WAYNE Combustion Systems
A SCOTT FETZER COMPANY
801 GLASGOW AVE.
FORT WAYNE, IN 46803
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MODEL "EHG" GAS BURNERS

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

- Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance.
- WHAT TO DO IF YOU SMELL GAS
• Do not try to light the appliance.
• Do not touch any electrical switch; do not use any phone in your building.
• Immediately call your gas supplier from a neighbor's phone. Follow the gas supplier's instructions.
• If you cannot reach your gas supplier, call the fire department.
- Installation and service must be performed by a qualified installer, service agency or the gas supplier.

Warranty is voided if not installed by qualified service person.

NOTICE

THESE INSTRUCTIONS SHOULD BE MAINTAINED IN LEGIBLE CONDITION. THESE INSTRUCTIONS SHOULD BE POSTED, AFFIXED TO THE BURNER, OR ADJACENT TO THE HEATING APPLIANCE. FOR FURTHER INSTRUCTIONS AND WARNINGS, SEE THE BACK OF THIS MANUAL.

SPECIFICATIONS FOR MODEL "EHG" BURNERS
NATURAL GAS OR PROPANE

NOTE: "S.I." Dimensions in ( ) are informational only. English values take priority.
Maximum Input Capacity * - 700 MBTU (738500 kJ)
Minimum Input Capacity * - 425 MBTU (448400 kJ)
* De-rate input for altitude over 2000 ft. (609.6 m) by 4% each 1000 ft. (304.8 m) above sea level.

SUPPLY LINE PRESSURE REQUIRED: Natural or Propane 6" W.C. (1494 Pa) Minimum, 14" W.C. (3487 Pa) Maximum
AIR TUBE DIAMETER: 4 inches (101.6 mm)
AIR TUBE INSERTIONS (STANDARD BURNERS):
5.00 inches (127 mm) Maximim
7.00 inches (177.8 mm) Maximum
10.00 inches (254 mm) Maximum
13.00 inches (381.0 mm) Maximum
MOUNTING: Adjustable flange standard.
STANDARD VOLTAGE: 120 VAC / 60 HZ/ 1 Phase
FLAME SAFETY: 24 VAC Single-Rod Gas Primary
IGNITION: 10,000 VAC Direct Spark Ignition. Optional transformers are available. 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.

GAS PIPETRAIN: The pipetrain is pre-assembled and pre-wired and is UL795 compliant, which includes High & Low gas pressure safety switches, two manual ball valves, two 1"NPT x 1"NPT 110VAC Solenoid Shut-off Valves, a Main Gas Pressure Regulator, and gas test ports. Upon request the pipetrain can be assembled without a Gas Pressure Regulator, but the correct Gas Pressure Regulator must be installed before operation. The pipetrain is shipped separate, and minor field plumbing and wiring are required. The pipetrain must be located 12' (3.6m) or less from the burner for optimal performance.

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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 (645.2mm^2) or more of free area each 1,000 BTU (.29kW) input per hour.

C. HEATING APPLIANCE INSPECTION

Clean the appliance heat exchanger interior, combustion chamber and flue connections. Remove all adhering tars, scale, dirt and soot. Inspect the heat exchanger for obvious and potential flue gas leaks. Cement all joints around the appliance base and access openings to prevent air and/or flue gas leakage into or out of the combustion chamber.

Warm Air Furnaces* - Make certain the electrical characteristics of the fan and limit switch correspond to those required by this burner and are in proper working order.

Hot Water Boilers* - Make certain water temperature and altitude gauges, pressure relief valves are in proper working order.

Steam Boilers* - Make certain the system is pressure tight, with pressure gage and pop off safety valve in proper working order. Insure Existing water sight glass permits clear observation of boiler water level.

*Where applicable, existing temperature of pressure limit switch or low water cut-off switch operation and electrical characteristics shall be checked to determine their compatibility to the gas control circuitry of this burner.

D. CHIMNEY, FLUE PIPE AND DRAFT CONTROL

The chimney should be inspected for unsafe conditions such as excessive soot accumulation, deteriorated masonry, blockage or potential blockage.

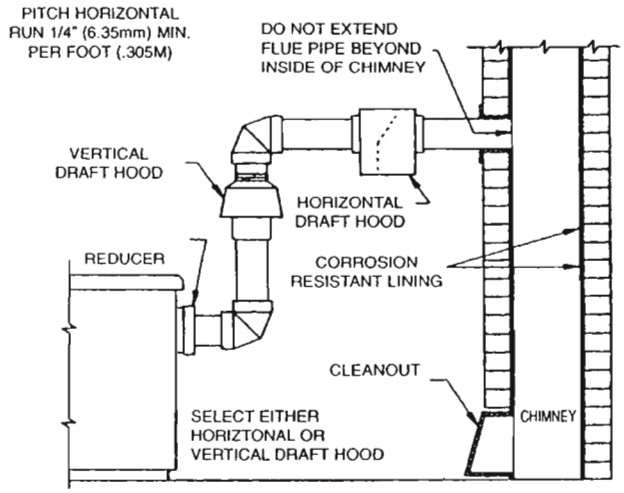
NOTICE: No manually adjustable flue pipe damper is permitted on any gas burner installation. The chimney should be lined with a corrosion resistant material. If the chimney is unlined, consult your local gas utility for recommendations.

WARNING: Under no circumstances should the flue pipe be connected to the chimney of an open fireplace.

Strict compliance to appropriate codes should be made regarding flue pipe clearances from combustible materials.

Pitch the horizontal run of the flue pipe upward 1/4 inch (6.35mm) per foot (.305m) or more. Run directly to the chimney, fasten joints securely and support horizontal runs to prevent sagging.

If the flue pipe must be extra long, its diameter should be increased. The horizontal length of the flue pipe should not exceed the height of the chimney above the flue connection.

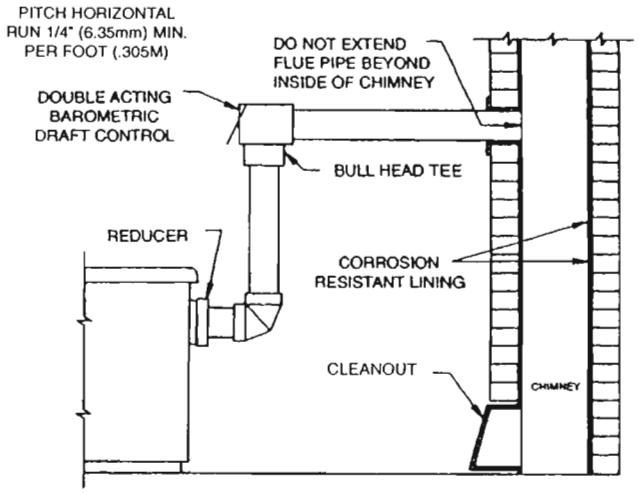


DRAFT HOOD POSITONS

FIGURE 1

The draft control should be hood type per Figure 1 or, IF APPROVED BY LOCAL AUTHORITIES, a barometric damper suitable for gas firing per Figure 2. The draft control should be sized the same as the flue pipe and should be located higher than the highest part on the appliance flue passage. Refer to the barometric draft regulator manufacturer's instructions for complete detail.

NOTICE: Should the flue pass through a partition, the draft control must be located in the same room as the heating appliance.



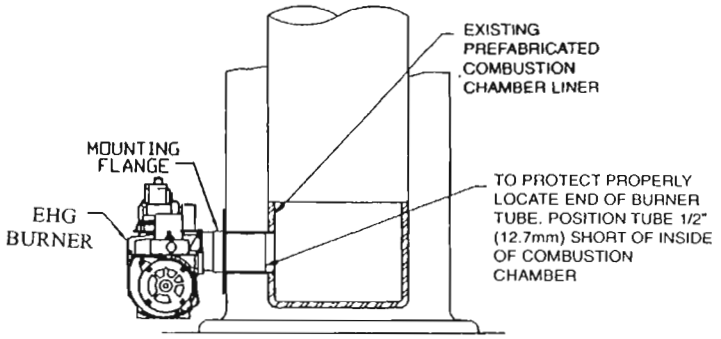
BAROMETRIC DRAFT CONTROL POSITION

FIGURE 2

E. COMBUSTION CHAMBER

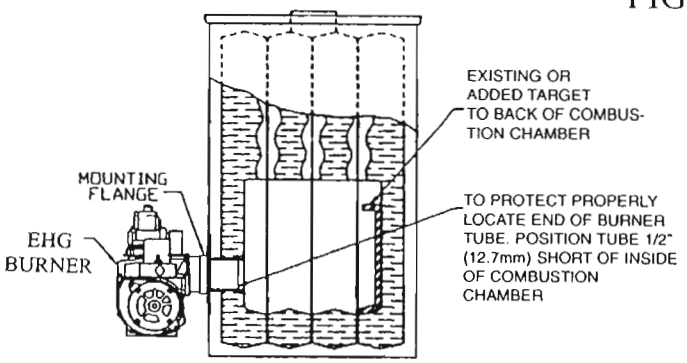
A combustion chamber is normally required to protect non-heat transfer surfaces, and to provide a radiant bed for rapid heat transfer to the primary surfaces of the heat exchanger. If in good condition, the existing combustion chamber can be used.

A full combustion chamber liner is recommended for warm air furnaces, see Figure 3, and a target wall or full combustion chamber liner is recommended for wet leg cast iron or steel boilers. See Figures 4 and 5. If a built up chamber is necessary, use 2300° F (1260°C) minimum insulating firebrick or FiberFrax™.



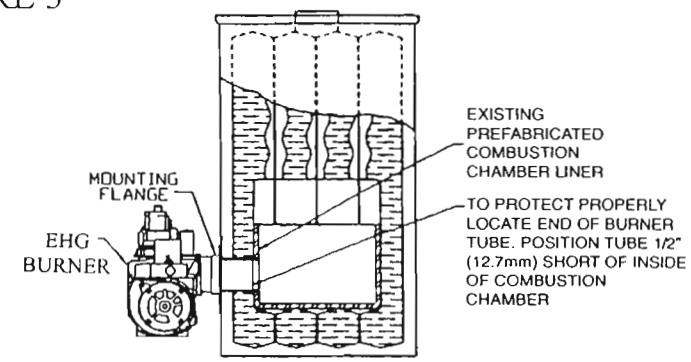
FORCED AIR FURNACE

FIGURE 3



HOT WATER OR STEAM BOILER WITH COMBUSTION CHAMBER TARGET

FIGURE 4



HOT WATER OR STEAM BOILER WITH COMBUSTION CHAMBER LINER

FIGURE 5

THE BURNER AIR TUBE MUST NOT BE ALLOWED TO EXTEND INTO THE CHAMBER PROPER; IT MUST BE SET 1/2" (12.7mm) SHORT OF THE INSIDE SURFACE.

Before permanently securing the burner to the heating appliance with either the adjustable mounting flange or pedestal, 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 6.

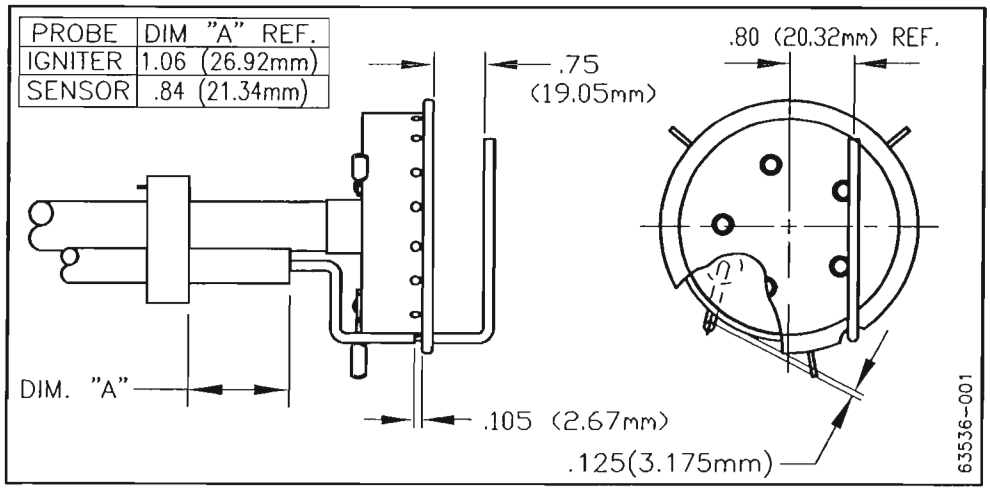
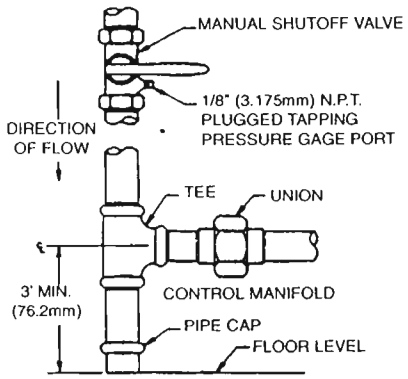


FIGURE 6

F. GAS PIPING

NOTICE: All piping must comply with 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 14" W.C. (3487.4Pa) maximum, an **intermediate main gas regulator** must be installed ahead of the main gas manual shut off valve shown in Figure 7.

WARNING: Failure to install the intermediate gas regulator will result in gas leakage from the main burner regulator. Consult local codes to install vent lines from regulators, if used. Vent lines should terminate outside the building, away from windows, doors, and fresh air intakes. Vent should terminate in a way to prevent water, dirt, foreign matter, or insects from entering the line.



SUPPLY LINE CONNECTION
TO BURNER

FIGURE 7

A pipe union shall be installed in the gas line adjacent to and upstream from the main gas manual shutoff valve. A drip leg or sediment trap/strainer must be installed in the supply line to the burner. See Figure 7.

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.

In CANADA, the installer must identify the Main Electrical Power disconnect, and the manual shut-off valve on the Gas Supply drop-line to the burner.

Use new black iron pipe and malleable fittings free of burrs and defects. Use pipe joint compound resistant to liquefied petroleum gases. A 1/8" (3.175mm) NPT plugged tap accessible for gauge test connection is provided for determining gas supply pressure to the burner. Test new supply piping for leaks.

CAUTION:
DURING PRESSURE TEST FOR LEAKS IN GAS SUPPLY PIPING, THE BURNER MUST BE DISCONNECTED TO PREVENT EXPOSING THE REGULATOR TO PRESSURES OVER 1/2" PSIG (3447 PaG), POSSIBLY DAMAGING THE UNIT AND VOIDING THE BURNER WARRANTY.

G. ELECTRICAL

The installation must be wired and GROUNDED in accordance with local codes or in their absence, with the National Electric Code ANSI/NFPA No. 70-1987 or 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 not lighter than #14 AWG. If a fused disconnect is used, it should be fused for a minimum of 15 amps.

CAUTION: Each installation must include suitable limit controls. Existing oil burner combination limit and operating controls are normally not suitable for gas burner use.

CAUTION: The burner is equipped with it's own 24VAC 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.

H. MAIN BURNER ORIFICE SIZING AND INSTALLATION

The EHG power gas 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 (kW/Hr) input on natural or propane gas, an orifice kit is supplied with each burner with the orifices shown in Figure 8.

To remove or interchange main orifice discs refer to the exploded parts view drawing in this manual (Figure 17).

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 8, 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				
BTU/hr	LP Gas		Orifice	Manifold
Input	Drill	Decimal	Part No.	ΔP "w.c.
425,000(124.6kW)	Ltr. "U"	.3680"(9.35mm)	62438-031	3.7(921.6Pa)
450,000(131.9kW)	3/8"	.3750"(9.53mm)	62438-036	3.5(871.8Pa)
500,000(146.5kW)	27/64"	.4219"(10.72mm)	62438-037	3.5(871.8Pa)
550,000(161.2kW)	29/64"	.4531"(11.51mm)	62438-038	3.5(871.8Pa)
600,000(175.8kW)	31/64"	.4844"(12.3mm)	62438-039	3.5(871.8Pa)
650,000(190.5kW)	1/2"	.5000"(12.7mm)	62438-040	3.5(871.8Pa)
700,000(205.2kW)	37/64"	.5781"(14.68mm)	62438-041	3.5(871.8Pa)

Propane (LP)

EHG Orifice Size Chart				
BTU/hr	Natural Gas		Orifice	Manifold
Input	Drill	Decimal	Part No.	ΔP "w.c.
425,000(124.6kW)	15/32"	.4688"(11.91mm)	62438-042	3.8(946.5Pa)
450,000(131.9kW)	31/64"	.4844"(12.3mm)	62438-039	3.5(871.8Pa)
500,000(146.5kW)	33/64"	.5156"(13.1mm)	62438-043	3.5(871.8Pa)
550,000(161.2kW)	35/64"	.5469"(13.89mm)	62438-044	3.5(871.8Pa)
600,000(175.8kW)	19/32"	.5938"(15.08mm)	62438-045	3.5(871.8Pa)
650,000(190.5kW)	5/8"	.6250"(15.88mm)	62438-046	3.5(871.8Pa)
700,000(205.2kW)	23/32"	.7188"(18.26mm)	no orifice	3.5(871.8Pa)

Natural

Figure 8

I. 120VAC SOLENOID SHUT-OFF GAS VALVES

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

The installation must be wired and GROUNDED in accordance with local codes or in their absence, with the National Electric Code ANSI/NFPA No. 70-1987 or latest edition.

