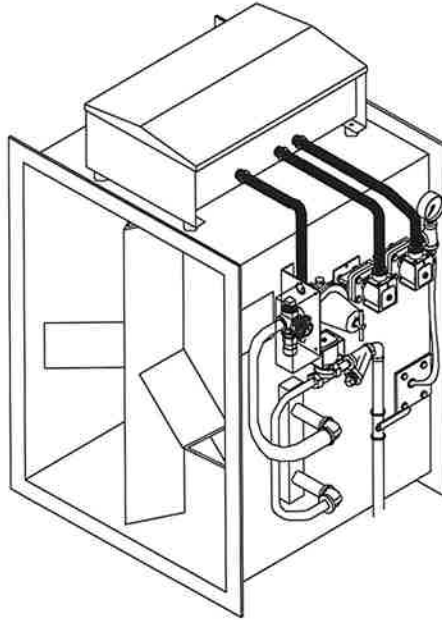


BLUE FLAME II **BURNER FOR CENTRIFUGAL FANS**



Installation & Operating Instructions

**For Models:
119K-001A -- LP
119L-001A -- NG**



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P-11802
10/12/2021
REV. D

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INTRODUCTION

COMPLETELY READ THIS MANUAL AND THE OPERATOR'S SAFETY MANUAL (P-10001), BEFORE INSTALLING OR USING THE BLUE FLAME II BURNER.

This manual is intended for use with the Blue Flame II burner connected to a Shivers Centrifugal Fan. The burner may be used with other manufacturers centrifugal fans, but care should be taken to insure proper hookup. This unit requires 115 VAC power at 5 Amps, which must be interlocked with the fan power to insure proper operation.

The Blue Flame II burner provides up to 3.2 million BTU's of heat utilizing Liquid Propane or Natural Gas as fuel. This is normally enough heat to allow the burner to be used on 10 to 20 horsepower fans. Liquid Propane models have a built in vaporizer. The pipe train is configured in a hi-low-off configuration for a wide temperature operating range. A 3-wire system is used to control the burner.

This series of Blue Flame II burners is similar to the centrifugal burners manufactured by Shivers in the past, except for the control circuitry. This series started with a limited production in the year 2002. These dryers use a flame sensing system called flame rectification. It eliminates the old flame sensing switch and replaces it with a flame rod. There are no moving parts in the flame rod. It just has to be in the flame but not touching the burner or housing. The flame sense module will apply an AC current to the flame rod. If a flame is present, the flame will rectify or change it to a DC current. If the flame sense module detects this DC current, it will turn off the ignition transformer and the burner will continue to burn. If the DC current is not detected, the flame sense module will lockout the burner, and the burner power switch will have to be shut off for a few seconds, then turned back on, to reset the module.

SAFETY INFORMATION

The operator of this machinery must assume the responsibility for his own safety, and that of those who are working with him. He must also make sure the equipment was installed properly. Factors that contribute to the overall safety of operation are: proper use, maintenance, and frequent inspection of the equipment. All of these are the operator's responsibility.

If any items covered in this manual are not completely understood, or there is a concern with the safety of the product, contact SHIVVERS Incorporated at the address shown on the front cover.

SHIVVERS is genuinely interested in providing the safest practical equipment to our customers. If you have a suggestion which you believe will enhance the safety of this product, please write us and let us know.



TAKE NOTE ANYTIME THIS SAFETY ALERT SYMBOL APPEARS. YOUR SAFETY, AND THAT OF PERSONS AROUND YOU IS AT STAKE.

The safety alert symbol will be accompanied by one of three signal words whose definitions are given as:

DANGER: Red and white. Indicates an imminently hazardous situation that, if not avoided, will result in death or serious injury. This signal word is to be limited to the most extreme situations, typically for machine components that, for functional purposes, cannot be guarded.

WARNING: Orange and black. Indicates a potentially hazardous situation that, if not avoided, could result in death or serious injury, and includes hazards that are exposed when guards are removed. It may also be used to alert against unsafe practices.

CAUTION: Yellow and black. Indicates a potentially hazardous situation that, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.

Be sure to observe these common sense rules when working with the dryer equipment:

- 1). All units must be equipped with a main power disconnect switch. This disconnect switch must shut power off to the complete drying system. It must have the capability of being locked into the OFF or OUT position. Disconnect and **LOCK OUT** this main power disconnect switch before conducting any inspection, maintenance, repair, adjustment, or cleaning of the drying system. When you must have the electrical power on to troubleshoot equipment, do it from a safe distance, and always from outside the bin.
- 2). Keep the bin entrances locked at all times. To unlock the bin, first lower the Level-Dry (if so equipped), then shut the main power disconnect off. Take the safety lock off the bin entrance and place it on the main power disconnect before opening the bin entrance. **Never enter the drying bin unless the Level-Dry (if so equipped), is completely lowered, and all power is disconnected and locked out.**
- 3). Always keep all shields and guards in place. If shields or guards must be removed for inspection or maintenance, replace them before unlocking and turning the power back on.
- 4). Be sure everyone is clear of all the drying and transferring equipment, and outside of all bins, before unlocking and turning the power on. Some equipment may run upon re-application of power.
- 5). Make sure that all decals are in place and are easy to read. Do not operate the equipment with missing or illegible decals. If replacements are needed, contact SHIVVERS Incorporated or your dealer.
- 6). Prior to use, inspect all equipment to insure that it is in good operating condition. Do not operate with missing, damaged, or worn parts. Use only SHIVVERS approved replacement parts.
- 7). Metal edges can be sharp. Wear protective clothing and handle equipment and parts with care.
- 8). Keep children and bystanders away from drying and transferring equipment at all times.
- 9). If going up the bin ladder and/or performing maintenance on the top of the bin, take precautions to prevent accidental falls. When on top of the bin, wear a safety harness or other safety device.
- 10). At least annually, review all operating and safety manuals with any personnel working with this equipment. Always train new employees before they operate the drying equipment. Insist that they read and understand the operating and safety manuals.

LOCATION OF SAFETY DECALS

This manual shows the location of safety decals that apply to the Blue Flame II burner. For complete instructions on where to find safety decals for other installed equipment consult your Operator's Safety Manual (P-10001).

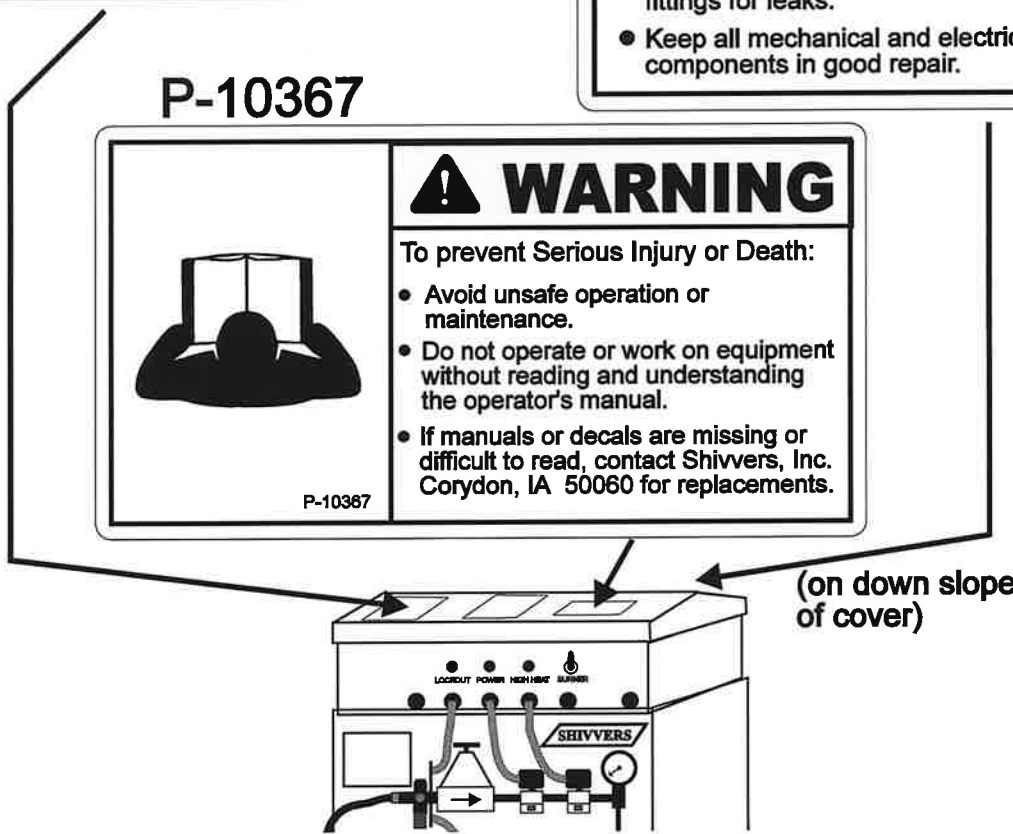
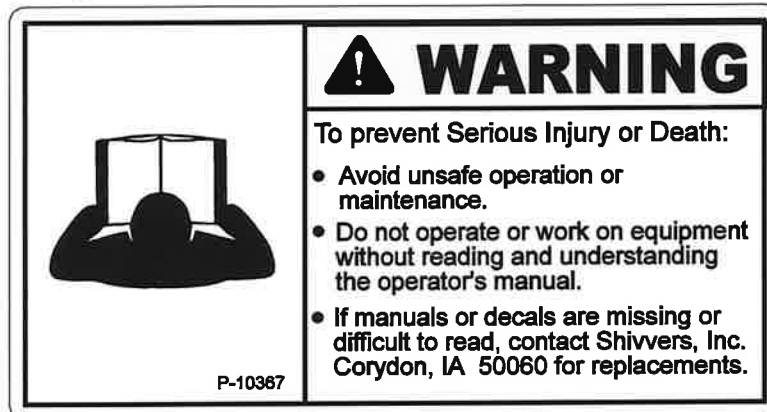
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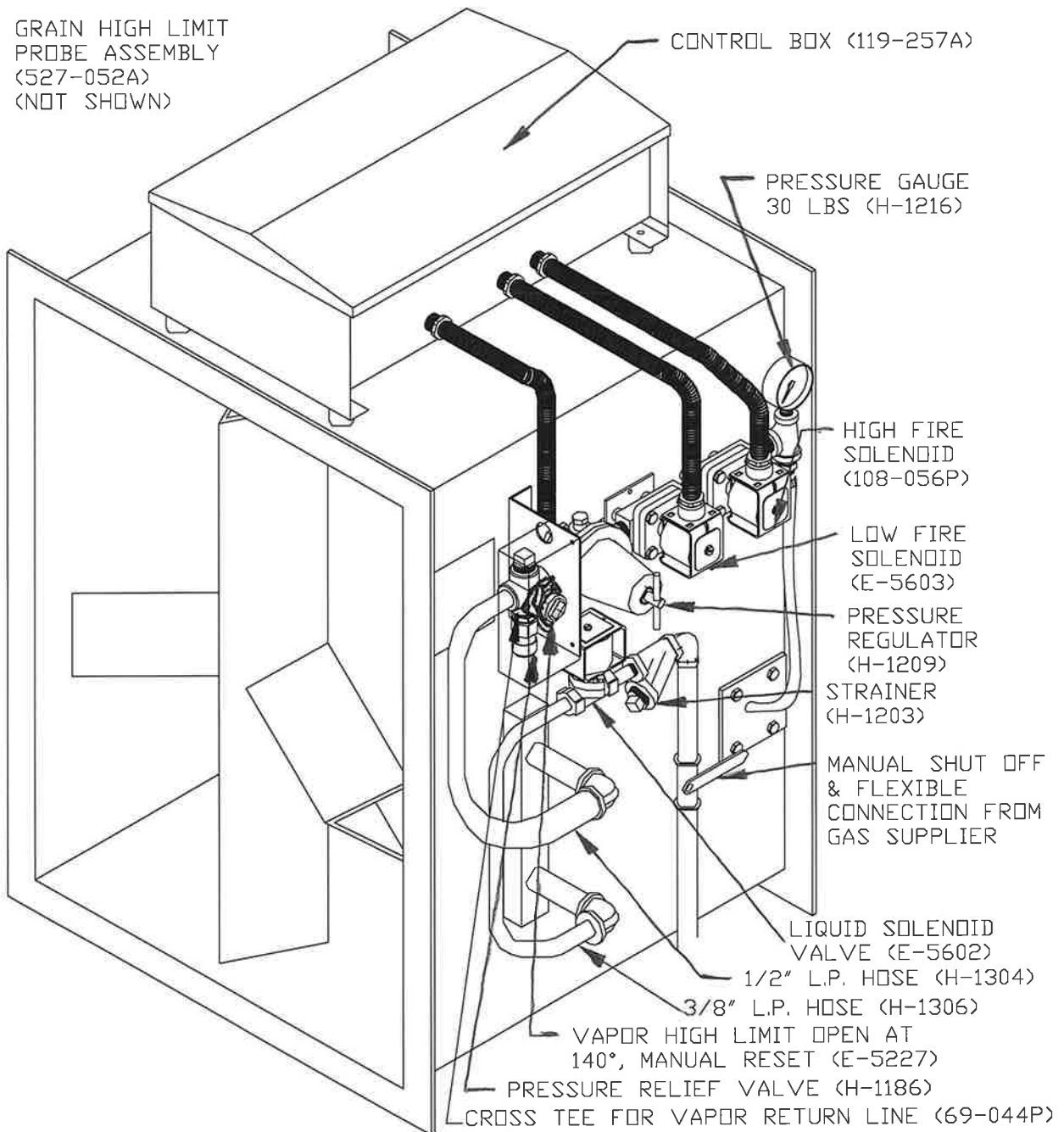
P-10367



