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

PHONE: (260) 425-9200
(855) WAYNECS
(800) 443-4625
FAX: (260) 424-0904

www.waynecombustion.com

EHG
Gas Burner

Manual 63537-001 | Revision K | Publication Date: 6/9/2014

SPECIFICATIONS

Burner Model: EHG
Minimum Input: 425 MBtu/hr (125 kW)
Maximum Input: 700 MBtu/hr (205 kW)
Standard Voltage: 120 VAC / 60 Hz 1 Phase
Flame Safety: 24 VAC Single-Rod Gas Primary

Mounting Flange: Adjustable Flange Standard
Air Tube Diameter: 4 inches (101.6 mm)
Air Tube Insertions: 5 inches (127 mm) Maximum with 6 inch (152 mm) Air Tube.
7 inches (178 mm) Maximum with 9 inch (228 mm) Air Tube.
10 inches (254 mm) Maximum with 12 inch (305 mm) Air Tube.
13 inches (381 mm) Maximum with 15 inch (381 mm) Air Tube.

Supply Line Pressure Required: Natural or Propane 6" w.c. (1494 pa) Minimum,14" w.c. (3487 Pa) Maximum

Ignition: 15.6k VAC Direct Spark Ignition. Standard burners are shipped with the ignition transformer mounted to the burner. If the transformer is to be remotely mounted, the ignition wire must not exceed 36" (914.4mm) per UL795.

De-rate maximum input for altitude over 2000 ft. (610 m) by 4% each 1000 ft. (305 m) above sea level.

INSTALLATION OF BURNER

INSTALLATION OF THE BURNER MUST BE DONE BY A QUALIFIED INSTALLER IN ACCORDANCE WITH REGULATIONS OF THE NATIONAL FUEL GAS CODE ANSI Z223.1/NFPA 54, AND IN COMPLETE ACCORDANCE WITH ALL LOCAL CODES AND AUTHORITIES HAVING JURISDICTION.

INCORRECT INSTALLATION, ADJUSTMENT, OR MISUSE OF THIS BURNER WILL VOID THE WARRANTY and COULD RESULT IN DEATH, SEVERE PERSONAL INJURY, OR SUBSTANTIAL PROPERTY DAMAGE.

A QUALIFIED INSTALLER IS THE PERSON WHO IS RESPONSIBLE FOR THE INSTALLATION AND ADJUSTMENT OF THE EQUIPMENT AND WHO IS LICENSED TO INSTALL GAS-BURNING EQUIPMENT IN ACCORDANCE WITH ALL CODES AND ORDINANCES.

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

INSTALLATION LOG

BURNER MODEL:	SPECIFICATION NUMBER:	FUEL (NATURAL OR PROPANE):	GAS ORIFICE DRILLED SIZE:
INLET GAS PRESSURE (in. w.c.):	CO_2 (%):	O_2(%):	CO (PPM):
INSTALLER'S NAME:	CONTRACTOR NAME:	CONTRACTOR ADDRESS:	CONTRACTOR PHONE NUMBER:
CONTRACTOR LICENSE #:	DATE OF INSTALLATION:		
COMMENTS ABOUT INSTALLATION/START UP:			

BURNER/APPLIANCE SERVICE LOG

SERVICE DATE	TECHNICIAN	COMPANY / ADDRESS	CONTRACTOR LICENSE #	WORK PERFORMED
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				
/ /				

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

FOR YOUR SAFTEY: **DO NOT STORE OR USE GASOLINE OR OTHER FLAMMABLE VAPORS AND LIQUIDS IN THE VINCINITY OF THIS OR ANY OTHER APPLIANCE.**

WHAT TO DO IF YOU SMELL GAS:

1. **Open Windows.**
2. **Do not try to light any appliances.**
3. **Do not touch electrical switches; do not use any phone in your building.**
4. **Extinguish any open flame.**
5. **Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.**
6. **If you cannot reach your gas supplier, call the fire department.**

⚠ WARNING

ELECTRIC SHOCK HAZARD

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

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

⚠ WARNING

OVERHEATING HAZARD

SHOULD OVERHEATING OCCUR:

1. Shut off the manual gas valve to the appliance.
2. Do not shut off the control switch to the blower.

⚠ WARNING

CARBON MONOXIDE POISONING HAZARD

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

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

CONTENTS

PAGE

SECTION I INSTALLATION **5**

A. GENERAL **5**

B. VENTILATION **5**

C. MOUNTING TO EQUIPMENT **5**

D. GAS PIPING **5**

E. ELECTRICAL SUPPLY **7**

F. BURNER ORIFICE SIZING AND INSTALLATION **7**

G. 120VAC SOLENOID SHUT-OFF GAS VALVE **10**

H. PRESSURE REGULATOR ADJUSTMENT **10**

I. GAS PRESSURE SWITCHES **11**

SECTION II INITIAL START UP **12**

SECTION III OPERATION AND TROUBLESHOOTING **15**

SECTION IV SERVICE **26**

TECHNICAL INFORMATION **34**

CONSUMER INSTRUCTIONS **45**

WARRANTY **46**

SECTION I
INSTALLATION

A. GENERAL

Installation of these power gas burners must conform to local codes, or in their absence, the National Fuel Gas Code, ANSI Z223.1/NFPA 54.

In CANADA, "The equipment shall be installed in accordance with the Provincial Installation Requirements, or in their absence, the CGA B149.1 and B149.2 Installation Codes shall prevail." Authorities having jurisdiction should be consulted before installations are made.

NOTICE: ANSI or local installation code compliance is the sole responsibility of the qualified installer.

B. VENTILATION

The EHG burner models covered by this manual shall not be installed in an appliance located where normal air circulation or infiltration is limited in providing all the air necessary for proper combustion and draft hood dilution air.

When the heating appliance is installed in a tightly closed room without ventilation 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 is to be sized on the basis of one square inch (645.2 mm^2) or more of free area for each 1,000 Btu/hr (0.29 kW) input.

C. MOUNTING TO EQUIPMENT

THE BURNER AIR TUBE MUST NOT BE ALLOWED TO EXTEND INTO THE CHAMBER PROPER; IT MUST BE SET 1/8 INCH (3.2 MM) SHORT OF THE INSIDE SURFACE.

Before permanently securing the burner to the heating appliance with the mounting flange or cementing around the air tube in the combustion chamber opening, check that the burner head assembly is free of foreign materials and that the sensor and electrode probes have not been damaged or repositioned, see Figure 1.

D. GAS PIPING

NOTICE: All piping must comply with state and/or local codes. The available gas supply pressure should be within minimum and maximum pressures shown in the burner specifications. If the gas supply pressure exceeds the 14" w.c. (3.5 kPa) maximum, an intermediate main gas regulator must be installed ahead of the main gas manual shutoff valve shown in Figure 2.

WARNING: Failure to install the intermediate gas regulator could result in gas leakage from gas valve(s) ad/or the burner's automatic pressure regulator.

A drip leg or sediment trap must be installed in the supply line to the burner. A pipe union shall be installed in the gas line adjacent to, and upstream from the main gas manual shutoff valve. See Figure 2.

The gas supply piping to the burner should branch off from the main gas supply line as close to the gas meter as possible. Do not connect to the bottom of a horizontal section. For pipe sizing and lengths refer to the tables on pages 44 and 45.

Use new black iron pipe and malleable fittings free from burrs and defects. Use pipe joint compound resistant to liquefied petroleum gases.

A 1/8" NPT plugged tapping accessible for test gauge connection shall be provided immediately upstream of the gas supply pressure connection for determining gas supply pressure to the burner. Test new supply piping for leaks. **CAUTION: DURING PRESSURE TEST FOR LEAKS IN SUPPLY PIPING, THE BURNER MUST BE DISCONNECTED TO PREVENT EXPOSING THE COMBUSTION REGULATOR/GAS VALVE(S) TO PRESSURES GREATER THAN 1/2" PSIG (3447 PaG) POSSIBLY DAMAGING THESE CONTROLS AND VOIDING THE BURNER WARRANTY**.

ELECTRODE SETTINGS

PROBE	DIM "A" REF
IGNITER	1.06 (26.9mm)
SENSOR	0.84 (21.3mm)

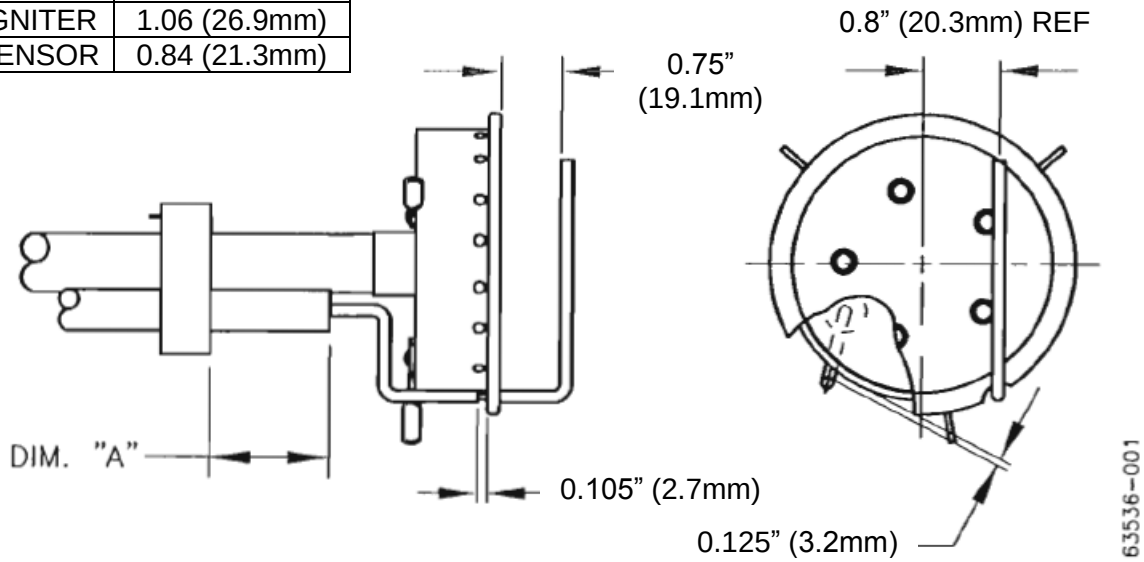
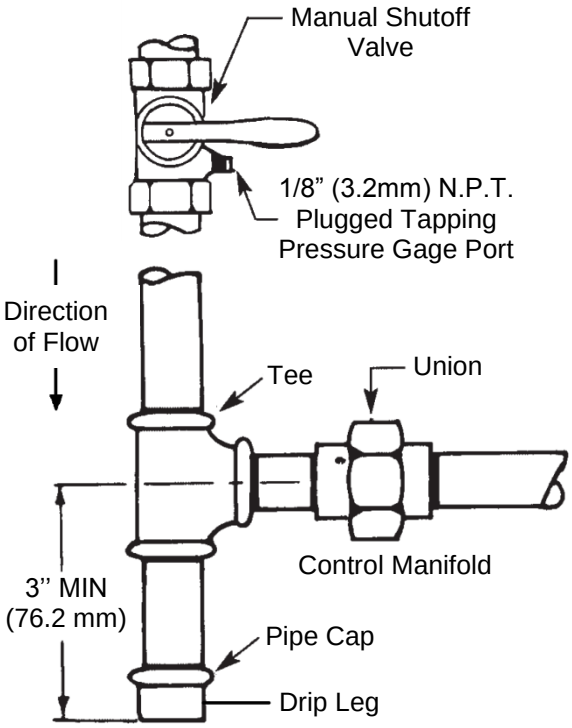


Figure 1



Supply Line Connection to Burner

Figure 2

E. ELECTRICAL SUPPLY

The installation must be wired and grounded in accordance with local codes or in their absence, with the National Electric Code ANSI/NFPA No. 70 latest edition. In Canada, all wiring shall be done in accordance with the Canadian Electrical Code.

For the 120 VAC wiring to the burner, use solid copper conductor wire no lighter than #14 AWG. If a fused disconnect is used, it should be fused for a minimum of 15 amps.

CAUTION: The burner is equipped with its own 24 VAC transformer. Do not add any 24 VAC power consuming device in the 24 VAC control circuit of the burner, as it could overload the transformer.

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

NOTE: if any of the original burner wiring must be replaced, it must be replaced with #18 AWG 105° C wire or equivalent.

See Section III – Operation and Troubleshooting for applicable burner wiring diagrams.

F. BURNER ORIFICE SIZING AND INSTALLATION

The EHG power gas conversion burners are approved for use with natural and propane gas only. The EHG burner models are shipped labeled and orificed for natural gas. To convert to propane gas and/or increase Btu/hr input on natural or propane gas, an orifice kit is supplied with each burner with the orifices shown in Figure 3.

To remove or interchange main orifice discs refer to Figure 27.

1. Remove 1" NPT orifice plug, item #5.
2. Remove orifice spring, item #4, to access and remove orifice disc, item #3.
3. Install desired orifice from Figure 3, making sure it is seated flat in the orifice holder, item #2.
4. Replace orifice spring and securely tighten 1"NPT orifice plug (using proper pipe dope) into orifice holder.

EHG Orifice Size Chart (LP)				
Btu/hr Input	LP Gas		Orifice Part No.	Manifold Pressure in. w.c.
	Drill	Decimal		
425,000 (125 kW)	"U"	0.3680" (9.35mm)	62438-031M	3.7 (922 Pa)
450,000 (132 kW)	3/8"	0.3750" (9.53mm)	62438-036M	3.5 (872 Pa)
500,000 (147 kW)	27/64"	0.4219" (10.72mm)	62438-037M	3.5 (872 Pa)
550,000 (161 kW)	29/64"	0.4531" (11.51mm)	62438-038M	3.5 (872 Pa)
600,000 (176 kW)	31/64"	0.4844" (12.3mm)	62438-039M	3.5 (872 Pa)
650,000 (191 kW)	1/2"	0.5000" (12.7mm)	62438-040M	3.5 (872 Pa)
700,000 (205 kW)	37/64"	0.5781" (14.68mm)	62438-041M	3.5 (872 Pa)

EHG Orifice Size Chart (Natural)				
Btu/hr Input	Natural Gas		Orifice Part No.	Manifold Pressure in. w.c.
	Drill	Decimal		
425,000 (124.6 kW)	15/32"	0.4688" (11.91mm)	62438-011M	3.8 (922 Pa)
450,000 (131.9 kW)	31/64"	0.4844" (12.3mm)	62438-039M	3.5 (872 Pa)
500,000 (146.5 kW)	33/64"	05156" (13.1mm)	62438-043M	3.5 (872 Pa)
550,000 (161.2 kW)	35/64"	0.5469" (3.89mm)	62438-044M	3.5 (872 Pa)
600,000 (175.8 kW)	19/32"	0.5938" (15.08mm)	62438-045M	3.5 (872 Pa)
650,000 (190.5 kW)	5/8"	0.6250" (15.88mm)	62438-046M	3.5 (872 Pa)
700,000 (205.2 kW)	23/32"	0.7188" (18.26mm)	No orifice	3.5 (872 Pa)

Figure 3

Gas Pipetrain:
The pipetrain includes High & Low Gas Pressure Safety Switches, two manual ball valves, two 120 VAC Solenoid Shut-off Valves, a Main Gas Pressure Regulator, and gas test ports per the requirements of UL795. Upon request the pipetrain can be supplied without a Gas Pressure Regulator, but the correct Gas Pressure Regulator must be installed before operation. The pipetrain components may be shipped separate, and minor field plumbing and wiring are required. Additional pipetrains that comply with CSD-1, NFPA, FM or GAP (formerly IRI) are available. Upon request, the pipetrain can be pre-assembled and pre-wired.

Gas Train Connection:
In most cases, the burner is supplied with a pre-assembled gas train. If this is the case, attach the gas train to the gas inlet connection of the burner (figure 4) making sure the gas train is orientated properly. The solenoid shut off valves and pressure regulator have arrows on the housings that indicate the direction of gas flow. When making connections that utilize NPT threads, use pipe joint compound that is resistant to the effects of liquefied petroleum gases. Turn the manual valves in the gas train to the off position. Using new black iron pipe and malleable fittings, connect the gas supply piping to the inlet of the gas train (figure 4). Refer to Section I.D, GAS SUPPLY PIPING.

NOTE: When connecting the gas train to the burner, the length of piping between the ball valve closest to the burner and the gas inlet on the burner, must not exceed 20". If installation of the burner and gas train to the equipment requires lengthening the gas train, the length of pipe (including the ball valve) must not exceed 25" in total.

