



WAYNE COMBUSTION SYSTEMS  
801 GLASGOW AVE.  
FORT WAYNE, IN 46803

# MODELS

**P250AF      P265      P265EP**  
**P250AFEP   P265F      P265DI**  
**P250AFDI   P265FEP**

## GAS BURNER

Publication Date 5/01 - Revision B - Manual 101220

NOTE: Dimensions in ( ) are informational only. English values take priority.

### 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.

**WARNING:** If the information in these instructions is not followed exactly, a fire or explosion may result causing property damage, personal injury or death.

- 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

#### CARBON MONOXIDE POISONING HAZARD

CARBON MONOXIDE IS A COLORLESS, ODORLESS GAS THAT CAN KILL. FOLLOW THESE RULES TO CONTROL CARBON MONOXIDE.

- ▲ Do not use this burner if in an unvented, enclosed area. Carbon monoxide may accumulate.
- ▲ Do not adjust the pressure regulator. High pressures produce carbon monoxide.
- ▲ Check flue gases for carbon monoxide. This check requires specialized equipment.
- ▲ Allow only qualified burner service persons to adjust the burner. Special instruments and training are required.
- ▲ Read the owner's manual before using.



### WARNING

#### ELECTRIC SHOCK HAZARD

HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT. FOLLOW THESE RULES TO AVOID ELECTRIC SHOCK.

- ▲ Use only a properly grounded circuit. A ground fault interrupter is recommended.
- ▲ Do not spray water directly on burner.
- ▲ Turn off power before servicing.
- ▲ Read the owner's manual before using.



### WARNING

#### OVERHEATING HAZARD

SHOULD OVERHEATING OCCUR:

- ▲ Shut off the manual gas valve to the appliance.
- ▲ Do not shut off the control switch to the pump or blower.

### CAUTION

FOR SHIPPING PURPOSES, THE FLAME SPREADER IS FULLY RETRACTED. FLAME SPREADER ADJUSTMENT IS MANDATORY AND AFFECTS BURNER IGNITION AND PERFORMANCE.

### NOTICE

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



## SPECIFICATIONS

BURNER MODELS	MINIMUM INPUT	MAXIMUM INPUT	FUELS
P250AF & P250AF-EP & P250AFDI	50,000 BTU/Hr (14.65 kW/Hr)	250,000 BTU/Hr (73.27 kW/Hr)	Natural & L.P. Gas
P265 & P265EP	65,000 BTU/Hr (19.05 kW/Hr)	200,000 BTU/Hr (58.61 kW/Hr)	Natural & L.P. Gas
P265F & P265FEP	65,000 BTU/Hr (19.05 kW/Hr)	200,000 BTU/Hr (58.61 kW/Hr)	Natural & L.P. Gas

**ELECTRICAL** Power Supply - 115V/60HZ 1 Ph.

**MOUNTING:** Adjustable Flange is Standard  
Pedestal Mount is Optional.

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 the 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, Z21.8-1984, and the National Fuel Gas Code, ANSI Z223.1-1984.

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, we may 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 close 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 (645.2mm<sup>2</sup>) or more of free area for each 1,000 BTU (.2931 kW) 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 (6.35 mm) 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 Systems  
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 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 (.61m) above the clean-out opening in 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 (.61m) above flat roofs or above fire wall parapets, and peaked roofs within 30 feet (9.144m) 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 to 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 CSA 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.

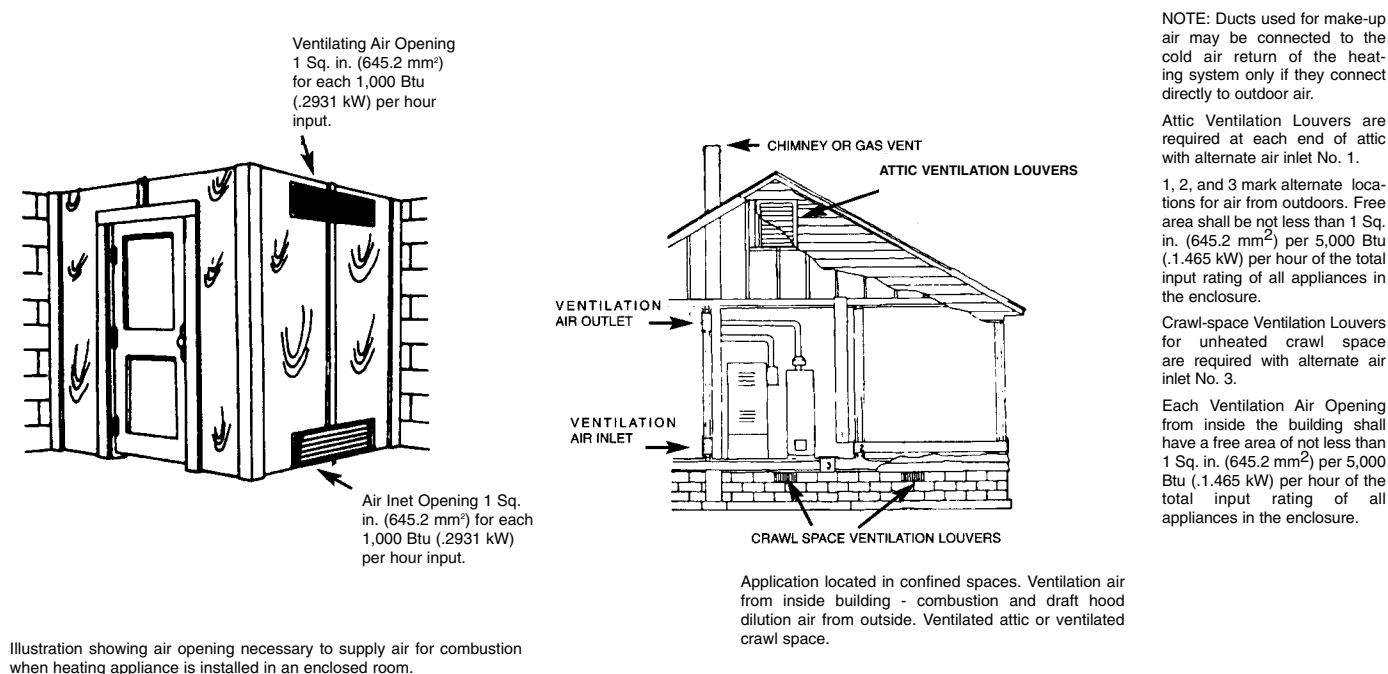
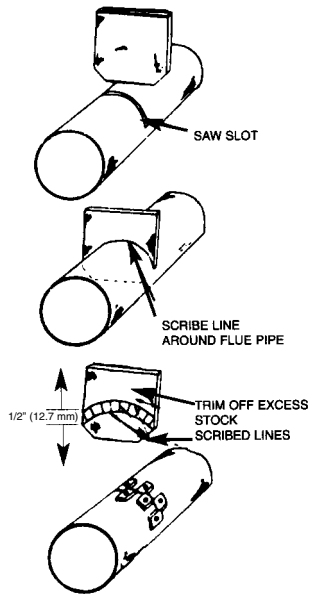


Illustration showing air opening necessary to supply air for combustion when heating appliance is installed in an enclosed room.

FIGURE 1



Suggested form of neutral pressure point adjuster. Insert in slot cut in flue pipe.

When adjustment is completed, scribe a line on adjuster so it can be relocated.

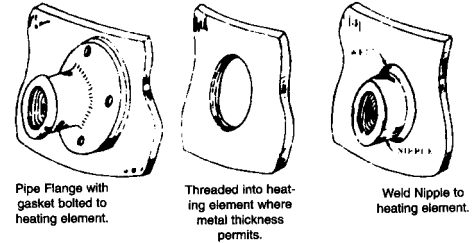
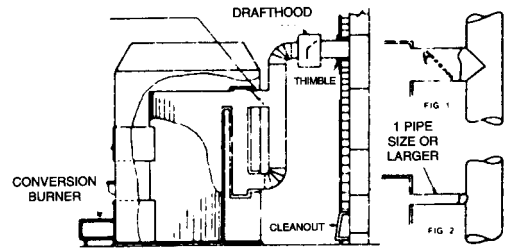
Remove adjuster, trim off excess, slit remainder vertically and bend segments in alternative directions.

Replace in flue pipe, recheck adjustment to ascertain unchanged conditions, and fasten adjuster in place with sheet metal screws.

Suggested Construction of a Neutral Pressure Point Adjuster.

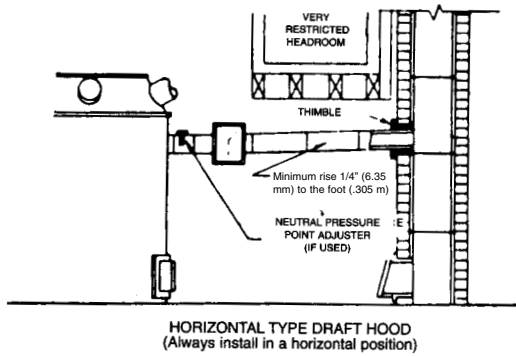
FIGURE 2

If there is a by-pass as indicated in Fig. 1, crack bypass and lock. Otherwise install pipe as suggested in Fig. 2.

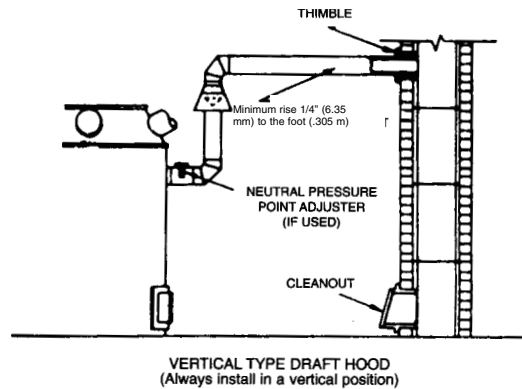


Suggested method for installing by-pass connection.

