

AllmandTM

MAXI-HEAT[®]

MAINTENANCE AND TROUBLESHOOTING GUIDE

MAXI-HEAT® GUIDE OUTLINE

- **INTRODUCTION**
- **SAFETY FEATURES**
- **OPERATION**
- **TUNE-UP FOR OPERATIONS**
- **MAINTENANCE**
- **TROUBLESHOOTING**

MAXI-HEAT®

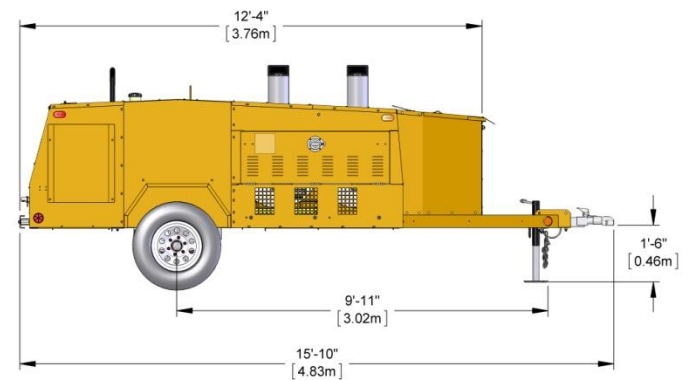
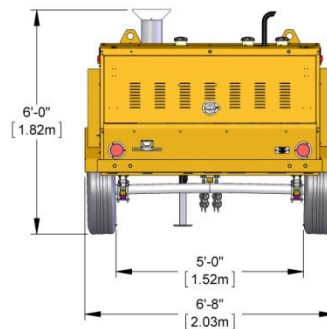
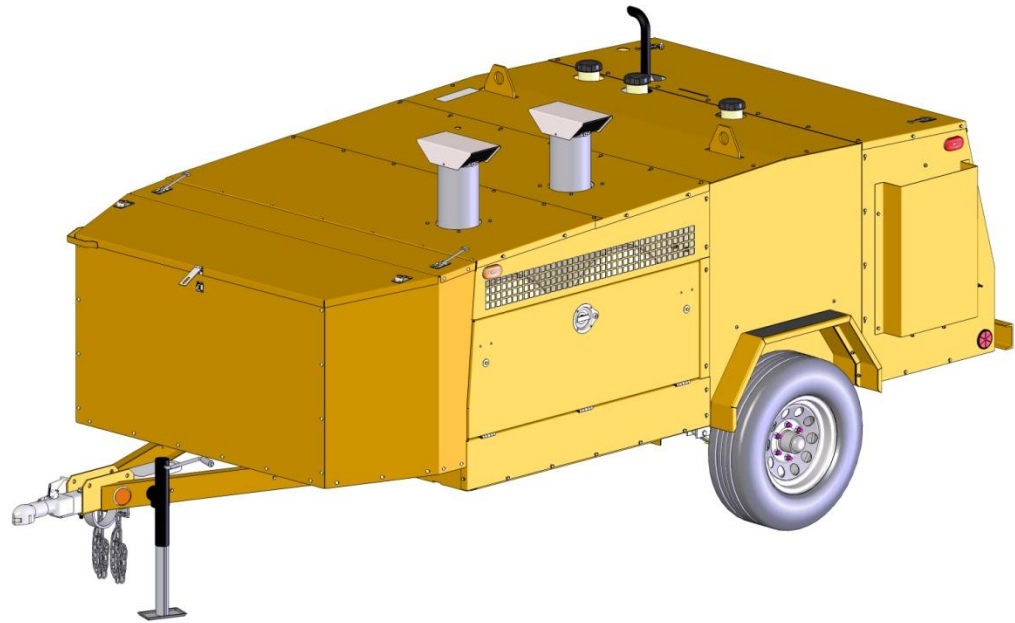
INTRODUCTION

- **DIMENSIONS**

- Height: 6 ft.
- Length: 15 ft. 10 in.
- Width: 6 ft. 8 in.

- **WEIGHT**

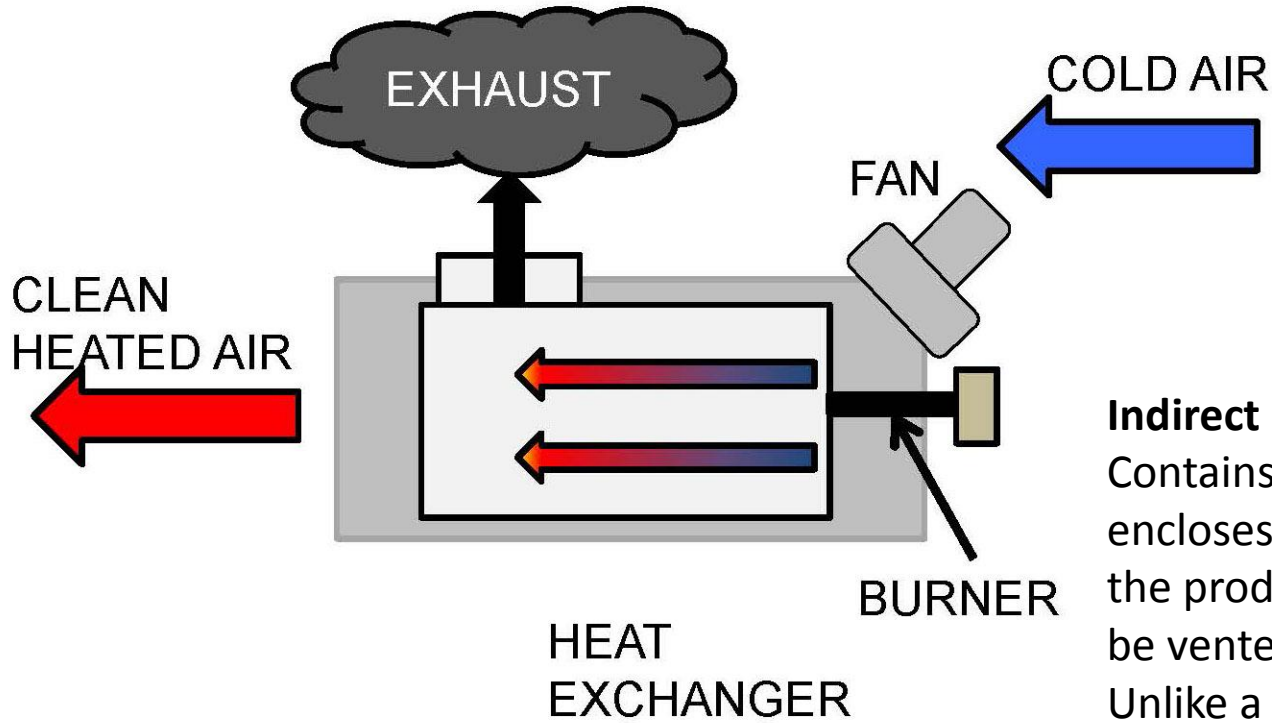
- Empty: 3,500 lbs.



- **ENGINE**
 - CAT C1.5 or Isuzu 3CD1 diesel engine
 - Starting: 12V 8D battery
 - Low oil pressure shutdown
 - High temperature automatic shutdown
- **GENERATOR**
 - 9 kW Cummins/Stamford 120V 60 Hz
 - Excellent motor starting capability
- **FUEL SYSTEM**
 - Requirements: No. 1 diesel fuel
 - Capacity: 250 gallons (2-100 gallon tanks (1 for each heater) and 1-50 gallon engine supply tank)

HEATERS

- 2 – I.C.E. Frost Fighter IDF500HS
 - 505,000 BTU/hr maximum output
 - Stainless steel heat exchanger
 - Nozzle size: 2.5 USGPH 60° solid nozzle (standard)
 - Static pressure: 2.3" wc
 - Each IDF500HS heater includes 1 - 16" heated air outlet (up to 110 ft. of 16" ducting per outlet)
 - Heated air output: 3,100 CFM per heater (without duct)
 - Operating time: 24+ hours without refueling at maximum BTU output



Indirect Fired:

Contains a heat exchanger that encloses the flame and allows the products of combustion to be vented through the flue stack. Unlike a direct-fired heater, the products of combustion are never in the air stream.



TRAILER

- Heavy duty steel enclosure
- Lockable access doors
- Full floor
- Leaf spring axle – 15” 6-lug wheels and tires
- Running lights, stop and turn signals
- Adjustable height, reversible 2” ball coupler and 3” pintle hitch
- Front screw jack
- Instrument panel and controls
- Hour meter
- Start, stop, and run switch
- Circuit breakers for heaters
- 12V interior compartment lights

APPLICATIONS

- **OIL & GAS**
 - Heat drilling rigs
 - Thaw wellheads
 - Keep crews safe and warm during construction
 - Pre-heat or thaw equipment
- **CONSTRUCTION**
 - Keep construction crews safe, warm, and productive
 - Heat building interiors during construction
 - Painting and drywall finishing
 - Concrete curing
- **MINING**
 - Pre-heat equipment
 - Heat mine shacks and remote office buildings
 - Keep mining crews safe and warm
- **Other Applications**
 - Aircraft ground support
 - Drying rail cars
 - Equipment pre-heating
 - Industrial plant maintenance
 - Industrial tank coating
 - Pipeline construction
 - Temporary heat
 - Winter painting



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SAFETY FEATURES

- Solid state primary control
- High limit switch
- Fan thermostat switch
- 15A fuse
- Photocell flame detector
- Solenoid valve
- Manual fuel shut off valve

