

Manual JA 1082 Rpt 0409
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Power Flame®

*The Power to Manage
Energy*



Power Flame Incorporated

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JA MANUAL

POWER FLAME INCORPORATED

FOR YOUR SAFETY

If you smell gas:

1. Open windows.
2. Do not touch electrical switches.
3. Extinguish any open flame.
4. Call your gas supplier immediately.

Do not store or use gasoline or other flammable liquids and vapors in the vicinity of this or any other appliance.

WARNING

Improper installation, adjustment, alteration, service or maintenance can cause injury or property damage.

Refer to this manual. For assistance or additional information consult a qualified installer, service agency or the gas supplier.

NOTICE

Effective 4/1/94 Underwriters Laboratories require that all gas burners firing at inputs of 2,500 MBH and under be supplied with two gas safety valves or one gas valve with proof of closure (Valve seal over travel). The photos in this manual may not depict these specific components. All U.L. listed products shipped after 4/1/94 will comply with the U.L. requirements.

LIMITED WARRANTY

Power Flame Incorporated, hereinafter called the Seller, of 2001 South 21st Street, Parsons, Kansas, hereby warrants its equipment manufactured by it and bearing its nameplate (hereinafter called Warranted Equipment) in the respects and exclusively for the benefits of those users, described herein. THIS LIMITED WARRANTY SHALL EXTEND SOLELY TO THOSE PERSONS WHO ARE OWNERS OF THE WARRANTED EQUIPMENT DURING THE WARRANTY PERIOD HEREINAFTER DEFINED AND WHO USE SUCH WARRANTED EQUIPMENT IN THE PROJECT AND FOR THE PURPOSES FOR WHICH SUCH WARRANTED EQUIPMENT WAS ACQUIRED FROM THE SELLER. The Seller warrants its equipment to be free from defects in the material and workmanship under normal use and service for fifteen (15) months from date of shipment. Burner blast tube (Firing Head) is warranted for a full five (5) years from date of shipment. EXCLUDED FROM ANY COVERAGE UNDER THIS WARRANTY ARE DEFECTS IN WARRANTED EQUIPMENT FROM DAMAGE IN SHIPMENT, FAULTY INSTALLATION, MISUSE OR NEGLIGENCE. If any person becomes entitled to a claim under this warranty, such person shall, as a condition precedent to securing warranty performance, return the Warranted Equipment to the Seller's plant, 2001 South 21st Street, Parsons, Kansas, transportation prepaid. If the Warranted Equipment thus returned is found by the Seller to be defective for a cause and within a time covered by this Warranty, such equipment shall be repaired or replaced without charge; and returned to its owner or job site at the Seller's cost for transportation and handling. If inspection of the Warranted Equipment discloses defects not covered by this Warranty, the Seller shall notify the owner. Said equipment, at the owner's option (to be determined thirty (30) days from the date of notification), may be repaired or replaced at the expense of the owner and Seller's regular charges shall apply. Owner shall assume the cost for transportation and handling. Equipment which is repaired or replaced shall carry a warranty equal to the unexpired term of the original warranty. The Seller will commence inspection of any Warranted Equipment returned to it for warranty claim within seven (7) working days after the arrival of such Warranted Equipment at Seller's plant, and shall complete any repairs required under this warranty within sixty (60) days after such arrival, unless Seller shall sooner notify said owner of reasonable cause for delay beyond control of Seller. Warranty obligations hereunder will be performed only during the hours of 9:00 a.m. and 4:00 p.m. Monday through Friday and excluding holidays. Any person believing himself entitled to warranty performance hereunder is required to notify the Warranty Claims Department of Power Flame Incorporated, 2001 South 21st Street, Parsons, Kansas prior to return of any Warranted Equipment for repair hereunder. IN ALL EVENTS, SELLER WILL NOT BE LIABLE FOR AND WILL NOT REIMBURSE ANY LABOR, MATERIAL, OR OTHER REPAIR CHARGES INCURRED BY ANYONE OTHER THAN SELLER ON ANY WARRANTED EQUIPMENT, UNLESS SUCH CHARGES HAVE BEEN SPECIFICALLY AUTHORIZED IN ADVANCE IN WRITING BY SELLER. ANY WARRANTY IMPLIED BY LAW WITH RESPECT TO THE MERCHANTABILITY OF FITNESS OF THE WARRANTED EQUIPMENT IS HEREBY LIMITED TO THE DURATION OF THE WARRANTY PERIOD HEREUNDER. THE SELLER WILL NOT IN ANY EVENT BE LIABLE FOR ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES ATTRIBUTABLE TO THE WARRANTED EQUIPMENT.

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1. GENERAL INFORMATION

The capacity range of the Type JA burner is from 250 MBH to 2200 MBH of natural gas (or the equivalent in propane, sewer or other approved waste gases). For HTD burners with adiabatic chambers, the minimum lowfire capacity is 45 MBH. Ratings are based on 0.5 ins. w.c. positive combustion chamber pressure.

The burner is a self-contained unit comprising blower assembly, firing head, ignition system, flame safeguard and control panel console. It only requires connection of 115V electrical supply, gas train piping, connection to gas service, and operating controls.

The JRA Models carry the same firing rates as the Model JA. The Type JRA is configured with the blower mounted above the blast tube and does not have a control console, except as an optional feature.

All Power Flame burners are operationally fire tested at the factory.

2. CAPACITIES, SPECIFICATIONS & DIMENSIONS

Table 1

Capacities & Specifications

Burner Model	Standard Flame Sensor (A)	3450 RPM Blower Motor H.P. (B)	MBTU/HR Natural Gas Maximum (C)	Nominal Boiler H.P. Maximum	Standard Gas Train Size (D)	Gas Pressure Required Inches W.C. Min - Max (E)
J15A-10	FR	1/4	700	16.7	1"	4.7 - 14
J30A-10	FR	1/3	1,075	25.6	1"	5.6 - 14
J30A-12	FR	1/3	1,260	30.0	1 1/4"	4.9 - 14
J50A-15	FR	1/3	2,200	52.3	1 1/2"	5.9 - 14
J50A-15B	FR	1/2	2,500	60.0	2"	6.0 - 14
J15A-10HTD	UV	1/4	700	16.7	1"	4.0 - 14
J30A-10HTD	UV	1/3	1,075	25.6	1"	7.3 - 14
J30A-12HTD	UV	1/3	1,260	30.0	1 1/4"	7.4 - 14
J50A-15HTD	UV	1/3	2,200	52.3	1 1/2"	9.0 - 14
J50A-15BHTD	UV	1/2	2,500	60.0	2"	6.4 - 14

A. The flame sensors listed are FR (Flame Rod) or UV (Ultra Violet). Other flame sensors are available to comply with specifications or codes.

B. On some OEM boiler applications, a 1/2 HP motor is required with the J50A-15 and J50A-15HTD.

C. All capacities listed are based on 0.50" w.c. positive pressure and 2000' elevation, except the J(R)50A-15B, which is rated at -0.02" w.c. negative pressure. Derate approximately 5% for each +.50" w.c. combustion chamber pressure and 4% for each additional 1000' elevation.

D. Model numbers will always reflect the standard UL listed gas train sizes to correlate with U.L. input listings. The actual train size may vary, depending on local gas supply pressures available.

E. At inlet to main shutoff cock with burner operating at maximum input rate.

Figure 1

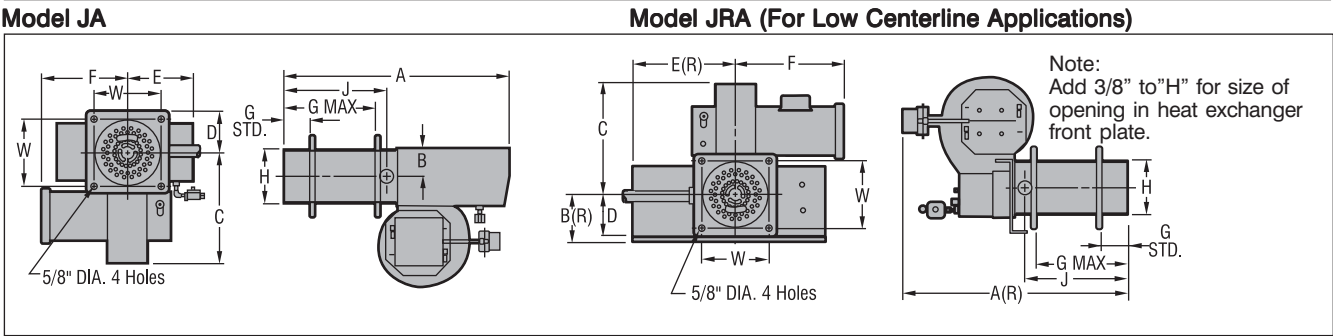


Figure 2

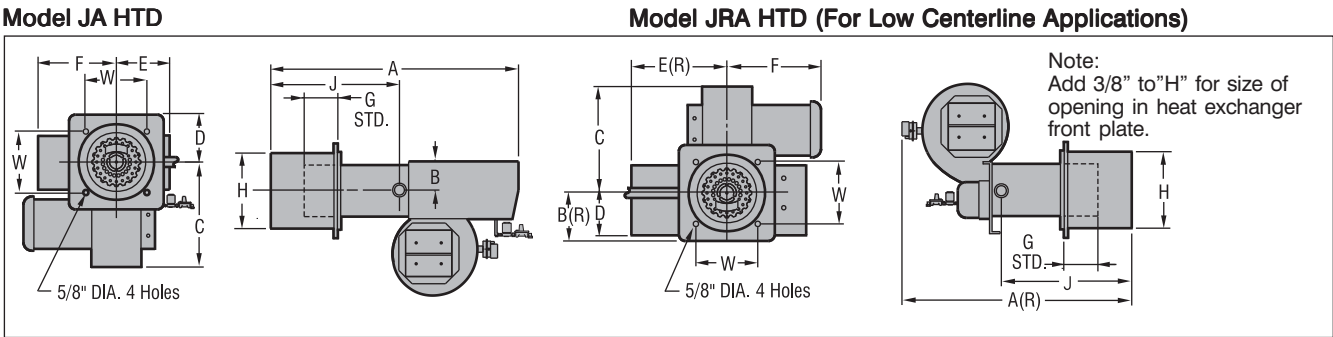


Table 2

Standard Dimensions (inches)

Model	A	A(R)	B	B(R)	C	D	E	E(R)	F	G			H	J	W
										STD.	MIN.	MAX.			
J15A-10	27 1/2	24 1/4	3 1/2	5	12 1/2	4 5/8	8 1/4	11 1/4	14	3	-	8 1/2	6 1/8	11 1/2	7 1/4
J30A-10	27 1/2	24 1/4	3 1/2	5	12 1/2	4 5/8	8 1/4	11 1/4	14	3	-	8 1/2	6 1/8	11 1/2	7 1/4
J30A-12	27 1/2	24 1/4	3 1/2	5	12 1/2	4 5/8	8 1/4	11 1/4	14	3	-	8 1/2	6 1/8	11 1/2	7 1/4
J50A-15	30 1/4	27 3/4	4 3/8	5 1/8	14	5 1/4	8 1/2	11 1/4	14	3 3/4	-	10 1/4	8 1/8	13 5/8	8 1/4
J50A-15B	30 1/4	27 3/4	4 3/8	5 1/8	14	5 1/4	8 1/2	11 1/4	14	3 3/4	-	10 1/4	8 1/8	13 5/8	8 1/4
J15A-10HTD	29 3/4	28 3/4	3 1/2	5	12 1/2	5 5/8	7 3/8	11 1/4	10 1/4	4	3	*	9	16	7 1/4
J30A-10HTD	29 3/4	28 3/4	3 1/2	5	12 1/2	5 5/8	7 3/8	11 1/4	11 3/4	4	3	*	9	16	7 1/4
J30A-12HTD	29 3/4	28 3/4	3 1/2	5	12 1/2	5 5/8	7 3/8	11 1/4	11 3/4	4	3	*	9	16	7 1/4
J50A-15HTD	34 1/4	32 1/4	4 3/8	5 1/8	14	6 1/4	8 1/2	11 1/4	11 3/4	4	3 3/4	*	10 3/8	18 1/8	8 1/4
J50A-15BHTD	34 1/4	32 1/4	4 3/8	5 1/8	14	6 1/4	8 1/2	11 1/4	11 3/4	4	3 3/4	*	10 3/8	18 1/8	8 1/4

*Consult Factory

3. ACCEPTANCE PROCEDURE

Uncrate burner carefully and check all parts received against your computer generated Bill of Material.