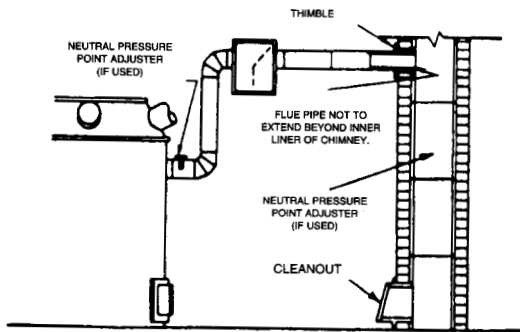
FIGURE 3



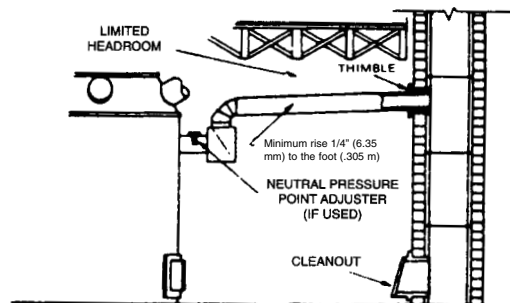
HORIZONTAL TYPE DRAFT HOOD  
(Always install in a horizontal position)



VERTICAL TYPE DRAFT HOOD  
(Always install in a vertical position)



Recommended Locations for a Horizontal Type Draft Hood.



90° (1.57 rad) ANGLE TYPE DRAFT HOOD  
(Always install in a vertical position)

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

FIGURE 4

### 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

A CSA 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 (6.35mm) to the foot (.305m) (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 (1.905 kW) per square inch (645.2 mm <sup>2</sup> ) of the flue area	
Input - BTU (kW) Per Hour	Draft Hood and Flue Pipe Size
Up to --- 120,000 (35.17)	5 inch (127mm)
120,000 (35.17) --- 180,000 (52.75)	6 inch (152.4mm)
180,000 (52.75) --- 250,000 (73.27)	7 inch (177.8mm)

NOTE: If the flue pipe exceeds 10 ft. (3.048m) in length, or contains more than two elbows, use next size larger pipe and draft hood.

NO MOVEABLE 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 furnaces or boilers, the draft hood (or draft diverter) should be located at least one foot (.305m) 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 (25.4mm) in diameter, be provided from the highest point in the flue passage, directly to the flue pipe. This is not necessary on the appliances with built in up draft bypass. (See Figure 3.) 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 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 ASH PIT 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" (101.6mm) diameter, high temperature cement should be used to reduce the opening to 4" (101.6mm) diameter.

IN NO CASE SHOULD THE TUBE BE ALLOWED TO EXTEND INTO THE CHAMBER PROPER. IT MUST BE AT LEAST 1/8" (3.175mm) 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 (211000kJ) per square foot (.093m<sup>2</sup>) 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" (50.8mm) above the grate line, covering the grate lugs and covering the bases of the water legs of boilers about 3" (76.2mm) or 4" (101.6mm) to avoid heating sections that may be filled with sediment. The back wall should be carried one or 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 ash pit 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 an Johns Manville No. JM-23 and No. JM-26.

## INSTALLATION OF BURNER AND CONTROLS

The 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, 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 140,000 BTUs (147700kJ) per gal. (L) of oil input. For example: Furnace rating 0.60 G.P.H. then 0.60 x 140,000 = 72,000 BTUs 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.(871.8 Pa). 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. (747.2Pa) and the maximum pressure should be 3.5 w.c. (871.8 Pa). 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. (2491Pa). 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. (2366 Pa), the maximum pressure 10.0" w.c. (2491 Pa). 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. (kW) INPUT PER HOUR	NATURAL GAS	PROPANE GAS
	3 1/2" (871.8Pa) W.C.P. Drill Size	10" (2491 Pa) W.C.P. Drill Size
50,000 (14.65)	#30 (.128") (3.264mm)	#45 (.082") (2.083mm)
75,000 (21.98)	5/32 (.156") (3.967mm)	#41 (.096") (2.438mm)
90,000 (26.38)	#17 (.173") (4.394mm)	#37 (.104") (2.642mm)
100,000 (29.31)	#14 (.182") (4.623mm)	#35 (.110") (2.794mm)
125,000 (36.63)	#5 (.205") (5.22mm)	1/8 (.125") (3.175mm)
130,000 (38.1)	#4 (.209") (5.309mm)	#30 (.128") (3.264mm)
150,000 (43.96)	#1 (.228") (5.791mm)	#29 (.136") (3.454mm)
160,000 (46.89)	15/64 (.234") (5.954mm)	#28 (.140") (3.569mm)
175,000 (51.29)	C (.242") (6.147mm)	#26 (.147") (3.734mm)
180,000 (52.75)	1/4 (.250") (6.35mm)	#25 (.149") (3.797mm)
200,000 (58.61)	G (.261") (6.629mm)	#22 (.157") (3.988mm)
225,000 (65.94)	J (.272") (7.036mm)	#19 (.166") (4.216mm)
242,000 (70.92)	L (.290") (7.366mm)	#17 (.173") (4.394mm)
250,000 (73.27)	M (.295") (7.493mm)	#16 (.177") (4.496mm)

FIGURE 6

NOTE: The BTU input valves on the preceding page 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 2 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. (1121Pa) for natural gas and 11.0" w.c. (2740Pa) for L.P. gas; the maximum gas supply pressure is 10.5" w.c. (2615Pa) for natural gas and 13" w.c. (3238Pa) for L.P. gas.

**P250 ONLY**

Input BTU/Hr. (kW/Hr.)	Floor Area Sq. Inches (mm <sup>2</sup> )	Preferred Width and Length (mm)	Recommended Minimum Wall Thickness	Recommended Minimum Floor Construction
50,000 (14.65)	49 (31610)	7(177.8)x7 (177.8)	2 1/2" (63.5mm) insulating firebrick plus back up of 1 1/2" (38.1mm) or more loose insulation.	2 1/2" (63.5mm) Insulating firebrick plus 1 1/2" (38.1mm) magnesia block.
85,000 (24.91)	56 1/4 (36290)	7 1/2(190.5)x7 1/2(190.5)		
100,000(29.31)	64 (41290)	8(203.2) X 8(203.2)		
120,000(35.17)	72 1/4 (46610)	8 1/2(215.9) x 8 1/2(215.9)		
140,000(41.03)	81 (52260)	9(228.6) x 9(228.6)		
154,000(45.13)	90 1/4 (58230)	9 1/2(241.3) x 9 1/2(241.3)		
175,000(51.29)	100 (64520)	10(254) X 10(254)		
210,000(61.55)	122 (78710)	11(279.4) X 11(279.4)		
240,000(70.34)	144 (92900)	12(304.8) x 12(304.8)		
250,000(76.2)	156 1/4 (100800)	12 1/2(317.5) X 12 1/2(317.5)		

**FIGURE 5**

**P265 ONLY**

Input BTU/Hr. (kW/Hr.)	Floor Area Sq. Inches (mm <sup>2</sup> )	Preferred Width and Length (mm)	Recommended Minimum Wall Thickness	Recommended Minimum Floor Construction
65,000 (19.05)	63 (40650)	7 (177.8) x 9 (228.6)	2 1/2" (63.5mm) insulating firebrick plus back up of 1 1/2" (38.1mm) or more loose insulation.	2 1/2" (63.5mm) insulating firebrick plus 1 1/2" (38.1mm) magnesia block.
75,000 (21.98)	71 1/4 (45970)	7 1/2 (190.5) x 9 1/2 (241.3)		
100,000 (29.31)	180 (116100)	7 1/2 (190.5) x 9 1/2 (241.3)		
150,000 (43.96)	200 (129000)	12 (304.8) X 15 (381)		
200,000 (58.61)	220 (141900)	13 (330.2) x 17 (431.8)		

**FIGURE 5A**

**P265F ONLY**

Input BTU/Hr. (kW/Hr.)	Floor Area Sq. Inches (mm <sup>2</sup> )	Preferred Width and Length (mm)	Recommended Minimum Wall Thickness	Recommended Minimum Floor Construction
65,000 (19.05)	63 (40650)	7 (177.8) x 9 (228.6)	2 1/2" (63.5mm) insulating firebrick plus back up of 1 1/2" (38.1mm) or more loose insulation.	2 1/2" (63.5mm) insulating firebrick plus 1 1/2" (38.1mm) magnesia block.
75,000 (21.98)	63 (40650)	7 (177.8) x 9 (228.6)		
100,000 (29.31)	71 1/4 (45970)	7 1/2 (190.5) x 9 1/2 (241.3)		
150,000 (43.96)	110 (70970)	10 (254) x 11 (297.4)		
200,000 (58.61)	165 (106500)	11 (297.4) x 15 (381)		

**FIGURE 5B**

## 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/NFPA No. 70-1987. See wiring diagrams, Figures 12&13.

If an external electrical source is utilized, the conversion 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/NFPA No. 70-1987.

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

## 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 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 bypassed 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, door, or 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. 1-1984 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 trap or drip leg must be installed in the supply line to the burner.

A 1/8" N.P.T. (3.175mm) 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 shutoff 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 for the gas piping. The piping should not be supported by the 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.

The appliance and its individual shutoff valve must be disconnected from the gas supply piping system during any pressure testing of the system at test pressure in excess of 1/2 (3447 PaG) psig.

The appliance must be isolated from the gas supply piping system by closing its individual manual shutoff valve during any pressure testing of the gas supply piping system at test pressures equal to or less than 1/2 (3447 PaG) psig.

## 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 feet (.014m<sup>3</sup>) 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.

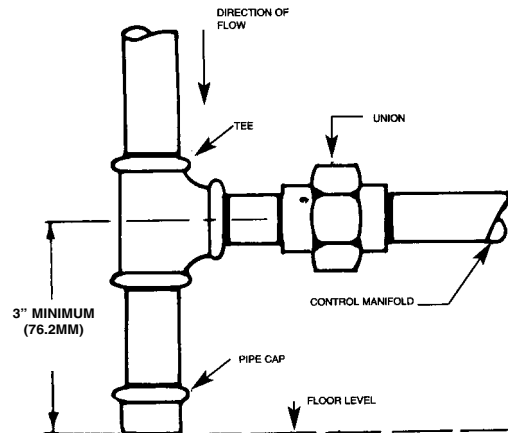
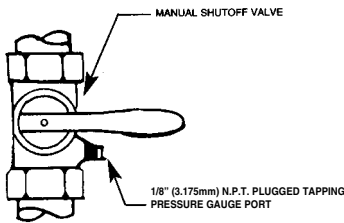
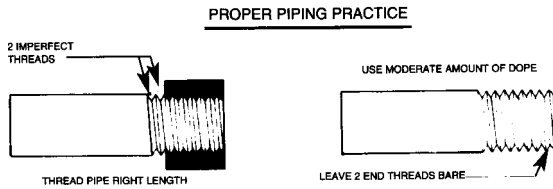


After the piping and meter have been checked completely, purge the system of air. Do not bleed the air inside the furnace. Be sure to relight all the gas pilots on other appliances.