IDENTIFICATION OF PARTS

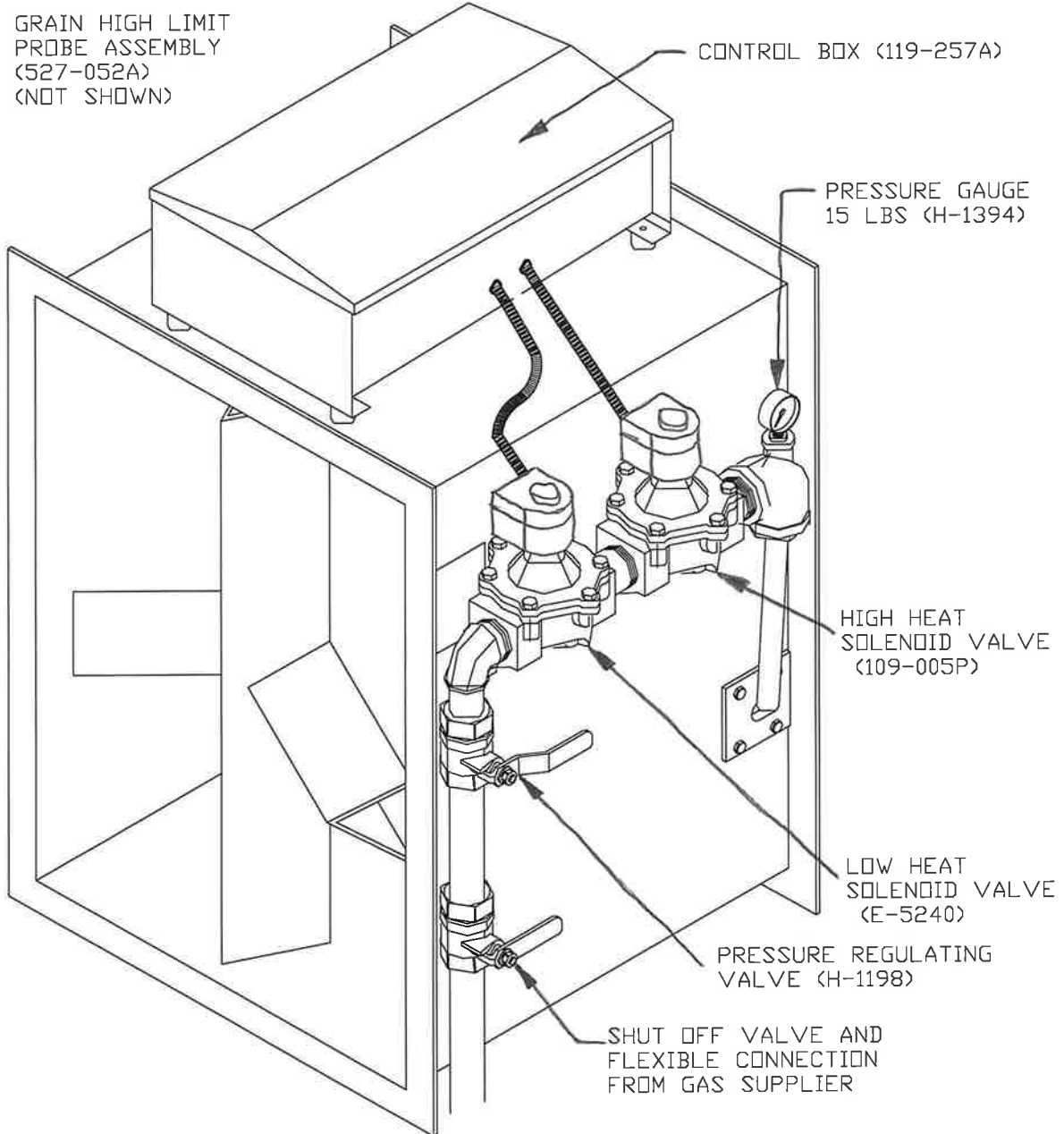
See the Operator's Safety Manual (P-10001) for definitions, proper use of safety locks and disconnects, and proper bin unloading procedures. Refer to other installed equipment manuals for a complete understanding of the total drying and grain handling system.

LIQUID PROPANE BURNER



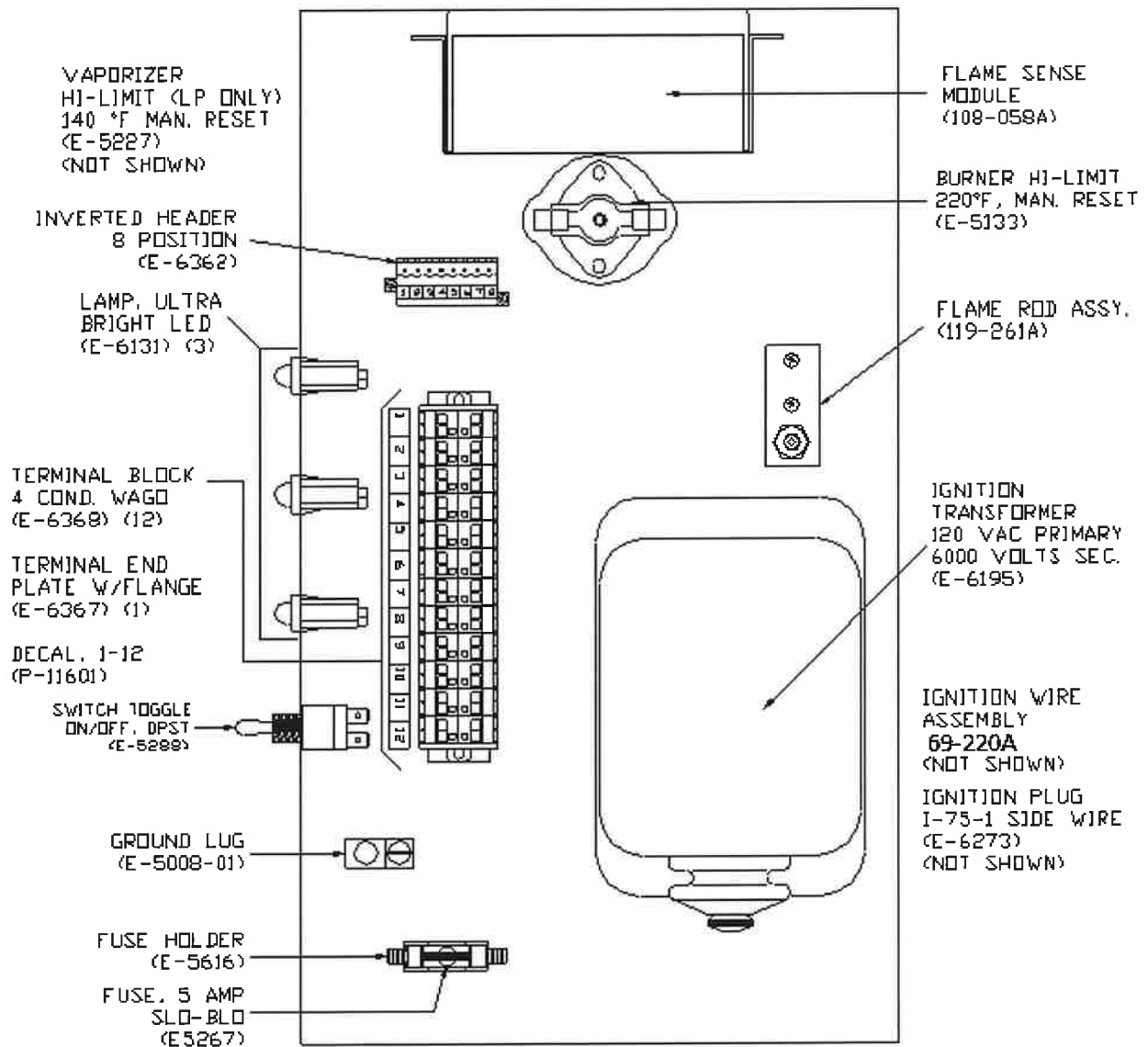
Identification of parts, con't:

NATURAL GAS BURNER



Identification of parts, con't:

BLUE FLAME II CONTROL BOX



Identification of parts, con't:

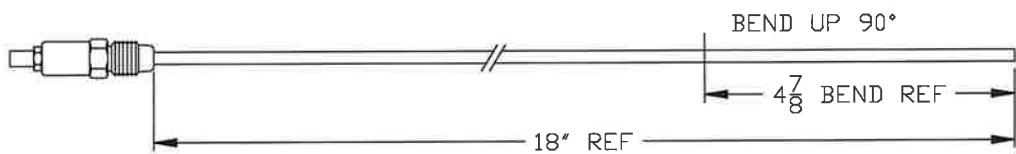
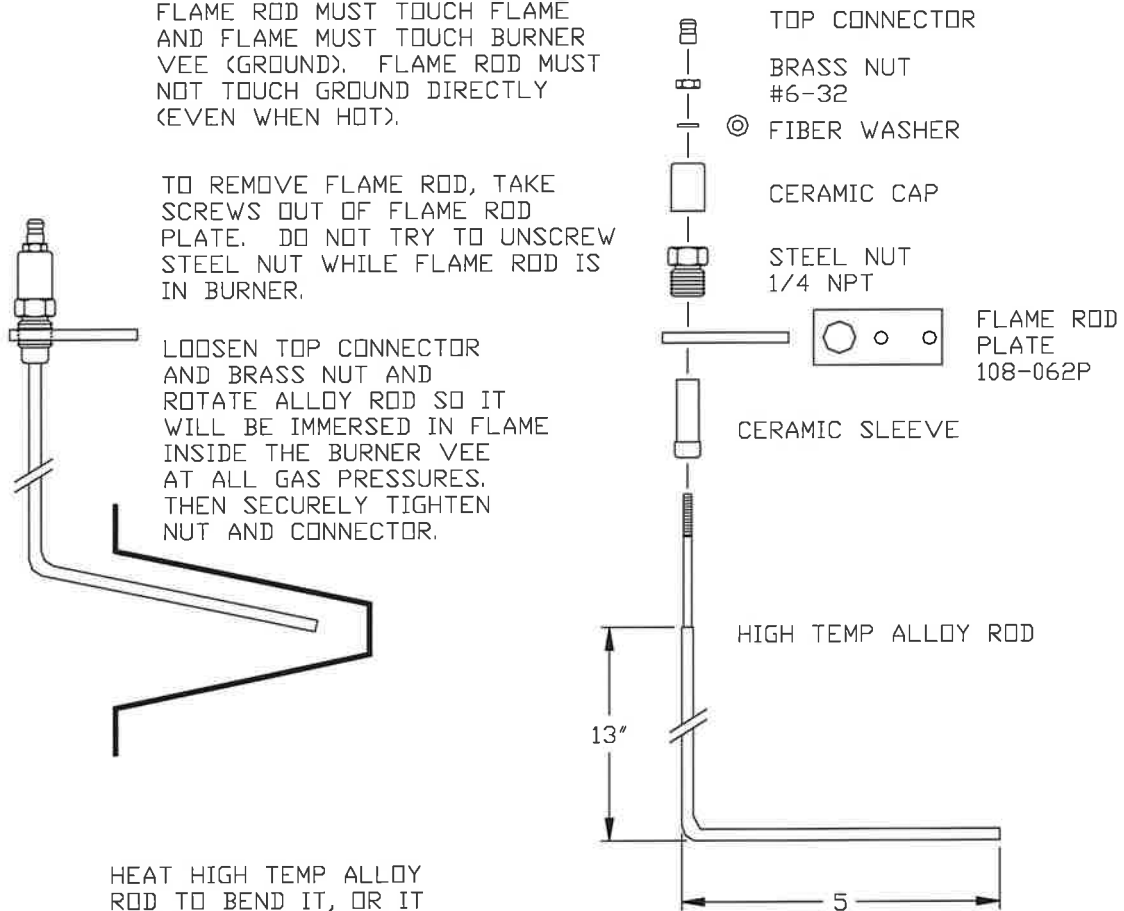
FLAME ROD, 1/4" NPT

FLAME ROD MUST TOUCH FLAME AND FLAME MUST TOUCH BURNER VEE (GROUND). FLAME ROD MUST NOT TOUCH GROUND DIRECTLY (EVEN WHEN HOT).