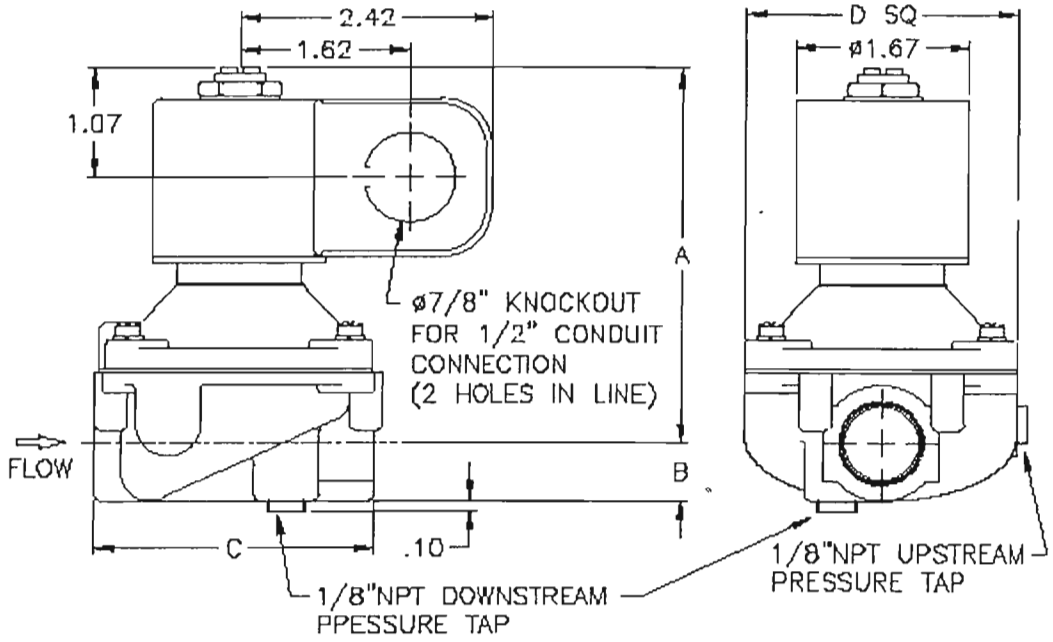


Fig.9

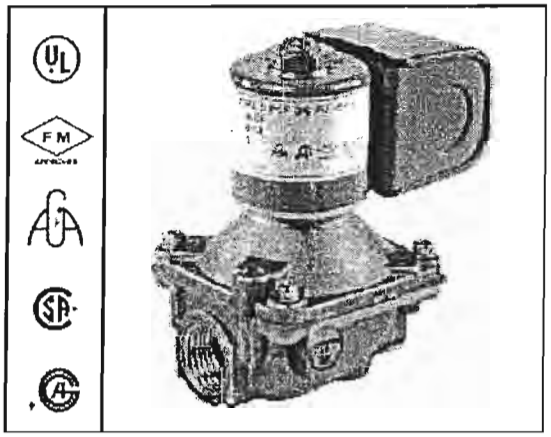


Fig.10

Note: The gas pipetrain, 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 pipetrain, and all safety components, should be tested for leaks and functionality at regular intervals.

J. 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 8 for pressure requirements.

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When pressure adjustment is required for setting input capacity with a selected orifice from Figure 8, remove the regulator cap for access to the slotted adjustment screw. Turning the screw counter clockwise reduces manifold orifice pressure, clockwise increases the pressure. A wide input range can be achieved with a single orifice size. If the desired input rating cannot be obtained within the above manifold orifice pressure adjustment range, the next size larger or smaller orifice should be used. (Refer to orifice chart Fig. 8)

NOTE: MANIFOLD PRESSURE ADJUSTMENTS CAN ONLY BE MADE WITH THE BURNER RUNNING AND THE GAS ON.
The 1/8" (3.175mm) NPT pressure tap for orifice manifold pressure measurement is located on the side of the orifice holder. 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.

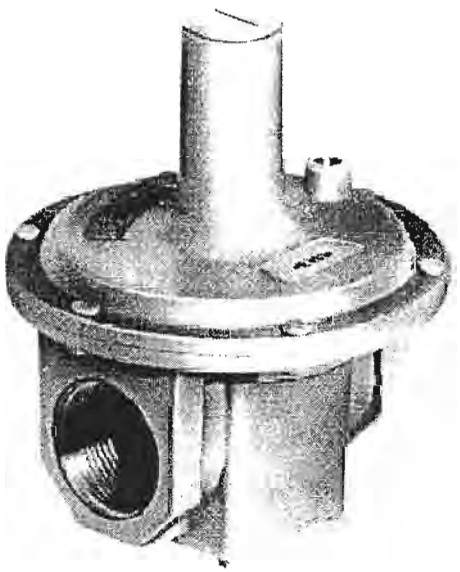


Fig.11

K. GAS PRESSURE SWITCHES

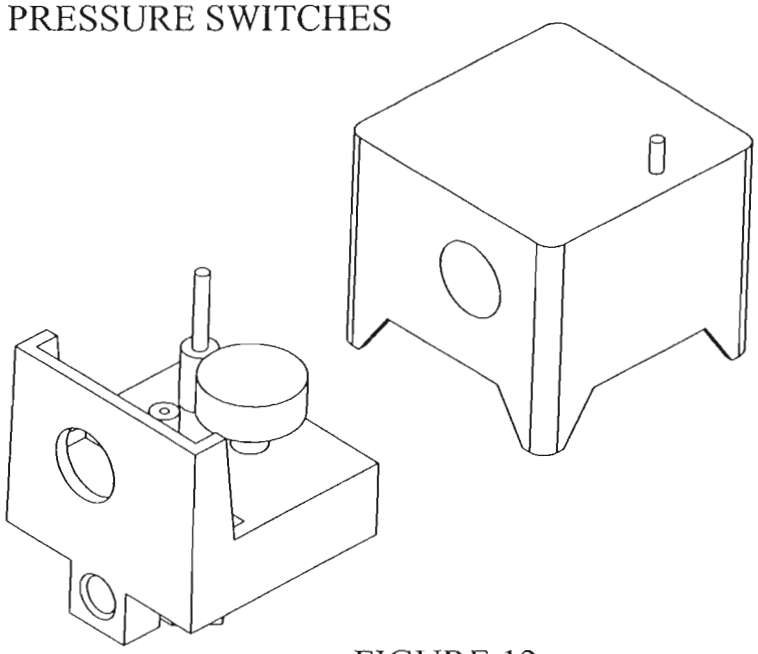


FIGURE 12

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, 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.

SECTION II
INITIAL START UP

1. NOTE: *Read the applicable sequence of burner/primary gas control operation, gas pressure switches, etc. in Section 3 Operation and Troubleshooting before proceeding.*

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

3. Adjust the primary air shutter setting per the dimensions shown in the chart below. *Remove blanking plate from the side of the burner **IF** the firing rate is over 650,000(190.5kW) BTU's on LP **ONLY**. See chart below.*

EHG Start-Up Reference Chart						
LP Gas				Natural Gas		
BTU/hr Input	**Air shutter**		**Manifold**	**Air shutter**		**Manifold**
	Opening	**Blank Plate**	**ΔP "w.c.**	**Opening**	**Blank Plate**	**ΔP "w.c.**
425,000(124.6kW)	3/8"(9.53mm)	yes	3.7(921.6Pa)	5/16"(7.94mm)	yes	3.8(946.5Pa)
450,000(131.9kW)	1/2"(12.7mm)	yes	3.5(871.8Pa)	1/2"(12.7mm)	yes	3.5(871.8Pa)
500,000(146.5kW)	13/16"(20.64mm)	yes	3.5(871.8Pa)	13/16"(20.64mm)	yes	3.5(871.8Pa)
550,000(161.2kW)	1-1/8"(28.58mm)	yes	3.5(871.8Pa)	1"(25.4mm)	yes	3.5(871.8Pa)
600,000(175.8kW)	1-3/8"(34.92mm)	yes	3.5(871.8Pa)	1-1/2"(38.1mm)	yes	3.5(871.8Pa)
650,000(190.5kW)	1-3/4"(19.05mm)	removed	3.5(871.8Pa)	1-3/4"(44.45mm)	yes	3.5(871.8Pa)
700,000(205.2kW)	1-7/8"(47.63mm)	removed	3.5(871.8Pa)	2-1/8"(53.97mm)	yes	3.5(871.8Pa)

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

FIGURE 13

4. 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.*

5. 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 "w.c. setting, as an initial starting point. The low gas pressure switch should be set at the lowest "w.c. setting, as a starting point. Push the manual reset buttons on the gas pressure switches.
Note: These settings must be re-adjusted after the burner is ignited.

6. 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.

7. 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.

8. 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.

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

10. 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 step 1. The green indicator light shows that the solenoid shut-off valves are powered.

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.

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

12. A more accurate BTU (kW) input can be determined by using the gas service meter with the burner operating (all other gas appliances should be off). The hand on the gas meter dial with the lowest cubic feet valve (fastest revolving dial), should be clocked (timed) for one complete revolution and 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's/ ft^3 heating value).

$\frac{3600 \times 1 \times 1000}{6} = 600{,}000$ BTU/HR

PROPANE GAS EXAMPLE: Timing one revolution of the $1ft^3$ dial at 15 seconds on propane gas (roughly 2515 BTU's/ ft^3 heating value).

$\frac{3600 \times 1 \times 2515}{15} = 603{,}600$ BTU/HR

13. 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.

14. 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.

15. 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).

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

For Natural Gas: $CO_{AIRFREE} = \frac{12.2}{(CO_2)} \times CO_{PPM}$

For Propane Gas: $CO_{AIRFREE} = \frac{14}{(CO_2)} \times CO_{PPM}$

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 (2.491Pa) to -.02 (4.982Pa) inches w/c during burner operation.

D. The flue gas temperature should be between 325°F (162.78°C) and 550°F (287.78°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/Hr) INPUT IS CHANGED, REPEAT STEP 13

16. 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.

17. 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 P/N 62759-002
W/BUILT IN 30 SECOND PREPURGE

On a call for heat, voltage (24V) is applied to motor start relay and air switch. Once the fan motor reaches operating rpm combustion air pressure is sensed by the air-proving switch and closes the switch contacts energizing the S89F 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 produce an approximate 10,000 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 an insufficient supply of combustion air 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

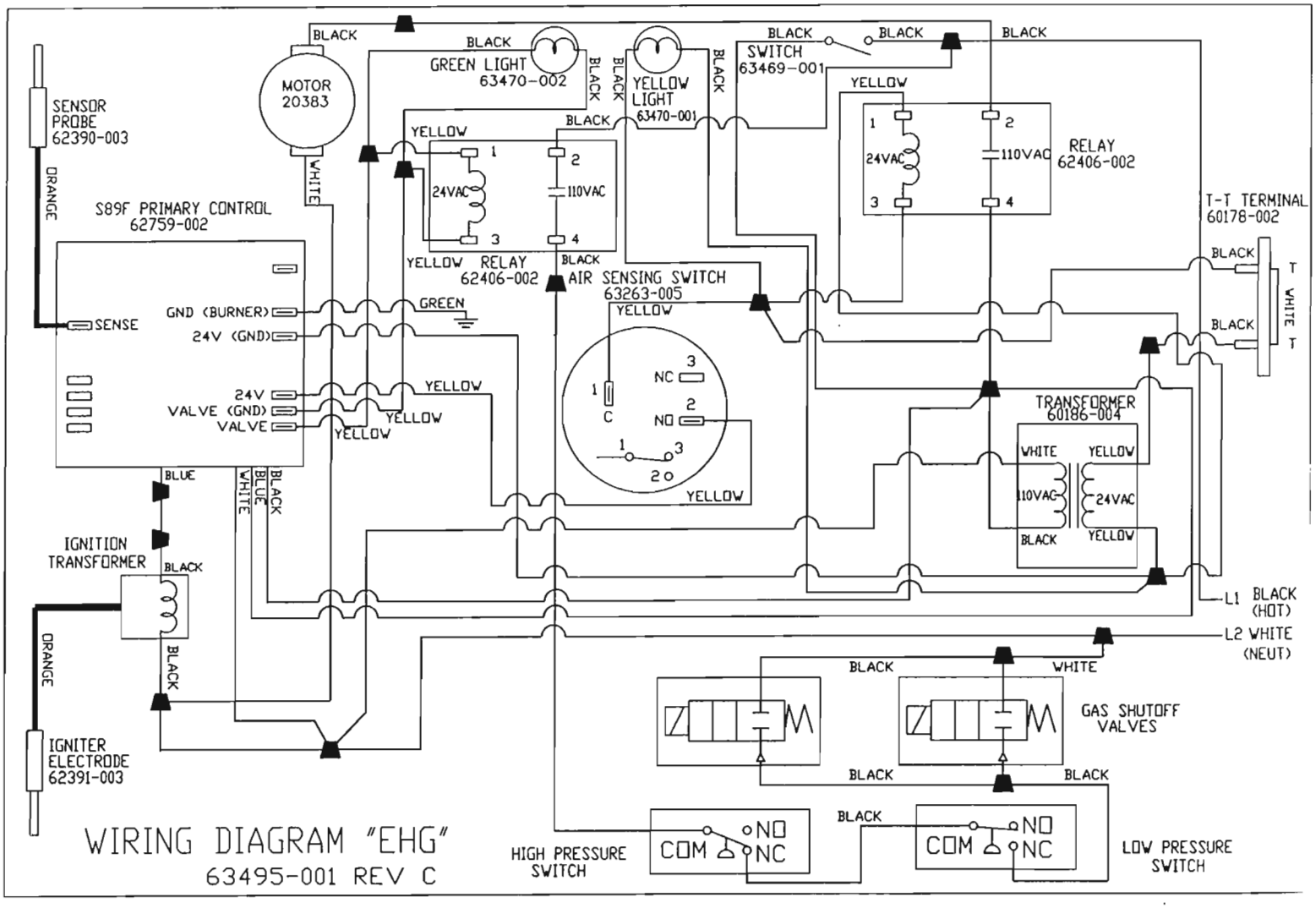


FIGURE 14

SEQUENCE OF OPERATION – EHG SERIES POWER GAS BURNER UTILIZING HONEYWELL S89E GAS PRIMARY P/N 62758-002 W/ EXTERNAL 30 SECOND PREPURGE TIMER P/N 62388-001 AND RESISTOR P/N 62530-001

On a call for heat, voltage (24V) is applied to the motor start relay and air switch. The motor relay pulls in the motor. After the motor reaches speed, the combustion air blower closes the air proving switch contacts, energizing the external 30-second pre-purge timer. After the 30 second pre-purge timing, the S89E is energized.

The S89E gas primary control has an internal 8-second safe start check. After the initial 30-second pre-purge provided by the external timer, the S89E gas primary control is energized, the 8-second safe start check will commence. Once this is accomplished, the S89E activates the gas valves allowing gas to flow to the burner head. Simultaneously, the S89E control energizes the ignition transformer, producing an approximate 10,000 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 S89E gas primary control for the remainder of the heat cycle.

When utilizing the S89E gas primary control with the eternal 30-second pre-purge timer, a 10K ohm resistor is wired in parallel between the output terminal of the 30 second pre-purge timer and the input terminal to the S89E gas primary control. The function of this resistor is to keep a load on the output terminal of the external 30-second pre-purge timer, after the initial call for heat and 30 second start pre-purge and 8-second safe start check.

This promotes simultaneous re-ignition of the main burner flame after the S89E's 8-second safe start check, overriding the 30-second pre-purge. This is desirable in oven or similar applications where temperatures cannot vary drastically.

Should the flame be extinguished during the heat cycle, the S89E primary ignition control will go into the 8 second safe start check after which time it

will reenergize the gas valve and ignition transformer in an attempt to re-establish the main burner flame. If this does not occur within the 4-second trial for ignition period, the S89E 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, and then re-energized. If at any time during the heat cycle, there is insufficient supply of combustion air to the burner, the air switch contacts will open, putting the system into lockout closing the gas valves.