### 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.



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

### LENGTH OF STANDARD PIPE THREADS inches (mm)

PIPE SIZE	EFFECTIVE LENGTH OF THREAD	OVERALL LENGTH OF THREAD
3/8 (9.525)	3/8 (9.525)	9/16 (14.29)
1/2 (12.7)	1/2 (12.7)	3/4 (19.05)
3/4 (19.05)	1/2 - 9/16 (14.29)	13/16 (20.64)
1 (25.4)	9/16 (14.29)	1 (25.4)

### PIPE CAPACITY TABLE

Length of Pipe in Feet (Meter)	Nominal Diameter of Pipe in Inches (mm)				
	3/4 (19.05)	1 (25.4)	1-1/4 (31.75)	1-1/2 (38.1)	2 (50.8)
	Capacity - Cu. Ft. (m <sup>3</sup> ) Per Hr. with a 0.6 Sp. Gr. Gas and Press. Drop of 0.3 In. (74.72 Pa) Water Col.				
15 (4.572)	172	345	750		
30 (9.144)	120	241	535	850	
45 (13.72)	99	199	435	700	
60 (18.29)	86	173	380	610	
75 (22.86)	77	155	345	545	
105 (32)	65	131	285	450	920
120 (36.58)		120	270	420	860
180 (54.86)		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 multiplier shown below.

### MULTIPLIER 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
.90	.817	2.10	.535

## ADJUSTMENT OF BURNER

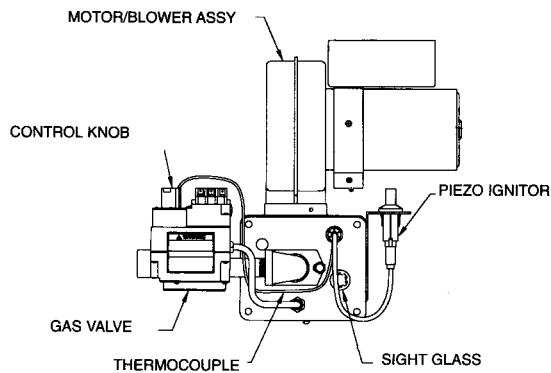
Starting the burner:

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. Turn gas valve control to "PILOT".
5. Depress red button on valve to start pilot gas flow.
6. Push red button down on spark generator until it snaps. Repeat this until the pilot lights. Note: this may take some time until all the air is "bled" out of the line.
7. Hold the red button on the valve for 60 seconds, then release.
8. Observe pilot - if not lit, SHUT OFF BURNER COMPLETELY AND WAIT 5 MINUTES. Repeat steps 1 through 7.
9. Turn gas control valves 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.

### STANDING PILOT



### COMBINATION GAS VALVE

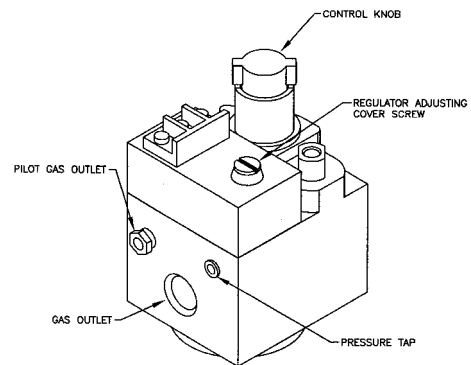
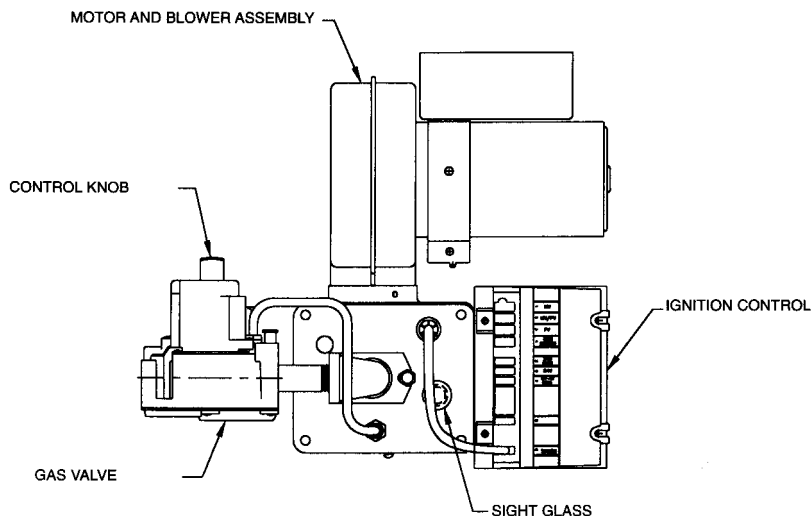


FIGURE 9

### ELECTRONIC PILOT



### COMBINATION GAS VALVE

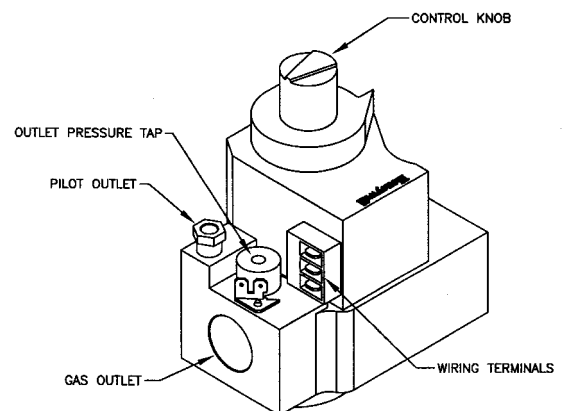
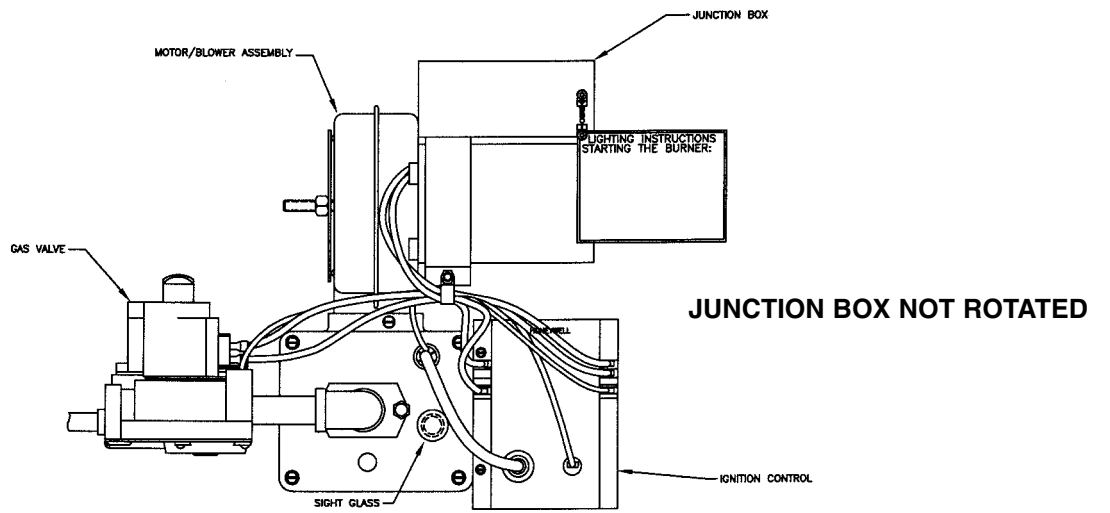
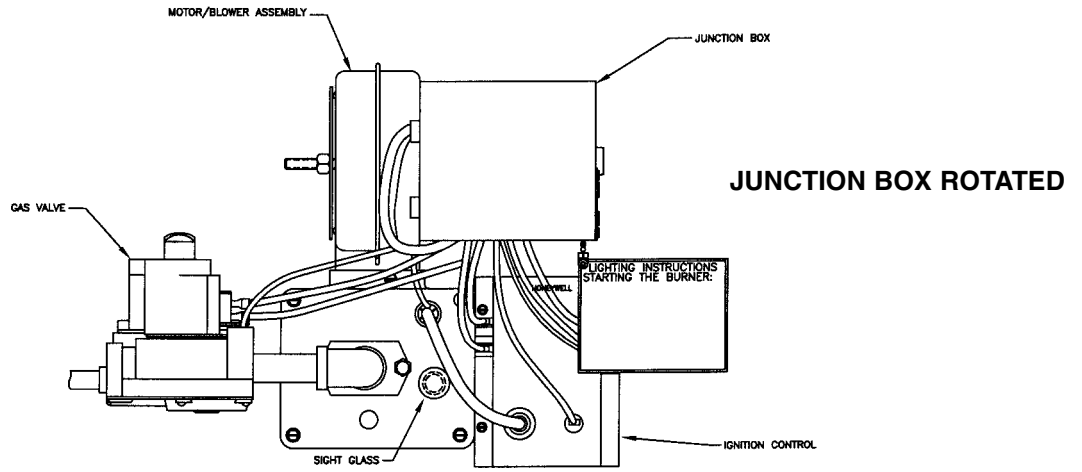
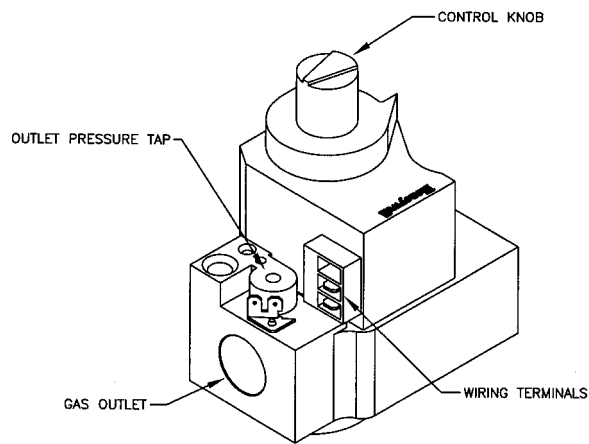


FIGURE 11

**P265DI**



**P265DI**



**COMBINATION GAS VALVE**

All adjustments below must be made with the following instructions:

1. Draft Gauge
2. O<sub>2</sub> or CO<sub>2</sub> Analyzer
3. CO Tester
4. Water Column Gauge

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 (3.175mm). Then by holding match flame along 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.

