# Automatic Batch Portable Dryer Operation

Service Manual

**PNEG-680**


A division of

THE GSI GROUP

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The GSI Group, Inc. (GSI) principle concern is your safety and the safety of others associated with grain handling equipment. This manual was written with that thought in mind. We want to keep you as a customer by helping you understand safe operating proceedures, and how to solve some of the problems that may be encountered by the dryer operator or 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 who are in the dryer area. Avoid any alterations to the equipment. Such alterations may produce a very dangerous situation, where serious injury or death may occur.

## Safety Alert Symbol

The symbol shown below is used to call your attention to instructions concerning your personal safety. Watch for this symbol; it points out important safety precautions. It means "ATTENTION", "WARNING", "CAUTION", and "DANGER". Read the message that follows and be cautious to the possibility of personal injury or death.

**WARNING! BE ALERT!**

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

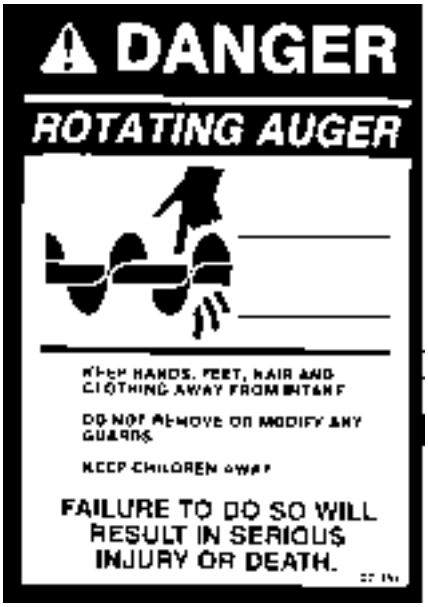
## Safety Alert Decals

The GSI Group, Inc. recommends you contact your local power company and have a representative survey your dryer installation, so your wiring will be compatible with their system and you will have adequate power supplied to your unit.



Safety decals should be read and understood by all people in and around the dryer area. If the following safety decals are not displayed on your dryer, or if they are damaged, contact The GSI Group, Inc. for replacement.

**A CAREFUL OPERATOR IS THE BEST INSURANCE AGAINST AN ACCIDENT**






**Three decals displayed on all GSI Dryers. Belt drives, chain driven meter rolls and combustible fuels must be treated with caution.**

**READ THESE INSTRUCTIONS BEFORE OPERATION AND SERVICE**

**SAVE FOR FUTURE REFERENCE**

1. Read and understand the operating manual before trying to operate the dryer.

2. Never operate the dryer while the guards are removed.

3. Power supply should be OFF for service of electrical compo nents. Use CAUTION in checking voltage or other procedures re quiring 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 be fore further operation.

5. Never attempt to operate the dryer by jumping or otherwise bypass ing any safety devices on the unit.

6. Set pressure regulator to avoid excessive gas pressure applied to burner during ignition and when burner is in operation. See chart 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.

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 START AUTOMATICALLY.

10. Do not operate in any area where combustible material will be drawn intothe fan.

11. Before attempting to remove and reinstall any propellor, make certain to read the recommended procedure listed within the servicing section of the manual.

12. Be certain that capacities of auxiliary conveyors are matched to dryer auger capacities.

13. Clean grain is easier to dry. Fine material increases resistance to airflow and requires removal of extra moisture.

## Use Caution in the Operation of this Equipment

The design and manufacture of this dryer is directed toward operator safety. However, the very nature of a grain dryer having a gas burner, high voltage electrical equipment and high speed rotating parts, does present a hazard to personnel, which can not be completely safeguarded against, without interfering with efficient operation and reasonable access to 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 this manual, and make it a practice to regularly inspect the operation of the unit for any developing problems or unsafe conditions.

Take special note of the safety precautions listed above before attempting to operate the dryer.


## Dryer Control Panel Featuring Competitor Series 2000 Control System

The control panel provides easy access to gauges and controls, and the lights by the switches provide a quick reference for every operating function. The Series 2000 Control System is a computerized control system that gives instant information regarding dryer operation.

### Moisture Control Thermostat

This electronic thermostat 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 thermostat. The light comes on when the grain column temperature is below the thermostat set point.

## Control Power Switch

The power to the Series 2000 Control System is turned on or off with this switch.

## Outside Light

The dryer service light is turned on or off here. It also may be set on auto, which turns the light on while the dryer is running, and off if a shutdown occurs.

## 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**, if grain flow is interrupted to the dryer. The switch will light whenever the load auger is operating.

Note: If the load auxiliary motor connections are 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. The auto position operates the fan during hi-heat, lo-heat and cool cycles, but shuts off during unload. The light will light up whenever the airflow switch is sensing air pressure and the dryer is full of grain.