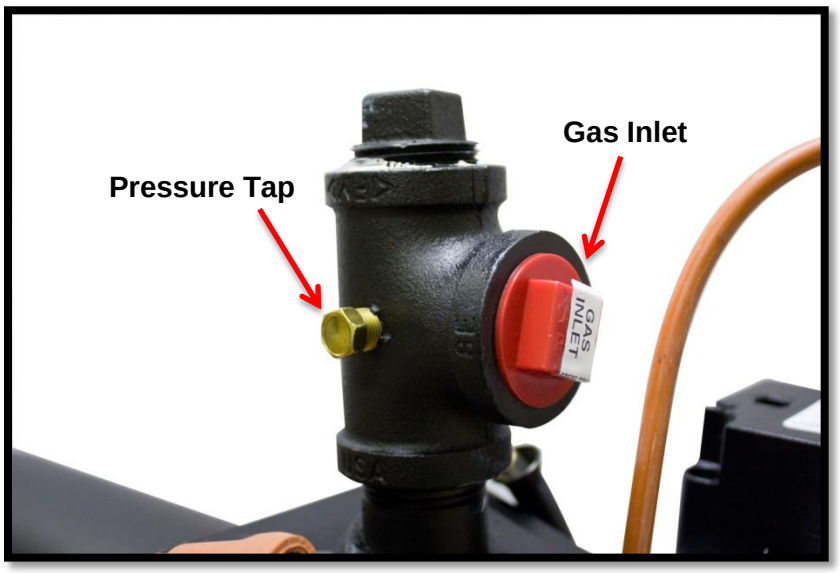


Figure 4

If the gas train is not pre-assembled, use new black iron pipe, malleable fittings, and suitable pipe joint compound to assemble the gas train. Examples of assembled gas trains are shown in Figures 31 and 32 (pages 41-44). The manual valves, solenoid valves, pressure switches and pressure regulator must be connected as described in the installation instructions for the given component, and in the flow sequence as shown in Figures 31 or 32. The solenoid shut off valves and pressure regulator have arrows on the housings that indicate the direction of gas flow. When assembling these components into the gas train, make sure the arrows point in the direction of gas flow. Following the assembly of the gas train, attach it to the burner and gas supply piping as described above.

Note: The gas train, and all its safety components, should be leak tested after installation. 1/8″ NPT fittings have been provided to isolate and test the solenoid valves. The train, and all safety components, should be tested for leaks and functionality at regular intervals.

Note: Gas trains are heavy causing stress to the gas connections on the burner. **The gas train must be properly supported to minimize the potential for stress on the burner's gas piping connections.**

Electrical Connections:
The installation must be wired and GROUNDED in accordance with local codes or in their absence, with the National Electric Code ANSI/NFPA No. 70-2002 or latest edition.

In CANADA, all wiring shall be done in accordance with the Canadian Electrical Code.

There are two sets of wires extending out of the control panel. The black and white wires marked “L1” and “L2” should be connected to the 120 VAC supply line. The black and white wires marked “GV1” and “GV2” are to be connected to the gas train. The green wire exiting the gas train must be connected to the ground lug in the control panel.

For the 120 VAC wiring to the burner, use solid copper conductor wire not lighter than #14 AWG. If a fused disconnect is used, it should be fused for a minimum of 15 amps.

For the 120 VAC wiring from the burner to the gas train, use solid copper conductor wire not lighter than #14 AWG.

CAUTION: The burner is equipped with it’s own 24 VAC transformer. Do not add any 24 VAC power consuming device in the 24 VAC control circuit of the burner, as it could overload the transformer.

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

NOTE: If any of the original burner wiring must be replaced, it must be replaced with #18 AWG 105 degrees C wire or equivalent. See Section 3- Operation and Troubleshooting for applicable burner wiring diagrams.

G. 120VAC SOLENOID SHUT-OFF GAS VALVES

The gas solenoid shut-off valves may be pre-plumbed onto the pipetrain. The pipetrain may also be pre-wired for convenience, but the electrical wiring from the burner must be connected in the field.

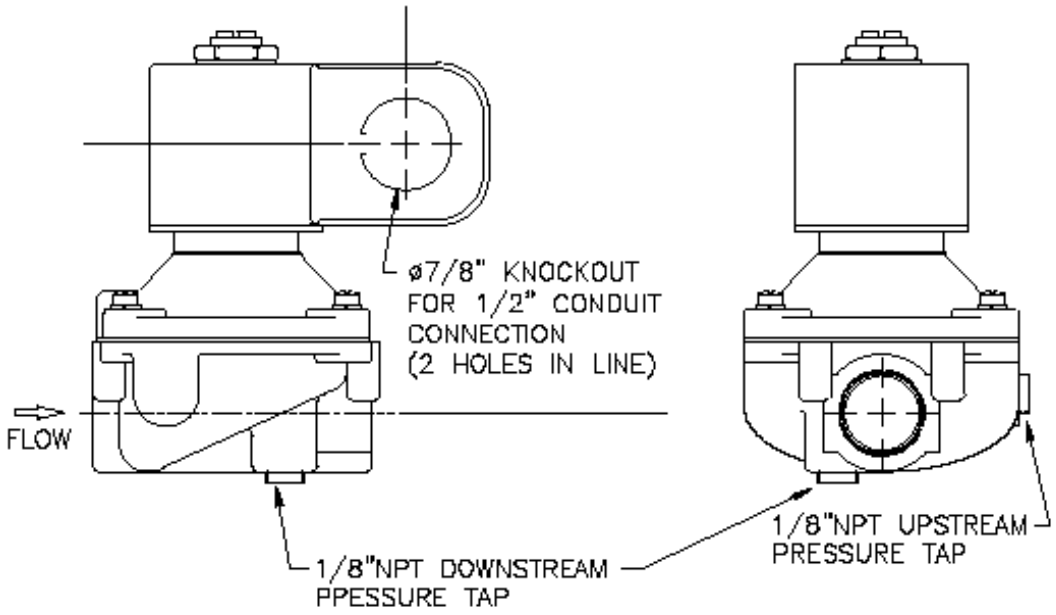


Figure 5

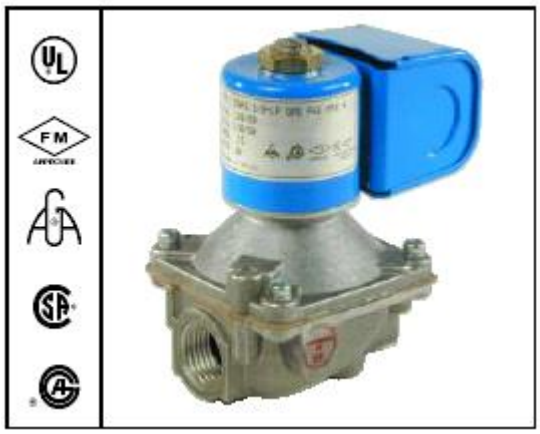


Figure 6

Figures 5 and 6 show one type of solenoid valve that is used in the gas trains. When installing solenoid valves into a gas train, the valves must be connected in the proper orientation. The arrow on the valve body depicts the direction of gas flow. Do not install the valves in a backward orientation.

Refer to the wiring diagram in Figure 11 of this manual for proper wiring of solenoid valves.

H. PRESSURE REGULATOR ADJUSTMENT

The gas pressure regulator is NOT factory preset, and must be field-adjusted while the burner is in operation. Refer to Figure 3 for pressure requirements.

When adjusting the regulator outlet pressure to set input capacity per the tables in Figure 3, remove the regulator cap for access to the slotted adjustment screw. Turning the screw counter clockwise reduces manifold pressure, clockwise increases the pressure.

NOTE: MANIFOLD PRESSURE ADJUSTMENTS CAN ONLY BE MADE WITH THE BURNER RUNNING AND THE GAS ON.

The 1/8″ NPT pressure tap for manifold pressure measurement is located on the side of the burner's manifold pipe (see figure 4). Use a "u"-tube manometer or dial type pressure gauge, scaled from 0″w.c. to 15.0″ w.c. (3736.5Pa) to read pressure.

Figure 7

I. GAS PRESSURE SWITCHES

MOUNTING

All switches can be mounted in either horizontal or vertical position. Switches should be reasonably level but do not require accurate leveling.

Switches have been factory calibrated and tested for leaks. However, it is recommended that the switch body, gas pipe inlets and connections be soap bubble tested for leaks after installation.

OPERATION

Low Gas Pressure Models

Low gas pressure switches break the electrical circuit on pressure drop at the point when gas pressure becomes lower than the indicated set pressure.

Before the manual reset button can be properly latched, gas pressure in the chamber must be higher than the indicated setting.

High Gas Pressure Models

High gas pressure switches break the electrical circuit when pressure rises above the indicated preset pressure.

Range Adjustment - All Models

To adjust gas pressure cut-off setting, remove the cover. Turn the range scale adjustable knob to increase pressure setting or decrease pressure setting. Install cover and tighten the cover screws to prevent tampering. Proper adjustment of the high and low gas pressure switches is explained in section II.

SECTION II
INITIAL START UP

NOTE: Read the applicable sequence of burner/primary gas control operation, gas pressure switches, etc. in Section III Operation and Troubleshooting before proceeding.

1. Lay out combustion test equipment, manometers, stopwatch, DC micro-amp meter, and other miscellaneous tools as needed.

2. Adjust the primary air shutter setting per the dimensions shown in the chart below. See figures 22 -26 (pages 31-32) for air band adjustment instructions.

NOTE: Remove block-out plate using a 1/2" nut driver or wrench from the side of the burner **IF** the firing rate is over 650,000(191 kW) Btu/hr on LP **ONLY**. See chart below. For location of block-out plate see figure 9 below.

EHG Start-Up Reference Chart						
	LP Gas			Natural Gas		
Btu/hr Input	Air shutter		Manifold Pressure	Air shutter		Manifold Pressure
	Opening	Block-out Plate	Inches w.c.	Opening	Block-out Plate	Inches w.c.
425,000 (125 kW)	3/8” (10mm)	yes	3.7 (922Pa)	5/16” (8mm)	yes	3.8 (947Pa)
450,000 (132 kW)	1/2” (13mm)	yes	3.5 (872Pa)	1/2” (13mm)	yes	3.5 (872Pa)
500,000 (147 kW)	13/16” (21mm)	yes	3.5 (872Pa)	13/16” (21mm)	yes	3.5 (872Pa)
550,000 (161 kW)	1-1/8” (29mm)	yes	3.5 (872Pa)	1” (25mm)	yes	3.5 (872Pa)
600,000 (176 kW)	1-3/8” (35mm)	yes	3.5 (872Pa)	1-1/2” (38mm)	yes	3.5 (872Pa)
650,000 (191 kW)	1-3/4” (19mm)	removed	3.5 (872Pa)	1-3/4” (44mm)	yes	3.5 (872Pa)
700,000 (205 kW)	1-7/8” (48mm)	removed	3.5 (872Pa)	2-1/8” (54mm)	yes	3.5 (872Pa)

Note: Air Shutter Opening Dimensions and Gas Manifold Pressures are approximate and must be properly adjusted with calibrated emissions equipment.

Figure 8

Block out plate location

Figure 9

NOTE: Initial activation of the burner should begin with checking the function of the automatic controls by means of a "dry run" before gas is supplied to the main burner nozzle – through a complete main burner firing cycle and a complete check of all automatic safety controls with the test firing valve in the closed position then through an activated firing cycle.

3. Temporarily remove the covers from the High and Low gas pressure switches and set the switches using the dials. The high gas pressure switch should be set at the highest pressure setting, as an initial starting point. The low gas pressure switch should be set at the lowest pressure setting, as a starting point. **NOTE:** These settings must be re-adjusted after the burner is ignited.

4. Open the ball valve to the inlet of the gas pipetrain. Make sure the ball valve nearest the burner (the outlet of the gas pipetrain) remains closed. Test all new piping for leaks with a soapy solution or leak detector. Do not use an open flame to test for gas leaks. Push the manual reset buttons on the gas pressure switches.

5. Turn on the main electrical power and set the thermostat or operation control to call for heat. Turn the burner on-off switch to the "on" position. Allow the combustion fan to run a MINIMUM of 5 minutes to purge the combustion chamber and appliance heat exchanger. The amber indicator light shows that the burner is powered and the switch is in the "on" position.

6. Turn the burner on-off switch to the "off" position or set the thermostat or operating control below room temperature, shutting the burner "OFF" at least 1 minute to RESET the primary control.

7. Open the ball valve on the outlet of the pipetrain (nearest the burner).

8. Power the burner, turn the burner on-off switch to the "on" position and set the thermostat or operating control to call for heat. The burner will start and go through the applicable sequence of burner/primary gas control operation, refer to Section III for sequence of operation.

NOTE: On new gas line installations, air may be trapped in the gas line, the burner may experience several lockouts until all the air is purged from the lines.

9. Once the burner is running, adjust the gas pressure regulator as described in Section I, paragraph H – Pressure Regulator Adjustment, based on the pressure described in Figure 8.

10. A more accurate Btu/hr (kW) input can be determined by using the gas service meter with the burner operating (all other gas appliances must be off). The hand on the gas meter dial with the lowest cubic feet value (fastest revolving dial), should be clocked (timed) for one complete revolution. Use the following formula:

$$\frac{3600 \times \text{cubic ft. per revolution} \times \text{Btu value/cubic ft}}{\text{seconds per revolution}} = \text{Btu/hr}$$

Natural Gas Example: Timing one revolution of the $1ft^3$ dial at 6 seconds on natural gas (roughly 1000 Btu/ ft^3 heating value).

$$\frac{3600 \times 1 \times 1000}{6} = 600{,}000 \text{ Btu/hr}$$

Propane Gas Example: Timing one revolution of the $1ft^3$ dial at 15 seconds on propane gas (roughly 2515 Btu/ ft^3 heating value).

$$\frac{3600 \times 1 \times 2515}{15} = 603{,}600 \text{ Btu/hr}$$

11. After the desired input has been obtained, re-adjust the primary air damper open or closed to visually obtain a blue flame with well-defined orange or yellow tips for natural gas, or well defined yellow tips for propane gas. If the burner is firing into a refractory lined chamber, a blue flame may not be possible to obtain.

12. After the burner has been in operation for at least 10 minutes, assuring combustion chamber and heat exchanger are fully warmed, take combustion analysis flue gas samples just ahead of the draft control in the flue pipe. **A combustion gas analyzer should be used to fine-tune the burner.**

NOTE: ALWAYS USE RELIABLE COMBUSTION TEST INSTRUMENTS. BEING PROFICIENT IN THE USE OF THESE INSTRUMENTS AND INTERPRETING THEIR DATA IS NECESSARY FOR SAFE, RELIABLE AND EFFICIENT BURNER OPERATION.

13. Perform the following combustion analysis. All adjustments below must be made with the following instruments: draft gauge, O_2 or CO_2 analyzer and CO tester.

A. Adjust the primary air damper to provide about 25% excess combustion air. Confirm this by checking the flue gas for its FREE OXYGEN (O_2) or CARBON DIOXIDE (CO_2) PERCENTAGES with a test instrument. Free oxygen should be about 4.5%, or carbon dioxide should be about 9.5% for natural gas, 12.1% for propane gas.

B. CARBON MONOXIDE (CO)– Should be checked for its presence in the flue gas. This percentage should not exceed .04% (or 400 PPM air free).

If an O_2 analyzer is used:

$$CO_{AIRFREE} = \frac{20.9}{(20.9 - \%O_2)} \times CO_{PPM}$$

If a CO_2 analyzer is used:

$$\text{For Natural Gas: } CO_{AIRFREE} = \frac{11.7}{\%\ CO_2} \times CO_{PPM}$$

$$\text{For Propane Gas: } CO_{AIRFREE} = \frac{13.8}{\%\ CO_2} \times CO_{PPM}$$

C. **NOTE:** The EHG was designed to fire into slightly positive, balanced, or slightly negative combustion chambers. For optimal performance, check overfire draft and adjust to NEGATIVE -.01 (-2.5Pa) to -.02 (-5.0 Pa) inches w.c. during burner operation.

D. The flue gas temperature should be between 325°F (163 °C) and 550°F (288 °C) for gas burners. Higher flue gas temperatures indicate overfiring or excessive draft through the appliance. Lower flue gas temperatures may cause excessive condensation and indicate underfiring. Consult your local utility or the appliance manufacturer for acceptable flue gas temperatures.

CAUTION: IF THE BURNER Btu/hr (kW) INPUT IS CHANGED, THE AIR SHUTTER MUST BE ADJUSTED. REPEAT STEP 13

14. Adjust the High & Low gas pressure switches according to actual firing conditions. The High gas pressure switch should be set at approximately 4”w.c. and the Low gas pressure switch should be set at approximately 2”w.c. for close burner control. Nuisance lockouts will occur if the switch settings are too close to the gas manifold setting, and fluctuations in gas pressures occur. Reattach switch covers.

15. Record the installation data, the combustion readings, etc., and affix to this manual, or the burner and/or appliance. Space has been provided at the back of this manual for start-up notes, dealer’s name, address, telephone number, as well as the date of installation.

SUGGESTION: All new installations should be re-inspected for proper combustion and burner operation after one or two weeks of normal operation.

For subsequent normal starting and shut off procedure, refer to the “Consumer Instructions” in the back of this manual or the instruction plate attached to the burner.

TO RESTART THE BURNER AFTER A FLAME FAILURE, remove power from the burner for 1 minute to reset the primary controller. Push the manual reset on the Low Gas pressure switch. The burner should relight after power is restored and the unit has a call for heat. If problems persist, refer to the troubleshooting section of this manual.

To stop the burner in the event of an emergency, remove power from the main electrical disconnect, shut off any manual gas ball valve, or turn the burner on-off switch to the off position.

SECTION III
OPERATION AND TROUBLESHOOTING

SEQUENCE OF OPERATION – EHG POWER GAS BURNER UTILIZING HONEYWELL S89F GAS PRIMARY W/BUILT IN 30 SECOND PREPURGE

On a call for heat, voltage (24VAC) is applied to the motor start relay and air switch. Once the fan motor reaches operating rpm, the available combustion air will close the air-proving switch contacts, energizing the gas primary control.