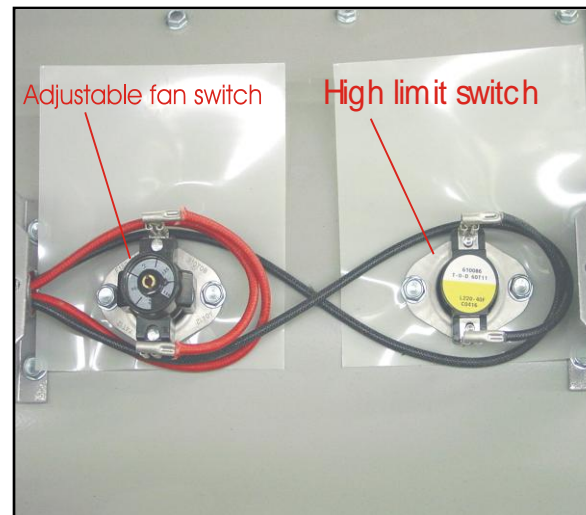
PRIMARY CONTROL

- Shuts down unit if photocell does not detect a flame
- 45 second pre-purge controller will check circuitry, then blow fresh air into heat exchanger before allowing fuel to be pumped into it
- Automatically locks out heater if three ignition failures occur
- Located on top of the junction box



- **HIGH LIMIT SWITCH**
 - Shuts down the unit if it reaches a maximum of 220° F (104° C)
- **FAN THERMOSTAT SWITCH**
 - Controls fan operation
 - Extends durability of the heat exchanger by providing a proper cool down cycle

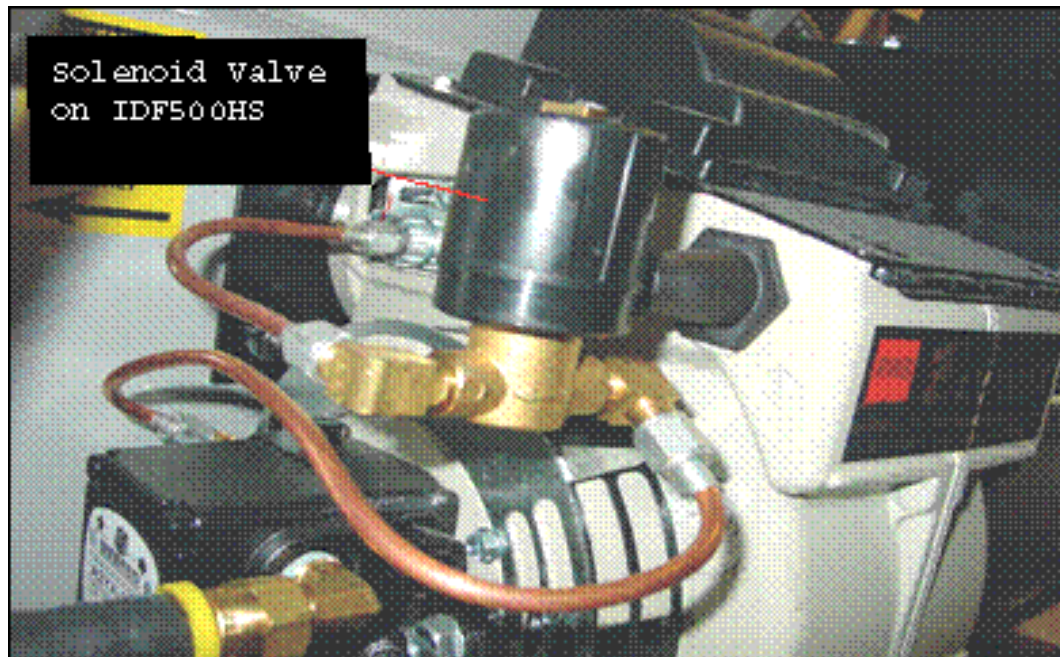
*Both are located toward the front of each heater assembly under a service panel



- **15AMP PUSHBUTTON CIRCUIT BREAKER**
 - Provides over-current protection
 - Found on junction box by toggle switch
- **PHOTOCELL FLAME DETECTOR**
 - Shuts down the unit if no flame is detected
 - Found under ignition transformer that is on burner
 - Accessed by removing two screws and flipping open lid



- **SOLENOID VALVE**
 - Located on the fuel line on the IDF 500 HS
- **MANUAL FUEL SHUT-OFF VALVE**
 - Positive fuel shut-off when servicing heaters



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OPERATION

- **STARTUP**

- Before starting:

1. Fill the engine with the specified grade and quantity of lubrication oil to correct level
(check engine dipstick)
2. Ensure there is an adequate supply of fuel
3. Ensure the air cleaner is firmly attached and air joints are properly sealed – air cleaner element should be checked and replaced if necessary

- **STARTUP**

- Starting the engine:

1. Heater switches must be in the **OFF** position
2. Open door covering heater outlets (**engine will not start with heater outlet door closed**)
3. Turn the key switch to the **PREHEAT** position, hold for no longer than ten seconds, and release the switch
4. Turn the key switch to the **START** position and the engine should start
5. Release the key immediately when the engine starts. If engine fails to start, it may be necessary to repeat the preheat cycle

STARTUP

- Heater Starting – circuit breakers for heaters must be switched to the **ON** position
- Allow the engine to come to full rpm and warm up before switching heater primary control toggle switches to the **ON** position

GENISYS CONTROLLER



Reset button
with **red light**

Yellow light

Green light

GENISYS CONTROLLER BURNER STATES



Standby:

The burner is idle, waiting for a call for heat.

Valve-On Delay:

The igniter and motor are on while the control delays turning on the oil solenoid valve for 45 seconds.

Trial For Ignition:

The oil solenoid valve is energized. A flame should be established within the factory set trial for ignition time ("lockout time").

GENISYS CONTROLLER BURNER STATES

Lockout:

The control has shut down for one of the following safety reasons:

- a) The trial for ignition (lockout) time expired without flame being established.
- b) The cad cell detected flame at the end of the Valve On Delay state.

To reset the control from lockout, click the reset button 1-second

NOTE: A recurrence of the above failure modes or a failed welded relay check could cause the control to enter a “Hard Lockout” state that must be reset only by a qualified service technician.

To reset from “Hard Lockout”, hold the reset button for 25 seconds until the yellow light turns on.



GENISYS CONTROLLER BURNER STATES

Run:

The flame is sustained until the call for heat is satisfied. The burner is then sent to **motor-off delay**, if applicable, or it is shut down and sent to **standby**.

Recycle:

If the flame is lost while the burner is firing, the control shuts down the burner, enters a 60 second recycle delay, and repeats the ignition sequence. The control will continue to recycle each time the flame is lost, until it reaches a pre-set time allotment. The control will then go into **hard lockout** instead of **recycle**. This feature prevents excessive accumulation of oil in the appliance firing chamber.

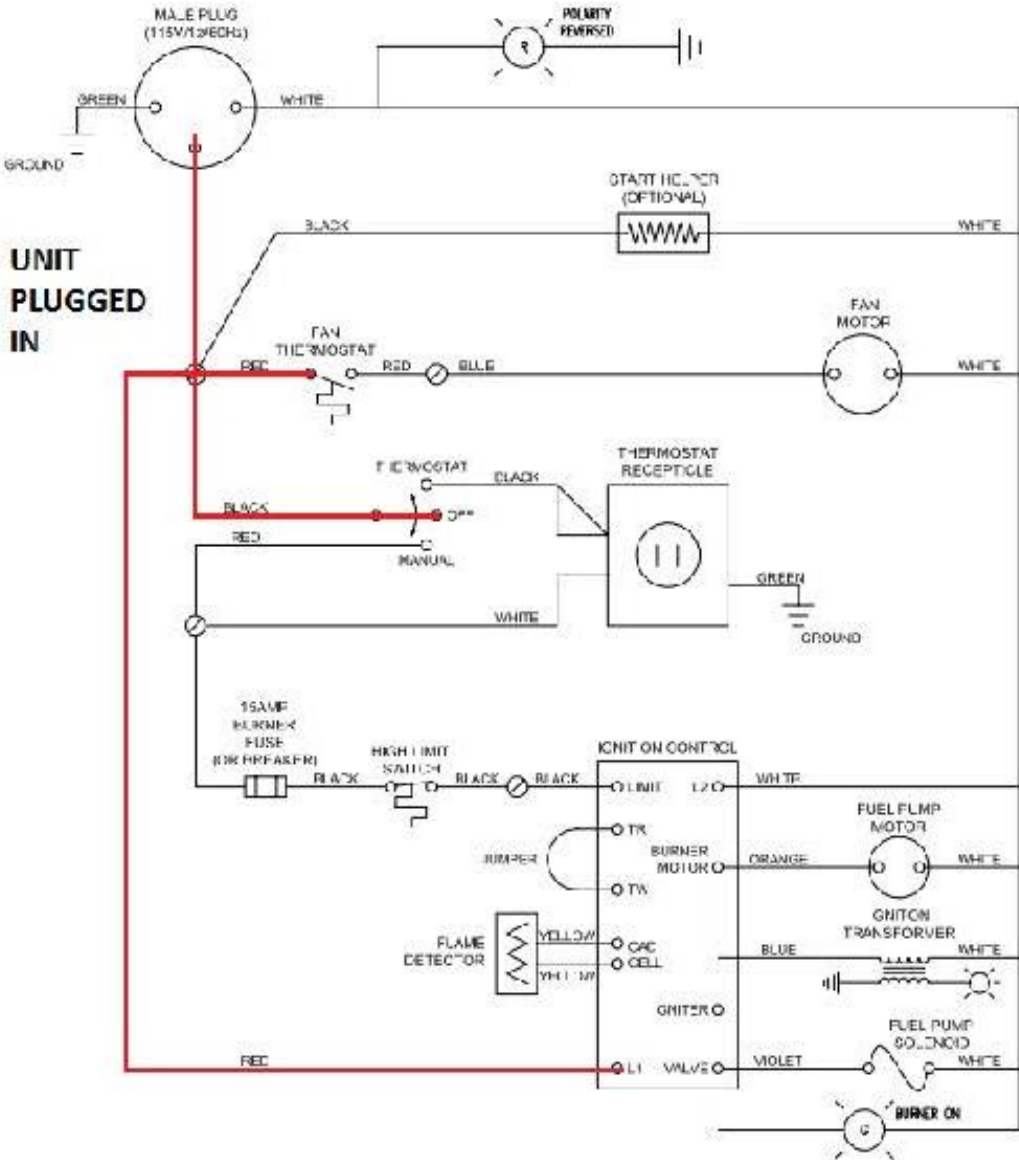
Motor-off delay:

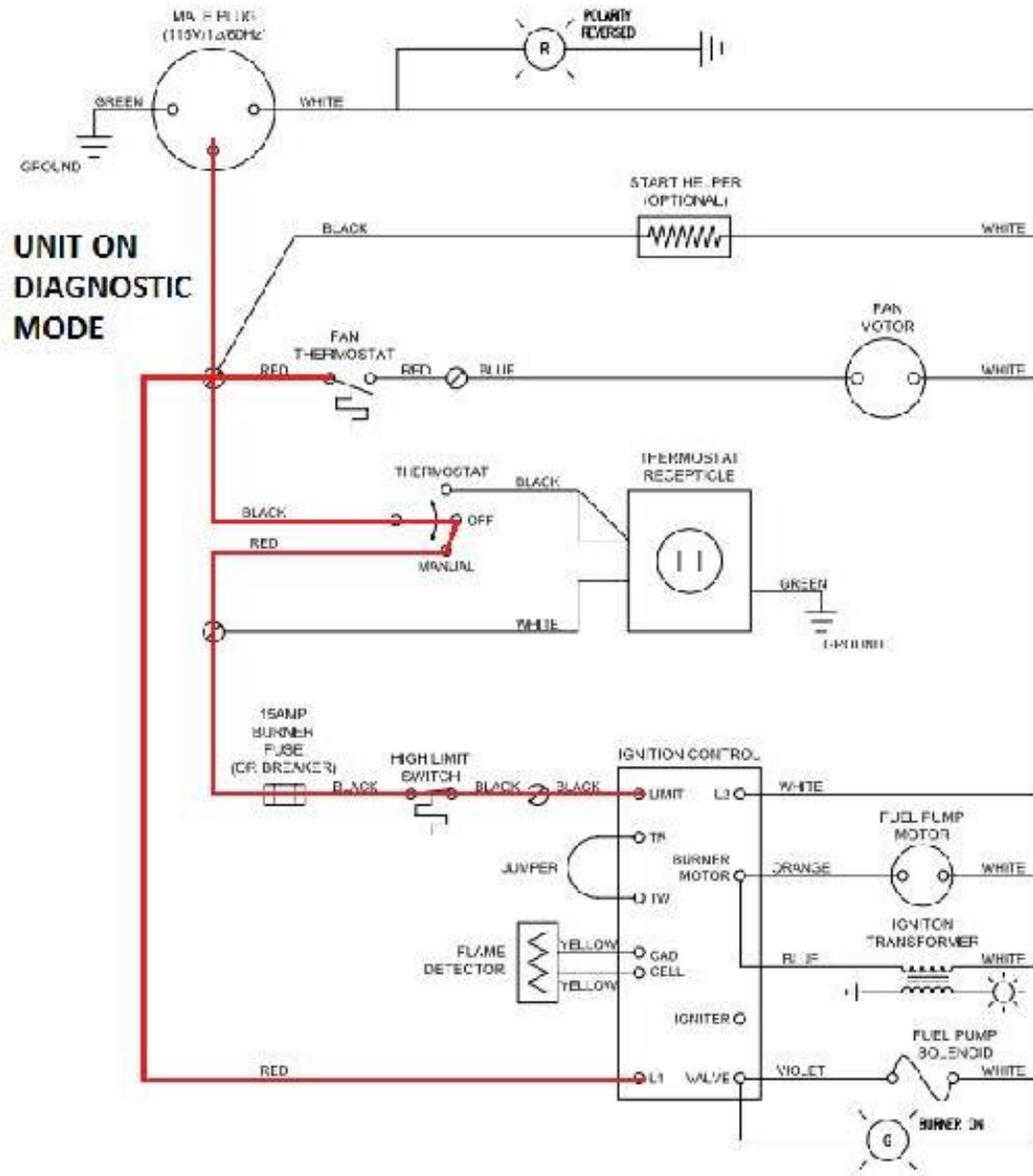
If applicable, the oil solenoid valve is turned off and the control delays turning the motor off for the set **motor-off delay time** before the control returns to standby.