TO REMOVE FLAME ROD, TAKE SCREWS OUT OF FLAME ROD PLATE. DO NOT TRY TO UNSCREW STEEL NUT WHILE FLAME ROD IS IN BURNER.

LOOSEN TOP CONNECTOR AND BRASS NUT AND ROTATE ALLOY ROD SO IT WILL BE IMMERSSED IN FLAME INSIDE THE BURNER VEE AT ALL GAS PRESSURES. THEN SECURELY TIGHTEN NUT AND CONNECTOR.

HEAT HIGH TEMP ALLOY ROD TO BEND IT, OR IT MAY BREAK.



FLAME ROD NOT BENT IS # E-6370

FLAME ROD ASSY. BLUE FLAME II

119-261A

CFROD.DWG

NOTE: PARTS ARE FRAGILE. HANDLE WITH CARE.

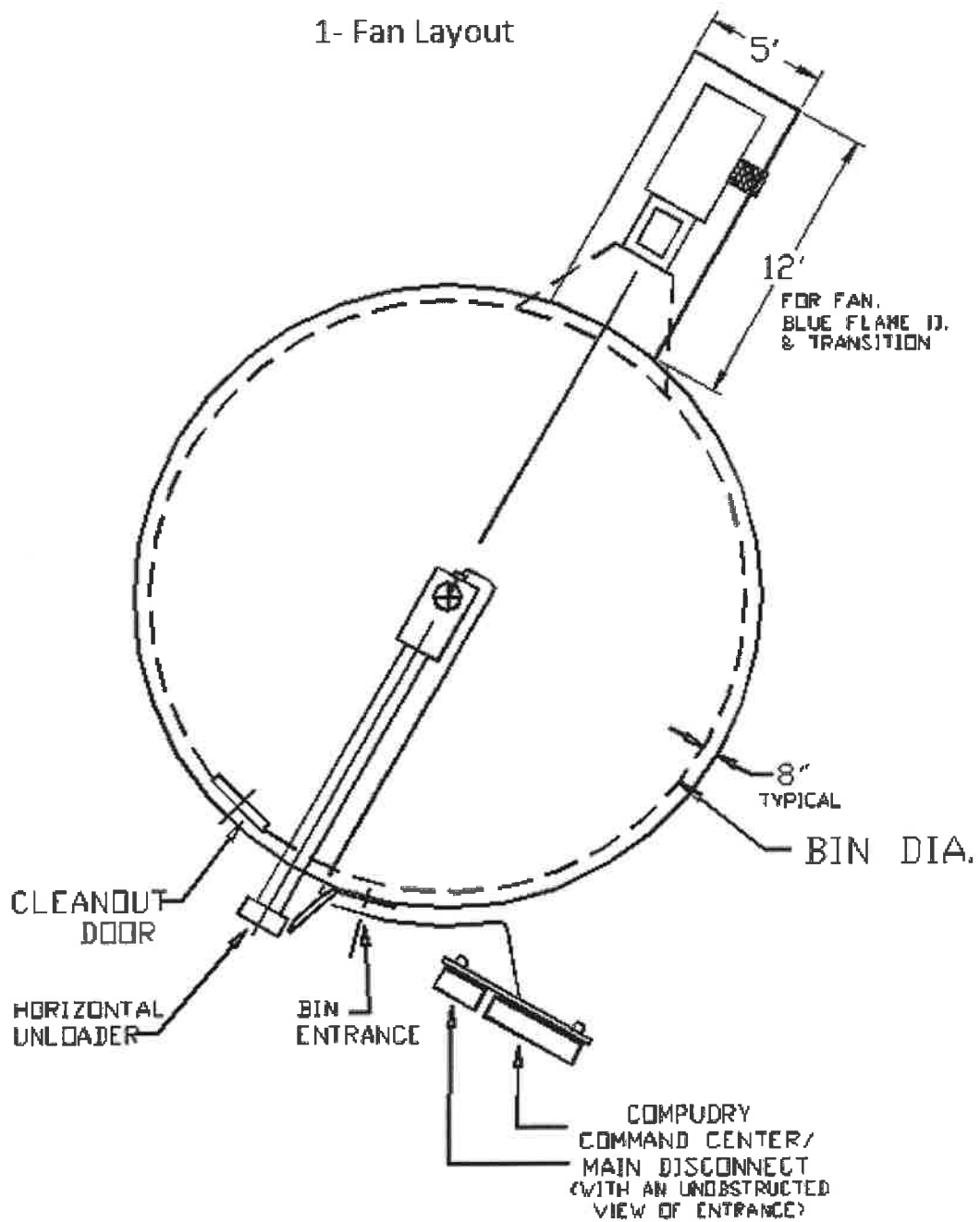
MECHANICAL INSTALLATION

DRYING BIN LAYOUT

- a). The horizontal unloader must come out of the bin near the main entrance door.
- b). The Compudry Command Center, (or installed controller), must be within line of sight of the bin's main entrance door. The plenum temperature sensing device of the Compudry Command Center (or installed controller) must be at least 12 feet from the nearest Blue Flame II.
- c). There must be a main electrical disconnect switch. This switch must shut off all electrical power to the drying system. It must have the capability of being locked in the OFF position. It must be located near the bin's main entrance and within line of sight of the Compudry Command Center, (or installed controller).
- d). The Blue Flame II burners should be located as shown in the following drawings whenever possible. They must be installed as shown for certified performance systems.
- e). It is recommended to use only Shivers entrance collars and transitions. Follow instructions provided with transitions for their installation. For drying bins with more than one Blue Flame II, air dampers are required to prevent reverse airflow.
- f). Keep the floor space in front of the entrance collar as free of obstructions as possible. Concrete blocks are not recommended for floor supports. They block too much airflow. Floor supports should be at least 15" tall. Shorter supports do not allow even heat under the floor.
- g). Concrete pads for Blue Flame II installations should be 12 feet long by 5 feet wide. This size pad should accommodate fans up to 20 Hp., from most manufacturers. The pad may be made smaller if you carefully measure your transition, burner and fan, and offset the pad to the motor side of the fan. Pads should be flush and level with the top of the bin concrete. Place footers under the pads and use re-rod to keep the pads from cracking and moving.
- h). Inspect the flame rod before installation to make sure it hasn't gotten out of adjustment during shipping. It should be in the burner vee, but not touching metal.