**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 CO<sub>2</sub> and O<sub>2</sub> are within acceptable limits. The flue gas sample is taken through the same hole used for the CO<sub>2</sub> test. CO test instrument **must** be used for this test.

The most common causes of CO are 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 CO<sub>2</sub> 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 CO<sub>2</sub> and stack temperature readings. These calculators are available from several manufactures of combustion test equipment.

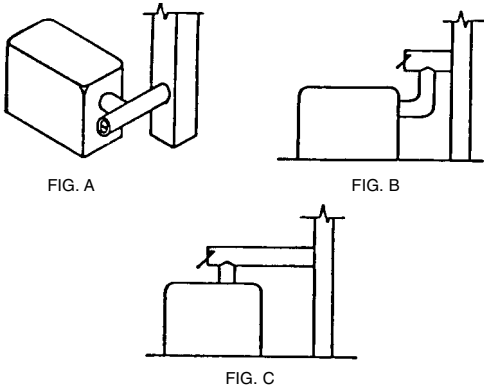
**IMPORTANT**

**DRAFT** - When installing Wayne power gas burners in oil fired boilers a minimum negative draft of .02" (4.982 Pa) w.c. over fire must be maintained.

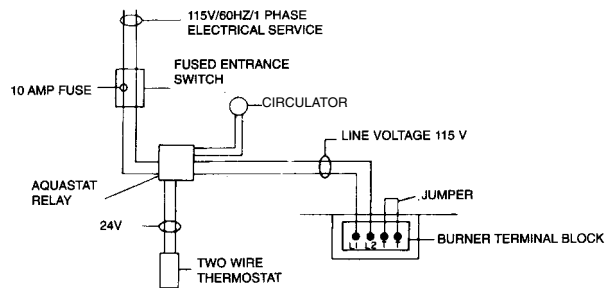
Refer to your local gas company and codes for assistance.

For gas fired equipment requiring a double acting barometric, the preferred location of the barometric draft control is part of the bulkhead tee shown in figures A, B OR C. During normal operation, flue gases make a right angle turn behind the control, but do not infringe upon it. Should a downdraft occur, air flowing n the opposite direction strikes the control directly, causing it to open outwardly and vents the air into the room with a minimum of resistance. Entrained products of combustion are thus provided greater relief.

**BEST LOCATIONS FOR GAS**

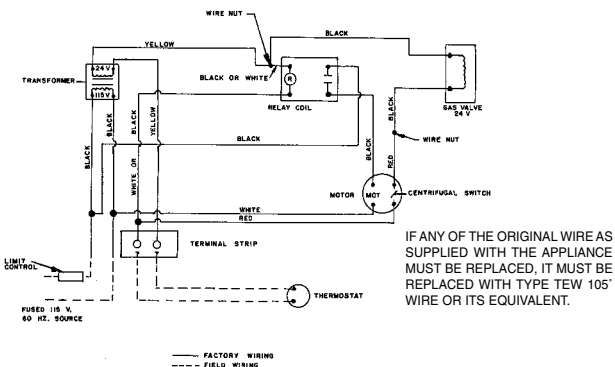


**WIRING DIAGRAM LADDER FORM**



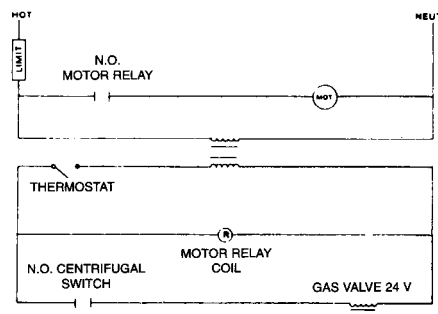
**FIGURE 12**

**WIRING DIAGRAM FOR GAS BURNER WITH STANDING PILOT**



**FIGURE 13**

**WIRING DIAGRAM LADDER FORM**



## GENERAL INSTRUCTION

Gas burners require the services of an experienced technician 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 serviceman.

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

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 breaker 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 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 as when final adjustments were made. Check blower wheel to see if it is dirty or full of lint. 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.

**CLEANING OF BURNERS:** Remove the burner from the appliance and visually inspect the blast tube for any deterioration. On burners equipped with standing pilot or intermittent ignition, inspect pilot burner for dust or corrosion and clean if necessary. Check pilots, thermo-couples, electrodes, etc. with illustrations in the owner's manual for proper locations.

Check flame spreaders if applicable for any deterioration and replace if necessary.

Remove corrugated flame ring from the end of the venturi and clean. Visually inspect the inside of the venturi for any excessive rust or corrosion and clean if necessary. Replace corrugated flame ring and reinstall burner.

## TROUBLE CHART CAUSE

### SYMPTOMS

- |  |   |   |
|--|---|---|
| 1. PILOT DOES NOT LIGHT                      | 1 | a. Air in gas line.<br>b. High or low gas pressure.<br>c. Blocked pilot orifice.  |
| 2. PILOT GOES OUT FREQUENTLY DURING STANDBY. | 2 | a. Restriction in the pilot gas line.<br>b. Low gas pressure.<br>c. Blocked pilot orifice.<br>d. Loose thermocouple connection on 100% shut off.<br>e. Defective thermocouple or pilot safety switch.<br>f. Poor draft condition.<br>g. Draft tube set into or flush with inner wall of combustion chamber. |
| 3. PILOT GOES OUT WHEN MOTOR STARTS.         | 3 | a. Restriction in pilot gas line.<br>b. High or low gas pressure.<br>c. Excessive pressure drop when the main gas valve opens.  |
| 4. MOTOR DOES NOT RUN.                       | 4 | a. Burned out fuse or current off.<br>b. Thermostat or limit defective or improperly set.<br>c. Relay or transformer defective.<br>d. Motor burned out.<br>e. Improper wiring.  |
| 5. MOTOR RUNNING BUT NO FLAME.               | 5 | a. Pilot out.<br>b. Thermocouple not generating sufficient voltage.<br>c. Very low or no gas pressure.<br>d. Vent in regulator plugged.<br>e. Defective regulator.  |
| 6. SHORT NOISY BURNER FLAME.                 | 6 | a. Air shutter not open enough.<br>b. Air openings or blower wheel clogged.<br>c. Too much input.   |
| 7. LONG YELLOW FLAME.                        | 7 | a. Defective valve<br>b. Obstruction on valve set   |
| 8. REGULATOR VENT LEAKING GAS.               | 8 | a. Hole in diaphragm.<br>b. Over pressurization   |

**P 265-EP, P265F-EP, P250AF-EP  
INTERMITTENT PILOT INSTRUCTION  
FOR HONEYWELL SYSTEM**

**STARTING BURNER**

1. Depress the gas valve control knob on the combination gas valve and turn to "OFF". See Figure 9.
2. Set the room thermostat above room temperature and wait five (5) minutes.
3. Set thermostat below room temperature.
4. Turn gas control valve knob to "ON".
5. Set room thermostat higher than room temperature so that the burner will start.

**SHUTTING DOWN THE BURNER**

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

**OPERATION**

**FIRST STAGE -- TRIAL FOR PILOT IGNITION**

On every call for heat (system start), the S8600 performs an internal safe-start check. A system start is prevented if the check shows that a flame-simulating condition is present..

During a normal start, the S8600 opens the first operator in the gas control. This allows gas to flow to the pilot burner. Simultaneously, the electronic spark generator in the S8600 produces a 15,000 volt spark pulse output. This voltage produces a spark at the pilot burner ignitor-sensor rod, igniting the gas flowing around the electrode. If the pilot flame is not detected during the trial for pilot ignition, the S86E and F will continue trying for pilot ignition until a flame is established. The S86G and H contain a safety locknut timer to limit the trial for pilot ignition period.

**SECOND STAGE -- MAIN BURNER OPERATION**

When the pilot flame is established, a flame rectification circuit is completed to the burner ground. The S8600 flame sensing circuit detects the flame current and shuts the spark generator off. At the same time the second operator (main) is opened in the gas control, allowing gas flow to the main burner. The pilot flame ignites the main burner conventionally. On the S86G and H the flame current also holds the safety lockout timer in the reset, or normal, operating condition.

**SAFETY LOCKOUT TIME (S8600 only)**

The safety lockout timer circuit starts timing the moment the trial for pilot ignition starts. When the timing period runs out, the trial for ignition ends, and the control module goes into lockout. Before another attempt to start can be made, the S8600 must be reset. Reset by adjusting the thermostat or controller below room temperature, or to its "OFF" position. An alternate method is to shut the system power "OFF". Wait at least one (1) minute, then turn the system "ON". If normal ignition does not occur, use the troubleshooting table to determine the problem.

**SERVICE**

**PRELIMINARY CHECK**

The following visual checks should be made before troubleshooting and after installation or maintenance.

1. Check the power to the appliance and S8600.
2. Manual shutoff cocks in gas line to appliance must be open.
3. Make certain all wiring connections are clean and tight.
4. S86G, H module must not be in safety lockout. First de-energize the system and wait at least one(1) minute. This resets the module, allowing a return to start condition.
5. Review the S8600 system normal sequence of operation.