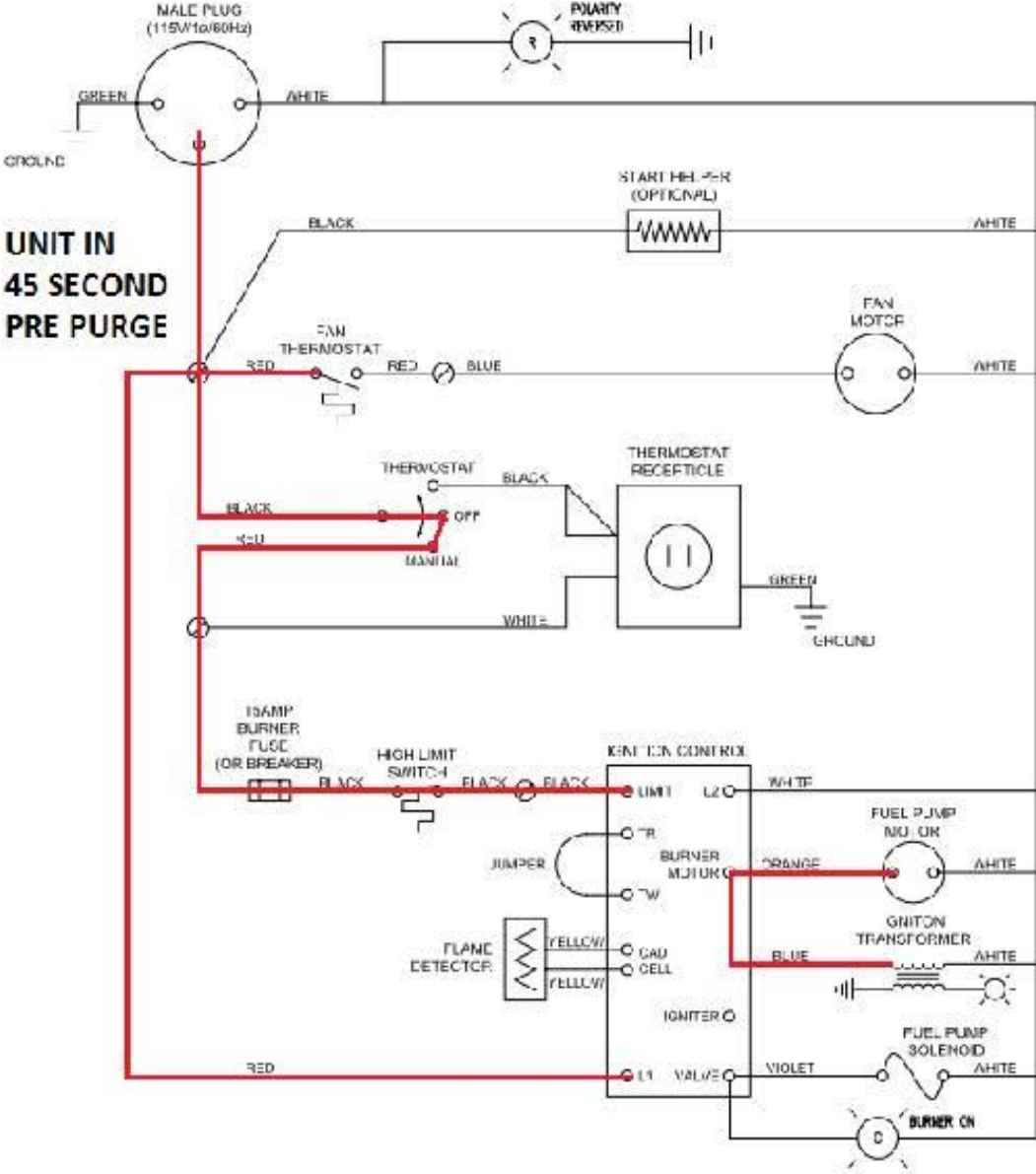
GENISYS PRIMARY CONTROLLER

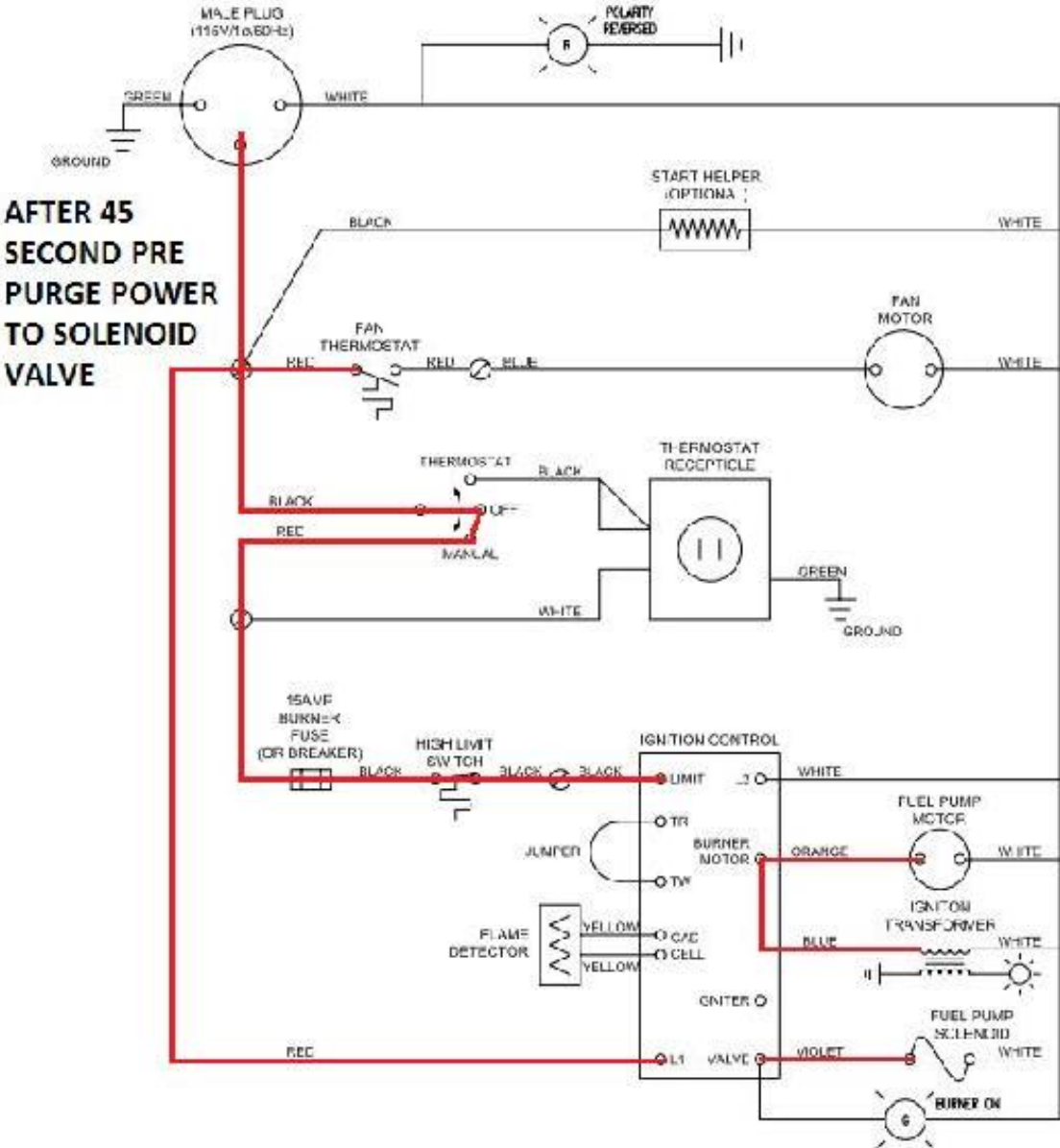
Any time the motor is running, press and hold the **reset** button to disable the burner. The burner will remain off as long as the button is held and will return to standby when released.

DISABLE FUNCTION	
LED	STATUS
ON	FLAME SENSED
OFF	FLAME NOT SENSED
FLASHING	LOCKOUT/RESTRICTED LOCKOUT
SOLID	RECYCLE

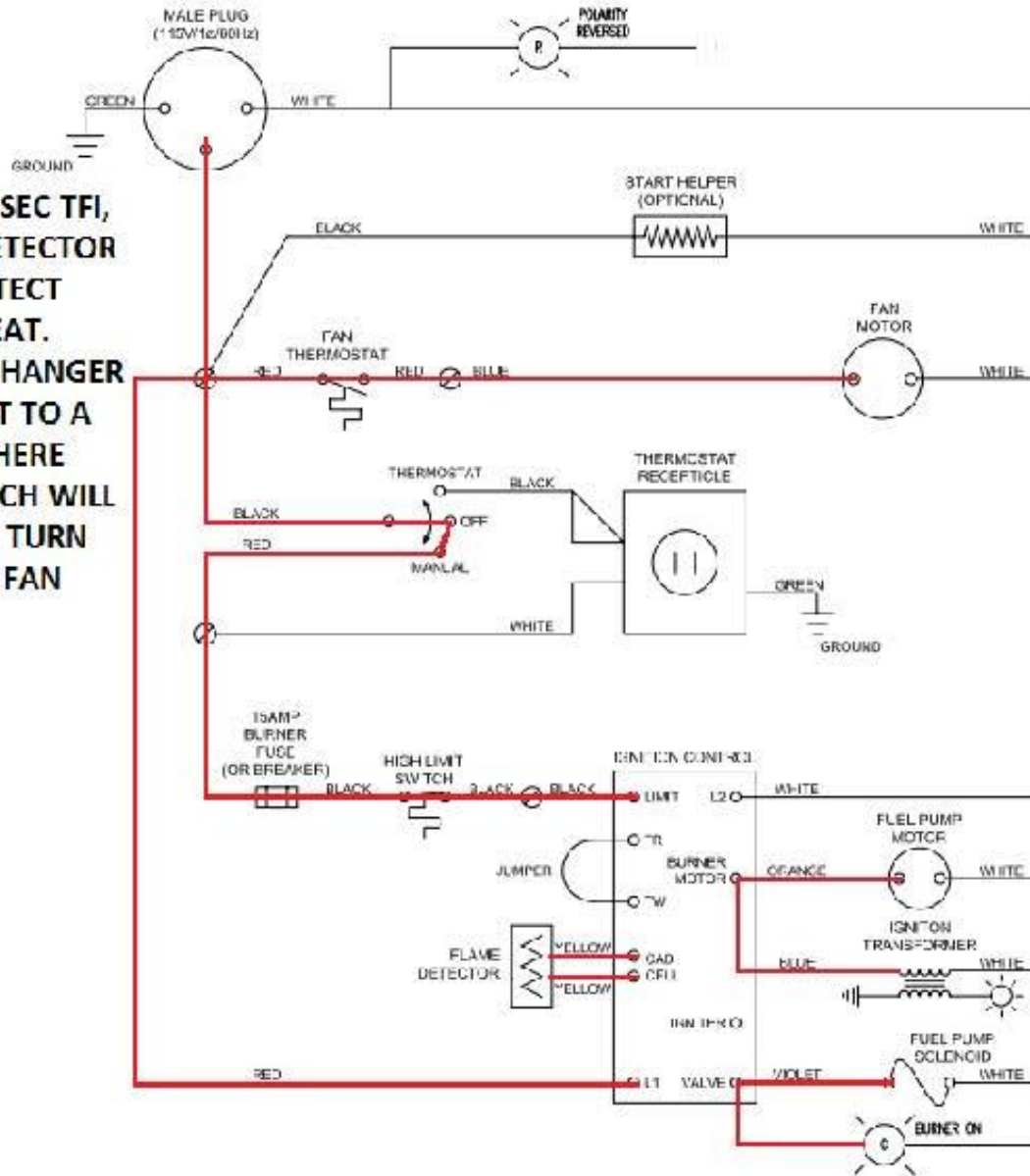








**AFTER 15 SEC TFI,
FLAME DETECTOR
MUST DETECT
FLAME HEAT.
HEAT EXCHANGER
WILL HEAT TO A
POINT WHERE
FAN SWITCH WILL
CLOSE TO TURN
ON MAIN FAN**



SHUTDOWN

- To stop heater:
 - Turn toggle switch at heater to OFF position
 - Allow time for the fans to turn off
- Engine shutdown:
 - Turn engine key switch to OFF position

CAUTION**Do NOT:**

- Start heater if excess fuel oil has accumulated in chamber
- Fill fuel tanks while unit is operating
- Shut off individual heaters by disconnecting supply cord
- Use gasoline, crankcase oil, or heavier than No. 1 diesel fuel
- Use No. 1 diesel fuel **ONLY**

