



TUBE HEATER TROUBLESHOOTING GUIDE

MODELS: HLV Series Tube Heater

THESE HEATERS **MUST** BE INSTALLED AND SERVICED BY TRAINED GAS INSTALLATION AND SERVICE PERSONNEL ONLY. READ AND UNDERSTAND ALL INSTRUCTIONS THOROUGHLY BEFORE ATTEMPTING TO INSTALL, OPERATE OR SERVICE THE DETROIT RADIANT PRODUCTS COMPANY HEATER. FAILURE TO COMPLY WITH THESE WARNINGS AND INSTRUCTIONS, AND THOSE ON THE HEATER, COULD RESULT IN PERSONAL INJURY, DEATH, FIRE, ASPHYXIATION AND/OR PROPERTY DAMAGE. RETAIN THESE INSTRUCTIONS FOR FUTURE REFERENCE.

CAUTION! Heater may be hot. Do not store or use gasoline or other flammable vapors and liquids in the vicinity of this or any other appliance. Note presence of flammable gas and electrical shock hazard.

WARNING! Extinguish open flame while servicing heaters. Test for gas leaks with soap and water solution only. Wear safety glasses while servicing unit.

FOR YOUR SAFETY!

IF YOU SMELL GAS:

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

SHUTDOWN INSTRUCTIONS!

1. Open electrical circuit.
2. Rotate heater's manual gas valve knob to "OFF" position.

Approval Standards and Certifications

Detroit Radiant Products units comply with or are certified by the following Organizations or Standards:

- American National Standards (ANSI Z83.6)
- Occupational Safety and Health Act (OSHA)
- American Gas Association (AGA)
- International Approval Services (IAS)

IMPORTANT: Any alteration of the system or of the factory-authorized components specified either in this manual or by Detroit Radiant Products Company voids all certification and warranties.

Detroit Radiant Products Company

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Tube Heater Vacuum System

Warnings

Detroit Radiant Products Company cannot anticipate every use which may be made of their heaters. Check with your local fire safety authority if you have questions about local regulations.

This infrared heater is designed for use in industrial and commercial buildings such as warehouses, manufacturing plants, aircraft hangars, service garages, etc.

Maintain all clearances to combustibles at all times!
See page 5 for clearance to combustibles guidelines.

WARNING!

This heater must be installed and serviced by trained gas installation and service personnel only. Read and understand these instructions thoroughly before attempting to install, operate or service this heater. Failure to comply could result in personal injury, asphyxiation, death, fire, and/or property damage. Retain these instructions for future reference.

WARNING!

This is not an explosion-proof heater. Where there is the possibility of exposure to flammable vapors, consult the local fire marshal, the fire insurance carrier and other authorities for approval of the proposed installation.

WARNING!

NOT FOR RESIDENTIAL USE!

Do not use in the home, sleeping quarters, attached garages, etc.

WARNING!

Do not operate heater with any part bypassed, with any part failed or in any scenario that may compromise safety.

IMPORTANT!

Any alteration of the system or of factory-authorized components specified in this manual or by Detroit Radiant Products Company voids all certification and warranties.

Operation

4. OPERATION

4.1 Electrical Requirements

1. The system operates on 120V, 60 Hz.
2. The system must be grounded in accordance with the National Electrical Code NFPA 70 latest edition.
3. The system must be installed in accordance with the typical wiring diagrams (see Figures 4-1 & 4-2).
4. Figure 4-3 illustrates the wiring of a PB series pump assembly.
5. All systems are two-stage heat systems and will be operated by a two-stage controller.
6. Check vacuum pump to ensure wiring is correct for proper fan wheel rotation. Check directional arrow on pump housing for proper wheel rotation.
7. The amperage draws for the individual HLV components are as follows. The circuit(s) must be sufficient to handle the starting current of the burner control boxes and the running amperage of the pump.

HLV VACUUM PUMPS	RUNNING CIRCUIT (amp)
NC-7	2.2
PB-8	7.6
PB-9	9.6
PB-10A	11.4

HLV BURNER CONTROL BOX CIRCUIT (amp)	STARTING	RUNNING
	1.0	0.2

4.2 Burner Lighting Instructions

1. Purge main gas supply line.
2. Rotate burner's manual gas valve knob to the "ON" position.
3. Close electrical circuit.
4. If burner fails to light, turn off gas and wait five minutes before repeating the above procedure.

4.3 Burner Shutdown Instructions

1. Open electrical circuit.
2. Rotate burner's manual gas valve to the "OFF" position.

4.4 Theory of Operation

Starting Circuit (Figures 4.1 and 4.2)

There is constant line voltage sitting at both the vacuum pump and burner(s). When the thermostat closes it sends power to relays at both the vacuum pump and burner(s).

