand

combustion chamber temperatures, the top course of the combustion chamber walls should be laid flat, extending to, and fitting the contour of the firebox and covering the loose insulation.

Always use cement furnished by the brick manufacturer for cementing insulating firebrick. It should be thinned to the consistency of a very thick cream so that the brick can be dipped into it and set in place. The use of other cement or mortar may impair the insulating and radiating qualities of the brick.

Magnesia block insulation, common brick, hard fire brick, dry sand and/or expanded mica products such as "Vermiculite" or "Zonolite" can be used to back up the insulating firebrick. High temperature furnace cement can be used to seal the openings around the burner and furnace.

Approved insulating bricks are: Babcock & Wilcox No. K-23 and No. K-26, A. P. Green No. G-23 and No. G-26, Armstrong Cork No. A-23 and No. A-26 and Johns Manville No. JM-23 and No. JM-26.

Input BTU/Hr.	Floor Area Sq. Inches	Preferred Width and Length	Recommended Minimum Wall Thickness	Recommended Minimum Floor Construction
75,000	71½	7½ x 9½	2½" insulating firebrick plus back up of 1½" or more loose insulation	2½" insulating firebrick plus 1/2 asbestos or mag- nesia block
100,000	180	12 x 15		
150,000	200	12 x 16		
200,000	220	13 x 17		
250,000	235	13 x 18		
300,000	260	13 x 20		
350,000	270	14 x 21		
400,000	330	15 x 22		

FIGURE 5

INSTALLATION OF BURNER AND CONTROLS

This Inshot power gas burner was designed especially for converting gun fired oil designed furnaces and boilers. Due consideration was given to making it as simple and easy to install and service as possible without weakening its durability or efficiency. The burner is supplied as a completely assembled package unit.

NOTE: The burner must be installed in such a manner that the unit and all controls will be readily accessible for inspection, cleaning, adjustment and repairs.

SIZING OF INPUT IN RELATION TO FURNACE

Figure 120,000 BTU's per gal. of oil input. For example: Furnace rating 0.60 G.P.E. then $0.60 \times 120,000 = 72,000$ BTU's input rate.

The orifice spud supplied with all burners is the size for the minimum BTU input of the burner for the type gas shown on the rating plate. Figure 6 shows the correct drill size for various inputs.

The correct manifold pressure for natural gas is 3.5" w.c. Only minor adjustments in the input rate should be made by adjusting the pressure regulator. The

minimum manifold pressure should be 3.0" w.c. and the maximum pressure should be 3.5" w.c. The next size larger or smaller orifice size should be used if the desired input rating cannot be obtained within the above manifold pressure adjustment range.

The correct manifold pressure for L.P. gas is 10" w.c., only minor adjustments in the input rate should be made by adjusting the pressure regulator. The minimum manifold pressure should be 9.5" w.c., the maximum pressure 10.0" w.c. If the desired input rating cannot be obtained within the above manifold pressure and adjustment range then the next size larger or smaller drill size should be used.

B.T.U. INPUT PER HOUR	NATURAL GAS 3½" W.C.P.	PROPANE GAS 10" W.C.P.
	Drill Size	Drill Size
75,000	5/32	41
90,000	17	37
100,000	14	35
130,000	4	30
160,000	15/64	28
180,000	1/4	25
200,000	G	22
225,000	U	19
242,000	L	17
275,000	N	13
300,000	P	10
340,000	S	5
400,000	U	2

FIGURE 6

NOTE: The above BTU input values show the approximate hourly input of the burner for the various drill sizes shown. To determine the actual input of the burner:

- 1) Turn off all other gas appliances.
- 2) The hand on the dial with the lowest cubic feet value (fastest revolving dial) should be clocked for one complete revolution.
- 3) Divide 3,600 by the time in seconds for one complete revolution and multiply by the dial value (1, 2, or 5, cubic feet depending on size of meter.)
- 4) Multiply this by the heating value of the gas to obtain the input to the burner in BTU per hour.

EXAMPLE: Time in seconds for one complete revolution of dial is 72.
3,600 divided by 72 is 50, a cubic foot dial was timed therefore 50 x 2 is 100. Multiply 100 by heating value of gas which is 1,000 and this will give you an input of 100,000 BTU per hour.

IMPORTANT: The minimum gas supply pressure is 4.5" w.c. for natural gas and 11.0" w.c. for L.P. gas; the maximum gas supply pressure is 10.5" w.c. for natural gas and 13" w.c. for L.P. gas.

ELECTRICAL WIRING

The power burner is shipped completely wired. It is only necessary to supply the 115 volt circuit, thermostat and limit circuit. All wiring must conform with

the National Electric Code or the code legally authorized in the locality where the installation is being made. The burner, when installed, must be electrically grounded in accordance with local codes or, in the absence of local codes, with the National Electrical Code, ANSI C1-1978. See wiring diagrams Figure 12 & 13.

LIMIT CONTROL SWITCHES

Warm air furnaces (gravity and forced air) should be equipped with an automatic temperature limit control switch. Hot water boilers (forced or gravity) should be equipped with an automatic temperature limit control switch.

Steam or vapor boilers should be equipped with an automatic pressure limit control switch that will open the electrical circuit on pressure rise.