Shivvers Circulator

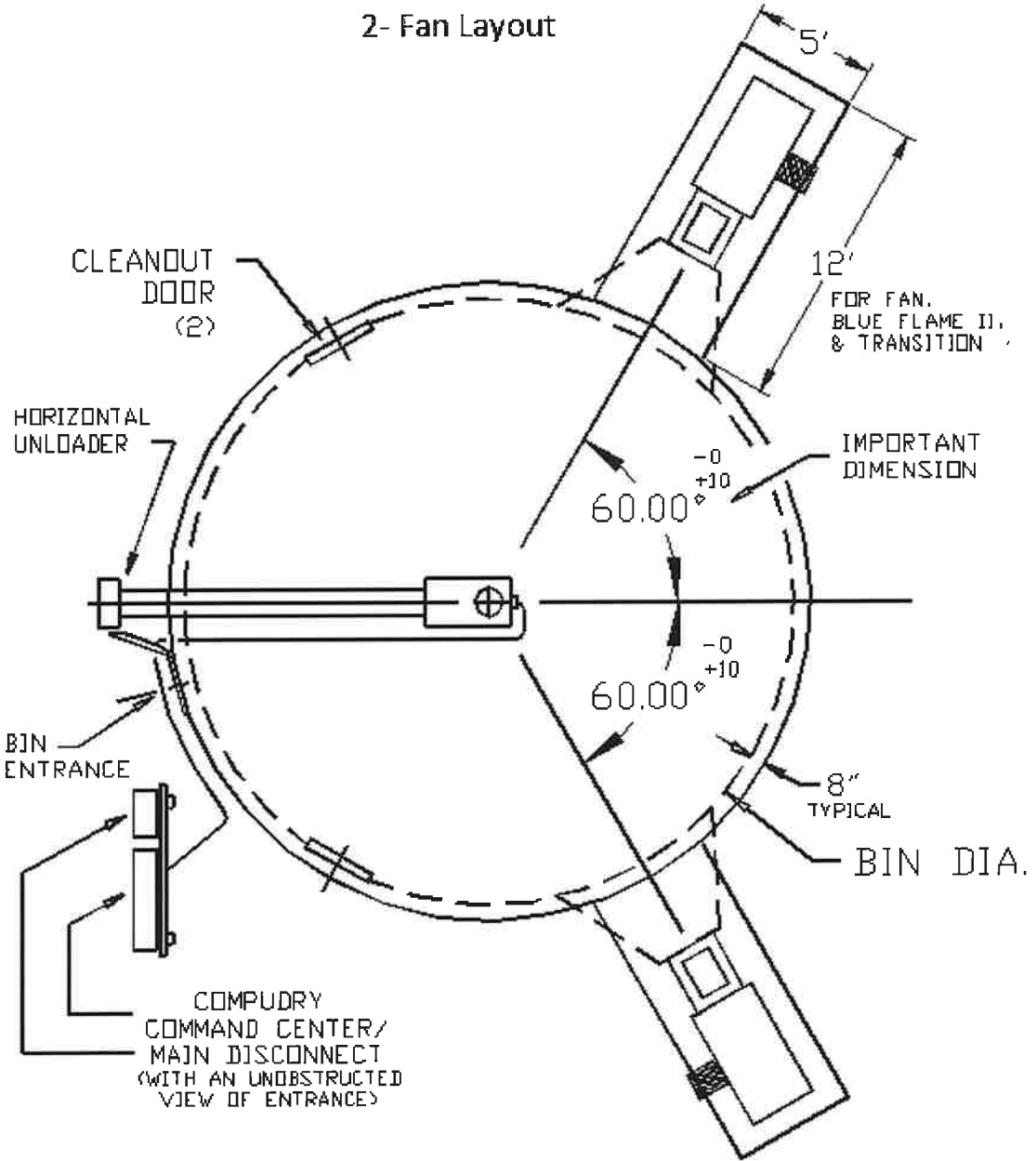
1- Fan Layout



CFANLYT-1.DWG

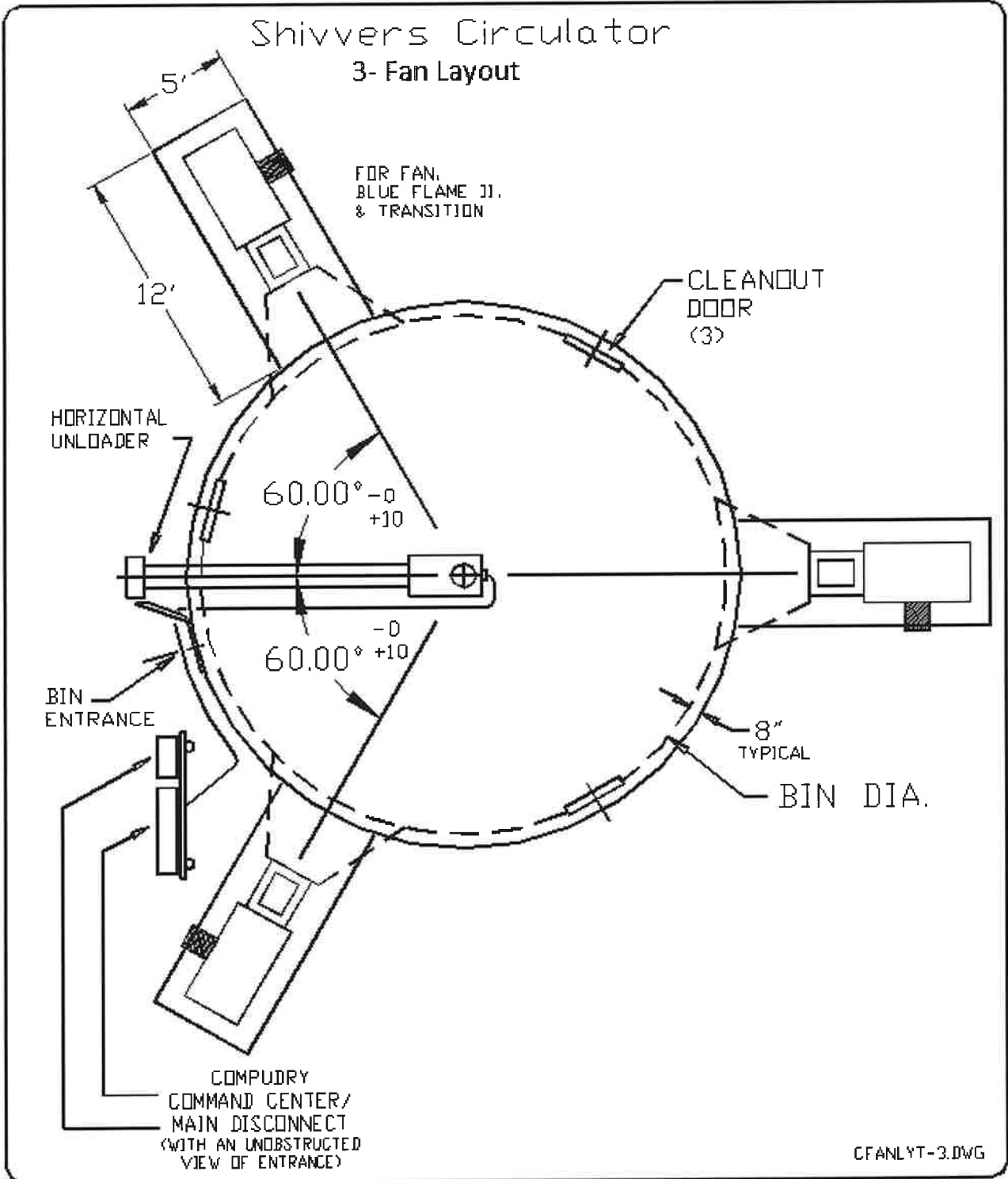
Shivvers Circulator

2- Fan Layout



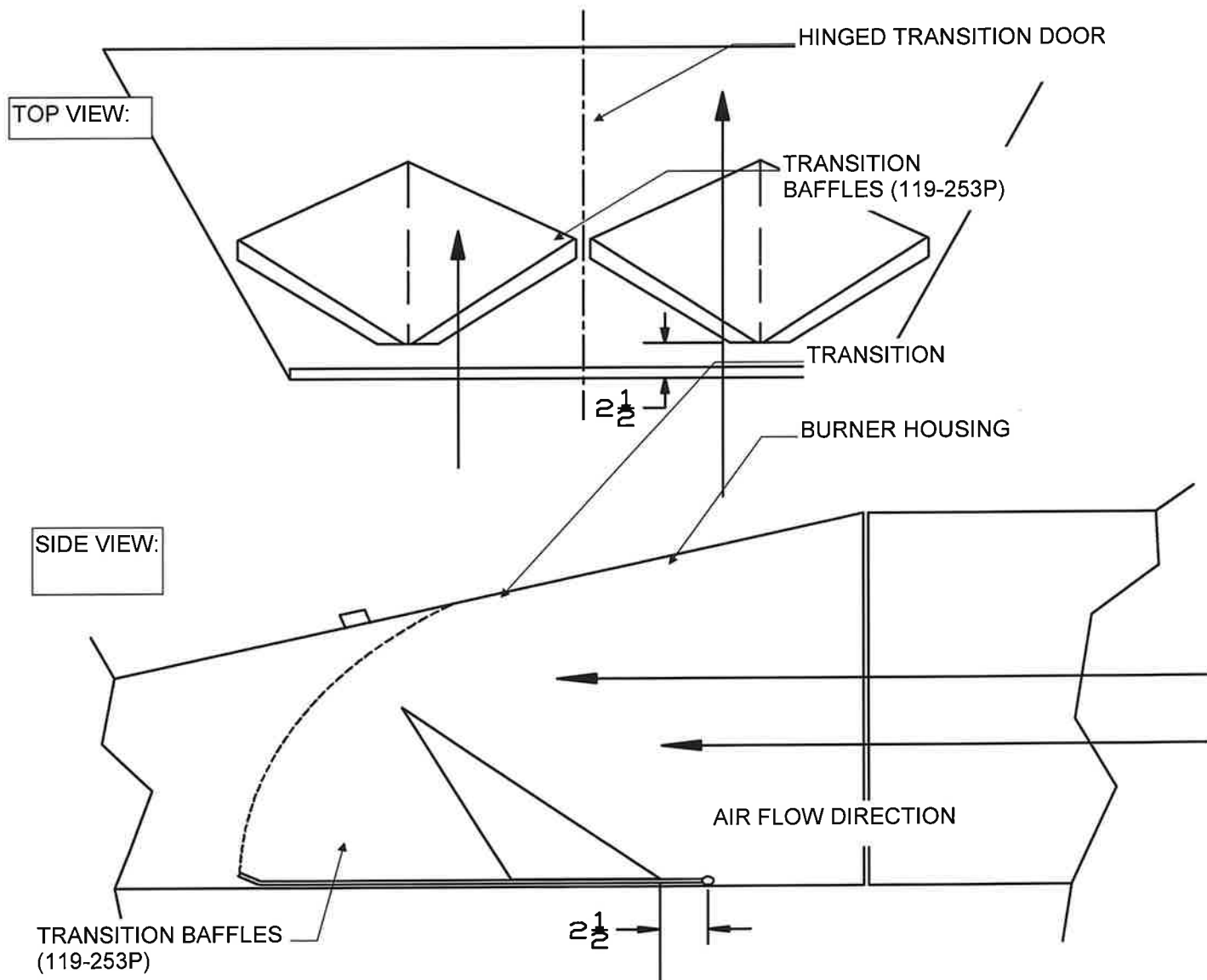
CFANLYT-2.DWG

Shivvers Circulator 3- Fan Layout



BURNER INSTALLATION

Perforated Transition Baffles (119-253P), are shipped with the burner to be used, if necessary, for directing heat flow into the drying bin plenum. Remove the transition baffles from the burner before installing the burner. It is generally recommended to try the burner without the baffles, and then add them as required. See the operating instructions for more information. If a damper door is used, the transition baffle(s), are placed on the hinged transition damper door. If a damper door is not used, they are placed approximately 10-1/2" back from the where the transition and the burner housing meet. Each installation seems to have different requirements. One or two of the baffles may be required. The baffle(s) should be placed within the transition so as to give the most even heat in the plenum and should not interfere with the damper door movement. Fasten each baffle using six #8 x 1/2" self tapping screws (F-1231) or drill and pop rivet in place. Shown below is an example of a two baffle installation.

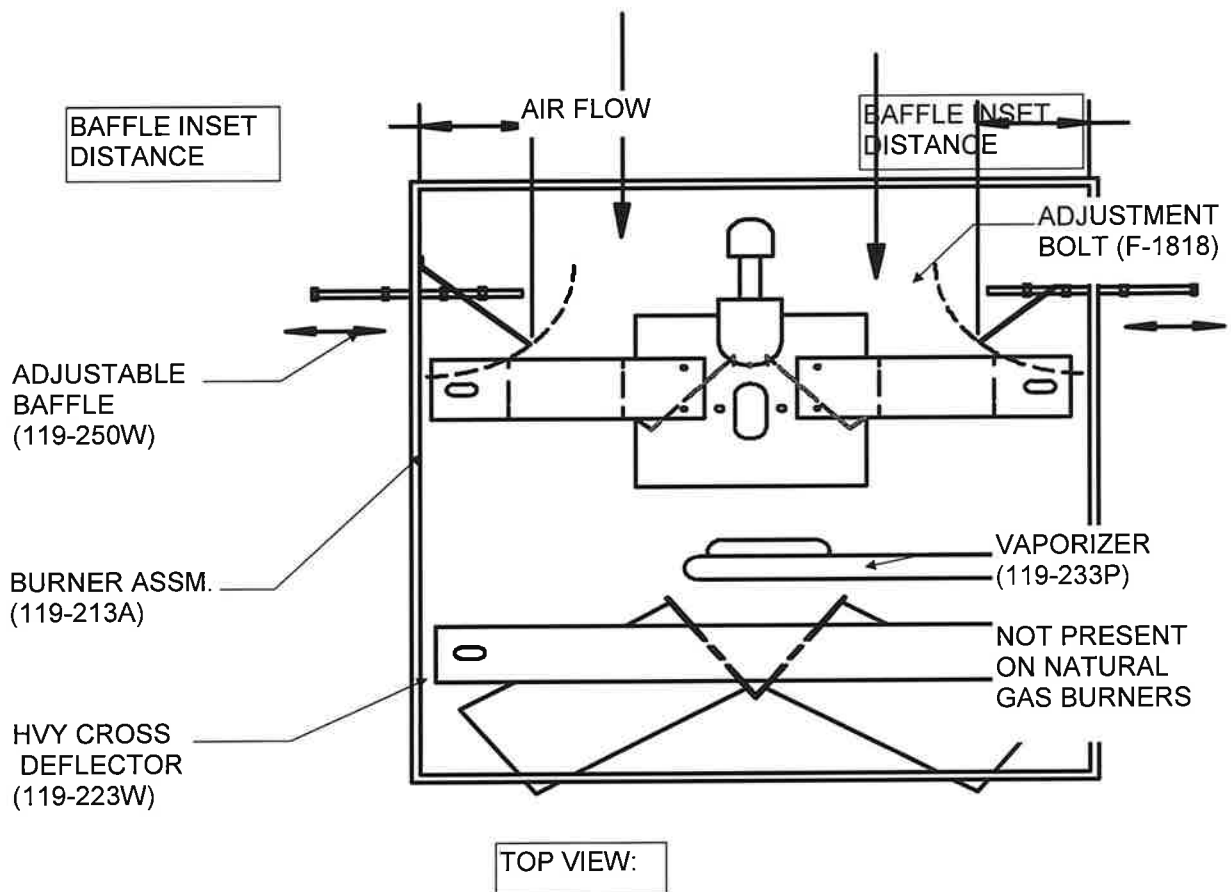


Burner Installation, con't:

Two hinged Side Baffles (119-250W) are located on opposite sides inside of the Burner housing. The purpose of these are to channel sufficient air flow from the fan into the burner element for proper fuel/air mixture. The Side Baffles also aid in giving adequate heat/air mixture for uniform heat to enter the plenum.

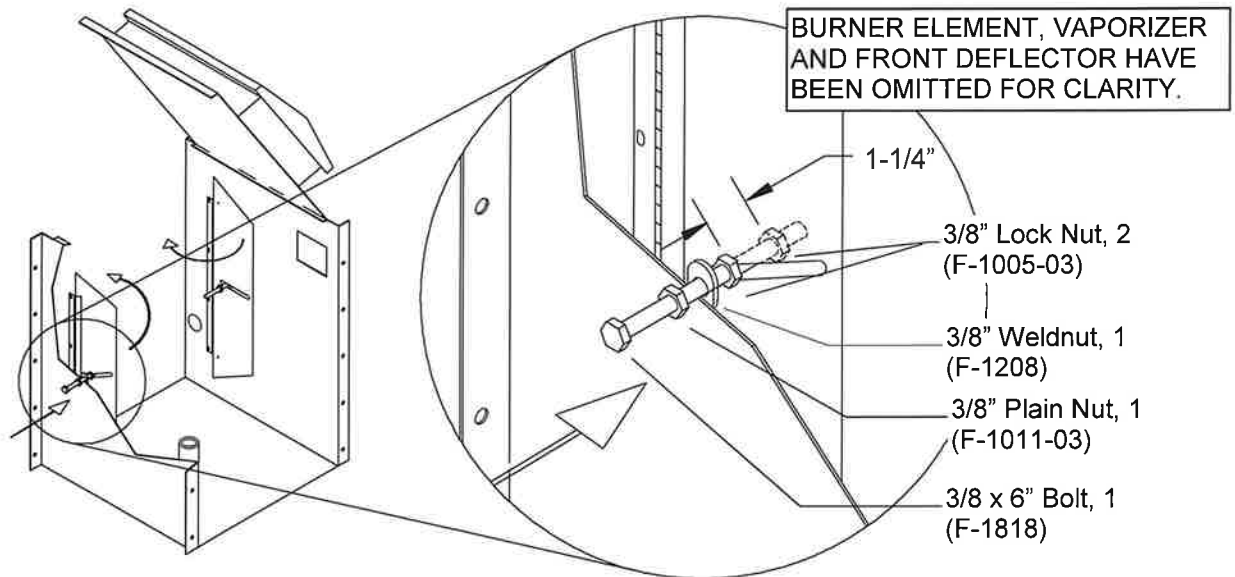
Adjustments to the Side Baffles are achieved by threading, inward or outward, the 3/8" bolt (F-1818). The distance that the Side Baffles are set will vary between installations and will have to be customized for each situation under operating conditions.