## Heater Switch

This switch is used to turn the burner on or off. The auto position operates the burner during the hi and low heat cycles. The on position will operate the burner anytime that the fan is running. The light will light up when the flame sensor detects the flame.

## Unload Switch

The unload switch turns the discharge auger on or off.

Note: If the unload auxiliary motor connections are being utilized in the dryer control panel, this switch will also control the operation of the auxiliary equipment.

## Dryer Power Start Switch

This switch starts and operates the dryer based on switch settings. The load, fan, heater, and unload switch must be either in the Aux or Manual position before the dryer will start.

## Dryer Power Stop Switch

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

## Competitor Series 2000

The Series 2000 Competitor System controls all timing functions and safety circuit checks. It is designed to simplify dryer operation by providing printed messages and warnings on its liquid crystal display (LCD).

## Turning on the Series 2000 Control System

Turn the control power switch to on. The monitor will first light up the entire display, then the screen will show "GSI" followed by the software version #, then the plenum temperature. When the plenum temperature is displayed you can run the dryer.

## High Heat, Low Heat and Cool Timers

These switches are used to set the cycle times. The current settings on these three timers is displayed on the screen. To change the setting of these timers follow these instructions:

1. Press the program timer button unit the carrot is over the correct timer.
2. Press the increase or decrease button to adjust the settings.
3. The new time is automatically accepted.

During 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 the stop button.

### Setting the Out of Grain Timer

If the dryer runs out of grain while the load auger switch is in the auto position, the out of grain timer automatically shuts off the dryer after the period of time preset on the timer.

### 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. The unload delay is used to control the amount of time the unload auger runs after the dryer is empty to allow for auger cleanout. Both the load and unload delays are set using the same procedure as the timers.

## Safety Circuit Shutdown Messages

### Dryer Safety Circuit

The 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 shutdown will be displayed on the LCD display. To restart the dryer after a safety shutdown, first correct the reason for the shutdown, and then press the dryer power stop button to reset the circuit. Press the start button.

### Vapor High Temperature

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

### Loss of Flame Warning

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. On these dryers, the flame probe must physically touch the flame. A probe can be Red Hot, but this does not mean that flame is sensed.

### Housing High Temperature

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 set at 200°F and must be manually reset.

### Grain 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.

### Fixed Grain High Temperature

An over temperature condition has occurred in the left side or right side (left and right as viewed from behind the dryer) grain column causing the control to shutdown the dryer. This control is set at 210°F and automatically resets itself when cool.

### Motor Overload

One of the thermal overloads on either the fan, load, unload or auxiliary motors has opened, indicating an overcurrent condition. The overloads must be manually reset.

### Out of Grain

The dryer has run low on grain, and the out of grain timer has timed out, shutting the dryer down.

### 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.

### Loss of Airflow

The contacts in the air switch have opened due to insufficient air pressure in the plenum.

### "Air" Warning

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

## Pre Season Inspection

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

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**BEFORE ATTEMPTING TO OPERATE THE DRYER MAKE SURE ALL SAFETY SHIELDS ARE IN PLACE, ALL BOTTOM CLEANOUT AND REAR ACCESS DOORS ARE CLOSED AND ALL PERSONNEL ARE CLEAR OF THE DRYER**

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## Set Control Switches

Moisture Control Switch-ON
Moisture Control Thermostat-
MAXIMUM TEMPERATURE
Load Switch-OFF
Unload Switch-OFF
Fan Switch-OFF
Burner Switch-OFF
Out of Grain Timer-1 MINUTE
Load Delay-30 SECONDS
Unload Delay-30 SECONDS
High Heat Timer-60 MINUTES
Low Heat Timer-20 MINUTE
Cool Timer-10 MINUTES

## 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.

## Power Start Button

Push the dryer start button, and all the selector switches on the control panel will be activated.

## Control Power Switch

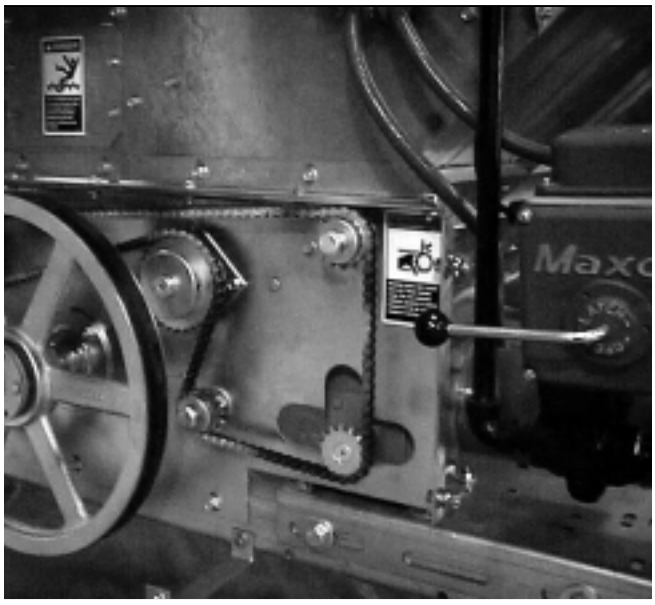
Turn the control power switch to on. The light will light up. If a fault is found, the cause will be displayed on the LCD. If all safeties are found closed, the dryer is ready to operate.