Warranty

The Owners Information envelope packed with the burner contains a Warranty Registration Card. The Warranty Registration Card is also a request form for a Spare Parts List. An on-hand supply of spare parts is highly recommended in case of emergency shutdown. We request that you complete and return the card to Power Flame in the enclosed self-addressed envelope as soon as possible.

4. INSTALLATION

Before Beginning Installation, Carefully Study These Instructions, All Charts, Drawings And Diagrams Shipped With The Burner.

Installation must be in accordance with all local and national codes including CAN1-B149.1 or B149.2 and Canadian electrical codes for Canadian installations.

- 4.1** If the burner is to be mounted in an existing boiler or furnace, be sure that all fire-side surfaces are clean and in good condition. All doors, cleanouts, cracks or other openings allowing excess air into the combustion chamber should be tightly sealed, whether the burner is to be fired under positive or negative Combustion Chamber Conditions.

- 4.2** The burner can be mounted through a fire door (Figure 3), in the base of the boiler (Figure 4) or through a heat exchanger side/end wall (Figure 6). When mounting through the fire door it may be necessary to install the burner at a downward angle to avoid impingement on the crown sheet. For fire door installations, complete the boiler base construction as shown in Figure 3.

JAHTD Installation (Figure 5)

The standard adiabatic chamber length is 8". If the burner blast tube insertion depth (Dimension "G"), i.e., the burner flange setting depth, is more than 4", the adiabatic chamber must be lengthened proportionately.

Example: If the blast tube flange setting is 6", the adiabatic chamber needs to be ordered with a 10" length.

Figure 3 Mounting in Fire Door

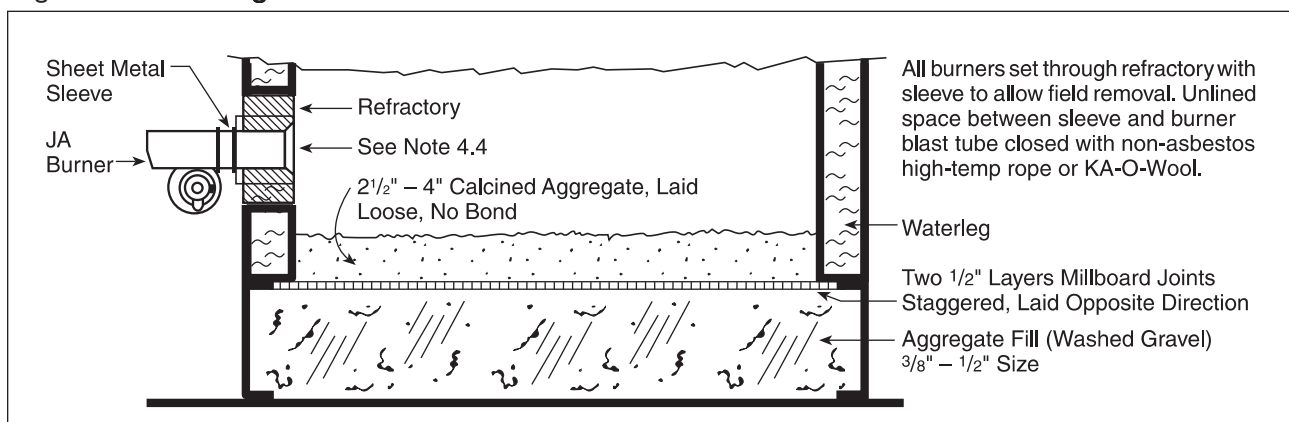


Figure 4 Mounting in Base of Boiler

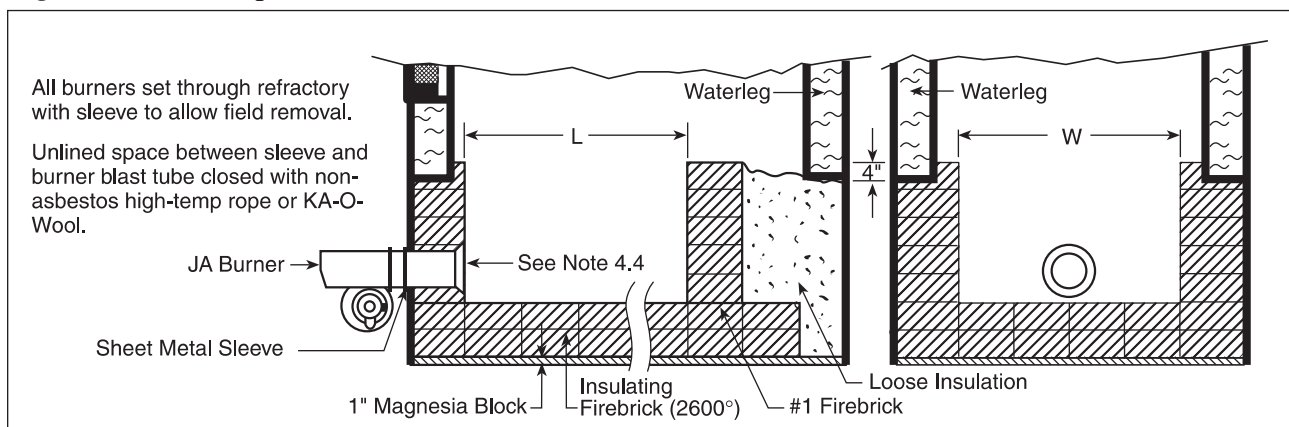


Figure 5 JA HTD Mounting with Adiabatic Chamber

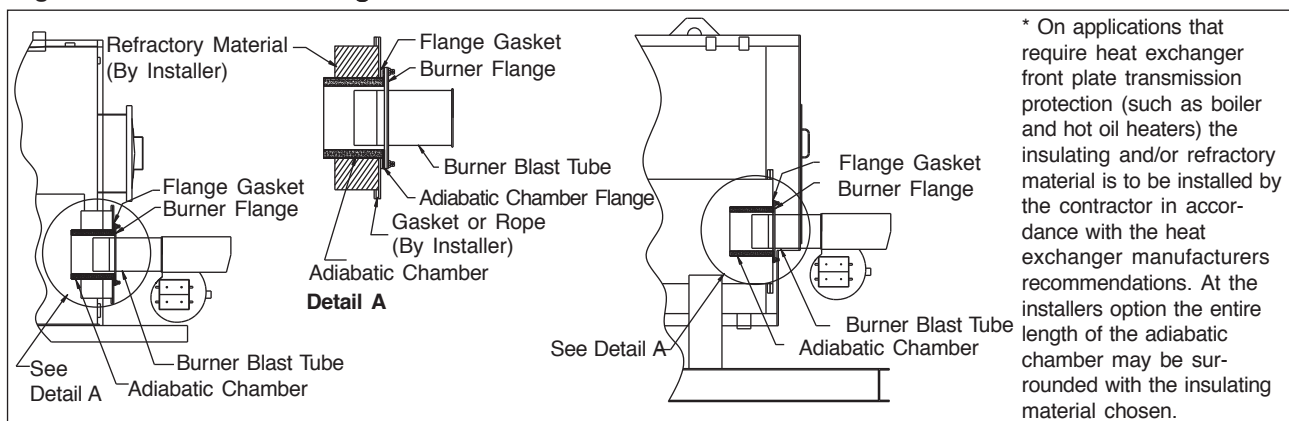
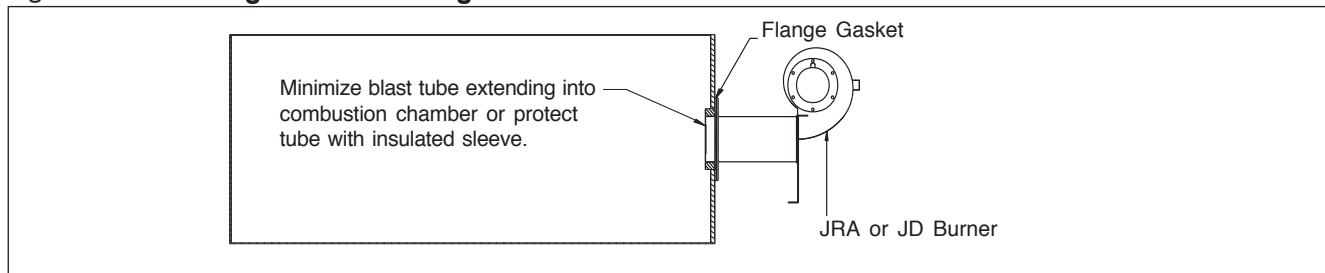


Figure 6 Mounting in Heat Exchanger



4.3 COMBUSTION CHAMBER SIZING

Table 3

Combustion Chamber Recommended Dimensions

GAS INPUT MBTU/HR	WIDTH Inches	LENGTH Inches	GAS INPUT MBTU/HR	WIDTH Inches	LENGTH Inches
250	13	17	1075	20	28
450	15	20	1260	23	33
600	16	23	1500	25	38
700	17	25	1800	26	40
850	18	26	2200	28	42
			2500	28	44

- 4.4 Whatever the method of mounting chosen, the burner blast tube must be recessed into the front wall surface from 0" to 1 1/2".

Serious Damage To The Burner May Result If The Blast Tube Is Extended Into The Combustion Chamber.

- 4.5 Secure the burner to the boiler, using the burner mounting flange. The burner mounting flange must be welded to the blast tube at the selected location for proper insertion. A tight seal between mounting flange and front plate should be accomplished using the optional flange gasket supplied by Power Flame Incorporated, a ceramic or other non-asbestos fiber rope.

5. GAS PIPING

- 5.1 Contact your local gas service company to ensure that adequate gas service is available and to review applicable installation codes for your area.
- 5.2 Size the main gas line in accordance with Table 4. The figures shown are for straight lengths of pipe at 0.2 ins. w.c. pressure drop, which is considered normal for low pressure systems. Note that fittings such as elbows and tees will add to the pipe pressure drop.

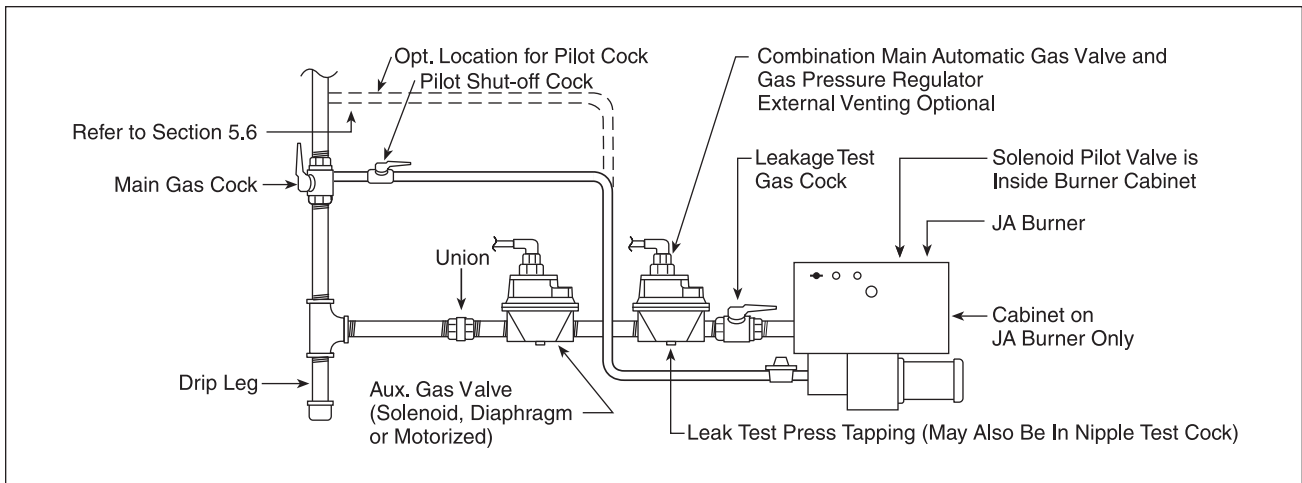
Table 4

Gas Piping Pressure Drop Data

	EQUIVALENT LENGTHS OF STRAIGHT PIPE IN FEET								
	20	30	40	50	60	80	100	150	200
Pipe Size In Inches	CFH GAS WITH .2" PRESSURE DROP								
1"	300	250	210	190	180	150	135	110	75
1 1/4"	520	425	360	325	300	260	230	190	165
1 1/2"	800	690	560	500	480	410	370	300	260
2"	1700	1400	1200	1100	1000	850	750	600	540
2 1/2"	3000	2500	2100	1900	1800	1550	1375	1100	950
Fitting Type	EQUIVALENT LENGTH OF STANDARD PIPE IN FEET FOR LISTED FITTINGS					Nominal Pipe Size In Inches			
	1"	1 1/4"	1 1/2"	2"	2 1/2"				
Std. Tee	5.5	7.5	9.0	12.0	13.5				
Std. Elbow	2.7	3.7	4.5	5.5	6.1				