It is recommended that all boilers be provided with means to guard against firing a dry boiler or one in which the water is dangerously low.

IMPORTANT: On installations where an oil burner is being replaced with a gas burner, the controls on the boiler or furnace will have to be checked for compatibility with the gas burner. All controls should be checked to insure that they operate properly and that they are in good condition. In no case should any limit or safety control be by-passed or wired in such a manner that it will result in unsafe operation of the burner or appliance. If the controls on the appliance are not compatible with the burner operation they should be replaced with the proper controls.

THERMOSTAT

The thermostat should be installed on an inside wall and should be located in the natural circulating path of room air. Locations which would expose the thermostat to cold air, or drafts from windows, doors, or other openings leading to the outside, or to air currents from cold or warm air registers, or where the natural circulation of air is shut off such as behind doors, above or below mantels, shelves or in corners, should be avoided. The thermostat should not be exposed to heat from nearby radiators, lamps, rays of the sun or mounted on a wall near pipes, warm air ducts or chimney flue. Any hole in the plaster or panel through which the thermostat wires pass should be sealed to prevent drafts.

The maximum comfort to be obtained from any automatic heating installation is dependent to a great extent upon the proper installation and adjustment of the room thermostat.

GAS PIPING

All piping must comply with local codes and ordinances or the National Fuel Gas Code ANSI Z223.1 - 1974 and NFPA No. 54. A sediment trap or drip leg must be installed in the supply line to the burner.

A union shall be installed in the gas line adjacent to and upstream from the control manifold and downstream from the manual main shutoff valve.

An 1/8" N.P.T. plugged tapping accessible for test gauge connection shall be installed immediately upstream of the gas supply connection for the purpose of determining the gas supply pressure to the burner.

A manual shut-off valve shall be installed in the gas supply line external to the appliance, see Figure 7.

The gas line should be a separate supply direct from the meter to the burner. It is recommended that new pipe be used and located so that a minimum amount of work will be required in future servicing. The piping should be so installed as to be durable, substantial and gas tight. It should be clear and free from cutting burrs and defects in structure or threading. Cast iron fittings or aluminum tubing should not be used for the main gas circuit. Joint compounds (pipe dope) should be used sparingly on male threads only and be approved for all gases.

It is recommended that table 8 be used to determine the size pipe to use from the meter to the burner.

The building structure should not be weakened by installation of the gas piping. The piping should not be supported by other piping, but should be firmly supported with pipe hooks, straps, bands or hangers. Butt or lap welded pipe should not be bent.

The gas piping should be so installed so as to prevent an accumulation of condensation and it must be protected against freezing. A horizontal pipe should be pitched so that it grades toward the meter and is free from sags. The pipe should not be run through or in an air duct or clothes chute.

TESTING PIPING FOR LEAKS

Before turning gas under pressure into piping, all openings from which gas can escape should be closed. Immediately after turning on gas, the system should be checked for leaks. This can be done by watching the 1/2 cubic foot test dial and allowing 5 minutes to show any movement, or by soaping each pipe connection and watching for bubbles. If a leak is found, make the necessary repairs and repeat the above test.

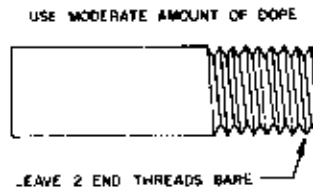
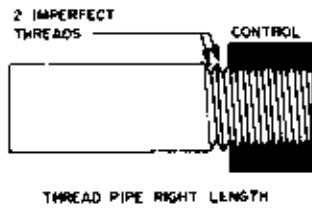
Defective pipes or fittings should be replaced and not repaired. Never use a flame or fire in any form to locate gas leaks, use a soap solution.

After the piping and meter have been checked completely, purge the system of air. Do not bleed the air inside the furnace. Be sure to relight all the gas pilots on other appliances.

PURGING

After the piping has been checked, all piping and appliances receiving gas through the meter shall be fully purged. A suggested method for purging the gas line to the burner is to disconnect the pilot line at the outlet of the pilot valve. Under no circumstances shall the line be purged into the combustion chamber.

After the gas line to the conversion burner has been fully purged and the pilot line reconnected, the gas supply at other pilot burners located on other gas appliances which were extinguished as the result of interrupted service shall be reignited.



LENGTH OF STANDARD PIPE THREADS (inches)