EHG POWER GAS BURNER
WITH HONEYWELL S89E GAS PRIMARY

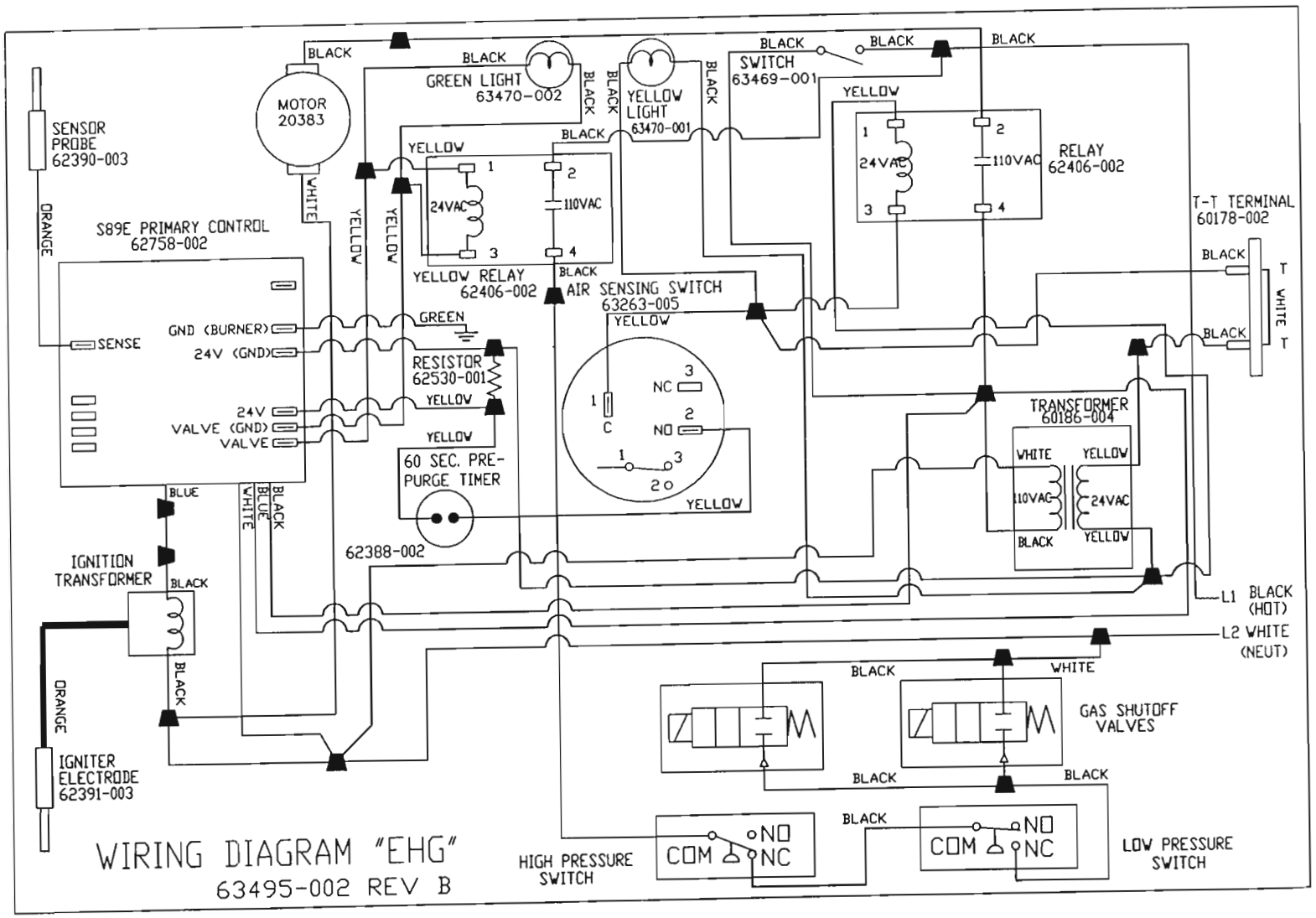


FIGURE 15

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 6 for sensor probe and electrode dimensional settings, Figure 16 for flame current measurement.

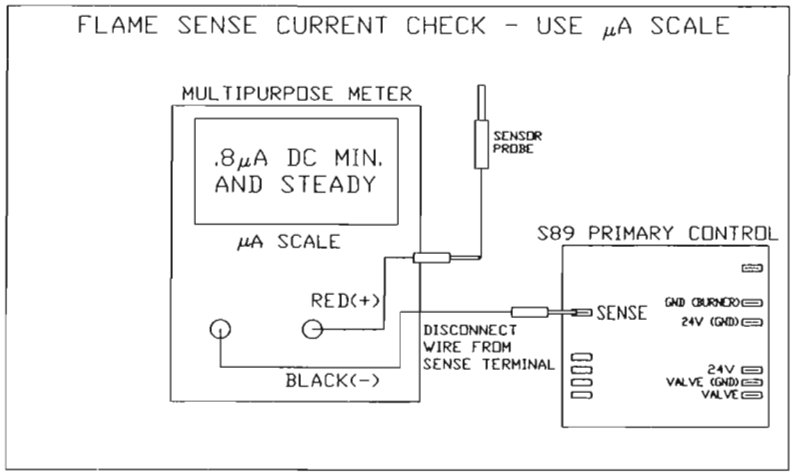


Figure 16

EHG SERIES WITH A HONEYWELL S89E, S89F PRIMARY IGNITION CONTROLS

TROUBLE SHOOTING GUIDE

MOTOR DOES NOT START

1. Check the low voltage transformer for 24 volt output between terminal 3 on the motor start relay either of the "T" terminals on the control box.
   - NO → Check electrical wiring and connections. → OK → Replace 24 volt AC 20 VA Transformer
   - OK ↓
2. Check for 24 volts AC between terminals 1 and 3 on motor start relay.
   - NO → Check electrical wiring and connections. → OK → Replace motor start relay.
   - OK ↓
3. Check for 120 volts AC between terminal 2 on motorstart relay and neutral line.
   - NO → Check electrical wiring and connections. → OK → Replace motor start relay.
   - OK ↓
4. Check electrical wiring and connections.
   - OK ↓
5. Does motor shaft turn freely?
   - NO → 1. Check for blower clearance. 2. Lubricate motor bearings.
   - OK ↓
6. Replace motor.
   - OK → (back to 5)

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. NOTE: The burner motor will continue to operate during the lock out mode when the thermostat circuit is called for burner operation.
2. Check for correct orifice/air setting relationship (see figures 8 & 13)
   - OK ↓

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 period that occurs at the END of the 30 second prepurge and 8 second safe start check cycle.

3. Check for 120 volts AC at gas valve terminals.
   - NO → Check electrical wiring and connections. Be sure leads are on correct gas valve terminals → OK → Replace primary ignition control.
   - OK ↓
4. Make sure leads are on the correct gas valve terminals
   - OK ↓
5. Check for correct manifold regulated pressure (see figures 8 & 13)
   - OK ↓
6. Replace gas valve.

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 ignition 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 8 second safe start check.

2. Check for 120 volts AC between the neutral line and the junction of the blue primary control lead and the black ignition transformer lead.
   - NO → Check electrical wiring and connections.
     - OK → Check the flame sensing circuit for (1) grounded flamerod. (2) Damage to flamerod lead insulation. NOTE: Make sure that the flamerod circuit and/or primary control is moisture-free.
       - OK → Replace primary ignition control.
   - OK

3. Check electrical wiring and connections.
   - OK

4. Check high voltage lead and connection to ignition electrode rod.
   - OK

5. Inspect ignition electrode for cracked insulator and correct spark gap (Fig. 6)
   - OK

6. Replace ignition transformer.

NO IGNITION — NO GAS VALVE

1. Reset Control — Motor starts — After 30 second prepurge cycle and 8 second safe start check. Motor continues to run but flame is not established.

In order to perform the following functional tests, the primary 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 8 second safe start check.

2. Check for 24 volts AC at the 24 volt primary control input terminals labeled yellow and brown.
   - OK → Replace primary ignition control.
   - NO

3. Check air proving switch for:
   a. Any impairment that would keep it from closing or opening.
   b. Electrical continuity; switch is normally open.
   c. Replace switch as necessary.
   - OK → 4. Check (when applicable) external 30 second prepurge timer (jumper around timer from air switch). Should primary ignition control become energized, replace timer.

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 lead terminal. See Fig. 16 Flame Current Measurement.

3. 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 (see (Fig. 6)
4. Poor ground path to primary control.
5. Defective primary control.
6. Read manual section "Flame Sensing".
7. Applicable only 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 will lock out.

NO

4. Microampere reading is less than .8 or unstable.

Probable 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 and location.

OK

2. Check thermostat heat anticipator for correct setting.

NO

Set anticipator to correct value if adjustable type. If proper setting cannot be made, replace with compatible thermostat.

OK

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

OK

4. Check line voltage circuit for bad wiring, electrical connection and/or switches.

NOTE: When the thermostat wires terminate on the HSG primary control box "T" terminals, the heat anticipator setting value for the HSG burner is determined by adding the primary control current to the gas valve current. The result is the anticipator setting. (Example: .2 + .6 = .8 amps.)

If the thermostat wires ARE NOT terminated on the burner control box "T" terminals, and these terminals are JUMPERED, you must then determine what the correct anticipator setting is by inspecting the controlling device at the point where the thermostat wires terminate. Typically, this information can be found on the body or cover of the controlling device.

When determining the current draw of the dual head gas valve, be sure to consider the separate ampere values for each valve. These usually are stenciled on the valve body, and must be added together to obtain the correct sum. (Example: .4 + .2 = .6 amps).

When the current draw cannot be determined accurately by the above method, measure the current with an ampere meter using the 1 AMP scale. Connect the meter leads in series with one of the thermostat leads for the accurate reading.

SECTION IV
SERVICE

Caution: Make sure that the main manual gas valves and main electrical power disconnect are turned off before opening burner or removing any parts for service. All cover plates, enclosures, and guards must be in place at all times, except during maintenance and servicing.

A. BURNER HEAD AND ELECTRODE/SENSOR ASSEMBLY

The burner head, electrodes, orifice holder and housing cover are part of the gas train assembly, which can be removed as one unit.
(See Figure 17)

1. Disconnect 1" NPT gas line from 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.

2. Remove the four 5/16"-18 hex head screws that attach the cover/manifold assembly to the burner.

3. To remove gas train assembly, gently lift up rear of housing cover pulling backward slightly on the drawer assembly gradually positioning the rear of the drawer assembly upward 90 degrees. Gently extract burner head and electrode/sensor assembly out opening in housing top taking extreme care as to not dislocate or damage electrode or sensor probe.

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.

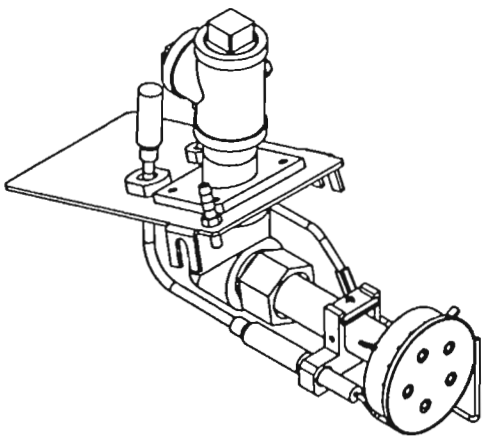
5. Examine the electrode and sensor probe for any serious corrosion or deterioration of metal at the tips. Check for proper dimensional settings of the sensor probe and electrode (see Figure 6). Adjust and/or replace these assemblies as necessary. Make sure that the ignition and sensor probe wires go 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 as shown in figures 3, 4 or 5.

ITEM	NAME	DESCRIPTION	QTY
		Parts List	
21	63528-001	DECAL, GAS INLET	1
20	101275-001	PLUG, HEX HEAD 1/8 BRASS	1
19	13026	BUSHING STRAIN RELIEF .562 HOLE	1
18	62909-XXX	WIRE, IGNITION (SEE BOM)	1
17	63497-XXX	WIRE, SENSOR ELECTRODE 5MM (SEE BOM)	1
16	62304	BUSHING STRAIN RELIEF 7/8" HOLE	1
15	100968-002	FITTING, HOSE BARB 1/4	1
14	X	CHAMBER/MANIFOLD ASSEMBLY (SEE BOM)	1
13	12693-002	SCREW, SET 10-24 X .50	1
12	62419-002	CLIP, SPRING ELECTRODE	1
11	12693	SCREW, SET 10-24 X .25	4
10	62390-XXX	ELECTRODE, SENSOR (SEE BOM)	1
9	62391-XXX	ELECTRODE, IGNITER	1
8	62387-001	BUSHING, ELECTRODE INSULATOR	2
7	62471-003	SUPPORT, ELECTRODE MACH.	1
6	63523-001	PLUG, P-88H 1" PLASTIC	1
5	63522-001	PLUG, 1" PIPE	1
4	62410-002	SPRING, ORIFICE	1
3	62438-XXX	ORIFICE, (SEE BOM)	1
2	63525-001	TEE, 1" WITH HOLE (M/F 63521-001)	1
1	63487-002	COVER ASSEMBLY	1

XXX = PART NUMBER WILL CHANGE WITH BURNER LENGTH OR FIRING RATE, REFER TO THE SPECIFICATION NUMBER BILL OF MATERIALS FOR PART NUMBERS

COVER/MANIFOLD/ORIFICE ASSEMBLY



ASSEMBLED VIEW

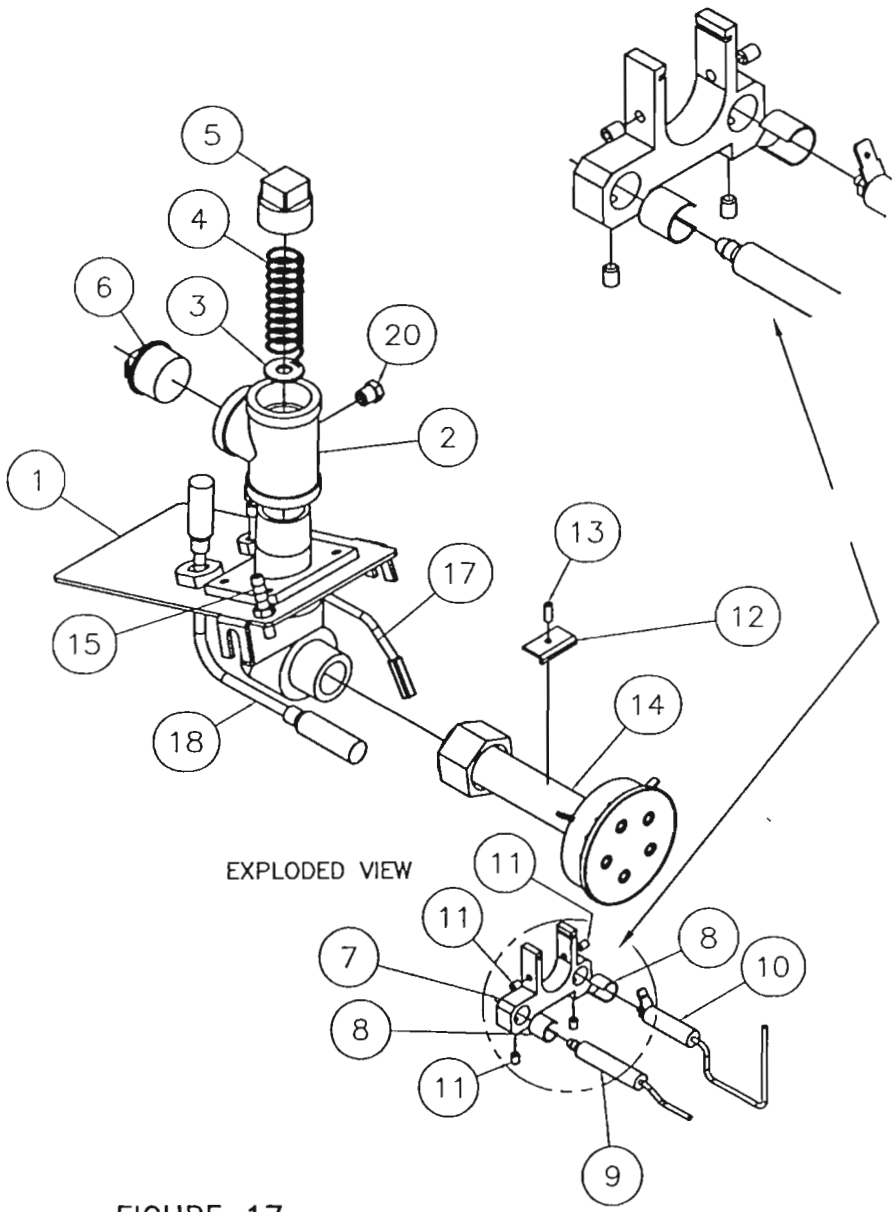


FIGURE 17

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. 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 the diaphragm to close a set of micro-switch contacts, thus completing the circuit.
The function of the air proving switch is to ensure that 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 valves will shut off.

1. The Air Proving switch should never require maintenance. However, should nuisance lockouts occur, the pressure switch can be checked. Disconnecting the 24V leads from the air switch and "jumpering" the leads together will bypass the switch's 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 **death or property damage**.

2. As mentioned above, the switch should never require maintenance. However a pinched or blocked 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.