The S89F gas primary control has an internal 30-second pre-purge timer. After the initial 30 second pre-purge, an internal 8-second safe start check of the S89F will commence. Once this is successfully completed, the S89F simultaneously energizes the gas valves and ignition transformer. Gas flows and the transformer produces an approximate 15,000 volt spark end point grounded at the burner head establishing main burner flame.

At the start of each heat cycle, there is a trial for ignition period of four (4) seconds duration. Normally, 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 to the S89F gas control primary for the remainder of the heat cycle. If the flame should be extinguished during the heat cycle, the S89F gas control primary will go into the 30 second pre-purge and 8 second safe start check, then re-energize the gas valve and ignition transformer in an attempt to establish the main burner flame. If this does not occur within the 4-second trial for ignition period, the S89F gas primary control will go into lockout de-energizing the gas valves and ignition transformer.

To restart the system, the main power or thermostat must be de-energized momentarily, then re-energized. If at any time during the heat cycle, there is a failure of the combustion air supply to the burner, the air switch will open, putting the system into lockout, closing the gas valves.

EHG POWER GAS BURNER
WITH HONEYWELL S89F GAS PRIMARY
AND GAS VALVE/REGULATOR COMBINATION

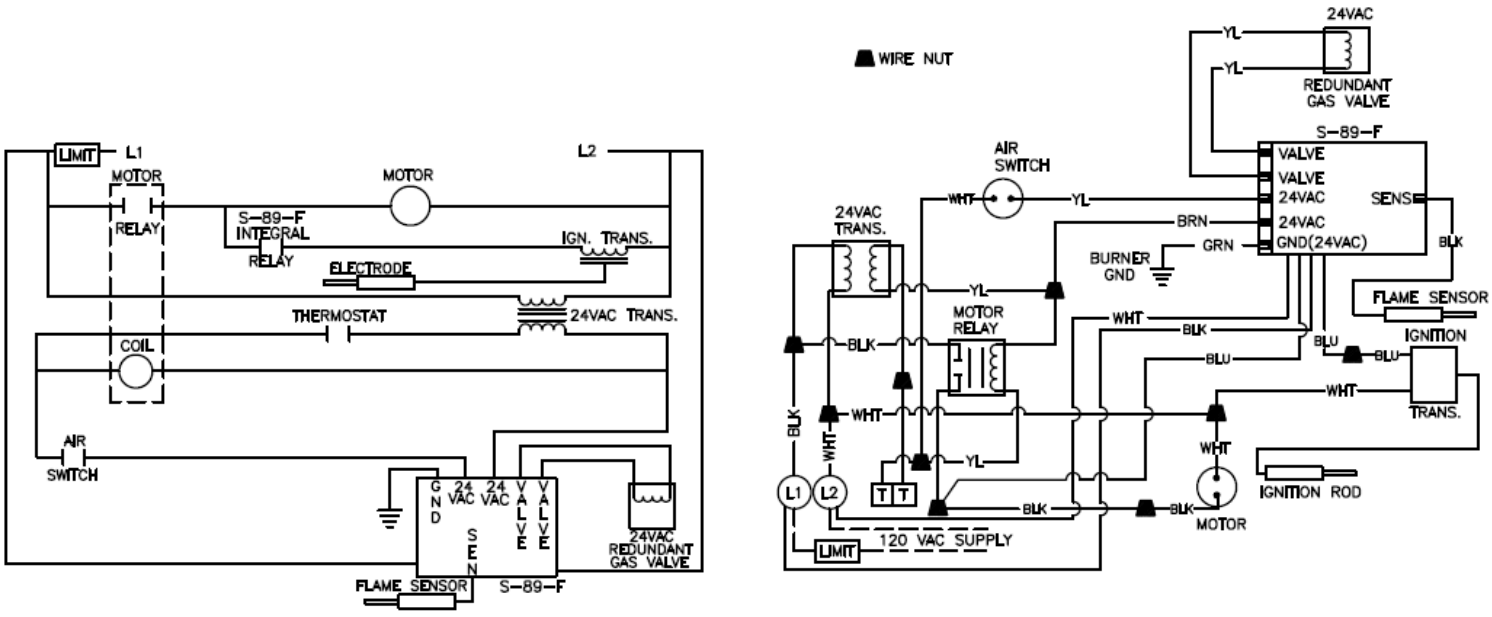


Figure 10

EHG POWER GAS BURNER
WITH HONEYWELL S89F GAS PRIMARY
AND GAS TRAIN ASSEMBLY

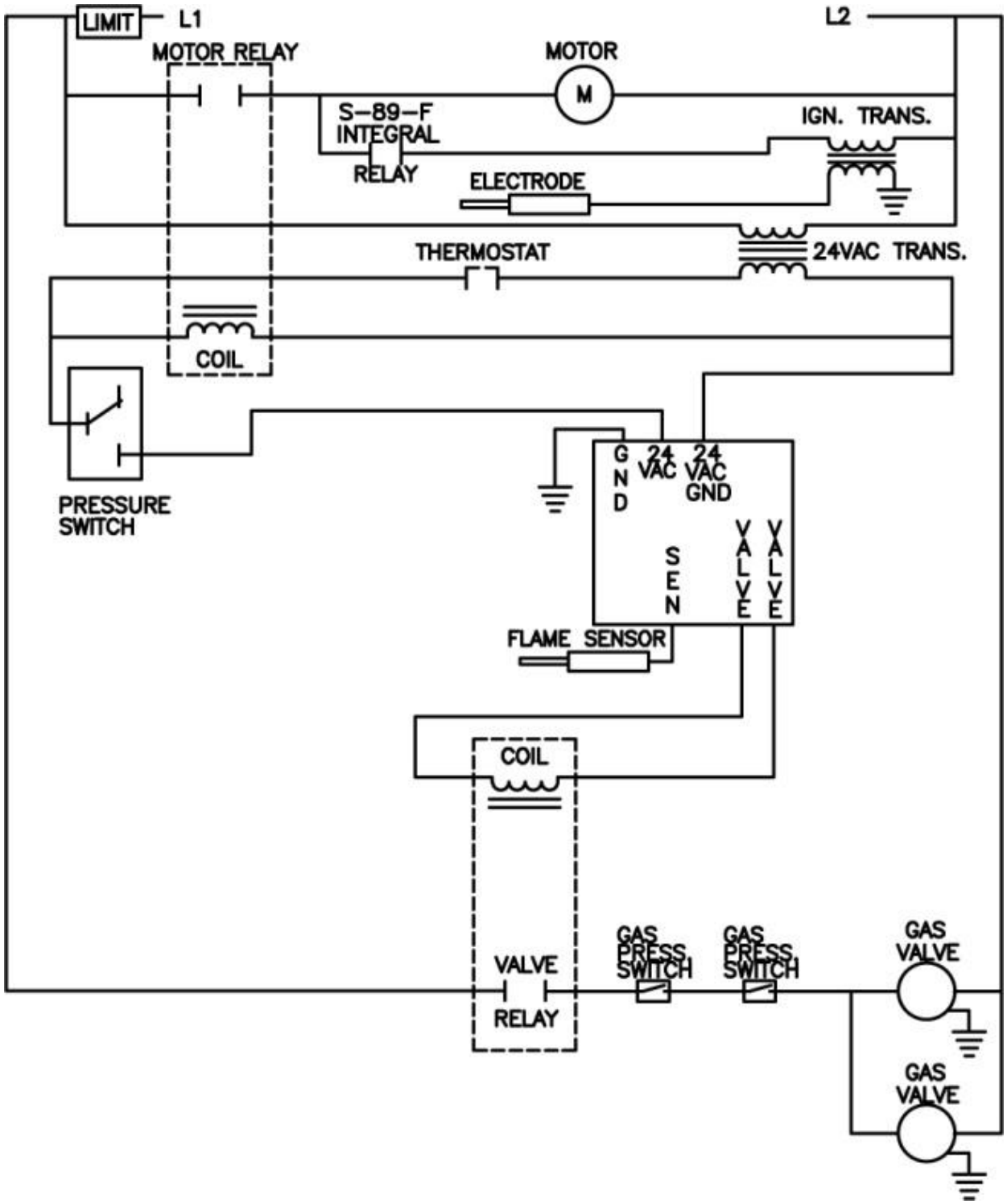


Figure 11

EHG POWER GAS BURNER
WITH HONEYWELL S89F GAS PRIMARY
AND GAS TRAIN ASSEMBLY (CONTINUED)

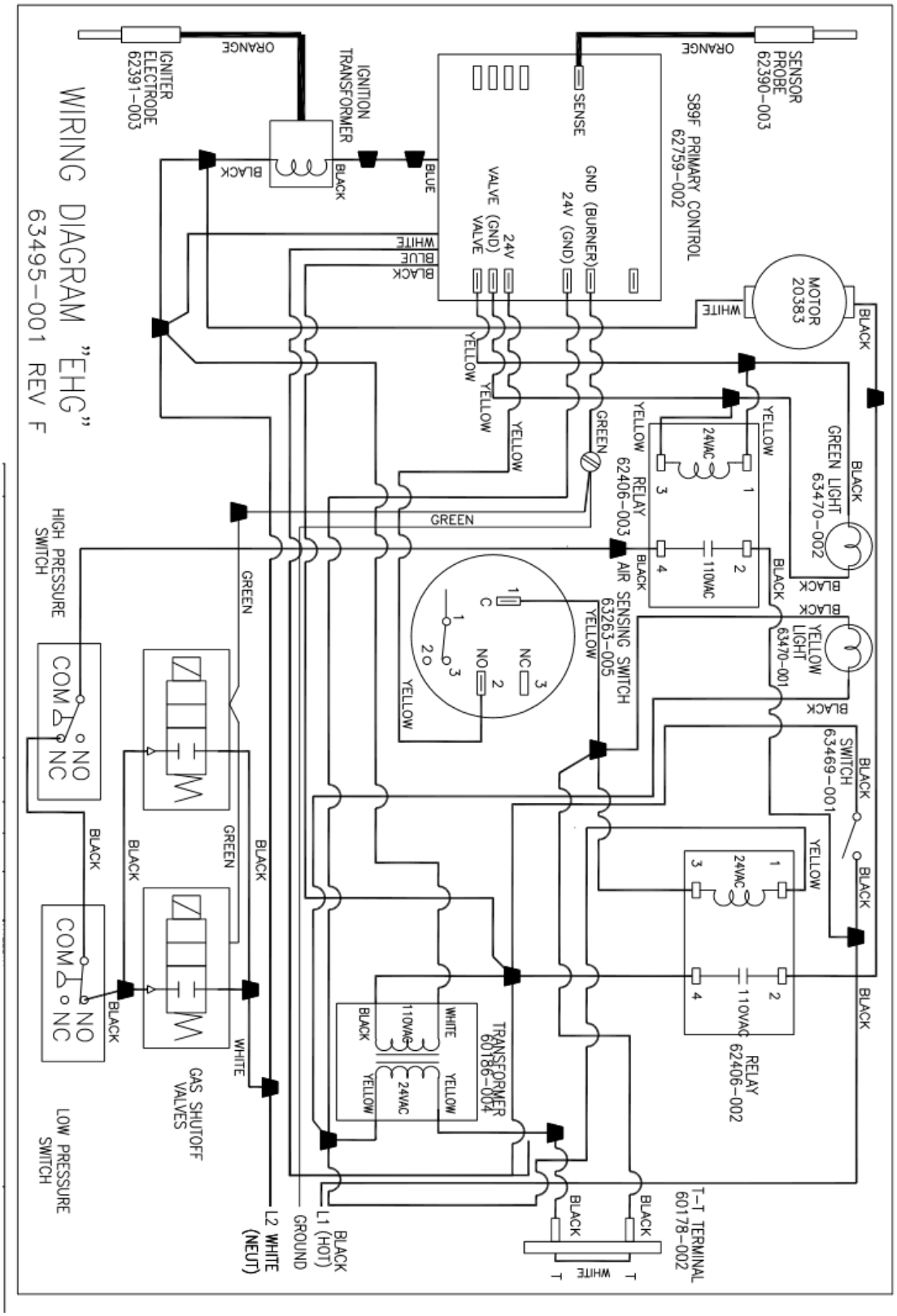


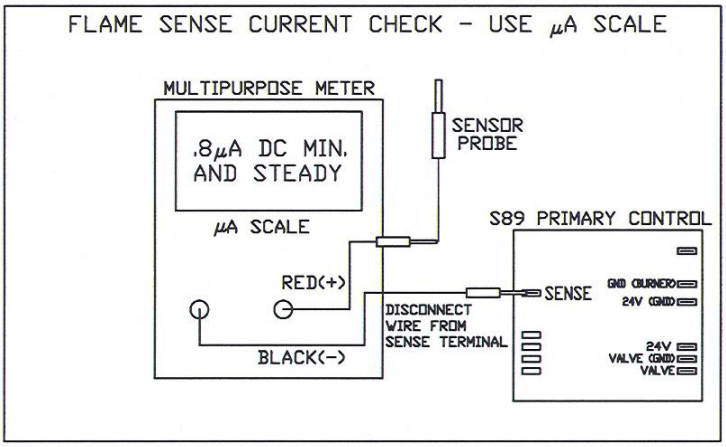
Figure 11 (continued)

FLAME SENSING

The Honeywell S89 series primary ignition controls utilize the flame current rectification principal for main burner flame sensing.

The flame rectification phenomenon occurs as follows: The ignited gas flame causes the immediate atmosphere around the flame to become ionized (gas atoms become electrically charged). The ionization causes the atmosphere around the flame to become electrically conductive. An AC voltage output from the control sensing circuit is routed through the flame sensor probe. When the sensor probe and the burner head are both in contact with a properly adjusted flame, the burner head with its larger surface attracts more free electrons, thus becoming negatively charged. The sensor probe with its small surface area gives up free electrons, thus becoming positively charged. The free electrons from the AC voltage in the sensor probe flow through the ionized gas flame to the grounded burner head. As the AC current passes through the gas flame, it is rectified into a DC current flowing back to the grounded side of the sensing circuit. The flame in actuality is a switch. When the flame is present, the switch is closed allowing current to flow through the sensing circuit of the control. When no flame is present, the switch is open with no current flowing through the sensing circuit of the control.

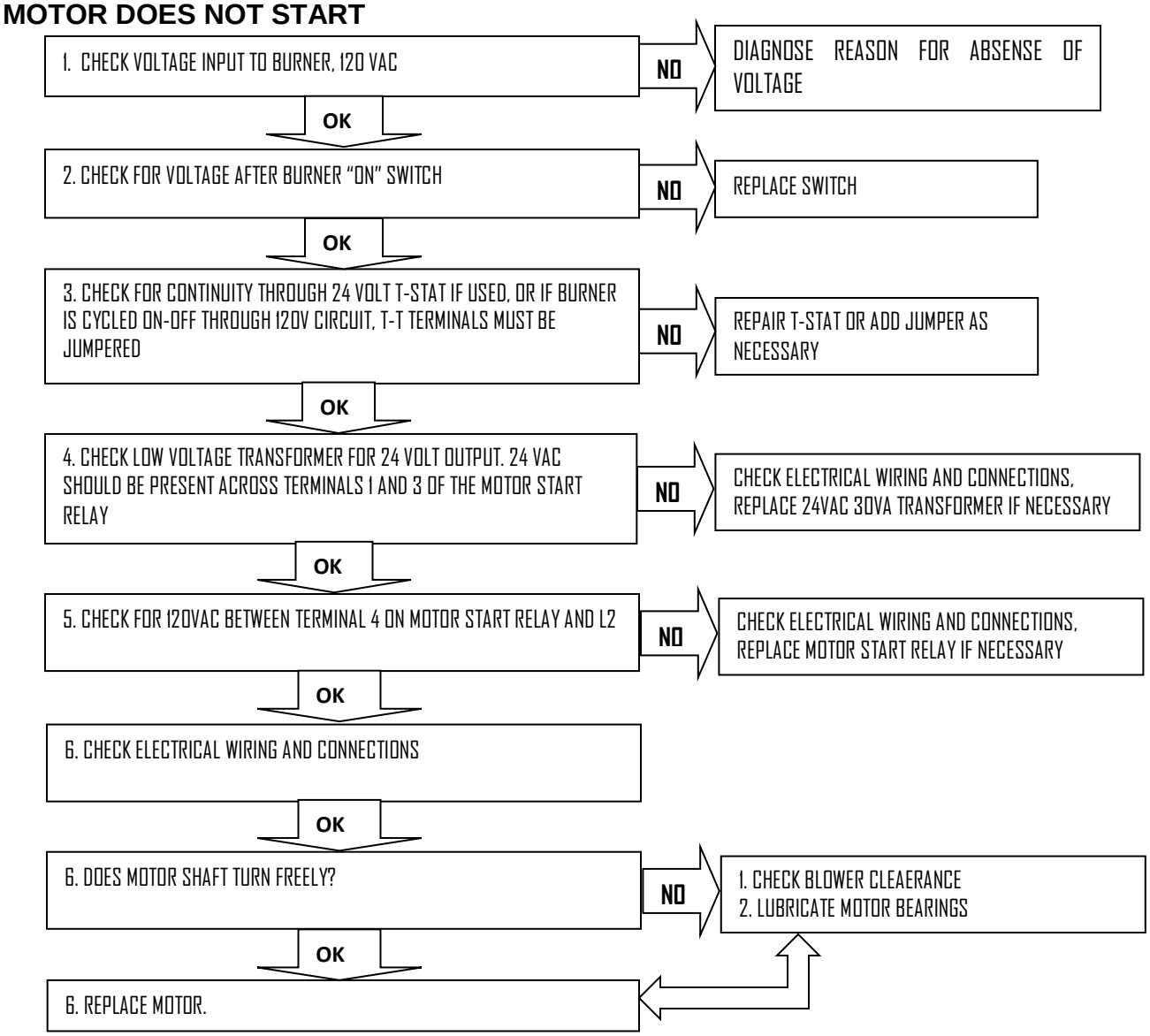
The DC current flow is measured in units called DC microamperes. A steady DC microampere current of 0.8 minimum (and steady) or higher through the sensing circuit of the primary ignition control is sufficient to keep the burner running without a safety lockout. See Figure 1 for sensor probe and electrode dimensional settings, Figure 12 for flame current measurement.