PIPE SIZE	EFFECTIVE LENGTH OF THREAD	OVERALL LENGTH OF THREAD
3/8	3/8	9/16
1/2	1/2	3/4
3/4	1/2 - 9/16	13/16
1	9/16	1

PIPE CAPACITY TABLE

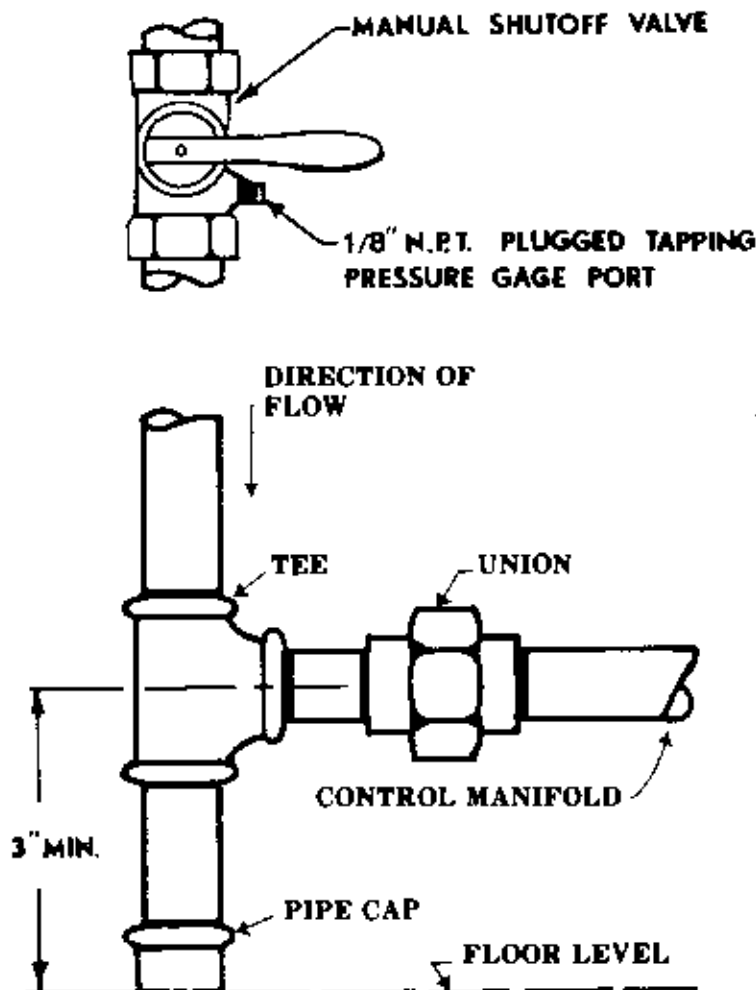
Length of Pipe in Feet	Nominal Diameter of Pipe in Inches				
	3/4	1	1-1/4	1-1/2	2
	Capacity - Cu. Ft. Per Hr. with a 0.6 Sp. Gr. Gas and Press. Drop of 0.3 in. Water Col.				
15	172	345	750		
30	120	241	535	850	
45	99	199	435	700	
60	86	173	380	610	
75	77	155	345	545	
90	70	141	310	490	
105	65	131	285	450	920
120		120	270	420	860
150		109	242	380	780
180		100	225	350	720

Figure 8

To convert the figures given above to capacities for another gas of different specific gravity, multiply the tabular values by the multipliers shown below.

MULTIPLIERS FOR VARIOUS
SPECIFIC GRAVITIES

Specific Gravity	Multiplier	Specific Gravity	Multiplier
.35	1.31	1.00	.775
.40	1.23	1.10	.740
.45	1.16	1.20	.707
.50	1.10	1.30	.680
.55	1.04	1.40	.655
.60	1.00	1.50	.633
.65	.962	1.60	.612
.70	.926	1.70	.594
.75	.895	1.80	.577
.80	.867	1.90	.565
.85	.841	2.00	.547
.90	.817	2.10	.535



Location of Union and Drip Leg for Connecting
Conversion Burner to House Piping.

Figure 7

ADJUSTMENT OF BURNER

Starting the burner:

1. Depress the gas valve control knob on the combination gas valve and turn to "OFF." Figure 9
2. Set room thermostat above room temperature and let burner run five minutes to purge the unburned gas from the unit.
3. Set thermostat below room temperature.
4. Open pilot lighter main valve, located ahead of the combination gas valve. Figure 10
5. Open pilot observation door. Figure 10
6. Hold match to pilot lighter tube and depress red button on pilot lighter valve. After flame has been established on lighter tube, continue to hold down red button while depressing and turning control knob on gas valve to "PILOT." Hold control knob down about 60 seconds until pilot stays lighted after releasing knob. Figure 11
7. Observe pilot - if not lighted, SHUT OFF BURNER COMPLETELY AND WAIT 5 MINUTES, then repeat steps 1 through 6.
8. Close pilot lighter main valve. Close pilot observation door.
9. Turn gas control valve knob to "ON."
10. Set room thermostat higher than room temperature so that the burner will start.

To put burner out of operation:

1. Depress the gas valve control knob on the combination gas valve and turn to "OFF."
2. Turn off electrical supply.

After the burner has been in operation for 10 minutes and if a neutral pressure point adjuster was installed, proceed as follows. Start from the wide open position and gradually close the neutral pressure point adjustment. Crack observation door about 1/8 inch. Then by holding match flame along the opening, the neutral pressure point can be determined. The flame should be drawn in below the center of the door and it should be blown outward above the center. In other words, the pressure inside the combustion chamber should be above atmospheric pressure above the burner flame and below atmospheric pressure below the burner flame. The pressure should be neutral at the center. Closing the adjuster lowers the neutral pressure point and opening the adjuster raises the neutral pressure point.