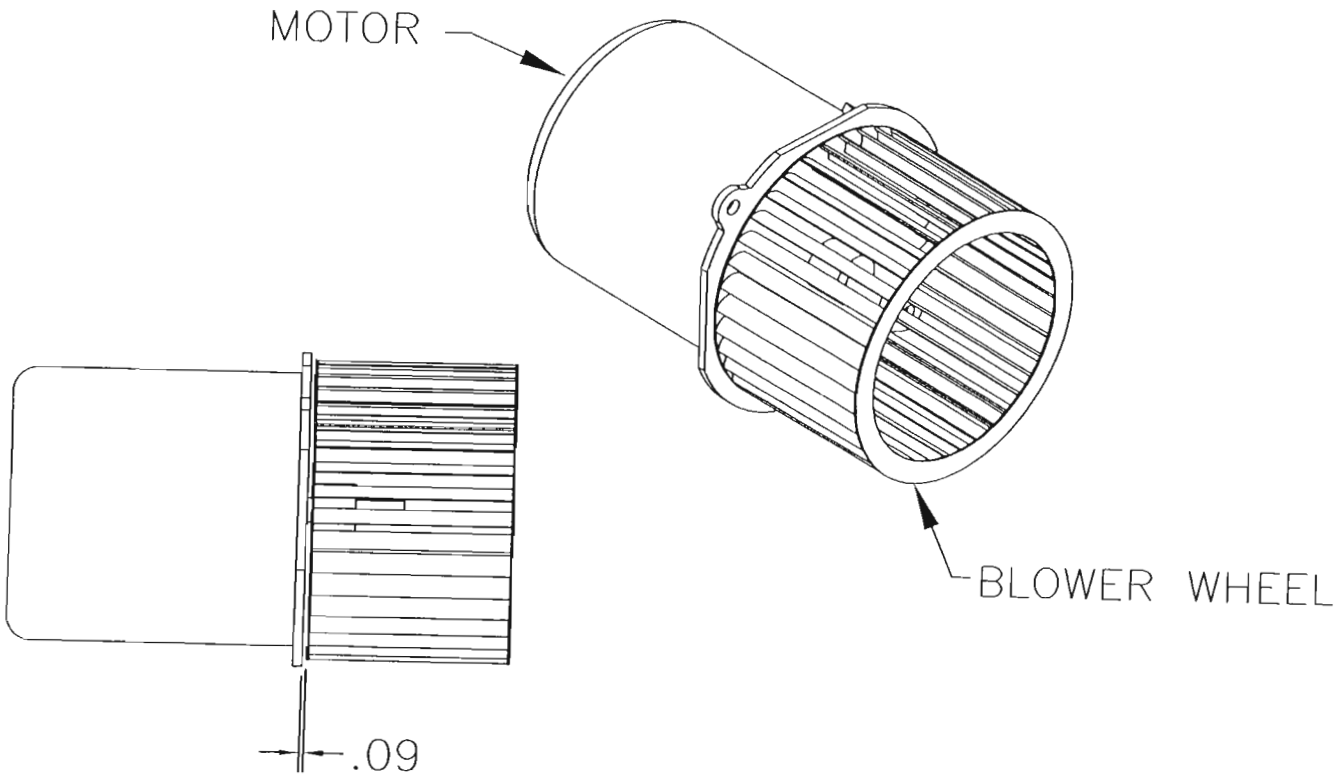
C. COMBUSTION AIR BLOWER AND MOTOR

1. Cleaning of the combustion air blower is required 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. Disconnect the motor wire under the cover/manifold assembly. Remove the two (2) 5/16"-18 hex head screws securing the motor to the burner housing.

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

3. Should removal of the blower wheel be necessary for cleaning or replacement of either it or the motor, the blower wheel must be positioned correctly on the motor shaft. (Figure 18)



FAN SPACING

D. GAS PRESSURE SWITCHES

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

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

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 "leaks" 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 flame. Should this situation exist for a period of time longer than the ignition control's stated 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 reinstate power to the burner.

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

• The burner is not properly grounded to "earth ground" on the line voltage.
• The ignition control is not properly grounded to the burner itself. Using an ohmmeter, 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:

• 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 positioned in the center of the clearance groove on the outer edge of the burner head with approximately .125" (3.175mm) clearance from the head. The probe must not be positioned to 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 drawing.

• 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 drawing 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 drawing and adjust if required.

• 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 gas train assembly into the burner. **NOTE:** Be careful not to accidentally reposition either the flamerod probe or electrode during reinstallation of the gas train assembly.

If, after all of the above listed items have been carefully checked, the burner still fails to work, it is due to one 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.

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

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

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

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

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

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

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

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

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.

EXPLOSION HAZARD: If PROPANE gas is used and the burner is located in a basement, crawlspace or confined space, contact your gas supplier about installing a "gas leak" warning device. PROPANE gas is heavier than air and can settle in low areas or confined spaces. This would create a DANGER OF EXPLOSION OR FIRE. If you suspect a gas leak, follow instructions on front cover of this manual.

HIGH VOLTAGES ARE PRESENT IN THIS EQUIPMENT FOLLOW THESE RULES TO AVOID ELECTRICAL SHOCK.
_ Use only a properly grounded circuit. A ground fault interrupter is recommended
_ Do not spray water directly on burner.
_ Turn off power before servicing.
_ Read the owner's manual before using.

CARBON MONOXIDE IS A COLORLESS, ODORLESS GAS THAT CAN KILL. FOLLOW THESE RULES TO CONTROL CARBON MONOXIDE.
_ Do not use this burner if in an un-vented, enclosed area. Carbon monoxide may accumulate.
_Adequate venting and combustion air is required at all times.
_ Only qualified personnel should adjust the pressure regulator. High pressures produce carbon monoxide.
_ Check flue gases for carbon monoxide. This check requires specialized equipment.
_ Allow only qualified burner service persons to adjust the burner. Special instruments and training are required.
_ Read the owner's manual before using.

SHOULD OVERHEATING OCCUR:
Shut off the manual gas control to the appliance
Do not shut off the control switch to the pump or blower.

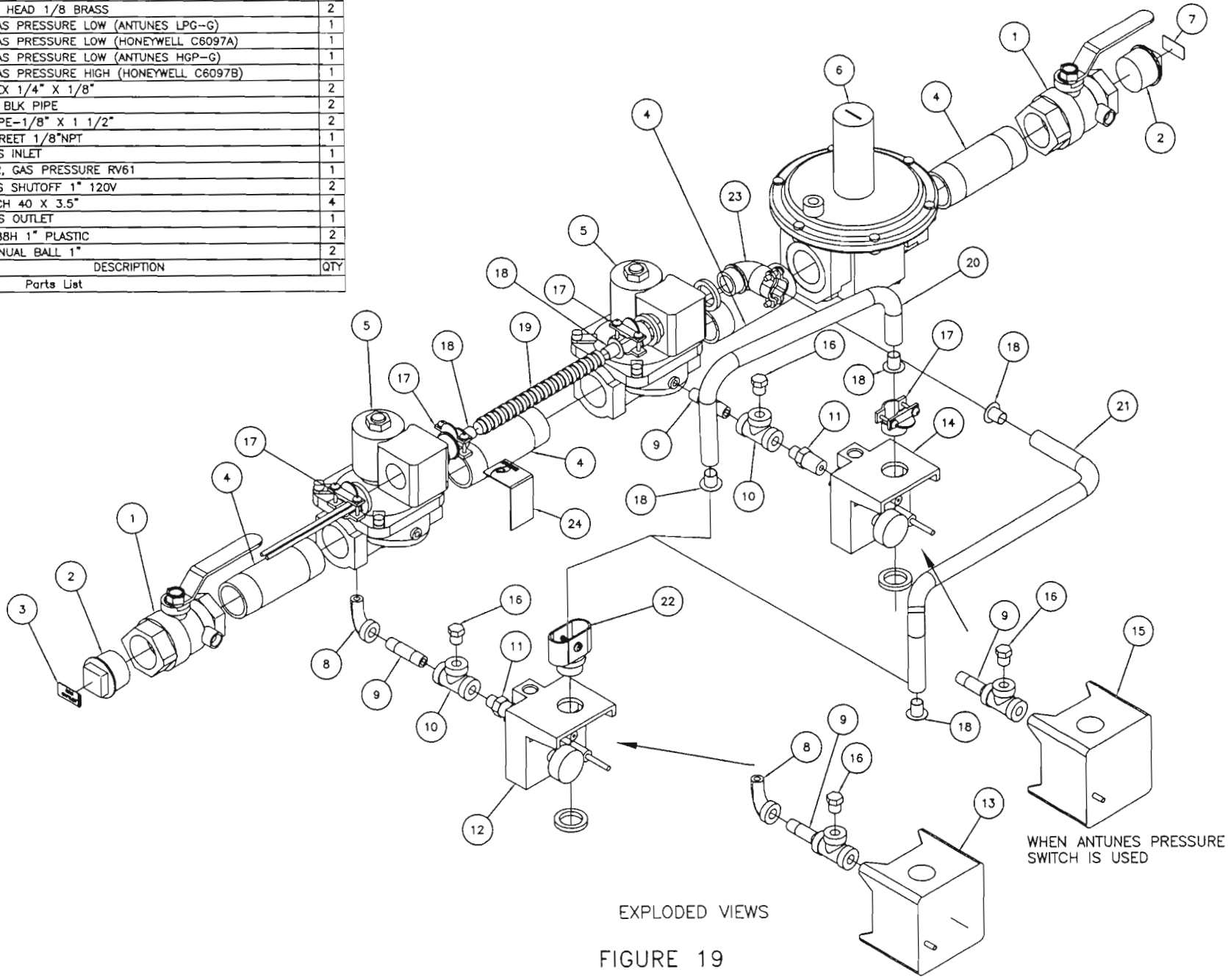
START-UP & SERVICE NOTES

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.

GAS TRAIN WITH REGULATOR
P/N 63527-001

ITEM	PART NO.	DESCRIPTION	QTY
24	100575-002	DECAL, SPEC NUMBER	1
23	15323	CONNECTOR, CONDUIT 3/8" 90°	1
22	14429	CONNECTOR, DUPLEX CONDUIT	1
21	100196-016	CONDUIT, FLEX 3/8" X 19.5"	1
20	100196-019	CONDUIT, FLEX 3/8" X 12"	1
19	100196-003	CONUDUIT, FLEX CUT 5"	1
18	13660	BUSHING, ASB-1	6
17	13801	FITTING, CONDUIT 3/8	4
16	101275-001	PLUG, HEX HEAD 1/8 BRASS	2
15	63513-001A	SWITCH, GAS PRESSURE LOW (ANTUNES LPG-G)	1
14	63513-001	SWITCH, GAS PRESSURE LOW (HONEYWELL C6097A)	1
13	63513-002A	SWITCH, GAS PRESSURE LOW (ANTUNES HGP-G)	1
12	63513-002	SWITCH, GAS PRESSURE HIGH (HONEYWELL C6097B)	1
11	63526-001	NIPPLE, HEX 1/4" X 1/8"	2
10	63521-002	TEE, 1/8" BLK PIPE	2
9	100462-001	NIPPLE, PIPE-1/8" X 1 1/2"	2
8	13385	ELBOW, STREET 1/8"NPT	1
7	63528-001	DECAL, GAS INLET	1
6	63262-003	REGULATOR, GAS PRESSURE RV61	1
5	63504-001	VALVE, GAS SHUTOFF 1" 120V	2
4	550014-002	NIPPLE, SCH 40 X 3.5"	4
3	63528-002	DECAL, GAS OUTLET	1
2	63523-001	PLUG, P-88H 1" PLASTIC	2
1	63503-001	VALVE, MANUAL BALL 1"	2

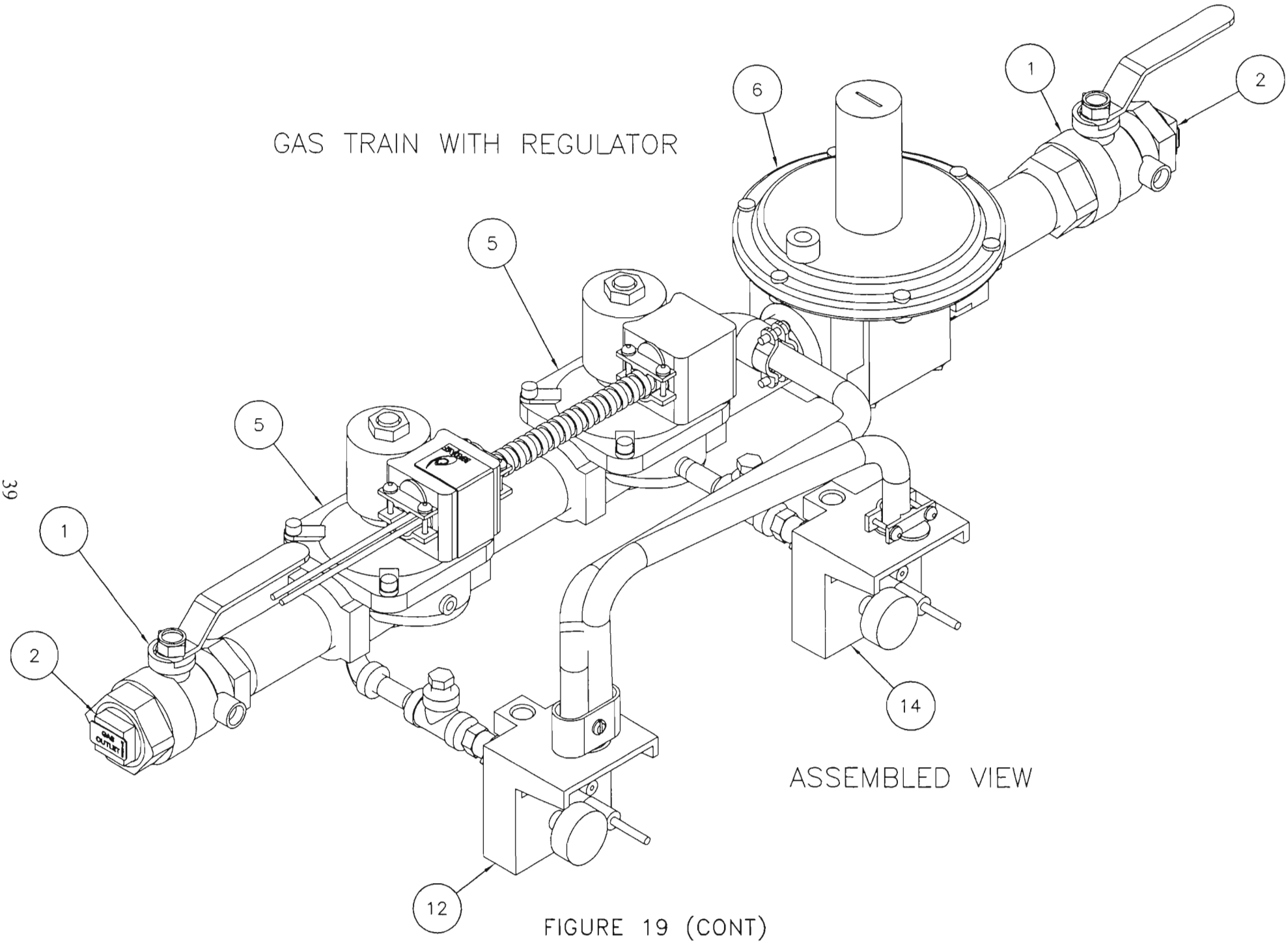
Parts List



EXPLODED VIEWS

FIGURE 19

GAS TRAIN WITH REGULATOR



ASSEMBLED VIEW

FIGURE 19 (CONT)