Honeywell S89F Flame Signal Measurement
Figure 12

EHG SERIES WITH A HONEYWELL S89F PRIMARY IGNITION CONTROL TROUBLESHOOTING GUIDE

MOTOR DOES NOT START



IGNITION ARC ESTABLISHED – NO FLAME

1. RESET CONTROL-MOTOR STARTS-COMPLETES 30 SECOND PREPURGE CYCLE, 8 SECOND SAFE START CHECK AND TRIAL FOR IGNITION, 4 SECONDS HONEYWELL SERIES S89F.
NOTE:THE BURNER MOTOR WILL CONTINUE TO OPERATE DURING THE LOCK OUT MODE WHEN THE THERMOSTAT CIRCUIT IS CALLING FOR BURNER OPERATION.

OK

2. CHECK FOR CORRECT GAS PRESSURE AT MANIFOLD. IF NECESSARY, ADJUST PER FIGURE 3. IF NO GAS PRESSURE CONTINUE BELOW.

OK → ADJUST AIR SHUTTER PER FIGURE 8. AFTER THE BURNER FIRES, SET UP THE BURNER PER SECTION II.

IN ORDER FOR THE FOLLOWING FUNCTIONAL TEST TO BE MADE, THE CONTROL MUST BE RESET AND THE TESTS MONITORED DURING THE 4 SECOND TRIAL FOR IGNITION PERIOD THAT OCCURS AT THE END OF THE 30 SECOND PREPURGE AND 8 SECOND SAFE START CHECK CYCLE.

OK

3. CHECK FOR 120 VOLTS ACROSS WIRES FEEDING GAS TRAIN.
NOTE: VOLTAGE WILL ONLY BE PRESENT DURING IGNITION TRIAL. IF NO VOLTAGE CONTINUE BELOW.

OK → IF VOLTAGE IS PRESENT, PROCEED TO GAS TRAIN TROUBLESHOOTING.

4. CHECK FOR 24VAC AT GAS VALVE RELAY TERMINALS 1 AND 3.
NOTE: VOLTAGE WILL ONLY BE PRESENT DURING IGNITION TRIAL.

NO → CHECK ELECTRICAL WIRING AND CONNECTIONS. BE SURE LEADS ARE ON CORRECT GAS VALVE TERMINALS. VERIFY TRANSFORMER VOLTAGE OUTPUT OF 24VAC

OK → REPLACE PRIMARY IGNITION CONTROL.

OK

5. CHECK FOR 120 VOLTS BETWEEN TERMINAL 2 ON GAS VALVE RELAY AND L2.

NO → CHECK ELECTRICAL WIRING AND CONNECTIONS BETWEEN TERMINAL 2 ON GAS VALVE RELAY AND L1.

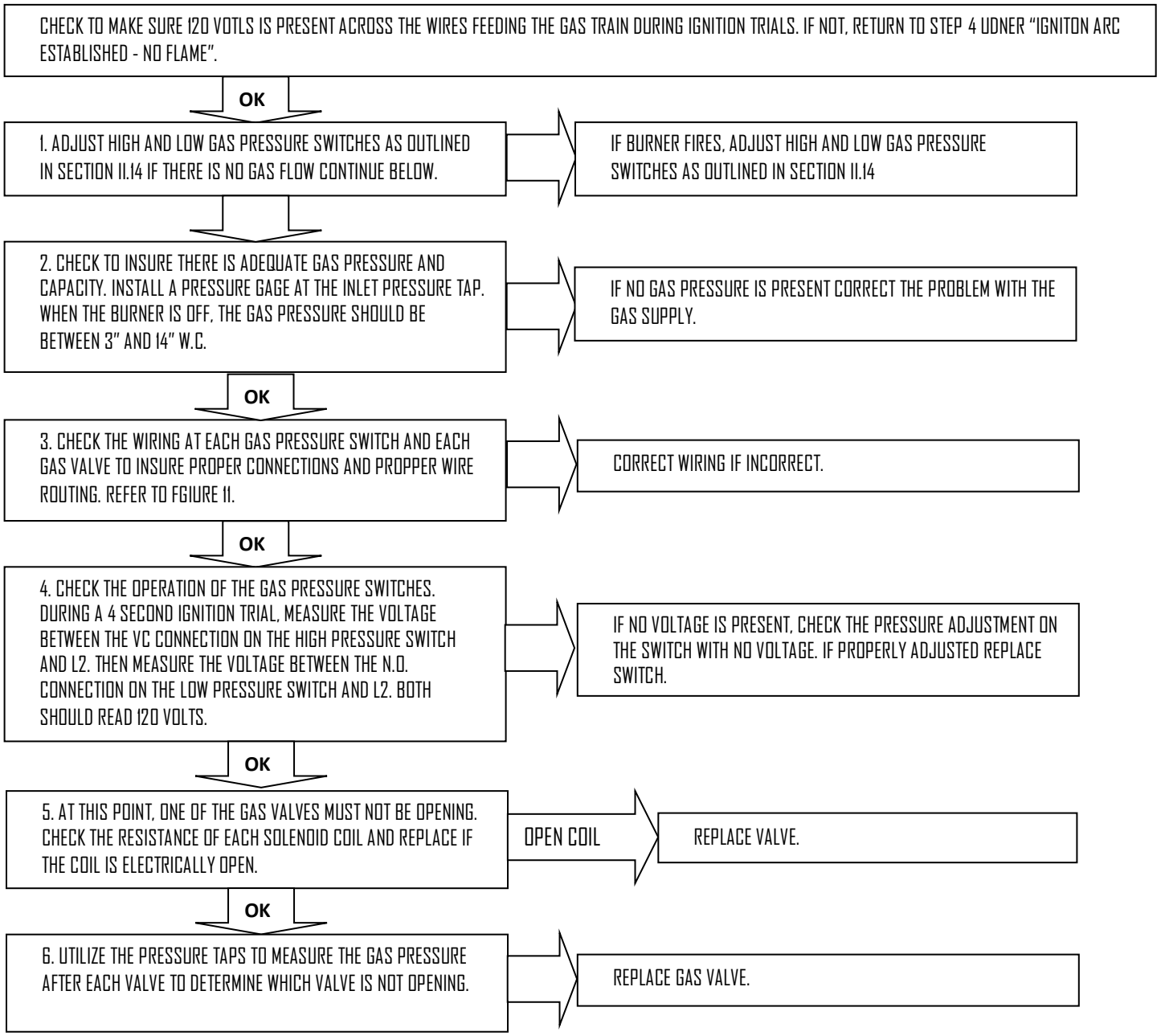
OK

6. CHECK FOR 120 VOLTS BETWEEN TERMINAL 4 ON GAS VALVE RELAY AND L2. VOLTAGE IS ONLY PRESENT DURING TRIAL FOR IGNITION.

NO → REPLACE GAS VALVE RELAY.

AT THIS POINT, RECHECK VOLTAGE ACROSS WIRES FEEDING GAS TRAIN. VOLTAGE SHOULD BE PRESENT DURING IGNITION TRIAL.

GAS TRAIN TROUBLESHOOTING



NO IGNITION ARC ESTABLISHED

1. RESET CONTROL: -MOTOR STARTS – COMPLETES 30 SECOND PREPURGE CYCLE, 8 SECOND SAFE START CHECK SERIES.
-GAS VALVE OPENS, REGULATING ADEQUATE GAS PRESSURE.
-NO FLAME ESTABLISHED – PRIMARY CONTROL LOCKS OUT AFTER 4 SECOND HONEYWELL SERIES TRIAL FOR IGNIITION PERIODS.

IN ORDER FOR THE FOLLOWING FUNCTIONAL TEST TO BE MADE, THE CONTROL MUST BE RESET AND THE TESTS MONITORED DURING THE 4 SECOND HONEYWELL SERIES TRIAL FOR IGNITION THAT OCCURS AT THE END OF THE 30 SECOND PREPURGE CYCLE, AND THE 8 SECOND SAFE START CHECK.

2. CHECK FOR 120VAC BETWEEN TWO LEADS OF IGNITION TRANSFORMER.

NO

CHECK ELECTRICAL WIRING AND CONNECTIONS PER WIRING DIAGRAM FIG. 11.

OK

CHECK THE FLAME SENSING CIRCUIT FOR:
1. GROUNDED FLAMEROD
2. DAMAGE TO FLAMEROD LEAD INSULATION
3. CHECK FLAME ROD FOR DEPOSITS.
REFER TO TECHNICAL INFORMATION, PAGE 34.
NOTE:MAKE SURE THE FLAMEROD CIRCUIT AND/OR PRIMARY CONTROL IS MOISTURE FREE.

OK

REPLACE PRIMARY IGNITION CONTROL.

OK

3. CHECK ELECTRICAL WIRING AND CONNECTIONS PER FIG. 11.

OK

4. CHECK HIGH VOLTAGE LEAD AND CONNECTION TO IGNITION ELECTRODE ROD.

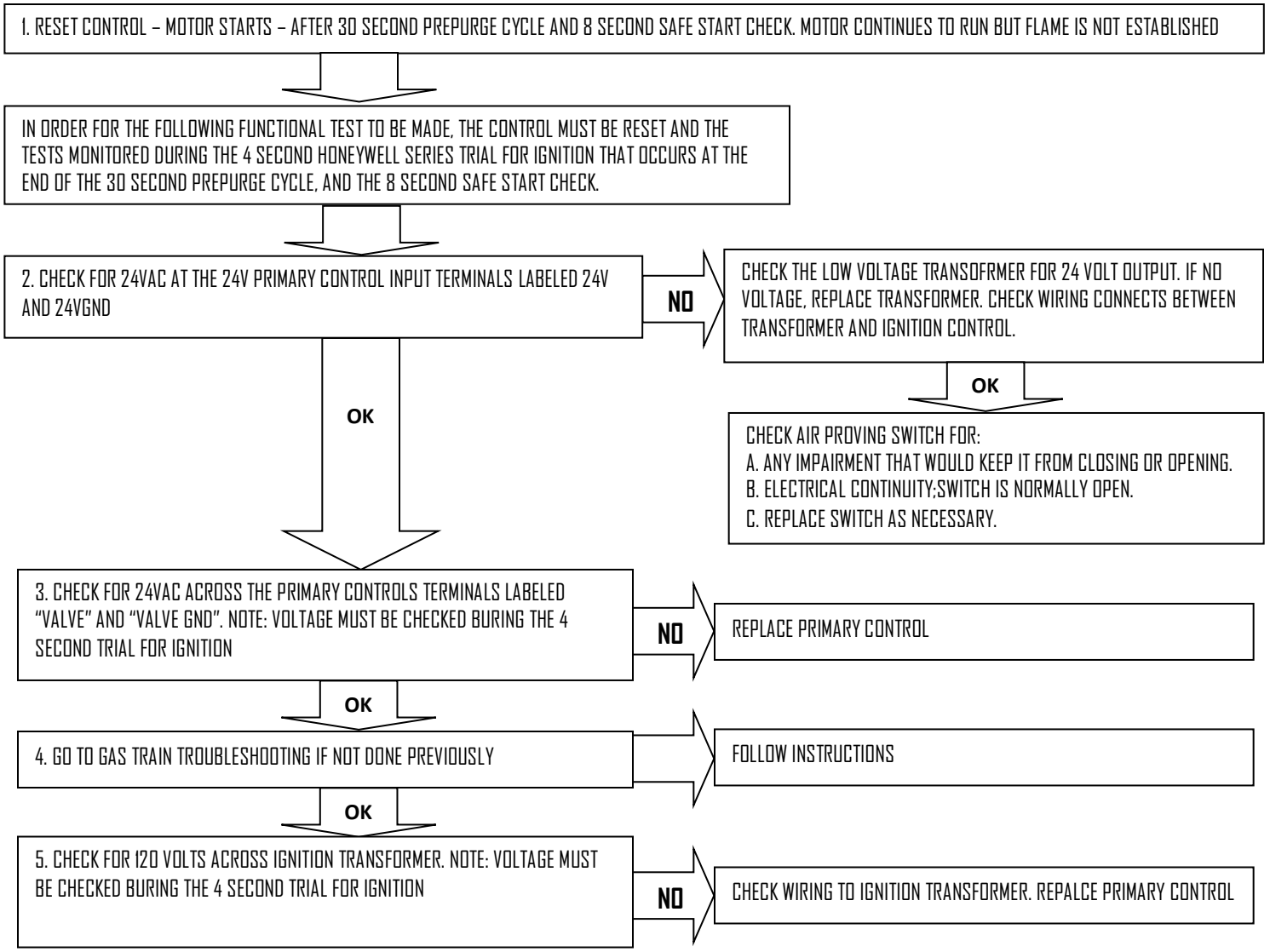
OK

5. INSPECT IGNITION ELECTRODE FOR CRACKED INSULATOR AND CORRECT GAP FIG 1.

OK

6. REPLACE IGNITION TRANSFORMER

NO IGNITION - NO GAS FLOW



LOSES FLAME DURING CYCLE – CONTROL LOCKS OUT ON SAFETY

1. RESET CONTROL: -COMPLETES 30 SECOND PREPURGE CYCLE, AND 8 SECOND SAFE START CHECK.
-FLAME IS ESTABLISHED.
-SOMETIMES THE CONTROL LOCKS OUT BEFORE THE THERMOSTAT OR CONTROLLING CIRCUIT IS SATISFIED.

2. DISCONNECT FLAMEROD LEAD FROM PRIMARY CONTROL. CONNECT (+) POSITIVE LEAD (DC) MICROAMPERE METER TO THE PRIMARY CONTROL TERMINAL. CONNECT THE (-) NEGATIVE MICROAMPERE METER LEAD TO THE FLAMEROD TERMINAL (SEE FIGURE 9) FLAME CURRENT MEASUREMENT.

2. RESET CONTROL, AFTER PREPURGE CYCLE, FLAME IS ESTABLISHED. A STABLE MICROAMPERE CURRENT OF .8 OR MORE IS REQUIRED FOR DEPENDABLE OPERATION.

PROBABLE CAUSE OF ERRATIC LOCKOUT:
1. FLAME PROVING CIRCUIT GROUNDED BY MOISTURE.
2. DAMAGED INSULATION ON FLAMEROD LEAD.
3. FLAMEROD IMPROPERLY POSITIONED IN FLAME (FIG 1)
4. POOR GROUND PATH TO PRIMARY CONTROL.
5. DEFECTIVE PRIMARY CONTROL.
6. READ MANUAL SECTION "FLAME SENSING".
7. DEPOSITS ON FLAME ROD. REFER TO TECHINCAL INFORMATION, PAGE 34.
8. INSURE GROUND ROD AT END OF AIR TUBE IS IN PLACE. SEE FIGURE 28
9. APPLICABLE TO HONEYWELL S89 SERIES PRIMARY IGNITION CONTROLS: CONNECT L1 TO THE BLACK LEAD AND L2 TO THE WHITE LEAD EXITING THE S89 OTHERWISE THE S89 WILL NOT DETECT THE FLAME AND LOCK OUT.

NO

4. MICROAMPERE READING IS LESS THAN .8 OR UNSTABLE.

PROBALE CAUSES:
1. EXTREMELY POOR COMBUSTION LEVEL.
2. FLAMEROD IMPROPERLY POSITIONED IN FLAME.
3. DEFECTIVE PRIMARY CONTROL.

BURNER CYCLES ERRATICALLY

1. Check for proper thermostat installation, location, and performance. If thermostat is used, remove wires at T-T terminals and replace with jumper wire. If burner runs properly, check thermostat for proper operation.

OK

2. Check low voltage circuit for bad wiring, electrical connections and/or switches.

OK

3. Check line voltage circuit for bad wiring, electrical connections and/or switches.

SECTION IV
SERVICE

Caution: Make sure the manual gas valves and main electrical power to the burner are turned off before opening burner or removing any parts for service.

A. BURNER HEAD AND ELECTRODE/SENSOR ASSEMBLY

The burner head, electrode, sensor probe, orifice housing and housing cover are part of the burner head assembly which can be removed as one unit (Figure 16).

1. Disconnect the gas train from the burner inlet, also disconnect the flame sensor lead wire, ignition transformer wire, and the clear tubing located on the brass hose barb on the top of the housing (Figure 13).