Once the neutral pressure point has been adjusted, the combustion air shutter should be adjusted so that the percent CO_2 in the flue products is in accordance with the applicable codes or standards. The CO_2 test must be made at the inlet side of the draft hood. If the CO_2 reading is not within the recommended limits,

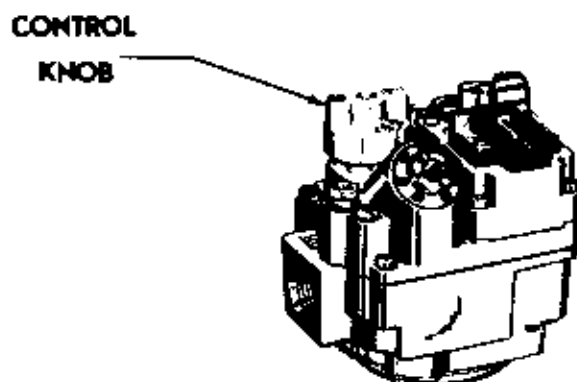


Figure 9
COMBINATION GAS VALVE

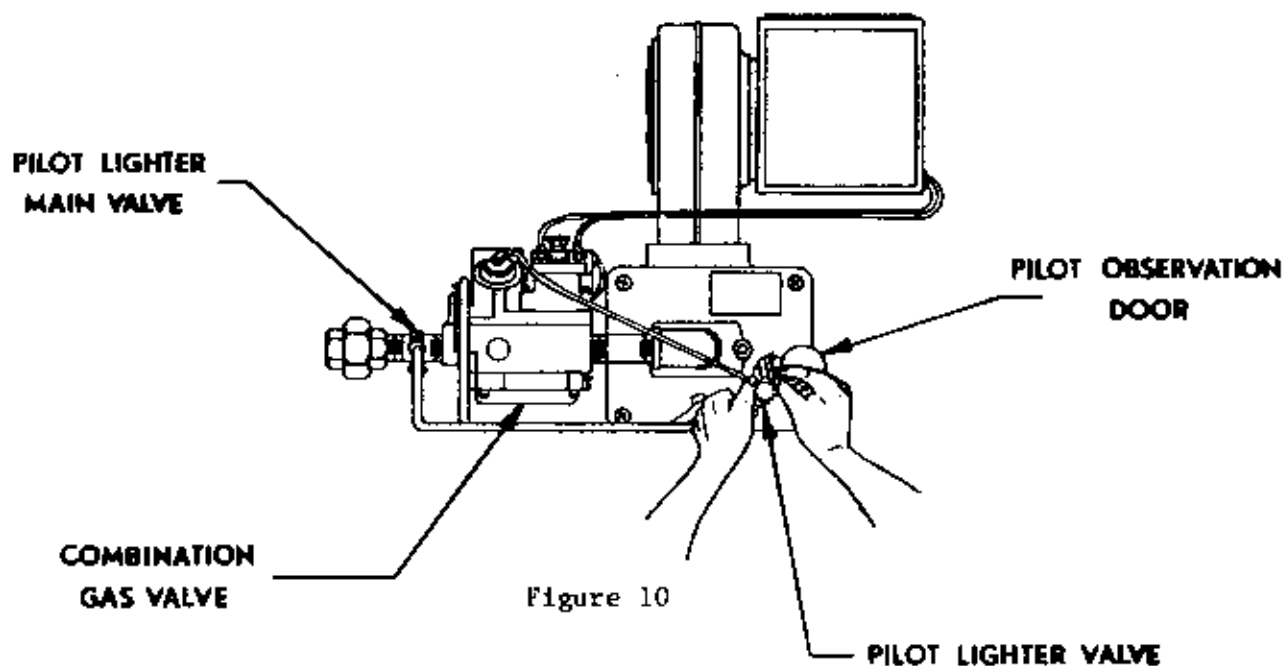


Figure 10

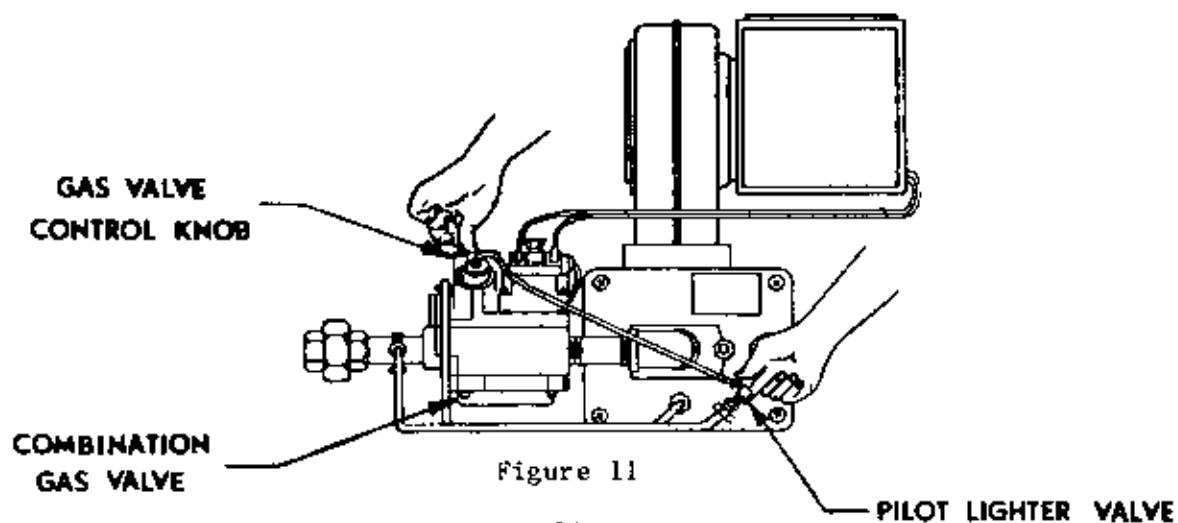


Figure 11

then the combustion air shutter should be re-adjusted and then the neutral pressure point be rechecked and re-set if necessary.