A starting point for setting these distances will depend on the fan airflow output and is given in the table below.

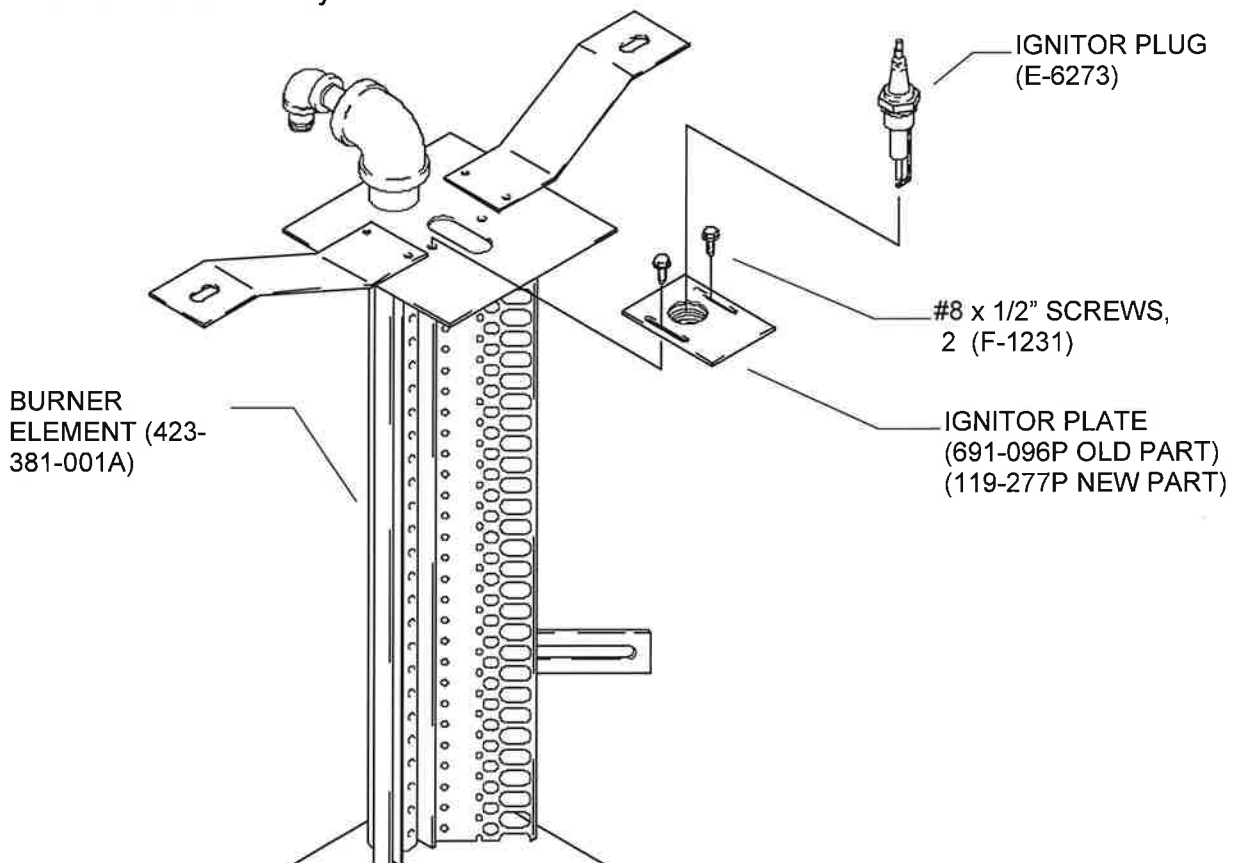


FAN HP	FUEL	STARTING BAFFLE INSET DISTANCE
10 hp	Propane	5"
15 hp	Propane	4"
20+ hp	Propane	3"
10 hp	Natural Gas	3"
15 hp	Natural Gas	2"
20+ hp	Natural Gas	1"

Burner Installation, con't:

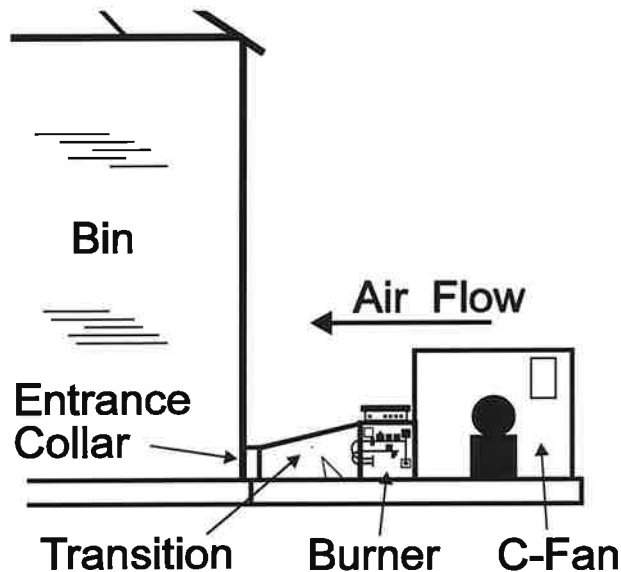


Verify that the spark plug mount is in the proper starting position. The threaded portion of the plate should be pointing downward. Initially, for LP fuel, place the Ignitor as close as possible to the Burner Element. For NG fuel, place the Ignitor as far as possible from the Burner Element. If ignition problems occur, this plate can be adjusted inward or outward as necessary.



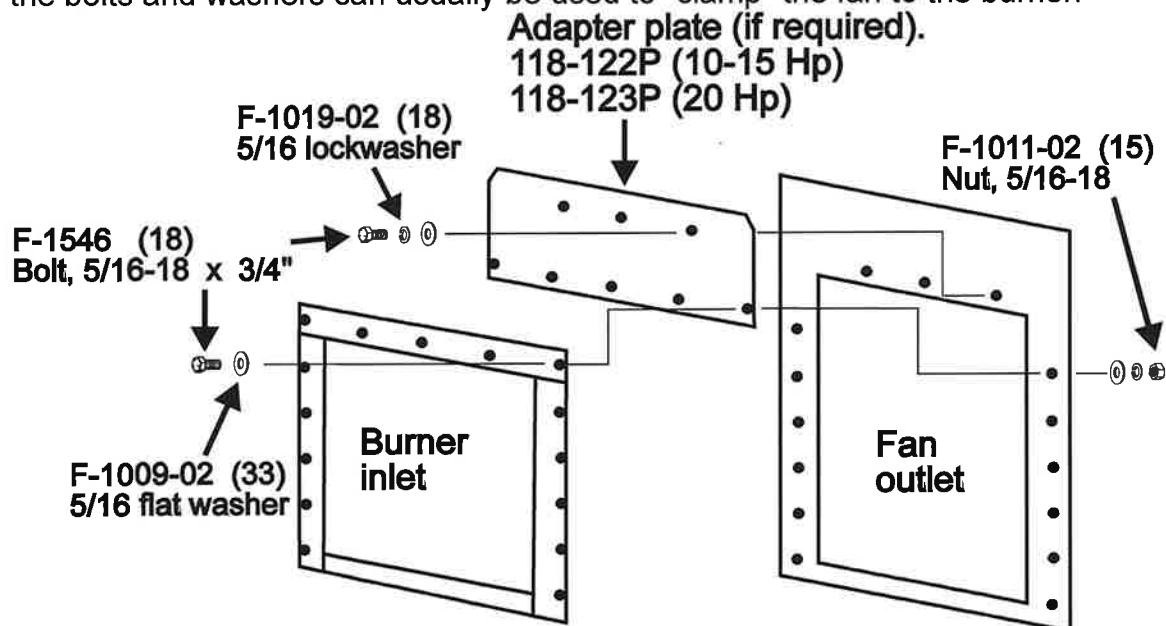
Burner Installation, con't:

Connect the Blue Flame II burner to the transition. Note the proper orientation with respect to airflow.



Some fans come with an adapter plate for connecting to the burner. If the fan has an adapter plate, remove it from the fan and bolt it to the burner using the top middle 3 holes of the burner inlet flange. Make sure the outside holes line up. Hardware is in the fan control box. Make sure the bolts point toward the fan (heads on burner side), so as not to interfere with lifting the burner top.

Add sealant around the fan opening and bolt the fan to the burner as shown. Some holes may need to be reamed out or re-drilled for proper fit. Ten horsepower fans may not have a wide enough flange to use the holes in the burner inlet. If this is the case, the bolts and washers can usually be used to "clamp" the fan to the burner.



LIQUID PROPANE INSTALLATION AND GAS HOOK-UP

ALL FUEL COMPONENTS MUST BE INSTALLED IN COMPLIANCE WITH NATIONAL AND LOCAL CODES AS APPLICABLE.

- 1). The LP storage tank should be placed at least 25 feet from the burner (some places require 50 feet, so check local regulations), and should not be near any structure.
- 2). A 1000 gallon tank is recommended as a minimum size to avoid nuisance refilling and to allow proper tank vaporization. This is normally a good size for one or two Blue Flame dryers.
- 3). If the Blue Flame II(s) will be used when outside temperatures are below 20° F, and the tank size is less than 500 gallons per Blue Flame II, a vapor return line may be required. The LP vapor heated in the Blue Flame II is fed back into the tank to help keep a steady supply of liquid fuel to the burner. Connect at least ½ inch copper tubing from the cross tee immediately in front of the pressure regulator on the Blue Flame II, to the vapor outlet on the LP tank. A check valve must be installed to allow vapor flow into the tank only.
- 4). The liquid propane should be drawn through a snorkel located 12 inches above the tank bottom. This prevents impurities in the LP from being fed into the burner and clogging the strainer and potentially causing other problems. A pressure regulator is not required on the storage tank.
- 5). Never use an ammonia tank for LP gas storage. It can be harmful to the dryer and is very dangerous.
- 6). Use at least 1/2 inch copper tubing from the LP tank to Blue Flame II. Bury the line 18 to 24 inches deep or route it such that it will not get damaged. For multiple burner installations try to keep the fuel line length as equal as possible to each burner.
- 7). Install a flexible line and a manual shut off valve in the gas line just before the gas strainer on the Blue Flame II.
- 8). Purge the gas line(s) before hooking to the Blue Flame II to blow any debris out which may have collected in the line during hookup.
- 9). Turn on the LP and check all connections for leaks with soapy water.

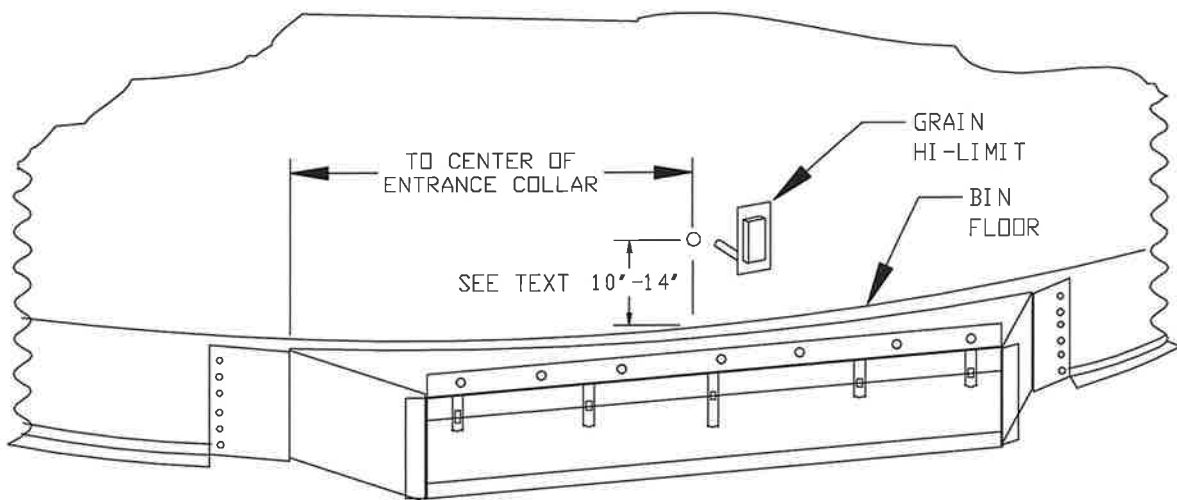
NATURAL GAS INSTALLATION AND GAS HOOK-UP

ALL FUEL COMPONENTS MUST BE INSTALLED IN COMPLIANCE WITH NATIONAL AND LOCAL CODES AS APPLICABLE.