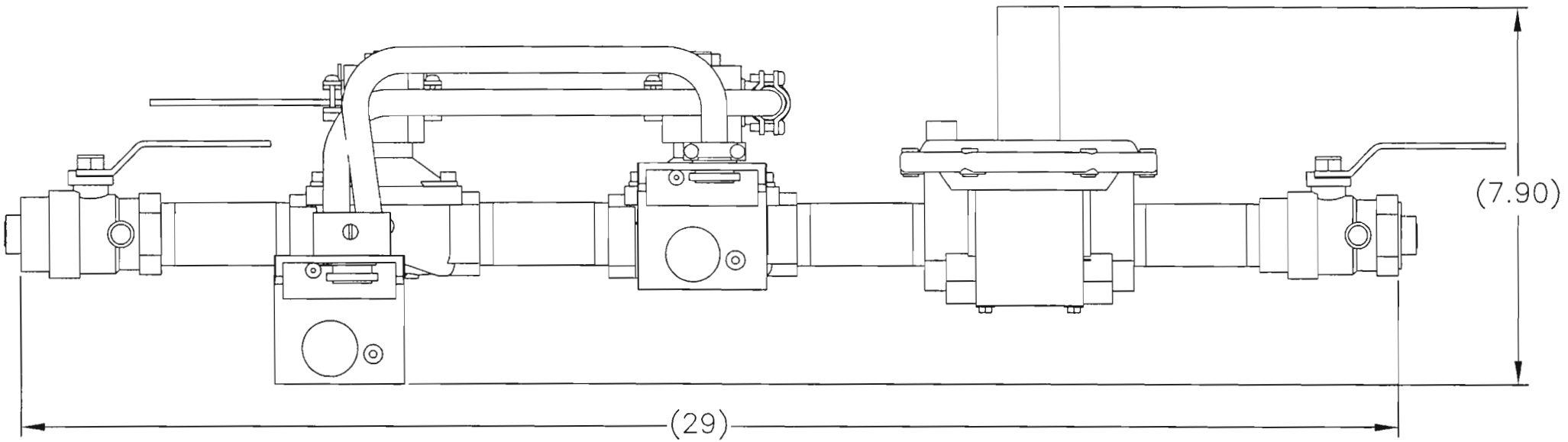
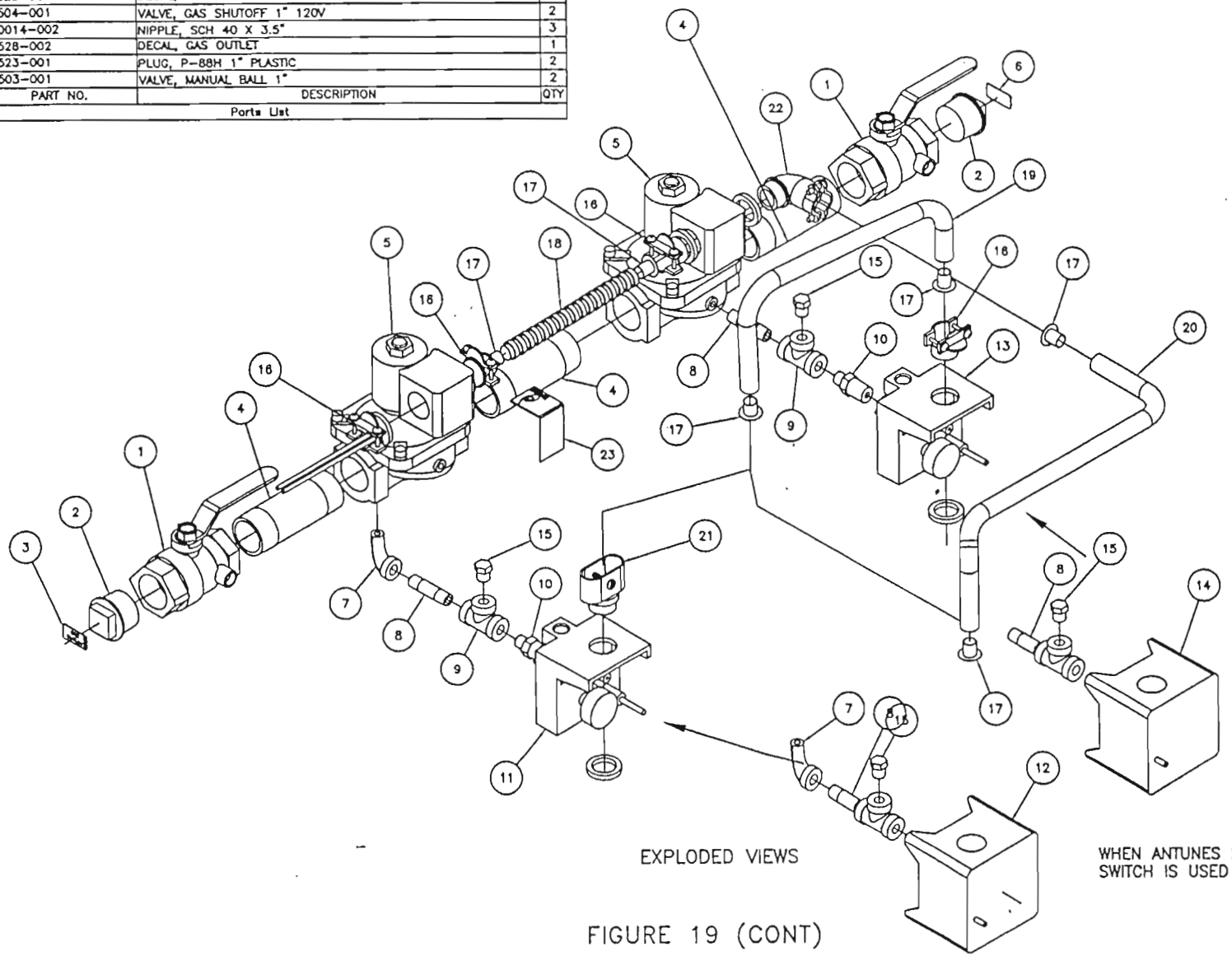


FIGURE 19 (CONT)

ITEM	PART NO.	DESCRIPTION	QTY
		Parts List	
23	100575-002	DECAL, SPEC NUMBER	1
22	15323	CONNECTOR, CONDUIT 3/8" 90°	1
21	14429	CONNECTOR, DUPLEX CONDUIT	1
20	100196-016	CONDUIT, FLEX 3/8" X 19.5"	1
19	100196-019	CONDUIT, FLEX 3/8" X 12"	1
18	100196-003	CONUDUIT, FLEX CUT 5"	1
17	13660	BUSHING, ASB-1	8
16	13801	FITTING, CONDUIT 3/8	4
15	101275-001	PLUG, HEX HEAD 1/8 BRASS	2
14	63513-001A	SWITCH, GAS PRESSURE LOW (ANTUNES LPG-G)	1
13	63513-001	SWITCH, GAS PRESSURE LOW (HONEYWELL C6097A)	1
12	63513-002A	SWITCH, GAS PRESSURE LOW (ANTUNES HGP-G)	1
11	63513-002	SWITCH, GAS PRESSURE HIGH (HONEYWELL C6097B)	1
10	63528-001	NIPPLE, HEX 1/4" X 1/8"	2
9	63521-002	TEE, 1/8" BLK PIPE	2
8	100462-001	NIPPLE, PIPE-1/8" X 1 1/2"	2
7	13385	ELBOW, STREET 1/8"NPT	1
6	63528-001	DECAL, GAS INLET	1
5	63504-001	VALVE, GAS SHUTOFF 1" 120V	2
4	550014-002	NIPPLE, SCH 40 X 3.5"	3
3	63528-002	DECAL, GAS OUTLET	1
2	63523-001	PLUG, P-88H 1" PLASTIC	2
1	63503-001	VALVE, MANUAL BALL 1"	2

GAS TRAIN WITHOUT REGULATOR

P/N 63527-002



EXPLODED VIEWS

WHEN ANTUNES PRESSURE SWITCH IS USED

FIGURE 19 (CONT)

GAS TRAIN WITHOUT REGULATOR

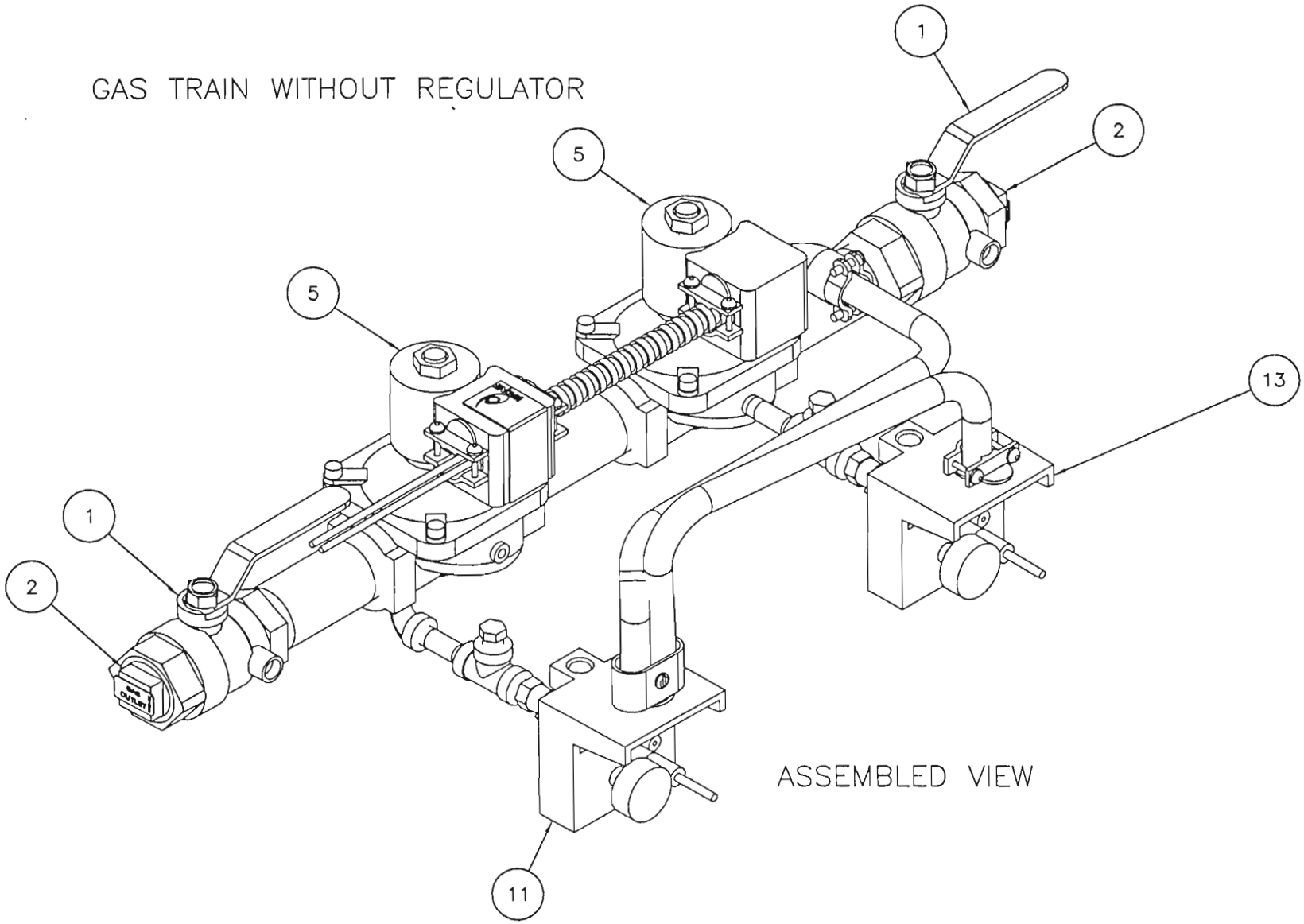


FIGURE 19 (CONT)

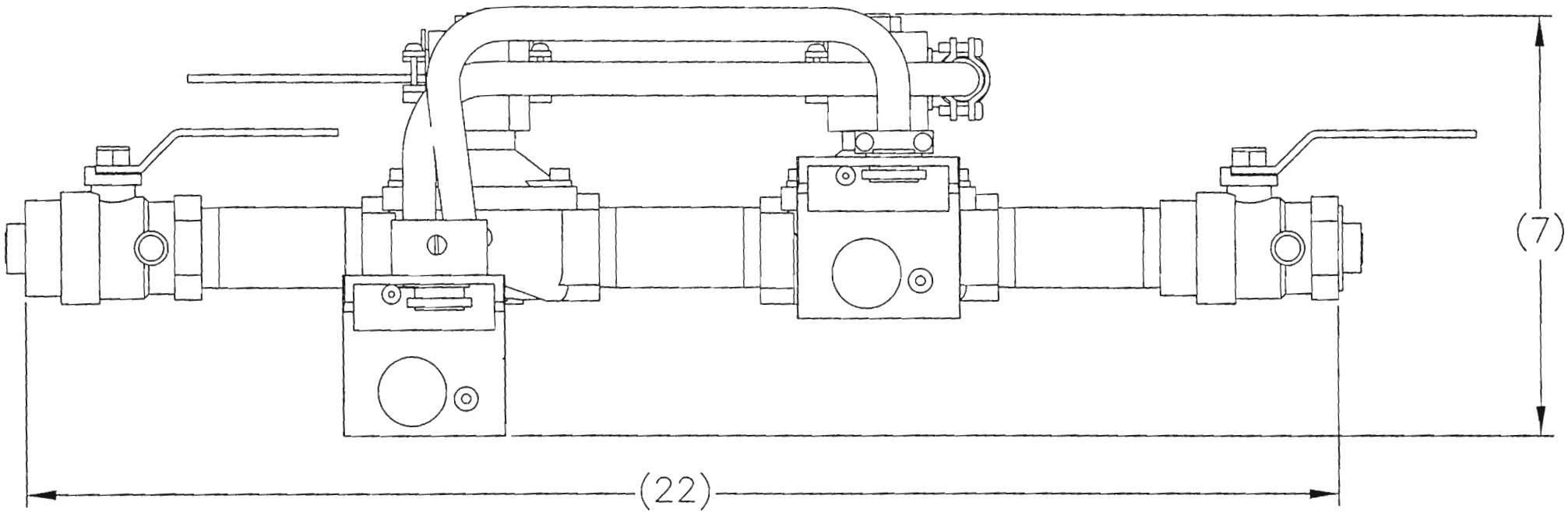


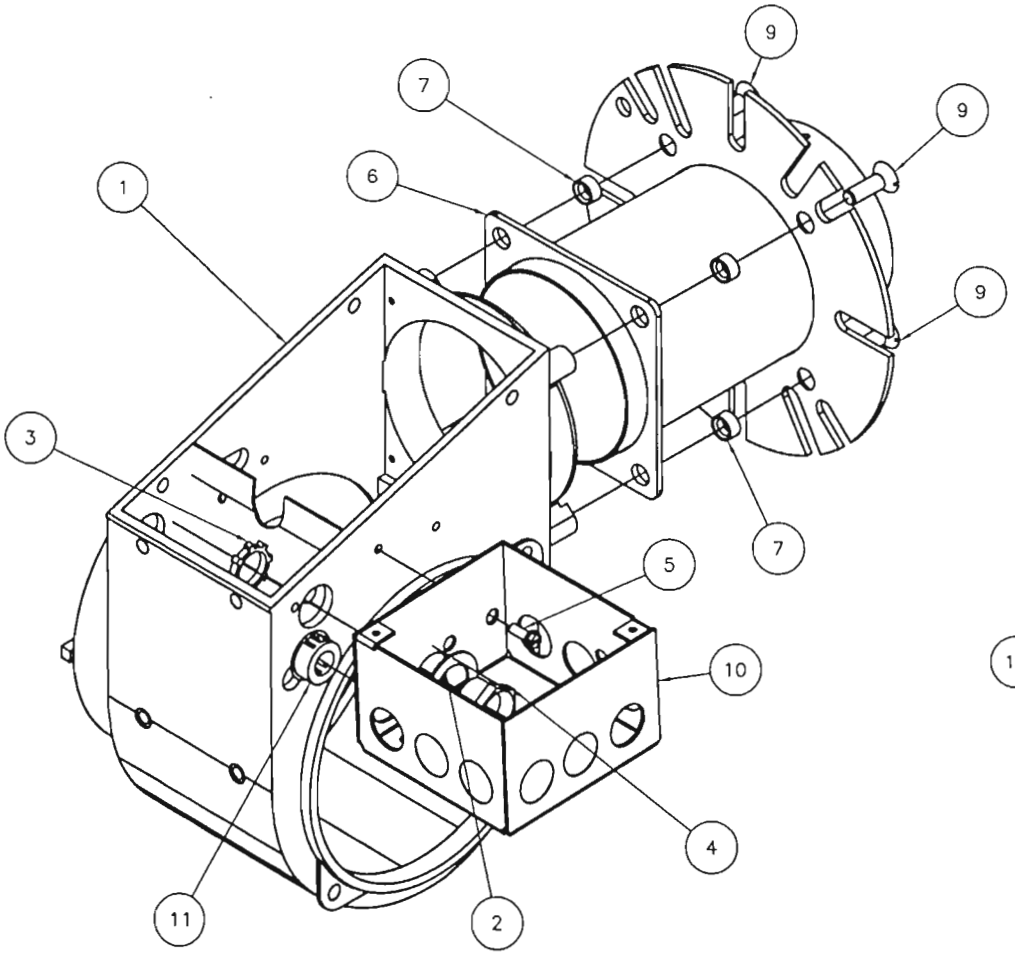
FIGURE 19 (CONT)

TUBE/HOUSING ASSEMBLY

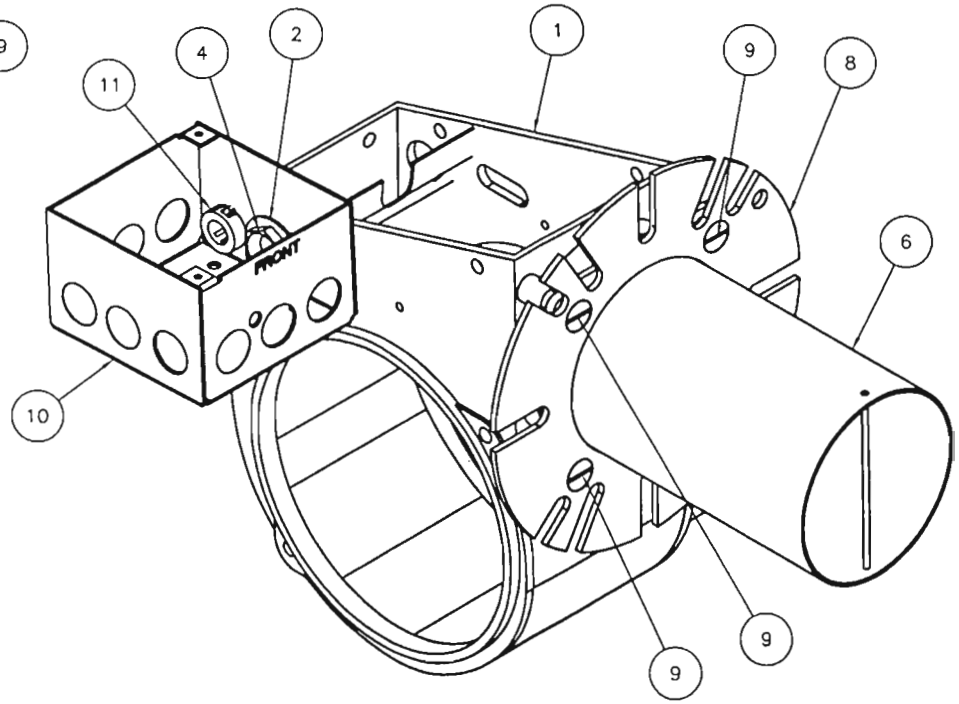
ITEM	PART NO.	DESCRIPTION	QTY	TYPE
11	12689	PLUG, HOLE .875 DIA.	1	P
10	64015-004	BOX,CONTROL-THERMO	1	M
9	100451-003	SCREW,FLSL 5/16-18 X 1.00"	4	P
8	62205-002	FLANGE, MOUNTING-COUNTERSINK	1	M
7	100893-001	SPACER,TUBE-1/4" BRASS	4	P
6	63477-001	TUBE/FLANGE-6" EHG	1	
5	12697	SCREW, HXSLT 23 10-24 X .5	1	P
4	12909	NIPPLE, CONDUIT	1	P
3	12910	LOCKNUT, CONDUIT	1	P
2	13167	WASHER, REDUCING 3/4 X 1/2	1	P
1	20372-005	HOUSING, MACHINED	1	M