TUNING AND ADJUSTING

BURNER COMPONENTS OF IDF 500 HS

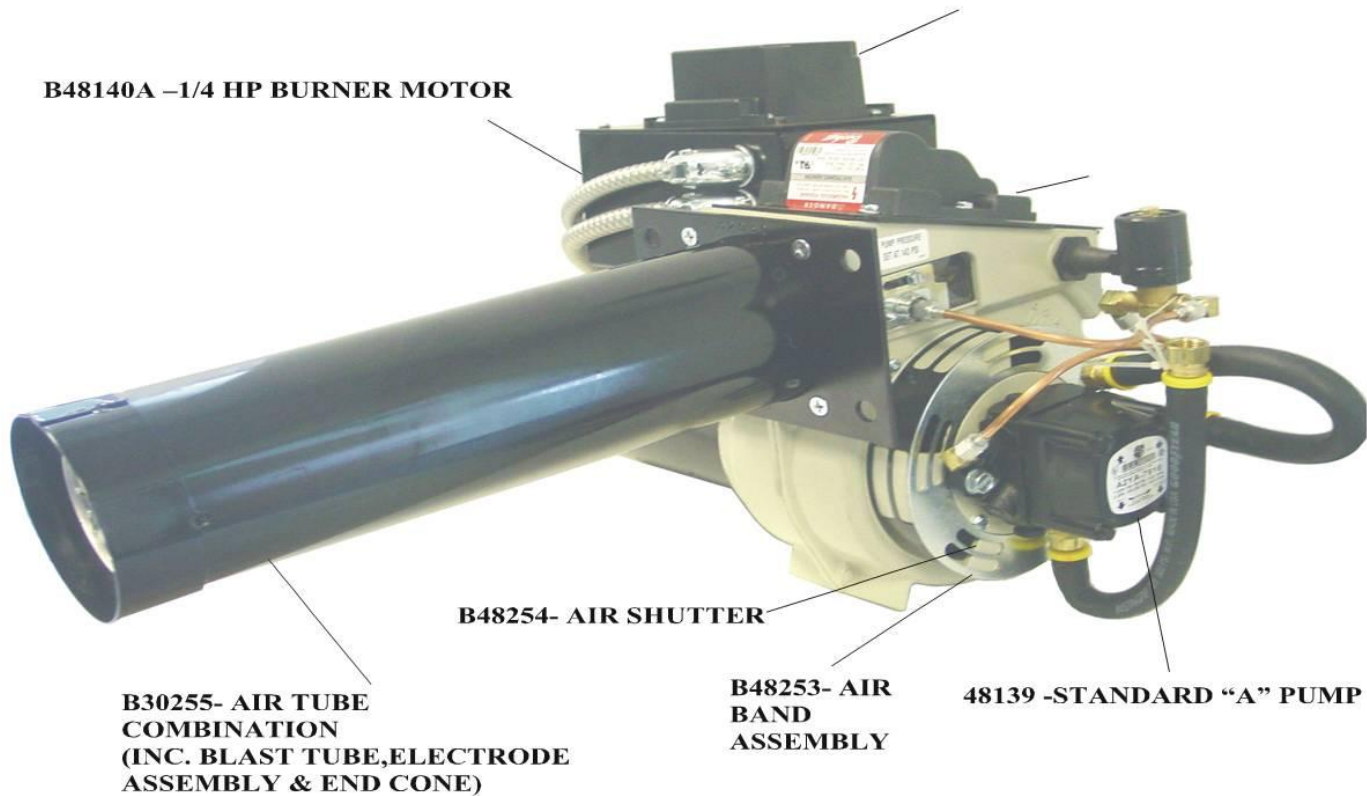
ELECTRODE ASSEMBLY IDF 500 HS

ELECTRODE ADJUSTMENT

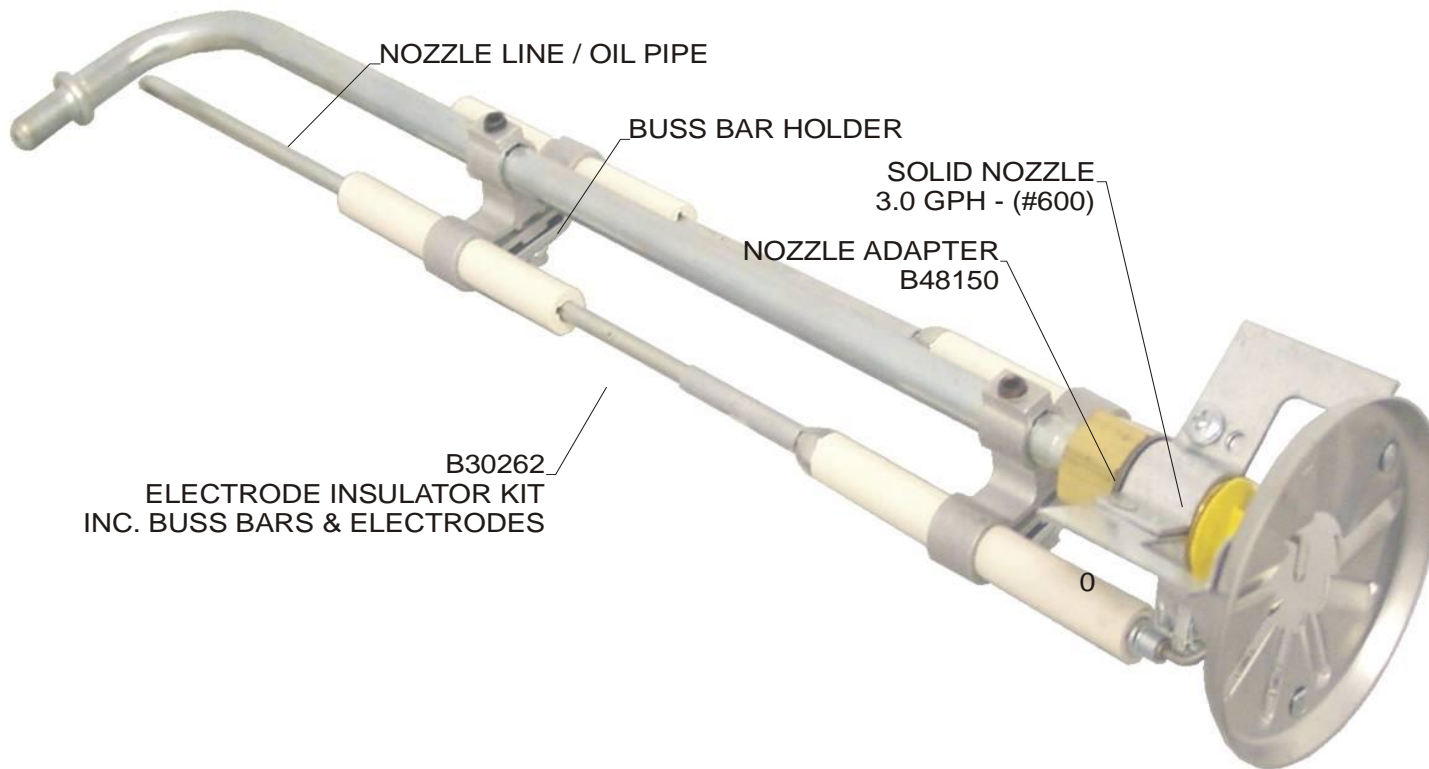
COMBUSTION AIR ADJUSTMENTS

TEMPERATURE FEELER ADJUSTMENTS

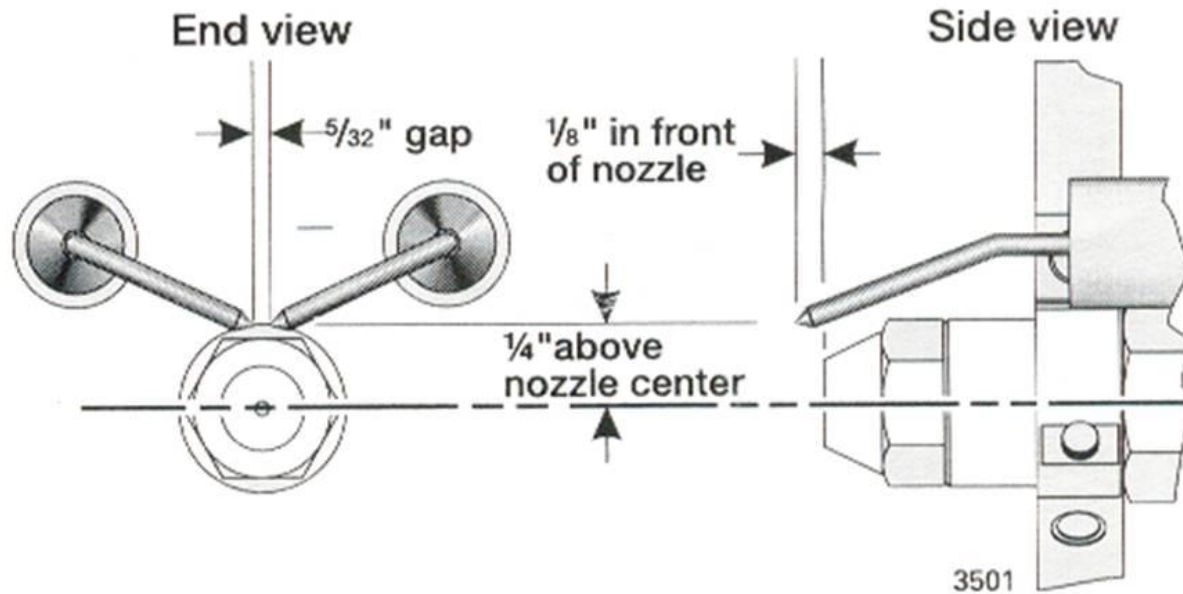
BURNER COMPONENTS – IDF 500 HS



ELECTRODE ASSEMBLY IDF 500 HS



ELECTRODE ADJUSTMENT IDF 500 HS



COMBUSTION AIR ADJUSTMENTS

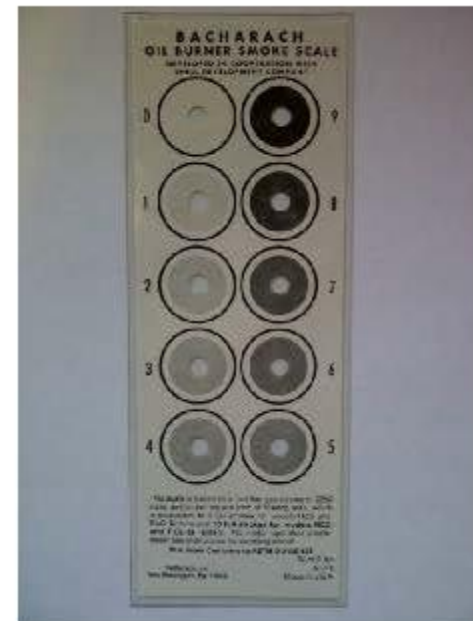
For proper combustion air adjustment, a smoke tester should be used to ensure complete combustion. For optimum combustion efficiency, the combustion air control should be set to provide no more than a No. 1 smoke (Bacharach Scale).