It is essential to make certain that the products of combustion do not contain carbon monoxide, CO. It is possible to have flame impingement on cold surfaces with resultant CO even if CO₂ and O₂ are within acceptable limits. The flue gas sample is taken through the same hole used for the CO₂ test.

The most common causes of CO is flame impingement on cool surface and insufficient primary air, both of which could be caused by over-firing. The only answer is to reduce the firing rate or increase the primary air.

Combustion efficiency is determined by the percent CO₂ and the temperature of the flue gases, these two measurements are taken on the inlet side of the draft hood. Combustion efficiency and stack loss calculators provide slide rule convenience for correlating CO₂ and stack temperature readings. These calculators are available from several manufacturers of combustion test equipment.

EXTERNAL WIRING
CONNECT 110 VOLT - 60 CYCLE
1 PHASE CURRENT TO BURNER AS FOLLOWS

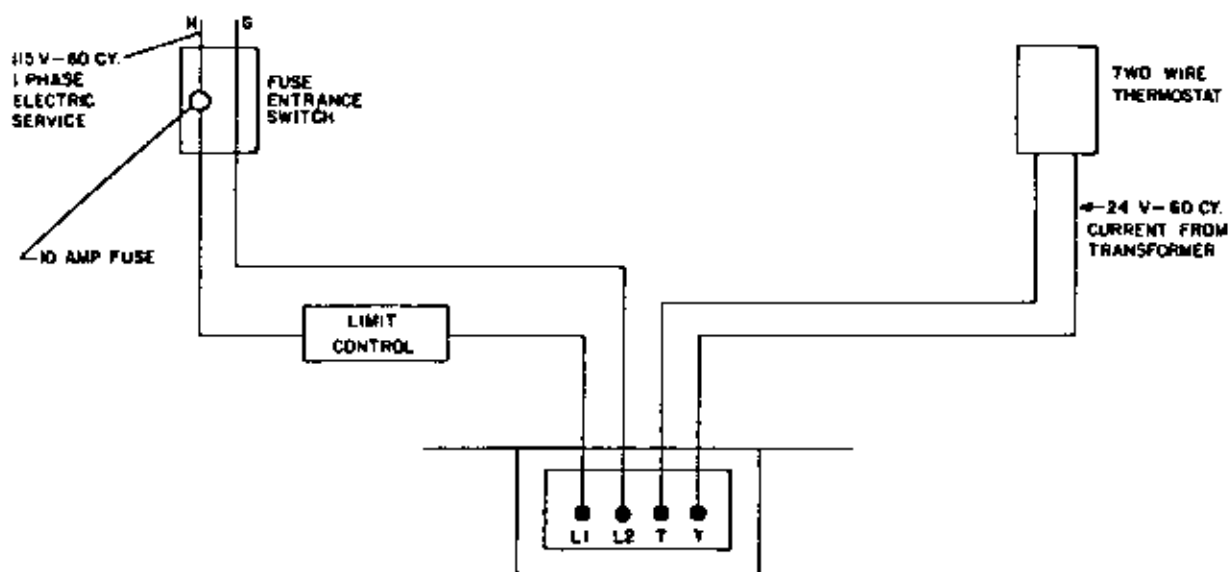
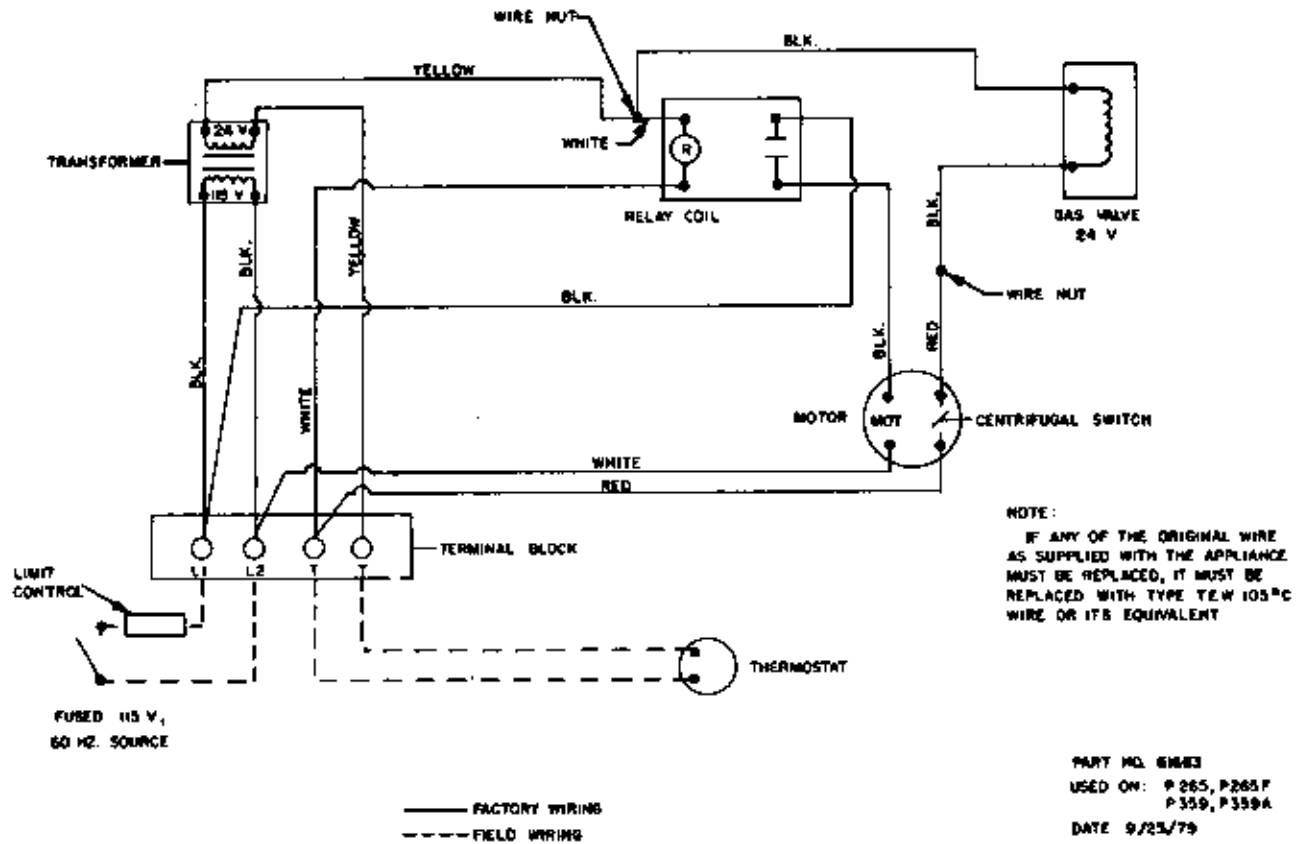