Parts List

X = PART NUMBER WILL CHANGE WITH AIR TUBE LENGTH, REFER TO THE SPECIFICATION NUMBER BILL OF MATERIALS FOR PART NUMBER



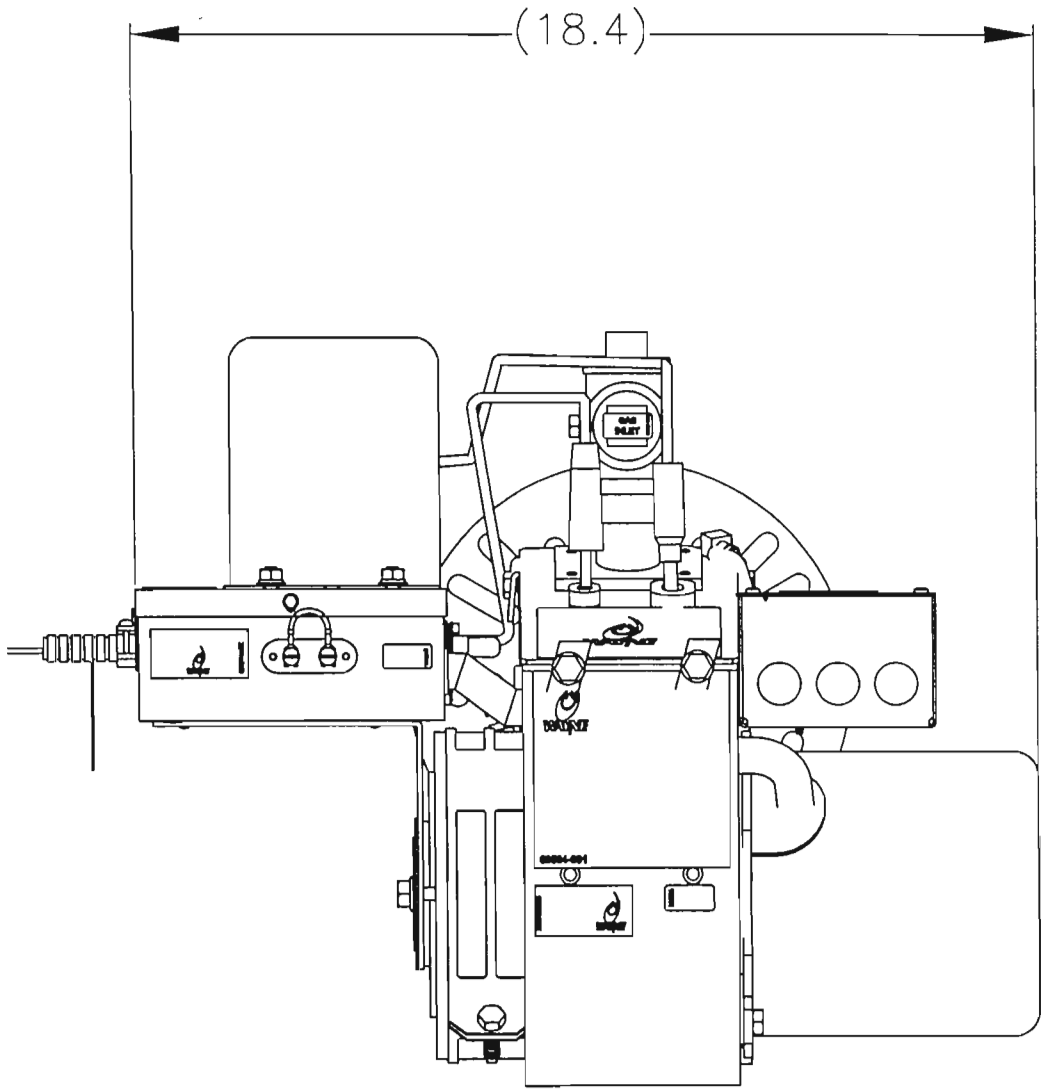
EXPLODED VIEW



ASSEMBLED VIEW

FIGURE 20

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)



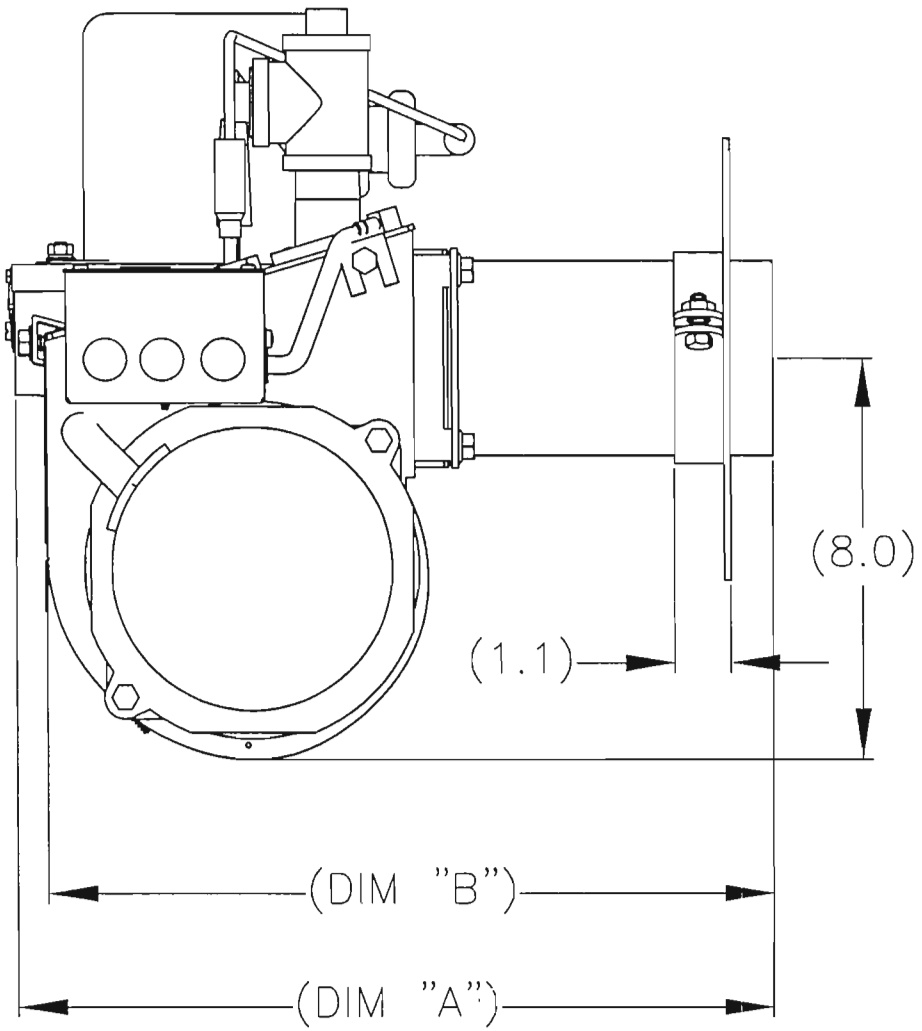
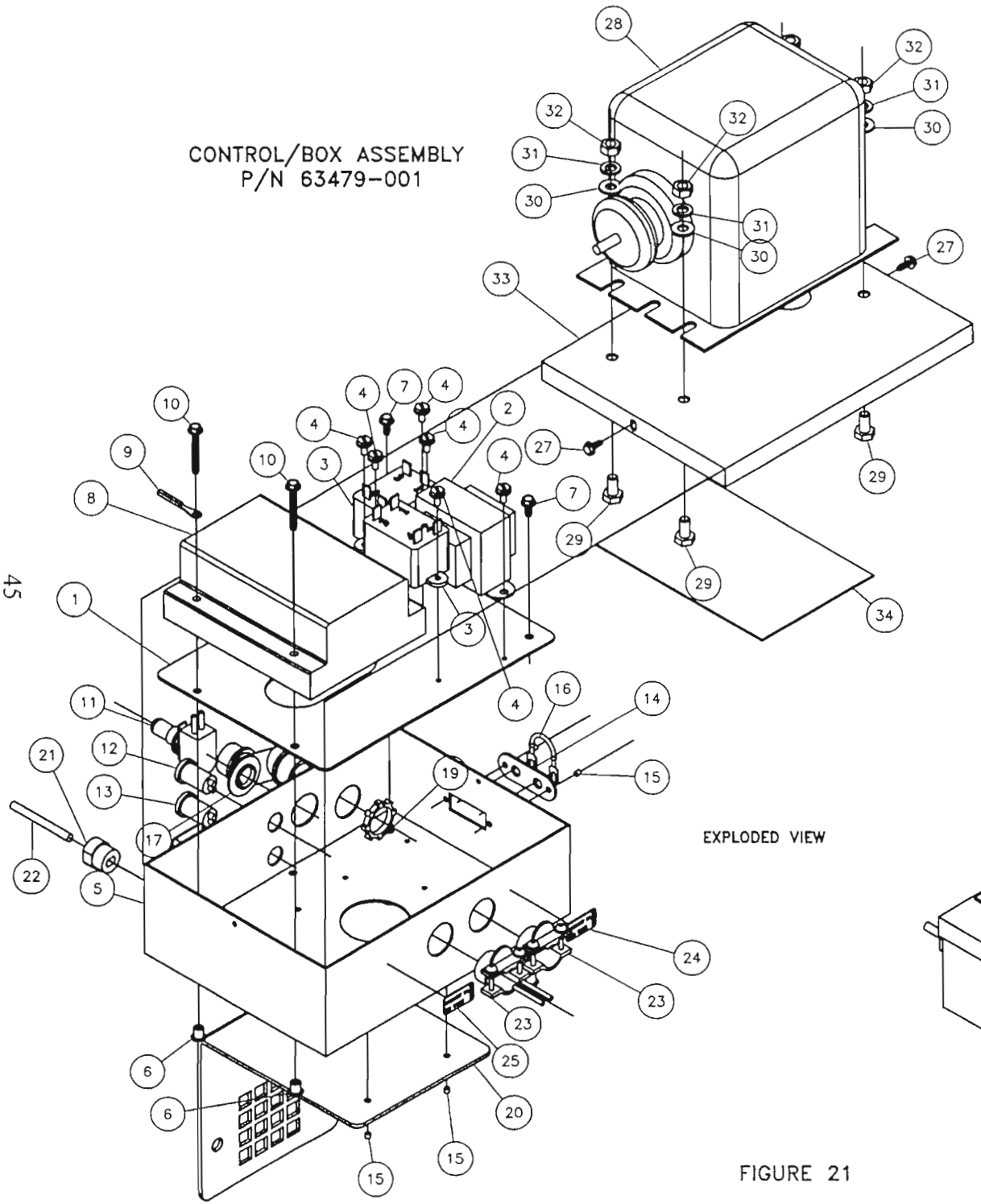
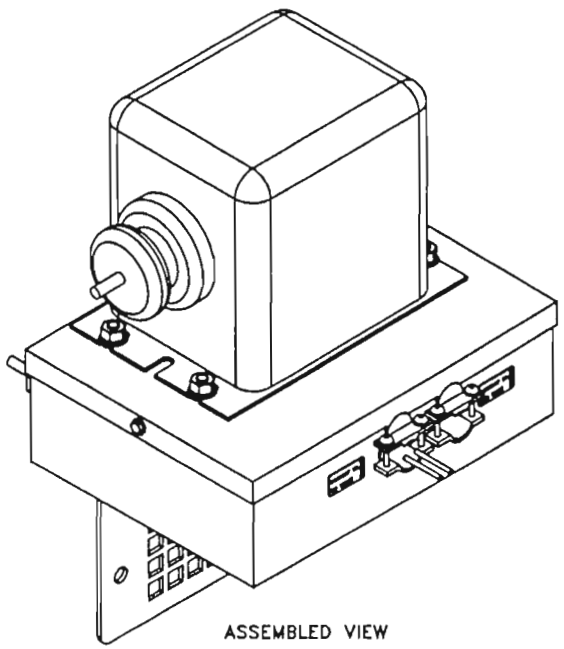


FIGURE 20

CONTROL/BOX ASSEMBLY
P/N 63479-001



EXPLODED VIEW

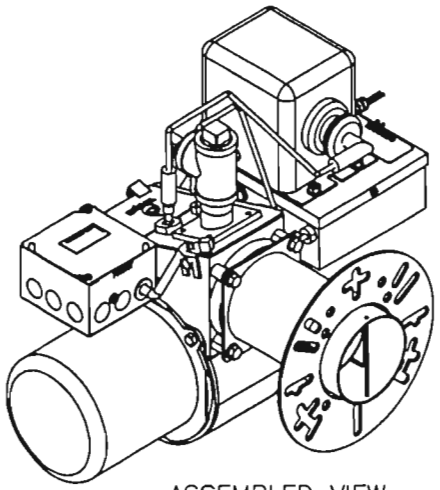


ASSEMBLED VIEW

ITEM	PART NO.	DESCRIPTION	QTY
34	63495-001	DECAL, WIRING DIAGRAM	1
33	63280-002	COVER, CONTROL BOX (M/F63280-	1
32	13313	NUT, 1/4 X 20 X .50	4
31	18003	WASHER, LOCK 1/4"	4
30	13367	WASHER, FLAT .25 ID .57 OD	4
29	18001-002	SCREW, SXSLTCS 1/4-20 X .50	4
28	63519-001	TRANSFORMER 542GP 120V	1
27	100603-001	SCREW, 6-20 X .375	2
26	63531-001	DECAL, BURNER OPERATING	1
25	63528-004	DECAL, GAS OUTLET	1
24	63528-003	DECAL, GAS OUTLET	1
23	13801	FITTING, CONDUIT 3/8	2
22	63499-001	WIRE,CONTROL SENSE 10"	1
21	13026	BUSHING STRAIN RELIEF .562 HOLE	1
20	63472-002	BRACKET, CONTROL BOX MOUNTING	1
19	12910	LOCKNUT, CONDUIT	1
18	63471-001	OFFSET NIPPLE, CONDUIT 1/2"	1
17	60226	BUSHING, METAL 7/8 HOLE ADAPTER	1
16	62411-017	WIRE, ASSEMBY WHITE 3"	1
15	61684	POP RIVET .12 X .28	5
14	60178-002	T-T TERMINAL	1
13	63470-002	LIGHT, INDICATOR GREEN	1
12	63470-001	LIGHT, INDICATOR AMBER	1
11	63469-001	SWITCH, TOGGLE	1
10	63473-001	SCREW - 8-32 X 1.25 HEXSLT	2
9	62411-034	WIRE, GROUND	1
8	62759-002	CONTROL, PRIMARY S89F	1
7	63473-002	SCREW, HXSLT 8-32 X .312"	2
6	63492-001	RIVNUT, FLAT HEAD ROUND BODY	4
5	63279-002	BOX, CONTROL (M/F 63279)	1
4	15731	SCREW, 6-32 X .312 HEXSLT	8
3	62406-002	RELAY, 24V 50/60 Hz	2
2	60186-004	TRANSFORMER, 120V/24V 50/60 Hz	1
1	63468-002	BRACKET, COMPONENT MOUNTING	1