- 1). For adequate heat, the natural gas supply must provide 3 Million BTU/HR (3,000 cubic feet/HR) at 10 PSIG pressure for each burner. Maximum pressure allowable is 15 PSIG.
- 2). Use 1-1/2 inch gas pipe from the Natural Gas Meter/Regulator to the Blue Flame II, and attach it with a flexible hose and a manual shutoff valve.
- 3). Purge the gas line(s) before hooking to the Blue Flame II to blow any debris out which may have collected in the line during hookup.
- 4). Turn on the Natural Gas and check all connections for leaks with soapy water.

GRAIN HIGH LIMIT INSTALLATION

A Grain Hi-Limit is provided with each Blue Flame II burner. Install a Grain Hi-Limit for each Blue Flame II on the bin. The Grain Hi-Limit will shut down the fan(s) if the grain temperature exceeds 220° F. For Certified Performance Systems, the Grain Hi-Limit probe should be 14 inches above the bin drying floor to accommodate higher plenum temperatures. For other systems, the Grain Hi-Limit probe should be installed 10" above bin drying floor. Remove the black plastic shipping protector from the probe before installation. Use silicone or thum-seal around the probe to make a waterproof installation.



The grain hi-limit contains a normally closed switch that opens at 200° F. If the grain gets too hot, it will open and shut off the fan(s). If there are two or more dryers on the bin, and one stops burning, the other one will try to make up all the heat and may trip the grain hi-limit. It may take quite a while for the grain to cool down before the switch re-closes and the fan(s) will start again. If the grain is getting to 200 degrees in this area, there could be a fire. Make sure the problem is corrected. Don't just keep running the system until the grain hi-limit trips again. Monitor the system closely.

ELECTRICAL INSTALLATION

ALL ELECTRICAL WIRING SHALL BE INSTALLED IN COMPLIANCE WITH THE LATEST EDITION OF THE ANSI/NFPA STANDARD 70, NATIONAL ELECTRICAL CODE, AS A MINIMUM REQUIREMENT, AND IN COMPLIANCE WITH LOCAL WIRING CODES AS APPLICABLE.

WIRING MUST BE DONE BY A COMPETENT ELECTRICIAN. A LICENSED ELECTRICIAN IS RECOMMENDED, AND MUST BE USED WHEN REQUIRED BY LOCAL OR STATE STATUTES.



Disconnect and lock out all power before wiring.

INCOMING POWER HOOKUP

(see fan installation manual for more information)

- 1). The Blue Flame II burners use 115 Volt AC control voltage. This control voltage must be interlocked with the fan, so it is only available when the fan is running. For 440 Volt three phase fan applications, a 0.5 kVA control voltage transformer (available from Shivers) must be installed. If it is not possible to obtain 115 Volts from one leg of the 220 Volt three phase, the 0.5 kVA control voltage transformer will also be required. Contact the factory if more information is required. A 3-prong plug is provided from the control box for the incoming burner power when used with Shivers centrifugal fans. The control power is connected at the factory to one lead of the fan motor contactor. For 3 phase fans, make sure this is not connected to the wild leg (a leg with the highest voltage when measured to ground or neutral). If a control voltage transformer is used, the control power wire is removed from the fan contactor and placed on the transformer secondary. Make sure the burner control circuitry is not exposed to more than 125 Volts maximum!
- 2). A circuit breaker must be installed in line with the incoming power to the fan control box. Do not use fuses, as one fuse can open and keep power on the gas valves. If fuses must be used, either add a 0.5 kVA control voltage transformer or a 240 volt coil relay, to shut down the control circuitry in case one fuse opens. The circuit breaker should break all lines if an overload occurs on any single line.
- 3). The fan incoming power must have a separate neutral and ground for proper operation of the Blue Flame II burner.

- 4). If conduit is attached to the bin wall, keep it at least 3 feet above the foundation to keep the ambient temperature lower. If the bin side wall will be covered with insulating foam, make sure the electrical conduit is not under the foam. When running the conduit from the bin wall to the Blue Flame II make sure it does not interfere with air damper operation. Make sure it does not block access through the transition lid. Make sure it does not touch the entrance collar or transition as these can get hot.

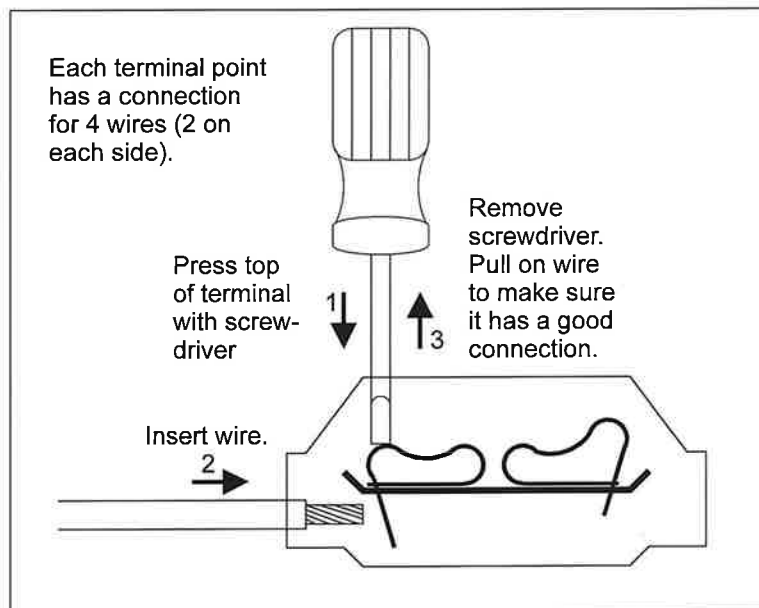
CONTROL WIRING

Control wiring will be based upon which controlling unit is on the drying bin. The wiring shown is for a Compudry Command Center. If another controller is used, consult the factory for assistance.

In general, the fan(s) should be shutdown whenever a Grain Hi-Limit, Gearbox Hi-Limit, or Compudry Fan Interrupt opens. The burner(s) should shut off whenever a Plenum Hi-Limit, Low Grain Shut-off, or Thermostat opens.

All terminal numbers refer to the 12 pole terminal strip, not the 8 pole inverted header that the flame sense module plugs into, unless otherwise noted.

The Blue Flame II 12 pole terminal strip is a spring cage clamp type. The following diagram shows how to properly connect the wires. Make sure the wire is lined up to go straight into the terminal before pressing on the spring.



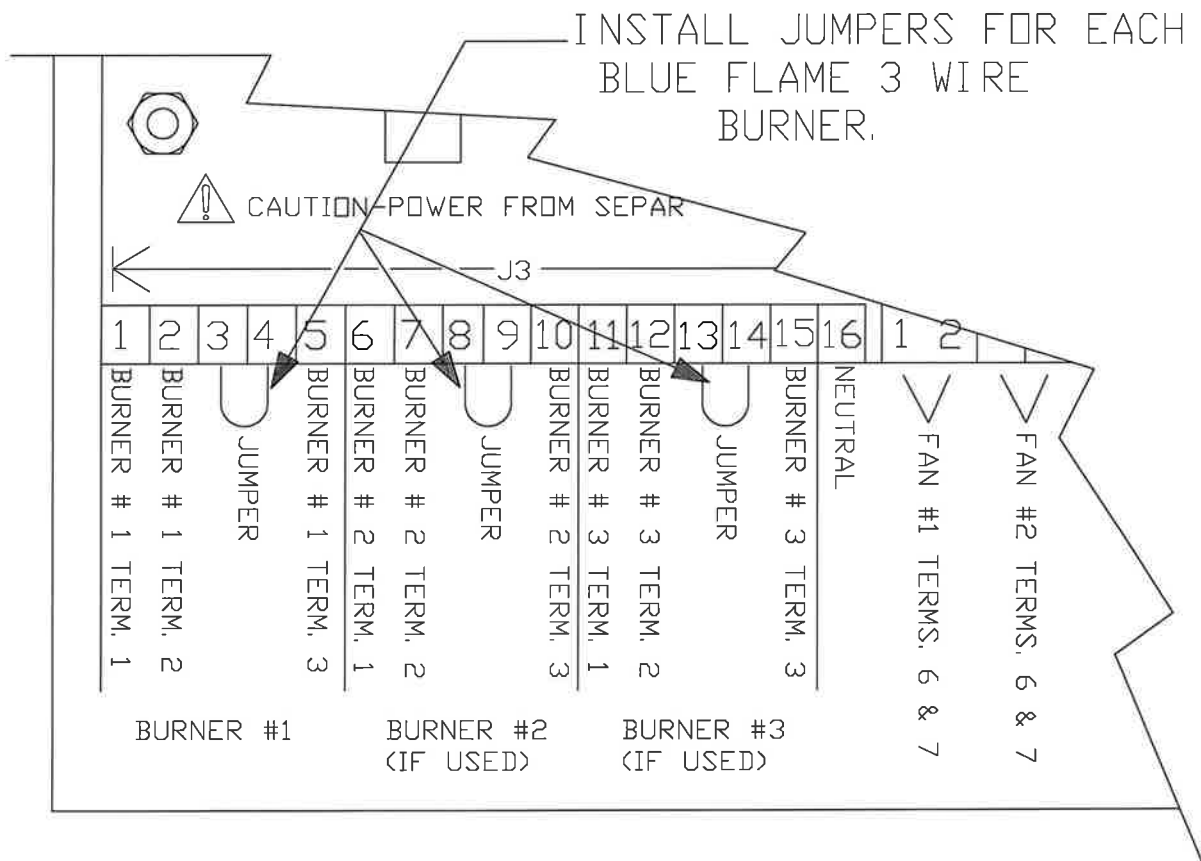
Terminals 1, 2, and 3 on this burner are the thermostat connections and have the same function as the corresponding terminals A, B, and C did on previous Blue Flame II's. Terminal 1 is the thermostat source of power. Terminal 2 is the call for heat or low fire connection. Terminal 3 is the high fire connection.

CONTROL WIRING TO COMPUDRY COMMAND CENTER

See the Compudry Command Center Installation manual for more details. Install control wiring conduit from the Command Center to the Blue Flame II. The conduit can go from the Command Center directly to the Blue Flame II, or it can go to a junction box on the bin side wall, to pick up the grain hi-limit wires. Each run will require at least 7 control wires and one ground wire.

Connect terminals 1,2, and 3, of the Blue Flame II 12 pole terminal strip to J3 in the Command Center as shown below. Be sure to install the jumpers as shown for each Blue Flame II installed.

BLUE FLAME II TO COMMAND CENTER THERMOSTAT CONNECTIONS

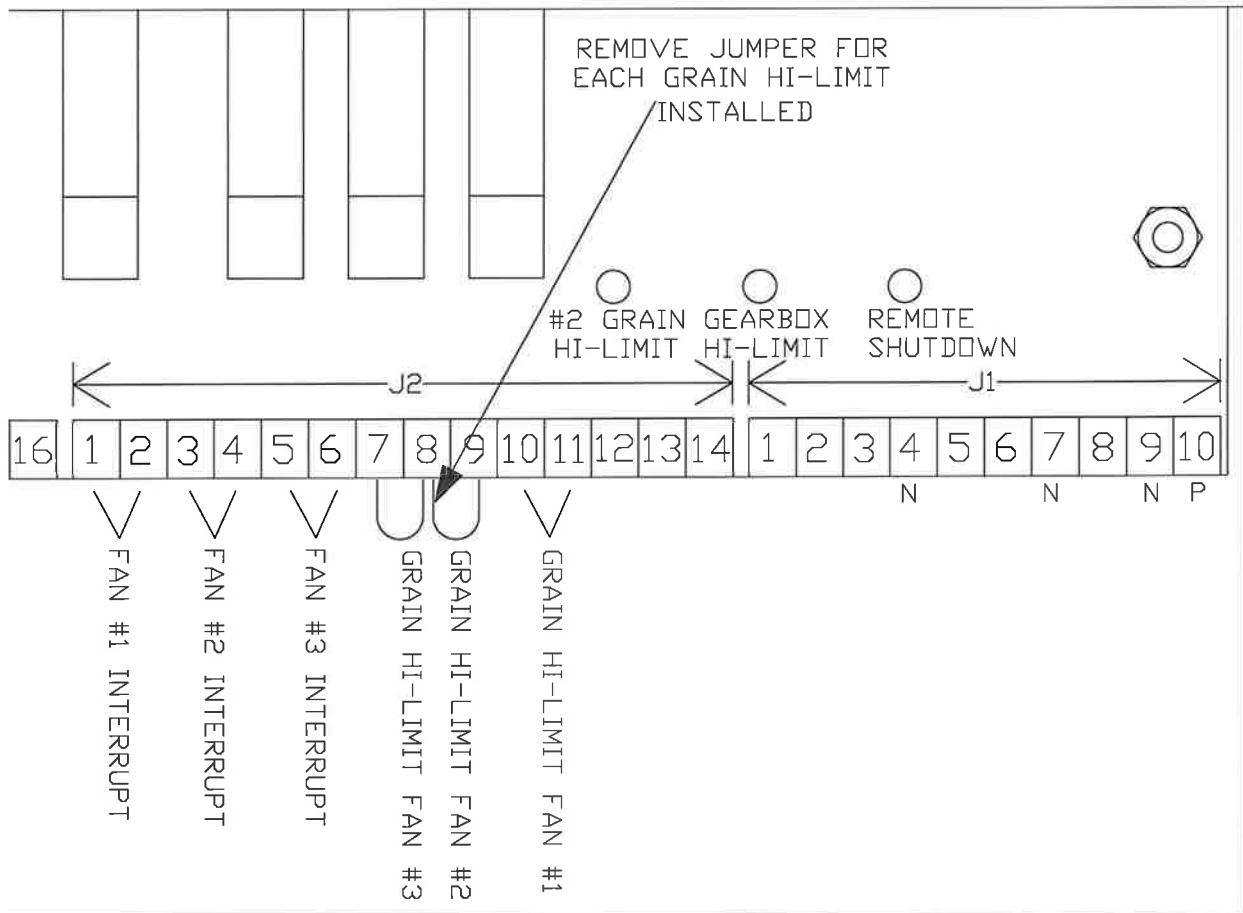


CONTROL WIRING TO COMPUDRY COMMAND CENTER, Con't:

Connect fan interrupt terminals in the fan control box to J2 in the Command Center as shown below.