## Fuel Check

If using LP gas, make sure the tank has plenty of fuel and that the tank does not have a 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. Open the Maxon electronic shut off valve, if so equipped, or open the manual shut off valve on the dryer to allow fuel flow to the dryer. Natural gas and multi-fan dryers are equipped with a Maxon valve, single fan dryers are not. Inspect all gas lines and connections for possible leaks.

**Any gas leaks must be fixed immediately!**



**The Maxon safety shut off valve.**

## 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 shutdown message (out of grain) displayed. Press the dryer power stop button to reset the panel, then press the start button.

**To test fire the burner, turn on the fan switch, the heater switch, then, turn on the fuel supply.**

## Fan Switch

Bump the fan switch and observe the fan rotation. The fan should run counterclockwise. Sometimes on three phase models all motors will run backwards. They can easily be reversed by interchanging two of the 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 will not operate. The fans cannot create enough static pressure to engage the air switch. You will receive a loss of airflow message.

## Burner Safety

To check the burner safety function, first 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.

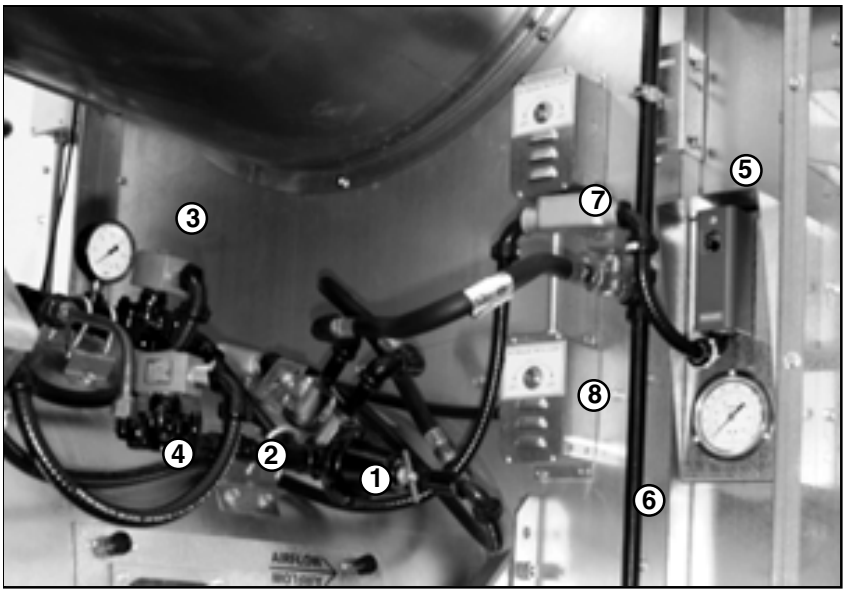
## Burner Test Fire

Test fire the burner by starting the fan, and then turn the burner switch to on. Turn on the fuel supply, and the burner should ignite after a short purge delay of approximately 10 seconds. Gas pressure should be shown on the gauge. At this time adjust the burner hi-lo fire thermostat to 200°F, causing the burner to operate on hi-fire, as indicated on the display. Observe the gas pressure on gauge, and adjust the plenum set point to a minimum setting, causing the burner to cycle into lo-fire, as indicated on the display. As the burner thermostat is turned down the gas pressure should also show a noticeable drop, indicating that the hi-fire solenoid is closed and the burner is being supplied with less gas through the low fire control valve. At this time set the hi-fire and lo-fire pressure settings. Use the pressure regulator for hi-fire and the ball valve for lo-fire. The thermostat should cycle between high and low, approximately 4 to 5 times per minute.

Approximate settings should be:

| | | |
|---|---|---|
| LP Gas | Hi-Fire 6-15 lbs. |
| | Lo-Fire 2-6 lbs. |
| Natural Gas | Hi-Fire 6-10 lbs. |
| | Lo-Fire 1-3 lbs. |

If the burner remains on hi-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 lo-fire and does not cycle, slightly decease gas pressure with the lo-fire control valve. If the gas pressure is decreased too much, a popping or fluttering sound will be heard. Also, anytime the high pressure side is adjusted the low pressure side needs to be checked.




