



100 Series Dryer

Operation and Service Manual

PNEG-552

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GSI GROUP



PNEG-552

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Safety Guidelines

This manual contains information that is important for you, the owner/operator, to know and understand. This information relates to protecting **personal safety** and **preventing equipment problems**. It is the responsibility of the owner/operator to inform anyone operating or working in the area of this equipment of these safety guidelines. To help you recognize this information, we use the symbols that are defined below. Please read the manual and pay attention to these sections. Failure to read this manual and its safety instructions is a misuse of the equipment and may lead to serious injury or death.



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.



NOTE indicates information about the equipment that you should pay special attention.



WARNING! BE ALERT!

Personnel operating or working around electric fans should read this manual. This manual must be delivered with the equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

Dryer Operation

Thank you for choosing a GSI product. It is designed to give excellent performance and service for many years.

This manual describes the operation and service for all standard 100 Series single fan grain dryers. These models are available for liquid propane or natural gas fuel supply, with either single phase 230 volt, or three phase 220 or 440 volt electrical power.

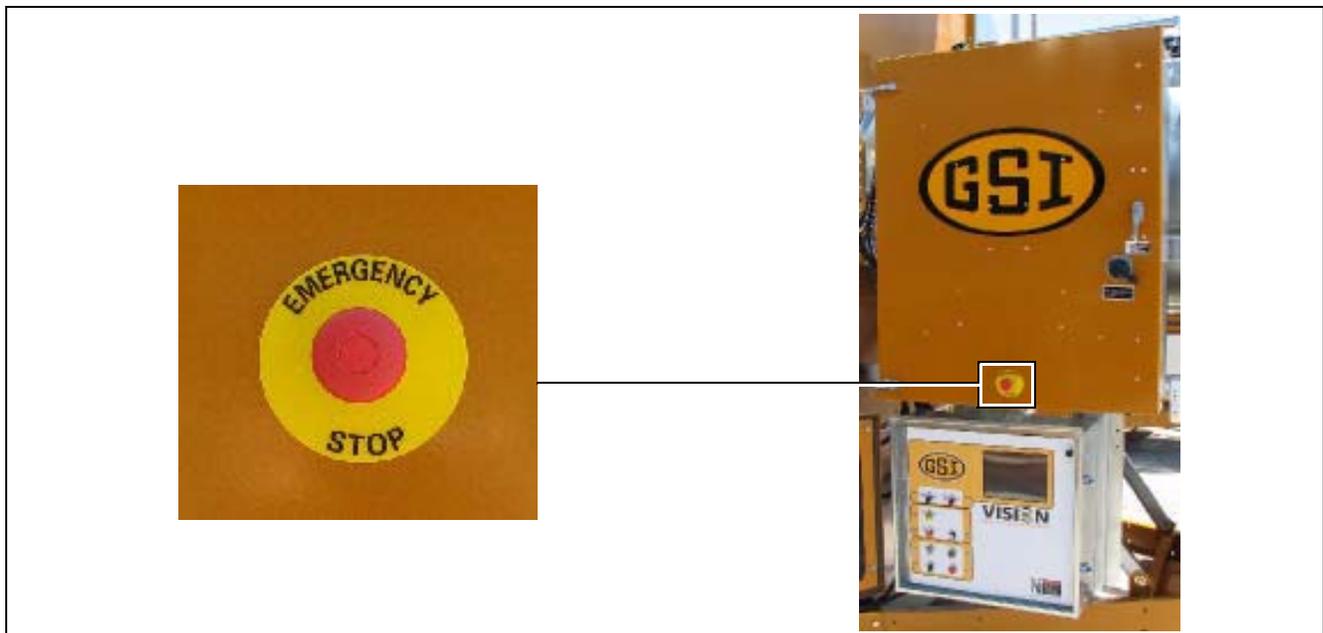
Our foremost concern is your safety and the safety of others associated with this equipment. We want to keep you as a customer. This manual is to help you understand safe operating procedures and some problems which may be encountered by the operator and other personnel.

As owner and/or operator, it is your responsibility to know what requirements, hazards and precautions exist, and to inform all personnel associated with the equipment or in the area. Safety precautions may be required from the personnel. Avoid any alterations to the equipment. Such alterations may produce a very dangerous situation where **SERIOUS INJURY** or **DEATH** may occur.

This equipment shall be installed in accordance with the current installation codes and applicable regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

Emergency Stop

The emergency stop switch is located on the upper control box on the door. Pushing the emergency stop switch will interrupt the control power and stop all dryer functions.



Pushing the emergency stop switch does not interrupt the main power to the upper control box panel.

Safety Precautions

READ THESE INSTRUCTIONS BEFORE OPERATION AND SERVICE SAVE FOR FUTURE REFERENCE

1. Read and understand the operating manual before attempting to operate the dryer.
2. **NEVER** operate the dryer while the guards are removed.
3. Power supply should be OFF for service of electrical components. Use **CAUTION** in checking voltage or other procedures requiring the power to be ON.
4. Check for gas leaks at all gas pipe connections. If any leaks are detected, **DO NOT** operate dryer. Shut down and repair before further operation.
5. **NEVER** attempt to operate the dryer by jumping or otherwise bypassing any safety devices on the unit.
6. Set pressure regulator to avoid excessive gas pressure applied to the burner during ignition and when the burner is in operation. *See Chart on Page 25* for operating procedures. **DO NOT** exceed maximum recommended drying temperature.
7. Keep the dryer clean. **DO NOT** allow fine material to accumulate in the plenum chamber. Clean grain is easier to dry. Fine material increases resistance to airflow and requires removal of extra moisture.
8. Keep auger drive belts tight enough to prevent slippage.
9. Use **CAUTION** in working around high speed fans, gas burners, augers and auxiliary conveyors which can **START AUTOMATICALLY**.
10. Keep area around air inlet to the fan clear of any obstacles and combustible materials.
11. **BEFORE** attempting to remove and reinstall any propeller, make sure to read the recommended procedure listed in the *Service* section of the manual.
12. Make sure that capacities of auxiliary conveyors are matched to dryer auger capacities.

Use Caution in the Operation of this Equipment

This dryer is designed and manufactured with operator safety in mind. However, the very nature of a grain dryer having a gas burner, high voltage electrical equipment and high speed rotating parts, presents hazards to personnel which can not be completely safeguarded against without interfering with the efficient operation of the dryer and reasonable access to its components.

Use extreme caution in working around high speed fans, gas-fired heaters, augers and auxiliary conveyors, which may start without warning when the dryer is operating on automatic control.



Keep the dryer clean. Do not allow fine material to accumulate in the plenum chamber or surrounding the outside of the dryer.

Continued safe, dependable operation of automatic equipment depends, to a great degree, upon the owner. For a safe and dependable drying system, follow the recommendations within the Owner's Manual and make it a practice to regularly inspect the unit for any developing problems or unsafe conditions.

Take special note of the *Safety Precautions* before attempting to operate the dryer.

2. Safety Alert Decals

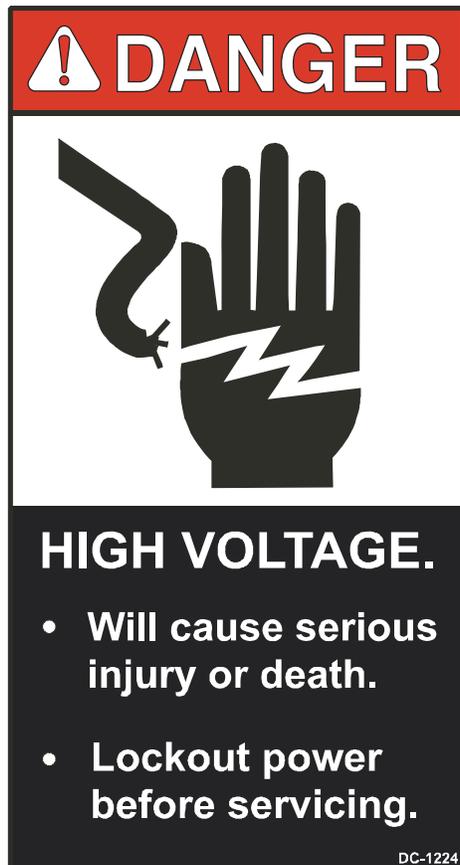
GSI Group recommends contacting the local power company and, having a representative survey the installation so that wiring is compatible with their system, and adequate power is supplied to your unit. Safety decals should be read and understood by all people in the grain handling area.

If a decal is damaged or is missing, contact:

GSI Decals

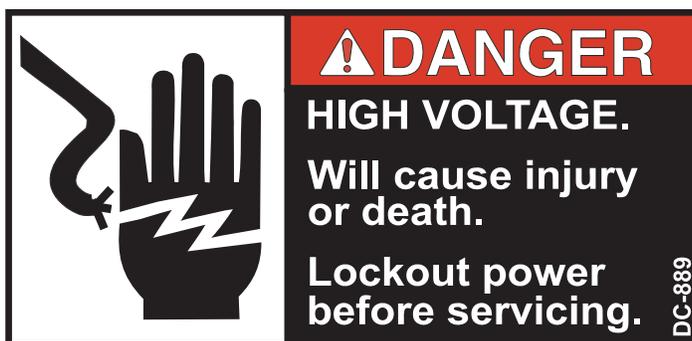
1004 E. Illinois St.
Assumption, IL 62510
Phone: 217-226-4421

A free replacement will be sent to you.



Decal: DC-1224

Decal DC-1224 is located in two places on the fan/heater control box. One is located on the lid and another one is on the front of the fan heater control box. An additional location for this decal is inside the upper control box for the dryer.



Decal: DC-889

Decal DC-889 has two locations. One is located inside the fan/heater control box and another one is on the dryer upper control box door next to the main power disconnect.

⚠ WARNING!



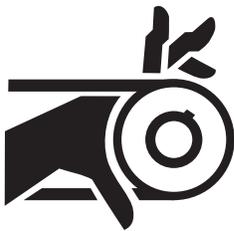
Moving parts can crush and cut. Keep hands clear. Do not operate without guards in place. Failure to do so could result in serious injury.

DC-972

Decal: DC-972

Decal DC-972 is located on the bottom auger belt guard and the front bearing plate (which is visible when the bottom auger belt guard is removed). An alternate location would be at the rear of the dryer for portable dryers equipped with the **Front Discharge Option**.

⚠ WARNING!



Automatically controlled belt drive can start at anytime. Keep hands clear. Failure to do so could result in serious injury.

DC-971

Decal: DC-971

Decal DC-971 is located on the bottom auger belt guard and the front bearing plate (which is visible when the bottom auger belt guard is removed). An alternate location would be at the rear of the dryer for portable dryers equipped with the **Front Discharge Option**.

An additional location for decal DC-971 is the top auger belt guard (one on the belt guard cover and another one is on the inside belt guard body visible when the belt guard cover is removed).

⚠ DANGER



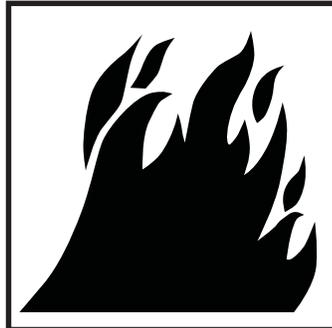
Rotating auger will crush and cut. Auto equipment can start at anytime. Do not enter until electric power is locked in off position. Failure to do so will result in serious injury or death.

DC-974

Decal: DC-974

Decal DC-974 has several different locations. Two are located on the front end panel below the fan/heater. Two are located on the rear end panel below the rear access door. Two are located on the auger discharge box (one on the outside top and one on the inside of the flapper lid next to the discharge mercury switch). One more of these decals is located inside the plenum on the rear plenum closure door just inside the rear access door.

2. Safety Alert Decals



! WARNING

Flame and pressure beyond door can cause serious injury. Do not operate with service door removed. Keep head and hands clear.

DC-1227

Decal: DC-1227

Decal DC-1227 is located on the fan/heater access door.



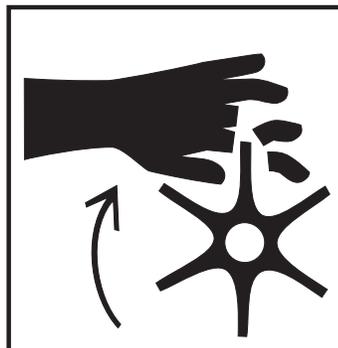
! WARNING

Stay clear of rotating blade. Blade could start automatically. Can cause serious injury. Disconnect power before servicing.

DC-1225

Decal: DC-1225

Decal DC-1225 is located on the fan/heater access door.



! WARNING

Rotating metering roll. Equipment can start automatically. Keep hands clear. Can cause serious injury. Disconnect power before servicing.

DC-1229

Decal: DC-1229

Decal DC-1229 is located on each of the meter roll access doors.

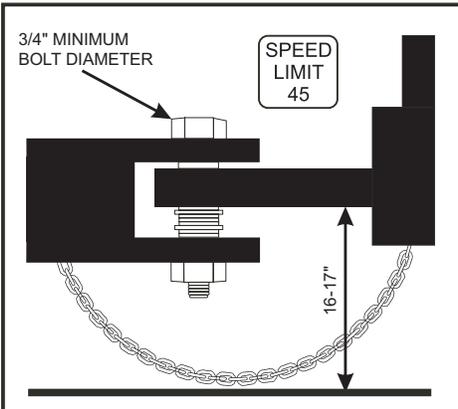
! DANGER!

Automatic equipment can start at anytime. Do not enter until fuel is shut off and electrical power is locked in off position. Failure to do so will result in serious injury or death.

DC-973

Decal: DC-973

Decal DC-973 is located on the rear plenum access door (inside and outside).



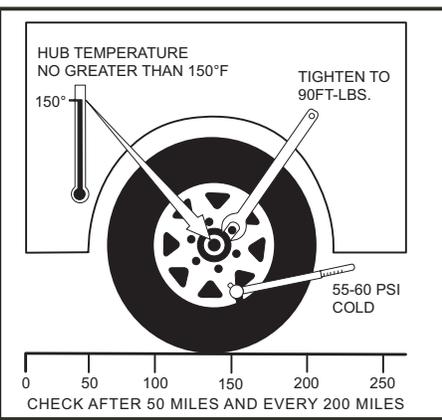
! CAUTION

Hitch pin must be securely fastened and no less than 3/4" in diameter. Failure to follow installation instructions may result in property damage.

DC-388

Decal: DC-388

Decal DC-388 is located on the hitch tongue.



! CAUTION

Dryer must be towed empty and in accordance with state and provincial regulations.

DC-1294

Decal: DC-1249

Decal DC-1249 is located on the hitch tongue.

3. Dryer Control Panel

Programming Instructions

Setting timers, time delays and temperatures

1. Press the button for the program that you wish to change the time or temperature in.
2. Use the increase and decrease buttons to change the present time or temperature.
3. After the time or temperature has been changed, the computer automatically accepts the new value.

Using the mode select

1. Pressing the mode select button will toggle the display between timer values, grain temperature and plenum temperature.

Checking the hour meter

Pressing the increase button changes the display to the total hours on the dryer. It will automatically return to the main screen after the button is released.

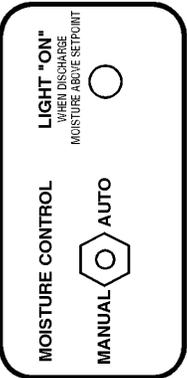
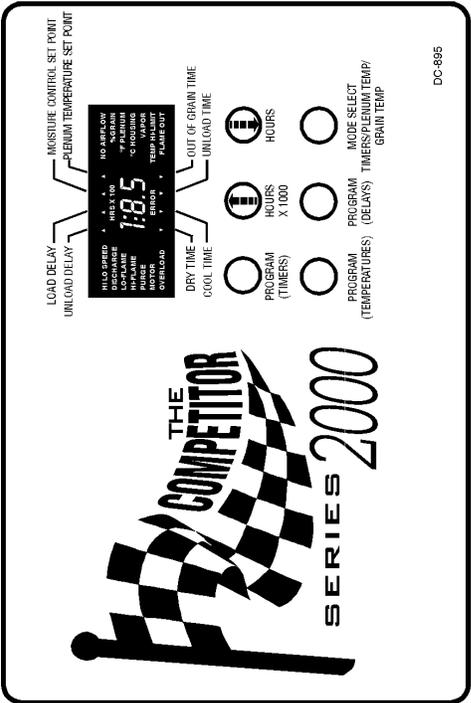




Figure 3A Grain Dryer Control Panel

Dryer Control Panel Featuring the 100 Series Control System

The control panel provides easy access to gauges and controls. The Competitor Series 2000 Control System is a computerized control system that gives instant information regarding dryer operation.

Moisture Control

The Series 2000 Dryer has a built in moisture control. It controls the moisture level of discharged grain by sensing grain column temperature.

Moisture Control Switch

This switch turns the power ON or OFF to the moisture control. The light beside the switch is illuminated when the grain column temperature is below the moisture control setpoint.

Control Power Switch

The power to the Competitor 2000 Control System is turned ON or OFF with this switch.

Outside Light

The dryer outside light is turned ON or OFF here.

Drying Mode Switch

This is used to select staged batch or continuous flow drying.

Load Auger Switch

This is used to select the operation of the fill auger. In both the AUTO and MANUAL position, the load auger will operate if the dryer is low on grain and will automatically shut off when the dryer is full. In the AUTO position only, the dryer will shut down after a preset period of time set on the out of grain timer.

NOTE: *If the load auxiliary motor overload relay is being utilized in the dryer control panel, this switch will also control the operation of the auxiliary equipment.*

Fan Switch

The fan is turned ON or OFF with this switch. The ON position operates the fan continuously during staged batch and continuous flow modes. The AUTO position is used in batch mode only and allows the fan to shut down during the unloading operation if desired. The light comes ON only when air pressure is sensed.

Heater Switch

This switch is used to turn the burner ON or OFF. The ON position will operate the burner continuously, but only when the fan is running. The AUTO position is used in batch mode only and allows the heater to be turned OFF to cool the grain and during the unloading operation. The burner light comes ON only when flame is detected.

3. Dryer Control Panel

Unload Switch

The UNLOAD switch turns the metering rolls and discharge auger ON or OFF, and selects the operation of the metering rolls.

- In the 2 Speed position, if the MOISTURE CONTROL switch is ON, and the drying mode switch is turned to continuous flow, the metering roll speed will alternate between the high speed metering roll potentiometer setting and the low speed metering roll potentiometer setting, depending on the control signal from the moisture control thermostat. The discharge auger will operate continuously.
- In the 1 Speed position, if the MOISTURE CONTROL switch is ON, and the drying mode switch is turned to continuous flow, the metering roll speed will operate at the high speed metering roll potentiometer setting or turn off depending on the control signal from the moisture control thermostat. The discharge auger will operate whenever the metering rolls are operating.
- In both the 1 Speed and the 2 Speed position, if the MOISTURE CONTROL switch is OFF, and the drying mode switch is turned to continuous flow, the metering roll speed can be manually controlled by adjusting the high speed metering roll potentiometer. The discharge auger will operate continuously.
- If the drying mode switch is turned to staged batch, the UNLOAD switch should be set to the 1 Speed position. The discharge auger and metering rolls will only operate during the unload cycle of the staged batch operation, and the speed of the metering rolls is adjusted using the high speed metering roll potentiometer.

NOTE: *If the unload auxiliary motor overload relay is being utilized in the dryer control panel, the same switch will also control the operation of the auxiliary equipment.*

Low Speed Metering Roll Potentiometer

Use this to adjust the low speed of the metering roll when the 2 Speed automatic moisture control feature of the dryer is in use.

High Speed Metering Roll Potentiometer

Use this to:

- Set the high speed of the metering roll when the 2 Speed automatic moisture control feature of the dryer is utilized.
- Set the speed of the metering rolls when the 1 Speed automatic moisture control feature of the dryer is utilized.
- Set the speed of the metering rolls during continuous flow operation when the moisture control is not used.
- Set the rate of grain discharge from the dryer during the unload cycle of staged batch dryer operation.

Dryer Power Start Switch

This switch starts and operates the dryer based on switch settings. If other switch settings are in the OFF position, individual dryer components can be operated by turning the drying mode switch to continuous flow, pressing the dryer power start button and then turning on the desired dryer component.

Dryer Power Stop Switch

This switch stops all dryer functions. If an automatic dryer shut down occurs, first determine and correct the cause of the shut down. Press the dryer power stop button to reset the dryer before restarting.