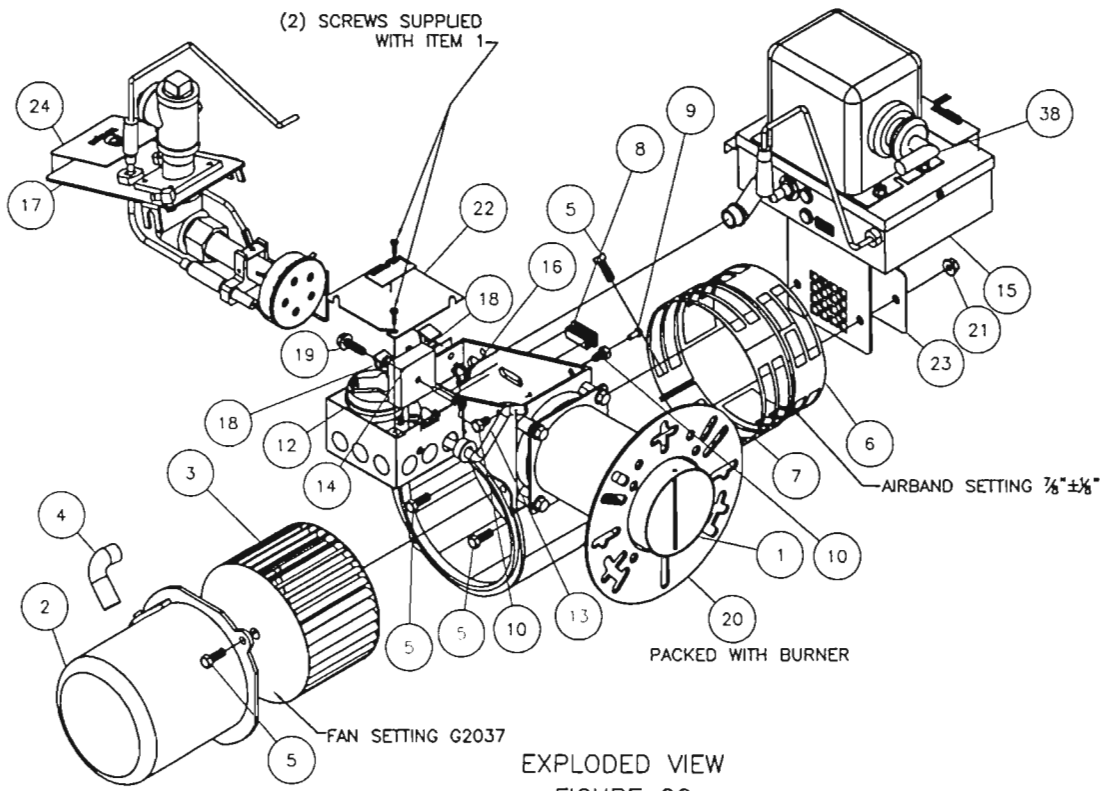
Parts List

FIGURE 21



ASSEMBLED VIEW

FINAL ASSEMBLY



EXPLODED VIEW
FIGURE 22

ITEM	PART NO.	DESCRIPTION	QTY
40	63863-XXX	DECAL, NEW YORK APPROVAL (SEE BOM)	1
39	JBOX SCREW	SCREW, FURNISHED WITH J-BOX	2
38	63308	WIRE, IGNITION 3" RIGHT ANGLE	1
37	61756-002	TAG, WIRING SUPPLY 105°C	1
36	60054	NUT, HEX 10-32	1
35	16635-002	WASHER,FLAT #8	2
34	61755	SCREW,RDPLMC 10-32 X 1.25"	1
33	62388-XXX	TIMER, 30 OR 60 SEC. 24VAC (SEE BOM)	1
32	63538-001	DECAL, PRESSURE REGULATOR	1
31	101267-001	DECAL, WAYNE LOGO	1
30	101265	DECAL, TECHNICAL ASSISTANCE	1
29	62960-001	DECAL, CARBON DIOXIDE WARNING	1
28	62460-XXX	DECAL, GAS TYPE (SEE BOM)	1
27	16201	DECAL, DATE CODE	1
26	100575-XXX	DECAL, SPEC. NUMBER MASTER (SEE BOM)	1
25	63534-XXX	DECAL, RATING (SEE BOM)	1
24	100010	DECAL WAYNE LOGO	1
23	63529-001	FAN INLET BLANK	1
22	13073	COVER, JUNCTION BOX	1
21	100408	NUT, LOCK 5/16-18 .50 HX	2
20	21756-011	FLANGE ASSEMBLY, ADJUSTABLE	1
19	13360	SCREW, 5/16 -18 X 1.00	2
18	100689-001	CLIP, COVER	2
17	X	COVER/MANIFOLD ASSEMBLY	1
16	12910	LOCKNUT, CONDUIT	1
15	63479-X	CONTROL BOX ASSEMBLY	1
14	63244-002	SCREW, FILLESTER 10-24 X .250I	1
13	63923-001	BULK,VINYL TUBING 1/4"ID	1
12	63263-005	SWITCH, AIR SENSING SP.2	1
11	13034	BUSHING,SNAP-HEYCO SB-875-8	1
10	13045	SCREW, 5/16-18 X .50 THREAD CUTTING	2
9	12697	SCREW, HXSLT 23 10-24 X .5	1
8	63467-001	PLUG, 5/8 X 1 3/8	1
7	2668-002	AIR BAND, OUTER E	1
6	2669-002	AIR BAND, INNER E	1
5	12701	SCREW, 5/16-18 X .88	5
4	13121	MOTOR CORD COVER	1
3	21854	BLOWER WHEEL 6.23 OD X 4.14W	1
2	20383	MOTOR, 1/4HP 120V	1
1	X	AIR TUBE/HOUSING ASSEMBLY	1

Parts List

X = PART NUMBER WILL CHANGE WITH AIR TUBE LENGTH, REFER TO THE SPECIFICATION NUMBER BILL OF MATERIALS FOR PART NUMBERS

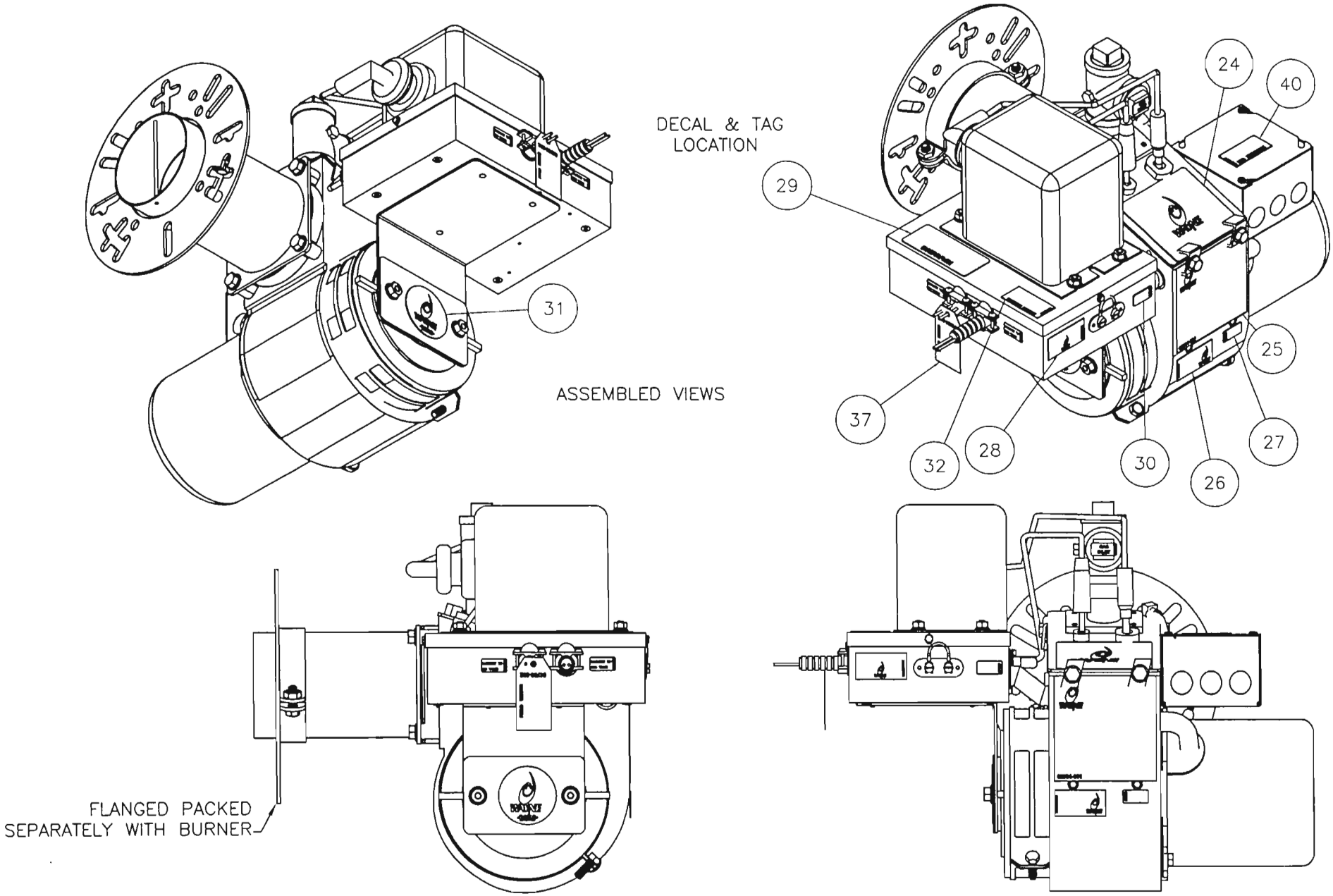


FIGURE 22 (CONT)

CONTROL BOX ASSEMBLY
P/N 63479-XXX

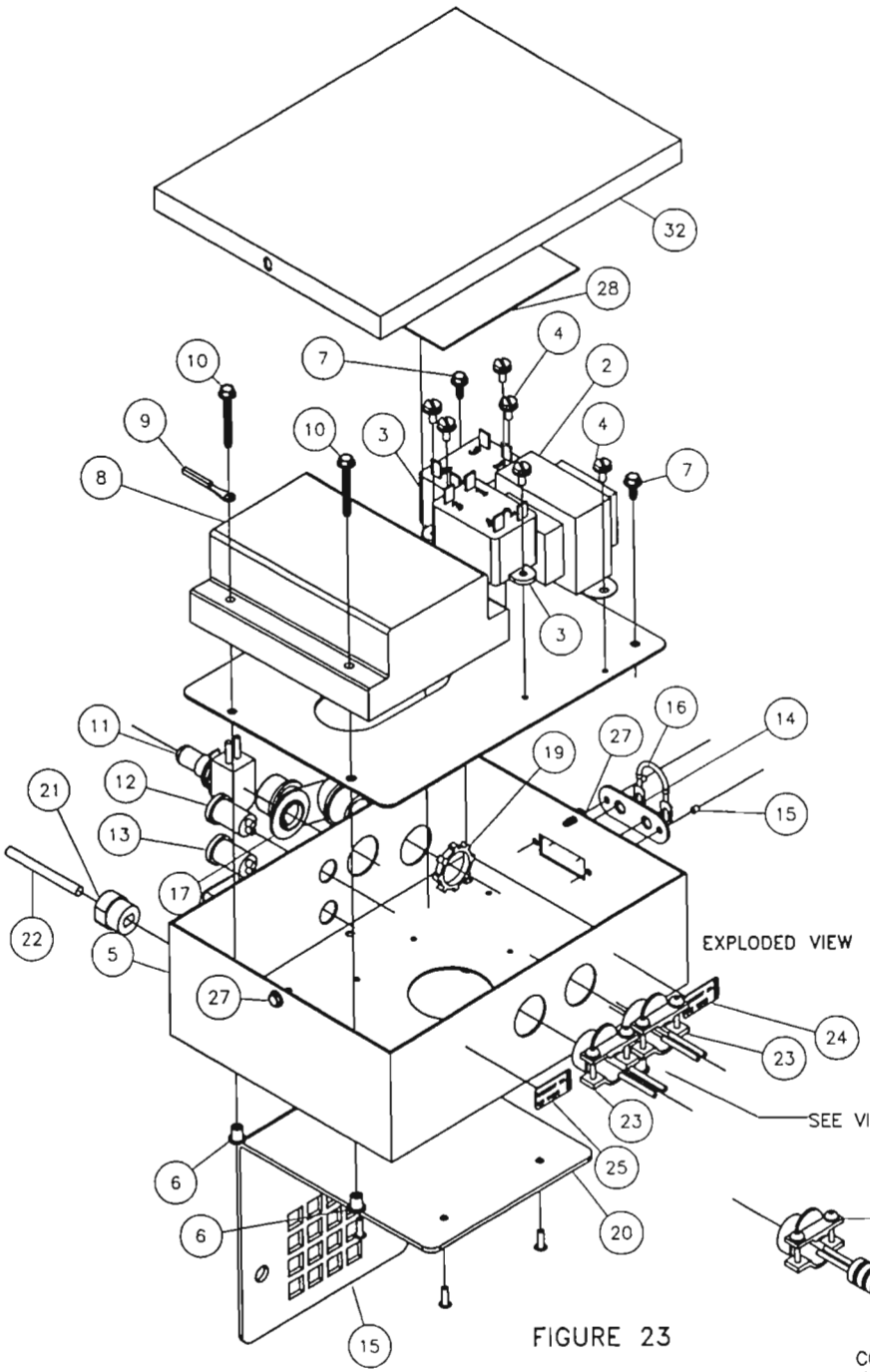
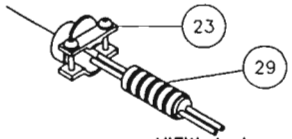


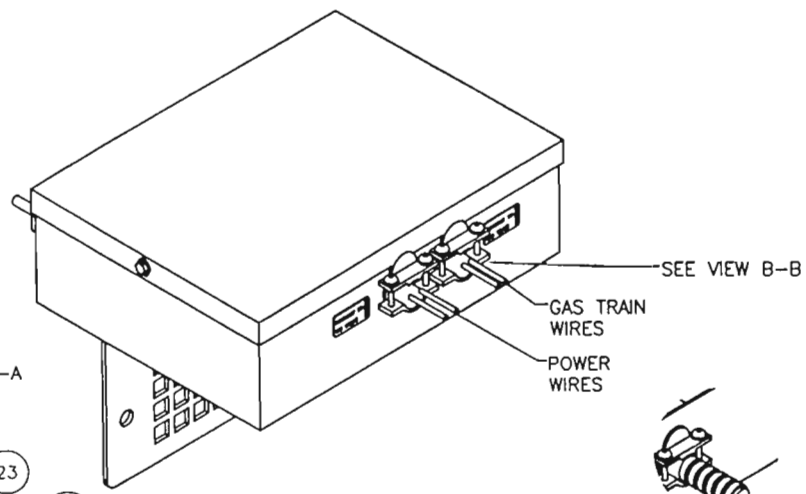
FIGURE 23

ITEM	PART NO.	DESCRIPTION	QTY
32	63280-001	COVER, CONTROL BOX	1
31	62411-002	WIRE, BLACK 15"	2
30	100594-001	POP RIVET, .12 X .400 LG FLSTL	3
29	100196-009	CONDUIT, FLEXIBLE 3 /8" X 44.5"	1
28	SEE BOM	DECAL, WIRING DIAGRAM	1
27	100603-001	SCREW, 6-20 X .375	2
26	63531-001	DECAL, BURNER OPERATING	1
25	63528-004	DECAL, CONNECT TO 120V	1
24	63528-003	DECAL, CONNECT TO GAS TRAIN	1
23	13801	FITTING, CONDUIT 3/8	2
22	63499-001	WIRE,CONTROL SENSE 10"	1
21	13026	BUSHING STRAIN RELIEF .562 HOLE	1
20	63472-002	BRACKET, CONTROL BOX MOUNTING	1
19	12910	LOCKNUT, CONDUIT	1
18	63471-001	OFFSET NIPPLE, CONDUIT 1/2"	1
17	60226	BUSHING, METAL 7/8 HOLE ADAPTER	1
16	62411-017	WIRE, ASSEMBY WHITE 3"	1
15	61684	POP RIVET .12 X .28	2
14	60178-002	T-T TERMINAL	1
13	63470-002	LIGHT, INDICATOR GREEN	1
12	63470-001	LIGHT, INDICATOR AMBER	1
11	63469-001	SWITCH, TOGGLE	1
10	63473-001	SCREW - 8-32 X 1.25 HEXSLT	2
9	62411-034	WIRE, GROUND	1
8	X	CONTROL, PRIMARY S89 (SEE BOM FOR P/N)	1
7	63473-002	SCREW, HXSLT 8-32 X .312"	2
6	63492-001	RIVNUT, FLAT HEAD ROUND BODY	4
5	63279-002	BOX, CONTROL (M/F 63279)	1
4	15731	SCREW, 6-32 X .312 HEXSLT	6
3	62406-002	RELAY, 24V 50/60 Hz	2
2	60186-004	TRANSFORMER, 120V/24V 50/60 Hz	1
1	63468-002	BRACKET, COMPONENT MOUNTING	1