At the vacuum pump, the relay closes to allow a completed circuit across L1 and L2.

At the burner control box negative air pressure generated by the vacuum pump will cause the normally open differential switch to close. A low voltage circuit is completed from the secondary side of the transformer through the relay and pressure switch to the control module. The hot surface igniter is now immediately powered. After the ignitor has been powered for 4-5 seconds, the control causes the gas valve to open and then initiates a 15 second ignition trial.

Running Circuit

After ignition, the flame rod monitors the flame. As long as a flame is present, the valve is held open. If proof of flame is not established within 15 seconds, the unit will attempt ignition two more times and then lock out. If lockout occurs, the control can be reset by briefly interrupting the power source.

If the flame is established for a period of time and then lost, the control acts to close the valve within one second, and a new trial sequence identical to that at start-up is initiated.

Tube Heater Vacuum System

Internal Wiring for Burner Control Box

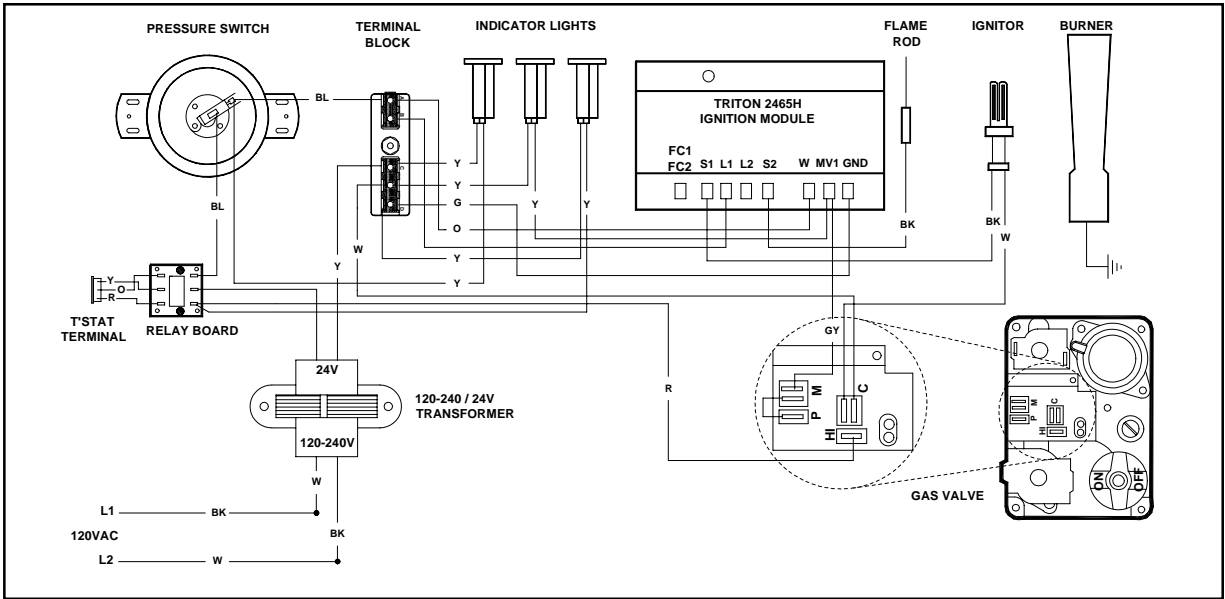


Figure 4-1 Block Wiring Diagram

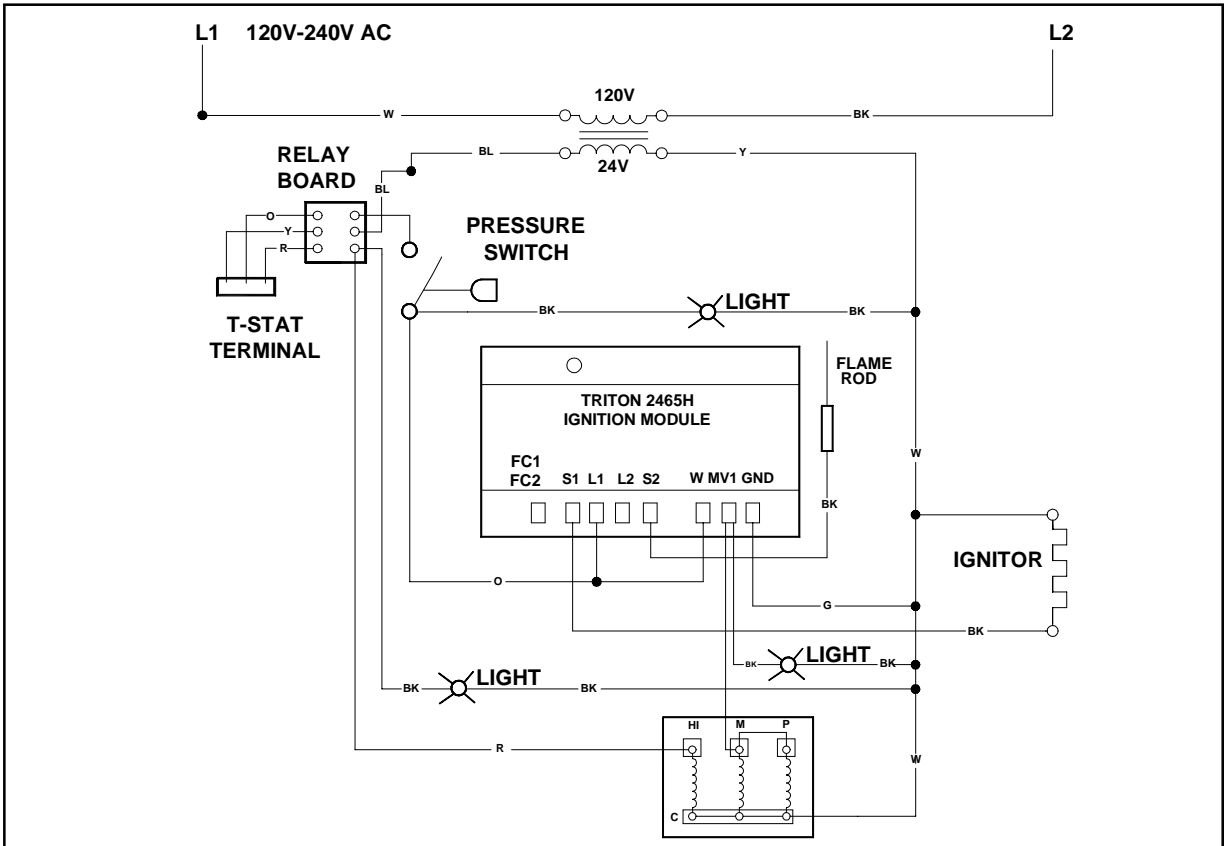


Figure 4-2 Ladder Wiring Diagram

Installation

Internal Wiring for Pump & Panel Assembly

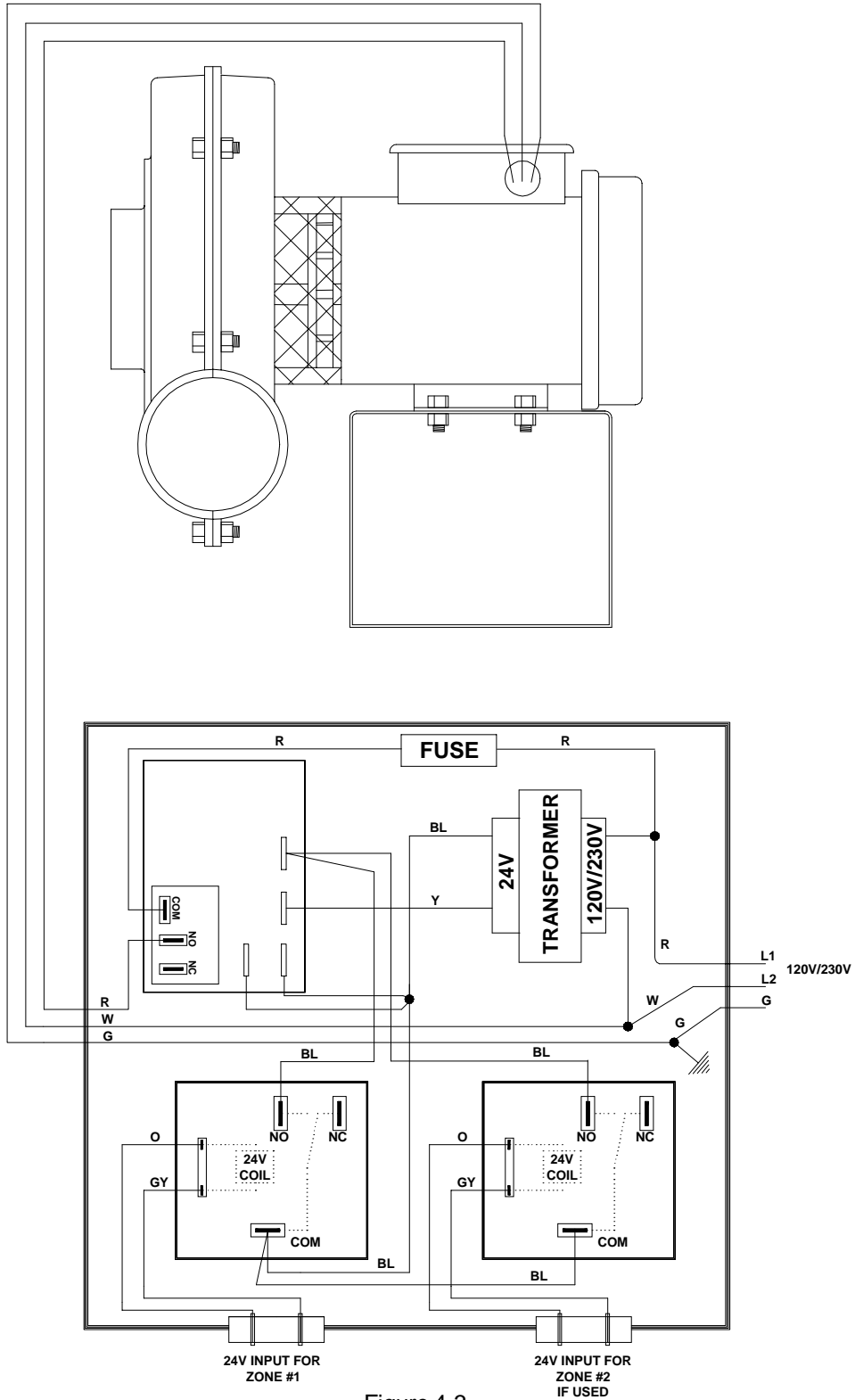


Figure 4-3

Tube Heater Vacuum System

System Field Wiring

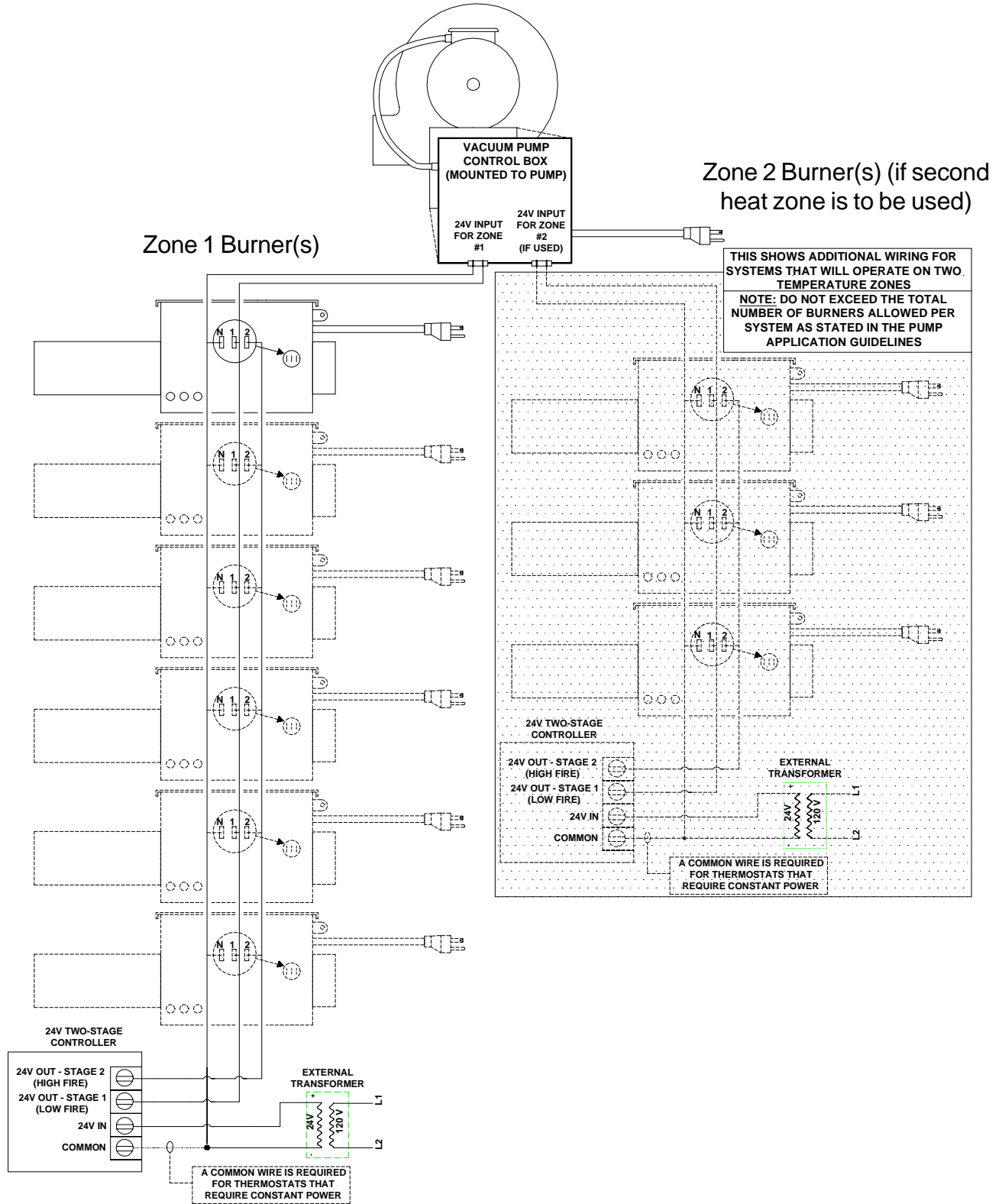


Figure 4-4

Operation

4.5 System Start-Up and Damper Setting

1. Recheck installation of gas piping, electrical, etc.
2. Preset primary and secondary dampers to half open.
3. Unassisted outside combustion air ducts (if required) must be installed before start-up.
4. Fan assisted outside combustion air ducts (if used) must not be connected to control box upon initial start-up.
5. To set the dampers, the system must be run for 20 minutes in High Fire Mode. Check to make sure all lights on the burner control are on .