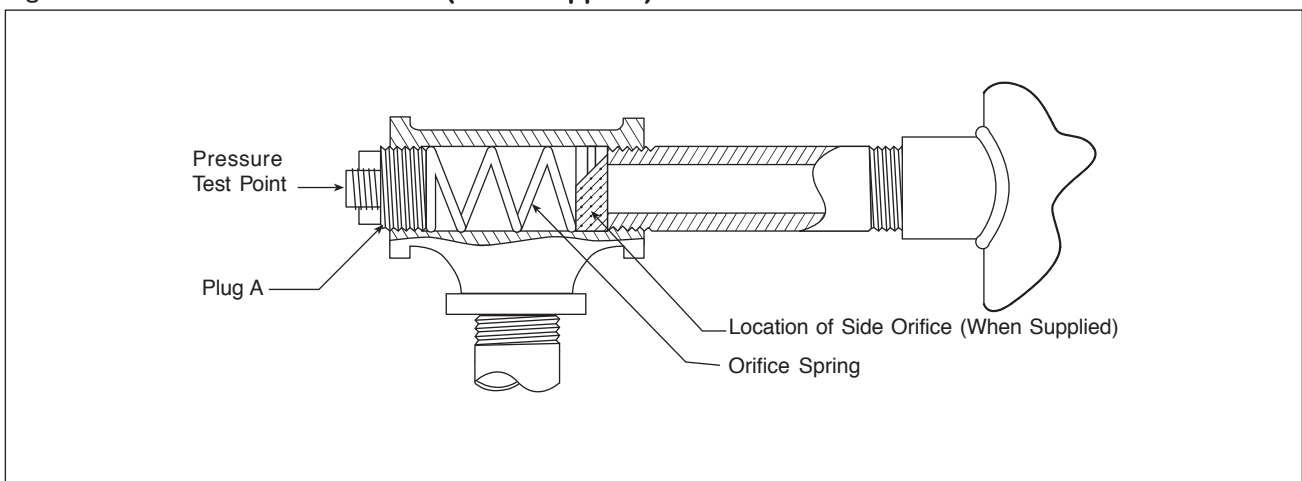
- 5.3** Refer to Figure 7 for details of gas piping. (Also refer to any additions to piping diagrams supplied for this specific unit.)
- 5.4** Mount leakage test and main gas cocks, main automatic gas valve or combination gas valve/pressure regulator, and (where required) auxiliary valves (if not factory mounted) and connect gas valve wires through flexible conduit to control terminal strip in accordance with wiring diagrams and all applicable codes.
- 5.5** Install pressure regulator (not used with combination gas valve/pressure regulator) directly upstream of main automatic gas valve(s) and fit drip leg and main gas cock upstream of regulator or automatic valve(s).
- 5.6** The pilot line should be piped into the upstream tapping on the main shut-off cock to gas train. An optional location is a tee piped in just upstream of main shut-off cock. Refer to Figure 7. For ease of servicing we recommend the use of a union immediately upstream of the main gas pressure regulator or combination gas valve/pressure regulator.

Figure 7 **UL Gas Piping Train for JA Burners**



- 5.7** Install vent lines from main gas regulator (if used) and (if applicable) diaphragm gas valve. Vent line should be run to the outside of the building, terminating clear of windows or fresh air intakes. Outside terminal of vent should have a screen to prevent insects from building nests in vent pipe. The vent should terminate in a manner which will preclude the possibility of water, dirt or other matter from entering the line.
- 5.8** Test gas lines for leaks using soap solution. Your local gas service company may wish to carry out or witness this test. **CAUTION** - gas pressure above 14 ins. w.c. may damage the standard diaphragm gas shut-off valve. Do not exceed this value when pressure testing lines unless you cap off line upstream of main gas cock and pilot take-off.
- 5.9** Check that side orifice size is correct according to burner specsheet. See Figure 8. To gain access to orifice, remove Plug A and withdraw spring and orifice. When replacing orifice, ensure that it seats properly inside the tee. The spring may be deformed slightly so as to hold the orifice firmly for insertion.

Figure 8 **Location of Side Orifice (When Supplied)**



6. WIRING

6.1 Refer to wiring diagram shipped with burner.

6.2 Electrical installation must be made in accordance with the National Electrical Code and applicable local codes. If this burner is part of a boiler or furnace package system - check wiring diagram as supplied by the boiler or furnace manufacturer.

7. START UP

Before attempting start up, thoroughly study and familiarize yourself with the exact sequence of operation and all other details on the specific Flame Safeguard Control System being used. This information will be found in bulletins supplied with the burner, as well as technical bulletins covering other components. All of these should be used as reference material in burner start up and service.

7.1 Check boiler water level (if applicable).

7.2 Lay out combustion testing equipment (See Section 8).

7.3 Attach gas pressure gauge or manometer to upstream side of main gas cock (0-35 ins. w.c.) and to burner side orifice tee, (0-10 ins. w.c.) as well as to pilot gas pressure test tee tapping (0-10 ins. w.c.).

7.4 Check the voltage at disconnect switch to make certain that it matches that shown on the burner label.

7.5 Make certain that all dampers in flue or stack are in wide open position, or as appropriate for start up.

7.6 Install stack thermometer and CO₂ sample line to breeching and draft gauge to combustion chamber test point.

7.7 Connect DC volt meter or microammeter to Flame Safeguard Control as appropriate to determine flame detection system signal values. Refer to Table 5.

7.8 With the main and leak test cocks and pilot cocks in OFF position, turn on gas cock at meter. Check to make certain that pressure upstream of main and pilot cocks does not exceed 14 ins. w.c. ($\frac{1}{2}$ PSIG) - unless special valve train components suitably rated have been furnished (Refer to Burner Specs sheet). If pressure is acceptable, proceed to next step.

7.9 Next, check the operation of the gas pilot system. This is a very important part of the start up procedure.

A. Remove the pilot assembly and check for proper orifice size and spark gap. The spark is to arc against the outside radius of the pilot assembly case (not the pilot head nozzle) on Flame Rod pilots only. See Figures 9 and 10. On UV pilots the spark is to arc against the pilot head. See Figure 11.

B. Flame Safeguard Programming Controls supplied can be of several different models (with varying sequences), depending upon the code requirements. Before attempting burner start up make certain that you are familiar with the operation of the Flame Safeguard Control and other components being used on this specific application. This information will be found in bulletins printed by Honeywell or Fireye. A copy of this bulletin was supplied with the burner. See Figure 10 for settings using S8600 control.

C. In order to prepare the pilot for proper operation, it is essential that appropriate adjustments be made to the burner air inlet damper and the pilot gas pressure. It is necessary that the air damper remain in one fixed position at least $\frac{1}{2}$ " open on one damper until it is determined that the pilot test will ignite instantly and stabilize with a good flame signal. Typical pilot test tee pressures for all TYPE JA burners are 1.5" to 2.5" w.c. for natural gas and 1" to 2" for propane gas. Typically lower pressures are for air damper openings of 50% or less, and higher pressures for air damper light off openings greater than 50%. The HTD air damper arrangement is designed for operation with the pilot and full low fire operating positions, such that the air dampers will be fully (or nearly) closed. Pilot test tee pressures for the JA15, JA30, and JA50 HTD burners will vary from 1" to 2" w.c., the best job specific pressure to be determined by the technician performing the on site start up.

D. **Frequently the cause for pilot problems relates to gas pressures that are too high and/or air dampers that are closed too far. Both conditions can cause a fuel rich mixture in the pilot box which can substantially delay or totally prevent pilot ignition. Read the following start up procedure thoroughly before proceeding.**

E. Perform an initial Spark Pickup Test. With the pilot gas cock closed, the burner will go through a blower prepurge period, after which the gas pilot ignition transformer will be energized, although no pilot will be established. (At no time should there be any flame signal reading, nor should the main gas valve attempt to open.) At the end of the pilot trial for ignition and blower purge period, the flame safeguard control should shut the system down in a safety lock-out mode, requiring manual reset of the flame safeguard control to restart burner. If a flame signal is detected, verify the flame retention tab and ignition electrode are properly positioned, per Figure 11.

Figure 9 Pilot Assembly - Flame Rod Type - Natural Gas Only (Do Not Use with Propane Gas)