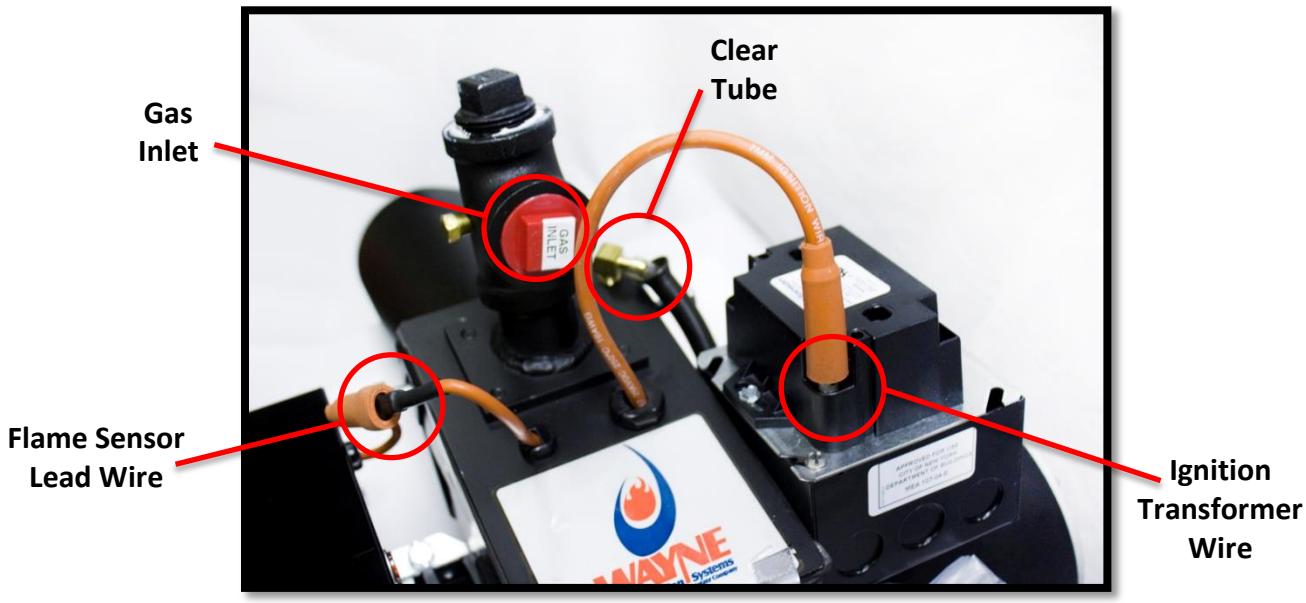


Figure 13

2. Remove the four 1/2" bolts that attach the cover/manifold assembly to the burner (Figure 14).

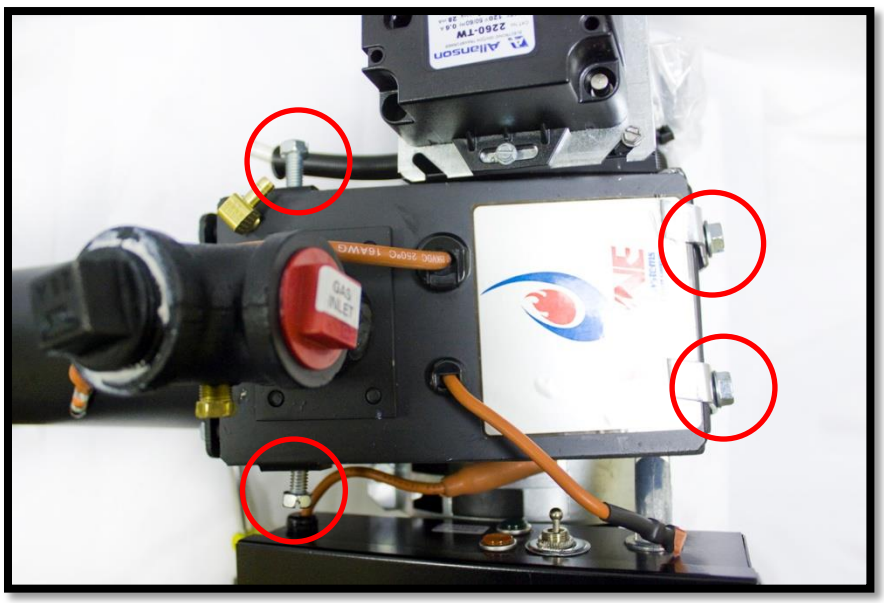


Figure 14

3. To begin removing gas train assembly, gently lift up rear of housing cover while pulling back. Rotate the assembly about 90 degrees toward the left side of the burner and gently extract burner head and electrode/sensor assembly out of opening in housing taking extreme care to not dislocate or damage electrode or sensor probe (Figure 15).

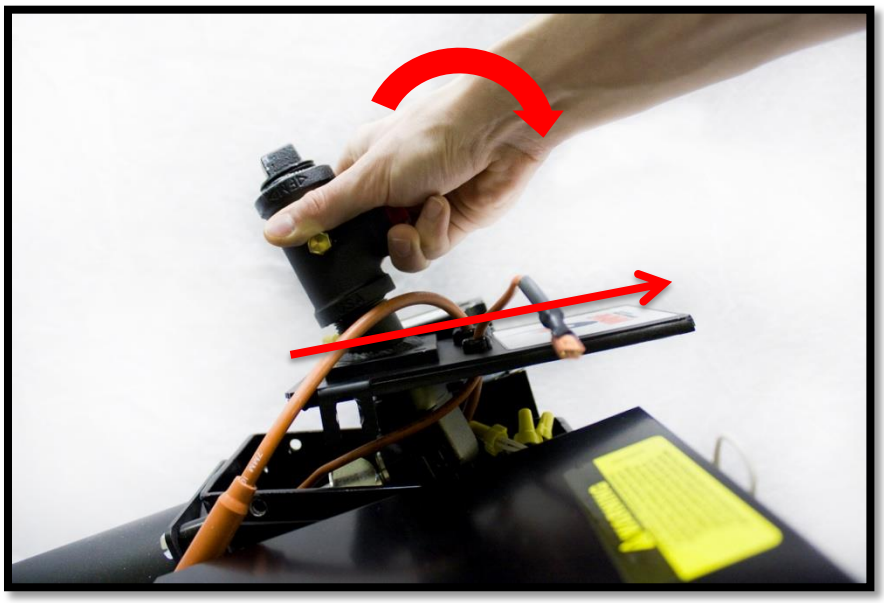


Figure 15

Figure 16

4. When servicing, clean burner head ports, electrodes and sensor probe. Inspect the sensor probe and electrode wires and porcelain insulators carefully for hairline cracks which might provide an electrical leak path that could short out the ignition spark or flame signal.

5. Examine the electrode and sensor probe for any serious corrosion or deterioration of metal at the tips. Check for proper dimensional settings of the sensor probe and electrode (See Figure 1). Adjust and/or replace these assemblies as necessary. Make sure that the ignition and sensor probe wires go to the correct electrodes and the ignition wire boot is in place over the electrode porcelain.

6. Make sure that the burner tube end is properly positioned in the combustion chamber entry. It must be set 1/2" (12.7mm) short of the inside face of the combustion chamber.

B. AIR PROVING SWITCH

The air proving switch has a black plastic top and grey bottom and is mounted inside the junction box on the right side of the burner housing (Figure 17). A clear plastic tube is connected to the barbed fitting on the pressure switch while the other end is connected to a brass barbed fitting on the cover/manifold assembly. The plastic tube allows pressurized air from the blower housing to travel to the pressure switch causing diaphragm contacts to close thus completing the circuit.

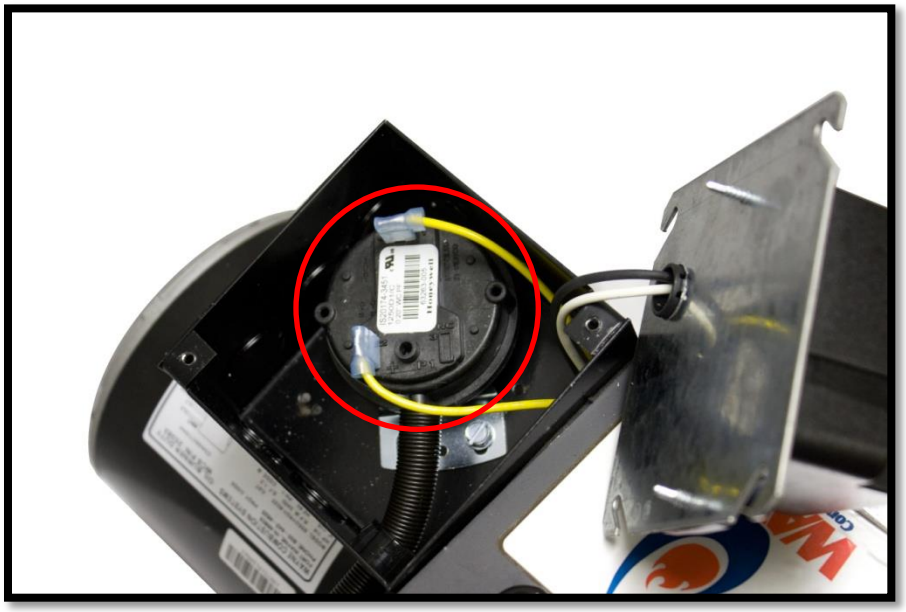


Figure 17

The function of the air proving switch is to ensure sufficient combustion air is being developed by the blower motor and blower wheel. Should the blower motor fail or the blower wheel malfunction, the burner gas valve will shut off.

1. The air proving switch should never require maintenance. However, should nuisance lockouts occur, the pressure switch can be checked. This is done by disconnecting the 24V leads from the Air Proving switch and jumpering the leads together. If the burner functions correctly, the switch needs to be replaced.

WARNING: If a jumper is used to check the switch it must be removed or an unsafe condition can occur resulting in property damage, personal injury or death.

2. As mentioned above, the switch should never require maintenance. However a pinched tube will shut off the flow of pressurized air to the diaphragm creating a failure similar to a bad air proving switch. Always check to ensure that the clear tubing is not pinched. Make sure the spring cover is reinstalled over the tube.

WARNING: For proper air switch operation, the burner must be mounted in the horizontal position. If it is necessary to mount the burner in a vertical position, the air switch must be repositioned to the horizontal. Contact Wayne Combustion Systems for details.

C. COMBUSTION AIR BLOWER AND MOTOR

1. Cleaning of the combustion air blower is indicated if the blades show an accumulation of dust and lint, or if the character of the flame indicates a deficiency of combustion air.

2. The motor and blower wheel are removed as one assembly. With the burner head and electrode/sensor assembly (Figure 13) out of the burner, disconnect the motor wires (Figure 18).

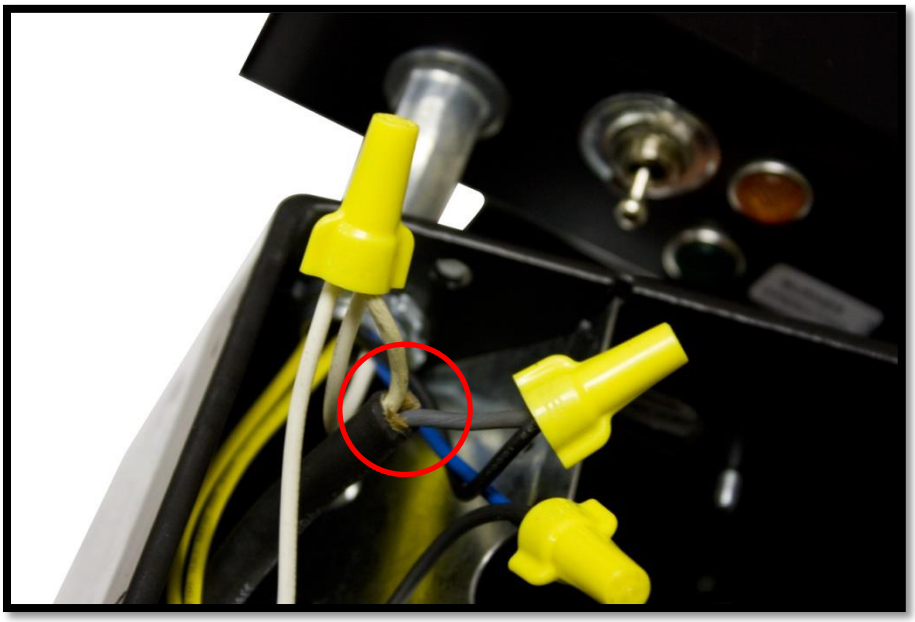


Figure 18

3. Remove the two (2) 1/2" bolts securing side plate to fan housing.

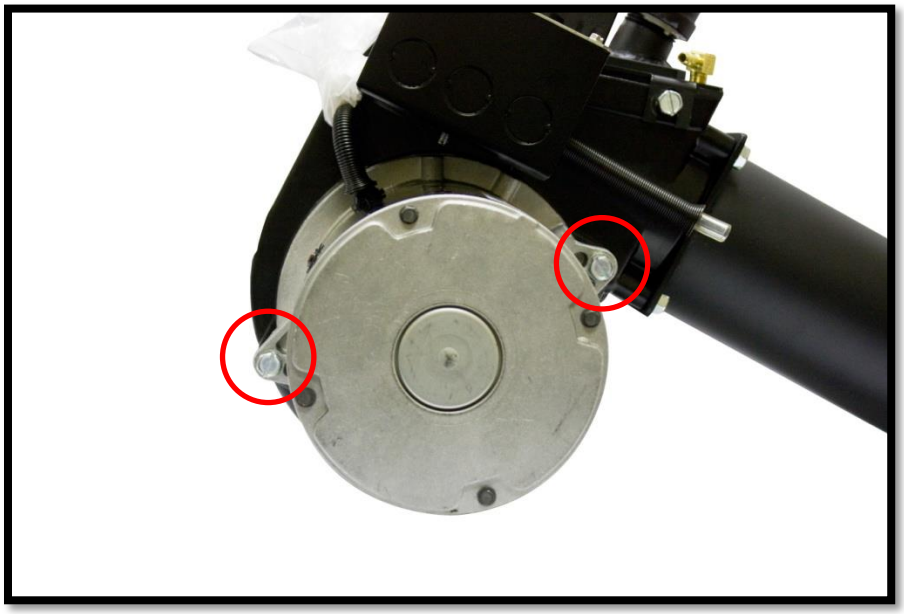


Figure 19

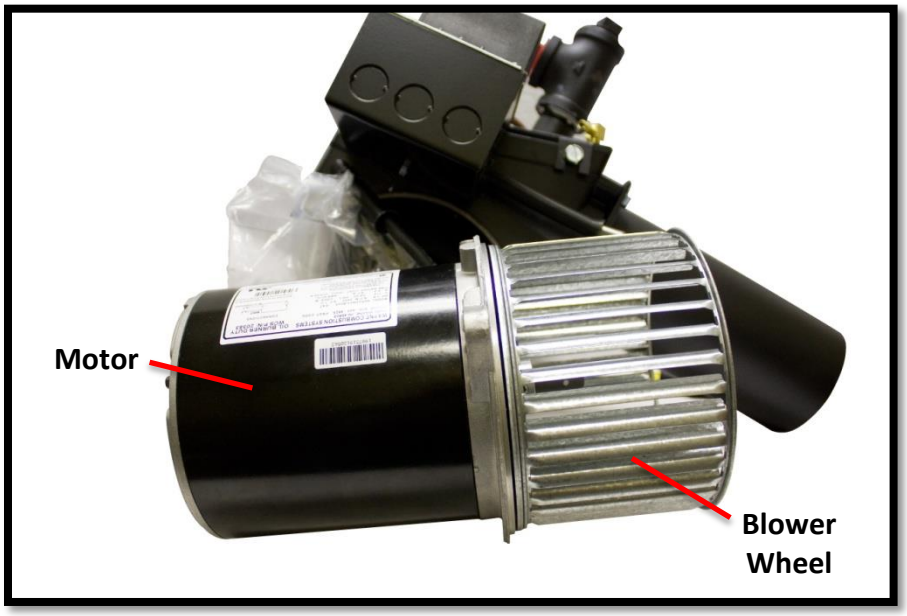


Figure 20

CAUTION: Do not remove blower wheel from motor shaft during periodic cleaning.

Should removal of the blower wheel be necessary for cleaning or replacement of it or the motor, the blower wheel must be positioned correctly on the motor shaft (Figure 21).