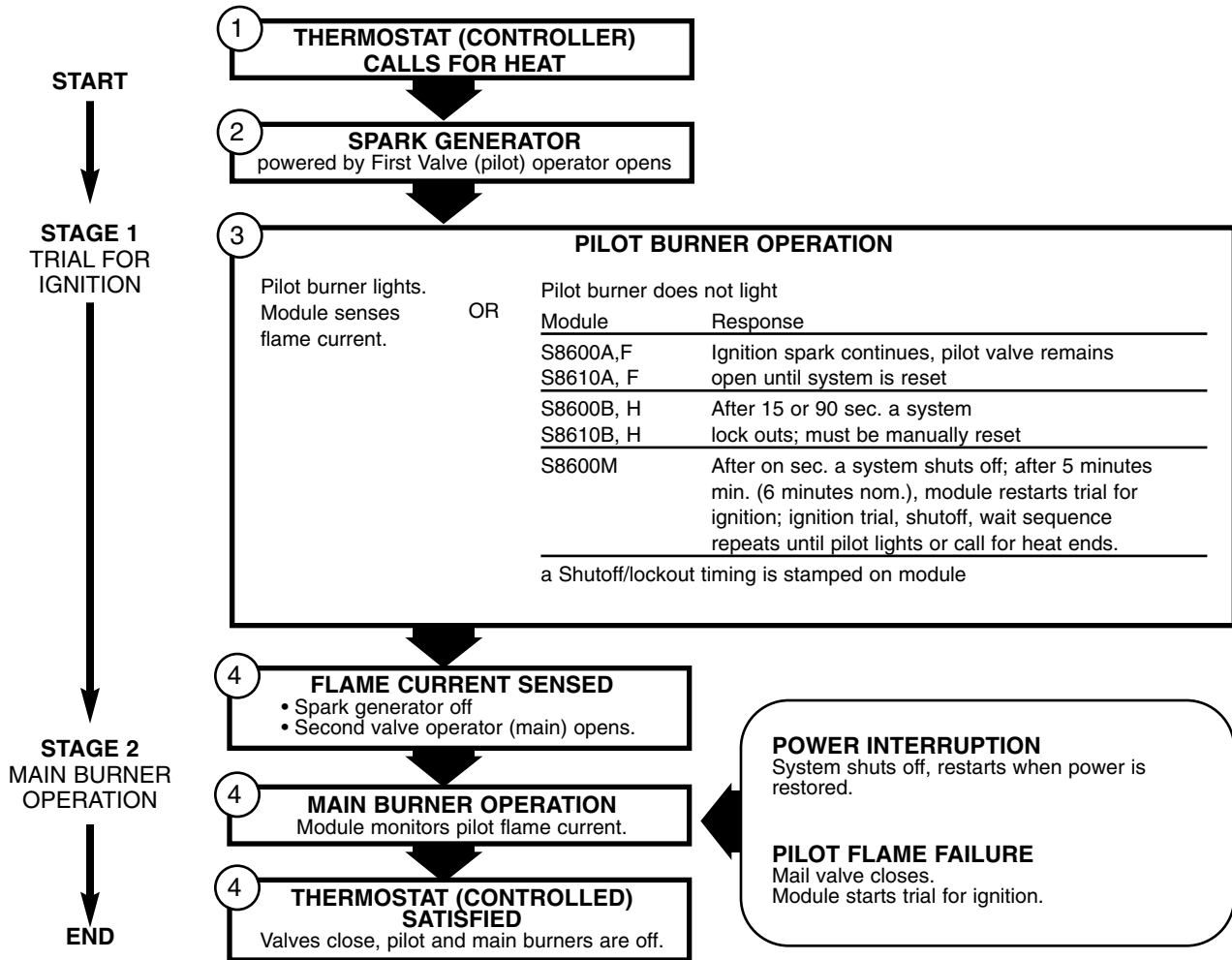
**SYSTEM TROUBLESHOOTING**

Start the system by setting the thermostat or controller above required temperature. Observe system response. Establish type of malfunction or deviation from normal operation. Use the S8600 Intermittent Pilot System Troubleshooting Table (Page 14) to check for normal system operation.

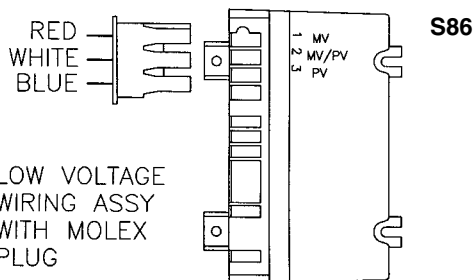
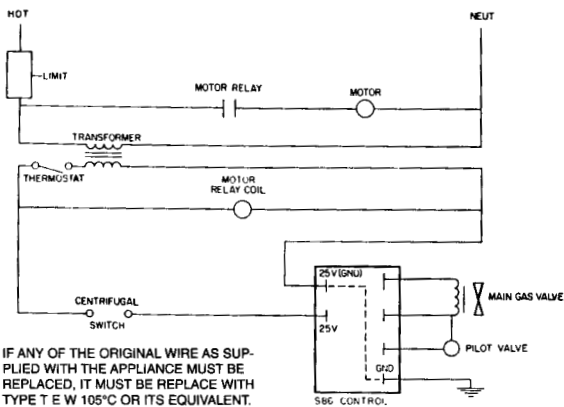
Use table by following instruction question in box. If the condition is true or okay (answers yes), go down to next box underneath. If the condition is not true or not okay (answers no), go right to the next box alongside. Continue checking and answering conditions in each box encountered, until a problem and/or the repair are explained. After any maintenance or repair, the troubleshooting sequence should be repeated until the troubleshooting procedure ends with normal system operation.

**IMPORTANT:** The electronic S8600 control Module cannot be repaired. If troubleshooting procedure indicates a malfunction in the S8600, the control Module must be replaced. Intermittent pilot systems should be serviced only by trained and experienced personnel.

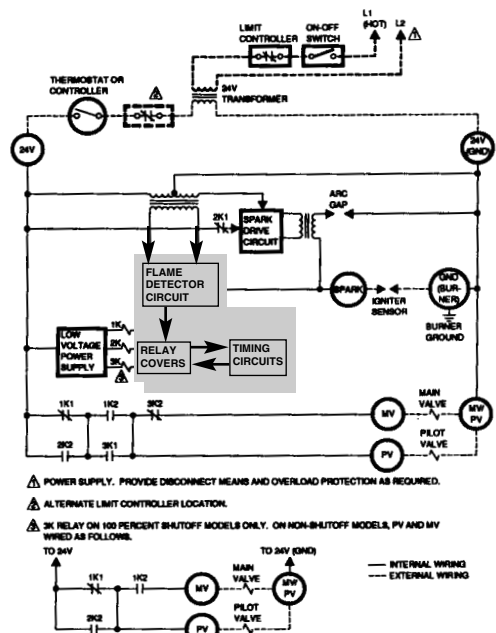
### SEQUENCE OF OPERATION



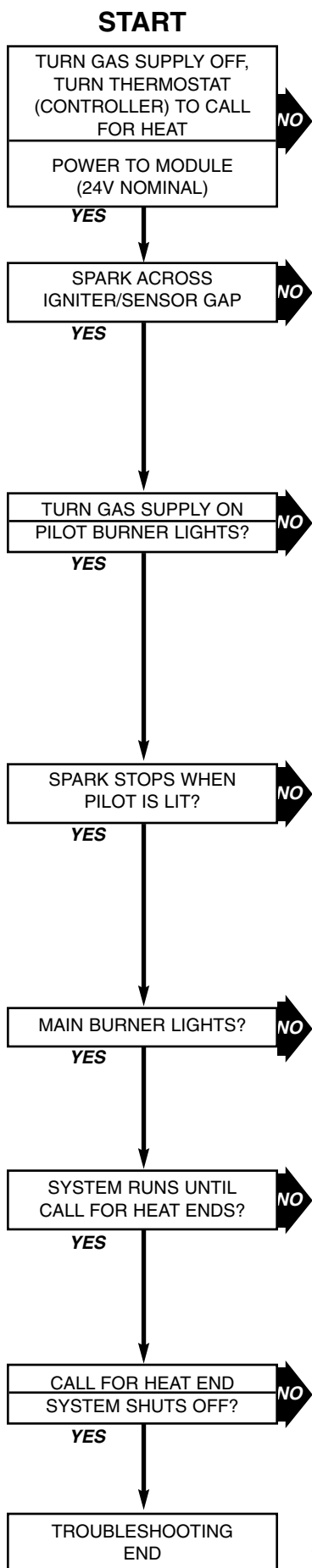
### WIRING DIAGRAM LADDER FORM



### WIRING DIAGRAM HONEYWELL EP SYSTEM



## S8600, S8610 TROUBLESHOOTING GUIDE



NOTE: Before troubleshooting, familiarize yourself with the start up and checkout procedure.

Check line voltage power, low voltage transformer, limit controller, thermostat (controller) and wiring. Also, check air proving switch on combustion air blower system (if used) and that vent damper (if used) is open and end switch is made.

Pull ignition lead and check spark at module

Spark okay?

- On modules with vent damper plug, make sure vent damper has not been installed, then removed. Replace vent damper if necessary.
- On other models, replace module.

YES

- Check ignition cable, ground wiring, ceramic insulator and gap, and correct.
- Check boot of the ignition cable for signs of melting or buckling. Take protective action to shield cable and boot from excessive temperatures.

- Check that all manual gas valves are open, supply tubing and pressures are good, and pilot burner orifice is not blocked.
- Check electrical connections between module and pilot operator on gas control.
- Check for 24 Vac across PV-MV/PV terminals on module. If voltage is okay, replace gas control; if not, replace module.

NOTE: If S8600B, H; S8610B, H goes into lockout, reset system. For S8600M, wait 6 min. nom. for retry or reset system.

- Check continuity of ignition cable and ground wire.
- Clean flame rod.
- Check electrical connections between flame rod and module.
- Check for cracked ceramic flame rod insulator.
- Check that pilot flame covers flame rod and is steady and blue.
- Adjust pilot flame.
- If problem persists, replace the module.

- Check for 24 Vac across MV-MV/PV terminals. If no voltage, replace module.
- Check electrical connections between module and gas control. If okay, replace gas control or gas control operator.

NOTE: If S8600B, H; S8610B, H goes into lockout, reset system. For S8600M, wait 6 min. nom. for retry or reset system.

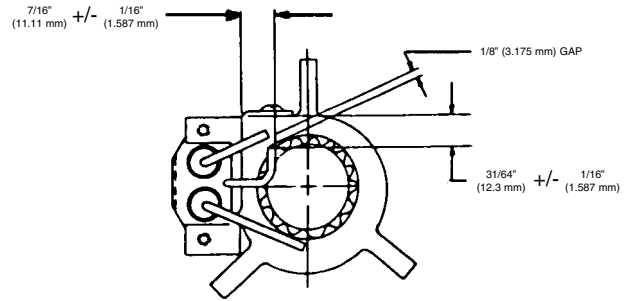
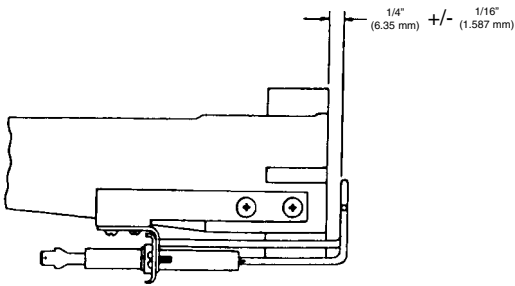
- Check continuity of ignition cable and ground wire.
- NOTE: If ground is poor or erratic, shutdowns may occur occasionally even though operation is normal at the time of checkout.
- Check that pilot flame covers flame rod and is steady and blue.
  - If checks are okay, replace the module.