100 Series Control System

The 100 Series System controls all timing functions and safety circuit checks. It is designed to simplify dryer operation by providing messages and warnings on its Liquid Crystal Display (LCD).

Turning ON the 100 Series Control System

Turn the CONTROL POWER switch to ON. The monitor will display "GSI" and the current software version number.

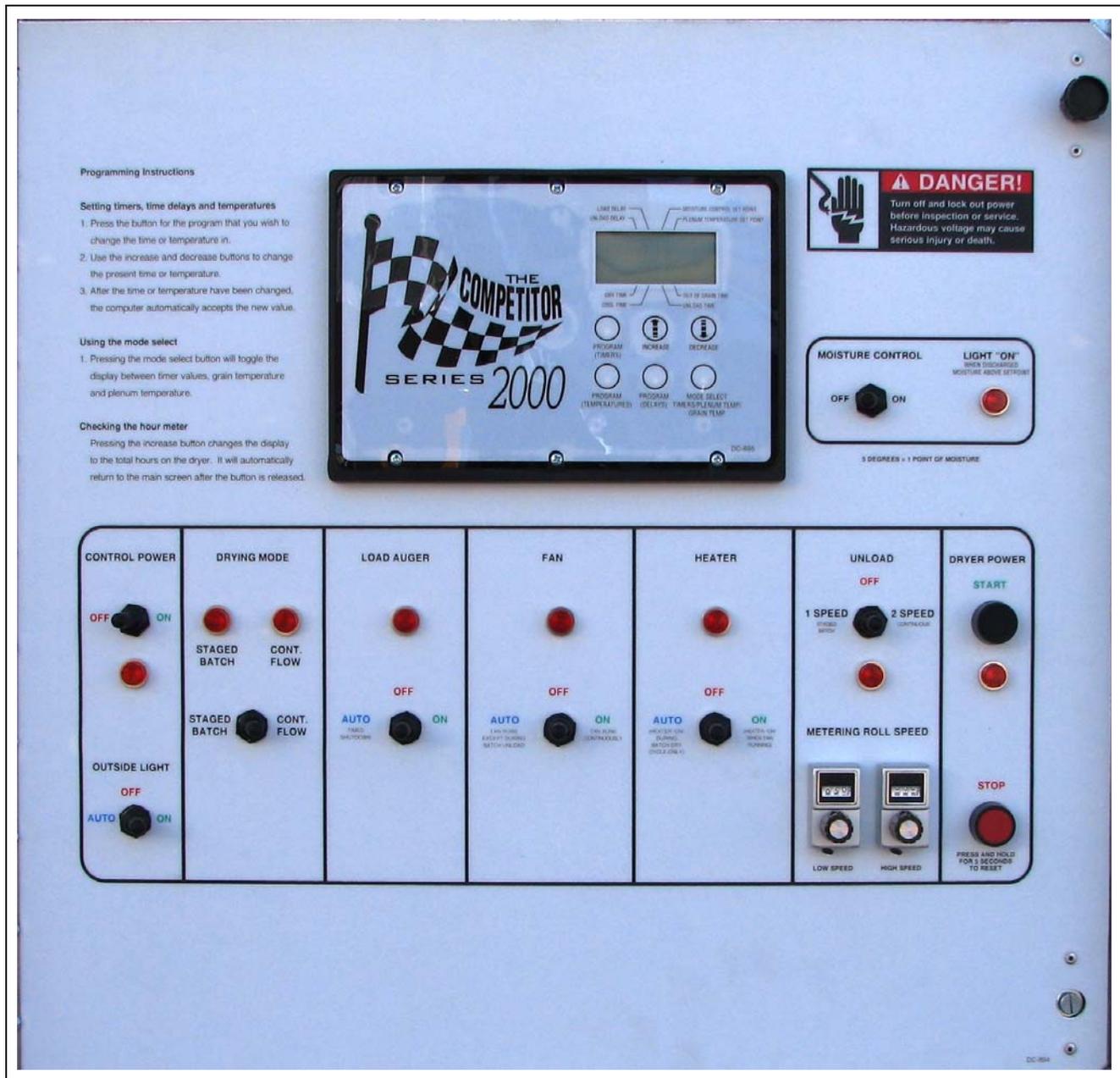


Figure 3B 100 Series Dryer Control Panel

3. Dryer Control Panel

Setting the Dry, Cool, Unload and Out of Grain Timers

These switches are used to set the drying cycle times in the staged batch drying mode only. The drying mode switch must be in the staged batch position. Out of grain sets the length of time the dryer will run before shutting down when the load switch is in the AUTO position. To change the setting of these timers, follow these instructions:

1. Press the PROGRAM (TIMERS) button until the “carrot” (See Figure 3C) is above the timer you want to modify.
2. Use the UP and DOWN arrow keys to change from the present time to the desired setting. The new time is automatically accepted.
3. Keep pressing the PROGRAM (TIMERS) button until the carrot disappears or press the mode select button once to exit.

During the operation, the remaining time on each timer is displayed on the screen. If the power goes out or if the dryer is stopped, these times are saved by the controller. When the dryer is restarted the timers will continue timing down. The timers will return to their initial settings by pressing and holding the “stop” button for 5 seconds.

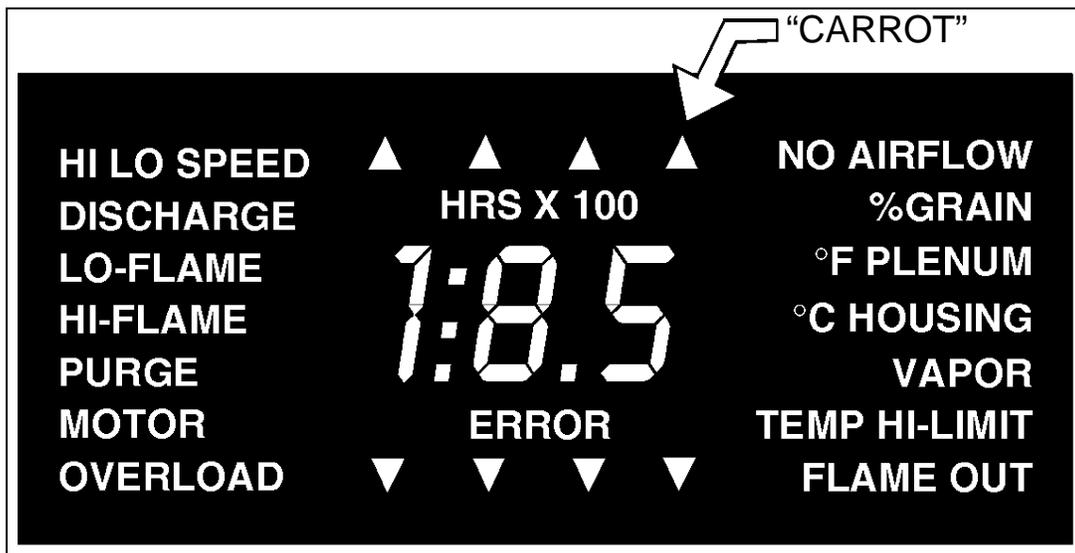


Figure 3C Dryer LCD Display

Setting the Load and Unload Delays

The load delay is used to delay the starting of the load auger when the dryer is unloading to prevent the load auger from starting and stopping too often. The unload delay is used to control the amount of time the unload auger runs after the metering rolls stop to allow for auger clean-out.

1. Press the PROGRAM (DELAYS) button until the carrot is under the time delay to be changed.
2. Use the UP and DOWN arrow keys to change from the present time to the new one. The new time is automatically entered.
3. Keep pressing the PROGRAM (DELAYS) button until the carrot disappears or press the mode select button once to exit.

Setting the Moisture Control and Plenum Setpoint

1. Press the PROGRAM (TEMPERATURES) button until the carrot is under the temperature setting to be changed.
2. Use the UP and DOWN arrow keys to change from the present temperature to the new one. The new time is automatically entered.
3. Keep pressing the PROGRAM (TEMPERATURES) button until the carrot disappears or press the mode select button once to exit.

Dryer Safety Circuit

The Competitor Series 2000 Control System continuously checks all safety circuits on the dryer and will automatically shut the dryer down should a problem occur. The cause of the dryer shut down will be shown on the LCD display. To restart the dryer after a safety shut down, first correct the reason for the shut down, and then press the dryer power stop button to reset the circuit. Press the start button.

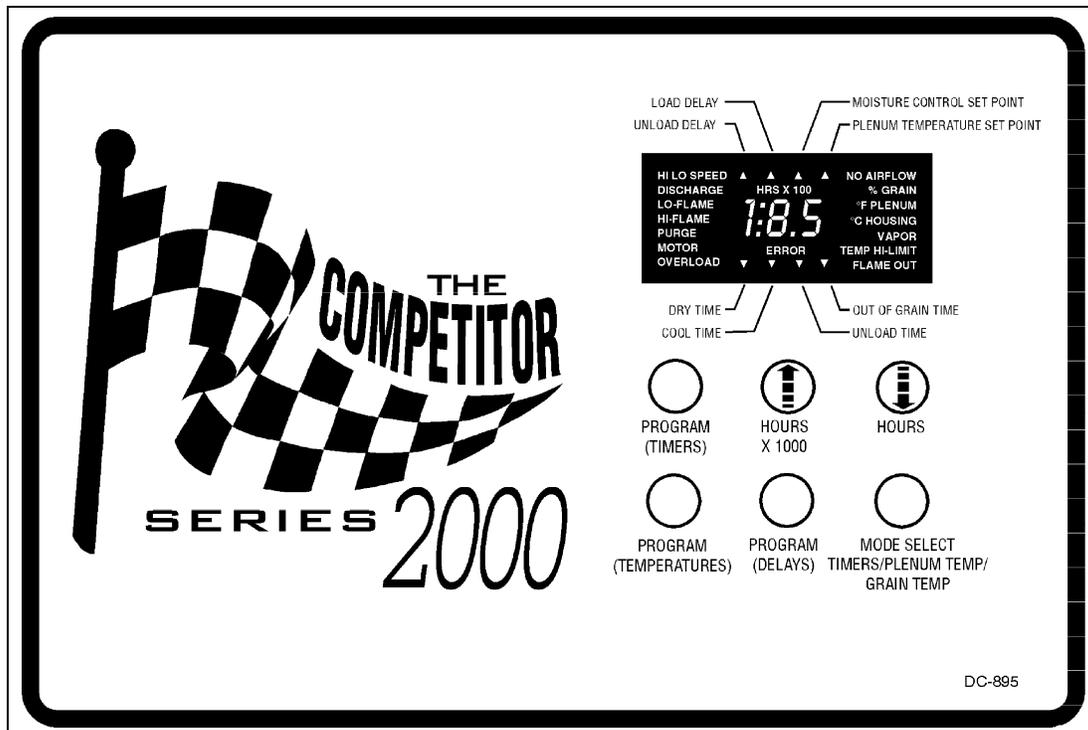


Figure 3D 100 Series Control System

Monitoring Grain Temperatures, Plenum Temperature or Timers

Use the mode select to decide which of the modes you want to view.

Checking the Hour Meter

Press the UP arrow key and the total hours on the machine are displayed along with the batch count and minutes since the last shut down in five (5) successive screens. The screens appear in the following order: Hours X 100, balance of hours, balance of minutes, batch count, and minutes since last shut down. For example, five (5) screens displaying 5 | 23 | 12 | 144 | 188 would be: 523 Hours, 12 minutes on the Hour Meter, Batch Count at 144 and 188 minutes since the last shut down.

Special Features

Dual Batch Drying Temperature Mode



To greatly improve quality in batch mode, reduce the plenum temperature at the end of the drying cycle. This will reduce peak temperature that the grain on the inside of the column attains and thereby reduce over-drying.

Enter dual batch drying temperature mode by switching ON dip switch number four (4), the fourth switch from the bottom, on the dip switches located inside the control box on the back of the computer control board. This enables two plenum and two grain temperature settings, high and low. Set these parameters the same way the single plenum and grain temperature settings are made. The first of each temperatures being set will be the low setting and will be indicated by the word “Low” on the screen. The second setting will be identified by “High” on the display screen.

Typically, the plenum settings would be 170 for low and 230 for high and the low grain temperature setting would be 10° to 20° below the normal moisture control temperature setting which becomes the new high setting.

Both capacity and quality will improve using this feature while operating in batch dry and cool or all heat modes.

Emergency Cooling Mode



To enter an emergency cooling mode, switch ON switch number seven (#7), which is the second switch from the top on the dip switch inside of the control box on the back of the computer control board. This initiates a mode in which only the dryer fan runs, in case there is a plenum temperature or grain high-limit warning. When either of these safeties shuts down the dryer, run the fan to help cool the grain and/or plenum high-limit back down to a safe level. After flipping the switch, press the Start button and only the fan will run for approximately five minutes.

Burner ON/OFF Operation

Due to changing fuel conditions and to aid in drying wheat and other low temperature grains in hot weather, an ON/OFF burner has been developed in recent years.

By moving the third switch, number six (#6), on the dip switch located inside the control box on the back of the computer control board to ON, the burner can be changed from a high-low burner to an ON/OFF burner. The burner will operate exactly the same as the high-low burner, however, when the setpoint is reached, the burner cycles OFF instead of switching to a lower pressure. The vaporizer cools much more quickly and allows a closer tolerance on the setpoint and to operate at lower temperature rises.

Safety Circuit Shut Down Messages

Vapor High Temperature

This shut down message indicates that the LP gas vapor temperature sensor, located in the gas pipe train downstream from the vaporizer has opened. This indicates that the vaporizer is running too hot and must be readjusted. This sensor is set at 200°F and automatically resets itself when cool.

Loss of Flame

The flame sensor failed to detect a burner flame, indicating that the burner has failed to light. There is a problem with the flame sensing circuitry or the dryer is not getting burner fuel. The burner switch light will be lit any time flame has been sensed by the burner controls.

Housing High Temperature

The temperature high-limit, located on the fan/heater housing has opened, indicating an over temperature condition has occurred toward the rear of the fan/heater housing in an oblong covered electrical box. This control is set at 200°F and **MUST BE MANUALLY RESET**.

Rear Discharge Warning

The lid on the grain discharge box has opened, indicating that grain is not being taken away fast enough at the discharge box.

Motor Overload

One of the thermal overloads on either the fan, load, unload or auxiliary motors has opened, indicating an over current condition. The overloads **MUST BE MANUALLY RESET**.

Grain High Temperature

An over temperature condition has occurred in one of the grain columns, causing the control to shut down the dryer. This control is set at 210°F and automatically resets itself when cool.

Out of Grain

The dryer has run low on grain, and the out of grain timer has timed out, shutting the dryer down. The unload auger will clean-out the dryer if in continuous flow operation.

Plenum High Temperature

An over temperature condition has occurred inside the dryer plenum. This control is a 300°F limit and automatically resets itself when cool. [See Emergency Cooling Mode on Page 18.](#)

No Airflow

The contacts in the air switch have opened due to insufficient airflow for the burner to operate. The contacts in the air switch have opened due to the fan not turning, or the air switch may need adjusting.

Air

The air switch contacts have closed prior to the fan starting, indicating a free wheeling blade or improper setting of the air switch.

Grain and Plenum High Temperature (Both at Same Time)

If both of these warnings appear on the screen at the same time, one of the two mechanical high-limits, located in each of the two grain columns, has been tripped due to heat exceeding their 200° setpoint or one or both have failed. They will automatically reset when the temperature returns below 200°.

NOTE: *The emergency cooling feature will not function if either or both of these mechanical sensors are tripped.*

4. Error Conditions

<p>1 ERROR</p>	<p>7 ERROR</p>	<p>Illegal flame sense. Error 7 is most likely caused by stuck open solenoid. Error 7 will not shut down fan until loss of flame is detected by control. Error 7 may also be caused by a bad ballast resistor (ballast resistor not open between poles). It may also occur if 1 of the 12 Volt DC limits is shorted to AC ground, or either temperature sensor is shorted to AC ground.</p>
<p>2 ERROR</p>	<p>8 ERROR</p>	<p>No safety circuit voltage. 12 volt supply is shorted to ground.</p>
<p>3 ERROR</p>	<p>9 ERROR</p>	<p>Input/Output board communication failure Input/Output board and master have lost communication.</p>
<p>4 ERROR</p>	<p>10 ERROR</p>	<p>User supplied safety. No voltage on J1-17 on the Input/Output board will cause this error condition.</p>
<p>5 ERROR</p>	<p>11 ERROR</p>	<p>Mercoïd gas pressure safety. No voltage on J1-16 on the Input/Output board will cause this error condition.</p>
<p>6 ERROR</p>	<p>12 ERROR</p>	<p>This indicates that one of the other on screen errors (vapor, plenum, housing temperature high-limit, flame out, no airflow, motor overload or rear discharge) has occurred.</p>
<p>User switched from continuous flow to batch while dryer is running.</p>		
<p>Grain temperature sensor open. One or both leads are OFF (open circuit).</p>		
<p>Grain temperature sensor leads are shorted together OR sensor is shorted.</p>		
<p>Plenum temperature sensor is open. One or both leads are OFF (open circuit).</p>		
<p>Plenum temperature sensor leads are shorted together OR sensor is shorted.</p>		
<p>Flame probe shorted to AC ground.</p>		

Figure 4A

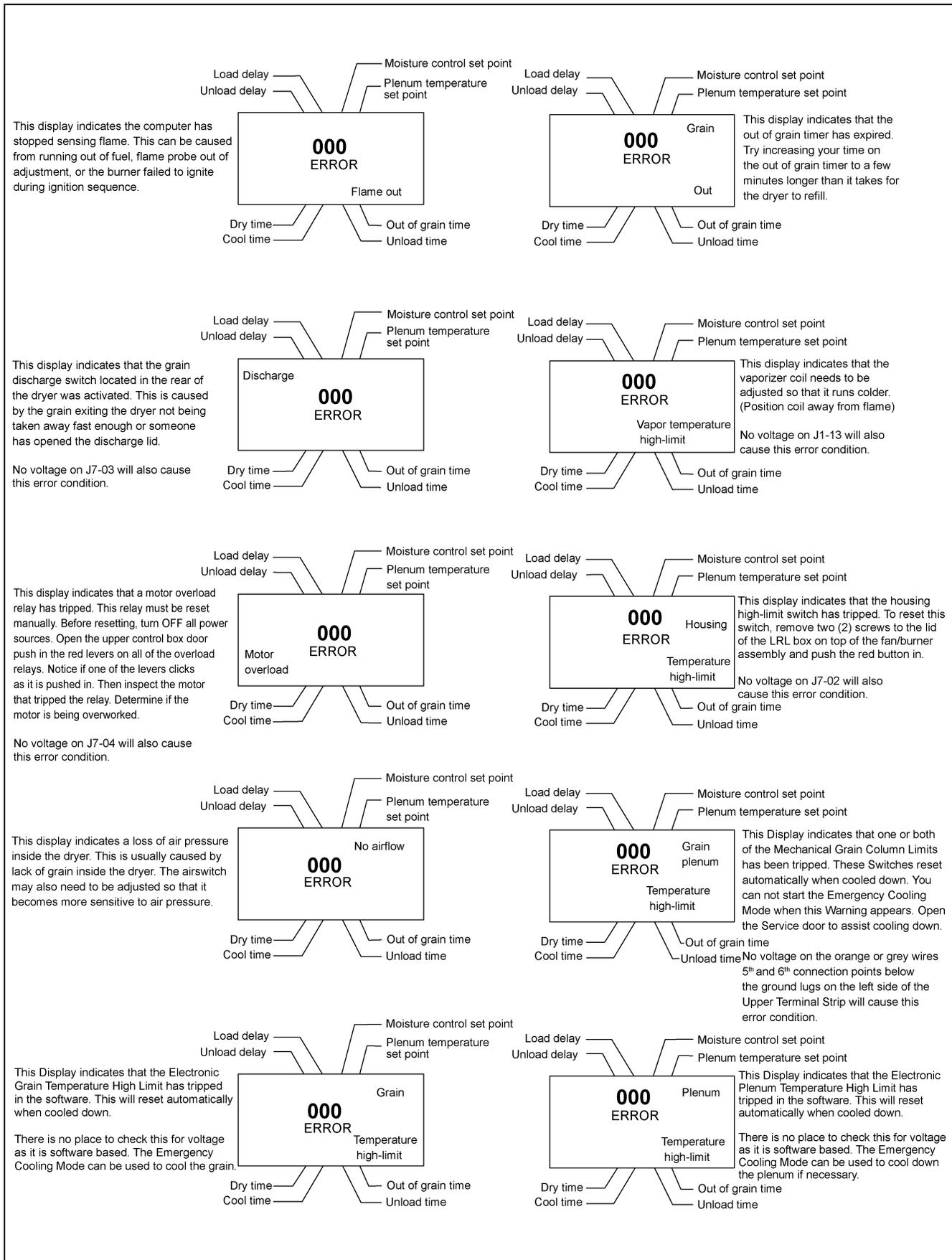


Figure 4B

5. Dryer Pre-Start Checks

Before the dryer is filled, thoroughly inspect the unit and check the operation of the dryer as follows.