Figure 12

WIRING DIAGRAM FOR GAS BURNER WITH
STANDING PILOT



WIRING DIAGRAM
LADDER FORM

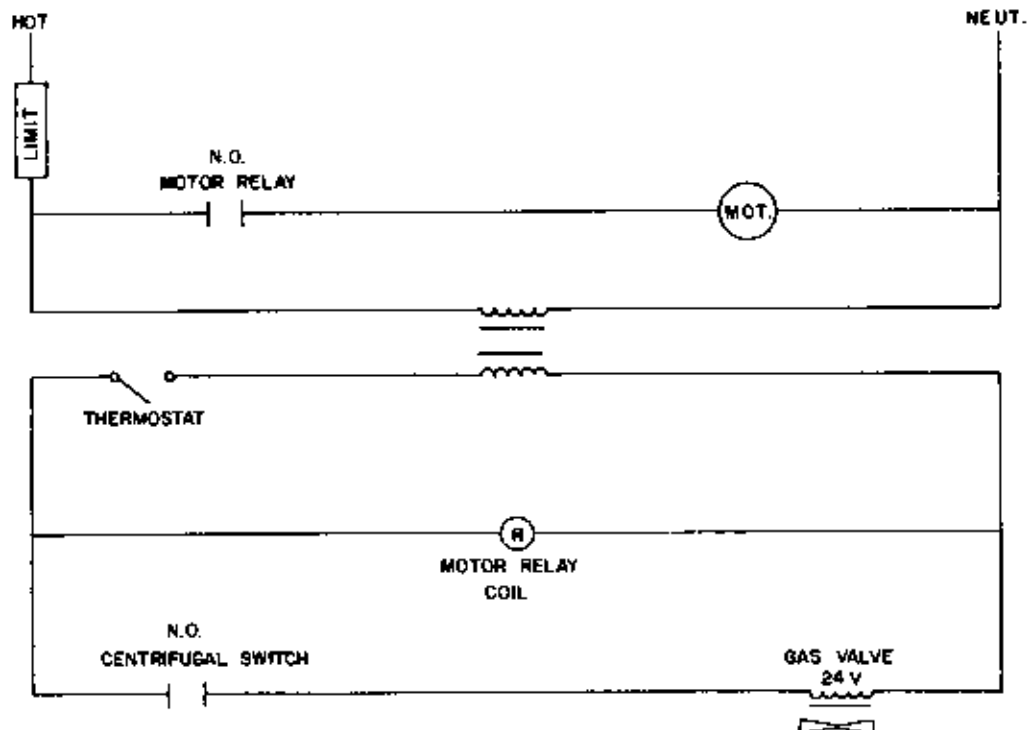


Figure 13

GENERAL INSTRUCTIONS

Gas burners require the services of an experienced mechanic for proper setting and adjustment. If the burner does not appear to be operating properly, DO NOT ATTEMPT TO ADJUST THE BURNER YOURSELF, but call in a competent service man.

A Homeowner should be able to check several possible causes of shut down before calling in a service man. The following check list may eliminate the need for a service call or at least provide information for the service man.