- Check for proper thermostat (controller) operation.
- Remove MV lead at module; if valve closes, recheck temperature controller and wiring; if not, replace gas control.

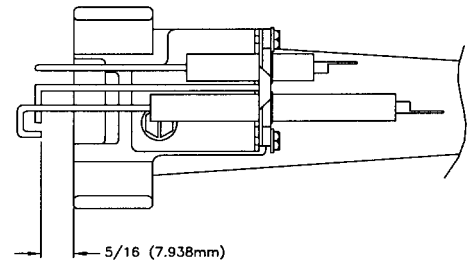
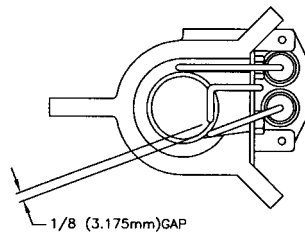
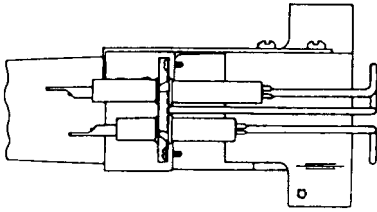
Repeat procedure until trouble free operation is obtained.



## P250AF DIRECT SPARK ELECTRODE LOCATION



## P265DI DIRECT SPARK IGNITION HONEYWELL S87K SYSTEM



## P250AF/P265-DI DIRECT SPARK IGNITION HONEYWELL SYSTEM

### Starting the burner:

- 1) Turn the gas valve control knob to "OFF", wait five minutes.
- 2) Turn gas valve control knob to "ON".
- 3) Set room thermostat above room temperature.
- 4) If burner does not light, SHUT OFF BURNER COMPLETELY AND WAIT FIVE MINUTES, then repeat steps 1 through 3 above.

### To shut off burner:

- 1) Turn the gas valve control knob to "OFF".
- 2) Turn off electrical supply.

### DESCRIPTION

The Honeywell S87K (24VAC) Direct Spark Ignition Systems operate through a thermostat to provide a means of ignition for the main burner on gas-fired equipment. This is accomplished by generating a spark between high voltage electrode and ground. Once the flame is established a flame rod monitors the main burner flame.

### SEQUENCE OF OPERATION

On a call for heat, voltage is applied to the ignitor across Terminals 1 (power) and 6 (ground) of the input connector. A high voltage spark is then generated from the spark electrode to ground. Simultaneously, the gas valve is energized.

At the start of each heat cycle, there is a "Trial for ignition period" of three seconds duration. Normally main burner flame will be established before the end of this period. Once the flame is established, sparking will cease and the "flame rod" will provide flame monitoring for the remainder of heat cycle. If the flame is extinguished during this cycle, the ignitor will start sparking automatically in an attempt to re-establish the flame. If this does not occur within the "Trial for ignition period," the system will go into lockout, closing the gas valve.

## **DIRECT SPARK IGNITION SINGLE ROD TROUBLESHOOTING INFORMATION**

NOTE 1: BURNERS ARE NOT PRESET FROM THE FACTORY AND MUST BE ADJUSTED AT THE SITE.

NOTE 2: NEW GAS LINE INSTALLATIONS WILL HAVE AIR IN THE LINES AND REQUIRE SEVERAL IGNITION ATTEMPTS TO PURGE ALL THE AIR FROM THE LINES.

NOTE 3: DO NOT ATTEMPT TO PERFORM ANY WORK ON THIS BURNER UNLESS THE FOLLOWING TOOLS ARE AVAILABLE AND YOU ARE A CERTIFIED INSTALLER:

1. VOLT METER-VOLTS, OHMS, CONTINUITY
2. AMP METER-CLAMP TYPE
3. BURNER MANUAL
4. MANOMETER
5. BLADE SCREW DRIVERS
6. NUT DRIVERS
7. OPEN END WRENCHS
8. TAPE MEASURE

The Wayne Burner that you are attempting to troubleshoot has the following electrical 115 Volt Single phase components:

1. 115 volt Combustion Fan Motor w/End Switch
2. Fan Relay-24 volt coil side and 110 volt fan side
3. Honeywell Gas primary Control(24 VOLT)
4. Honeywell Gas Valve(24 VOLT)
5. 24 volt Transformer
6. Ignition Rod/Sensing Rod
7. Ignition Lead
8. T-T (24 VOLT) TERMINAL

## **NORMAL BURNER SEQUENCE OF OPERATION**

1. APPLIANCE CALLS FOR HEAT BY RAISING THE THERMOSTAT TO THE DESIRED SETTING:.Note the transformer is always energized with 110 volts.
2. When the thermostat circuit is complete, this allows 24 volts to coil side of the fan relay which are the bottom terminals.
3. Now that 24 volts (Yellow Wires)are applied to the coil, this in turn allows the 115 volt contacts to close thus allowing 115 volts to flow to the fan across terminals #1 and #3 which are in series with the fan motor.
4. The Combustion fan motor should now be operational.
5. With the fan energized, there will be a 30 second pre-purge.
6. The Fan motor will develop 3400 rpm quickly causing the centrifugal endswitch to close. The End switch can be identified by the two red wires coming from the end cap.
7. After the Endswitch makes, this allows 24 volts to the Honeywell S87K control
8. Now the Ignition process will follow.
9. The S87K will generate a high frequency spark at the same time the gas valve opens. The S87K has a 4 second trial for ignition period; If after four seconds the control does not sense a minimum flame signal of .8 microamps then the control will go into lockout. To Reset the control simply cycle the thermostat off and then set it to the desired room temperature.
10. After the Burner is operational, the Honeywell control shifts into a rectification mode constantly monitoring the flame signal.
11. The Burner will now cycle off and on based on the thermostat setting.

## **COMPONENT SECTION**

### FAN RELAY MALFUNCTION

1. If the 24 volt coil fails to operate then the Fan Motor will not be energized. To check the coil for short circuit, power should be off, set the multimeter setting to continuity. If the multimeter reads O.L then the 24 volt coil has break in its circuit and must be replaced. Some multimeters have an audible Continuity setting. If the continuity thru the 24 volt coil is good then the multimeter will beep and this part of the Relay is good. The Fan relay should have 24 volts across the lower coil terminals. The 24 volts is supplied from the 24 volt transformer.
2. If 24 volts are present on the coil side but we do not have 115 volts on the contact side of the relay, then check the voltage supply or look for a blown fuse. The 115 volts are supplied from L1 (Hot) and L2(Neutral).The 115 volt contacts can be checked easily by checking continuity also. Set multimeter to the continuity setting and place the black and red leads across the terminals with the 24 volts on. If the multimeter does not make any sound then the contacts are open and the relay must be replaced.

### 24 VOLT TRANSFORMER MALFUNCTION

1. The 24 volt transformer has a 115 volt primary side with a 24 volt secondary circuit. To check the transformer simply apply 115 volts to the black and white leads. If the transformer is working correctly, 24 volts will be present across the two yellow leads. If the multimeter does not register 24 volts then the transformer needs to be replaced. The transformer will not function unless 115 volts are present across L1 and neutral.

### HONEYWELL GAS PRIMARY CONTROL

1. The Honeywell Primary Controls the burner operation. The Gas Primary requires 24 volts input into the control from the 24 volt transformer path. After the control receives 24 volts then the trial for ignition period begins. At this point we should have 24 volts into and out of the primary control. The Burner will have a 30 second prepurge followed by a 4 second trial for ignition period. During the ignition process the control will be generating a spark at the same time the gas valve opens. After the flame is established the flame signal strength should range from 2 to 5 micro amps and be stable. To check the flame signal strength simply disconnect the black sensing lead from the Honeywell control and place the meter in series connecting one lead to the black sensing lead and the other lead from the multimeter to the sensing post on the Honeywell Primary control.

### HONEYWELL GAS VALVE MALFUNCTION

1. The gas valve is supplied with 24 volts from the gas primary which in turn is supplied with 24 volts from the 24 volt transformer. During operation the two terminals on the gas valve should have 24 volts measured across the terminals. If the 24 volt transformer is working, the endswitch is made and the thermostat calls for heat but the gas valve does not open then replace the gas valve.

### FASCO COMBUSTION FAN ENDSWITCH

1. The Fasco 115 volt motor is equipped with a centrifugal endswitch. The purpose of the endswitch is to ensure that the combustion fan motor has reached the proper operating RPM which is generally about 3400 rpm. If the endswitch fails to close then the 24 volt circuit to the gas primary is interrupted and the gas valve will not open. If the Blower motor has 115 volts applied but is not rotating then the motor assembly must be replaced. Lastly if the motor is not rotating, the centrifugal switch will not make and 24 volts will not be present at the gas primary control.

### IGNITER ROD

1. The igniter rod is responsible for conveying the spark to a grounding rod in an appropriate location to ignite the gas and air mix. The igniter Rod gap should be 1/8" Larger Gaps will create ignition problems. If the igniter rod is cracked, a sparking sound will be heard inside the burner airtube but ignition will not occur and lockout will occur.