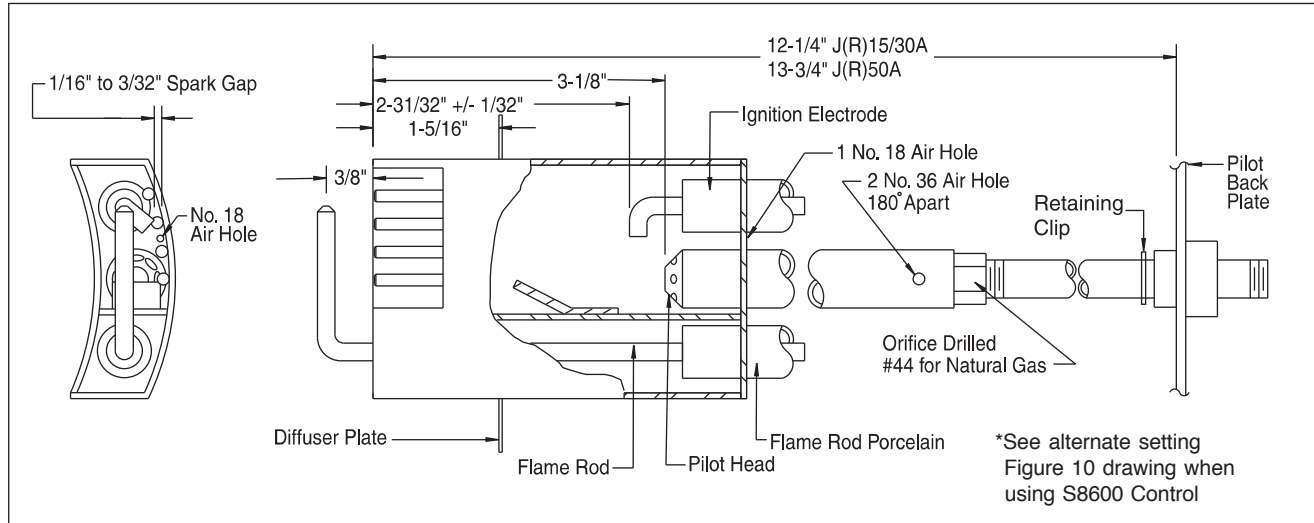


Figure 10 Pilot Assembly using S8600 or S8680J Control

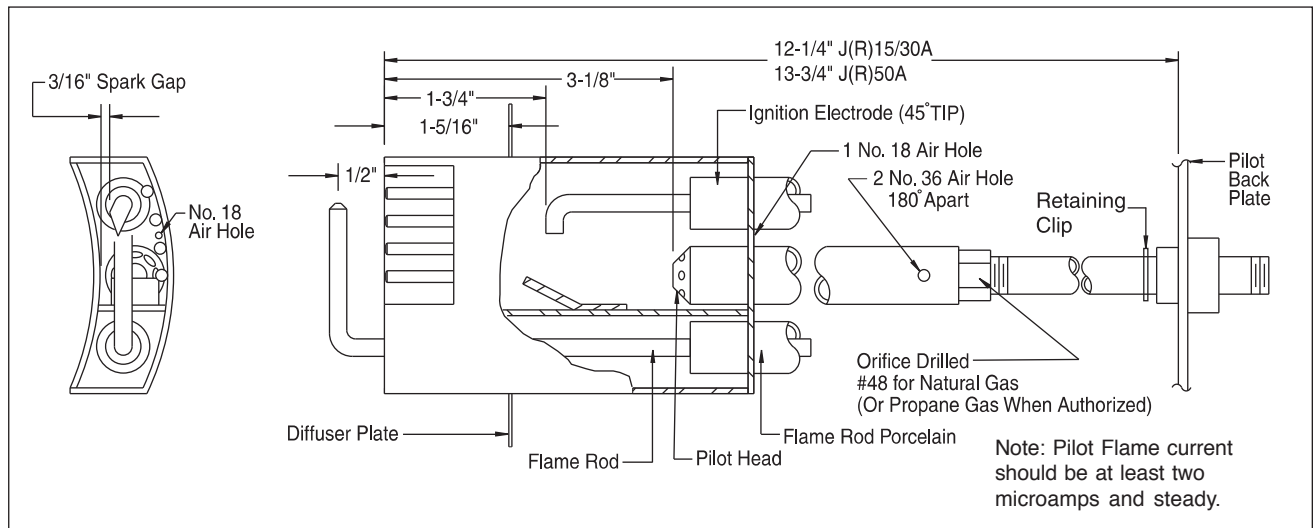
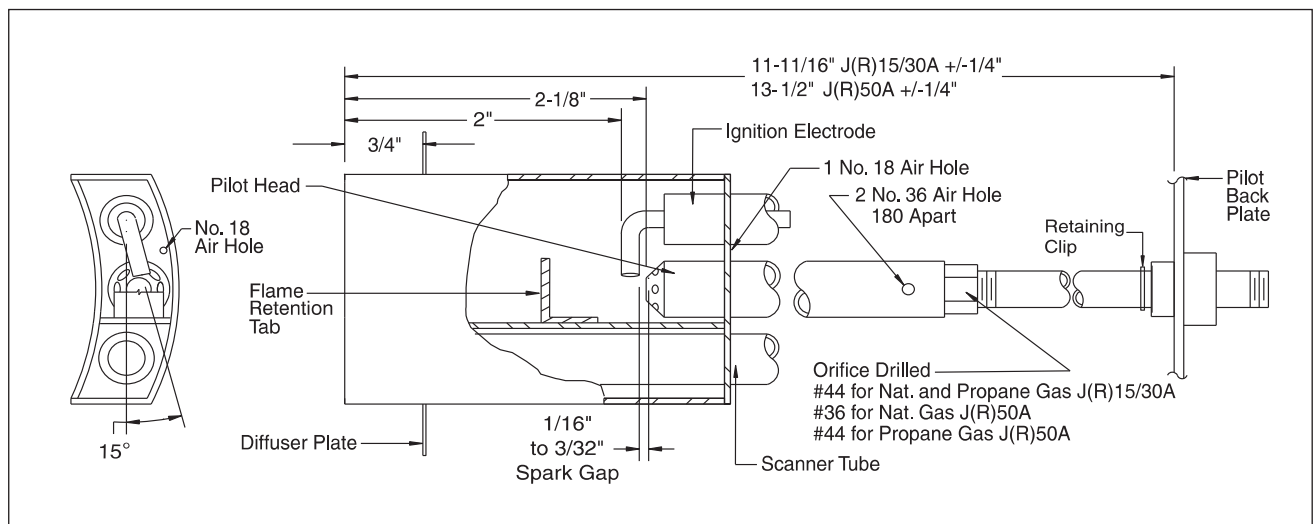


Figure 11 Pilot Assembly - Scanner Type - Natural or LP Gas



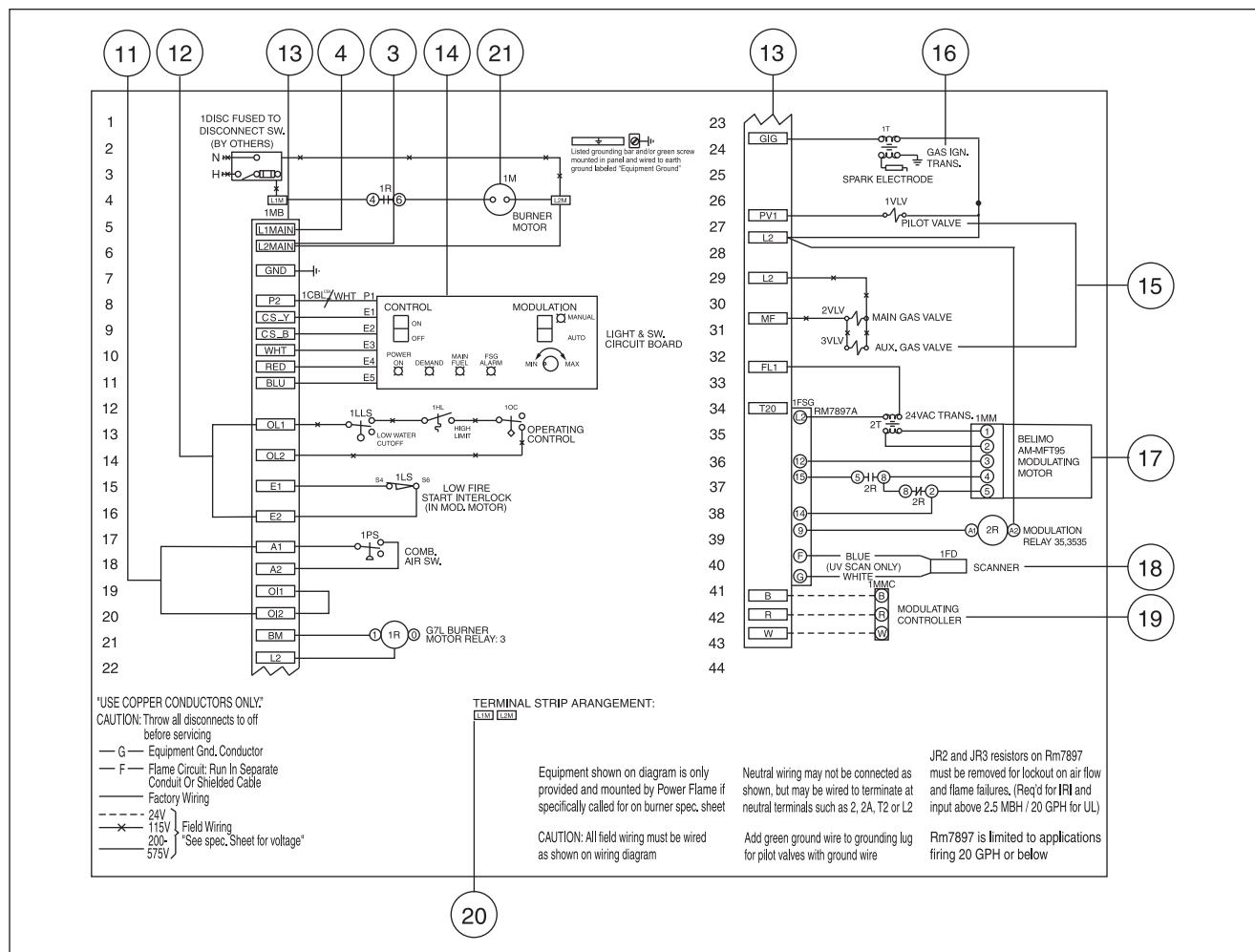


Figure 12 & Figure 13 Parts List

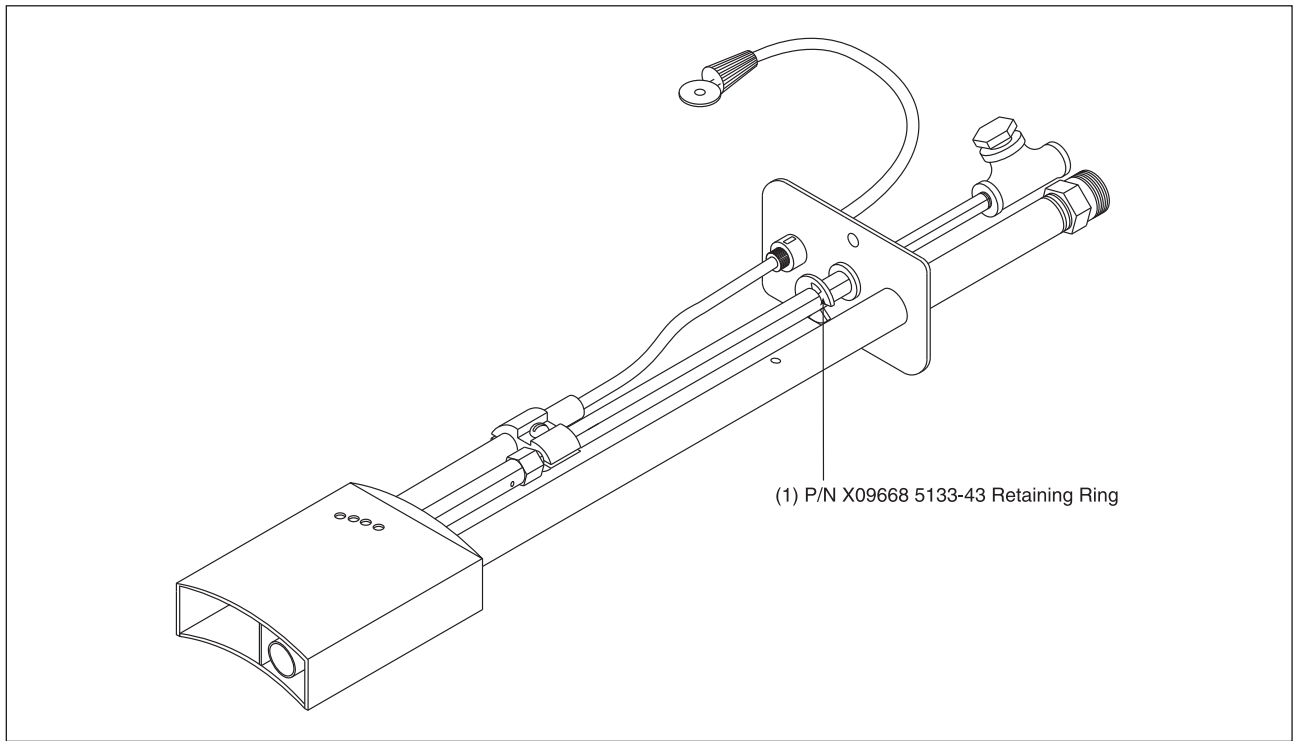
1	Motor Starter	10	Auxiliary Power Connection (For Factory Use Only)	20	Wiring Terminal Strip Identification
2	Grounding Lug	11	Running Interlock Connections	21	Burner Motor
3	(L2) Main Neutral 115 Volt Wiring Connection*	12	Limit Device Connections (Typical) *	Main 115 volt hot incoming power terminal is located at the top of the circuit board. Neutral 115 volt power terminal is locat- ed on the lower set of terminals at the bottom of the main circuit board.	
4	(L1 Main) Hot 115 Volt Power Connection*	13	Main Circuit Board		
5	Replaceable Fuse	14	Light & Switch Board		
6	Light & Switch Board Connection	15	Operating Valve Connections		
7	Replaceable Relay	16	Gas Ignition Transformer		
8	Flame Safeguard Base	17	Modulation Motor Connections		
9	Terminal Strip for Field Connection	18	Flame Detector Connection		
		19	Operating Control Connection		

Pilot Positioning Safety Stop

Power Flame P/N X09668 retaining ring is assembled to the pilot assembly at the factory, and is *not* to be removed or repositioned at any time during the initial commissioning of the burner or during subsequent burner or pilot maintenance activities. Replacement pilots will also have this clip prepositioned and under no circumstances should it be moved from the factory set position, or tampered with in any manner.

This stop prevents the pilot from being retracted to a position which may cause pilot-to-main flame transition problems, while allowing sufficient room for minor pilot position adjustment.

Figure 14 Pilot Positioning Safety Stop



- 7.10** With the Main and Leak gas cocks Closed-Pilot gas cock Open: Turn the burner switch ON. The blower motor will purge the heat exchanger of **any accumulated combustibles**. At the end of the purge cycle, which may be as short as 30 seconds for fixed air dampers or as long as 90 seconds with automatic air dampers, the pilot solenoid valve and ignition transformer will energize.
- 7.11 Pilot Adjustment and Main Flame Light Off Procedure for Burners with Fixed Air Dampers**
- A. Set the air flow and pilot gas pressure in order to provide instant pilot ignition, good flame stability and flame signal readings. This can be accomplished as follows: Observe pilot signal with DC Voltmeter or Microammeter (as appropriate) and reduce pilot gas pressure to a point where the signal is erratic or reduced substantially from initial reading (See Table 5 for flame signal values).