6. All dampers in the system are initially set to half closed. If a burner does not light and stay lit, the damper for that burner will need to be adjusted to get the burner to light for the initial 20 minute start-up.
7. Using a manometer with an adequate range, measure the vacuum at the burner (Figure 4-5) farthest away from the vacuum pump. Adjust the primary damper at the pump until the manometer reaches the specified reading shown in the chart below.
8. If secondary dampers have been installed in the system, connect manometer to the designated burner and set secondary damper to the specified reading shown in the chart below.
9. All dampers must now be readjusted a second time in the same order. Lock the dampers in place.

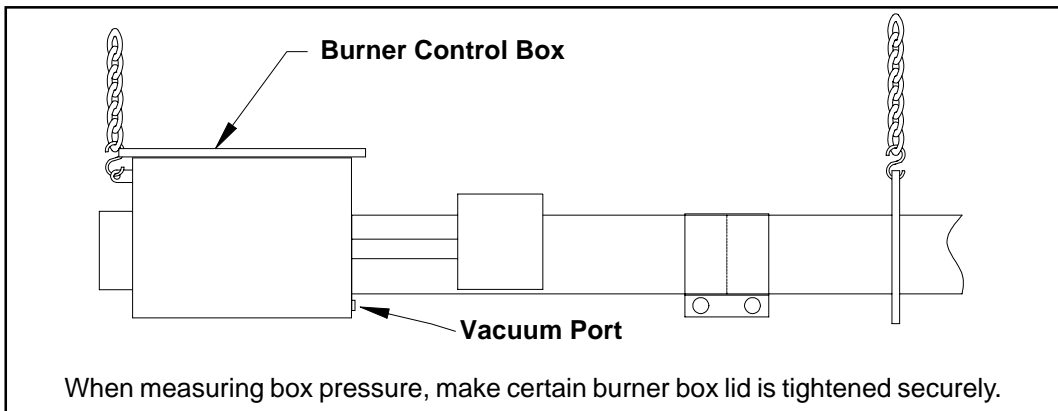


Figure 4-5

Each system damper must be adjusted to obtain the following box pressure. The systems must be operating for a minimum of 20 minutes before adjusting the dampers to the following setpoints.

BTU Rating	Box Pressure (inches W.C.)	
50,000 - 60,000	-0.51	+/- .01
75,000 - 110,000	-0.19	+/- .01
120,000 - 180,000	-0.22	+/- .01
200,000 - 225,000	-0.19	+/- .01

Tube Heater Vacuum System

5. MAINTENANCE

The HLV Series Vacuum System requires basic maintenance to keep it operating at peak performance. This system requires no filters to be replaced.

- 1. Routinely inspect the vent intakes and vent exhausts for dirt and/or obstructions. If dirt becomes a problem, installation of outside air intake ducts for combustion are recommended.
- 2. Keep the aluminum reflectors clean using a light soap and water solution. Use a metal polish if reflectors are severely dirty. Maintenance of the reflectors can vary significantly depending on the environment.

- 3. Annually inspect the exhauster system for abnormal noise. Consult factory for troubleshooting.
- 4. Periodically check the integrity of the combustion tube and heat exchangers. Replace if there are signs of structural failure.