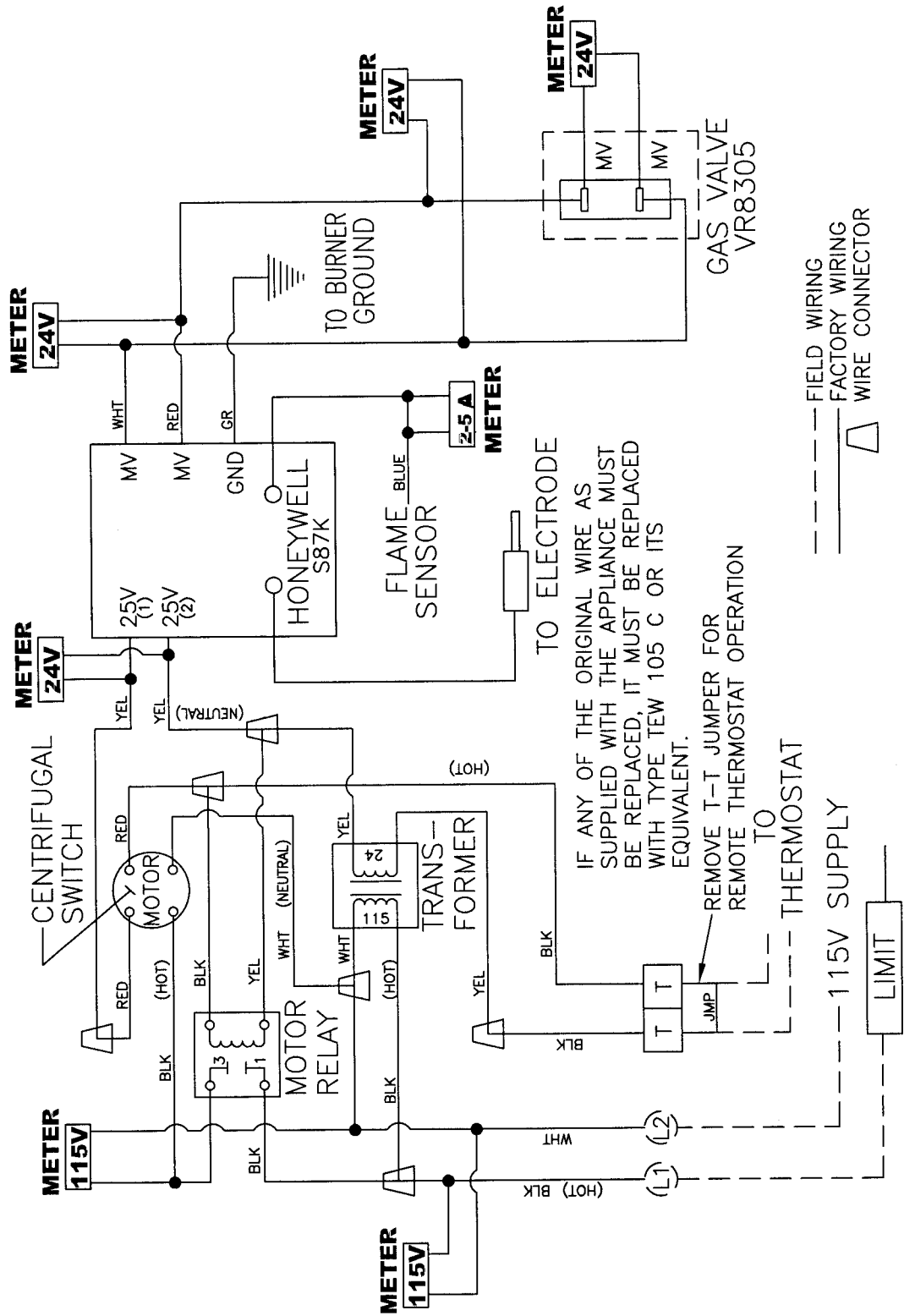
### RECTIFICATION ROD

The Rectification Rod is responsible for sending a DC signal back to the control to tell the control that a flame is present. A typical flame signal strength ranges from 2 to 5 micro amps and should be stable. If the rectification rod is cracked, then the signal will be grounded thus no current back to the control causing lockout

### THERMOSTAT CALLS FOR HEAT AND THE FOLLOWING CONDITIONS OCCUR:

1. **PROBLEM:** The Combustion Fan motor is not operating.  
**POSSIBLE REASONS:**
  - A. Power is not on.
  - B. Circuit Breaker tripped
  - C. Thermostat in the off position
  - D. Thermostat connections to T-T terminals on junction box have shorted to the junction box.
  - E. Bad Thermostat
  - F. Blower wheel Jammed
  - G. Excessive amount of debris stuck in blower wheel blades.
  - H. 24 volt transformer is not functioning properly.
  - I. Thermostat leads not connected to the T-T terminals.
  - J. Motor shorted out due to over voltage
2. **PROBLEM:** Combustion Fan motor runs but ignition sequence does not occur.  
**POSSIBLE REASONS**
  - A. Blower Motor Endswitch not closed which completes the 24 volt circuit to the Gas primary
  - B. The Blower motor is not reaching full rpm due to debris on wheel
  - C. Low Voltage to the Blower Motor
  - D. Loose Connections on the 24 volt circuit after the endswitch or between Fan relay and the 24 volt side of the gas primary
  - E. The S87K Gas Primary control is defective and must be replaced.
3. **PROBLEM:** Combustion Fan motor runs and Ignition Sequence initiated but goes Into Lockout.  
**POSSIBLE REASONS**
  - A. Flame Sensing Rod is cracked which would ground out the signal.
  - B. Spark Electrode Rod is cracked shorting the spark to ground.
  - C. Loose Connection on Flame Sensing Rod
  - D. Loose Connection on Spark Electrode Rod
  - E. Gas Primary Control not allowing 24 volts to Gas Valve
  - F. Gas Valve shorted out or defective
  - G. No Earth Ground between burner and appliance.
  - H. Flame Sensing Rod grounding out on Burner
    1. Spark Electrode location shifted
  - J. Gas Primary Control not generating spark
  - K. Ignition Wire insulation melted and is grounding out on burner
  - L. Gas Supply is not turned on
  - M. Gas Manifold pressure too high
  - N. Gas Manifold -pressure too low
  - O. High negative draft conditions
  - P. Flue Passage is blocked
  - Q. Gas Supply line is undersized
  - R. Multi appliances operating on undersized line
  - S. Insufficient combustion air flow
  - T. Incorrect Air shutter adjustment allowing too much combustion air to enter burner.

# WIRING TROUBLESHOOTING DIAGRAM HONEYWELL S87KDI OPERATING SYSTEM



To measure flame current, first shut off the power to the system and then remove the flame sensing lead wire from the electrode terminal and insert a 0-50 DC microamp meter in series with the sensor electrode and the sensor lead wire. "Plus" terminal of meter to component board and "negative" terminal to sense electrode. Energize the ignitor. If the meter reads below zero, shut the system off and reverse meter leads.

Once the flame is established, assure that the flame current is above the minimum specified. If not, assure that the system has the proper input voltage, and then relocate the sensor electrode in the flame pattern until flame current is increased.

Once the flame has been established and the system is in its heat cycle, occasional sparking may occur. This is common in some installations and is not significant. Sparking will not damage the ignitor.

7. Ambient Temperatures

The S87K is designed to operate over the temperature range of -40 to 175° F (-40 to 79° C). Care should be taken to insure that it operates within this range. If these limits are exceeded, the ignitor should be relocated to an area that is within this temperature range.

8. Relative Humidity

The S87K is coated for moisture resistance from 5-95% relative humidity at 90° F (32°C). Caution should be taken to protect the component board against direct exposure to water.

**SERVICE HINT, DIAGNOSIS AND CORRECTIVE MEASURES**

**WHAT'S WRONG**

- 1. Lockout Occurs 3-10 seconds after ignition.
- 2. Flame not established. Arcing to ground.
- 3. No spark.
- 4. Arcing other than across gap.

Weak Spark.

No flame.  
Low flame current and/or nuisance lockouts.  
Nuisance lockouts.

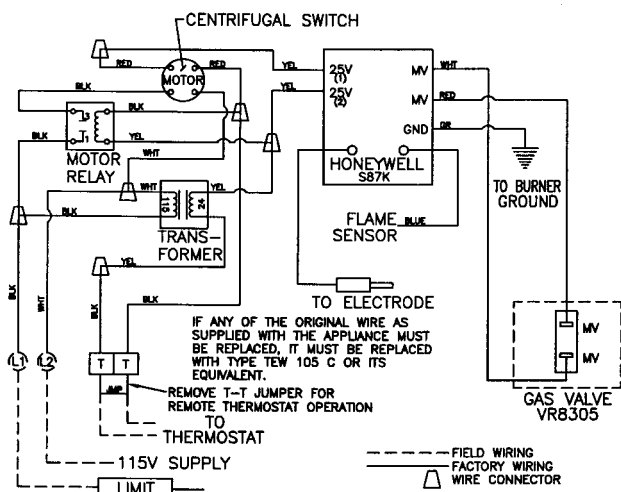
**WHY**

- 1. Reverse polarity.
- 2. System improperly grounded.
- 3. Gas pressure too high, causing flame to lift off burner.
- 4. Sensor probe incorrectly positioned in flame pattern. Spark gap too small. Spark too large. Corroded connector.
- 1. Cracked or dirty insulator.
- 2. Broken high voltage lead. High voltage lead too close to metal surface. Valve malfunction. Electrode improperly placed.
- 1. Flame current falls below 2.5 uA
- 2. Low gas pressure.

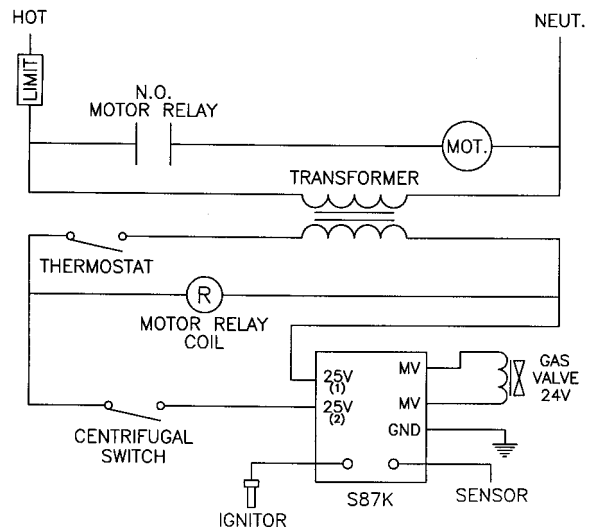
**WHAT TO DO**

- Para. 1.
- Para. 2.
- Check to ensure input pressure as specified on manufacturer's data plate.
- Para. 6.
- Para. 3a
- Para. 3a.
- Para. 3b.
- Para. 3c.
- Para. 3c.
- Para. 3e.
- Para. 4.
- Para. 5.
- Para. 6.
- Check to ensure that manifold pressure meets manufacturer's specifications.