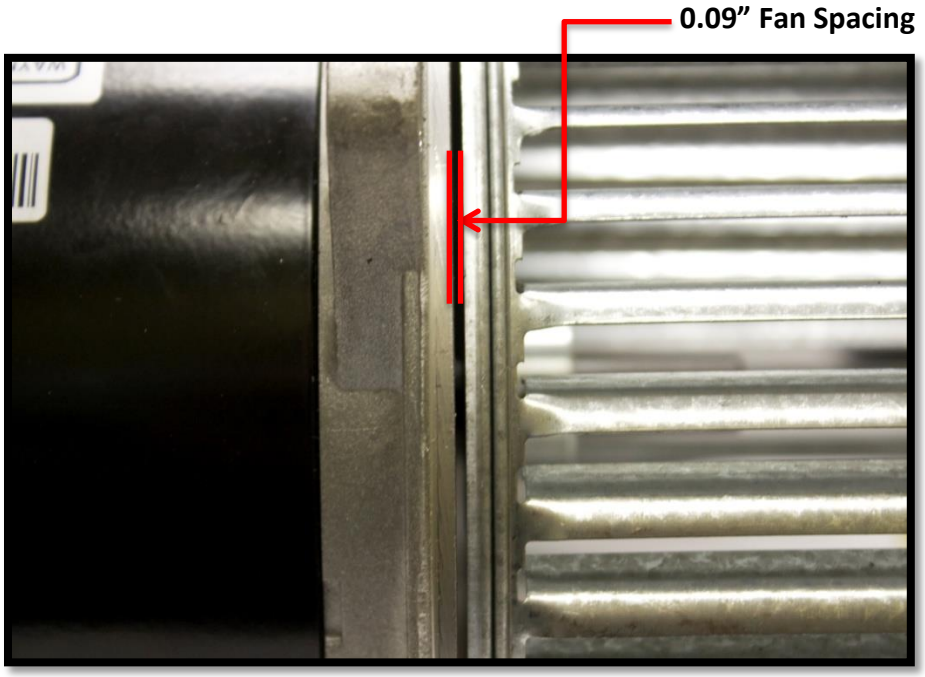


Figure 21

D. GAS PRESSURE SWITCHES

1. The gas pressure switches should never require maintenance. If nuisance problems persist, the switches can be function temporarily jumpered out to bypass the switches function. If the burner functions correctly then the switch is malfunctioning.

WARNING: If a jumper is used to check the switch it must be removed or an unsafe condition can occur resulting in property damage, personal injury or death.

E. AIR BAND ASSEMBLY ADJUSTMENT

1. The air band assembly is located on the left side of the burner housing, opposite the motor. The air bands are held in place by a 1/2” bolt.

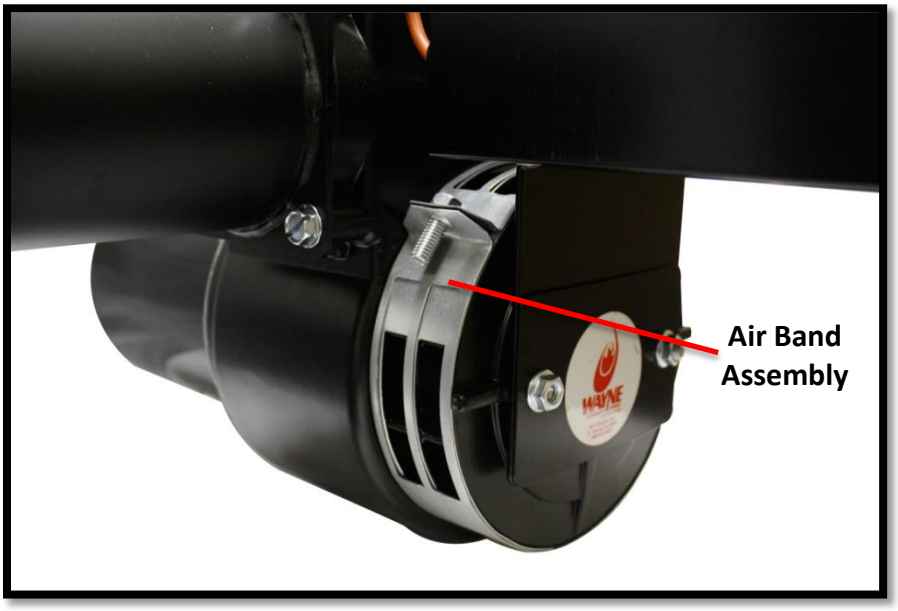


Figure 22

2. Using a 1/2” nut driver, loosen the bolt holding the air bands in place.

Figure 23

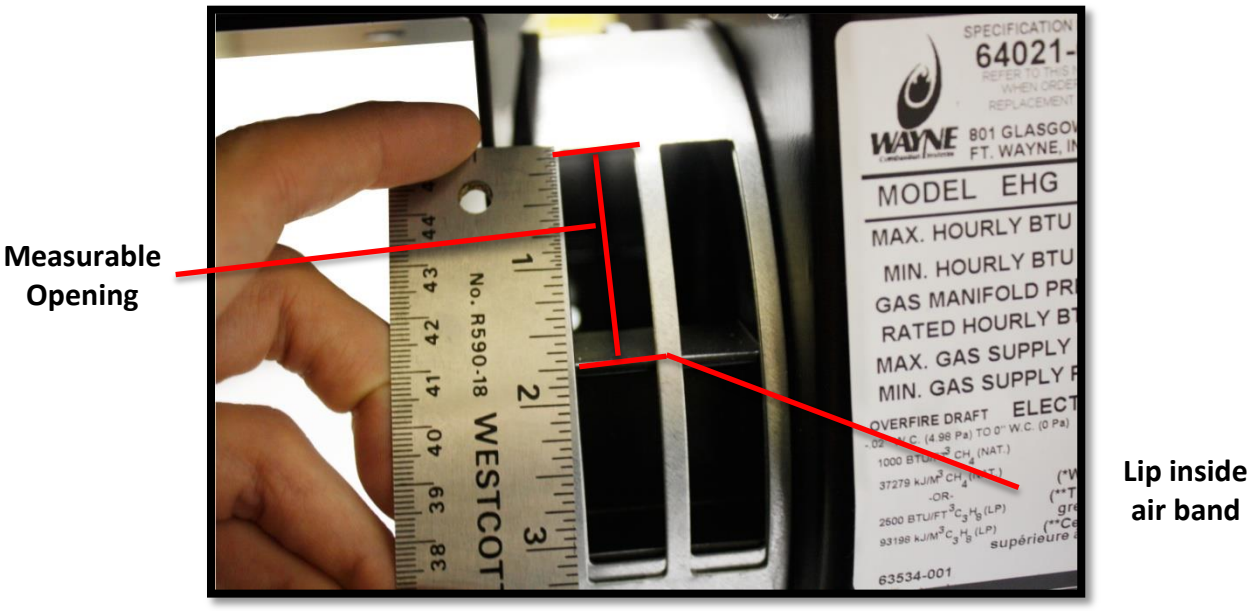
CAUTION: Do not remove the bolt or the air bands. Re-installation of air bands is difficult.

3. The air band assembly can now be adjusted from the fully closed position (figure 24), to the fully open positions (figure 25) by sliding the outer ring.

Fully Closed Position
Figure 24

Fully Open Position
Figure 25

4. To measure the air band opening, place a ruler or other measuring device alongside the air band and measure the opening from the lip of the solid black piece inside the air band assembly to the edge of the air band itself.



Measuring the air band opening
Figure 26

5. After the air band assembly has been adjusted to the desired opening, tighten the 1/2" bolt to secure the air bands in place.

TECHNICAL INFORMATION
"Troubleshooting Guide"
Nuisance Lockouts/Flame Sensing Problems – EHG Gas Burners

Wayne's EHG series direct spark ignition (DSI) gas burners prove flame through the process of flame rectification. Flame rectification is achieved by placing a small voltage on the flame sensing probe. When the probe is surrounded by flame, the voltage on the probe "flows" to ground through the flame, resulting in an electrical current. This current is interpreted by the ignition control as the presence of flame.

One of the most common problems with gas appliances utilizing this type of electronic flame sensing system is the "nuisance lockout". Lockouts are not generally due to the burner failing to ignite, but rather simply the failure of the system to sense the establishment of the flame. Should this situation exist for a period of time longer than the ignition control's state lockout timing, the control will shut down or go into permanent lockout. The only way to get the burner to recycle is to break, and then re-establish power to the burner.

The following situations can lead to flame sensing problems and can be checked without disassembling the burner:

- The burner is not properly grounded to "earth ground" on line voltage.
- The ignition control is not properly grounded to the burner itself. Using an ohm meter, check the wire attached to both parts for good contact and continuity.
- The burner ignition control is polarity sensitive. The polarity of the incoming line voltage may be reversed. Verify that black and white wires are hot and neutral respectively, and that they are connected to the corresponding black and white wires on the burner.

The remaining checks and/or adjustments require removal of the gas train, and burner head assembly:

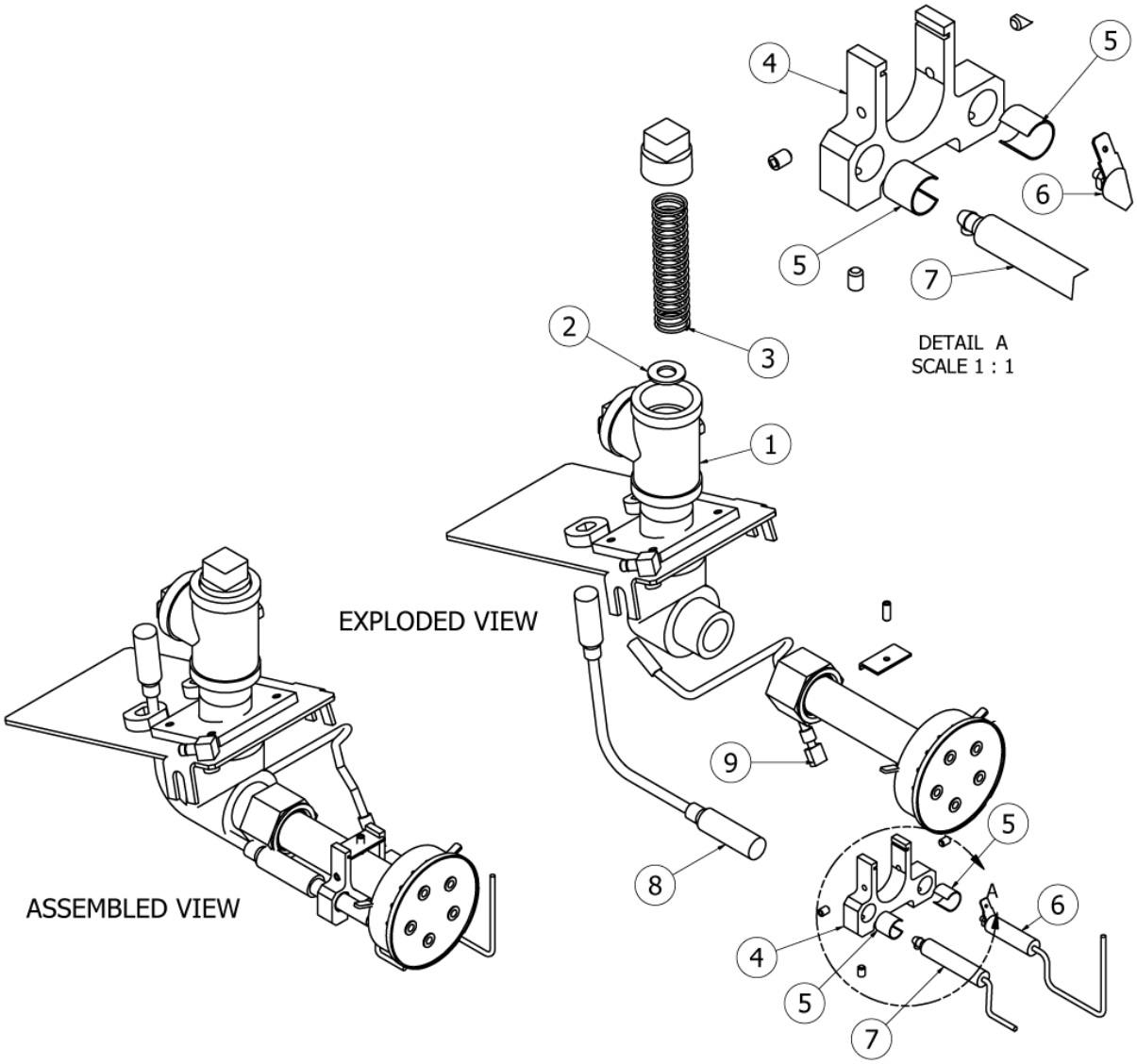
- The connections from the "SENSE" terminal of the ignition control to the end of the flamerod may be broken at some point. Check all quick connect terminations and connections. Check the continuity with an ohmmeter while flexing wires to assure no hidden conductor breakage exists. If replaced, wiring must be of equal or heavier gauge and equal or better temperature rating.
- The flamerod probe may be grounded out. Assure that the flamerod probe is not touching the burner head. The probe should be position in the center of the clearance groove on the outer edge of the burner head with approximately 1/16" (1.5875mm) clearance from the head. The probe must not be positioned too far away from the head as this may result in grounding out of the probe against the inside surface of the air tube.
- The flamerod probe should be free of soot and creosote. Deposits may insulate the probe, leading it not to pass the electrical charge to the flame. The probe can be cleaned with steel wool, emery paper or fine sandpaper. NOTE: This is the leading cause of nuisance lockouts in dual-fuel wood/gas fired appliances.
- The flamerod probe may be burned away. Check it against dimensions on the ELECTRODE AND FLAMEROD PROBE SETTINGS, figure 1.
- The dimensional location of the flamerod probe may be incorrect, or the probe may be bent out of shape. Check it against dimensions on the ELECTRODE AND FLAMEROD PROBE SETTINGS, figure 1, and adjust if necessary.
- The spark electrode gap may be incorrect, resulting in no spark or an inadequate spark that will not ignite the gas properly. Check the electrode gap against the ELECTRODE AND FLAMEROD PROBE SETTINGS, figure 1, and adjust if necessary.
- The high tension lead conductor from the ignition transformer to the tip of the spark electrode may be broken, preventing the high voltage current from getting to the electrode tip. Check all connections thoroughly and/or check to continuity of the lead wire assembly with an ohmmeter.

Once all of the items listed previously have been carefully checked and corrected if necessary, reinsert the burner head assembly into the burner. **NOTE:** be careful not to bend the air proving switch sail arm (if so equipped) or accidentally reposition with the flamerod probe or electrode during reinstallation of the burner head train assembly.

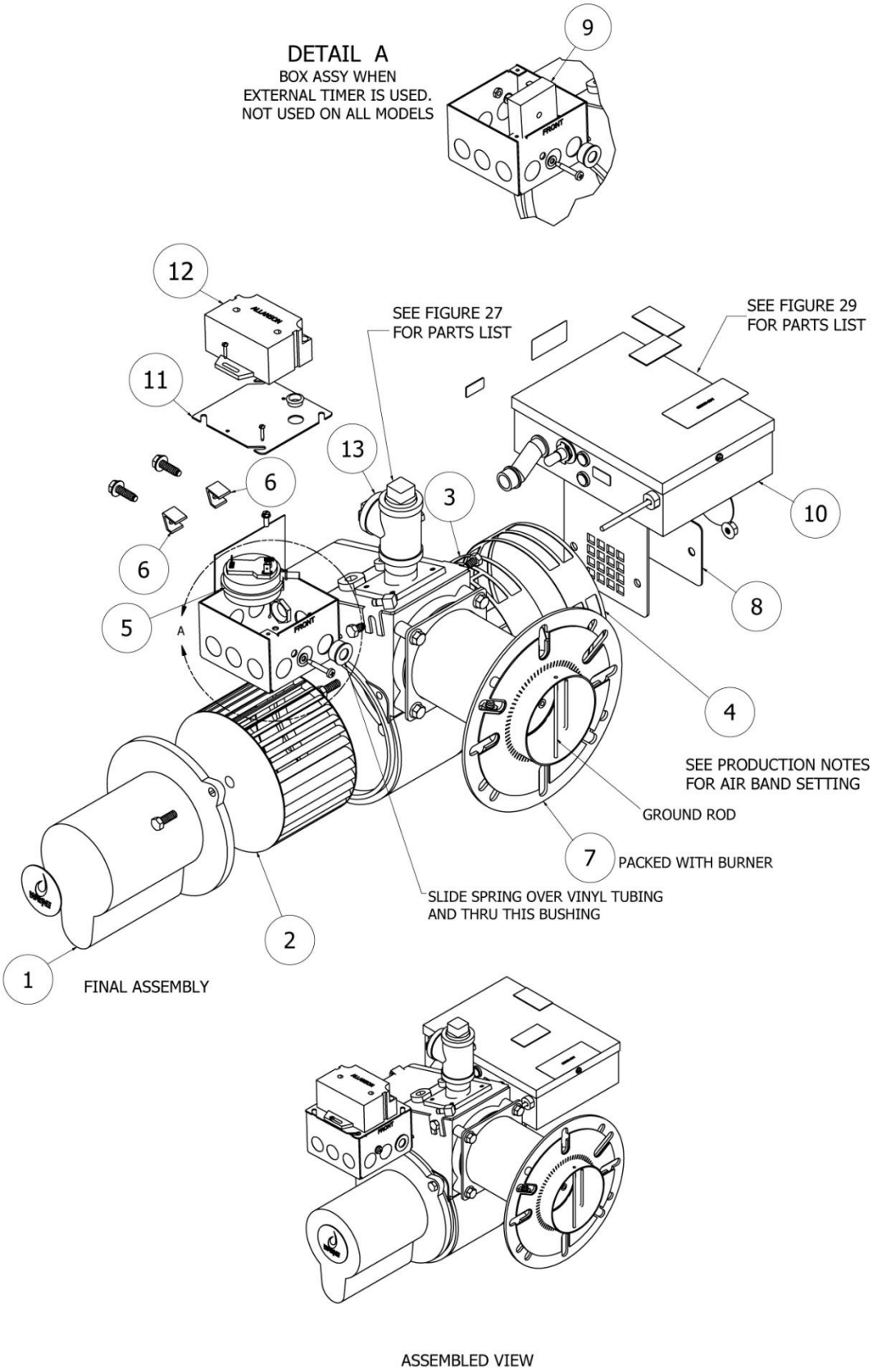
If, after all of the above listed items have been carefully checked, the burner still fails to work, it is due one of or more of the following problems:

1. Unit sparks and fires but will not stay lit. Ignition control module is malfunctioning and must be replaced.
2. Unit does not spark. Ignition transformer is bad and must be replaced.

PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	63525-001	TEE-1" W/ 1/8" HOLE	1
2	62438-XXXM	ORIFICE-SEE FIG. 3 FOR PROPER SIZE	1
3	62410-002	SPRING,ORIFICE	1
4	61951-002	ELECTRODE SUPPORT KIT	1
5	62387-001	BUSHING,INSULATOR-HSG	2
6	62390-002	PROBE,SENSOR-HSG & EHG (9"-15")	1
6	62390-003	PROBE,SENSOR-EHG 6" ONLY	1
7	62391-002	ELECTRODE-HSG/EHG (9"-15")	1
7	62391-003	ELECTRODE-EHG 6" ONLY	1
8	63995-001	WIRE,IGNITOR LEAD-18"	1
8	62947-002	WIRE,IGNITOR LEAD-34"	1
9	63497-001	WIRE,SENSE LEAD EHG-24"	1
9	63497-002	WIRE,SENSE LEAD EHG-12"	1



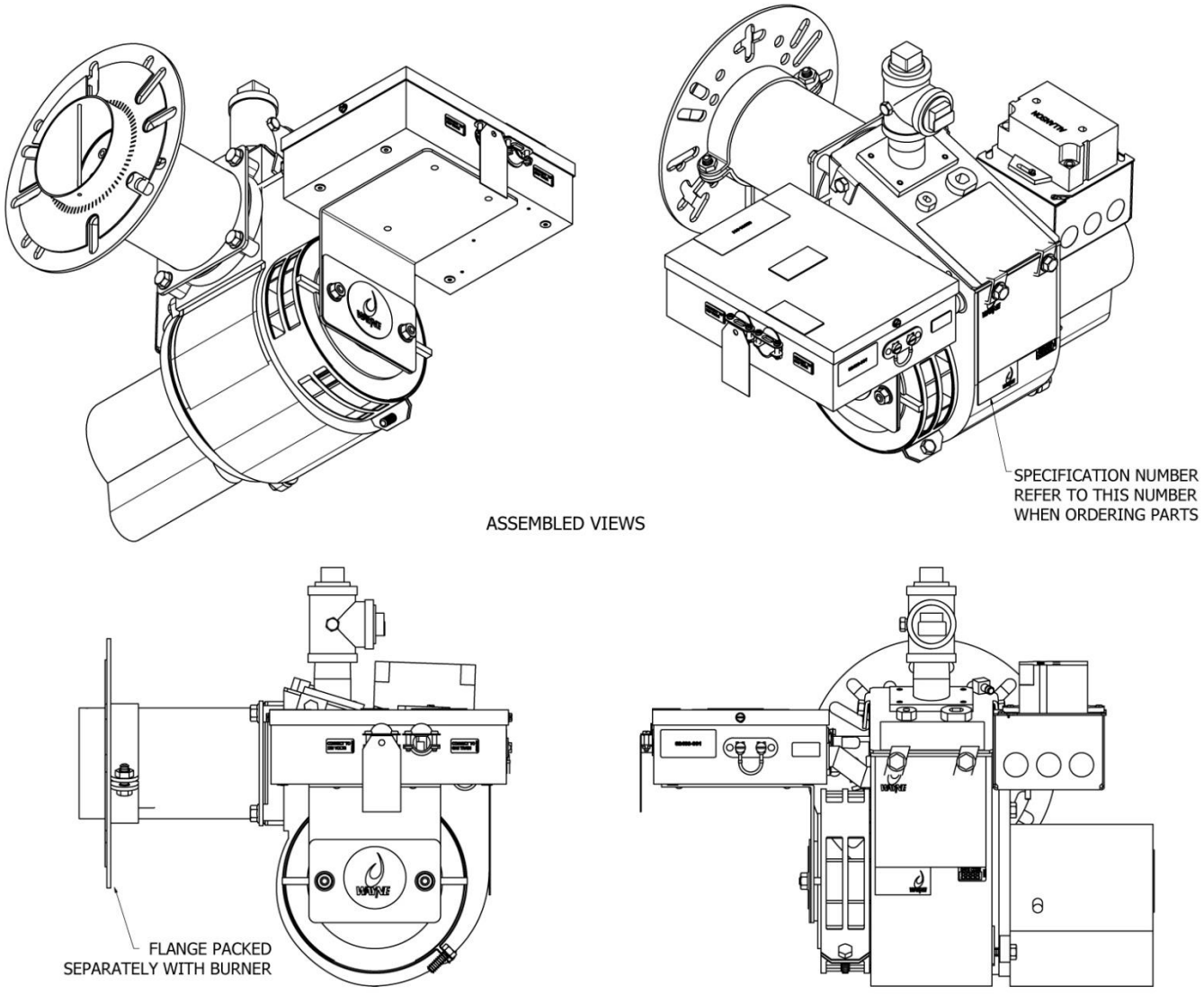
Cover / Manifold / Orifice Assembly
Figure 27



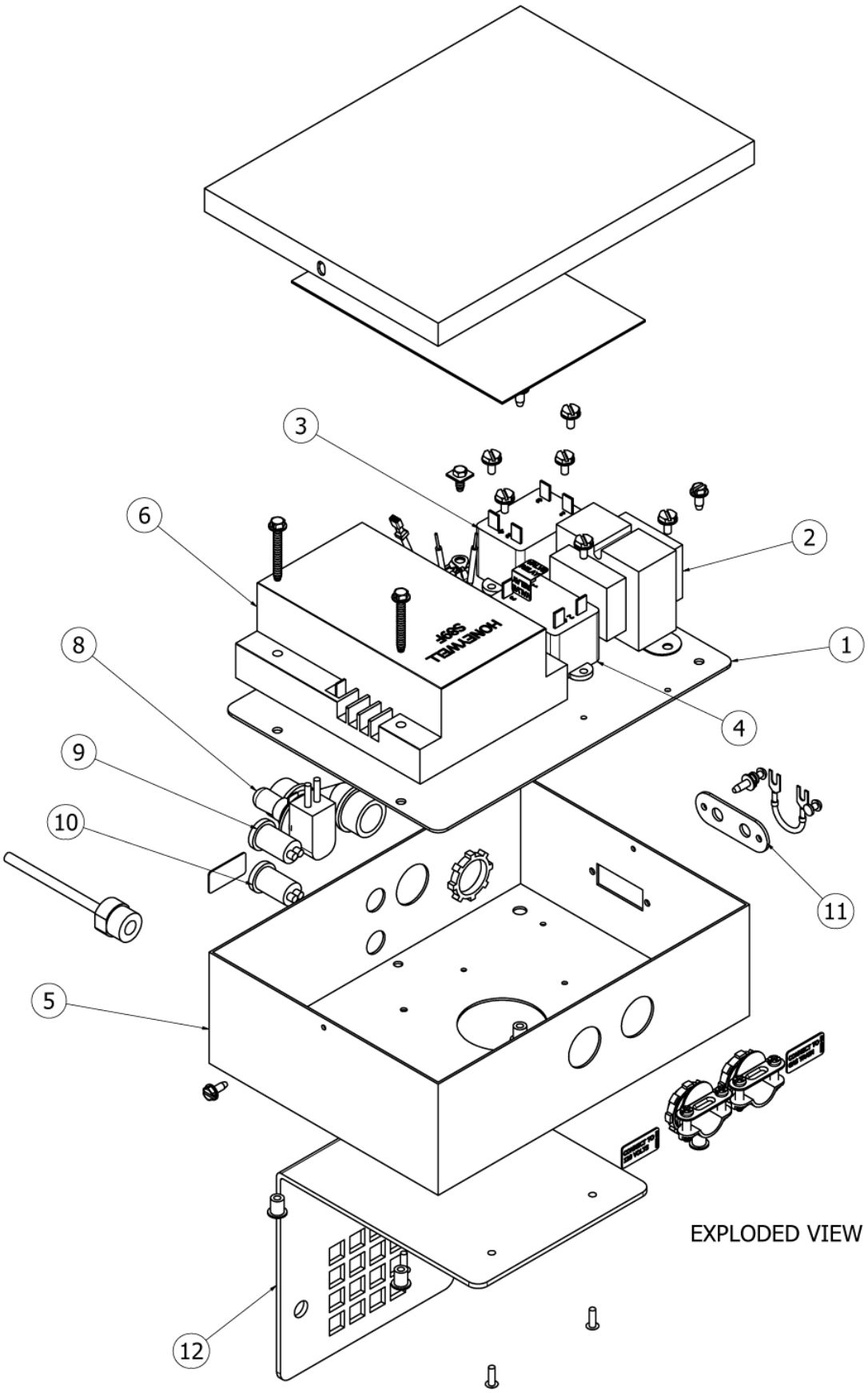
Burner Exploded and Assembled Views
64021-003
Figure 28

Burner Assembly 64021-003 Parts List

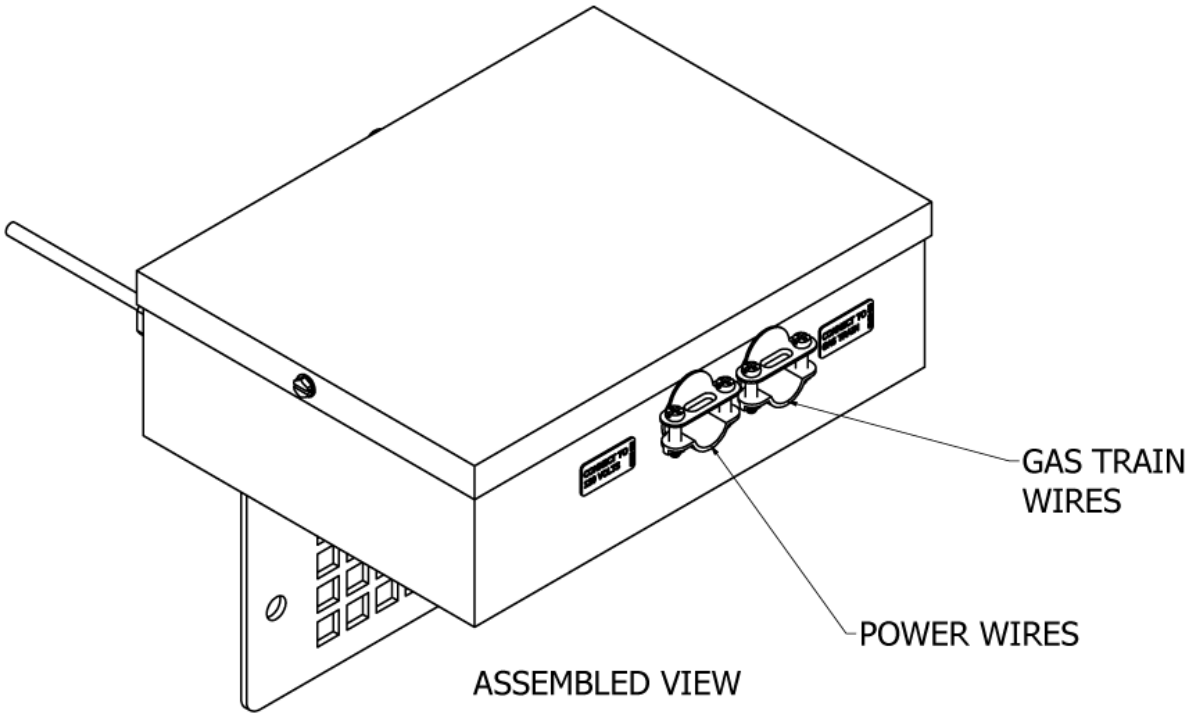
Item	Part No.	Description	Qty
1	23001-001	MOTOR, 1/4 - 1/5 115/60/3450 PSC	1
2	21854	FAN- 4.00“W X 6.25”D E/FHA HD	1
3	2669-002	BAND, AIR-INNER E/FH	1
4	2668-002	BAND, AIR-OUTER 8-HOLE E/F	1
5	63263-005	SWITCH, AIR PRESS – SP.2 HORIZ	1
6	100689-001	CLIP, RETAINER-E TRANS	2
7	21724-011	FALNGE ASM., ADJ-BLACK W/ GASKET	1
8	63529-001	COVER, FAN INLET-BLACK	1
9	62388-XXX	TIMER, 30 OR 60 SEC 24 VAC	1
10	63479-004	CONTROL BOX ASM-EHG NO IGN	1
11	13073-002	COVER, J-BOX-EHG-CSD1	1
12	63873-001	IGNITOR, A 2260-TW 120V 50/60	1
13	SEE FIG 27	MANIFOLD / CVR ASM-EHG	1



Burner Assembled Views
Figure 28 (Continued)



Control Box Assembly
63479-004 or 63479-005
Figure 29



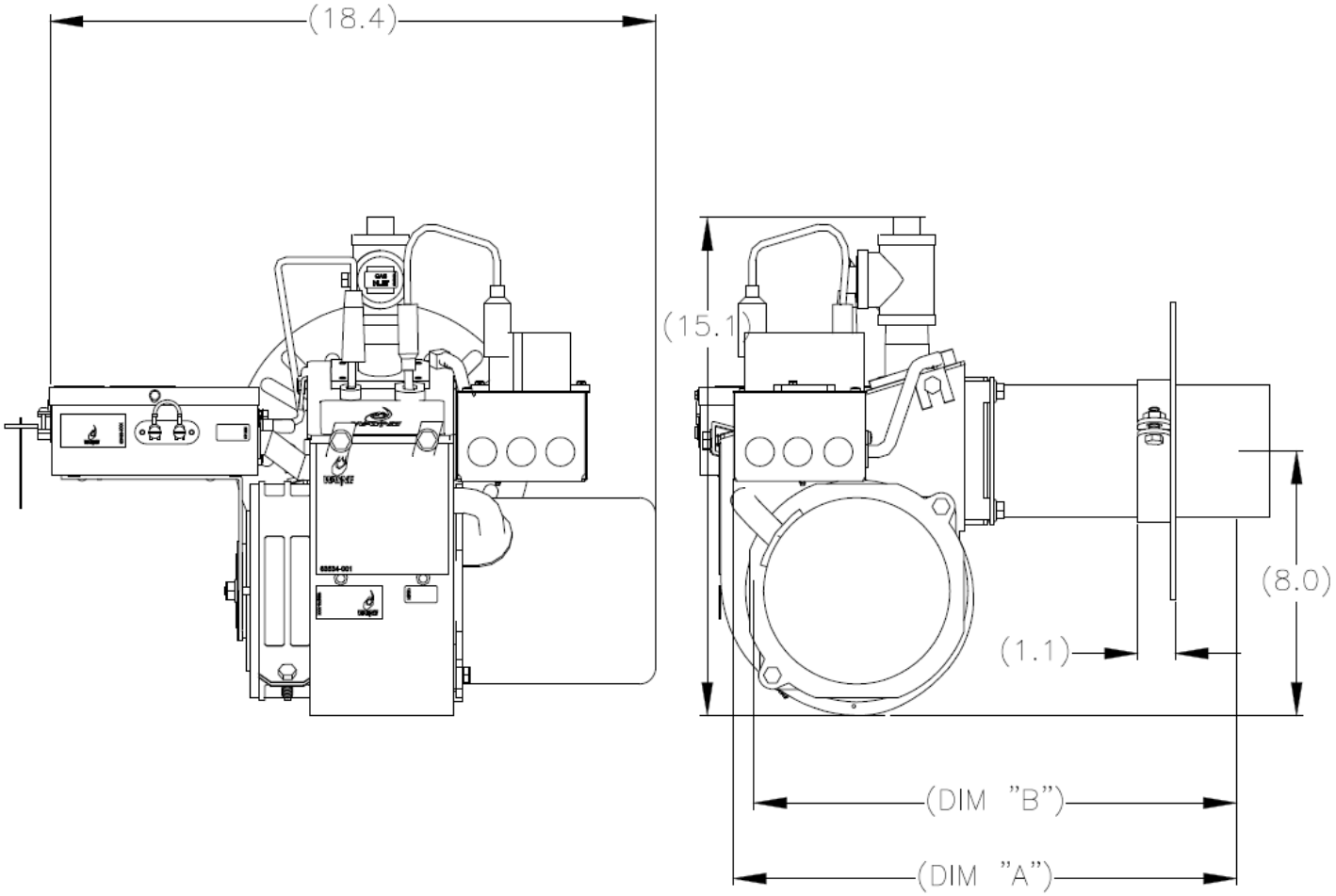
Control Box Assembly
63479-004 or 63479-005
Figure 29 (Continued)