- B. Raise the pilot gas pressure to the point where the signal is again stable. Remove scanner (if used in this application) and use a mirror to view the pilot flame through the scanner pipe (you may need a live flame from a cigarette lighter or butane torch to keep scanner actuated). Be sure that you are getting full coverage of scanner pipe by pilot flame. If flame rod is used, make certain of its correct positioning in pilot assembly. If pilot is slow in lighting, this may be due to air in the pilot line. Eliminate air and/or adjust pilot gas pressure regulator flow rate.
- C. After attaining the proper pilot flame signal values, cycle the pilot off and on several times in order to ensure reliability (with the main and gas leak test cocks still closed). **Turn Burner Switch Off.**
- D. Having established pilot reliability, open gas leak test cock (with main gas cock still closed) and start burner.
- E. After burner has pre-purged and established good pilot flame signal readings, the main automatic fuel valve will be energized. As this valve begins to open, slowly open the main gas cock to light off the main flame. The main flame should light immediately. If not, it is possible that you will have to eliminate air from the main gas line, adjust main gas pressure regulator flow rate and/or adjust bleed valve at vent line connection on main diaphragm type automatic gas valve when furnished.
- F. Adjust burner as necessary to provide smooth ignition of main flame. If pilot flame signal drops significantly when main fuel valve opens, slightly increase pilot gas pressure to attain reasonably stable flame signal value.
- G. Make certain that the air flow setting provides correct CO₂, O₂ and other combustion values at the proper firing input rates. (See Section 8 and Table 6 for firing rate information). Generally accepted values for natural gas are 3.0 to 6.0% CO₂ (carbon dioxide), 3.0 to 6.0% O₂ (oxygen) and little or no* CO (carbon monoxide). Equivalent ratings on propane gas are 9.8 to 11.8% CO₂ and 3.0 to 6.0% O₂. Check also with local utility and any other authorities having jurisdiction before making final burner adjustments.

7.12 Pilot Adjustment and Main Flame Light Off Procedure for Burners with Automatic Dampers

- A. If the burner has automatic air dampers (operated by linkage from the main automatic fuel valve, or by a 2 position or modulating firing rate motor) ensure that the air dampers are held (fixed) in the pilot lighting (low) air flow position (See Page JA6, 7.9, Item C) until all pilot adjustments are completed.
- B. Depending upon the flame safeguard programmer being used, it may be necessary to temporarily disconnect the wires powering the main automatic fuel valve and/or employ the use of the *check/run* switch in the Flame Safeguard Programming Control to hold the timing function at the *pilot ignition* position while making pilot adjustments.

Table 5 Acceptable Pilot and/or Main Flame Current Readings

Control	Photocell of Flame Rod	U.V.	Lead Sulfide
R7795A or C	N/A	3¹/₂ Microamps	N/A
R7795B or D	2 Microamps	N/A	N/A
R4795A (D)	2 Microamps	1¹/₂ Microamps	N/A
R4140M (G,L) or BC7000	2-5 Microamps	3¹/₂ -7¹/₂ Microamps	2-5 Microamps R7248A Red Amp 3¹/₂ Microamps R7248B Red Amp
RM7800/RM7897A or C	1.25-5.0 DC Volts	1.25-5.0 DC Volts	N/A
S8600	1-5 Microamps	N/A	N/A
TFM-2(3) or MII	14-17 DC Volts¹	N/A	N/A
UVM-2(3)(5) or MII	N/A	5-6 DC Volts	N/A
D Series	15-25 DC Volts	15-25 DC Volts	15-25 DC Volts
E110	10 min., 20 or greater normal	10 min., 20 or greater normal	N/A

1. 4-10 Microamps - with Microammeter in series with S-2 Wire to Flame Rod

- C. Set the air flow and pilot gas pressure such as to provide instant ignition, good flame stability and flame signal readings. This can be accomplished as follows:
- D. Observe pilot signal with DC Voltmeter or Microammeter (as appropriate) and reduce pilot gas pressure to a point where the signal is erratic or reduced substantially from initial readings. (See Table 5 for flame signal values). Raise the pilot gas pressure to the point where the signal is again stable. Remove scanner (if used in this application) and use a mirror to view the pilot flame through the scanner pipe (you may need a live flame from a cigarette lighter or butane torch to keep scanner actuated). Be sure that you are getting full coverage of scanner pipe by pilot flame. If flame rod is used, make certain of its correct positioning in pilot assembly. If pilot is slow in lighting, it may be due to air in the pilot line. Eliminate air and/or adjust pilot gas pressure regulator flow rate.
- E. After attaining the proper pilot flame signal values, cycle the pilot off and on several times in order to ensure its reliability (with the main and leak gas cocks still closed). **Turn the Burner Switch Off.**

* Note: Although Underwriters Laboratories permits higher readings of CO (carbon monoxide), it is desirable to obtain readings between 0 and 100 ppm, depending on local codes and heat exchanger manufacturer's recommendations.

- F. Electrically reconnect main automatic fuel valve. Make certain that linkage (when used) from the automatic fuel valve to the air damper is in place. Air damper opening should be set to pilot air flow ignition position. If necessary, return flame safeguard *check/run* switch to the automatic position.
- G. Open gas leak test cock (with main cock still closed) and start burner.
- H. After burner has pre-purged and established good pilot flame signal readings the main automatic fuel valve will be energized. As this valve begins to open, slowly open the main gas cock to light off the main flame. The main flame should light immediately. If not, it is possible that you will have to eliminate air from the main gas line and/or adjust main gas pressure regulator flow rates.
- I. Adjust burner as necessary to provide smooth ignition of main flame. If flame signal drops significantly when main automatic gas valve opens, slightly increase pilot gas pressure to attain stable flame signal value.
- J. For Low/High/Off burners - adjust the main gas pressure regulator in combination with the air damper linkage operation to achieve 8.5 to 10% CO₂ (carbon dioxide), 3.0 to 6.0% O₂ (oxygen) and little or no* CO (carbon monoxide) at the full high fire input rate position. Make certain the linkage operates smoothly and without binding or overtravel of the air damper stops. Under certain circumstances it is acceptable procedure to disconnect one of the air dampers and lock it into position; the other damper then being adjusted for automatic operation.
- K. For Low/High/Low burners - adjust the main gas pressure regulator in combination with the air damper linkage operation to achieve 8.5 to 10% CO₂ (carbon dioxide), 3.0 to 6.0% O₂ (oxygen) and little or no* CO (carbon monoxide) at the full high fire input rate position. Make certain the linkage operates smoothly and without binding or overtravel of the air damper stops. Run burner to the low fire position and lock motorized gas valve internal low fire adjustment to a setting that will attain 7.0 to 9.0% CO₂, and 3.0 to 6.0% O₂ at the desired low fire input rate. Under certain circumstances it is acceptable procedure to disconnect one of the air dampers and lock it into position; the other damper then being adjusted for automatic operation.
- L. Intermittently operate the burner until the water is warm in the boiler, follow specific initial firing recommendations provided by the heat exchanger manufacturer.

Burners Designed for Full Modulation Operation

After completing pilot adjustments and other procedures as appropriate in items A through I above, proceed with modulating adjustments as follows:

- M. Initial adjustments should be made at the low fire position. All Power Flame burners are factory tested and adjusted. However, to determine that the metering butterfly valve is, in fact, in the low fire position, observe the end of the metering valve shaft. The slot in the end of the shaft indicates the position of the valve. When the slot is in the horizontal position (parallel with the gas flow direction), the valve is fully open.
- N. Turn the burner on and let it advance to the main flame light off position. Hold the linkage at the low fire position by using a manual potentiometer or by electrically disconnecting the modulating motor. Linkage adjustments for modulation on Power Flame burners are set during factory testing. These settings relate to test pit firing and will not relate directly to specific field conditions. It is suggested that the factory settings be noted and marked on the linkage prior to proceeding with the final adjustment, so that those settings can be restored as initial reference points, if need be.
- O. With the burner in the *factory set* low fire position, adjust air and fuel linkage to good fuel/air ratio settings (7.0 to 9.0% CO₂ and 5.0 to 8.0% O₂, with little or no* CO). Mark the linkage at the new settings.
- P. Increase the firing rate to the midway point. Set the fuel/air ratios to achieve good combustion values (7.0 to 9.0% CO₂ and 5.0 to 8.0% O₂, with little or no* CO). Mark the linkage as a reference point for this new mid fire position.
- Q. Increase the rate to high fire position and repeat the test done for the midpoint adjustment. Results should range in the area of 8.5 to 10% CO₂ and 3.0 to 6.0% O₂, with little or no* CO. The metering device setting and air damper openings should be marked and noted to obtain high fire reference points. Note that an additional point of the fire adjustment may be obtained by modifying the regulated gas pressure delivered to the burner metering device. The burner pressure regulator is used to obtain this adjustment and can be used within available pressure limits to obtain optimum firing conditions.
- R. Operate the modulating lever arm on the modulating motor through the three previously referenced points. Minor settings modifications may be required to ensure that the reference points are acquired. Under certain circumstances it is acceptable procedure to disconnect one of the air dampers and lock it into position; the other damper then being adjusted for automatic operation.
- S. Tighten (finger tight) the hex bolt to the linkage rod at the swivel on the modulating motor driver arms and run the motor through its full travel to ensure that the linkage is free and that limits on the metering device and air dampers

* Note: Although Underwriters Laboratories permits higher readings of CO (carbon monoxide), it is desirable to obtain readings between 0 and 100 ppm, depending on local codes and heat exchanger manufacturer's recommendations.

are not exceeded.

- T. Determine that the required gas input rate is being achieved by clocking the gas flow at the gas meter. Consult the gas utility to determine if any correction factors have to be applied to the indicated meter flow rates.
- U. Intermittently operate the burner until the water is warm in the boiler, or follow specific initial firing recommendations provided by the heat exchanger manufacturer.
- V. Tighten all linkages and permanently mark settings.

7.13 Conduct all applicable test procedures shown in control manufacturer's bulletins included with burners. Set and check operation of low and high gas pressure switches (if applicable), all burner and heat exchanger controls, and operating devices. Check blower air flow switch by first closing main gas cock and disconnecting motor lead wire. Also, perform a final Spark Pickup Test following the procedures outlined in 7.9E.

7.14 Gas Pilot Flood Test

Many pilot problems are caused by a poor mixture of gas and air at the point of ignition (ignition spark gap). The cause of this poor mixture condition is usually excessive gas flow or insufficient air (air dampers are closed too far). Once the pilot is adjusted and felt to be correct, it is suggested that the following test be conducted to further verify that the pilot will be reliable.

- A. Turn the burner off and shut the manual leak test cock in the main gas train. (This valve should always be closed when making pilot adjustments.)
- B. If the burner is Low/High/Off, Low/High/Low or Modulating, take steps to keep the fuel air linkage in the pilot off position. If the flame safeguard control has a timer *check* switch, it can be placed in the test position. If the flame safeguard control does not have the timer switch, it may be necessary to disconnect the power wire to the motorized gas valve.
- C. Install a 0 to 10" w.c. gas pressure gauge or a manometer in the pilot test tee fitting. Plug an appropriate flame signal meter into the flame safeguard control.
- D. Disconnect the high tension ignition leadwire at the ignition transformer secondary terminal. Either hold onto the insulated portion or let the free ignition wire hang loose, so that it is not able to come into contact with the bare ignition terminal on the transformer.
- E. Start the burner and let it go through the prepurge period. As soon as the pilot ignition circuit is energized (listen for the sound of the solenoid valve opening or watch the pilot gas pressure gauge), let about 3 to 4 seconds lapse and then CAREFULLY (the ignition transformer produces 6000 volts) touch the ignition leadwire to the transformer terminal secondary.

If the pilot fuel/air mixture and ignition electrode are adjusted correctly, the pilot will light instantly and the flame signal reading will be steady and of the correct value. If the pilot does not light instantly, then readjust the pilot gas pressure and/or the air dampers and/or the ignition electrode setting according to the information provided in this manual.
- F. Turn the burner off. Reconnect the ignition leadwire to the ignition transformer secondary terminal. Set the check switch in the flame safeguard control for automatic operation. Reconnect any wires that have been disconnected to hold the motorized gas valve in the pilot position. Open the checking gas cock, turn the burner on and verify that the pilot lights and proves instantly, providing good, smooth ignition of the main gas flame.
- G. If the Gas Pilot Flood Test is successful, it is not always a guarantee of correct pilot air/fuel mixture, but a failure will almost always indicate an excessively rich mixture.

7.15 Clean up the area around the burner and instruct owner and/or operator.

7.16 Post *Operating Instructions* card (inside back cover) close to the burner in clearly visible position.

8. COMBUSTION ARRANGEMENT REQUIREMENTS

- 8.1** The JA burner has been designed to fire with high combustion efficiency into combustion chambers with positive, balanced or negative pressures.
- 8.2** In order to fire efficiently, the burner requires an adequate supply of combustion air. Ventilation to the boiler room should be provided on the basis of 1/2 square inch of opening for each 1000 BTU/HR input. This excludes the requirements for any other fired equipment in the room. The boiler room should not become excessively hot and under no circumstances should it be under a negative pressure.
- 8.3** The burner should be set up initially and serviced at regular intervals (suggested beginning of and midwinter) by

a trained serviceman using the proper test instruments. Failure to maintain the correct burner settings may result in inefficient gas consumption, premature wear of burner components, or explosion hazard.