Connect the two leads from each Grain Hi-Limit to J2 in the Command Center as shown below. Be sure to remove the jumpers as shown for each extra Blue Flame II installed. Note that there will be two wires under J2 terminal 8 in the Command Center.

BLUE FLAME II TO COMMAND CENTER FAN INTERRUPT AND GRAIN HI-LIMIT CONNECTIONS



INITIAL CHECKOUT

- 1). Once the wiring is completed, make sure the burner power switch is off. Make sure everyone is out of the grain bin and are safely away from all drying equipment, then unlock the main power. Lock the bin entrances shut, then turn on the main power. Check for proper incoming voltages in the fan control box. If connected to a CompuDry Command Center, make sure the fan(s) enabled light is on. On the fan, press the fan start switch then quickly press the fan stop switch. If the fan does not attempt to start, make sure there is a separate neutral wire connected coming into the fan control box. If the fan did attempt to start, check the fan blade for proper rotation. Looking into the venturi, rotation should be counter-clockwise. If the rotation is not correct, and the incoming power is three phase, exchange any two incoming wires. Disconnect and lock out the power first! Make sure that the wild leg does not end up on the control power! Re-apply power.
- 2). Press the fan start switch. After the fan has reached operating speed, verify that that air is going into the bin, not blowing out.
- 3). Set the Low Grain Shut-off, or Grain Level Indicator to Bypass, and turn up the thermostat or set the Command Center to call for heat. Leave the fuel shut off for now.
- 4). Turn on the burner power switch. The burner power light should come on. The High Fire and Lockout lights should also come on. After a 30 second purge, the spark plug should start sparking. The Lockout light should go off for about 5 seconds, then come back on. The burner is now locked out because there wasn't any fuel to burn.
- 5). Shut the burner power switch off and turn on the fuel supply. Turn the burner power switch back on. After 30 seconds the burner should fire. On LP units adjust the vaporizer and regulator as required. If the burner does not continue to run, inspect the flame rod to make sure it hasn't gotten out of adjustment during shipping. It should be in the burner vee, immersed in the flame, but not touching metal.
- 6). If possible, adjust the thermostat or Command Center to cycle the burner to low fire and off, then back on.
- 7). Shut off the fuel supply and allow the lines to burn out. Once the flame is gone, the burner should go into lockout.
- 8). Disconnect and lock out the main power.

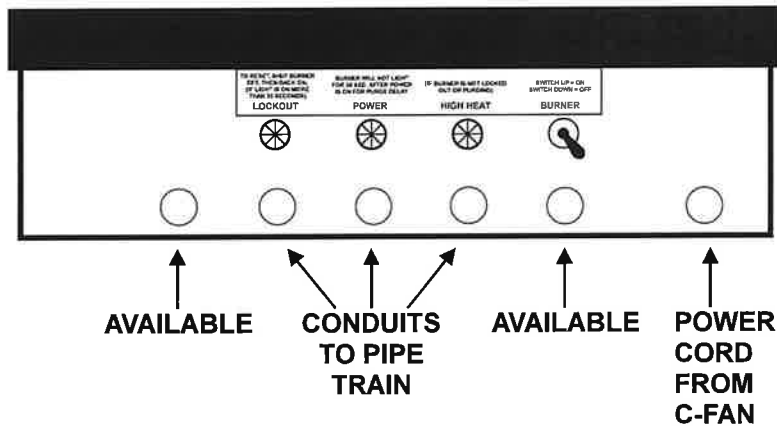
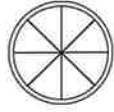
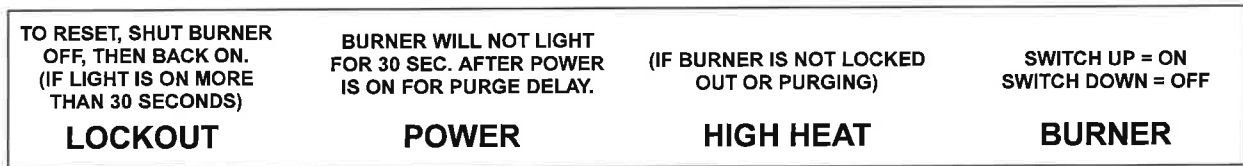
OPERATING INSTRUCTIONS

To Operate:

The fan must be running to provide power to the burner. The fuel supply must be turned on. The Low Grain Shut Off or Grain Level Indicator must be enabled (either in the Auto or Bypass position). The plenum thermostat or Compudry must be set above ambient temperature and be calling for heat. On LP units, the regulator should initially be set less than ½ way between full on (all the way in) and full off (all the way out). Slide the vaporizer about half way out as a starting point. On Natural Gas units, open the ball valve about ¼ turn.

- 1). Turn on the Burner Power Switch. The Burner Power, High Heat, and Lockout lights should all come on.
- 2). After a 30 second purge, the ignition transformer will come on, then the gas valves will open.
- 3). The burner should fire within 5 seconds, then shut off the ignition transformer.
- 4). On LP units, adjust the vaporizer in or out, so the gas line before the regulator is warm, not hot, to touch. **CAUTION:** The vaporizer line can become scalding hot if set too close to the flame. The pipe train can freeze up if the vaporizer is too far away from the flame. Keep checking the vaporizer as it will require several minutes for the temperature to stabilize.
- 5). Adjust fuel pressure so the burner cycles between High Fire and Low Fire. If burner cycles off, reduce gas pressure. If burner stays on High Fire, increase gas pressure. On LP units, fuel pressure is adjusted with the pressure regulator. On Natural Gas units, fuel pressure is adjusted with the pressure regulating ball valve. Re-adjust vaporizer as required for LP units.
- 6). If the Lockout light is on for more than 30 seconds, reset the control by turning the burner switch off for a few seconds, then back on.

BLUE FLAME II OPERATOR'S CONTROL PANEL



Short Term Stop (less than a couple days):

- 1). Close manual gas valve at Blue Flame II.
- 2). Burn out all gas in pipe train.
- 3). Turn burner switch off.
- 4). Let burner cool down for a few minutes then stop fan.

Long Term Stop (more than a couple days):

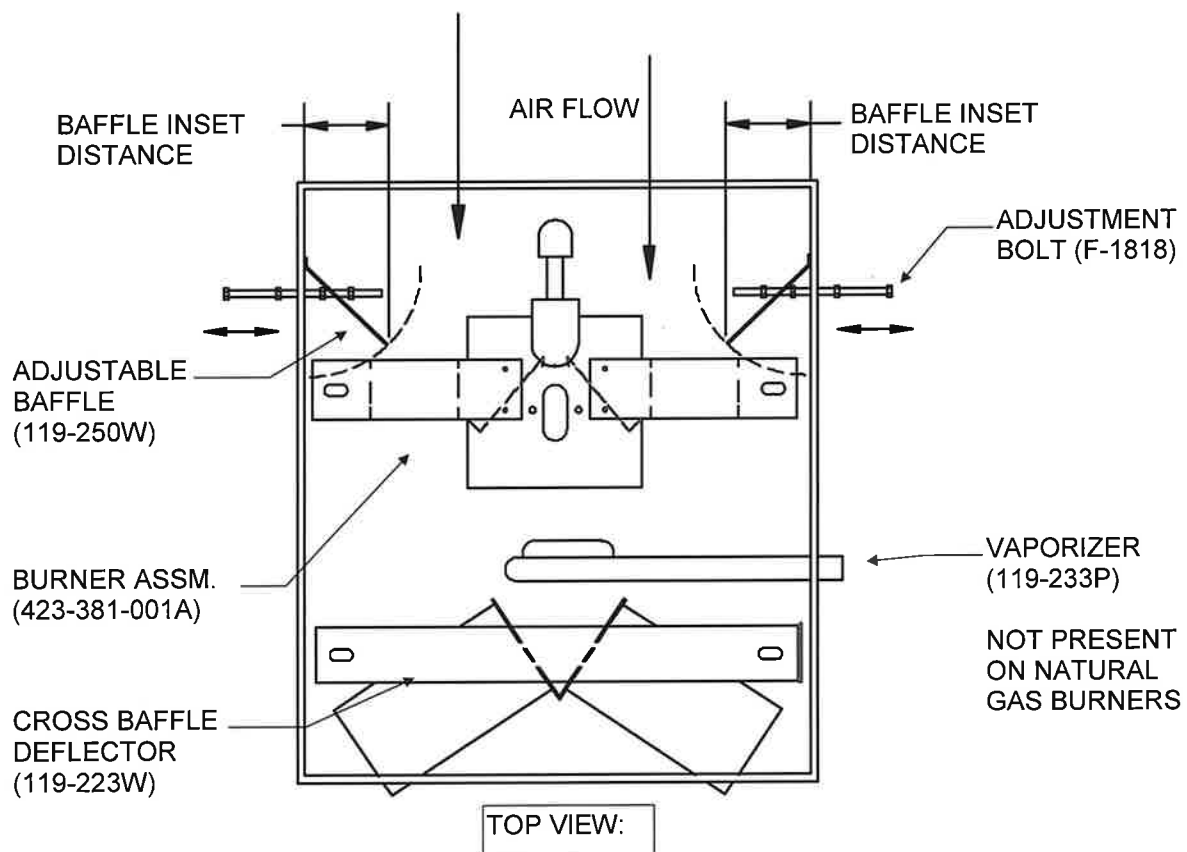
- 1). Close gas valve at storage tank.
- 2). Burn out all gas in line. This may take a while on LP units.
- 3). Turn burner switch off.
- 4). Let burner cool down for a few minutes then stop fan.

Operating Instructions con't:

OPERATION OF ADJUSTABLE HINGED SIDE BAFFLES:

Two hinged side baffles (119-250W) are located on opposite sides inside of the burner housing. The purpose of these are to channel sufficient air flow from the fan into the burner element for proper fuel/air mixture. The side baffles also aid in giving adequate heat/air mixture for uniform heat to enter the plenum.

Adjustments to the side baffles are achieved by threading, inward or outward, the 3/8" bolt (F-1818). The distance that the side baffles are set will vary between installations and will have to be customized for each situation. From the initial starting distances set on the side baffles, observe the flame appearance. Different burn characteristics can be achieved by adjusting the baffles in or out. Adjust the side baffles so there is a blue flame from the burner vee to the cross baffle deflector under most conditions. It may be necessary to shut the fan off to adjust the baffles.



NOTE: Adjusting the baffles in too far may result in decreased fan output performance. Gas pressure, grain depth and ambient temperatures are a few of the factors that will affect fan and burner performance.

Adjustment of the side baffles will also affect the Heat/Air mixture entering the bin. Uneven Heat/Air mixtures could cause hot spots within the bin and affect drying capacity and grain quality. If both baffle inset distances are the same, then by threading in the adjustment bolt (increasing the Inset Distance) of one baffle will generally increase the Plenum temperature on the side opposite of that baffle. The use of dial thermometers (E-5226) placed through the bin wall into the plenum will aid in establishing actual temperature variations.