**WIRING DIAGRAM HONEYWELL S87KDI SYSTEM**



**WIRING DIAGRAM LADDER FORM**



**PARTS LIST - P265/P265F SERIES GAS BURNERS**

Part No.	Description	Qty Req'd	P265	P265F	P265F BB	P265 EP	P265F EP	P265F EP BB	P265 DI	P265F DI	P265F DI BB
62903-001	Control Box/Strap Assembly	1	•	•	•	•	•	•	•	•	•
60182-002	Power Cord Assembly	1	•	•	•						
60186-004	Transformer - 24V	1	•	•	•	•	•	•	•	•	•
100986-002	Relay	1	•	•	•	•	•	•	•	•	•
62899	Control Box Cover	1	•	•	•	•	•	•	•	•	•
60172-002	Motor/Blower (inch end switch)	1	•	•	•	•	•	•	•	•	•
62901-001	Air Shutter - Stationary Position	1	•	•	•	•	•	•	•	•	•
61770-002	Air Shutter - Disc	1	•	•	•	•	•	•	•	•	•
62715-001	Air Tube/Housing Assembly	1	5" (127mm)			5" (127mm)			5" (127mm)		
62715-003	Air Tube/Housing Assembly	1	8" (203.0mm)			8" (203.0mm)			8" (203.0mm)		
62715-005	Air Tube/Housing Assembly	1	11" (279.4mm)			11" (279.4mm)			11" (279.4mm)		
62715-002	Air Tube/Housing Assembly	1		5" (127mm)			5" (127mm)			5" (127mm)	
62715-004	Air Tube/Housing Assembly	1		8" (203.0mm)			8" (203.0mm)			8" (203.0mm)	
62715-006	Air Tube/Housing Assembly	1		11" (279.4mm)			11" (279.4mm)			11" (279.4mm)	
62715-007	Air Tube/Housing Assembly	1			•			•			•
21724-011	Adjustable Flange w/Gasket	1	•	•	•	•	•	•	•	•	•
100428-002	Flange Gasket	1	•	•	•	•	•	•	•	•	•
21760-011	Base Assembly	1	•	•	•	•	•	•	•	•	•
60270-002	Gas Valve - Standing Pilot	1	•	•	•						
62246-004	Gas Valve - EP Pilot	1				•	•	•			
62374-004	Gas Valve - Direct Spark (DI)	1							•	•	•
62898-001	Orifice Holder - 5" (127mm) Units	1	•	•	•	•	•	•	•	•	•
60249	Orifice Holder - 8" (203.2mm) Units	1	•	•		•	•		•	•	
60250	Orifice Holder - 11" (279.4mm) Units	1	•	•		•	•		•	•	
See Chart	Orifices - Natural gas	1	•	•	•	•	•	•	•	•	•
See Chart	Orifices - LP gas	1	•	•	•	•	•	•	•	•	•
61455	Bulkhead Union	1	•	•	•	•	•	•	•		
63432-001	Venturi - Less Fixed Flamespreader	1	•			•			•		
60944	Venturi - Less Fixed Flamespreader	1	•			•					
61403	Venturi - With Fixed Flamespreader	1		•	•		•	•			
61637-003	Venturi - With Fixed Flamespreader	1								•	•
60987	Thermocouple-5" (127mm) & 8" (203.2mm) Units	1	•	•	•						
60280	Thermocouple - 11" (279.4) Units	1	•	•	•						
63228-001	Pilot Burner	1	•	•	•						
63062-001	Pilot Burner	1				•	•	•			
60680-002	Pilot Orifice - Natural gas	1	•	•	•	•	•	•			
60680	Pilot Orifice - LP gas	1	•	•	•	•	•	•			
63210-001	Electrode Assembly - Piezo System	1	•	•	•						
63212-001	Electrode Bracket - Piezo	1	•	•	•						
62261-002	Electrode Assembly - DI	1							•	•	•
61818	Flamespreader	1	•	•	•	•	•	•	•	•	•
62243-003	Control - EP Pilot	1				•	•	•			
101243-001	Control - Direct Spark (DI)	1							•	•	•
63213-001	Spark Generator - Pushbutton Piezo	1	•	•	•						
63217-003	Ignitor Wire - Piezo Electrode	1	•	•	•						
62947-003	Ignition Wire Assembly	1				•	•	•	•	•	•
63375-001	Wire Set	1							•	•	•
62955-001	Burner Conversion Kit - Nat to LP	1	•	•	•	•	•	•			
62956-001	Burner Conversion Kit - LP to Nat	1	•	•	•	•	•	•			

**PARTS LIST - P250AF SERIES GAS BURNERS**

<b>Part No.</b>	<b>Description</b>	<b>No. Req'd</b>	<b>P250AF</b>	<b>P250AF EP</b>	<b>P250AF DI</b>
62903-001	Control Box/Strap Assembly	1	•	•	•
60182-002	Power Cord Assembly	1	•		
60186-004	Transformer-24V	1	•	•	•
100986-002	Relay	1	•	•	•
62899	Control Box Cover	1	•	•	•
60172-002	Motor/Blower (inch end switch)	1	•	•	•
62901-001	Air Shutter - Stationary Portion	1	•	•	•
61770-002	Air Shutter - Disc	1	•	•	•
62715-003	Air Tube/Housing Assembly	1	•	•	•
63228-001	Pilot Burner	1	•		
63062-001	Pilot Burner	1		•	
62261	Electrode Assembly - DI	1			•
62261-002	Electrode Assembly - DI	1			•
See Chart	Orifices - Natural gas	1	•	•	•
See Chart	Orifices - LP gas	1	•	•	•
60680-002	Pilot Orifice - Natural gas	1		•	
60680	Pilot Orifice - LP gas	1	•	•	
60987	Thermocouple	1	•		
61818	Flamespreader	1	•	•	•
63213-001	Piezo Spark Generator	1	•		
60270-002	Gas Valve - Standing Pilot	1	•		
62246-004	Gas Valve - EP Pilot	1		•	
62374-004	Gas Valve - Direct Spark (DI)	1			•
62243-003	Control - EP Pilot	1		•	
101243-001	Control - Direct Spark (DI)	1			•
63212-001	Spark generator	1	•		
62955-001	Burner Conversion Kit - Nat to LP	1	•	•	
62956-001	Burner Conversion Kit - LP to Nat	1	•	•	
63217-004	Ignitor Wire - Piezo Electrode	1	•		
62947-003	Ignition Wire Assembly	1		•	•
63375-001	Wire Set	1			•





# WAYNE COMBUSTION SYSTEMS

801 GLASGOW AVE.  
FORT WAYNE, IN 48803

## LIMITED WARRANTIES FOR OIL AND GAS BURNERS, MADE BY WAYNE AND USED IN RESIDENTIAL INSTALLATIONS

WAYNE COMBUSTION SYSTEMS (“WAYNE”) warrants to those who purchase its **Oil Burner Models** for resale or for incorporation into a product of resale, that its burner is free from defects in material and workmanship under normal use and service for thirty-six (36) months from the date of manufacture. **ALL GAS BURNERS** manufactured by “WAYNE” will be similarly warranted for eighteen(18) months from date of manufacture except where original manufacture offers a greater warranty. (Reference #6 below) THESE LIMITED WARRANTIES DO NOT APPLY UNLESS THE BURNER COVERED BY IT **IS PROPERLY INSTALLED BY A QUALIFIED, COMPETENT TECHNICIAN**, WHO IS LICENSED WHERE STATE AND/OR LOCAL CODES PREVAIL, AND **WHO IS EXPERIENCED IN MAKING SUCH INSTALLATIONS**, IN ACCORDANCE WITH NFPA #31 OF THE NATIONAL FIRE PROTECTION ASSOCIATION AND IN ACCORDANCE WITH ALL LOCAL, STATE AND NATIONAL CODES.

Any **IN-WARRANTY** burner component which is defective in material or workmanship will be either repaired or replaced as follows:

1. Fuel units, motors, transformers, gas valves, and controls should be returned to an authorized service station or distributor of WAYNE for determination of applicability of this LIMITED WARRANTY as to either repair or replacement, where said service station or distributor is reasonably available in the customer’s locality. The manufacturers of burner components regularly publish and distribute listings showing the locations of their network of service stations. Where such local service is NOT available for the burner components described above or other burner parts are involved, these items should be returned, freight prepaid, to WAYNE Service Department, 801 Glasgow Ave, Fort Wayne, Indiana 46803.
2. Burners and/or component(s) determined to be covered under this LIMITED WARRANTY by WAYNE shall be repaired or replaced at WAYNE’s sole option.
3. WAYNE is not responsible for any labor cost for the removal and replacement of said burner or burner components and equipment associated therewith.
4. A burner so repaired will then carry the LIMITED WARRANTY equal to the unexpired portion of the original burner LIMITED WARRANTY.
5. If inspection by WAYNE does **NOT** disclose any defect covered by this LIMITED WARRANTY, the burner or burner component(s) will be either repaired or replaced at the expense of the customer and WAYNE’s regular charges will apply.
6. If the original manufacturer of a burner component offers a warranty greater than either of our LIMITED WARRANTIES described above, then this portion will be added to our LIMITED WARRANTY.

This LIMITED WARRANTY does **NOT** cover products which have been damaged as the result of accident, abuse, misuse, neglect, improper installations, improper maintenance or failure to operate in accordance with WAYNE’s written instructions.

These LIMITED WARRANTIES do not extend to anyone except the first purchaser at retail and only when the burner is in the original installation site.

**IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE SHALL BE LIMITED TO THE DURATION OF THE LIMITED EXPRESS WARRANTIES CONTAINED HEREIN. WAYNE EXPRESSLY DISCLAIMS AND EXCLUDES ANY LIABILITY FOR CONSEQUENTIAL OR INCIDENTAL DAMAGES OF ANY NATURE FOR BREACH OF ANY EXPRESS OR IMPLIED WARRANTY.**

Some states do not allow limitation on how long an implied warranty lasts, so the above limitation may not apply to you. Also, some states do not allow the exclusion or limitation of incidental or consequential damages, so the above limitation or exclusion may not apply to you. WAYNE neither assumes or authorizes any person to assume for WAYNE any other liability or obligation in connection with the sale of these products. This warranty gives you specific legal rights, and you may also have other rights which vary from state to state.