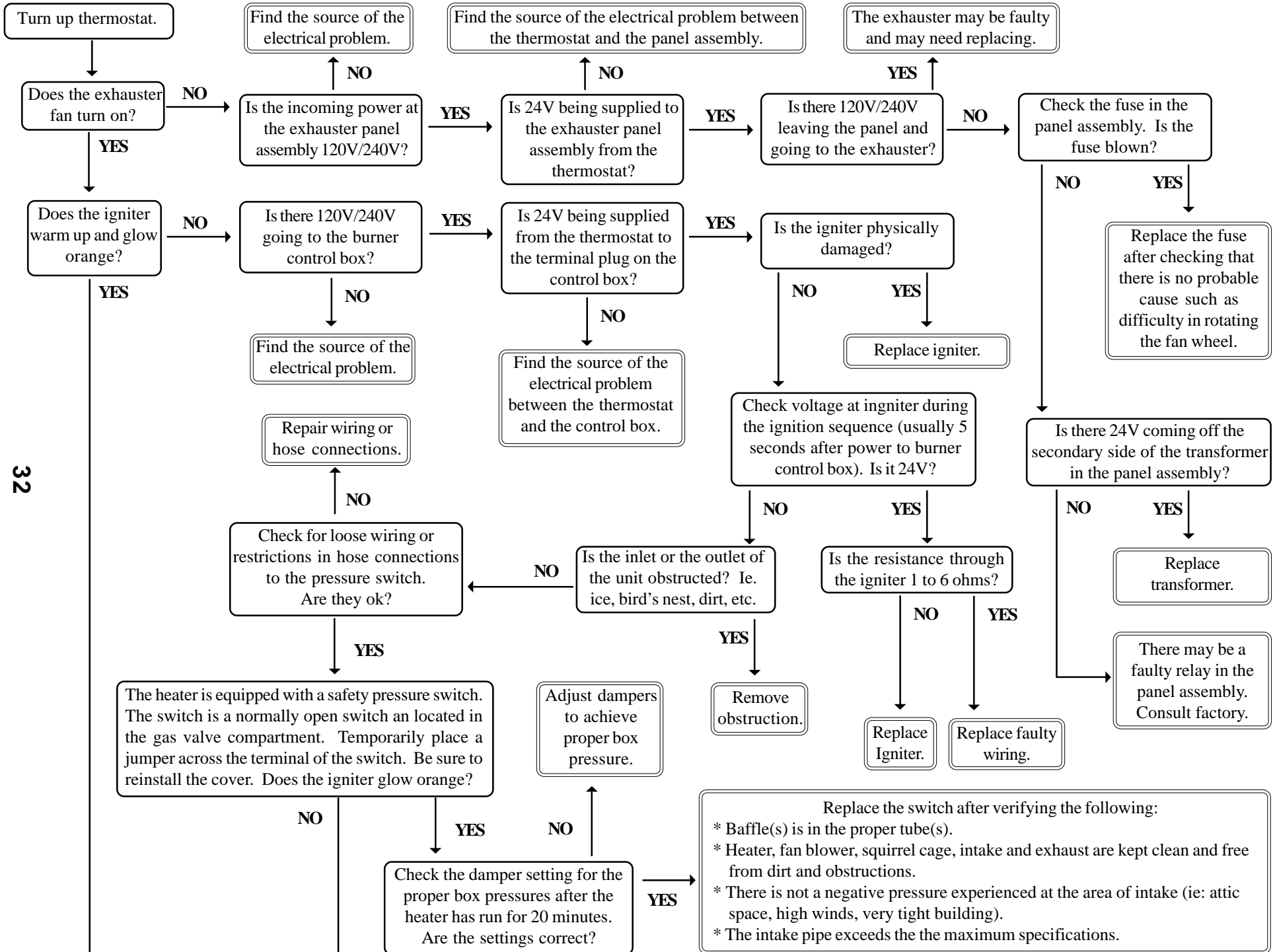
Date	Maintenance Performed	Replacement Components Required