1. Check thermostat. Make sure that it is set at the desired room temperature. If the thermostat is damaged or loose on the wall, have it replaced or repaired.
2. Check fuses in service box for the burner circuit. Replaceable type fuses should not be loose in the socket. If a fuse is blown out or if in doubt, replace with the same size and type. If circuit breakers are in the service box, check position of indicator. If tripped, reset.
3. Check on-off switch for the burner circuit, it may have been accidentally turned off.
4. With the thermostat set 10 degrees above room temperature, the burner should start automatically. If it does not start, check pilot. If no flame is visible, relight pilot following lighting instructions.

It is advisable, periodically, to visually inspect the burner. Check air inlet on blower to make sure it is not clogged or blocked. Check air shutter to make sure that it has not been tampered with, make sure that it is in the same position when final adjustments were made. Check blower wheel to see if it is dirty or full of lint. The motor has two openings, one at each end, to lubricate the bearings. Use SAE 20 or 30 nondetergent motor oil and put a few drops in each opening twice a year. Wipe off any oil spills and keep this equipment clean and dry. Open observation door and check pilot flame. If the flame does not appear normal or if in doubt, call a serviceman.

The areas around the conversion burner should be kept clear and free of combustible materials, gasoline and other flammable vapors and liquids.

The flow of combustion and ventilating air to the burner must not be blocked or obstructed in any manner.

TROUBLE CHART

<u>SYMPTOMS</u>	<u>CAUSE</u>
1. PILOT DOES NOT LIGHT.	a. Air in gas line. b. High or low gas pressure c. Blocked pilot orifice. d. Flame runner improperly located.
2. PILOT GOES OUT FREQUENTLT DURING STANDBY.	a. Restriction in pilot gas line. b. Low gas pressure. c. Blocked pilot orifice. d. Loose thermocouple connection on 100% shut off. e. Defective thermocouple or pilot safety switch. f. Poor draft condition. g. Draft tube set into or flush with inner wall of combustion chamber.
3. PILOT GOES OUT WHEN MOTOR STARTS.	a. Restriction in pilot gas line. b. High or low gas pressure. c. Excessive pressure drop when main gas valve opens.
4. MOTOR DOES NOT RUN.	a. Burned out fuse or current off. b. Thermostat or limit defective or improperly set. c. Relay or transformer defective. d. Motor burned out. e. Tight motor bearings from lack of oil. f. Improper wiring.
5. MOTOR RUNNING BUT NO FLAME.	a. Pilot out. b. Thermocouple not generating sufficient voltage. c. Very low or no gas pressure. d. Motor running too slow.
6. SHORT NOISY BURNER FLAME.	a. Pressure regulator set too low. b. Air shutter open too wide. c. Too much pressure drop in gas line. d. Vent in regulator plugged. e. Defective regulator.
7. LONG YELLOW FLAME.	a. Air shutter not open enough. b. Air openings or blower wheel clogged. c. Too much input.
8. MAIN GAS VALVE DOES NOT CLOSE WHEN BLOWER STOPS.	a. Defective valve. b. Obstruction on valve seat.
9. REGULATOR VENT LEAKING GAS.	a. Hole in diaphragm.

The _____ Burner Model No. _____, Serial No. _____,
(MAKE)
installed at _____ Bears a label evidencing compliance with
(ADDRESS OF INSTALLATION)
ANSZ21.17b 1978 and has been installed in accordance with the instructions in
the manufacturer's installation manual and in conformity with local regulations,
codes, and ordinances.

The Boiler
Furnace _____ No. _____, and the Input
(MAKE)
of unit consists of _____ BTUH

CO₂ In Flue _____ % Flue Gas Temperature _____ °F
CO In Flue _____ % Ambient Temperature _____ °F
Overfire _____ Net Flue Gas Temperature _____ °F
Draft In Flue _____ Firing Rate _____ BTU/HR
(inches H₂O) Manifold Pressure _____ "W.C.

All controls and limiting devices have been checked for proper installation _____
Fuel used, _____ Gas
Gas Supply Pressure _____ Inches W.C.

The above test results are certified to be true:

(NAME OF COMPANY MAKING INSTALLATION)

Per _____

(SIGNATURE)

(ADDRESS)

(TELEPHONE)

FOR SERVICE CALL:

Name _____

Address _____

Telephone _____

Date _____



LIMITED WARRANTY

Bard Manufacturing Company warrants its products and components to be free from defects due to faulty workmanship or defective materials at time of shipment and under normal use and service for twelve (12) months from the date of installation by a qualified installer or eighteen (18) months from the date of manufacture, whichever date occurs first. This LIMITED WARRANTY does not extend or apply to Bard's products, or any component thereof, which has been misused, neglected, improperly installed or otherwise abused. Equipment which is defective in material or workmanship and which is removed within the specific time period will be repaired or replaced as follows:

- (1) Field units, controls, motors & transformers should be returned to an authorized service point or distributor of Bard for determination of applicability of this LIMITED WARRANTY as to repair or replacement where said service point or distributor is reasonably available in customer's locality.
- (2) Where such local service is not available for components involving said controls, motors & transformers, or where other components are involved, such products should be returned, freight prepaid, to Bard's home office.
- (3) Products determined to be covered under this LIMITED WARRANTY by Bard shall be either repaired or replaced at Bard's sole option.
- (4) Bard is not responsible for any labor cost for removal and replacement of said products and equipment associated therewith.
- (5) Controls, motors & transformers, or other components which are so repaired or replaced will carry this LIMITED WARRANTY equal to the unexpired portion of the original product LIMITED WARRANTY.
- (6) If inspection by Bard does not disclose any defect covered by this LIMITED WARRANTY, the product will be repaired or replaced at the expense of the customer and Bard's regular charges will apply.