Control Box Parts List

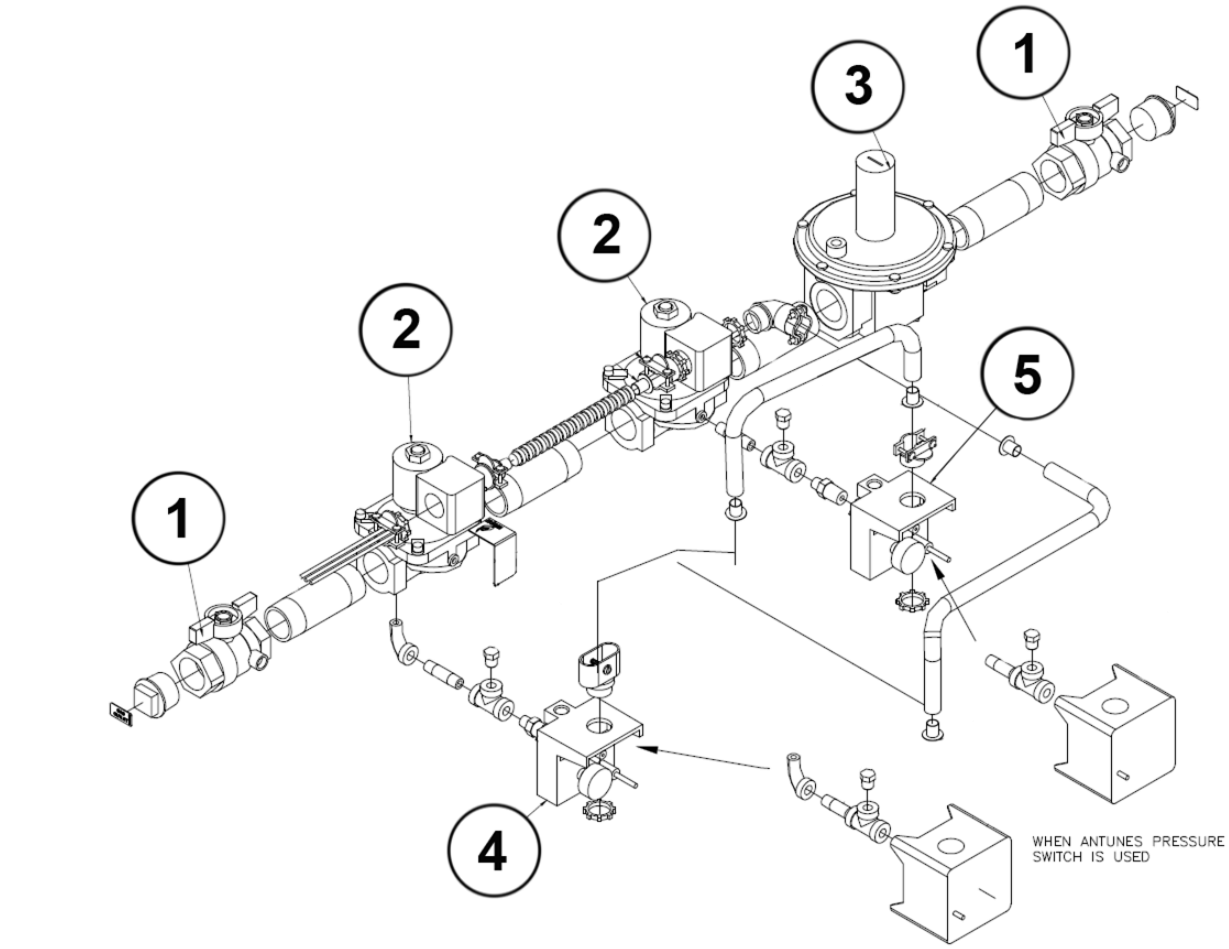
PARTS LIST			
ITEM	PART NUMBER	DESCRIPTION	QTY
1	63468-002	BRACKET,COMPONENT MTG	1
2	60186-004	TRANSFORMER-120V/24V/30VA	1
3	62406-002	RELAY-24VAC/50-60HZ, MOTOR START	1
4	62406-003	RELAY-24VAC/50-60HZ, GAS VALVE	1
5	63279	BOX,CONTROL-8.5"X6.25"X2.625"	1
6	62759-002	CONTROL,IGN-H S89F1098 DI (USED IN 63479-004)	1
6	62758-002	CONTROL,IGN-H S89E1058 DI (USED IN 63479-005)	1
8	63469-001	SWITCH,TOGGLE-SPST	1
9	63470-001	LIGHT,INDICATOR-AMBER	1
10	63470-002	LIGHT,INDICATOR-GREEN	1
11	60178-002	TERMINAL STRIP-4" LEADS 18GA	1
12	63472-002	BRACKET,CONTROL BOX MTG-BLK	1

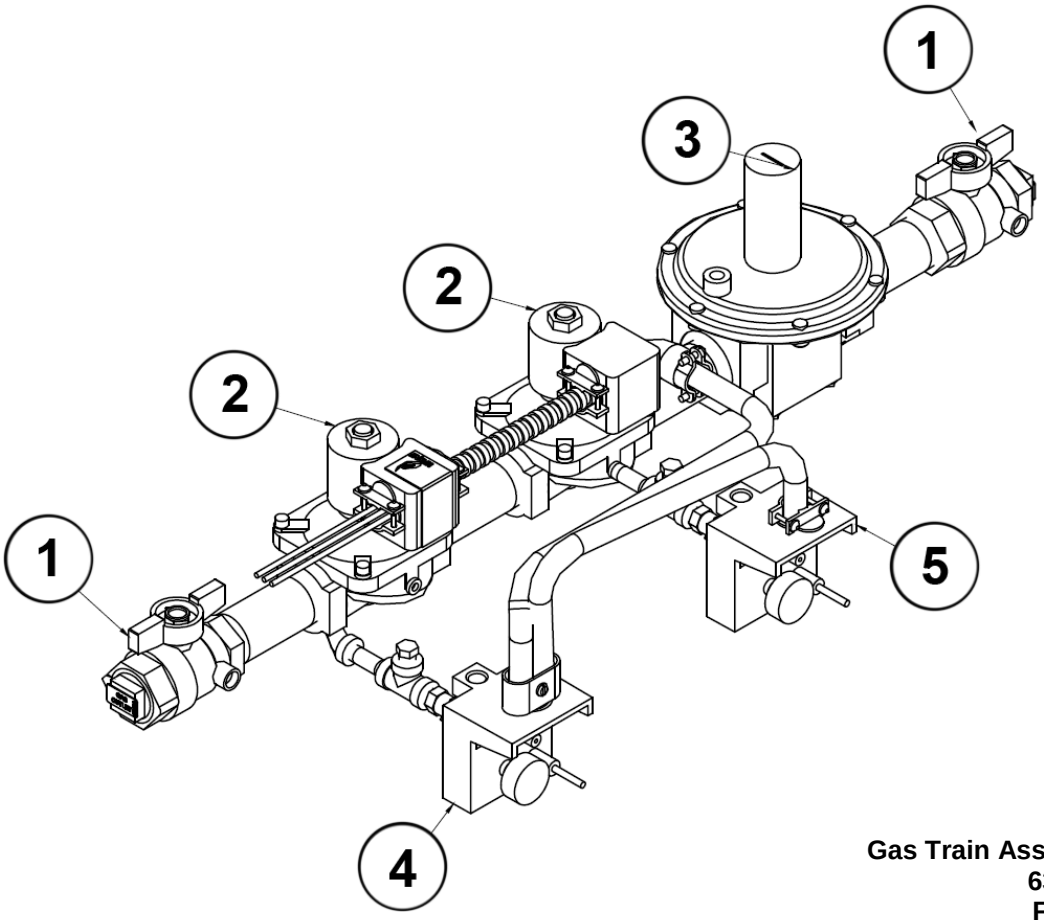
Model*	DIM. “A”	DIM. “B”
6	15.3	14.7
9	17.3	16.7
12	20.3	19.7
15	23.3	22.7

*****Denotes Air Tube Length

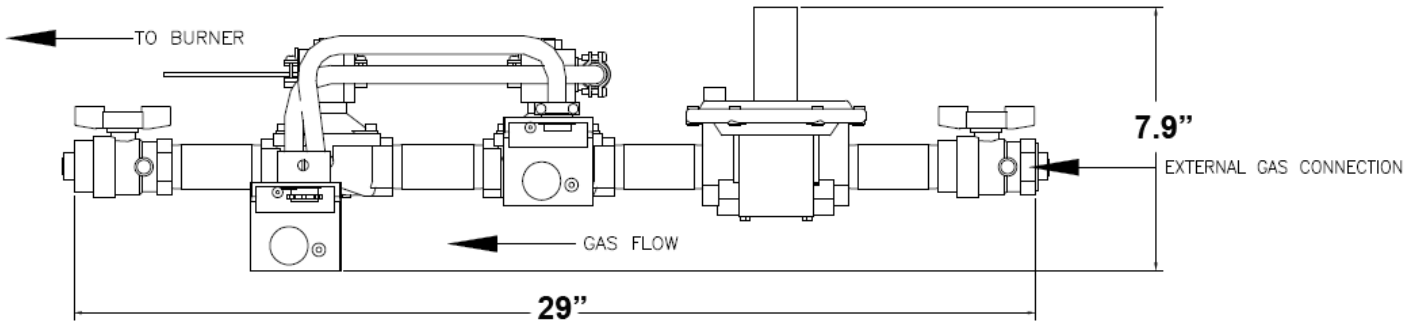


Burner Dimensions
Figure 30





Gas Train Assembly with Regulator
63527-001
Figure 31



Gas Train Assembly with Regulator
63527-001
Figure 31 (Continued)

Parts List

Item	Part No.	Description	Qty
1	63503-001	Valve, Manual Ball 1”	2
2	63504-001	Valve, Gas Shutoff 1” 120V	2
3	63262-003	Regulator, Gas Pressure RV61	1
4	63513-002	Switch, Gas Pressure High (Antunes HPG-G)	1
5	63513-001	Switch, Gas Pressure Low (Antunes LPG-G)	1

Pipe Sizing Chart for Natural Gas

The following chart is based on 0-0.5 psi inlet pressure, specific gravity of 0.6, and a pressure loss of 0.5" w.c.. Numbers are for straight schedule 40 metal pipe.

Maximum Capacity in Cubic Feet of Gas per Hour

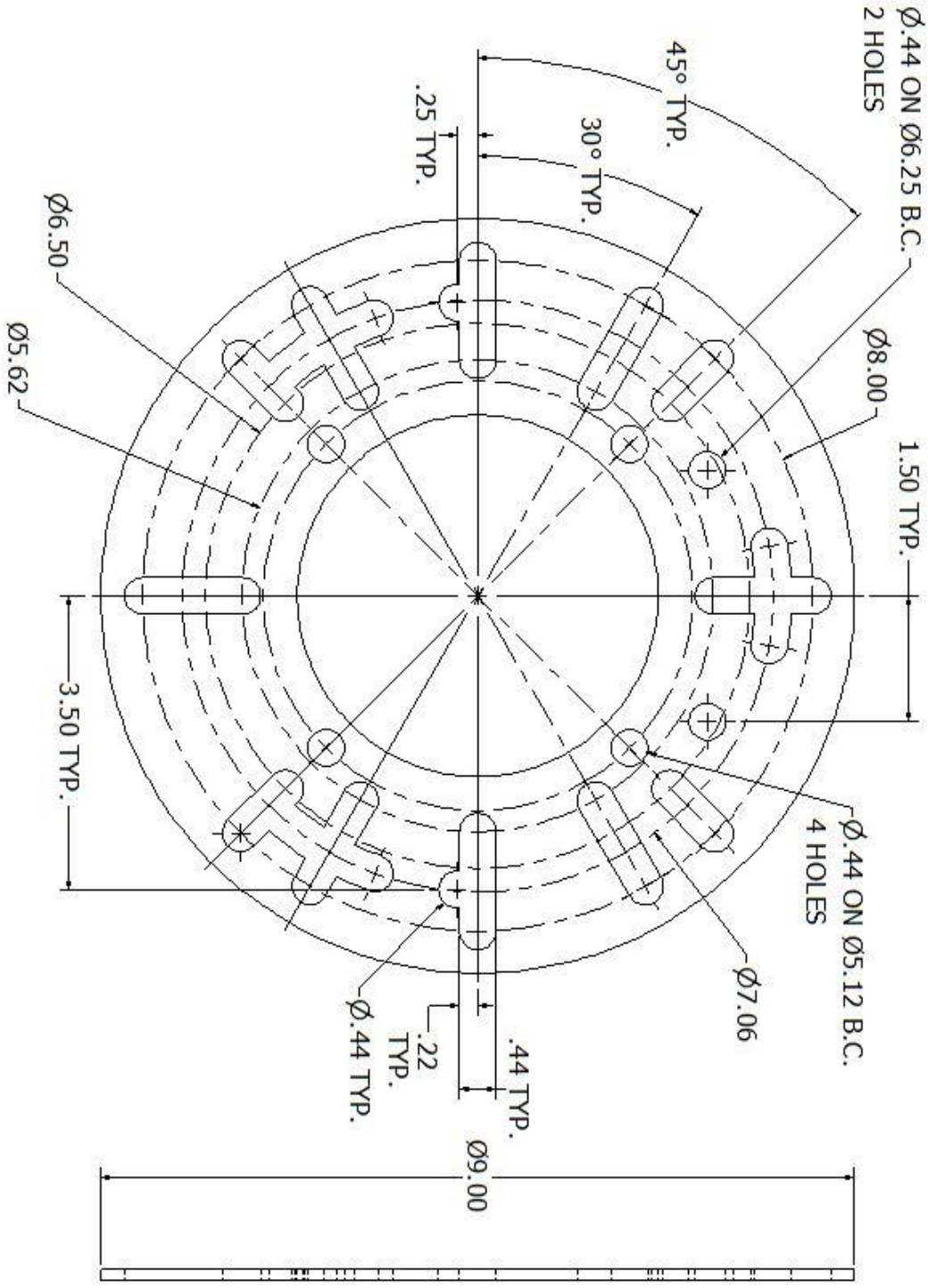
Length of Pipe (ft)	3/4"	1"	1 1/4"	1 1/2"	2"
10	360,000	680,000	1,400,000	2,100,000	3,950,000
20	250,000	465,000	950,000	1,460,000	2,750,000
30	200,000	375,000	770,000	1,180,000	2,200,000
40	170,000	320,000	660,000	990,000	1,900,000
50	151,000	285,000	580,000	900,000	1,680,000
60	138,000	260,000	530,000	810,000	1,520,000
70	125,000	240,000	490,000	750,000	1,400,000
80	118,000	220,000	460,000	690,000	1,300,000
90	110,000	205,000	430,000	650,000	1,220,000
100	103,000	195,000	400,000	620,000	1,150,000
150	84,000	160,000	325,000	500,000	950,000
200	72,000	135,000	280,000	430,000	800,000

Pipe Sizing Chart for Liquid Propane

The following chart is based on 10 psi inlet pressure and a pressure drop of 1 psi. Numbers are for straight schedule 40 metal pipe.

Maximum Capacity in Btu per Hour

Length of Pipe (ft)	1/2"	3/4"
10	3,339,000	6,982,000
20	2,295,000	4,799,000
30	1,843,000	3,835,000
40	1,570,000	3,283,000
50	1,391,000	2,909,000
60	1,261,000	2,636,000
70	1,160,000	2,423,000
80	1,079,000	2,256,000
90	1,012,000	2,117,000
100	956,000	2,000,000
150	768,000	1,606,000
200	657,000	1,374,000
250	582,000	1,218,000
300	528,000	1,104,000
350	486,000	1,015,000
400	452,000	945,000
450	424,000	886,000
500	400,000	847,000



Flange
20614
Figure 33

CONSUMER INSTRUCTIONS

Keep the area around the burner clear and free of combustible materials, gasoline or other flammable liquids or vapors. Do not obstruct burner air openings or ventilation grilles for combustion air. If the burner is to be shut down for an extended time, the main manual gas valve should be closed as a precaution.

***CAUTION**:* Check the burner flame periodically. A proper NATURAL gas flame will appear blue at the burner face with orange and yellow tips. A proper PROPANE gas flame will appear blue at the burner face with yellow tips. If the flame is too rich, it will appear billowy and yellow with hazy tips, if too lean, it will appear short and all blue. Burner cleaning and/or readjustment is indicated by flames that are too rich or too lean.

WARNING: If any flame is observed when the burner is on standby, or if the ignition spark or valve operator is heard to come on before the motor reaches operating speed, immediately turn off the manual gas control and main power. A dangerous condition has developed and must be corrected.

CONTACT A QUALIFIED SERVICE TECHNICIAN FOR CLEANING, READJUSTMENT OR REPAIR.

LIGHTING INSTRUCTIONS:
See Section II Initial Start Up
1. Turn Main Electrical Disconnect Power Switch On.
2. Open All Manual Gas Valves.
3. Set Thermostat Or Operating Control To Call For Heat.
4. Turn Burner On-Off Switch To The On Position.

Wait 30 Seconds. If Burner Has Failed To Light, Or If Burner Lights Then Goes Out, Turn Burner Off For 30 Seconds And Then Back On For Restart.

TO SHUT OFF:
1. Turn Main Power Switch Off Or Turn Burner Switch Off.
2. Shut All Manual Gas Valves.

START-UP & SERVICE NOTES

Record the installation data, the combustion readings, etc., and affix to this manual, or the burner and/or appliance. Space has been provided for start-up notes, dealer's name, address, service telephone numbers, emergency telephone numbers, as well as the date of installation.

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 pumps, 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.

NOTES

WAYNE
Combustion Systems
a Scott Fetzer company