Inspect the Metering Rolls



Figure 5A Asco Safety Shut Off Valve

Open all metering roll access doors and inspect each compartment for any bolts, nuts or other foreign material, that may cause possible jamming of the metering rolls.



Before attempting to operate the dryer make sure all safety shields are in place, all bottom clean-out and rear access doors are closed and all personnel are clear of the dryer.

Set Control Switches

Moisture Control Switch	OFF
Moisture Control Thermostat	200°
Load Switch	OFF
Unload Switch	OFF
Fan Switch	OFF
Burner Switch	OFF
Out of Grain Timer	1 MINUTE (Reset to 8 Minutes after testing)
Load Delay	30 SECONDS
Unload Delay	30 SECONDS
Metering Roll Speed	LOW AND HIGH SPEED SETTINGS PUT ON ZERO
Dry Timer	60 MINUTES
Cool Timer	20 MINUTES
Unload Timer	10 MINUTES
Mode Switch	CONTINUOUS FLOW

Electrical Power

Turn ON the electrical power supply to the dryer. Set all circuit breakers to ON, including the safety disconnect handle mounted on front of the dryer's power panel.

Control Power Switch

Turn the CONTROL POWER switch to ON. The switch light comes on. "GSI" and the software version will appear. At this point, the controller will lock out all other dryer functions and the dryer will perform its safety circuit check. If a fault is found, the cause will be displayed on the LCD. If all safeties are found safe, the controller will supply power to the electronic fuel shut off valve (if so equipped). Press the start button to initialize the computer.

Power Start Button

Push the dryer start button, and all the toggle switches on the control panel will be activated. This initializes the load, fan, burner, unload and metering rolls individually.

Fuel Check

If using LP gas, make sure the tank has plenty of fuel and that the **TANK DOES NOT HAVE A PRESSURE REGULATOR MOUNTED TO IT**. If using natural gas, make sure an adequate supply is available.

If using LP gas, slowly open the main fuel supply valve at the tank. If using natural gas, turn ON the valve along the supply line. Then, open the electronic shut off valve (Asco valve), if so equipped, or open the manual shut off valve on the dryer to allow fuel flow to the dryer. Inspect all gas lines and connections for possible leaks. **ANY GAS LEAKS NEED TO BE FIXED IMMEDIATELY.**

Load Auger

With the grain supply shut off, quickly bump the load auger switch to MANUAL and see if the load auger rotates clockwise, as viewed from the drive end, or counterclockwise if the dryer is a front load model. If the wet grain supply auxiliary is wired to the dryer it should also rotate in the correct direction at this time. Turn the load auger switch to the AUTO position. The top auger and wet grain supply auxiliary should run for one minute and then the dryer will shut down leaving the safety shut down message (out of grain) displayed. Press the dryer power stop button to reset the panel, then press the start button to resume operation.

1 Speed Operation

To check 1 Speed operation, place the unload switch in the 1 Speed setting. Turn the high speed metering roll dial up until the metering rolls start rotating. The bottom auger should rotate counterclockwise, as viewed from the drive end. The metering roll drive motor should rotate clockwise, as viewed from the drive end of the gear box. If the dry grain take away auxiliary is wired to the dryer, it should start and rotate in the proper direction.

Metering Roll Operation

To check the metering roll operation, turn high speed knob clockwise. The metering roll speed should increase. Turning the knob counterclockwise will decrease the speed. Turn ON the MOISTURE CONTROL switch. If the Grain Temperature Setpoint is set above the outside temperature, the system will switch to Low Speed if working correctly. Make sure the drive chain tension is properly adjusted and all sections of the metering rolls rotate. Turn the unload switch OFF after these checks are complete. The bottom auger will continue to run for 30 seconds after the switch is turned OFF to allow for clean-out.

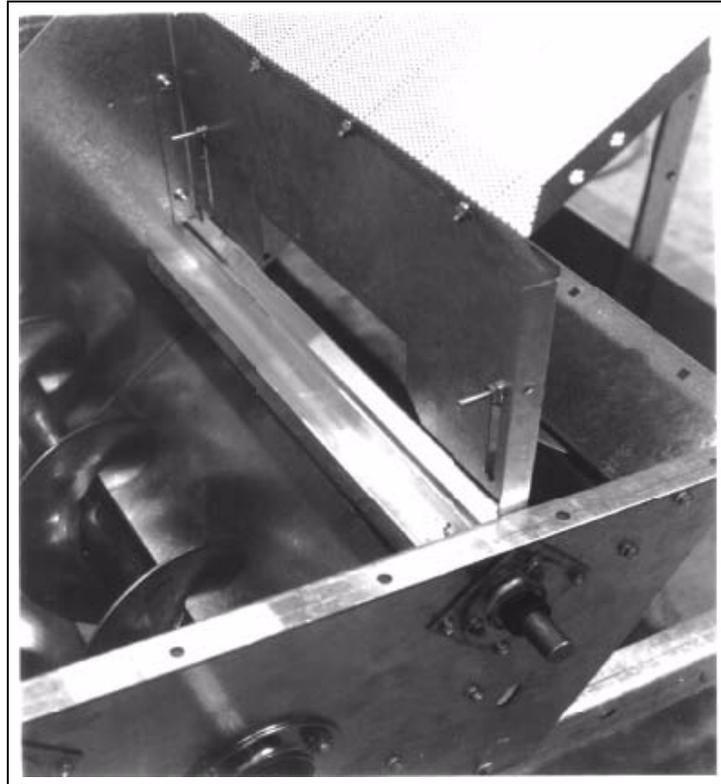


Figure 5B *The Metering Roll Access Area*

Fan Switch

Bump the FAN switch and observe the fan rotation. The fan should run counterclockwise. Sometimes on three phase models all motors on the dryer will run backwards. They can easily be reversed by interchanging two of three power supply wires. Reverse the two outside wires, L1 and L3 and leave the middle one in the same position.

NOTE: *If the dryer is empty, the burner does not operate. The fans cannot create enough static pressure to engage the air switch. You will receive a “no airflow” message. To start the dryer when it is low on grain, the airflow switches must be turned OFF. Switching Dip Switch number eight (#8), on the back of the computer control board, to ON turns the Air Switch OFF.*



Dip switch number eight (#8) must be turned back to the OFF position after this test is complete or no air testing will occur.

Burner Safety

To check the burner safety function, make sure the main gas valve is OFF. Turn the FAN switch ON and allow the fan to start. Then, turn the HEATER switch ON. The dryer will shut down after 20 seconds. The safety message, “loss of flame” will appear.

Heater Test Fire

The following test should be done with grain in the dryer. If no grain is present, set approximate pressure settings and fine tune when grain arrives. Test fire the burner by starting the fan, and then turn the burner switch to ON with the fuel supply turned on. The heater should ignite after a short purge delay of approximately 10 seconds. Gas pressure should be shown on the gauge. At this time, set the high-fire and low-fire pressure settings. Use the pressure regulator ([See #1 on Page 26](#)) for high-fire and the needle valve located in the side of the Cycle Solenoid (low fire) Valve ([See #2 on Page 26](#)) for low-fire. The burner should cycle between high and low-fire, approximately 2 or 3 times per minute.

Approximate settings should be:

LP Gas	Natural Gas
High-Fire 6-15 lbs.	High-Fire 6-10 lbs.
Low-Fire 2-6 lbs.	Low-Fire 1-3 lbs.

If the burner remains on high-fire and does not cycle, increase the regulator setting on the propane models, or the supply valve on the natural gas models, in order to reach the thermostat setting. If the burner remains in low-fire and does not cycle, slightly decrease gas pressure with the low-fire solenoid needle valve. If the gas pressure is decreased too much, a popping or fluttering sound will be heard. Be sure to adjust the low pressure needle valve anytime the high pressure regulator is adjusted.

Staged Batch Check

The following test must be done with grain in the dryer or with the air switch turned OFF as noted in the FAN switch Section [on Page 24](#). To check the staged batch operation, turn the CONTROL POWER switch to the ON position. Open the main fuel supply valve at the tank on an LP dryer or open the valve in the fuel supply line on a natural gas dryer. Turn the drying mode switch to the staged batch position. Turn ON the electric shut off valve to allow fuel flow to the dryer. Turn the load switch to AUTO, the unload switch to 1 Speed and the fan and burner to ON. Push the dryer power start button and the controller will sequentially start all dryer components in their proper order. If any switches are not in their correct position for staged batch operation, the dryer will indicate improper switch position, and will not start until the switches are in the proper position. After starting, all batch timers will time down in sequence. When the unload cycle is complete, the timers will automatically reset to their original settings, and start the dryer timer again.

NOTE: *If the dryer is empty, the burner does not operate. The fans cannot create enough static pressure to engage the air switch. You will receive a “no airflow” message. To start the dryer when it is low on grain, the airflow switches must be turned OFF. Switching Dip Switch number eight (#8), on the back of the computer control board, to ON turns the Air Switch OFF.*



Dip switch number eight (#8) must be turned back to the OFF position after this test is complete or no air testing will occur.

Dryer Shut Down

To shut down the dryer, first close the fuel supply valve at the tank or valve along the fuel line. If the burner is operating, let the dryer run out of fuel, and it will shut down automatically due to loss of flame. Close the fuel valve at the dryer, and press the dryer power stop button. Turn OFF the safety disconnect handle on the front of the power box, and turn OFF the main power to the dryer.

Stopping Dryer Operation

To stop operation of the dryer, push the dryer power stop button. The fan, burner and all augers will stop immediately.

Emergency Stop

In case of emergency, push the emergency stop button located at the bottom of the Upper Control Box. (See Page 6.)

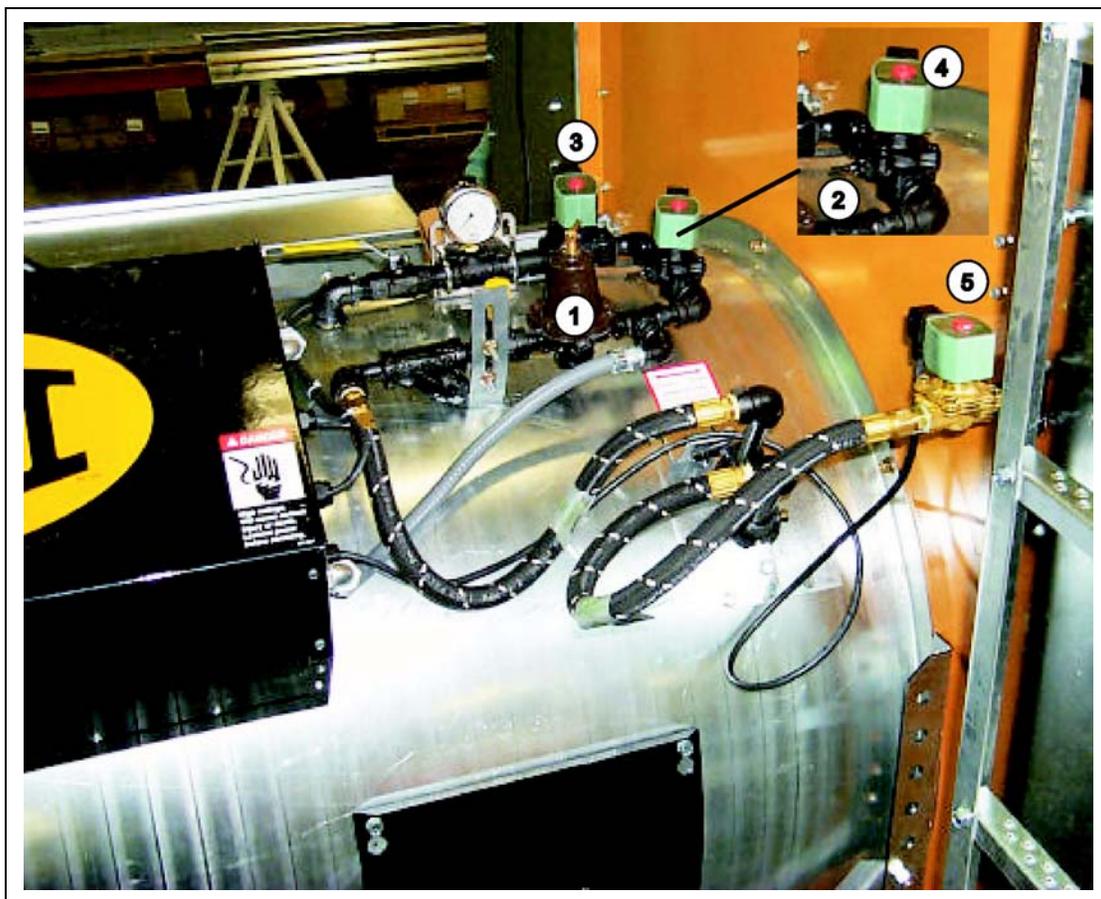


Figure 5C

The dryer fan/heater controls featuring:

Ref #	Description
1	Pressure Regulator
2	Low-Fire Solenoid Adjustment
3	High Pressure Solenoid
4	Low Pressure Solenoid
5	Supply Line Solenoid

Continuous Flow Operation

Standard electrical safety practices and codes should be used when working with a dryer. Refer to the National Electric Code standard handbook by the National Fire Protection Association. A qualified electrician should make all wiring installations.



Always disconnect and lock out power before working on or around dryer.

Full Start-Up Check

This start-up procedure assumes the following:

1. You have read and understand the DRYER OPERATION AND SERVICE MANUAL.
2. You have taken special note of all SAFETY PRECAUTIONS.
3. All safety shields are in place.
4. All meter roll access doors have been opened and all foreign objects have been removed.
5. A pre start-up check has been performed.
6. All motors have been checked for proper rotation.
7. All heaters have been test fired.
8. The fuel has been turned ON at the tank.
9. The electric power has been turned ON.
10. The main disconnect switch on the dryer is ON.
11. There is wet grain in the wet holding bin.
12. The incoming grain moisture is known.
13. Dry grain take away equipment is in place.
14. Grain is going to the proper bin.
15. All switches have been set to the OFF position.
16. The load tilt switch box is installed with the side stamped up, in the UP position.

Filling the Dryer

1. Turn the CONTROL POWER switch to ON.
2. Turn the drying mode switch to CONTINUOUS FLOW.
3. Make sure the FAN, BURNER and UNLOAD switches are in the OFF position.
4. Push the DRYER POWER START switch.
5. Turn the LOAD AUGER switch to the MANUAL position to fill the dryer. The load auger should start and run until the dryer is full, then shut off automatically. (If the switch is set to the AUTO position, the dryer will shut down each time the out of grain timer times out, and will have to be restarted.)
6. When the dryer has filled, turn the LOAD AUGER switch to the AUTO position.

Staged Batch Operation

1. Turn the CONTROL POWER switch to ON.
2. With load, unload, fan and burner turned OFF, turn the drying mode switch to continuous then push the dryer power start switch to arm the safety circuit. Turn the LOAD switch to ON and Fill the dryer with grain. The load auger will stop when full if the LOAD TILT Switch is installed and set properly.
3. Turn the drying mode switch to staged batch.
4. Open the main fuel supply valve on the tank if using LP gas, or the valve in the fuel supply line if using natural gas. Turn ON the electric shut off, Maxon valve (if so equipped), or open the manual shut off valve to allow fuel flow to the dryer.
5. Set switches to the following settings:

Load	AUTO (For timed shut down when out of grain. ON will shut off auger when full, but will not shut dryer down when out of grain.)
Fan	AUTO (To Stop during Unloading. ON to Continue Cooling during Unloading.)
Heater	AUTO (For Dry and Cool. ON for All Heat.)
Unload	1 Speed

Fan/Heater Switch Settings

Fan Setting	Heater Setting	Fan Function	Heater Function
AUTO	AUTO	Fans stay ON during dry and cool cycle only	Burners stay ON during dry timer cycle only
AUTO	ON	Fans stay ON during dry and cool cycle only	Burners stay ON during dry and cool
ON	ON	Fans are ON continuously	Burners are ON continuously
ON	AUTO	Fans are ON continuously	Burners shut down at the end of the dry cycle

At the end of the dry cycle in staged batch, the fans and heaters will continue running if the MOISTURE CONTROL is "ON", until the preset temperature on the moisture control thermostat is reached.

6. Make sure the load auger switch is set to AUTO. In both the AUTO and MANUAL position, the grain level switch will automatically keep the dryer full of grain. In the AUTO position, the dryer will shut down after the preset time period on the out of grain timer, or if the grain flow to the dryer is interrupted.
7. To properly set the correct dry, cool and unload time for various moisture content grains, see the chart on [Page 30](#).
8. To start the drying operation, push the dryer power start button. The controller will start all the dryer components in their proper order. If any of the selected switches are improperly positioned for staged batch drying, the display will indicate the proper switch position, and will not allow the dryer to operate until the position of the switch is corrected.
9. The fan will start and airflow is checked.

10. After purging for approximately 10 seconds the heater will fire. For information concerning heater adjustment, see [Dryer Pre-Start Checks on Page 22](#).
11. If the dryer is being operated in all heat, move the FAN switch to the ON position. In this position, the fan will run continuously during the dry, cool and unload stages of the staged batch operation. If the dryer is being operated in the dry and cool mode, the preferred position for the FAN switch is the ON position, so the fan will run continuously and continue to cool the grain during the unload operation. If desired, the fan can be turned OFF during the unload cycle of the dry-cool-unload sequence by turning the FAN switch to AUTO.
12. If the dryer is being operated in all heat, move the HEATER switch to ON. The burner will operate whenever the fan is operating. If the dryer is being used in dry and cool, turn the HEATER switch to AUTO and the burner will automatically shut down during the cooling and unloading cycles.
13. The bottom auger and metering rolls will start automatically during the unload cycle of the dry-cool-unload mode, along with any grain handling equipment that is wired to the dryer. The speed at which the metering rolls operate during the unload cycle is adjusted by using the high speed metering roll knob. Turning the dial clockwise will increase the grain discharge rate, and turning it counterclockwise will decrease the discharge rate.
14. When the last batch is done and the dryer is out of grain, turn the drying mode switch to continuous. Turn the load, unload, fan/heater switches off and push the dryer power start switch to arm the safety circuit. Run the fan/heater manually for 6 minutes per point of moisture to be removed. Turn the burner off to cool the grain for 30 minutes. Turn off the fan and manually unload the dryer by turning the unload switch to 1 Speed and setting the meter rolls as fast as the unload equipment will allow.
15. To control the length of the dry cycle using only the dry time setting programmed into the system, turn the MOISTURE CONTROL setting to OFF. To use the automatic moisture control so that the dry time is determined, not only by the dry time setting, but also by the moisture content of the drying grain, turn the MOISTURE CONTROL switch to ON.
16. To shut down the dryer, close the fuel supply valve at the fuel tank or fuel source. If the burner is operating, let the dryer run out of fuel, causing an automatic shut down due to a loss of flame. Close the fuel valve at the dryer, and press the dryer power stop button. Turn OFF the dryer's main circuit breaker located on the front of the power panel. Turn OFF the main power supply to the dryer.
17. In case of an emergency, press the dryer power stop button. The burner, fan and all augers will stop immediately.