Parts List

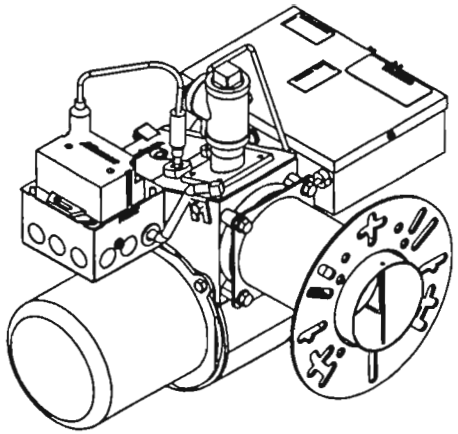


VIEW A-A
CONDUIT 100196-009
USED ON MODELS WITH
THE S89E CONTROL



ASSEMBLED VIEW

VIEW B-B
CONDUIT 100196-
USED ON MODELS
THE S89E CONTRC



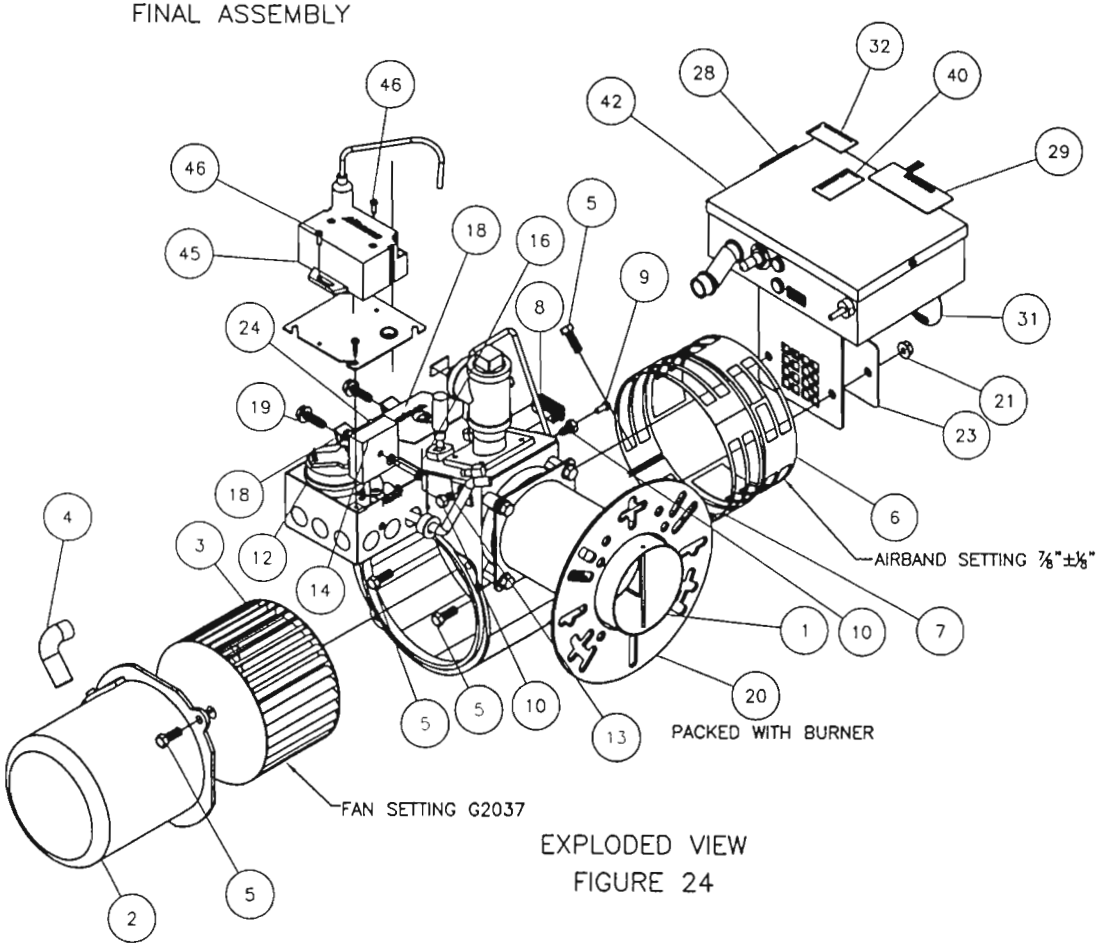
ASSEMBLED VIEW

ITEM	PART NO.	DESCRIPTION	QTY
47	63556-042	MANIFOLD, COVER ASSY	1
46	18007	SCREW,HEXSLT #8 X 1/2" SELF DRILL	2
45	63873-001	IGNITOR,120V/50-60HZ-ALLANSON	1
44	60177-001	BUSHING,SNAP INSULATING .50"	1
43	13073-002	COVER, JUNCTION BOX	1
42	63479-004	CONTROL BOX ASSY	1
40	63863-XXX	DECAL, NEW YORK APPROVAL (SEE BOM)	1
39	JBOX SCREW	SCREW, FURNISHED WITH J-BOX	2
37	61756-002	TAG, WIRING SUPPLY 105°C	1
36	60054	NUT, HEX 10-32	1
35	16635-002	WASHER,FLAT #8	2
34	61755	SCREW,RDPLMC 10-32 X 1.25"	1
33	62388-XXX	TIMER, 30 OR 60 SEC. 24VAC (SEE BOM)	1
32	63538-001	DECAL, PRESSURE REGULATOR	1
31	101267-001	DECAL, WAYNE LOGO	1
30	101265	DECAL, TECHNICAL ASSISTANCE	1
29	62960-001	DECAL, CARBON DIOXIDE WARNING	1
28	62460-XXX	DECAL, GAS TYPE (SEE BOM)	1
27	16201	DECAL, DATE CODE	1
26	100575-XXX	DECAL, SPEC. NUMBER MASTER (SEE BOM)	1
25	63534-XXX	DECAL, RATING (SEE BOM)	1
24	100010	DECAL WAYNE LOGO	1
23	63529-001	FAN INLET BLANK	1
21	100408	NUT, LOCK 5/16-18 .50 HX	2
20	21756-011	FLANGE ASSEMBLY, ADJUSTABLE	1
19	13360	SCREW, 5/16 -18 X 1.00	2
18	100689-001	CLIP, COVER	2
16	12910	LOCKNUT, CONDUIT	1
14	63244-002	SCREW, FILLESTER 10-24 X .250I	1
13	63923-001	BULK,VINYL TUBING 1/4"ID	1
12	63263-005	SWITCH, AIR SENSING SP.2	1
11	13034	BUSHING,SNAP-HEYCO SB-875-8	1
10	13045	SCREW, 5/16-18 X .50 THREAD CUTTING	2
9	12697	SCREW, HXSLT 23 10-24 X .5	1
8	63467-001	PLUG, 5/8 X 1 3/8	1
7	2668-002	AIR BAND, OUTER E	1
6	2669-002	AIR BAND, INNER E	1
5	12701	SCREW, 5/16-18 X .88	5
4	13121	MOTOR CORD COVER	1
3	21854	BLOWER WHEEL 6.23 OD X 4.14W	1
2	20383	MOTOR, 1/4HP 120V	1
1	X	AIR TUBE/HOUSING ASSEMBLY	1

Parts List

X = PART NUMBER WILL CHANGE WITH AIR TUBE LENGTH, REFER TO THE SPECIFICATION NUMBER BILL OF MATERIALS FOR PART NUMBERS

FINAL ASSEMBLY



EXPLODED VIEW
FIGURE 24

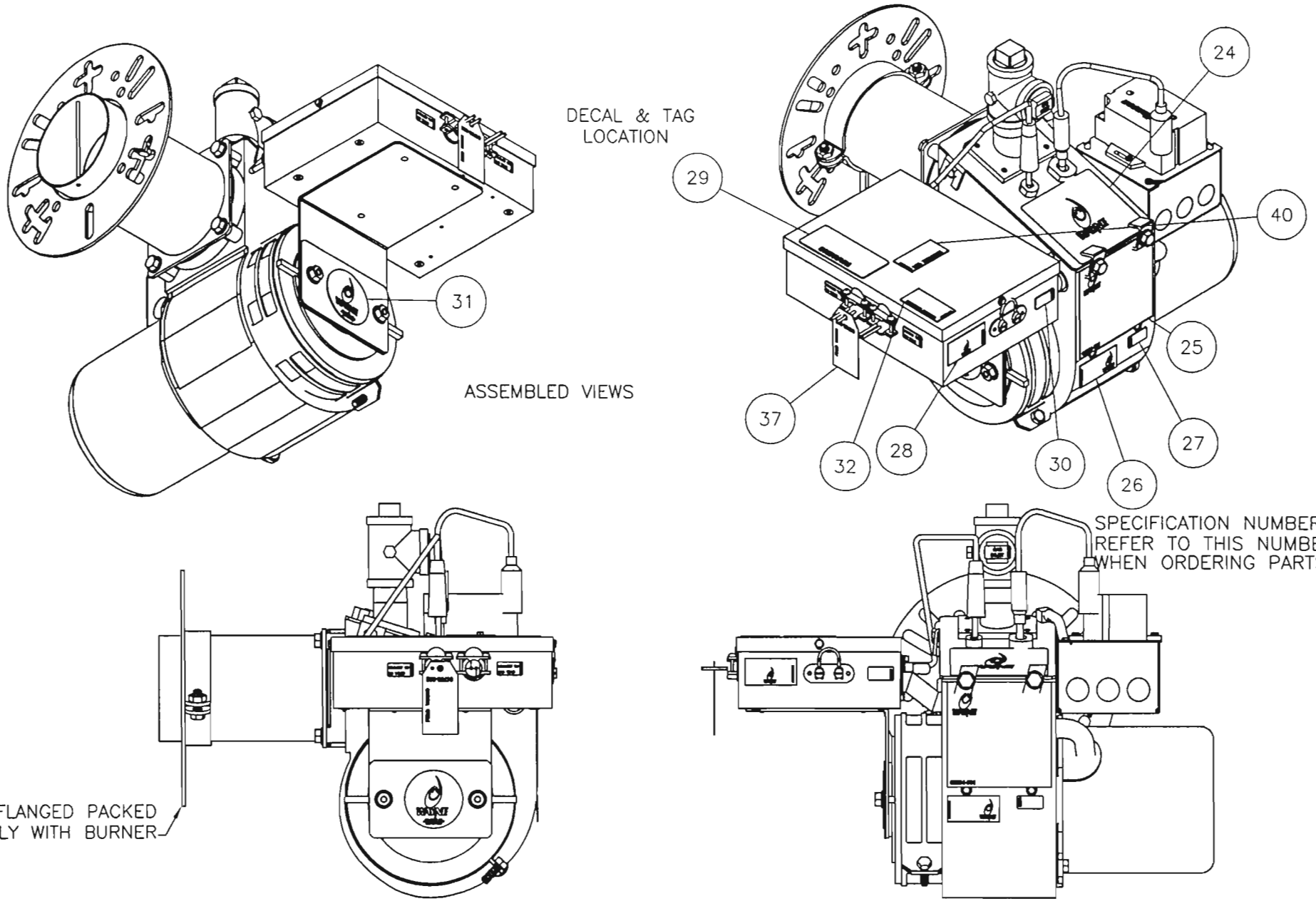
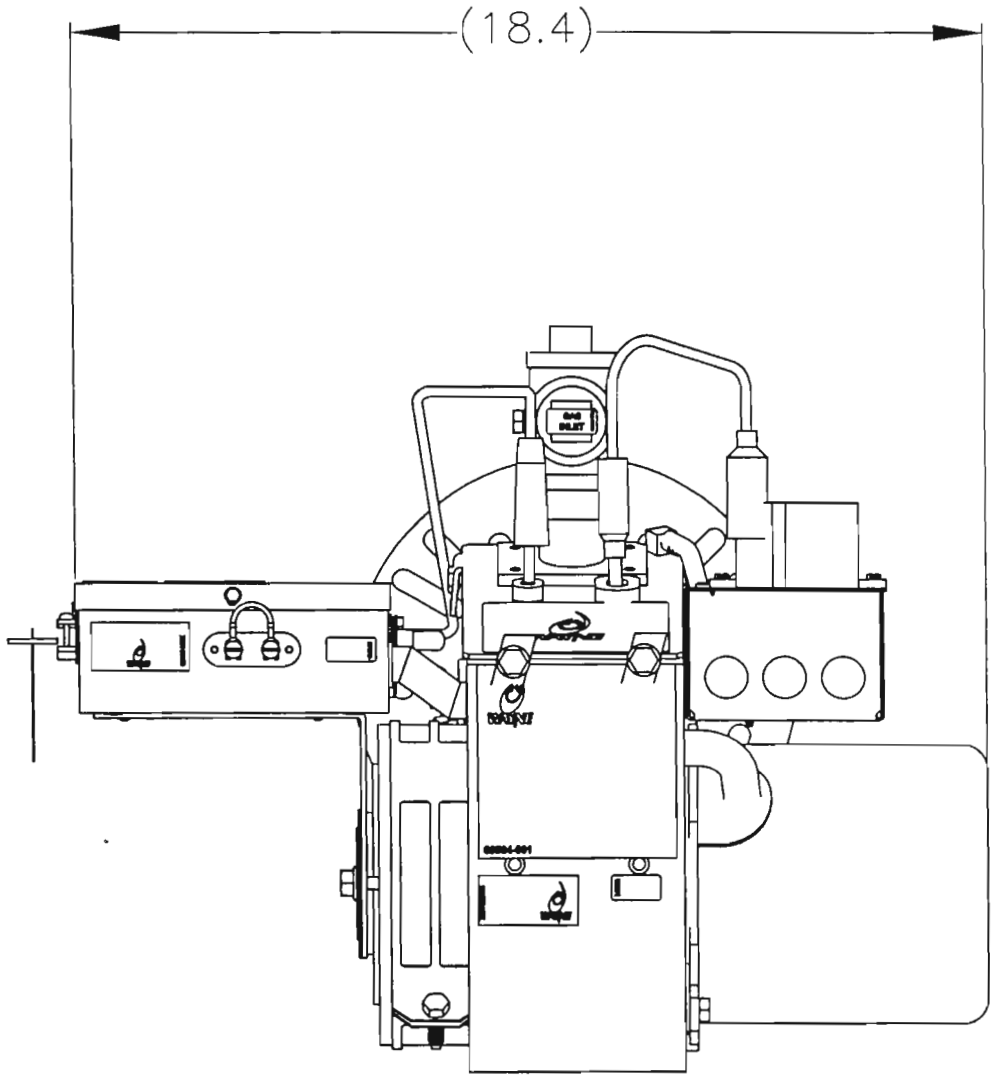


FIGURE 24 (CONT.)

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)



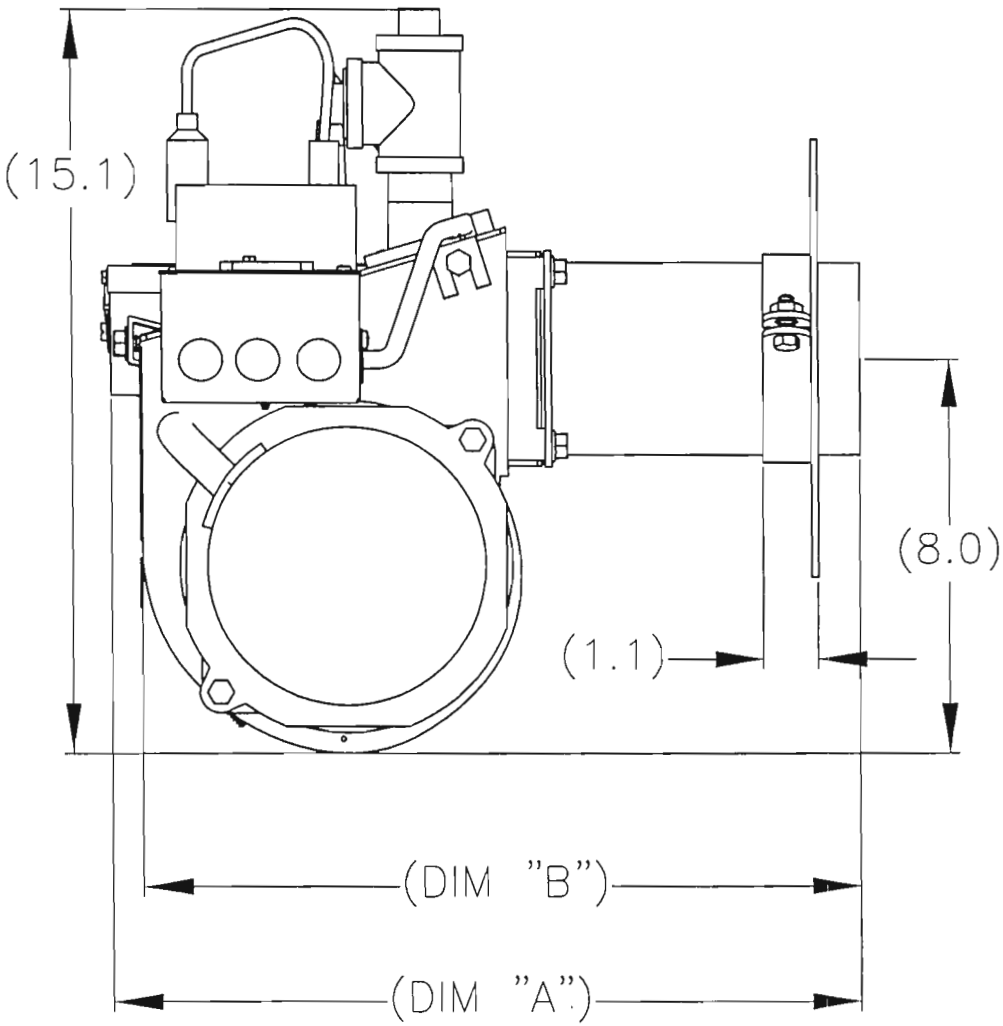


FIGURE 25