Table 6

Propane Gas/Natural Gas Orifice Pressure Settings/Flow Rate with V4943B Combination Valve

Natural or MBH LP Gas	Burner Model	Natural Gas 1000 BTU/cf .64 S.G.				Propane Gas 2550 BTU/cf 1.55 S.G.			
		SIDE ORIFICE DRILL SIZE	PRESSURE INTO ORIFICE TEE INCHES W.C.	PRESSURE * INTO MAIN S/O COCK MIN. INCHES W.C.	GAS TRAIN SIZE INCHES	SIDE ORIFICE DECIMAL DIAMETER	SIDE ORIFICE DRILL SIZE	PRESSURE INTO MAIN GAS SHUT OFF COCK INCHES W.C.	PRESSURE INTO ORIFICE TEE INCHES W.C.
300	J15A-10	5/16	3.75	3.7	1"	.187	3/16	4.0	3.3
350	J15A-10	11/32	3.3	3.7	1"	.281	9/32	4.0	3.1
400	J15A-10	3/8	3.1	3.6	1"	.297	19/64	4.0	3.4
475	J15A-10	13/32	3.3	3.9	1"	.328	21/64	4.0	3.1
500	J15A-10	27/64	3.2	3.9	1"	.328	21/64	4.0	3.5
550	J15A-10	7/16	3.5	4.2	1"	.359	23/64	4.0	3.3
600	J15A-10	15/32	3.3	4.1	1"	.390	25/64	4.0	3.4
650	J15A-10	1/2	3.1	4.1	1"	.406	13/32	4.0	3.0
700	J15A-10	17/32	3.1	4.2	1"	.406	13/32	4.0	3.5
800	J30A-10(12)	9/16	3.3	4.8	1"(1-1/4")	.422	27/64	4.0	3.8
900	J30A-10(12)	11/16	2.7	4.5	1"(1-1/4")	.437	7/16	4.5	4.1
1000	J30A-10(12)	3/4	2.9	5.1	1"(1-1/4")	.500	1/2	4.5	3.7
1100	J30A-12	3/4	3.6	4.6	1-1/4"	.562	9/16	4.5	3.4
1200	J30A-12	None	2.7	4.0	1-1/4"	.625	5/8	4.5	3.1
1260	J30A-12	None	3.0	4.4	1-1/4"	.625	5/8	4.5	3.4
1260	J50A-15	11/16	3.6	4.3	1-1/2"	.562	9/16	4.5	3.1
1400	J50A-15	3/4	3.5	4.4	1-1/2"	.594	19/32	4.5	3.2
1600	J50A-15	7/8	3.3	4.4	1-1/2"	.625	5/8	4.5	3.0
1800	J50A-15	1	3.4	4.7	1-1/2"	.688	11/16	5.0	3.0
2000	J50A-15	None	2.9	4.5	1-1/2"	.719	23/32	5.0	3.1
2200	J50A-15	None	3.5	5.4	1-1/2"	.781	25/32	5.0	3.1
2500	J50A-15B	None	4.5	6.0	2"	.938	15/16	6.0	2.8

The above data is **approximate** for combustion chamber pressure of 0.0" w.c.; for application specific data, refer to the specification sheet provided with the burner. Use combustion readings (CO₂ or O₂, CO and stack temperatures) and flow meter to determine exact inputs.

* Increase pressures when using separate gas pressure regulator or auxiliary gas valve. When supply pressure is lower than that required for above data, the orifice size may be increased or removed to utilize the lower pressure. Consult factory for details.

- 8.4** The correct test instruments are —
- A. CO₂ indicator (Fyrite or similar) or O₂ analyzer
 - B. CO indicator (Monoxor or similar)
 - C. Stack thermometer
 - D. Draft gauge or inclined manometer
 - E. U-tube manometer or calibrated 0-10" and 0-35" w.c. pressure gauge
 - F. Combination volt/ammeter
 - G. DC Micro-Ammeter or DC Volt Meter as required by Flame Safeguard Programmer Selection

- 8.5** Approximate gas flows and pressures are shown in Table 6 for natural gas and LP gas.

9. SERVICE SUGGESTIONS

9.1 Burner Fails To Start

1. Bad fuse or switch open on in-coming power source, or motor overload out.
2. Control circuit has an open control such as operating, limit or low water cut-off.
3. Reset button on motor or flame safeguard programming control open. Push reset button.
4. Loose or faulty wiring. Tighten all terminal screws. Check wiring against wiring diagram furnished with burner.

9.2 Burner Motor Runs, But Pilot Does Not Light

1. Be sure gas is turned on at meter and pilot cock is open.
2. Place hand on pilot valve to *feel* it open. Check gauge at tee in pilot line for gas pressure and prompt opening of pilot valve.

3. Check visually or by sound for spark arcing.
4. Refer to section 7.9 on pilot checking procedures.
5. Check air switch and be sure its circuit closes during start. Be sure timing card is inserted into Flame Safeguard.

9.3 Burner Motor Runs, Pilot Lights But Main Gas Valve Does Not Open

1. Check flame signal. If low, adjust pilot gas pressure and air settings for improved readings.
2. Check gas valve circuit, both main valve and proof of closure switch (if so equipped).
3. Main valve opening too slow - adjust bleed on diaphragm valve.
4. Shut-off cock or test cock not open.
5. Defective main valve.

9.4 Occasional Lockouts For No Apparent Reason

1. Re-check microamp or DC voltage readings. If insufficient, check gas pressure and air damper setting. Check electrodes setting. If flame rod pilot, flame rod may have to be re-positioned.
2. Check ignition cable and electrode porcelain for damage or breaks which could cause short.
3. Check for loose or broken wires.

9.5 Burner Will Not Start - Even Though Burner Had Never Failed Before Or Had Been Running On Normal Cycling Without Failure

1. Operating Control circuit open.
2. Starting interlock such as proven low fire switch or proof of closure switch open.
3. Defective control or loose wiring.
4. Limit circuit open.

An additional source of information relative to trouble-shooting can be found in the Flame Safeguard Programmer Manual supplied with the burner.