THE FOREGOING STATES THE SOLE AND EXCLUSIVE REMEDY FOR ANY BREACH OF WARRANTY OR FOR ANY OTHER CLAIM BASED ON ANY DEFECT IN, OR NON-PERFORMANCE OF, THE PRODUCTS, WHETHER SOUNDING IN CONTRACT, WARRANTY OR NEGLIGENCE. NO OTHER WARRANTY, WHETHER EXPRESSED OR IMPLIED, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, SHALL EXIST IN CONNECTION WITH THE SALE OR USE OF SUCH PRODUCTS AND IN NO EVENT WILL BARD BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE. Bard neither assumes nor authorizes any person to assume for Bard any other liability or obligation in connection with the sale of these products.

PARTS LIST

WP20 & WP40 POWER GAS BURNER

<u>Item No.</u>	<u>No. Req'd</u>	<u>Description</u>	<u>Part No.</u>
1	1	Air Tube & Housing Assy. 8-1/2" Burner	60745
	1	Air Tube & Housing Assy. 12" Burner	60814
	1	Air Tube & Housing Assy. 15" Burner	60815
	1	Air Tube & Housing Assy. 18" Burner	60816
	1	Air Tube & Housing Assy. 21" Burner	60817
	1	Air Tube & Housing Assy. 24" Burner	60818
2	1	Cover Plate	61460
3	1	Blower Wheel	60363
4	1	Blower Motor	60362
5	1	Air Shutter	60365
6	1	Housing Wiring Cover	60650
7	1	Mounting Flange	60211
8	1	Pedestal Mounting Assy.	
9	1	Venturi	60381
10	1	Orifice Holder Assy. 8-1/2" Burner	60390
	1	Orifice Holder Assy. 12" Burner	60391
	1	Orifice Holder Assy. 15" Burner	60392
	1	Orifice Holder Assy. 18" Burner	
	1	Orifice Holder Assy. 21" Burner	
	1	Orifice Holder Assy. 24" Burner	
11	1	Bulkhead Union	61455
12	1	Motor Bracket	60364
13	2	Venturi Mounting Bolts 8-1/2" Burner	15841
	2	Venturi Mounting Bolts 12" Burner	60084
	2	Venturi Mounting Bolts 15" Burner	60086
	2	Venturi Mounting Bolts 18" Burner	60087
	2	Venturi Mounting Bolts 21" Burner	60088
	2	Venturi Mounting Bolts 24" Burner	60123
14	2	Venturi Spacer 8-1/2" Burner	60383
	2	Venturi Spacer 12" Burner	60387
	2	Venturi Spacer 15" Burner	60389
	2	Venturi Spacer 18" Burner	60808
	2	Venturi Spacer 21" Burner	60809
	2	Venturi Spacer 24" Burner	60810
15	1	Main Burner Orifice - Natural Gas	61055
	1	Main Burner Orifice - L.P. Gas	61056
16	1	Orifice Holder	60534
17	1	Pilot Shield	60375
18	1	Pilot	60659
19	1	Transformer	60186

PARTS LIST (CONTINUED)

WP20 & WP40 POWER GAS BURNER

Item No.	No. Req'd	Description	Part No.
20	1	Motor Relay	60227
21	1	Terminal Block	60228
22	1	Runner Lighter Tube 8-1/2" Burner	60243
	1	Runner Lighter Tube 12" Burner	60244
	1	Runner Lighter Tube 15" Burner	60245
	1	Runner Lighter Tube 18" Burner	60246
	1	Runner Lighter Tube 21" Burner	60247
	1	Runner Lighter Tube 24" Burner	60248
23	1	Runner Lighter Valve 8-1/2" Burner	61430
	1	Runner Lighter Valve 12" - 24" Burner	61510
24	1	Pilot Tubing 8-1/2" Burner	60374
	1	Pilot Tubing 12" Burner	60776
	1	Pilot Tubing 15" Burner	60777
	1	Pilot Tubing 18" Burner	60778
	1	Pilot Tubing 21" Burner	60779
	1	Pilot Tubing 24" Burner	60811
25	1	Thermocouple 8-1/2" Burner	60280
	1	Thermocouple 12" & 15" Burner	60281
	1	Thermocouple 18" - 24" Burner	60530
		MAJOR PARTS NOT ILLUSTRATED	
	1	Combination Gas Valve - Robertshaw (Natural Gas) WP20	60270
	1	Combination Gas Valve - Robertshaw (L.P. Gas) WP20	61190
	1	Combination Gas Valve - Robertshaw (Natural Gas) WP40	60255
	1	Combination Gas Valve - Honeywell (Natural Gas) WP20	60272
	1	Combination Gas Valve - Honeywell (L.P. Gas) WP20	61666
	1	Combination Gas Valve - Honeywell (Natural Gas) WP40	61667
	1	Gas Valve Cord Assy.	60182
	1	Runner Lighter Door	60615
	1	Flame Retention Ring	60748
	1	Pilot Orifice - Natural Gas	60680
	1	Pilot Orifice - L.P. Gas	60740