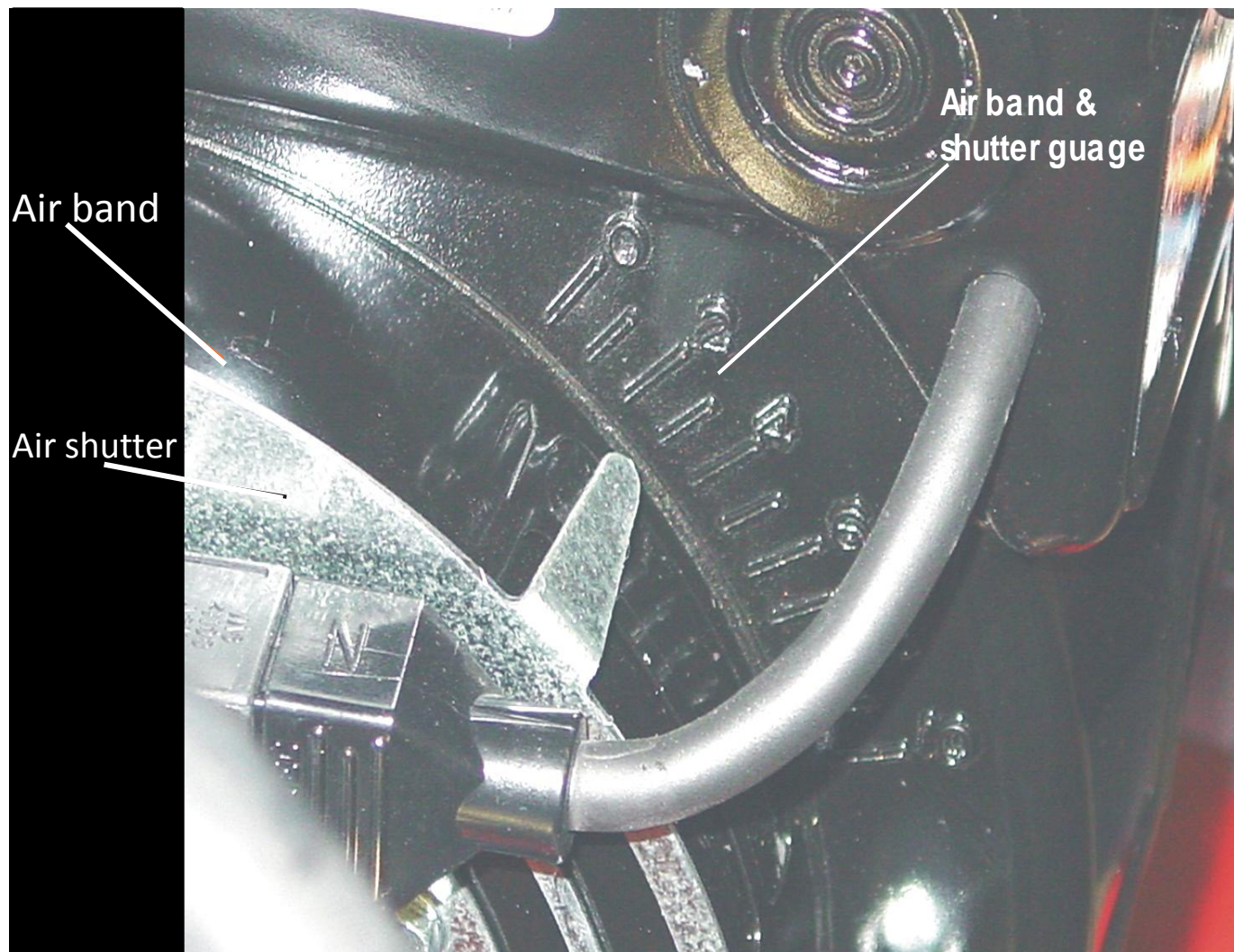
The Beckett burner has a calibrated air band, which will assist in adjusting the primary air for a good oil/air mixture. Adjust air band supply by loosening lock screws and moving air shutter and, if necessary, the bulk air band. Begin by reducing the air until the unit begins to produce smoke. Increase air until no smoke is produced.

This adjustment is to be carried out while the unit is operating and after 5 minutes of firing. Rotating the air bands on the burner housing makes the adjustment.

COMBUSTION AIR ADJUSTMENTS

For proper combustion air adjustment, a calibrated gas analyzer and smoke tester should be used to ensure complete combustion. Air adjustment should be made at the correct input and be adjusted to achieve 10% CO₂. For optimum combustion efficiency, the combustion air control should be set to provide no more than a No. 1 smoke (Bacharach Scale).





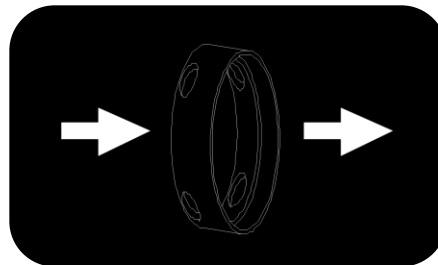
TEMPERATURE FEELER ADJUSTMENT

ALWAYS MAKE SURE THAT THE TEMPERATURE FEELER IS TOUCHING THE HEAT EXCHANGER.

The temperature feeler provides air flow over the fan switch, which regulates the cycling of the fan. The temperature feeler can be adjusted for different outside temperatures by rotating the location of the temperature feeler holes. This will provide optimum performance of the unit in different applications and will reduce or eliminate unnecessary fan cycling.

If surrounding air is warm (-5°C or 23°F – indoor application) turn the temperature feeler so that the holes are parallel with the heat exchanger and make sure nothing is blocking the air flow. By doing this, the fan switch will remain cool and not overheat.

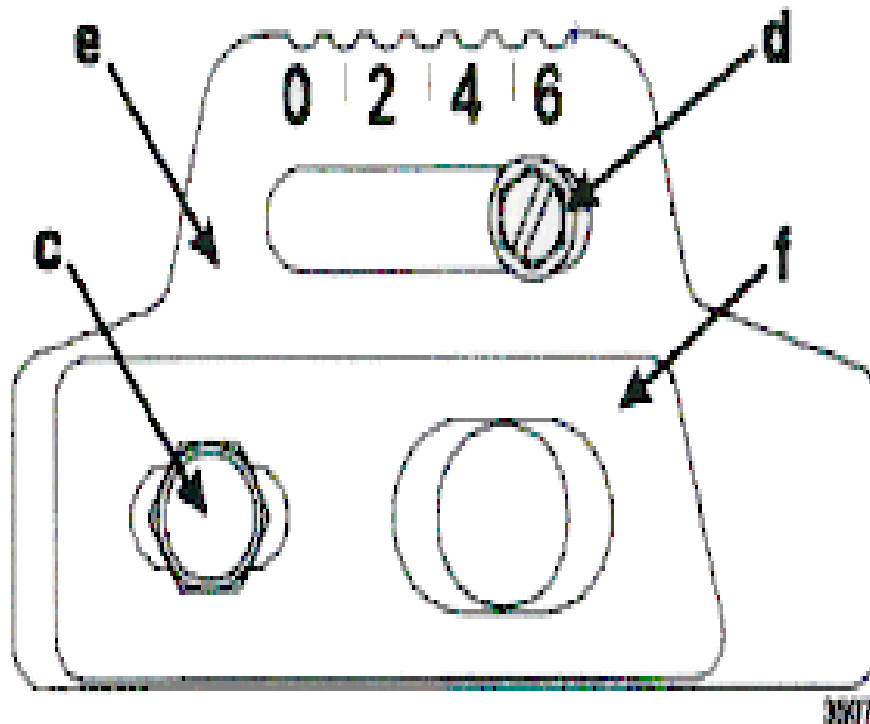
*Fan switch is located under the high limit/fan cover mounted on the jacket close to the front of unit



SLIDE PLATE ADJUSTMENT

- C Acorn nut
- D Fastener
- E Indicator adjusting plate
- F Secondary adjusting plate

IDF 500 HS – 6



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MAINTENANCE

- High limit switch
- Fan switch
- Fuel filter
- Flame detector
- Burner electrode
- Heat exchanger
- Fan
- Motors
- Fuel system
- Fuel pump
- Maintenance chart



CAUTION: MAINTENANCE SHOULD BE PERFORMED BY TRAINED PERSONNEL ONLY.
INCORRECT MAINTENANCE MAY RESULT IN IMPROPER OPERATION AND SERIOUS INJURY.

- **HIGH LIMIT SWITCH**

- We recommend replacing the high limit switch at the beginning of each heating season to ensure the burner will shut down if temperature exceeds 220°F (104°C)
- To test the high limit switch, you can restrict the air flow through the unit. After tests are complete, remove restrictors as both 16" ducts must be open for proper operation.

- **FAN SWITCH**

- The fan switch has been selected to allow for preheating of the heat exchanger to ensure that only heated air is allowed to enter the space. After satisfying the need for heat, the fan switch will continue to run the supply fan until the heat exchanger has cooled sufficiently. This feature will help prolong the life of your heat exchanger.
- Fan switch turns ON at 90°F and turns OFF at 70°F

- **PRIMARY FUEL FILTER (SPIN-ON)**

- **STANADYNE PRE-FILTER AND FUEL HEATER**

- Each IDF 500 HS is equipped with its own pre-filter and integral fuel heater

- **FLAME DETECTOR (PHOTOCELL)**

- When performing maintenance:

1. Turn machine ON and run for a few minutes
2. Press red button on primary control
3. Hold for one second and release
 - a) If light flashes once or twice, cad cell is functioning properly
 - i. Clean the face of the cad cell with a soft, non-abrasive cloth
 - b) If light flashes three times, check alignment and proper flame
 - c) If light flashed four times, follow the above steps
 - d) If flashing four times persists, replace the cad cell

- **BURNER**

- The electrode spacing must be checked and adjusted, if necessary, after every nozzle change
- Nozzle should be replaced annually or sooner if the burner cannot be set up to operate properly.

- **HEAT EXCHANGER**

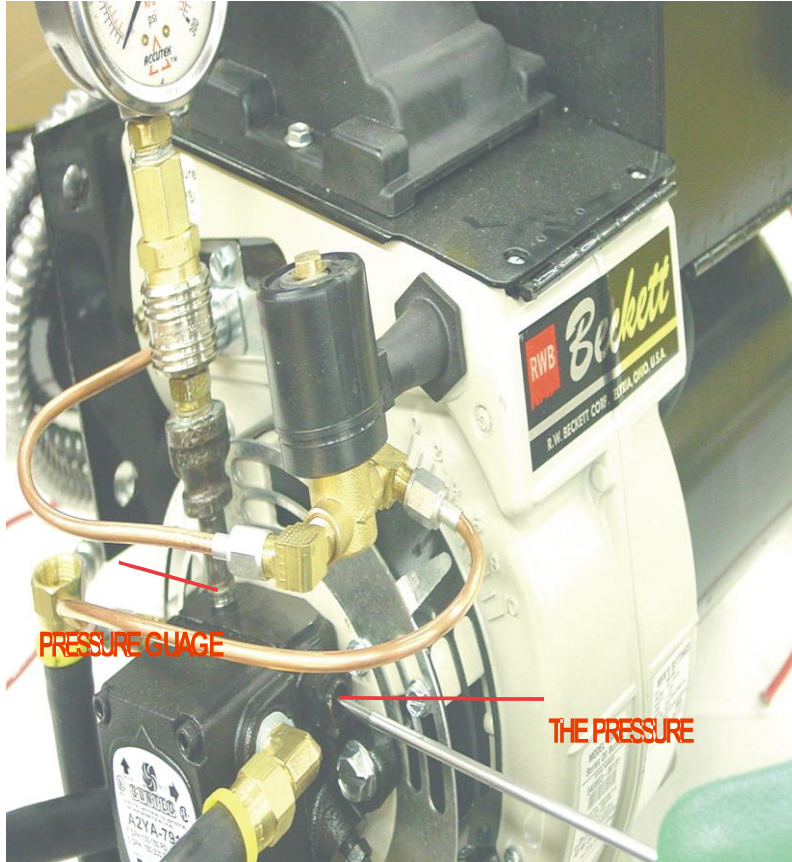
- If the heater has been operated continuously with a smoky exhaust, the heat exchanger may need to be thoroughly cleaned
- *Consult operator's manual for heat exchanger cleaning procedure