10. COMPONENT ARRANGEMENT

Figure 15 Type JA Basic Component Identification

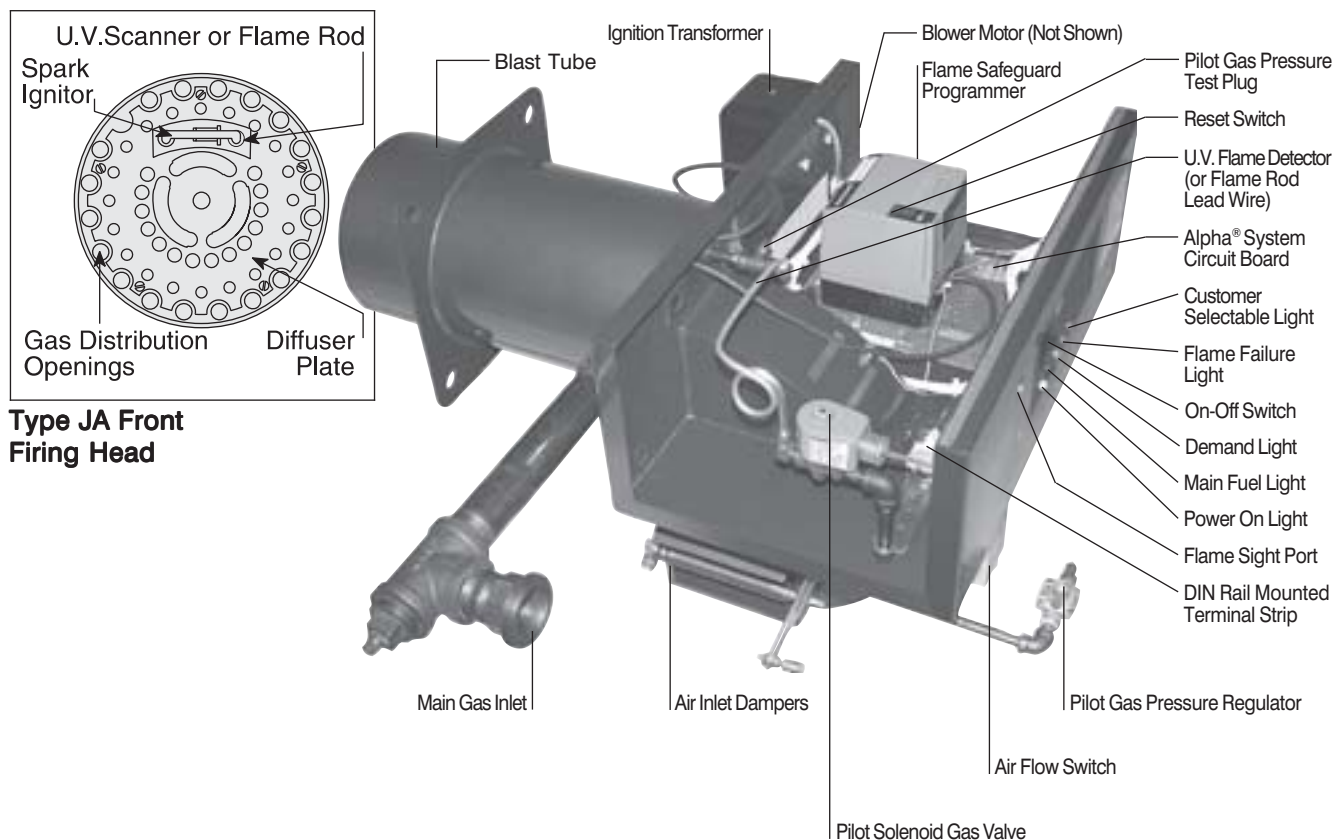


Figure 16 Type JRA Basic Component Identification

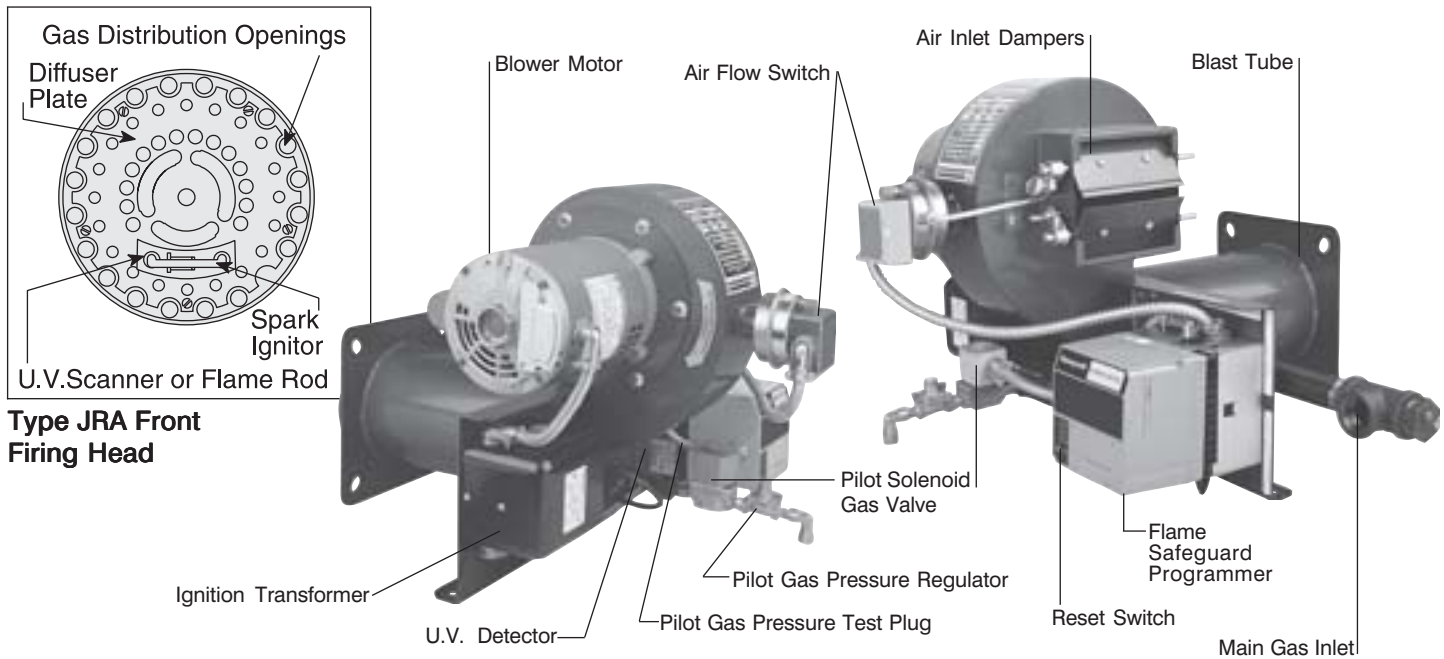


Figure 17 JA Burner Parts

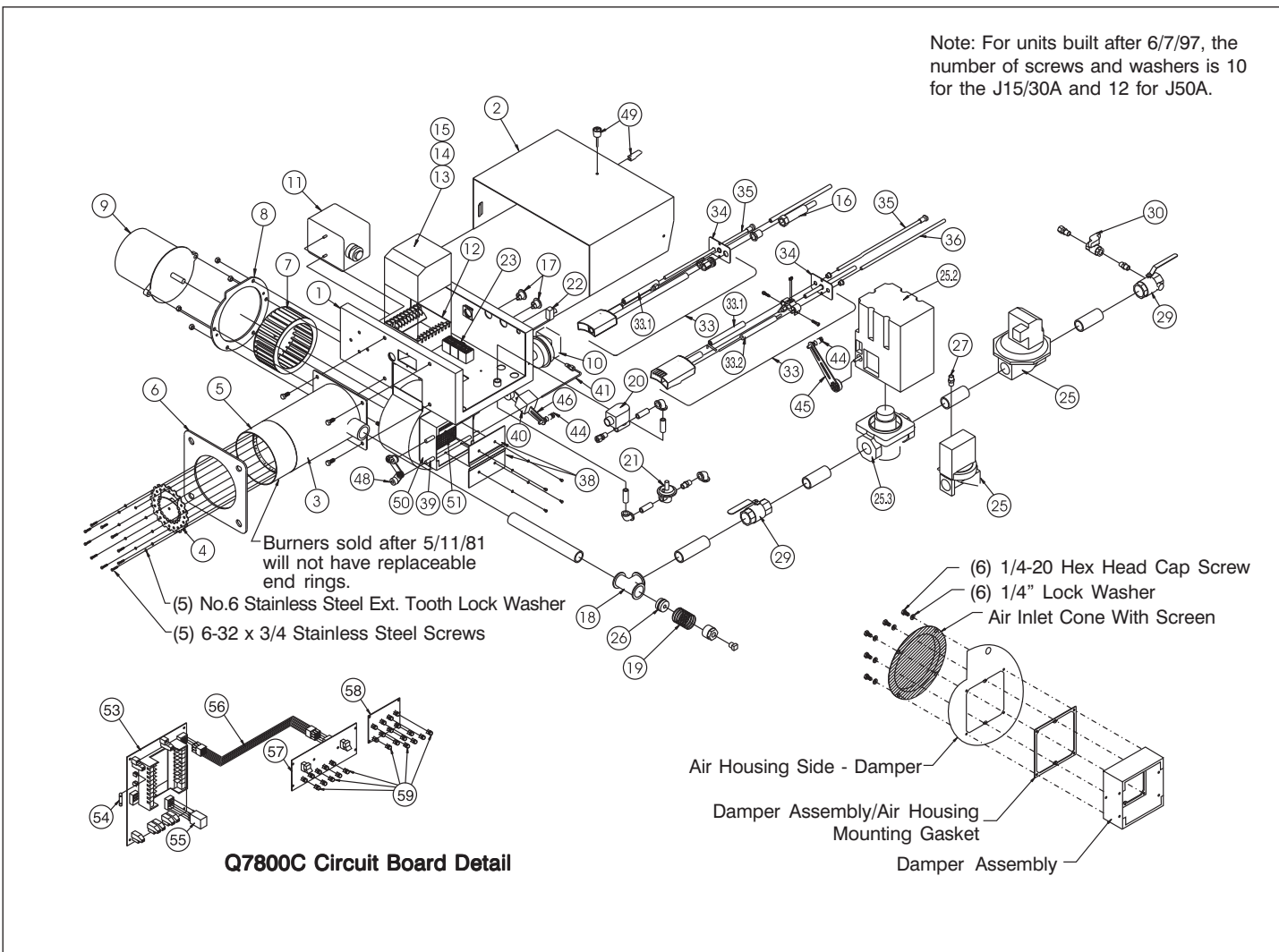


Figure 18 JRA Burner Parts

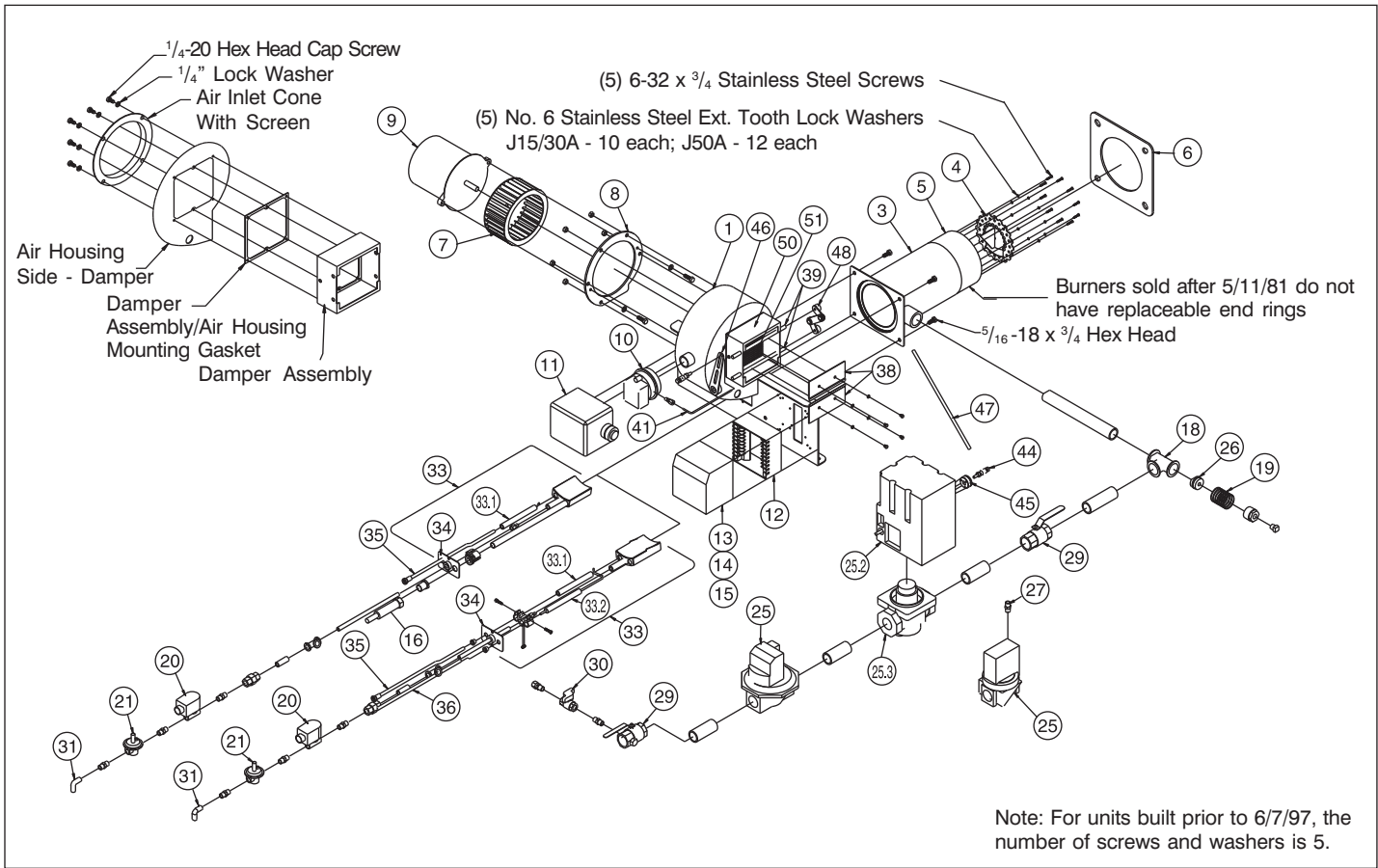


Figure 19 JA HTD Burner Parts

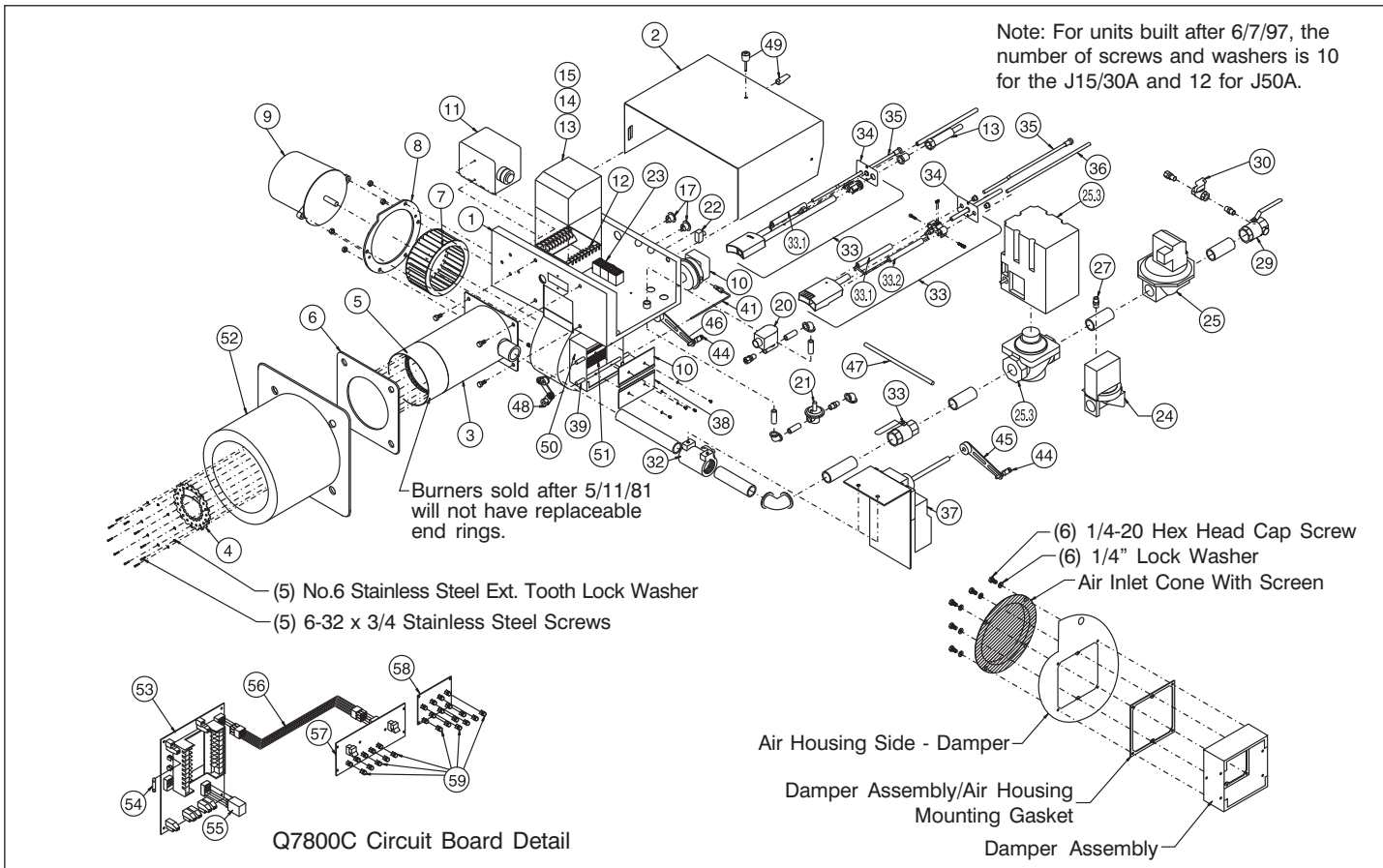
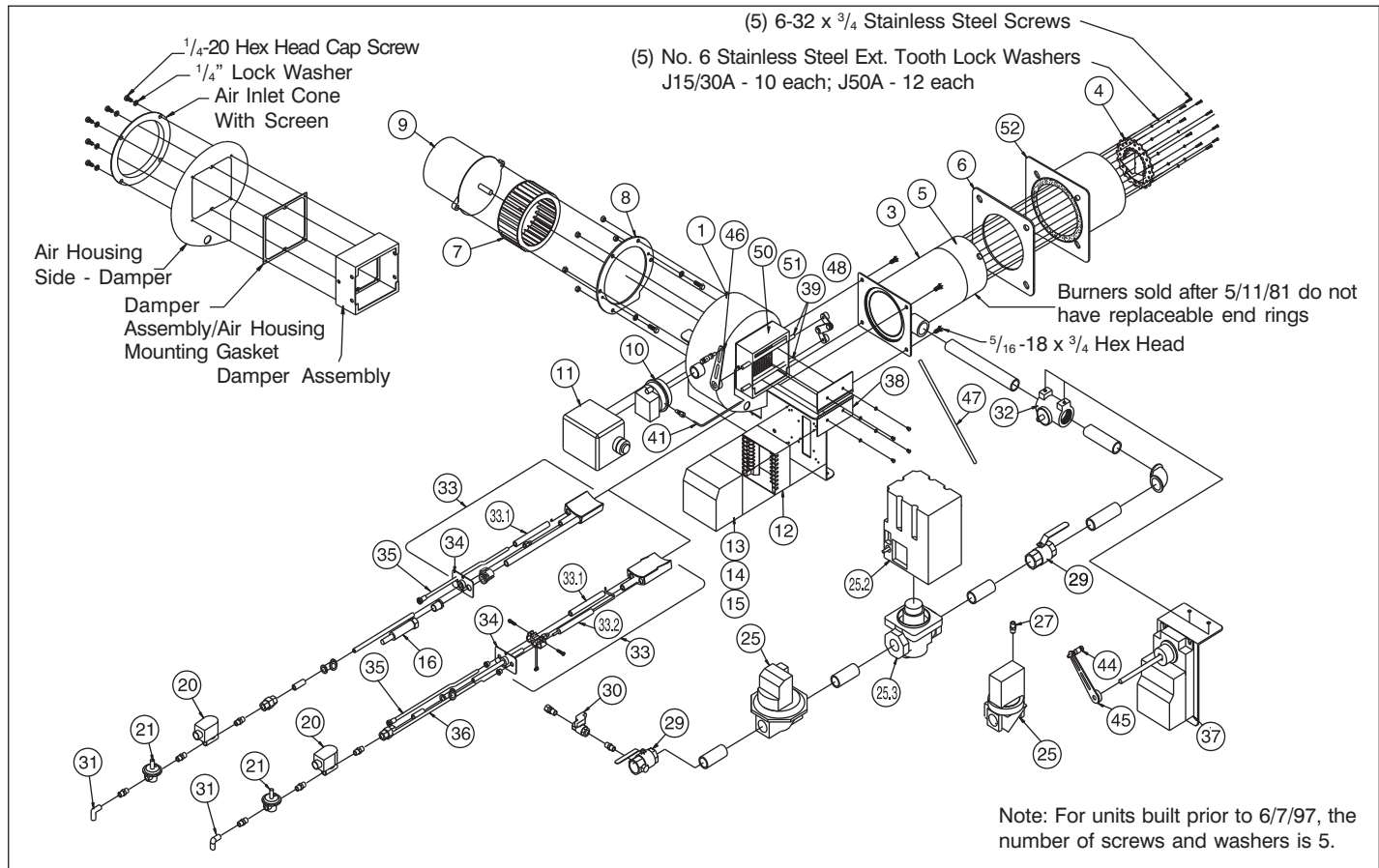