6. Dryer Start-Up

100 Series Batch Timer Settings

		Full Heat Fan and Burner Switches on MANUAL				Dry and Cool Fans on MANUAL Burners on AUTO			
Initial Moisture (%)	Moisture Removed (pts.)	Approx. Dry Time (min.)	Dry (min.)	Cool (min.)	Unload* (min.)	Approx. Dry Time (min.)	Dry (min.)	Cool (min.)	Unload* (min.)
17.0	2.0	16.0	6.0	0	10.0	18.0	18.0	18.0	10.0
18.0	3.0	21.0	11.0	0	10.0	24.0	24.0	18.0	10.0
19.0	4.0	26.0	16.0	0	10.0	30.0	30.0	18.0	10.0
20.0	5.0	31.5	21.5	0	10.0	35.0	35.0	18.0	10.0
21.0	6.0	37.0	27.0	0	10.0	40.0	40.0	18.0	10.0
22.0	7.0	41.5	31.5	0	10.0	45.0	45.0	18.0	10.0
23.0	8.0	47.0	37.0	0	10.0	50.0	50.0	18.0	10.0
24.0	9.0	51.0	47.0	0	10.0	55.0	55.0	18.0	10.0
25.0	10.0	54.0	44.0	0	10.0	60.0	60.0	18.0	10.0
26.0	11.0	58.0	48.0	0	10.0	65.0	65.0	18.0	10.0
27.0	12.0	62.0	52.0	0	10.0	70.0	70.0	18.0	10.0
28.0	13.0	66.5	56.5	0	10.0	75.0	75.0	18.0	10.0
29.0	14.0	71.5	61.5	0	10.0	80.0	80.0	18.0	10.0
30.0	15.0	76.0	66.0	0	10.0	85.0	85.0	18.0	10.0
31.0	16.0	81.0	71.0	0	10.0	90.0	90.0	18.0	10.0
32.0	17.0	86.0	76.0	0	10.0	95.0	95.0	18.0	10.0
33.0	18.0	91.0	81.0	0	10.0	100.0	100.0	18.0	10.0
34.0	19.0	96.0	86.0	0	10.0	105.0	105.0	18.0	10.0
35.0	20.0	100.0	90.0	0	10.0	110.0	110.0	18.0	10.0

These are approximate starting points.

*Set unload meter roll high speed setting to 999. If unload equipment cannot adequately keep up, lower the speed setting and add time to the unload timer setting to completely unload the batch. In full heat mode, the time added to the unload timer will need to be subtracted from the dry timer. If fan is on AUTO and does not run during unload, set cool timer to 25 minutes.

New unload time calculation = present unload time ÷ $\frac{\text{new dial setting}}{1000}$

Example: $13.75 = 11 \div \frac{800}{1000}$

Starting the Dryer

This start-up procedure is for a cold start on wet grain for continuous flow operation.

1. Turn on the LP gas tank and any other manual gas valve at this time. Set the MAXON or FAST ACTION HAND VALVE, if so equipped, on the incoming fuel line to the ON position.
2. Make sure the MOISTURE CONTROL switch is in the OFF position.
3. Turn the FAN switch to the ON position.
4. Adjust the AIR PRESSURE SWITCH if necessary.
5. Turn the HEATER switch to the ON position. The heater will purge for about 10 seconds then ignite. If flame is detected the dryer will run, if not, a "loss of flame" error will occur. If this happens, check gas supply, and all valves in the fuel line to make sure they are ON and attempt again.

Adjusting the Temperature

1. Press the PROGRAM(TEMPERATURES) button until the “carrot” is above the timer to be modified.
2. Use the UP and DOWN arrow keys to change the present temperature to the desired setting. The new temperature is automatically accepted.
3. Keep pressing the PROGRAM(TEMPERATURES) button until the carrot disappears or press the MODE SELECT button once to exit.
4. On LP gas models, adjust the PRESSURE REGULATOR (high-fire) on the burner fuel line, so that burner will reach the thermostat setting and switch to low-fire. Pressure up to 25 lbs. may be required. Natural gas does not have a regulator, but uses a LARGE BALL VALVE close to the vertical supply line for adjustment. Pressure up to 18 lbs. may be required.

The Approximate Settings should be:

LP Gas	Natural Gas
High-Fire 6-15 lbs.	High-Fire 6-10 lbs.
Low-Fire 2-6 lbs.	Low-Fire 1-3 lbs.

Do not set the low-fire pressure so low that a popping or fluttering sound is heard in the heater. If popping or fluttering sound are heard, increase the pressure until the sound goes away.

On LP and NG gas models adjust the needle valve on the cycle solenoid (low-fire valve) so that the burner maintains flame then switches back to high-fire.

5. Adjust the burner pressure so that the burner CYCLES 2 to 3 times per minute (approximately 15 to 20 seconds on HIGH and approximately 5-8 seconds on LOW). Increasing the gas pressure with the LP gas regulator or the Natural Gas hand valve increases the cycling rate and lowering it decreases the rate. This is the primary way to change the cycling rate.

Decreasing the low pressure setting with the needle valve will also increase the rate while increasing that pressure will decrease the rate.

6. On LP gas models adjust the vaporizer so the fuel pipes going to the burner from the regulator are warm to the touch (not hot and cold).

The vaporizer can be adjusted two ways. First, by loosening the bolt in the hinging mechanism and swinging it to a hotter or cooler position. Second, by loosening the two bolts in the hinge pipe and sliding the vaporizer in or out to a cooler or hotter position. Either one or both methods may need to be used to get the vaporizer to the proper temperature, but the first almost always gives adequate adjustment. Natural gas does not use a vaporizer.

Full Heat Continuous Flow Operation

1. Refer to the DRYER START-UP section of the Operator's Manual. ([CONTINUOUS FLOW METER ROLL SETTINGS - FULL HEAT on Page 33.](#)) There are settings for *Initial Moisture*, *Moisture Removed*, *Approximate Dry Time*, *1 Speed*, *2 Speed Low* and *2 Speed High*. Select the line that indicates the initial moisture. These are the settings referred to throughout this start-up procedure.
2. Make sure the UNLOAD switch is OFF.
3. Make sure the MOISTURE CONTROL switch is OFF.
4. If the dryer is stopped, press the dryer start switch to lock in the control circuit.
5. Turn the fan and burner switches to the "ON" position to run fans and burners. Be sure to adjust the plenum temperature to 180°F for all burners. Run the fans and burners for about 10% longer than the approximate dry time (from [chart on Page 33](#)) for the incoming moisture. Example: 10 pt. removal from the chart is 54 minutes, plus 5.4 minutes (10%) equals 59.4 minutes (round up to 60).
6. Increase the drying temperature to a maximum of 210°F (corn) for single fan dryers. For multiple fan dryers adjust the top burner to a maximum of 230°F (corn) and stage the temperature of the lower burners down 30° per burner. Example: 3 fan dryer Top burner: 230°, Middle burner: 200°, Bottom burner: 170°.
7. After the initial fan and burner run time, set the unload switch to "1 Speed" and set the high speed meter roll potentiometer to the setting for 1 Speed ([see chart on Page 33](#)). Meter rolls should start and grain will begin to flow from discharge of dryer. Run time for this step should be the same as from [Step 5](#) above. DO NOT TO ADJUST THE DRYER DURING THIS PERIOD. The grain discharging towards the end of this period will be over dried, but it is necessary so that the corn moisture is staged properly and evenly in the dryer.
8. Turn the Moisture control switch to "ON". Set the moisture control (grain) temperature to 100°F.
9. Turn the Unload switch to "2 Speed". Find the "2 Speed High" and "2 Speed Low" meter roll settings ([see chart on Page 33](#)) and set meter roll potentiometers accordingly. Allow the dryer to run for the time established in [Step 5](#) and then sample the grain. If the dryer has been cycling regularly from high to low and the grain is not coming out to moisture desired, then adjust the moisture control (grain) temperature up or down 5° per point of moisture. Example: Moisture control is set to 100°, desired moisture is 15%, sampled moisture is 17%. Adjust moisture control to 110°. EVERY TIME AN ADJUSTMENT IS MADE IT IS IMPERATIVE THAT THE DRYER IS ALLOWED TO RUN FOR THE ESTABLISHED TIME IN ORDER FOR CHANGES TO TAKE AFFECT. Repeat this process as necessary until desired moisture content is being discharged from dryer.
10. After the run time in [Step 9](#), the moisture control and the meter roll speeds can be adjusted if required. Each time an adjustment to the moisture control is made, it will take approximately the time [as shown in the example in Step 5](#) to see the results of this adjustment.

100 Series Continuous Flow Metering Roll Settings

Initial Moisture (%)	Moisture Removed (pts.)	Full Heat			
		Approximate Dry Time (min.)	1 Speed	2 Speed Low	2 Speed High
17	2	16	625	317	875
18	3	21	476	270	775
19	4	26	385	241	675
20	5	31.5	317	213	575
21	6	37	270	196	476
22	7	41.5	241	185	385
23	8	47	213	172	317
24	9	51	196	161	270
25	10	54	185	150	241
26	11	58	172	140	213
27	12	62	161	132	196
28	13	66.5	150	123	185
29	14	71.5	140	116	172
30	15	76	132	110	161
31	16	81	123	104	150
32	17	86	116	100	140
33	18	91	110	096	132
34	19	96	104	087	123
35	20	100	100	082	116

These are approximate starting points.

Adjusting the Moisture Control

1. 5° on the moisture control will change the output moisture by about 1%. Example: With 100° set, the result is 16% corn but 17% corn is desired. Reduce the moisture control setpoint temperature by 5° to 95°. This should change the moisture out to about 17%. If you want the corn to come out dryer, raise the temperature on the moisture control setpoint.
2. Four (4) sensors are averaged together for sensing moisture control temperature, one (1) on each side of the dryer in the front, and one (1) on each side of the dryer in the back. They are located about 1/3 of the way up the grain column from the bottom, and in from the side about 4".
3. Grain temperatures can be monitored by pressing the mode select button.
4. The moisture control should stay on HIGH about 50% to 90% of the time. There is a broad range that will work. It should switch from low to high and back again to maintain the desired moisture. A control that does not switch will not maintain an evenly dried grain moisture when the incoming wet grain moisture varies.
5. If the metering roll switches to LOW and stays there for long periods of time, both the High and Low Speed Potentiometers should be slowed down 2% (20 points) and monitored for further adjustment.
6. If the metering roll switches to HIGH and stays on HIGH more then 90% of the time, increase the speed on both Potentiometers 2% (20 points) and monitor for further adjustment.
7. When adjusting the METER ROLL SPEEDS it is better not to change the speed more than 20 points (2%) at a time.
8. Anytime a change is made, wait the approximate dry time for that moisture grain from the [Chart above](#) before checking the grain moisture level and making another change if necessary.

Seasonal Inspection and Service

The dryer is made of weather resistant material, and is designed to require a minimum of service. However, each season we recommend the following items be checked before the unit is used and any damaged or questionable parts replaced. These checks will help eliminate possible failures, and assure dependable operation of the equipment.



Always shut off and lock out power before servicing.

1. Shut OFF electrical power. Open power box and control box, and inspect for moisture, rodent damage or accumulated foreign material. Remove any foreign material present. Inspect and tighten any loose terminal connections. Replace any damaged or deteriorated wiring.
2. Check propeller for freedom of rotation and uniform tip clearance. It should also be inspected for dirt and grain dust, especially inside the hub. Any additional weight can seriously affect the balance, and result in harmful vibrations and a short bearing life.
3. Check propeller for free play. Any side play is an indication of defective motor bearings, which should be replaced to prevent a complete motor failure. Make sure motor mount bolts are tight.
4. Motor bearings should be lubricated periodically, depending on operating conditions. Under normal usage it is desirable to have the motor cleaned, checked and bearings repacked by an authorized service station every two to three seasons. If the unit is operated continuously through most of the year, this service should be performed each year.

NOTE: *If on site bearing relubrication is to be performed, see lubrication instructions for ball bearing motors. To keep motor bearings properly lubricated and dispel any accumulation of moisture within the windings, the fan and auger motors should be operated for 15 to 30 minutes each month.*

Lubrication Instructions for Ball Bearing Motors Suggested Lubrication Intervals*

Hours of Service per Year	H. P. Range	Suggested Lube Interval
5000	1/8 to 7-1/2	5 years
	10 to 40	3 years
	50 to 150	1 years
Continuous Normal Applications	1/8 to 7-1/2	1 year
	10 to 40	3 year
	50 to 150	9 months
Seasonal Service (motor is idle for 6 months or more)	All	1 year-Beginning of season
Continuous high ambient temperatures, dirty or moist locations, high vibrations or when shaft end gets hot	1/8 to 40	6 months
	50 to 150	3 months

* The bearings have been lubricated at the factory, thus no lubrication should be added before start up.

Suggested Lubricants

Insulation Class	Consistency	Type	Grease	Frame Type
A and B	Medium	Polyurea	Shell Dolium R	215T and Smaller
A and B	Medium	Polyurea	Shell Dolium R	254 and Larger
F and H	Medium	Polyurea	Shell Dolium R	All

NOTE: All of the auger and metering roll bearings are lifetime lubricated and do not require service relubrication.

Lubrication Procedures

If the motor is equipped with an alemite fitting, clean the tip of the fitting and apply grease with a grease gun. Use 1 or 2 full strokes on motors in NEMA 215 frame and smaller. Use 2 to 3 strokes on NEMA 254 through NEMA 365 frame. Use 3 to 4 strokes on NEMA 404 frames and larger. On motors having drain plugs, remove drain plug and operate motor for 20 minutes before replacing drain plug. On motors equipped with slotted head grease screw, remove screw and apply grease tube to hole. Insert 2" to 3" length of grease string into each hole on motors in NEMA 215 frame and smaller. Insert 3" to 5" length on larger motors. On motors having grease drain plugs, remove plug and operate motor for 20 minutes before replacing drain plug.

Suggested Lubricants

Insulation Class	Consistency	Type	Grease	Frame Type
A and B	Medium	Polyurea	Shell Dolium R	215T and Smaller
A and B	Medium	Polyurea	Shell Dolium R	254 and Larger
F and H	Medium	Polyurea	Shell Dolium R	All

NOTE: All of the auger and metering roll bearings are lifetime lubricated and do not require service relubrication.

Additional Checks

1. Remove and clean the gas line strainers. Make certain gas valves are closed and that gas is purged from the system before attempting disassembly.
2. If required, inspect ignitor plug and clean the electrodes. Use an ignition point file to remove carbon and rust between the electrode surfaces. Ignitor gap should be about 1/8".
3. Inspect flame sensor for possible damage or poor connections. Flame sensor wire must be in good condition.
4. Inspect and manually rotate the top auger paddle assembly. The paddle unit must rotate freely without any indication of sticking or binding.
5. Inspect the top auger and bottom auger drive lines for proper adjustment and condition. Readjust line tension as required.

7. Service

6. Operate dryer clean-out levers, and check clean-out hatch mechanism for proper operation. With hatch open, inspect and remove any accumulation of dirt, fines and foreign material from the bottom auger through area.

NOTE: Do not allow high moisture material to collect within the trough area. It may adversely affect metal parts.

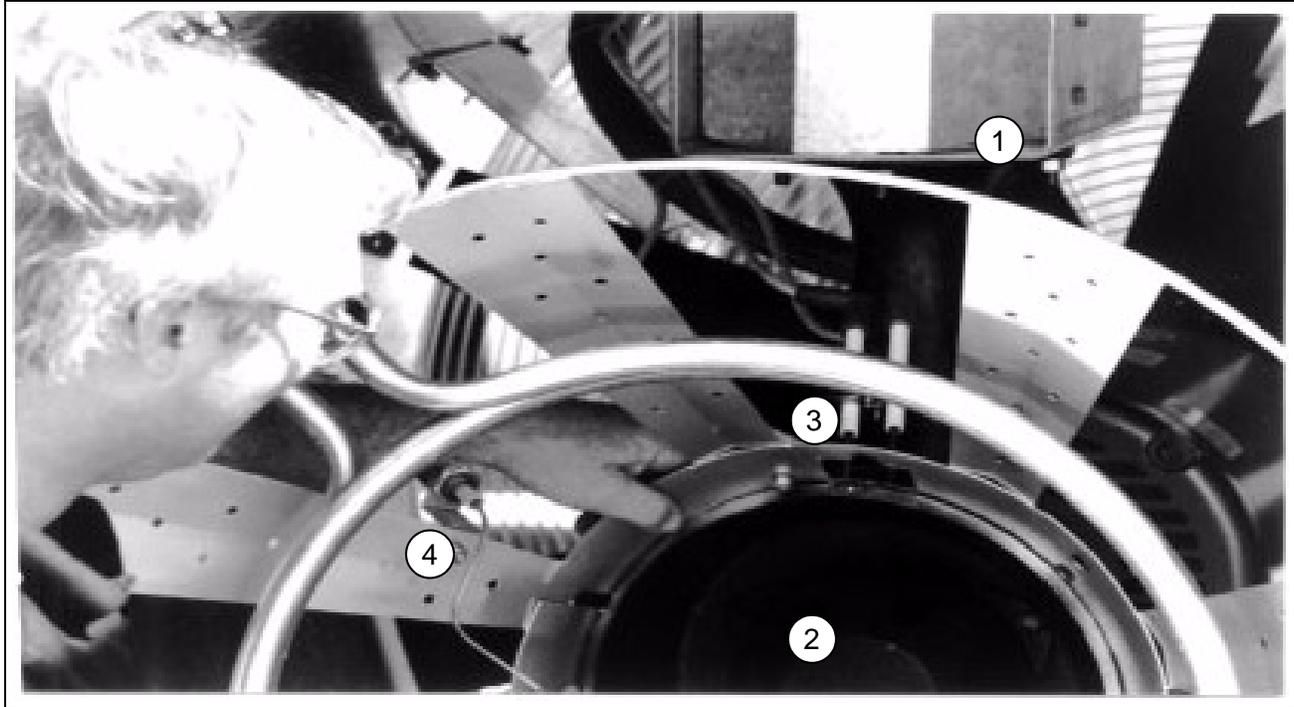


Figure 7A

7. Remove the blue burn optimizer cone and inspect:

Ref #	Description
1	Inspect the collector plate (at the top of the burner casting) and the burner cup for any accumulation of foreign material. Clean if required. Foreign material in the burner cup or casting will not burn out and will impair burner operation.
2	Burner Cup
3	Ignitor Plug and Electrodes
4	Flame Sensor on the Heater

8. Inspect entire dryer for loose, worn or damaged parts. Include check of auger flighting, metering rolls and other internal parts. Ensure that temperature sensors in air plenum chamber are secured by insulated clamps, and do not chafe on other metal parts.
9. Make sure all dryer guards and warning decals are securely installed. Guards should not interfere with moving parts. If guards or warning decals are missing, contact your dealer for a free replacement.
10. Test fire the dryer several weeks ahead of the drying season. Check for possible gas leaks. (See page 25 for heater test fire.)

Fan Propeller Removal and Installation

The fan propeller is secured to the motor shaft by the use of a taper-lock bushing, motor shaft key and three cap screws.



Although the taper-lock method of retaining the propeller onto the motor shaft is simple, it is essential that the following points be read carefully and fully understood. Improper installation can cause a loose flying propeller, and result in serious injury or death.

Threaded Bushing Holes

The threaded holes within the bushing are provided for disassembly purposes only. Do not attempt to use these holes for reassembly. They do not allow the parts to lock onto the shaft and thereby create a very hazardous operating condition.

Clearance Holes

When reassembling parts, the cap screws must be installed through the untapped clearance holes as shown. This will cause the propeller to be pulled forward onto the tapered bushing, thus locking the parts securely onto the motor shaft. (See Figure 7B.)

When fan servicing requires removal and installation of the propeller, make sure the propeller is removed and reinstalled properly.

1. Lock out the fan power supply, remove the fan guard and the venturi, as required on some models.
2. Remove the three cap screws from the clearance holes in the taper-lock bushing.