If plenum temperatures cannot be equalized with the side baffles, the transition baffles may need to be installed. See the burner installation section for more details. The best overall performance will come from an installation that has plenum temperatures within 20 degrees Fahrenheit around the bin under normal operating conditions.

MAINTENANCE



Disconnect and lock out all power before opening any control boxes or removing any shields. Make sure everyone is clear of all drying equipment before restoring power.

- 1). Once every month, start the fan to circulate the grease in the motor bearings. In the off season, do not allow the fan blades on single phase units to free wheel with the wind. It can wear a groove in the centrifugal start switch. Follow motor manufacturer's recommendations for relubricating motor bearings.
- 2). Prior to each drying season, make sure the fan blade rotates freely. Make sure the blade is not coated by any foreign material which could unbalance it or block airflow. If blade requires cleaning, make sure power is disconnected and locked out first!
- 3). On LP units, yearly remove the wire screen in the gas strainer and clean it. The big plug at the bottom of the strainer must be removed to get at the screen. Make sure the fuel supply is shut off first!
- 4). Yearly, check all wiring and gas connections to be sure they are tight and in good condition. A mixture of one part soap to three parts water can be brushed onto pressurized gas line connections to check for leaks. Check all flexible hoses for wear or cracks and replace if necessary.

Maintenance con't:

- 5). Yearly, inspect the burner element for pieces missing and plugged holes. It is normal for the Blue Flame II burner element to initially crack in the corners. Once the stress is relieved, the burner should continue to operate without any problems for a long time. Check for an even burn when operating. On LP units, check the vaporizer tube for wear and replace if splits or cracks appear.
- 6). Maintain a clean operation. Clean up spilled corn, clean out fines under the bin floor (contact Shivvers about clean-out doors), keep all control boxes shut and replace seals if required. Control the rodent population. Control weeds and tall grasses around the Blue Flame II. They can get sucked in and block airflow or start a fire. They can interfere with damper operation.
- 7). At the beginning of each season, check for proper operation of the flame lockout system. With the burner running, shut off the fuel supply. Approximately 6 seconds after the flame goes out, the Lockout light on the front panel should come on and stay on. Make sure it stays on for more than 30 seconds. It is not safe to operate the burner without this circuit operating properly.
- 8). During the drying season, check the transition dampers for free movement and proper operation.
- 9). At the end of the season, make sure the main power is disconnected and locked off. There will be fewer problems with lightning damage with all switches and breakers open.
- 10). The flame rod may corrode and will not conduct enough current, especially when hot. A cleaning before the season may be required. Disconnect and lock out power. Open Blue Flame II control box. Remove red wire from top of flame rod. Remove two screws from flame rod plate. Remove flame rod and plate, being careful not to change the rotational angle of the flame rod to the plate. Clean the flame rod with emery cloth and carefully re-insert it. Reconnect the red wire. Shut the control box.

TROUBLESHOOTING



Disconnect and lock out all power before opening any control boxes or removing any shields. Make sure everyone is clear of all drying equipment before restoring power.

Only qualified personnel should perform troubleshooting on energized circuits.

All terminal strip numbers refer to the 12 pole terminal strip in the Blue Flame II control box unless otherwise noted.

FAN WILL NOT START

- 1). Make sure main power is turned on. Make sure the fan(s) are enabled at the Comudry Command Center or Grain Hi-Limit Control box. If the gearbox hi-limit or any grain hi-limit is open, the fan(s) will not start until the hi-limits cool down. This may take quite a while. If these switches are opening, make sure the problem is identified and corrected or a fire may result. Monitor the system closely.
- 2). If fan will not start after initial wiring, make sure separate neutral wire is in conduit and connected to the appropriate terminal.
- 3). Check 5 amp slow blow fuse in the fan control box.

FAN WILL RUN ONLY WHILE START SWITCH IS HELD DOWN

(stops when start switch is released)

- 1). Defective (open) auxiliary switch on fan motor contactor.

FAN WILL STOP ONLY WHILE STOP SWITCH IS HELD DOWN

(starts back up when stop switch is released)

- 1). Defective (shorted) auxiliary switch on fan motor contactor.
- 2). Defective (shorted) fan start switch.

Troubleshooting con't:

BURNER POWER LIGHT WILL NOT COME ON

- 1). Fan must be running. Make sure burner power switch is on.
- 2). Burner Hi-Limit may be open. Shut power off and lock it out. Open control box and press manual reset on Burner Hi-Limit.
- 3). On L.P. units, Vaporizer Hi-limit may be open. Press manual reset with insulated screwdriver. Check vaporizer for proper setting. It may be getting too hot (140° F). Check L.P. supply tank. It may be low and supplying vapor instead of liquid to the burner. This would cause vaporizer to get too hot. If outside temperature is below 20° F, tank may not develop enough pressure to supply only liquid. A vapor return line may need to be added.
- 4). Check for power on terminal #1. If power is there, burner power light may be defective.

LOCKOUT LIGHT WILL NOT COME ON

(Burner power light is on)

- 1). There is not a call for heat. Make sure plenum temperature controlling device is calling for heat (power on terminal #2). The target temperature may be set too low. The low grain shut off or grain level indicator may not be enabled. The plenum hi-limit may be open.
- 2). Lockout light or flame sense module may be defective.

LOCKOUT LIGHT WILL NOT GO OFF

- 1). After power is applied, the lockout light should be on for 30 seconds during the purge cycle. It should then go off for at least 5 seconds for an ignition trial. If it doesn't go off at all, the flame sense module may be defective.

Troubleshooting con't:

BURNER WILL NOT SPARK BUT GAS COMES ON

(View spark plug through inspection window)

- 1). After the 30 second purge delay, power should be applied to terminal #4 of the flame sense module 8 pole terminal strip. If there isn't power here for at least 5 seconds (after the 30 second purge delay), the flame sense module may be defective.
- 2). If step #1 is OK, the ignition transformer could be defective. Make sure the ignition transformer is bolted securely to the control box.
- 3). Could be a bad spark plug, or grounding electrode. Too large of a gap for the spark to jump across.
- 4). Could be a bad ignition cable. It could be open, or shorting out to ground somewhere. Check where cable comes through burner housing.

BURNER SPARKS BUT WILL NOT FIRE

(Not even for 5 seconds)

- 1). If there isn't any pressure indication on the gauge, make sure fuel supply is turned on. On L.P. units, regulator must be screwed in at least partially.
- 2). If there isn't any pressure indication on the gauge, it could be a defective liquid or low fire solenoid. If there isn't any power on terminal #4, it could be a defective flame sense module. The power will only be on terminal #4 for about 5 seconds while the burner is sparking during the trial for ignition.
- 3). If there is a pressure indication on the gauge, then there is a problem with the fuel/air mix at the ignition point (spark plug). Try changing fuel pressure. If the bin is too empty or too full, it could be affecting the airflow. Make sure the burner element is in good condition (no pieces missing, clogged fuel holes, etc.). Try changing spark plug location.

Troubleshooting con't:

BURNER FIRES FOR 5 SECONDS, BUT WON'T RUN CONTINUOUSLY

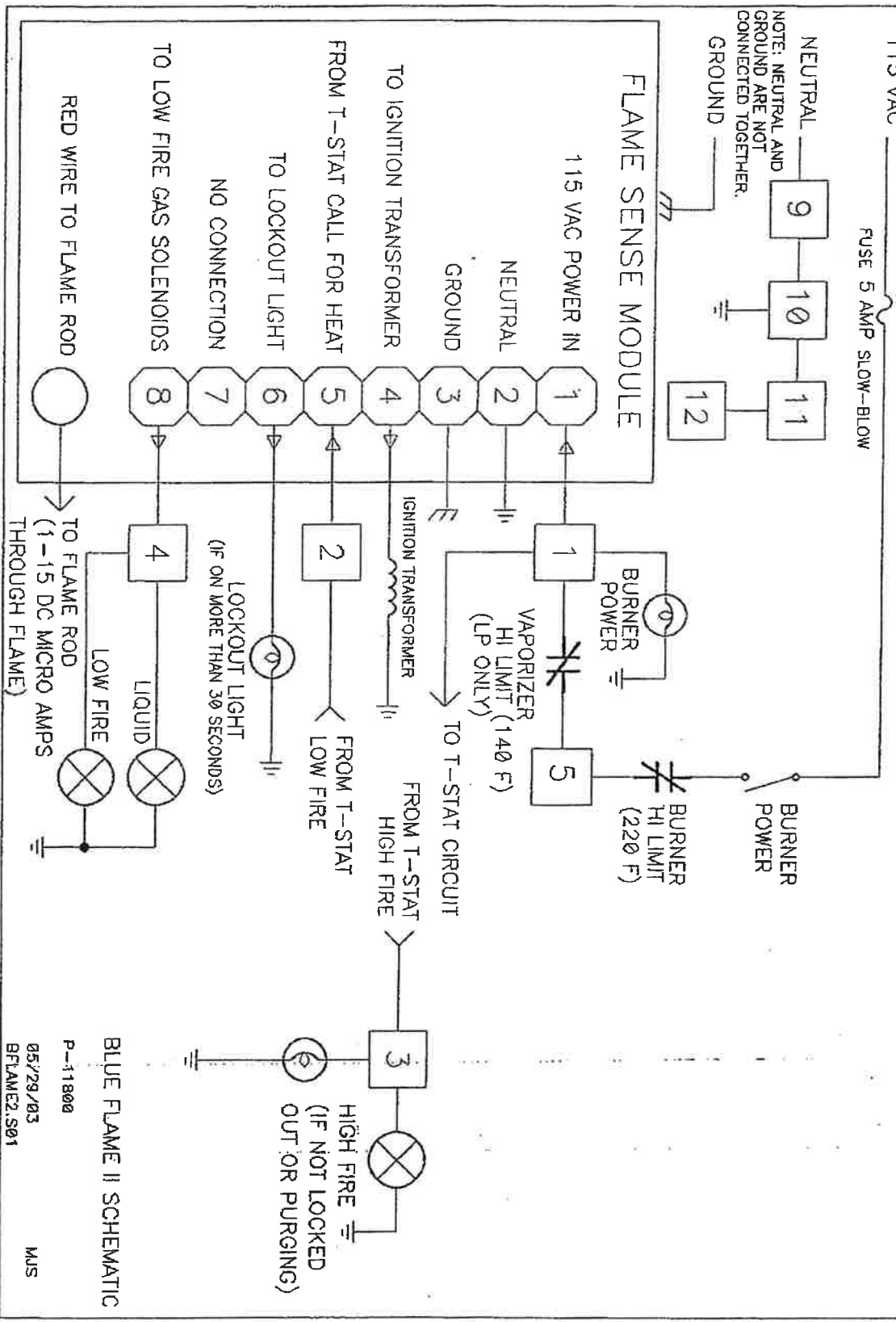
(Most of these problems deal with the flame sensing rod)

- 1). Make sure the flame rod is immersed in the flame. The flame rod can be bent into any shape, but should be heated first to prevent breakage. The flame rod can also be rotated in its ceramic by loosening the top connector and brass nut.
- 2). Make sure the flame rod is not touching any metal. The flame rod and/or burner element can move while operating due to the heat. Watch through the inspection window.
- 3). The flame rod may be corroded and not conducting enough current, especially when hot. Disconnect and lock out power. Open Blue Flame II control box. Remove red wire from top of flame rod. Remove two screws from flame rod plate. Remove flame rod and plate, being careful not to change the rotational angle of the flame rod to the plate. Clean the flame rod with emery cloth and carefully re-insert it. Reconnect the red wire. Shut the control box and try again.
- 4). If possible, measure the flame current with a D.C. micro-ammeter placed in series with the red flame sense wire. Flame sense current should be from 1 to 15 DC micro-amps.
- 5). If flame rod does not seem to be the problem, the flame sense module may be defective.

PIPE TRAIN FREEZES UP ON L.P. UNITS

- 1). Usually the frost will start near where the problem is.
- 2). If the incoming line is frosted, make sure tank has fuel. Make sure the excess flow valve on tank hasn't shut. To reset, shut tank valve off, then turn back on slowly.
- 3). If frost starts at upper pipe train, make sure vaporizer is adjusted properly. If it is, there could be a problem with the pressure regulator or low fire solenoid. They can get sticky oil in them from the liquid propane, and will require cleaning or replacement.

POWER COMES IN ONLY WHEN FAN IS RUNNING. MAKE SURE POWER IS NOT CONNECTED TO WILD LEG ON 3 PHASE UNITS.



BLUE FLAME II SCHEMATIC

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