Figure 20 JRA HTD Burner Parts



JA/JRA/JA HTD/JRA HTD Burner Parts List

1	Blower Housing/Cabinet/ Damper Assembly	22	Control Switch	36	Flame Rod Cable
2	Hood Assembly	23	Terminal Strip	37	Mod Motor (Not Shown)
3	Blast Tube Assembly	24	Grounding Bar	38	Damper Blade
4	Diffusers (Includes Stainless Steel Mounting Screws)	25	ITT Diaphragm Gas Valve	39	Damper Axle
5	End Ring For Burners Sold Before 5/11/81 Only	25.1	Auxiliary Solenoid Gas Valve (Not Shown)	40	Damper Weight (Not Shown)
6	Mounting Flange	25.2	ITT Gas Valve Operator (Not Shown)	41	Air Sensing Tube (Not Shown)
7	Blower Wheel	25.2	Honeywell Gas Valve Operator (Not Shown)	42	Locking Arm
8	Motor Plate	25.3	ITT Gas Valve Body	43	Sight Glass
9	Blower Motors 3450 RPM	25.3	Honeywell Gas Valve Body (Not Shown)	44	Swivels (Not Shown)
10	Air Switch	26	Side Orifice	45	Linkage Arm (Not Shown)
11	Ignition Transformer	27	Bleed Valve for V48A	46	Damper Arms (Not Shown)
12	Sub-Base	28	Gas Pressure Regulator	47	Damper Collar (Not Shown)
13	Flame Safeguard Control	29	Gas Cock	48	Cross Link with Rivets (Not Shown)
14	Timing Card for Programmer Timing Modules	30	Pilot Cock	49	Door Latch & Knob
15	Amplifier	31	Aluminum Pilot Tubing	50	Damper Box Assembly
16	Scanner	32	Butterfly Valve (Not Shown)	51	Inlet Ring with Screen
17	Signal Light	33	Pilot Assembly	52	Adiabatic Chamber
18	Side Orifice Tee	33.1	Ignition Electrode	53	Main Circuit Board
19	Side Orifice Spring	33.2	Flame Rod	54	Fuse
20	Pilot Valve	34	Pilot Back Plate	55	Relay
21	Pilot Regulator	35	Ignition Cable	56	Wire Harness
				57	Light & Switch Board
				58	Auxiliary Light Board
				59	Lens Cap

11. BURNER START UP INFORMATION & TEST DATA

The following information shall be recorded for each burner start up:

Power Flame Model No. _____ Invoice No. _____ Serial No. _____
 Installation Name _____ Start Up Date _____
 Start Up Contractor's Name _____ Phone _____
 Name of Technician Doing Start Up _____
 Type of Gas Nat. ☐ Propane ☐ Other _____

Gas Firing

Gas Pressure at Train Inlet	Flame Signal Readings	Stack Outlet Test Point Draft
Burner in Off Position _____ "W.C.	Pilot _____	Low Fire _____
Gas Pressure at Train Inlet	Low Fire _____	High Fire _____
Low Fire _____	High Fire _____	Net Stack Temperature
High Fire _____	CO₂ or O₂ (Specify)	Low Fire _____
Gas Pressure at Firing Head	Low Fire _____	High Fire _____
Low Fire _____	High Fire _____	Combustion Efficiency
High Fire _____	CO	Low Fire _____ %
Gas Pressure at Pilot Test Tee	Low Fire _____	High Fire _____ %
Low Fire _____	High Fire _____	Air Inlet Damper Opening with Pilot Only
High Fire _____	Input Rate BTU/HR	Top _____ inches
Power Supply	Low Fire _____	Bottom _____ inches
Volts _____ Ph _____ Hz _____	High Fire _____	Air Inlet Damper Opening Low Fire
Control Circuit Volts _____	Over Fire Draft	Top _____ inches
Blower Motor Amps at High Fire _____	Low Fire _____	Bottom _____ inches
_____	High Fire _____	Air Inlet Damper Opening High Fire
		Top _____ inches
		Bottom _____ inches

Control Settings

General	Gas
Operating control cut out setting _____	Low gas pressure switch _____ inches
Operating control cut in setting _____	High gas pressure switch _____ inches
Limit control cut out setting _____	
Limit control cut in setting _____	

Operation Checklist

Checked For Proper Operation Of:	Yes	No		Yes	No
Low water cut off	()	()	Fresh air damper end switch	()	()
High water cut off	()	()	Barometric damper	()	()
Flame safeguard control ignition failure	()	()	Boiler room combustion air and		
Flame safeguard control main flame failure	()	()	ventilation provisions correct	()	()
Burner air flow switch	()	()	All gas lines checked for leaks	()	()
Induced draft fan controls	()	()	Gas lines and controls properly vented	()	()
Over fire draft controls	()	()	Other system components (specify)	()	()

Notified _____
 of following system deficiencies _____

12. PERIODIC CHECK LIST

Item	Frequency	Checked By	Remarks
Gages, monitors, and indicators	Daily	Operator	Make visual inspection and record readings in log
Instrument and equipment settings	Daily	Operator	Make visual check against heat exchanger manufacturer's recommended specifications
Firing rate control	Weekly Semiannually Annually	Operator Service Technician Service Technician	Verify heat exchanger manufacturer's settings Verify heat exchanger manufacturer's settings Check with combustion test
Flue, vent, stack, or outlet damper	Monthly	Operator	Make visual inspection of linkage, check for proper operation
Combustion air	Monthly	Operator	All sources remain clean and open
Ignition system	Weekly	Operator	Make visual inspection, check flame signal strength if meter-fitted (See Section 7.12, Table 5)
Fuel Valves Pilot and Main	Weekly	Operator	Open limit switch - make aural and visual check - check valve position indicators if so fitted
Fuel Valves Main	Annually	Service Technician	Perform valve leak test per valve manufacturer's instructions
Combustion safety controls Flame failure	Weekly	Operator	Close manual fuel supply for (1) pilot, (2) main fuel cock, and/or valve(s); check safety shutdown timing; log
Flame signal strength	Weekly	Operator	If flame signal meter installed, read and log; for both pilot and main flames, notify service organization if readings are very high, very low, or fluctuating; refer to flame safeguard manufacturer's instructions
Pilot turndown tests	As required/annually	Service Technician	Required after any adjustments to flame scanner mount or pilot burner; verify annually - refer to flame safeguard manufacturer's instructions
Refractory hold in	As required/annually	Service Technician	See <i>Pilot turndown tests</i>
High limit safety control	Annually	Service Technician	Refer to heat exchanger manufacturer's instructions
Operating control	Annually	Service Technician	Refer to heat exchanger manufacturer's instructions
Low draft, fan air pressure, and damper	Monthly	Operator	Refer to this manual and control component manufacturer's instructions
Inspect burner components	Semiannually	Service Technician	Refer to this manual and control component manufacturer's instructions
Check blower motor and wheel for cleanliness. Remove and clean as necessary	Annually	Service Technician	Remove and clean
Remove, inspect and clean gas pilot assembly	Annually	Service Technician	Remove and clean

Refer to heat exchanger manufacturer's instructions for general inspection procedures and for specific testing and inspection of all liquid level controls, pressure/temperature relief and other applicable items.

If you have any questions about the procedures listed above or questions relating to components or devices on your unit not specifically covered in the above — contact our Service Department at **620-421-0480** for assistance.



Power Flame Incorporated

2001 South 21st Street Phone 620-421-0480
Parsons, KS 67357 FAX 620-421-0948
Web Site: <http://www.powerflame.com>
E-Mail: CSD@powerflame.com

13. OWNER OPERATING INSTRUCTIONS FOR YOUR SAFETY

WARNING

If you smell gas:

1. Open windows.
2. Do not touch electrical switches.
3. Extinguish any open flame.
4. Call your gas supplier immediately.

Do not store or use gasoline or other flammable liquids and vapors in the vicinity of this or any other appliance.

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

IMPORTANT PRECAUTIONS

1. Never attempt to light burner with paper or other materials.
2. Never experiment with the burner.
3. Never change the fuel or air adjustments without consulting with the burner service company.
4. Never attempt to light the burner if combustion chamber contains any unburned fuel.
5. Never throw waste paper, rags, garbage, or other waste materials into the combustion chamber.
6. Never wash out heating equipment room without first covering the burner with waterproof material.

START UP

Preparation for Start Up

1. Ensure that the system is in working order. If heat exchanger is a boiler, ensure that proper water level is available.
2. Set the burner control panel switch to the *OFF* position.
3. Turn the thermostat or operating control down to its lower setting.
4. Check fuses and replace as necessary.
5. Depress the flame safeguard programming control reset button.

Start Up

1. Manually open and close the main gas shut off cock, leakage cock and pilot cock to determine that they operate freely. Open all three cocks. (Reset low gas pressure switch, if supplied.)
2. Set the main power switch and burner panel control switch to the *ON* position. Wait 30 seconds and turn up thermostat or operating control to the desired setting.
3. The burner blower motor will start and after a suitable prepurge period (this will vary with the type of flame safeguard control supplied - but will usually be a minimum of 30 seconds to a maximum of 90 seconds) the burner pilot will light, after which the main flame will be established.
4. If the system does not respond properly, contact your qualified burner service company.

EXTENDED SHUT DOWN

1. Place main power switch and burner control panel switch to the *OFF* position.
2. Close all valves in gas lines.
3. Cover burner to protect it from dust and dampness.

MAINTENANCE

Burner should be maintained and serviced periodically by a qualified service agent. See *Service Suggestions* section in burner manual for standard trouble shooting procedures.

Burner Service Company

Date of Installation

Address

Telephone