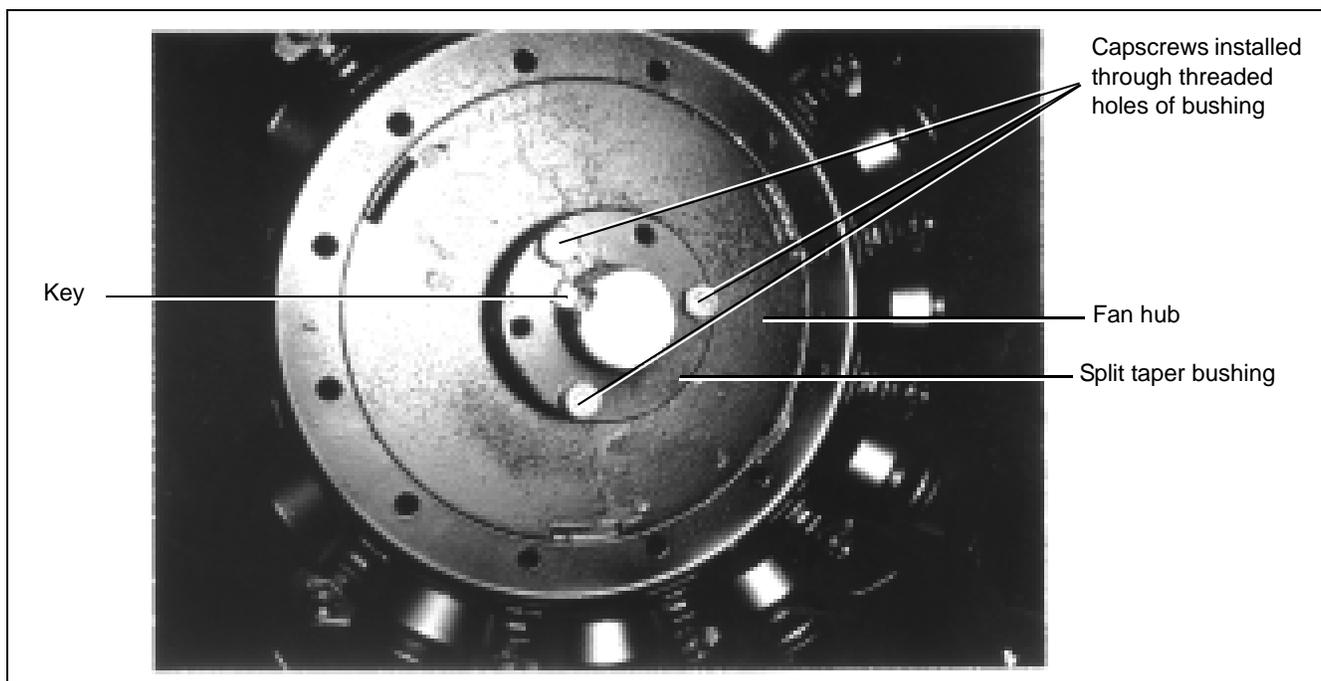


Figure 7B Fan Blade Installation

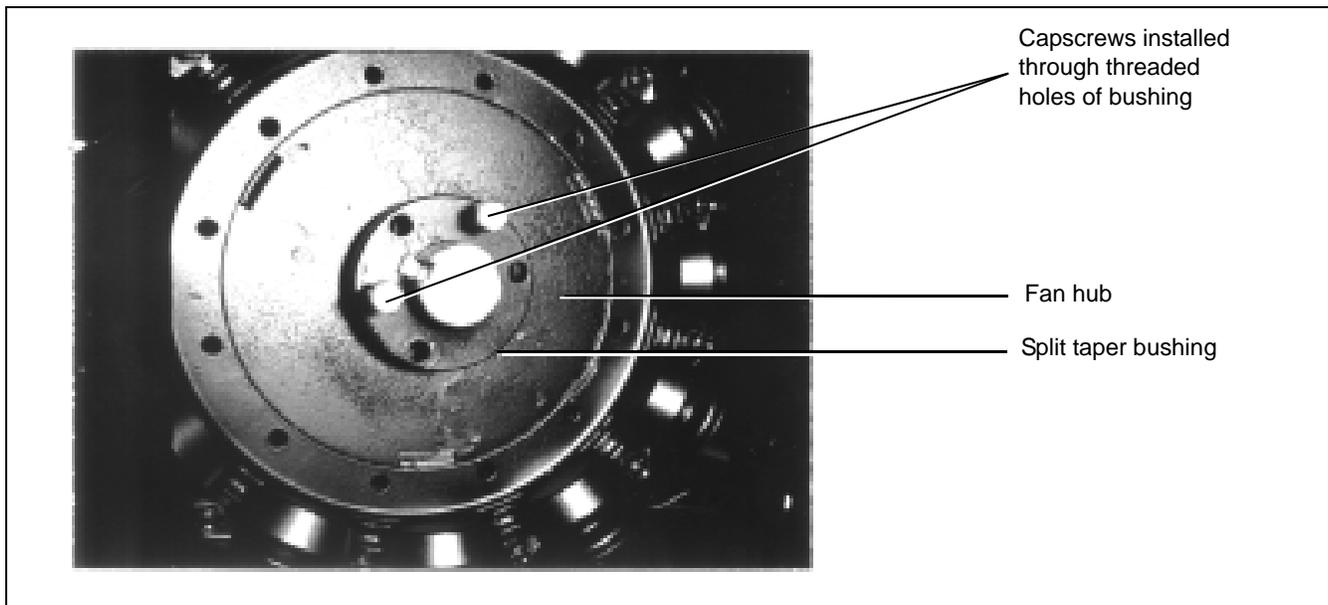


Figure 7C Fan Blade Removal

3. Install two grade 5 cap screws into the threaded holes in bushing and turn them by hand until they bottom against the front surface of the propeller.
4. Block propeller to prevent it from turning and gradually turn the cap screws (up to 1/4 turn at a time) until the propeller breaks loose from the bushing and motor shaft. Carefully remove bushing and propeller. With the propeller free from the bushing, a gear puller can be used to pull the bushing off of the motor shaft. Reattach bushing onto propeller to prevent the loss of parts.

NOTE: *During manufacture the propeller and bushing on the 26" and 28" solid aluminum blades are balanced together and are marked with two small dots to identify their original alignment position. Check the bushing and propeller to make sure they have alignment marks. Mark the alignment of the propeller and bushing, if necessary.*

On Crowley blades (a composite plastic), the propeller and bushing have a keyway that prevents any misalignment of the two pieces. There are alignment marks on the back of the fan hub assembly. If the user were to replace one of the blade fins, alignment would be necessary. However, this is not recommended. In most cases, the complete propeller should be changed.

Fan Motor Removal and Installation

In the event of motor failure, remove the motor as described, and take it to the nearest service station. An authorized service station is the only place that can provide possible motor warranty. Motor service and repair at other places will be at owner's expense.

If the service station determines motor failure is caused by faulty material or workmanship within the warranty period, repair will be covered under the warranty. Motor failure caused by external sources will result in a charge to the owner for repair.

1. Make certain power is shut OFF and locked out. Remove fan guard and propeller. ([See Figure 7D.](#))
2. Remove cover from fan heater control box, and disconnect the motor lead wires within the box.

NOTE: *Tag or otherwise identify wires for ease of reassembly.*



Figure 7D *Position of Fan Motor*

3. Remove motor mount bolts. If there are shims between the motor and its base, note their location so they can be properly installed during reassembly.
4. Disconnect the upper end of the motor conduit, then carefully pull the wires through the hole in the fan heater housing. Remove motor from the fan heater unit with the conduit still attached. If motor requires service, take it to an authorized service station.
5. To reinstall motor, slide onto motor base plate and replace shims (if required) between motor base and plate. Reinstall motor mount bolts and washer, but do not fully tighten at this time.
6. Reinstall conduit and wires through hole in fan heater housing and carefully connect all electrical wiring.
7. Adjust position of motor by temporarily mounting fan blade on motor shaft. Rotate fan blade by hand, making the necessary adjustments, so the tip clearance between blade and housing is uniform. If required, remove the fan blade and fully tighten all four motor mount bolts.

NOTE: *Make sure to install and tighten the propeller in accordance with previous instructions.*

Heater Parts Removal and Installation

Most of the heater parts can be removed by identifying attached wiring and disconnecting the obvious mounting parts.

1. **Flame sensor:** Disconnect the wire connector and unscrew the flame sensor out of its mounting bracket. (See Figure 7E.) **IMPORTANT:** Flame sensor has voltage present. Turn OFF main disconnect before removing or adjusting.
2. **Gas solenoid valve coil:** Unsnap either the plastic cap or the metal clip on the gas valve and slide the housing and coil off the valve stem and body. Do not energize the coil when it is removed, as the coil may become damaged due to excessive current flow. (See Figure 7E.)
3. **Regulator and gas solenoid valve(s):** The gas regulator and solenoid valve(s) are directional and must be connected as indicated by the markings near the port openings. Make sure gas is shut OFF and purged from the system before removing parts. (See Figure 7E.)

NOTE: When installing a liquid gas solenoid valve on LP models, do not overtighten the connection into the inlet side, as the inlet orifice may become partially blocked.

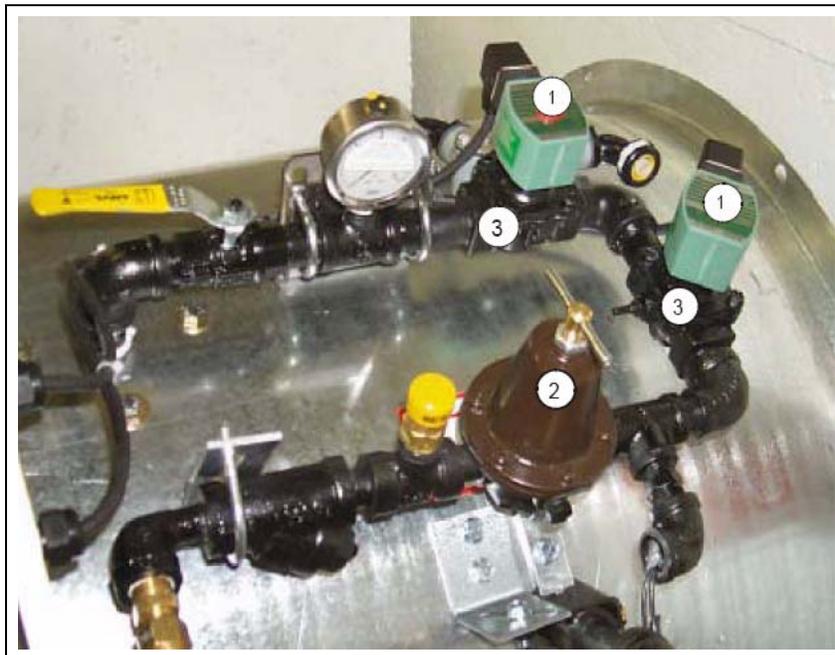


Figure 7E

4. **Main Gas Orifice:** With fuel shut OFF and gas purged from system (See Figure 7E), proceed as follows:
 - a. Disconnect the plumbing support brackets from the pipetrain.
 - b. Disconnect gas solenoid valve coils. Be sure to mark which one goes where.
 - c. Lift pipe (with orifice, solenoid valve and other parts attached) straight up and remove from fan heater housing. Orifice and other parts can now be removed from pipe train, if desired.

5. **Reassemble:** To reassemble parts (*See Figure 7E*), reverse the disassembly procedure and check the following:
- Make sure all parts are thoroughly cleaned and open.
 - Use a dependable brand of high temperature pipe caulking compound when assembling gas connections. Apply only a light coating onto male threaded end of fittings.
 - Solenoid valves and gas regulators are directional and must be properly installed. Do not attempt to connect gas solenoid valve by applying force to the valve core stem as it may ruin the unit.
 - Make sure all electrical wires are properly connected. Refer to *Wiring Diagrams*.

Figure 7E shows:

- Gas Solenoid Valve Coils
- Gas Regulator
- Gas Solenoid Valves

Metering Roll Servicing

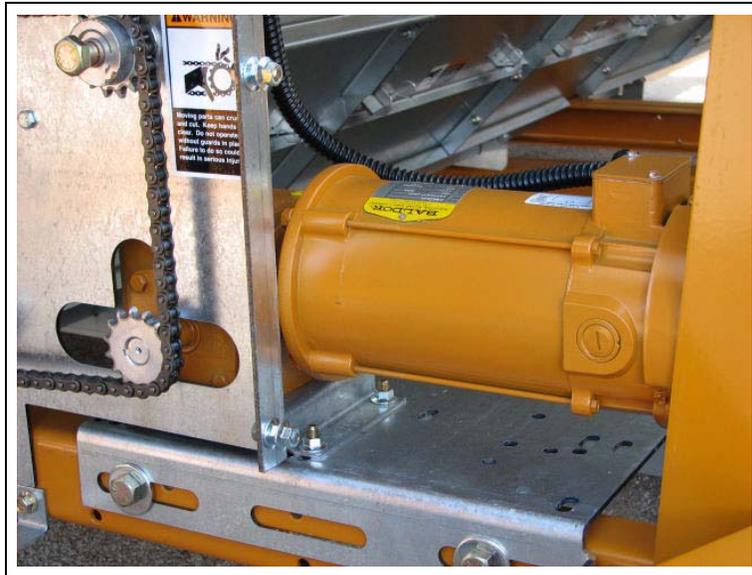


Figure 7F Meter Roll Motor and Speed Reducer Gear Box for the Metering Rolls.

This dryer is equipped with SCR (silicon controlled rectifier) metering roll drive assembly. The metering rolls are driven by a separate DC type electric motor. The speed of the motor is variable and is controlled by an electric SCR control within the main control box. (*See Figure 7F.*)

Main Controls

- SCR speed control:** The control unit dial on the front of the control box regulates the speed of the DC motor which drives the metering rolls. (*See Figure 7F.*)

The markings on the scale from 0 to 999 represent the flow of grain past the metering rolls as a percent of the maximum grain discharge rate for the dryer. The maximum setting of 999 provides a maximum 100% discharge of 857 BPH for 190T, 1285 BPH for 270, 1499 BPH for 320, 1714 BPH for 370, 1928 BPH for 400, 2142 BPH for 460, 2356 BPH for 511 and 2785 BPH for 601 model dryers.

NOTE: When the control is set to the maximum discharge rate (999), the metering roll speed should be 17.5 RPM.

7. Service

2. **DC electric motor:** The direct current (DC) motor provides the drive for the metering roll and is located on the front left hand side of standard model dryers. The output shaft of the motor is connected directly to the gear box assembly. (See Figure 7F.)

The DC motor requires no operational adjustment as it is completely controlled from the control box.

3. **Speed reducer gear box:** The direct drive gear box provides the required speed reduction, and transmits power to the metering rolls through a drive chain arrangement. The gear box does not require adjustment. The drive chain should also be periodically lubricated and tensioned as necessary. (See Figure 7F.)
4. **Unload auger time delay:** The delay controls the bottom auger system and causes the unload auger (and any connected auxiliary unloading conveyors) to continue operating for the programmed amount of time, even after the metering rolls stop. (See Figure 7F.)

This feature permits the clean-out of grain within the unloading equipment at the end of all discharge cycles.

How to Determine a Metering Roll Problem

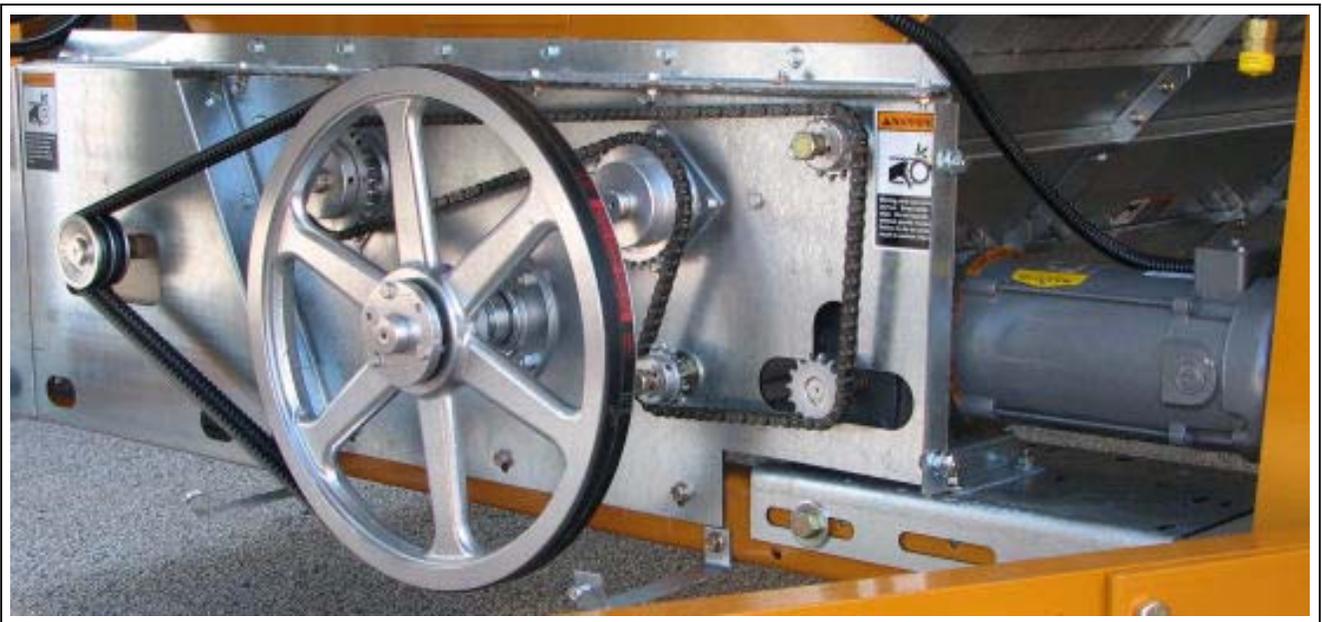


Figure 7G Metering Roll Drive

To determine if the metering problem is from blockage, perform the following test with the power OFF. Remove the drive chain by loosening the motor mounting bolts. Refer to [Figure 7G](#), and place a pipe wrench on the hub of the roller chain sprocket, on the left hand metering roll at the drive end of the dryer. Apply up to 100 ft. lbs. of force, and try to rotate the roll towards the inside of the dryer. If the metering roll turns, then repeat for right hand side and it can be assumed that no blockage exists, and the problem is from some other cause. Check for a break in the power train, chain, drive key, pin, etc.



Keep hands away from sprocket teeth to avoid injury from chain backlash, as a result of torsion build up in the system caused by the jam.

How to Clear a Jammed Metering Roll

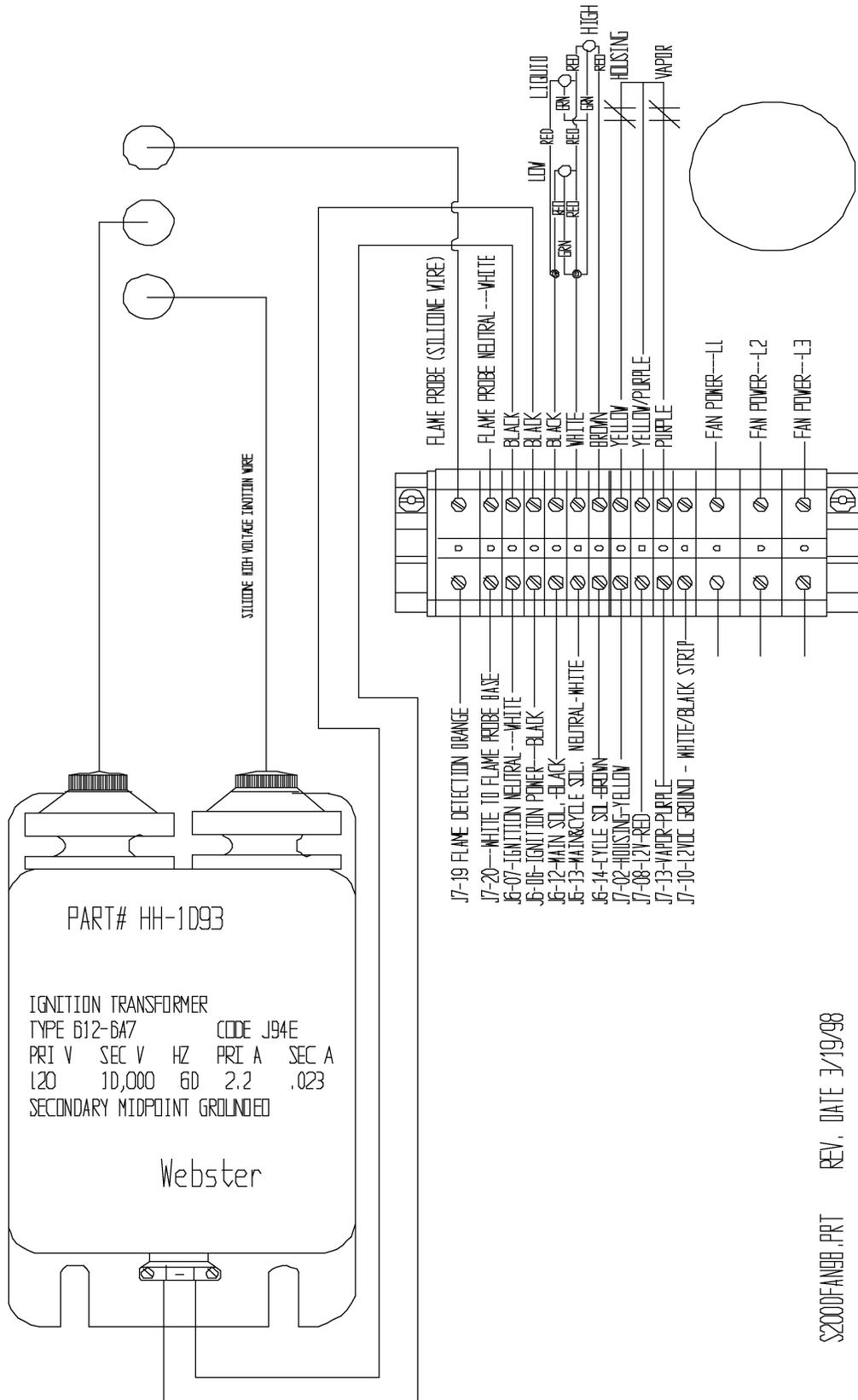
Shut down the fan/heater and eliminate any other noise when making this check. Place a pipe wrench on the hub of the sprocket of the jammed metering roll and turn the roll. First backward, and then forward several times in an attempt to dislodge the object, and clear it through the roll. If this is not successful, have an assistant turn the metering roll, and attempt to locate the jam by sound. Once the location is determined, the roll can be reached from the inside of the dryer by opening the hinged auger cover panel in that specific section. Loosen the two (2) nuts on the bolts holding the meter roll shield (also called meter roll strike off Plate in the past) and lift the shield to access the area above and behind the meter roll. If removing all the grain from this column is necessary, lift the shield to its highest position and tighten the nuts. FROM OUTSIDE THE DRYER, manually run the Unload Auger with the MOISTURE CONTROL switch turned OFF and the high speed potentiometer set to 000. This will allow the grain from that column alone to pass over the metering roll and into the auger emptying that column for complete access to the meter roll.