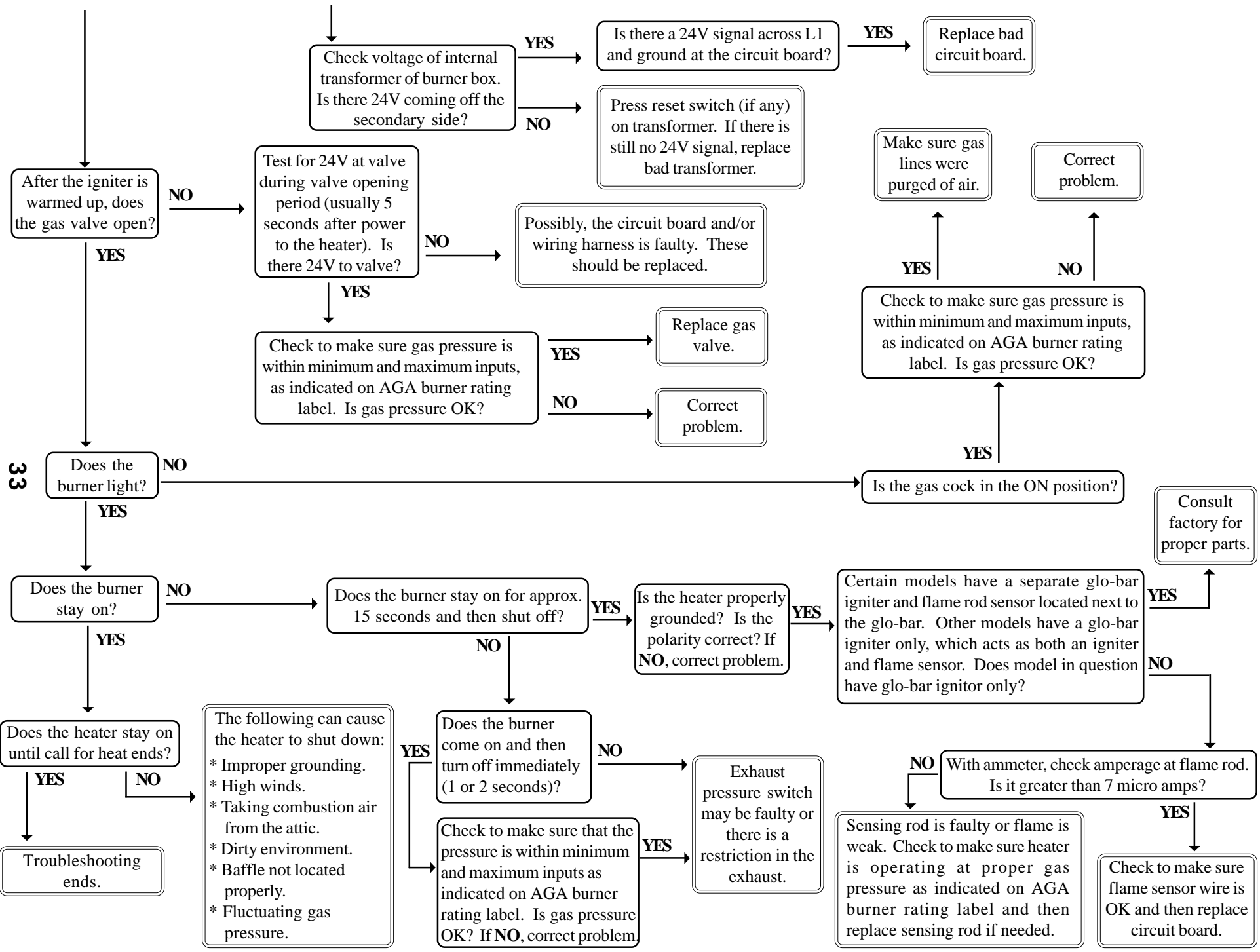
Maintenance

5.1 Troubleshooting Chart

General Trouble Shooting Chart		
SYMPTOM	POSSIBLE CAUSE	CORRECTIVE ACTION
Thermostat closed but nothing happens.	<ol style="list-style-type: none"> 1. Blown fuse. 2. Defective thermostat. 3. Defective vacuum pump relay. 4. Loose or disconnected wire. 5. Defective vacuum pump. 	<ol style="list-style-type: none"> 1. Replace. 2. Replace. 3. Replace. 4. Repair as required. 5. Repair or replace.
Thermostat closed. Vacuum pump operates. Vacuum indicating light off.	<ol style="list-style-type: none"> 1. Low vacuum pressure setting. 2. Loose or disconnected wiring. 3. Plugged or restricted exhaust vent. 4. Plugged vacuum pressure switch lines. 5. Defective circuit control. 	<ol style="list-style-type: none"> 1. Adjust burner box to proper specified pressure. 2. Replair as needed. 3. Clean. 4. Clean or replace. 5. Replace.
Thermostat closed. Vacuum pump operates. Vacuum indicating light on. No glo-bar energization.	<ol style="list-style-type: none"> 1. Defective glo-bar. 2. Loose or disconnected wire. 3. Defective circuit control. 	<ol style="list-style-type: none"> 1. Replace. 2. Repair or replace. 3. Replace.
Thermostat closed. Ignition occurs. Burner cycles off and will not recycle.	<ol style="list-style-type: none"> 1. System not grounded. 2. Defective circuit control. 3. Vacuum pressure setting incorrect. 4. Low gas inlet pressure. 5. Restricted air inlet. 	<ol style="list-style-type: none"> 1. Connect electrical ground. 2. Replace. 3. Adjust. 4. Provide required gas pressure. 5. Clean
Thermostat closed. Ignition occurs. Burner cycles off and will not recycle.	<ol style="list-style-type: none"> 1. Low gas inlet 2. Defective vacuum pressure switch. 3. Restricted air inlet. 4. Vacuum pressure set incorrectly. 	<ol style="list-style-type: none"> 1. Provide required gas pressure. 2. Replace. 3. Clean. 4. Adjust