- **FAN**

- Check for dust or dirt build up on blades
- Check for tightness of the set screw
- Run heater to check for fan vibration
- Replace fan blade if vibration is noticeable

- **FAN MOTORS**

- No lubrication is necessary since the bearings are sealed
- Clean motor of existing dust or dirt



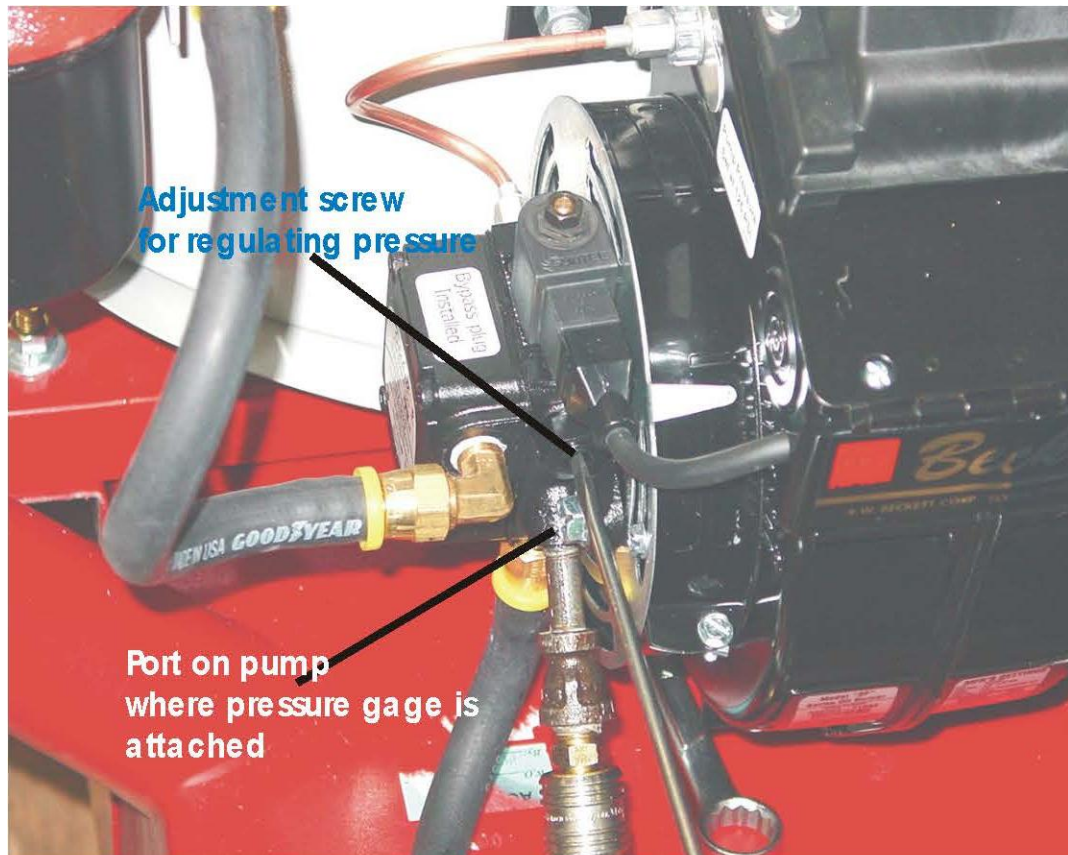
• FUEL SYSTEM

- Do NOT store unit containing fuel oil for long periods
- The quality of fuel oil will affect ignition at low ambient temperatures
- Use #1 diesel fuel **ONLY**

• FUEL PUMP

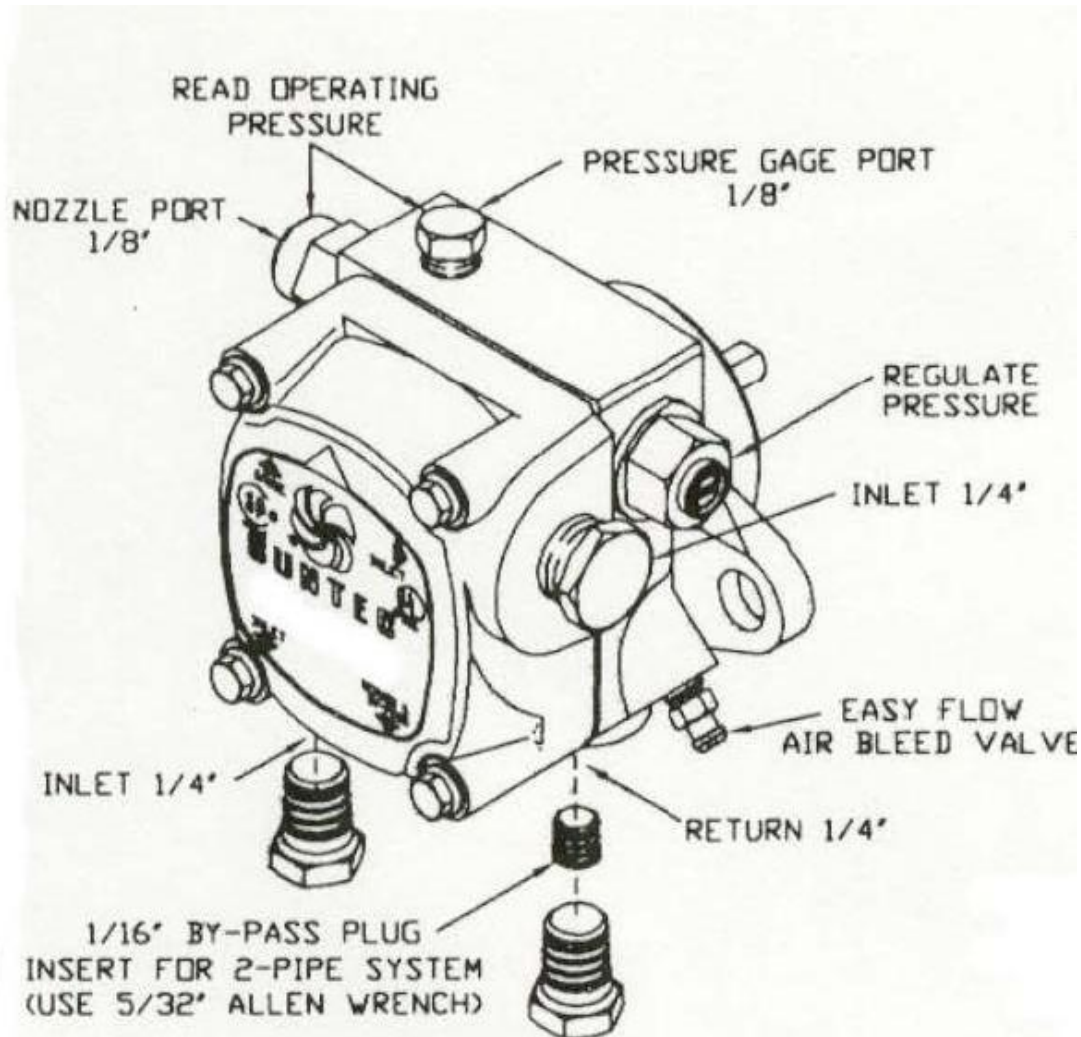
- Check fuel pump pressure on a regular basis
- Pressure should be set at 140 PSI
- This can be checked at the fuel pressure gauge on each heater
- Add 10 lbs. to this reading to set the true pressure (there is a pressure loss when fuel passes through the solenoid valve)

PRESSURE ADJUSTMENT



Pressure adjustments for the IDF500

“A” PUMP FOR IDF500



When replacing a fuel pump, ensure 1/16" bypass plug is installed in return port.

Use a 5/32" allen wrench.

FUEL AND LUBRICATING OIL REQUIREMENTS

Temperature on Starting	Oil Viscosity				Fuel
	°C	°F	Monograde	Multigrade	USA Specifications ASTM D-975-77
Below	-15	5	5W	5W/20	#1 Diesel Fuel
Between And	-15 4	5 39	10W	10W/30	#1 Diesel Fuel
Between And	4 30	39 86	20/20W	15W/40	#1 Diesel Fuel
Above	30	86	30	20W40	#1 Diesel Fuel

Isuzu 3CD1

CAT C1.5

○ : User maintenance ● : Parts Replacement ▲ : Shop Inspection

CLASSIFICATION	Item	Daily	Maintenance Period				
			Every 50 Hours	Every 250 Hours or 3 Months	Every 500 Hours or 6 Months	Every 1000 Hours or One Year	Every 2000 Hours or Two Years
Whole	Visual check around engine	○					
	Fuel tank level check and fuel supply	○					
Fuel Oil System	Fuel Tank Draining		○				
	Water Separator (option) draining		○				
	Bleeding the fuel system		○				
	Water separator cleaning				○		
	Fuel filter element replacement				●		
Lubricating Oil System	Lube Oil level check and replenish	○					
	Lube oil replacement		●	2nd time ● and thereafter			
	Lube oil filter replacement		1st time ●	and thereafter			
Cooling Water System	Coolant water level check and replenishment	○					
	Radiator fin cleaning			○			
	V-belt tension check		●	2nd time ● and thereafter			
	Coolant water replacement					●	
	Coolant/water path flushing and maintenance					▲	
Rubber hose	Fuel pipe and coolant water pipe inspection and maintenance					▲	
Governor	Inspection and adjustment of governor level and accelerator	○		○			
Air intake system	Air cleaner cleaning and element replacement			○	●		
	Diaphragm assy inspection					▲	
	Turbocharger blower cleaning*					▲ (2 years)	
Electrical System	Warning lamp & instrument function check	○					
	Battery electrolyte level check and battery recharging		○				
Cylinder Head	Intake/Exhaust valve head clearance adjustment					▲	
	Intake/exhaust valve seat lapping						▲
Fuel injection pump and nozzle	Fuel injection timing adjustment, fuel injection pump inspection and adjustment					▲	
	Fuel injection nozzle pressure inspection						▲