Never run the unload auger or the metering rolls with anyone inside the dryer.

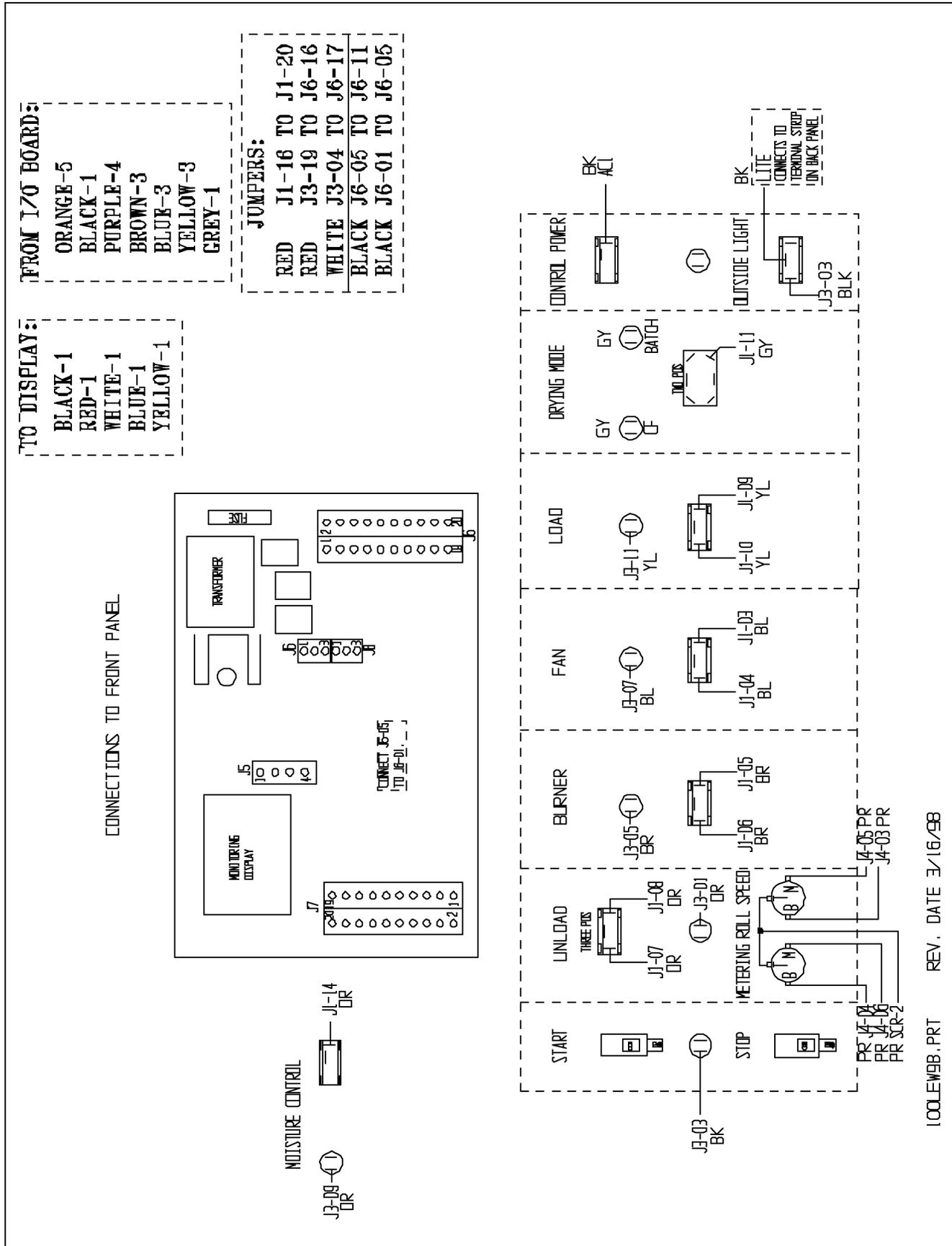
100 Series Single Fan Wiring to Control Box

FAN HEATER WIRING SERIES 2000



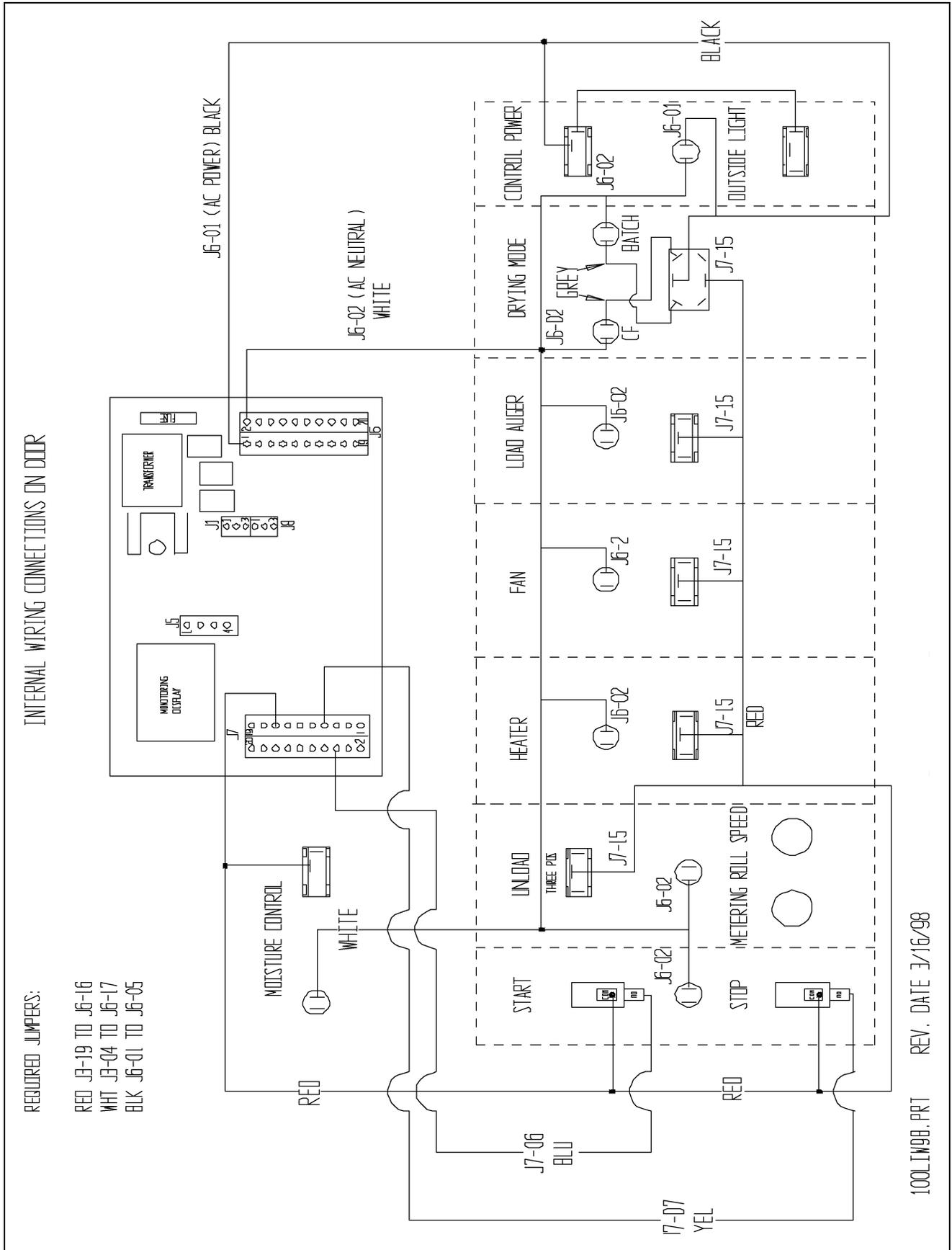
S2000FANWB.PRT REV. DATE 3/19/98

100 Series Front Panel External Wiring

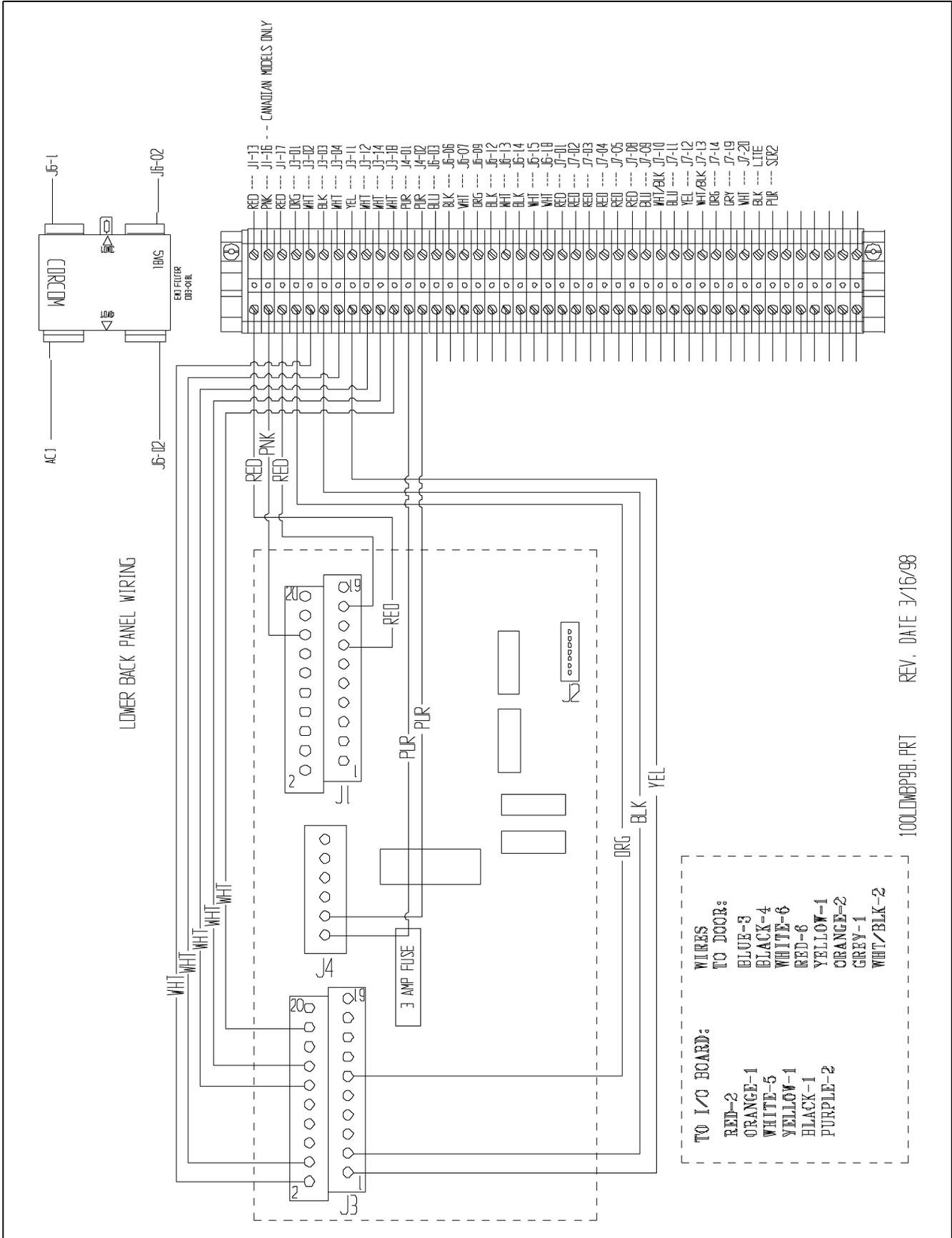


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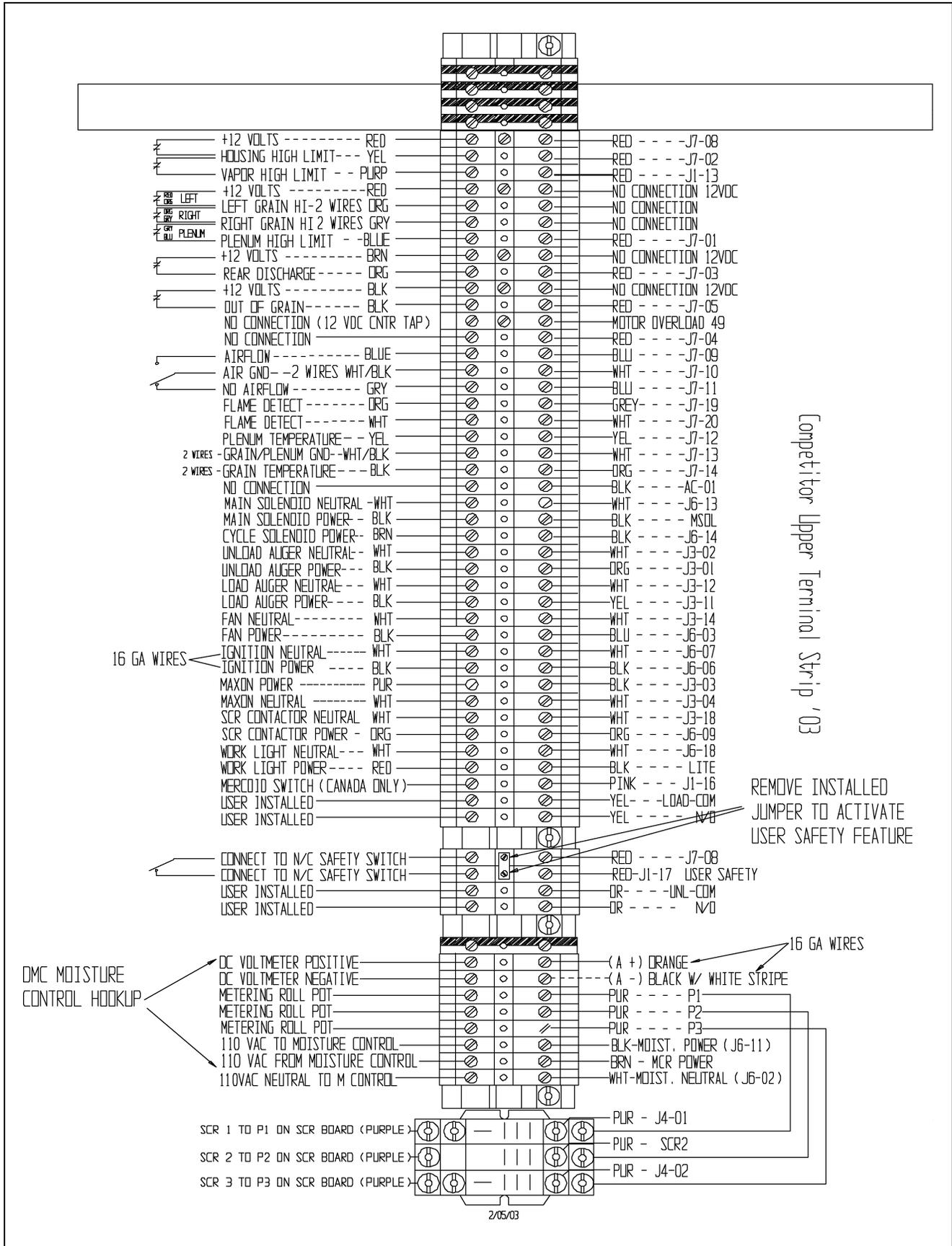
100 Series Front Panel Internal Wiring