HLV SERIES TROUBLESHOOTING FLOWCHART





33

HLV SERIES PARTS LISTING

TP#	ITEM	TP#	ITEM
TP-1	CONTROL BOX COVER	TP-303	RIGHT END PANEL
TP-5	FLANGE GASKET	TP-304	CONTROL BOX
TP-9	CONDUIT COUPLING	TP-329	1/4" NEUTRAL TERMINAL BLOCK
TP-10	CONDUIT 4" X 1/2"	TP-566	VENT LIMITING ORIFICE
TP-11	IGNITOR BOX	TP-801	CENTER PANEL
TP-12	IGNITOR BOX COVER	TP-825	24V ISOLATION RELAY BOARD
TP-17	SIGHT GLASS KIT	TP-828	OPERATIONAL INDICATOR LIGHTS
TP-19B	4" TUBE & REFLECTOR HANGER W/ SPRING CLIP	TP-832	THERMOSTAT TERMINAL STRIP
TP-20C	120" REFLECTOR	TP-840	36E96-224 24V NAT. GAS VALVE - 1/2"
TP-21B	TUBE CLAMP	TP-841	36E96-226 24V LP GAS VALVE - 1/2"
TP-26A	10 FT. RADIANT TUBE STRAIGHT	TP-1202	16" BURNER TUBE WITH FLANGE
TP-26B	10 FT. RADIANT TUBE STRAIGHT (AL-TI)	TP-1216	NC-7 EXHAUSTER PUMP
TP-31B	CONTROL BOX BRACKET	TP-1250	24V IGNITER
TP-33B	1/2" GAS COCK	TP-1251	TRITON 2465H CIRCUIT BOARD
TP-44	AIR ORIFICE W/SCREEN - CONSULT FACTORY	TP-1254	IGNITER GASKET
TP-56C	1/4" PRESSURE TUBE - CONSULT FACTORY	TP-1289	EXHAUSTER MOUNTING TUBE FOR NC-7 PUMP
TP-65I	33" INTERLOCKING BAFFLE	TP-1502	HLV LEFT END PANEL
TP-68A	STRAIN RELIEF BUSHING	TP-1526	75VA TRANSFORMER W/ FOOT MOUNTS
TP-70	CONTROL BOX COVER GASKET (PER FOOT)	TP-1527	24V SWITCHING CONTROL RELAY
TP-76	RUBBER GROMMET	TP-1528	EXHAUSTER POST PURGE RELAY
TP-82	REFLECTOR CENTER SUPPORT	TP-1530	FUSE HOLDER
TP-83	STAINLESS STEEL FLEX CONNECTOR	TP-1565	8" X 8" ELECTRICAL BOX
TP-97	1/4" X 1/4" BRASS INT./EXT. ATMOS. BARB FITTING	TP-1566	EXHAUSTER CONTROL PANEL ASSEMBLY w/ Electrical Components
TP-105	REFLECTOR END CAP	TP-NOPS	NORM. OPEN DIFFERENTIAL PRESSURE SWITCHES
TP-106	REFLECTOR CLIP	(TP-61B)	N.O. Differential Pressure Switch (50 TO 80MBTU/H)
TP-122	GASKET FOR AIR ORIFICE & AIR COLLAR	(TP-61E)	N.O. Differential Pressure Switch (90 TO 125MBTU/H)
TP-200	BURNER (50 TO 100MBTU/H LP GAS)	(TP-1261A)	N.O. Differential Pressure Switch (140 TO 180MBTU/H)
TP-201	BURNER (125 TO 225 MBTU/H NAT OR LP GAS)	(TP-1061A)	N.O. Differential Pressure Switch (200 TO 225MBTU/H)
TP-204	GAS ORIFICE - CONSULT FACTORY	V-23	ISOLATION BOOT
TP-208	"Z" MOUNTING BRACKET	V-24	WORM GEAR CLAMP
TP-212	1/2" X 3" PIPE NIPPLE	V-55A	4" ADAPTER
TP-217	PRESSURE BARB FITTING	V-56A	5" ADAPTER
TP-218	EXHAUST PRESSURE TUBE (VINYL)	V-57A	6" ADAPTER
TP-220	STAIN. STL. TUBE CLAMP (175 & 225 MBTU/H)	V-301	PB-8 PUMP ONLY
TP-222	FLAME ROD	V-302	PB-9 PUMP ONLY
TP-222A	FLAME ROD WIRE	V-303	PB-10A PUMP ONLY
TP-223	GAS MANIFOLD		