*EPA allows to maintain the emission related parts every 1500 or 3000 hours as shown

Every Day or every 8 hours
First Service - (20/50 hours)
Every 100 hours or 3 months
Every 200 hours or 6 months
Every 400 hours or 12 months
Every 600 hours or 18 months

- Check level of coolant (Top up with coolant only)
- Check concentration of coolant
- Renew Coolant (FILL SLOWLY, ENSURE CORRECT QUANTITY IS USED)
- Check engine lubricating oil level
- Renew engine oil (FILL SLOWLY, ENSURE CORRECT QUANTITY IS USED)
- Renew engine oil filter
- Drain water from fuel filter and pre-filter
- Renew fuel filter canister (N.B. Air vent screws on filter and fuel pump)
- Check tension of alternator drive belt
- Check alternator drive belt for wear
- Renew alternator drive belt
- Check and adjust idle speed
- Tighten cylinder head
- Check and adjust valve clearances
- Check electrical systems
- Check all nuts/bolts for tightness
- Check injectors for performance
- Clean air filter (earlier check may be necessary)
- Renew air filter element
- Check and correct any leaks or engine damage

*Service intervals shown have been established for operation under normal conditions

*Refer to engine operation manual for recommended engine services

TROUBLESHOOTING OVERVIEW

1	• Unit is turned on – nothing happens after 5 sec. – safe start
2	• Burner motor starts but unit will not fire
3	• Burner fires then locks out
4	• Smoky fire
5	• Delayed ignition
6	• Main fan will not come on – unit shuts down on high limit
7	• Unit on, but cycles on high limit
8	• Combustion chamber turns red

TROUBLESHOOTING OVERVIEW

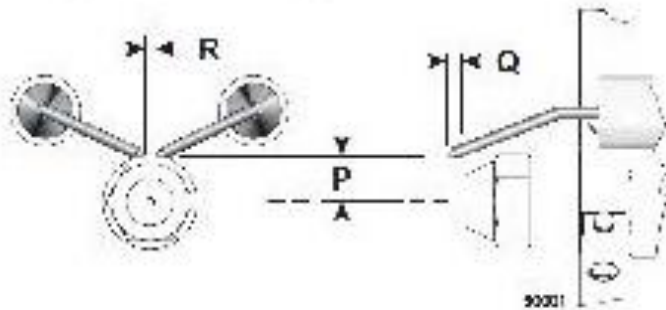
1 – Unit is turned on, nothing happens after 5 sec. safe start

- a) Ensure proper voltage coming in – 115V AC
- b) Check for power on both sides of burner fuse. If no power, then check toggle switch. If power on one side, replace fuse or check to make sure breaker does not need to be reset. If power on both sides, go to **c**.
- c) Check black wire from primary control. If no power there, remove high limit cover and check for power on both sides of high limit. If power on one side only, replace high limit. If power on both sides, go to **d**.
- d) Ensure thermostat contacts on primary control (T and T) are jumpered out.
- e) Make sure light on primary control is not flashing. If so, push button to reset.
- f) Check manual reset button on motor and wiring connection to motor. If reset pushed and power going to motor, nothing is happening, replace the burner motor.
- g) On neutral line (white wires) make sure all connections are tight and secure and unit is properly grounded. With AC voltage tester, check white (neutral lines) for power (one on ground, one on neutral). If over 5 volts, check polarity. If polarity is correct, check wires individually for power to determine leak source, then replace leak source.
- h) If power coming into black wire on primary control but no power out to orange wire, replace primary control.
- i) If green light on primary control stays on, check to ensure transformer door is closed properly as cad cell is detecting light. Check cad cell is working. If light stays on and no obvious areas open, check OHM reading across two yellow wires. If you get a reading, replace cad cell. If you get no OHM reading from cad cell, replace primary control if light is still on.

TROUBLESHOOTING OVERVIEW

2 – Burner motor starts but unit will not fire

- a) Check for power on blue wire on primary control going to igniter. If no power there, replace primary control. If powered, go to **b**.
- b) Remove electrode assembly and check isolators for cracks or chips in the porcelain. Make sure electrode setting is proper. Clean assembly if there is any soot or oil.
- c) The nozzle should be checked and ensure it is not clogged or blocked. Make sure nozzle is not loose.
- d) Ensure air shutters are properly set to factory specifications.
- e) Check for power on violet line on primary control. After pre-purge, if no power sent to violet line, replace primary control. If power on violet line, remove copper fuel line at electrode assembly to ensure fuel is coming out. If not fuel there, replace solenoid valve.
- f) At the bleeder screw, check for proper out pump pressure. If low or no pump pressure, go to **g**.
- g) Check oil filter, oil pick up tube and oil lines to ensure free flow and they are not clogged or dirty.
- h) Check electrical polarity and grounding.



P – Nozzle centerline to electrode tip = 3/16"

Q – Nozzle face to electrode tip = 1/4"

R – Electrode spacing = 3/16" gap

TROUBLESHOOTING OVERVIEW

3 – Burner fires then locks out

- a) Check oil pressure to ensure solenoid valve is opening. Check oil flow system, filter, pick up tubes, and lines.
- b) The nozzle should be checked to ensure it is clean and emitting a good spray pattern, as this could affect the cad cell operation.
- c) Cad cell (flame detector) could be defective. Disconnect yellow cad cell wires from primary control. Start unit and when it fires, connect jumper across connections on primary control. If unit continues to run, check cad cell alignment with burner, clean face with a soft cloth and ensure no external light is affecting it. With an ohmmeter, check resistance across cad cell leads with machine running and primary control cad cell leads jumpered out. If resistance over 1200 OHMS, cad cell should be replaced. If unit locks out with jumper, replace primary control.
- d) Wires between cad cell and primary control should be checked to see that they are not pinched or crimped.
- e) Prime fuel pump by loosening bleeder screw until steady stream of fuel comes out to ensure no air or bubbles are in the fuel line.
- f) **If unit locks out 3 times in succession, it will go into restricted lock out mode. To reset, hold down reset button for 45 seconds until LED flashed twice. The unit will then resume in normal operating mode.** After verifying primary control is not in lockout and light continues to flash, replace primary control.
- g) Check polarity, ground and voltage must be between 108-132v AC.
- h) Make sure high limit is functioning properly.

TROUBLESHOOTING OVERVIEW

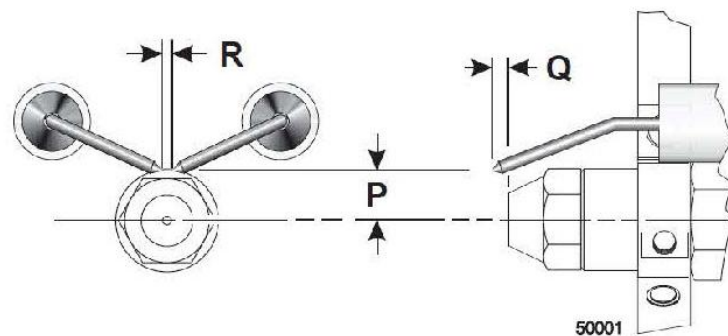
4 – Smoky fire

- a) Check nozzle, make sure it is tight and not clogged.
- b) Check combustion chamber for cracks or burnt out.
- c) Check air band settings (air shutter and/or air band may be closed too much restricting combustion air).
- d) Check pump pressure.
- e) Check slide plate to make sure it is in correct position. If necessary, open slightly.
- f) Check recommended settings if using #2 fuel in cold ambient temperatures.

TROUBLESHOOTING OVERVIEW

5 – Delayed ignition

- a) Check for proper electrode setting.
- b) Check the isolators for cracks or a conducting coat of soot or oil. Cracks sometimes occur under the electrode bracket, causing a short circuit.
- c) Check to see that the air shutter is not overly open – too much air will blow out a flame.
- d) Check to ensure pump pressure is properly set.
- e) Change nozzle.
- f) Check fuel filter and replace if necessary.
- g) Ensure that draft or wind is not blowing out flame – add 3 ft. stack.



P – Nozzle centerline to electrode tip = 3/16"

Q – Nozzle face to electrode tip = 1/4"

R – Electrode spacing = 3/16" gap

TROUBLESHOOTING OVERVIEW

6 – Main fan will not come on, unit shuts down on high limit

- a) Check for temperature feeler, make sure it is in properly.
- b) Jumper out fan switch to test motor. If you have voltage to motor and still does not start, replace motor. Check line voltage to ensure proper voltage. Also check amp draw on motor – motor may be running too hot and not run due to thermal overload being tripped.
- c) Replace fan switch if you have power on one side after unit heating up it does not make.
- d) Replace high limit as it may be tripping too soon and not giving fan switch time to engage.
- e) Ensure fan switch temperature is correct for weather conditions.

TROUBLESHOOTING OVERVIEW

7 – Unit on, but cycles on high limit

- a) Check air flow - ensure both ducts are in place and clear of obstruction and straight.
- b) Check pump pressure – unit could be over firing.
- c) Check nozzle that proper size of nozzle is installed.
- d) Change high limit.
- e) **Maximum duct length for 16” outlet is 110 feet. Any longer will create back pressure in the unit and trip the high limit.**
- f) Fuel type - #2 will increase BTU output at cold ambient temperatures resulting in overheating.

TROUBLESHOOTING OVERVIEW

8 – Combustion chamber turns red

- a) Nozzle may be firing side ways (replace or adjust)
- b) Clogged nozzle (replace)
- c) Temperature feeler not on properly or missing (must be touching heat exchanger)
- d) High limit not functioning (replace)
- e) Excessive pump pressure (check and reset if necessary)

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