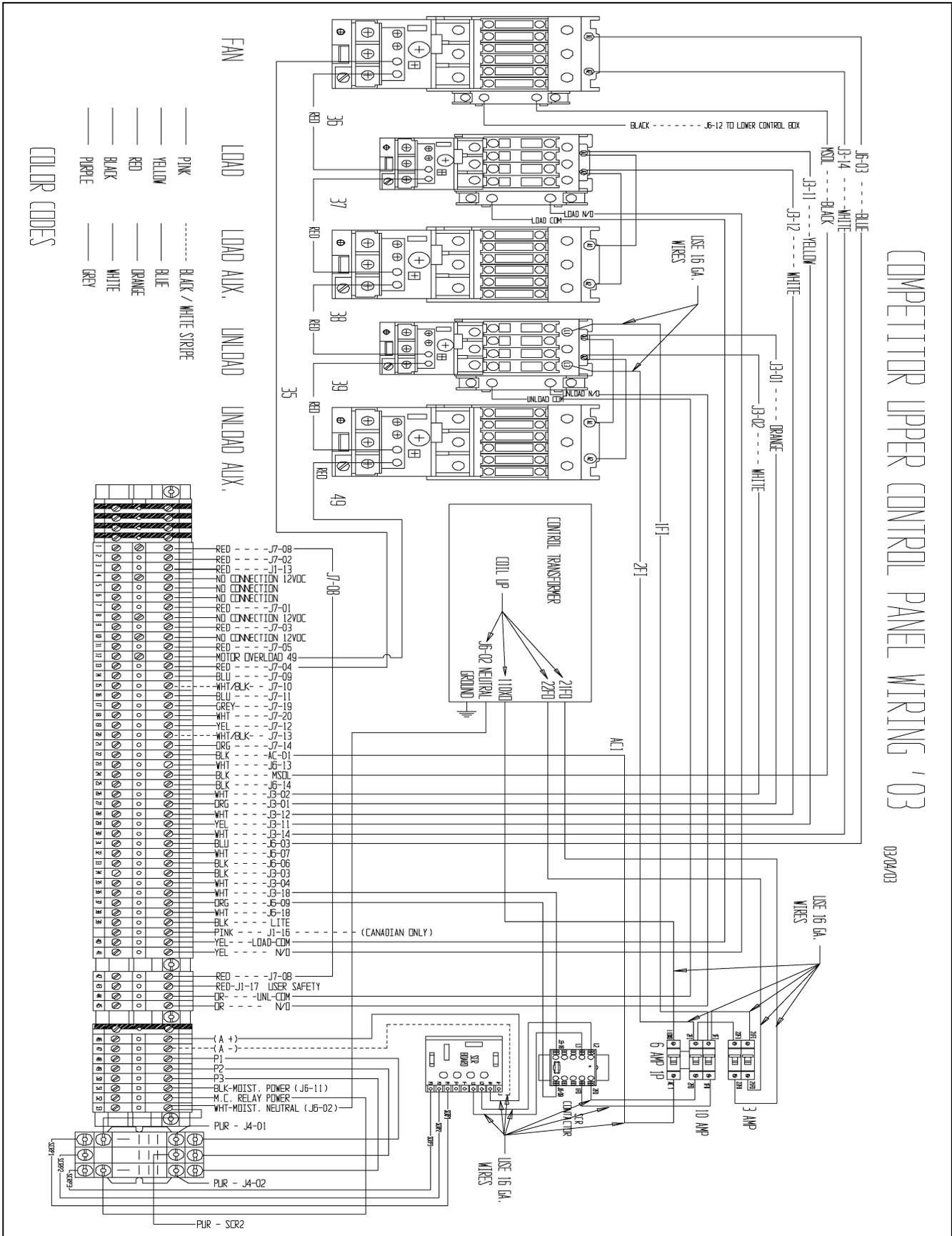
100 Series Lower Back Panel Wiring



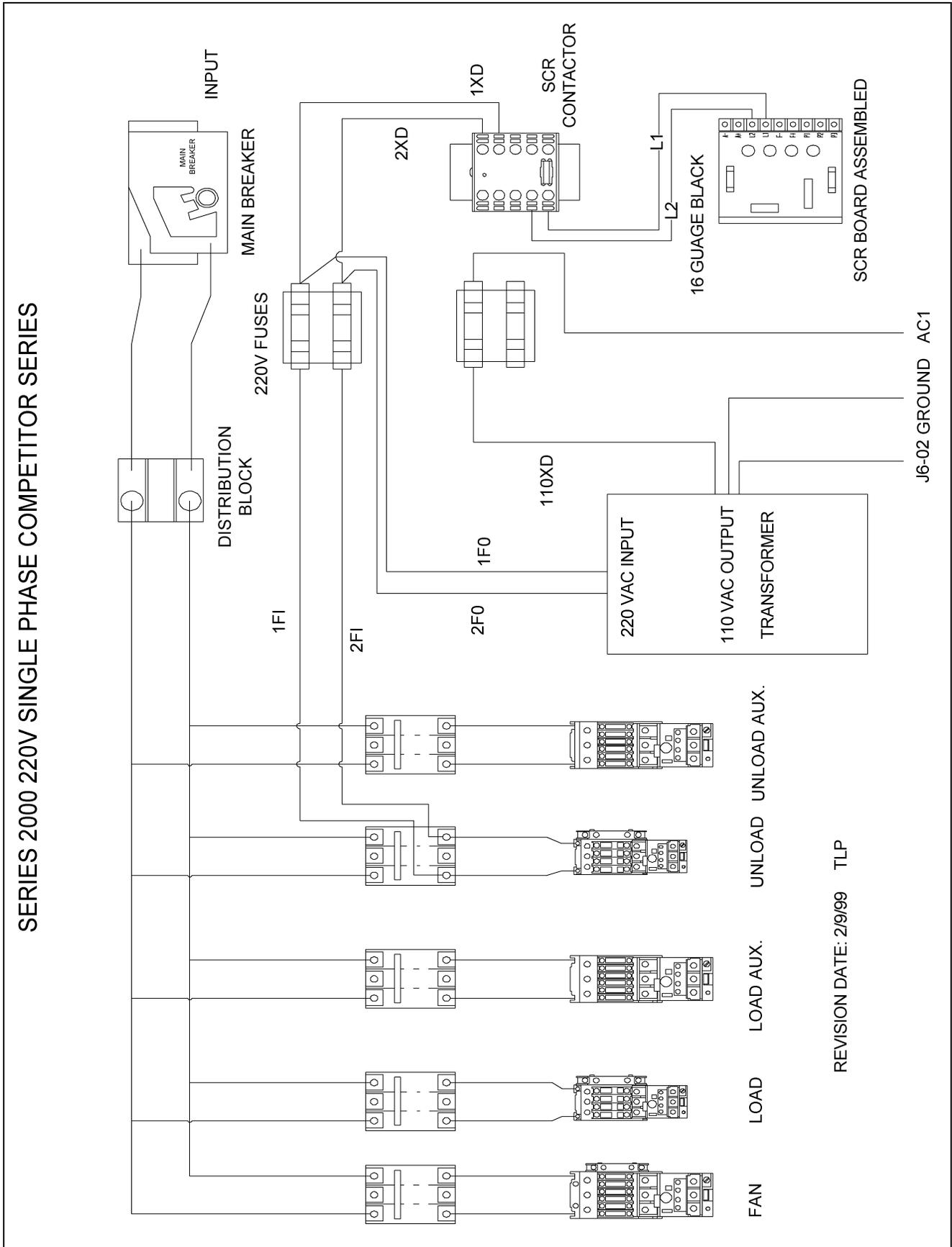
100 Series External Wiring to Dryer



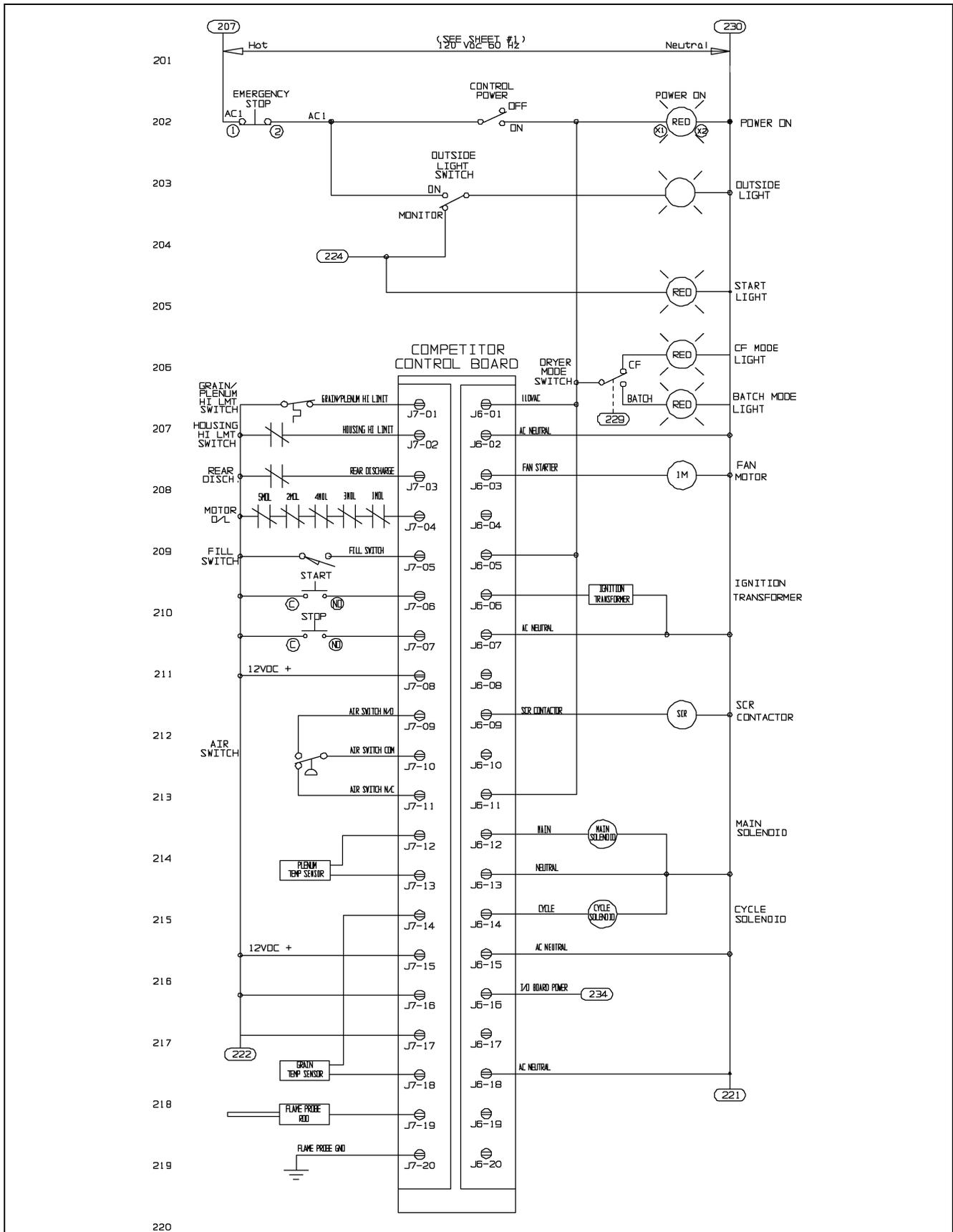
100 Series Upper Control Box Wiring



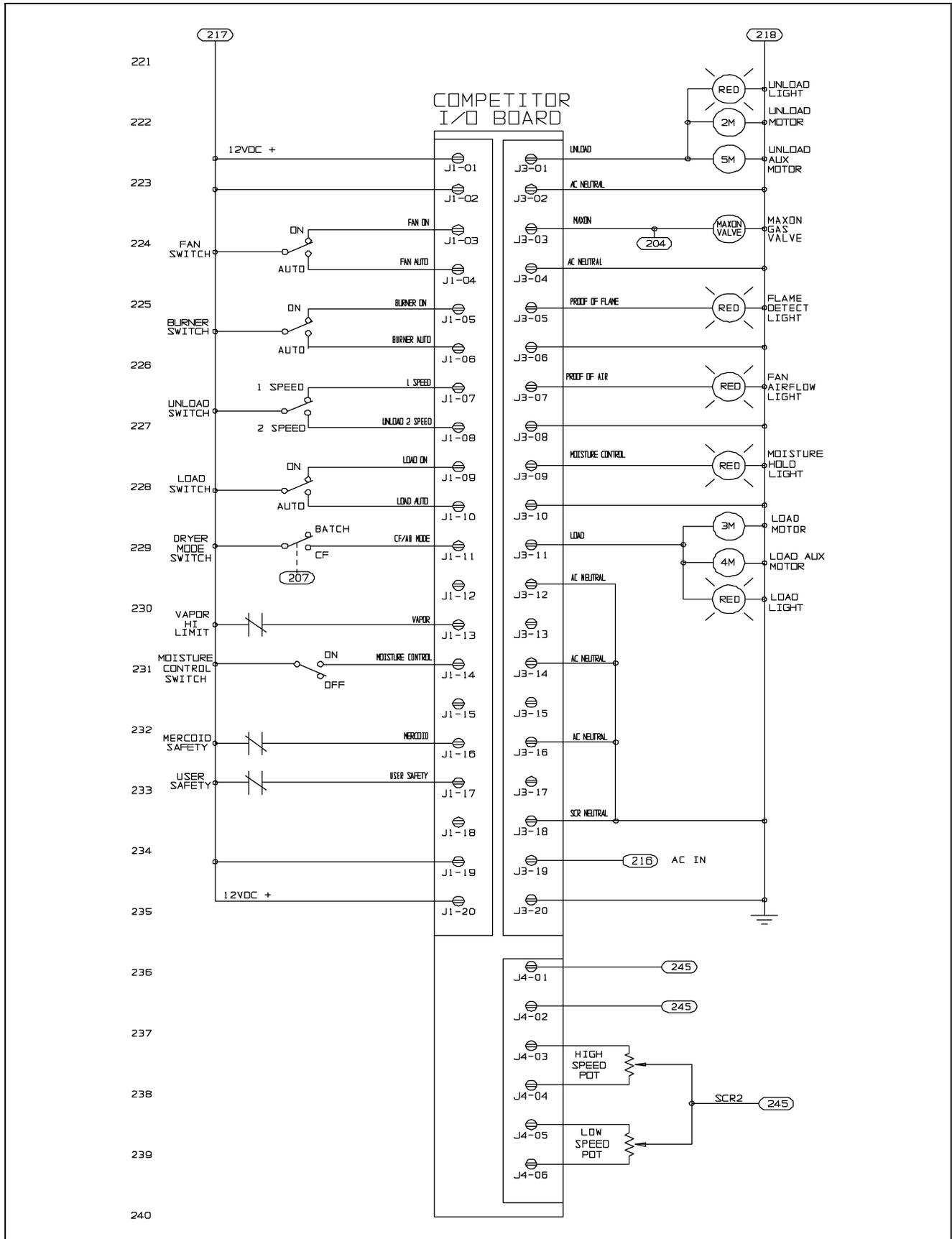
100 Series Main Power Wiring



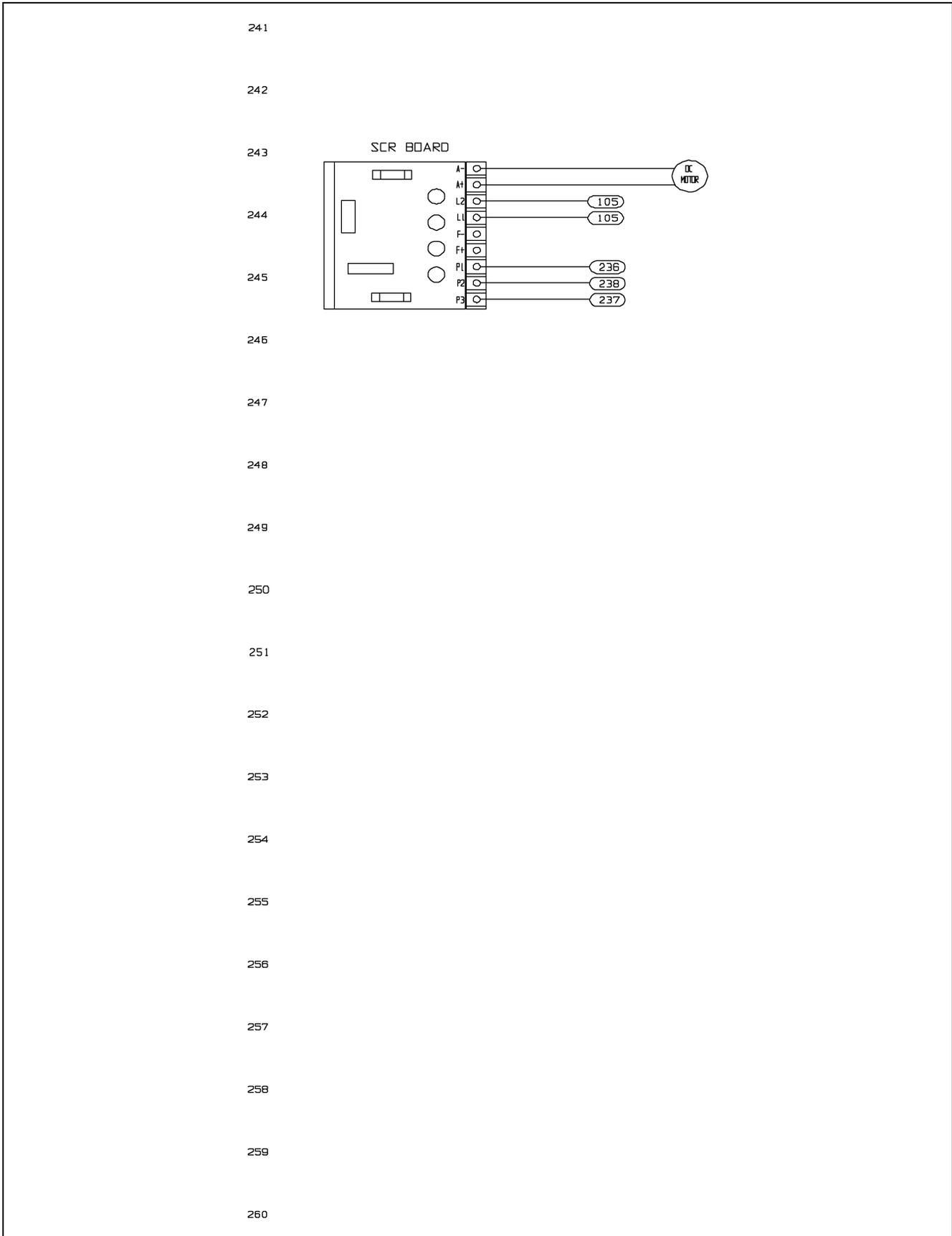
100 Series Control Schematic



100 Series Control Schematic (Continued)

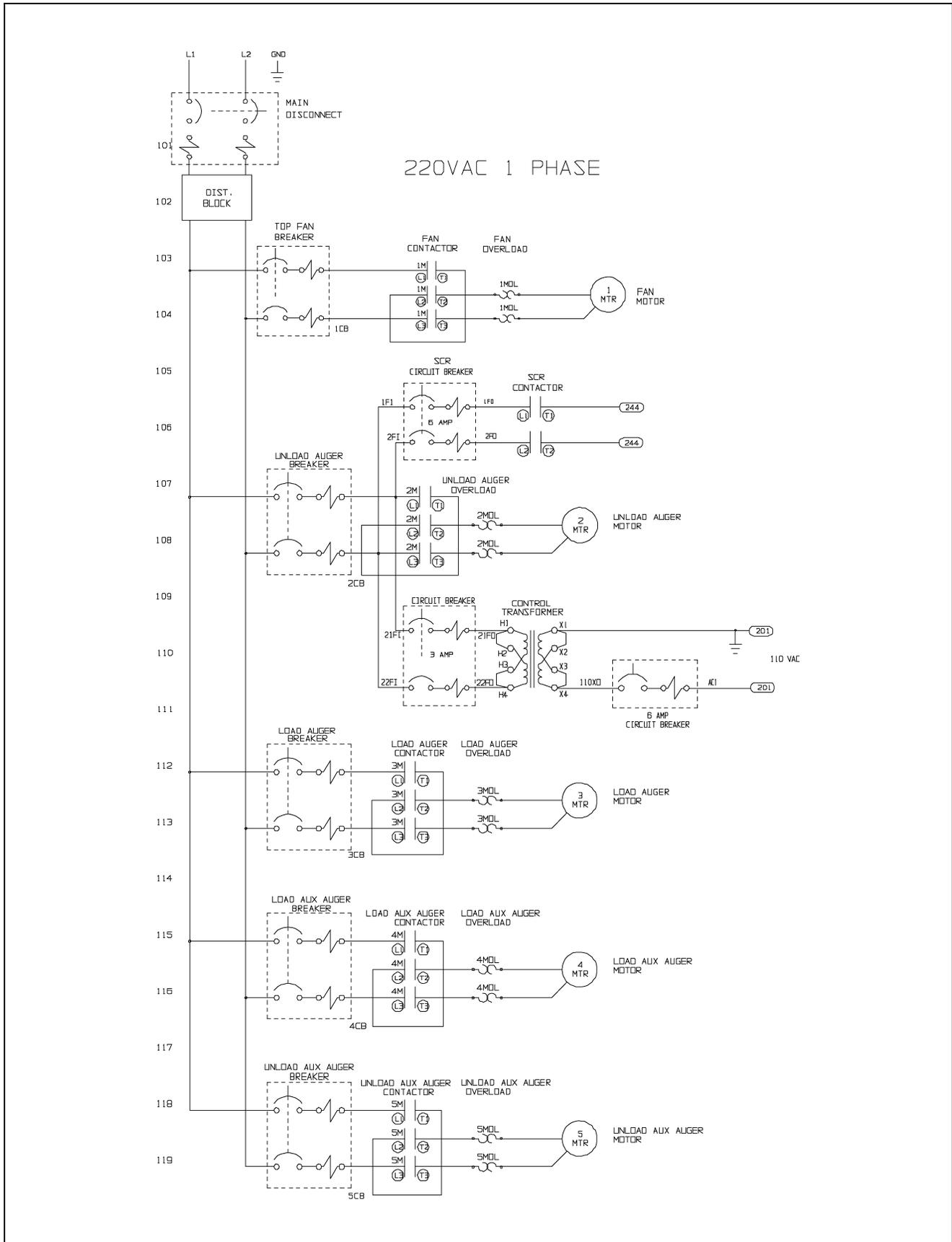


100 Series Control Schematic (Continued)

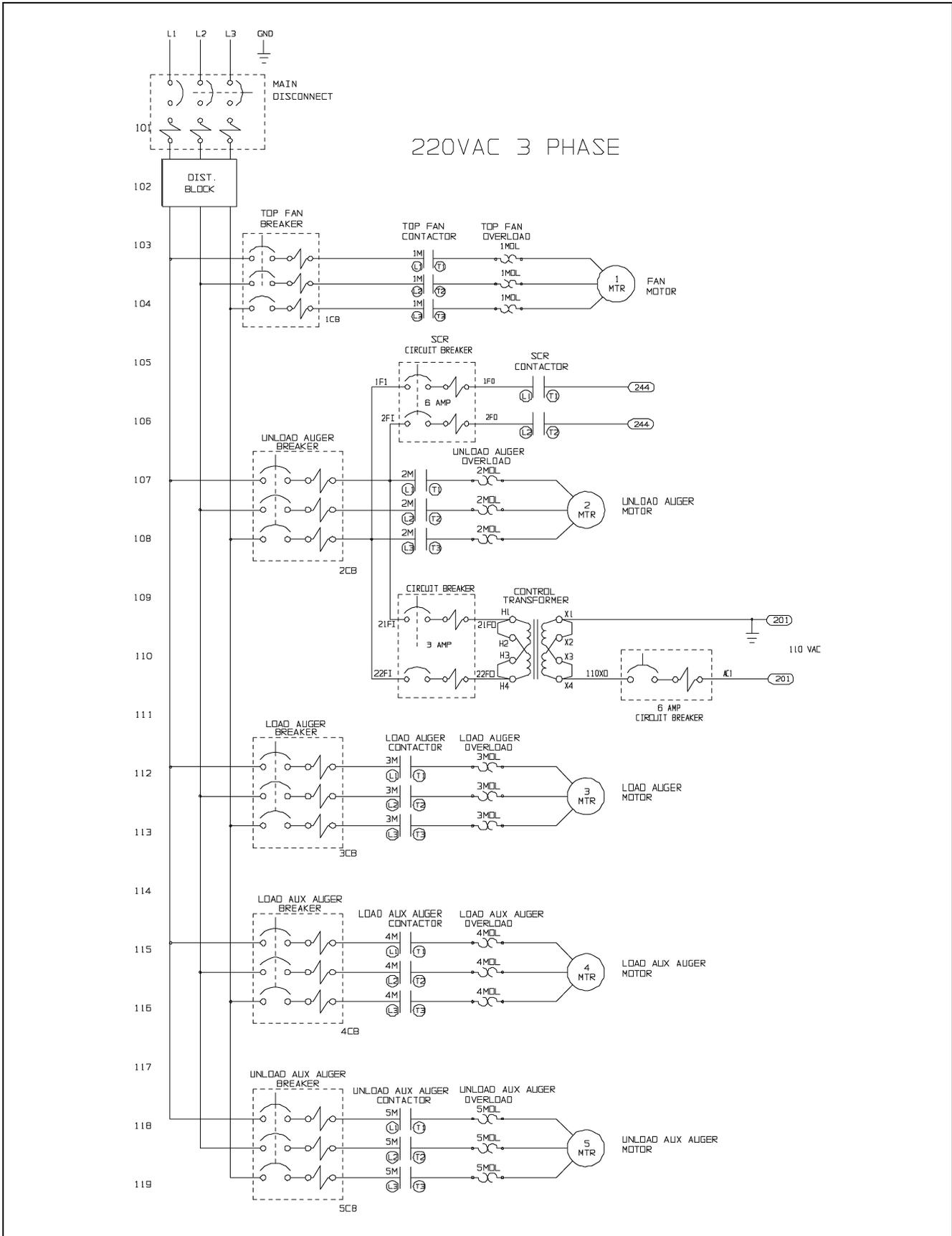


9. Schematic Diagram

100 Series 220 Volt 1 Phase Power Schematic

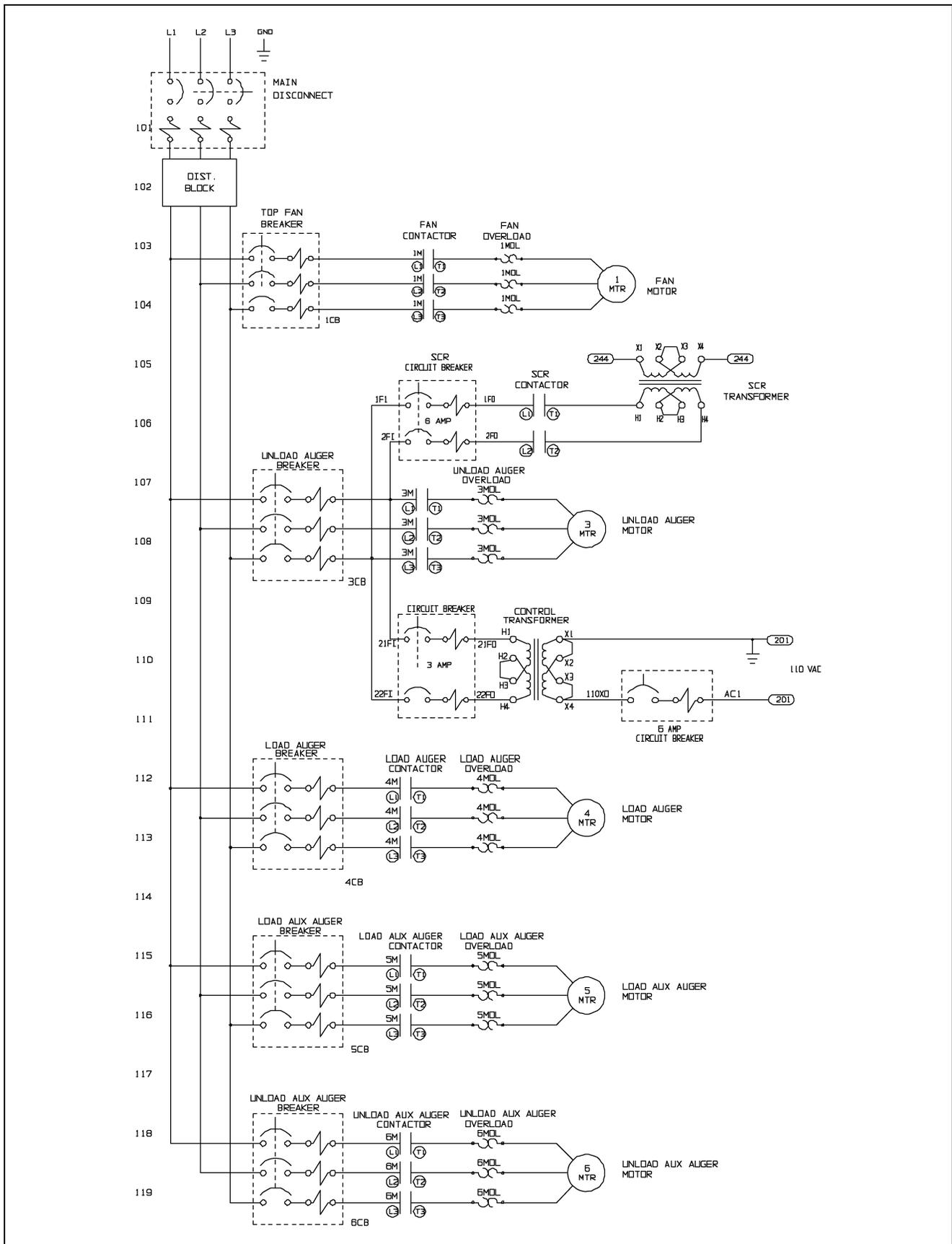


100 Series 220VAC 3 Phase Power Schematic



9. Schematic Diagram

100 Series 440VAC 3 Phase Power Schematic



A multimeter is required for some of the following checkout procedures. Before performing any tests, determine if the dryer power supply is 1 phase, 230 volt, or 3 phase, 230 or 460 volt.

- The burner circuit is 120 volts AC on all standard U. S. production models.
- The control circuit to the motor starters is 120 volts AC.
- The safety circuit is 12 volts DC.
- When checking these circuits, measure voltage between the circuit test location and to ground.
- DC circuits should be measured between the test location and its respective DC ground. Refer to [Wiring Diagrams](#) and the parts list for identification of parts and the electrical terminals.



When making high voltage tests with “live” circuits, be extremely careful. Follow established safety practices. Turn power ON for testing only. Do not attempt to make the dryer operate by using a jumper wire to bypass a defective safety component.

Problem	Possible Cause
Control power light OFF.	<ol style="list-style-type: none"> 1. Check that main power and circuit breakers are turned ON. Check for tripped breaker. 2. Check for blown 5 amp fuses. 3. Monitor relay is defective. 4. Defective transformer or wiring. 5. Check for a defective power switch. 6. Check wiring between fuses and input/output board. Refer to Wiring Diagrams for test locations.
Control power is ON. Drying mode light OFF. This indicates control power is present at input/output board, but no power is being transferred through the I/O board.	<ol style="list-style-type: none"> 1. Power interruption: Incoming power to the dryer has been interrupted. The display screen will show the date and time if this has occurred, once power has returned. 2. Display not finished initial setup: The monitor will display a copyright message and model number, total running time in hours and minutes and then the current date and time. To activate the controller press the reset button. 3. Input/output board: The input/output board has developed a problem that requires its replacement.
No display on LCD screen.	<ol style="list-style-type: none"> 1. Check for a defective power switch. 2. Check wiring between fuses and input/output board. 3. Check for 120 volts AC between points J6-02 and AC-1. 4. The display may have a malfunction requiring its replacement.
Control power light is ON, drying mode light is ON-load auger, fan, heater, unload auger does not operate.	<ol style="list-style-type: none"> 1. Press the dryer power start button. 2. Refer to the problem listed for load auger, fan heater and unload auger in the following sections.
Display shows “ MOTOR OVERLOAD ” message.	The thermal overload on the fan motor, load motor, unload motor or an auxiliary motor has opened indicating an overloaded motor. (The overloads must be manually reset.)
Display shows “ VAPOR HIGH TEMPERATURE ” message.	The LP gas vapor temperature sensor located in the gas train downstream from the vaporizer has opened, indicating that the vaporizer is running too hot and must be readjusted. (This control is a 200°F limit which automatically resets when it cools.)
Display shows “ LOSS OF FLAME ” message.	The flame sensor has failed to detect a burner flame, indicating that the burner has failed to light. There is a problem with the flame sensing circuitry or the dryer is not getting burner fuel.

10. Troubleshooting

Problem	Possible Cause
Display shows " HOUSING HIGH TEMPERATURE " message.	The temperature high-limit located on the fan/burner housing has opened, indicating an over temperature condition has occurred towards the rear of the fan/heater housing. (This control is a 200°F limit control that must be manually reset.)
Display shows " REAR DISCHARGE WARNING " message.	The cover on the grain discharge box has opened, indicating that grain is backing up into the discharge box.
Display shows " OUT OF GRAIN " message.	The dryer has run low on grain, and the out of grain timer has timed out shutting the dryer down. The unload auger will then clean-out the dryer, if the unload switch is ON during continuous flow operation. Check the out of grain timer setting, and if necessary adjust. Also, before restarting, inspect load equipment for possible damage or adjustment.
Display shows " PLENUM HIGH TEMPERATURE " message.	An over temperature condition has occurred inside the dryer Plenum. (This control is a 300°F limit which automatically resets when it cools.)
Display shows " NO AIRFLOW " message.	The air switch contacts have opened, indicating the fan may not be turning. The air switch may need adjustment.
Display shows " Grain High Temperature " message	An over temperature condition has occurred in the Dryer Grain Columns. This control is a 200°F limit which automatically resets when it cools. It may require the use of the Emergency Cool Feature as described on Page 18 .
Display shows " Grain High Temperature " and " Plenum High Temperature " messages at the same time	One of both of the mechanical high-limits located one in each grain column have tripped. Note that the Emergency Cooling Feature will not work in this case, open the back access door to help speed the cooling of the grain. Replace the mechanical sensor if faulty.
Fan motor does not start.	<ol style="list-style-type: none"> 1. Check that the fan circuit breaker and the FAN switch are ON. Also, check for defective switch or bad wiring connections. 2. If lighted switch does not light, the air switch needs adjustment, or the bulb may be burned out. 3. Verify closing of fan motor contactor. Check voltage on load side of contactor. See appropriate power Wiring Diagrams for terminal numbers. Inspect contactor for defective points or a burned out coil. 4. Inspect connections, and check voltage applied to the motor leads in the fan heater box to determine if the motor is defective. 5. Check capacitors on single phase motors, and replace if defective. If motor starts slowly, check for low voltage during starting due to excessive voltage drop in power supply wiring.
Top auger does not start.	<ol style="list-style-type: none"> 1. Check that the top auger circuit breaker and the load auger switch are turned ON. 2. If lighted switch does not light, the output power to the contactor is missing. Check connections, or if the bulb is burned out. 3. Check position of the upper auger paddle switch. It must be down to start auger. 4. Inspect for secure mounting and wiring of mercury switch in the terminal box on the top auger paddle switch shaft. Include check for a defective mercury switch. 5. Verify closing of the top auger contactor. Check voltage on load side of contactor. Inspect contactor for defective points, or a burned out coil. 6. Inspect connections, and check voltage applied to motor leads in motor junction box to determine if motor is defective. 7. Check that the mercury switch box is in the proper position.

Problem	Possible Cause
Bottom auger does not start.	<ol style="list-style-type: none"> 1. Check that the bottom auger circuit breaker is ON. 2. If the lighted switch does not light, the output power to the contactor is missing. Check connections, and whether the bulb is burned out. 3. Check that the unload switch is ON (1 Speed or 2 Speed). 4. Verify closing of bottom auger contactor; check voltage on load side of contactor. 5. If using the moisture control, check for proper setting, or defective operation of the control. 6. Check for any loose wire connections in unload auger and moisture control thermostat circuits.
Grain not moving through columns.	<ol style="list-style-type: none"> 1. Check the dryer for fine material buildup inside the columns. 2. Avoid leaving the dryer columns full for long periods at a time (2-3 days) while not operating the dryer or during rainy weather. 3. Empty the dryer. Keep the dryer clean. Do not allow fine material to gather in the plenum chamber. 4. It may be necessary to open the strike off plates in the affected columns in half inch intervals.
<p>Uneven drying-Some kernels appear brown while others are under dried.</p> <p>Uneven heat exiting from dryer columns.</p>	<ol style="list-style-type: none"> 1. Check plenum thermostat temperature setting. Some varieties of grain are more sensitive to higher operating temperatures. It may be necessary to lower the plenum operating temperature to accommodate this. 2. Check for proper burner alignment (side to side). Vibration during shipment may have caused misalignment.
Burner does not fire with fan operating.	<ol style="list-style-type: none"> 1. Burner switch must be ON. 2. Check for power to ignition board.
Heater light and gas solenoids go ON and OFF erratically. The light blinks ON and OFF while the solenoids "chatter".	<ol style="list-style-type: none"> 1. The blinking light indicates the flame sensor is not detecting flame. 2. The "chattering" solenoids are caused by the loss of flame detection and the thermostat, and Fenwal Ignition Board trying to reestablish a flame. Check for loose wires on flame sensor; replace or repair wires or sensor.
Burner does not fire. No gas pressure with fan operating at least 15 seconds (gas supply or fan heater malfunction).	<ol style="list-style-type: none"> 1. Check gas supply. Also, check gas filter and gas line for possible obstruction or closed valves. Refill tank; replace or repair parts, as required. 2. Inspect gas solenoid valves (including liquid valve on LP units) for defective coils or improper wiring. Replace valve or coil if valve will not open with proper voltage applied (115 volts). 3. Check for proper voltage. 115 volts across L1 and L2 incoming voltage to the Fenwal Ignition Board and 115 volts outgoing across V1 and V2 to the solenoids.
Burner does not fire but gauge shows gas pressure.	<ol style="list-style-type: none"> 1. Fenwal Ignition Board: Check board for spark by removing ignition wire from board, and holding an insulated screwdriver against the output terminal and 1/4" away from the control box casing. There should be a strong spark. Check board wire connections. Replace the Fenwal Board, if necessary. 2. Ignitor: Check that the ignitor is properly gapped to 1/8" and that it has a strong spark. Inspect the porcelain and electrodes for damage or cracking. Replace or clean if necessary.
Burner maintains desired drying temperature-but cycles from high-fire to OFF (without going to low-fire).	<ol style="list-style-type: none"> 1. Make sure the low flow control valve is not completely closed. Valve must be adjusted open to provide the proper low-fire gas pressure listed in this manual. 2. Check low-fire solenoid valve for proper operation.

10. Troubleshooting

Problem	Possible Cause
<p>Burner operates but does not cycle from high-fire to low-fire.</p>	<ol style="list-style-type: none"> 1. Check the gas pressure reading on the gauge. Problem may be due to insufficient gas regulator setting. Temporarily decrease the High-Low Fire thermostat setting to verify that the thermostat will function and cause the burner to cycle. If burner will cycle at the reduced thermostat setting, it indicates that the problem was due to insufficient heat to satisfy the original setting. Increase the gas regulator setting for additional heat output. Do not exceed the maximum pressure listed in this manual. 2. High-Low Fire thermostat control may be defective. If the burner still does not cycle to low-fire after decreasing the thermostat, the problem may be due to a broken or kinked thermostat sensor tube. Observe reading on the thermometer. Replace control assembly if it cannot be set to cause its switch to go to the open circuit position with normally hot air plenum temperatures. 3. If the burner continues to operate on high-fire, check the high-fire gas solenoid valve for a stuck or blocked open condition, or for reversed gas pipe connections. The solenoid valve must not allow gas flow when its coil is not energized.
<p>Burner operates but does not cycle from low-fire to high-fire.</p>	<ol style="list-style-type: none"> 1. Check for an excessive low-fire gas pressure setting. Observe pressure setting shown on gauge, and compare reading with recommended low pressure settings listed in this manual. Readjust low-fire setting on flow control valve, if necessary. 2. Check for improperly adjusted or defective High-Low Fire thermostat control. Temporarily increase the temperature setting. If the heater will still not cycle, check for problem in the control wire connections. The control wires should be connected to terminals R and B of the thermostat, so the switch will open upon temperature rise. If the burner will cycle with these two wires connected together, the thermostat is faulty. 3. Check for improperly connected or faulty high-fire gas vapor solenoid valve. Correct any poor connections or defective wiring. If wiring appears proper, problem may be caused by a burned out valve coil or defective valve. Replace high-fire solenoid valve, or its coil, if defective.
<p>If the Load and Unload Auger does not start but everything else seems to work.</p>	<p>Check the fuse on the I/O Board in the back of the lower control Box.</p>

How much gas pressure is needed?

See [Step 4 on Page 31](#) in the Adjusting the Temperature section.

How often should the burner cycle?

See [Step 5 on Page 31](#) in the Adjusting the Temperature section.

How often do I make speed adjustments?

See [Step 4 on Page 33](#) in the Adjusting the Moisture Control section.

How do I set the moisture control?

See [Step 1 on Page 33](#) in the Adjusting the Moisture Control Section.

NOTES

The GSI Group Warranty

THE GSI GROUP (GSI) WARRANTS ALL PRODUCTS WHICH IT MANUFACTURES TO BE FREE OF DEFECTS IN MATERIAL AND WORKMANSHIP UNDER NORMAL USAGE AND CONDITIONS FOR A PERIOD OF 12 MONTHS AFTER RETAIL SALE TO THE ORIGINAL END USER. THE PURCHASER'S SOLE REMEDY AND GSI'S ONLY OBLIGATION SHALL BE TO REPAIR OR REPLACE, AT GSI'S OPTION AND EXPENSE, PRODUCTS THAT, IN GSI'S SOLE JUDGMENT, CONTAIN A MATERIAL DEFECT DUE TO MATERIALS OR WORKMANSHIP. ALL DELIVERY AND SHIPMENT CHARGES TO AND FROM GSI'S FACTORY WILL BE PURCHASER'S RESPONSIBILITY. EXPENSES INCURRED BY OR ON BEHALF OF THE PURCHASER WITHOUT PRIOR WRITTEN AUTHORIZATION FROM AN AUTHORIZED EMPLOYEE OF GSI SHALL BE THE SOLE RESPONSIBILITY OF THE PURCHASER.

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PRIOR TO INSTALLATION, PURCHASER HAS THE RESPONSIBILITY TO COMPLY WITH ALL FEDERAL, STATE AND LOCAL CODES WHICH MAY APPLY TO THE LOCATION AND INSTALLATION OF PRODUCTS MANUFACTURED OR SOLD BY GSI.

This equipment shall be installed in accordance with the current installation codes and applicable regulations which should be carefully followed in all cases. Authorities having jurisdiction should be consulted before installations are made.

G S I G R O U P



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