**The dryer fan and heater controls featuring: 1-pressure regulator, 2-lo-fire control valve, 3-high pressure solenoid, 4-low pressure solenoid, 5-hi-lo fire thermostat (assembly includes thermometer), 6-fuel supply line, 7-LP solenoid or supply ball valve(NG) and 8-air pressure switch.**

## Batch Test Check

To check the batch operation, locate the white junction box in the back of the dryer, under the rear access door, and remove the cover exposing the mercury switch. Position the switches on the control panel as follows:

Load - Manual position, to avoid the out of grain warning in the auto position
Fan - Auto position
Burner - Auto position
Unload - Auto position

Turn on the control power and wait until the display settles on the plenum tempature. At this point the timers may be adjusted. Press the start button. The load switch should light up indicating the loading process. If it is not lit check the back of the load mercury switch to see that it is installed properly. This mercury switch is shipped to you mounted on the front of the dryer in a white box with a black cord going to the junction box with the outside light attached. This switch must be installed on the load auger to work.

Go to the back of the dryer and reverse the mercury switch in the clip so the leads are on the right side. This simulates the presence of grain.

On the front of the dryer, turn the load mercury switch 90 degrees counterclockwise to simulate the dryer being completely full of grain. At this point, the fan should start up and the burner should light. During this time, the hi thermostat should be the only one controlling the hi-lo cycle of the burner. When the cycle reaches the lo-heat cycle, then only the lo thermostat will control the hi-lo burner cycle. Also, in this cycle the load will discontinue to run. At the end of this cycle the moisture control will hold in the Lo heat mode if the moisture control switch is on, and the grain has not reached the preset temperature. If it is in the off position then it will proceed to the cooling cycle. At the end of the cooling cycle the unload auger should start.

Return to the back of the dryer and again reverse the unload mercury switch, so the leads are coming from the left side of the switch. This will tell the dryer all the grain has been emptied and will start the process at the beginning of the batch cycle again.

Be sure to return the rear unload mercury switch to its original position with the leads coming from the left side of the switch before closing the box up. **Caution:** the adjustment of this switch is critical. Try not to change the angle of the switch!

## Dryer Shutdown

To shutdown 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 shutdown 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.

## Emergency

In case of emergency push the dryer emergency stop button. The fan, burner and all augers will stop immediately.

**All dryer functions should be checked before operation each season.**

## Batch Operation

1. Turn the control power switch to on.

2. 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 Maxon electric shut off valve, if so equipped, or open the manual shut off valve to allow fuel flow to the dryer.

3. The dryer should already be filled with grain. Turn the load auger switch 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.

4. Turn the fan switch to auto. The fan will start, and the switch will light up when air pressure is detected.

5. Start the burner by turning the heater switch to auto. After purging for approximately 10 sec onds the burner will fire, and light above the heater switch will light up indicating that the flame sensing circuit is sensing burner flame.

For information concerning burner adjustment see the pre start section of this manual.

6. To properly set the correct dry, cool and unload time for various moisture content grains. See the charts on page 18 and 19.

7. To control the length of the dry time using only the HI and LO temperature setting pro grammed into the system, turn the moisture control setting to off. To use the automatic mois ture control so that the dry time is determined, not only by the dry time setting, but only by the HI and LO temperature setting, and also by the moisture content of the drying grain, turn the moisture control switch to on.

8. To start the drying operation push the dryer power start button. The controller will start all the dryer components in their proper or der. If any of the selected switches are im properly positioned for batch drying, the dis- play will indicate an error and will not allow the dryer to operate until the position of the switch is corrected.

9. To shutdown 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 shutdown 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 lo cated on the front of the power panel. Turn off the main power supply to the dryer.

10. In case of an emergency press the emergency stop button. The burner, fan and all augers will stop immediately.

## Batch 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 batch, the fans and heaters will continue running if in the Auto-Auto setting, until the preset temperature on the moisture control thermostat is reached.**

## Batch Timer Settings

| Full Heat | | | | | |
|---|---|---|---|---|---|
| Initial Moisture | Moisture Removed | Approx. Dry Time | High Heat | Low Heat | Cool |
| 17% | 2 pts. | 16 min. | 6 min. | 10 min. | 0 |
| 18% | 3 pts. | 21 min. | 8 min. | 13 min. | 0 |
| 19% | 4 pts. | 26 min. | 10 min | 16 min. | 0 |
| 20% | 5 pts. | 31.5 min. | 13.5 min. | 18 min. | 0 |
| 21% | 6 pts. | 37 min. | 19 min. | 18 min. | 0 |
| 22% | 7 pts. | 41.5 min. | 23.5 min. | 18 min. | 0 |
| 23% | 8 pts. | 47 min. | 29 min. | 18 min. | 0 |
| 24% | 9 pts. | 51 min. | 33 min. | 18 min. | 0 |
| 25% | 10 pts. | 54 min. | 36 min. | 18 min. | 0 |
| 26% | 11 pts. | 58 min. | 40 min. | 18 min. | 0 |
| 27% | 12 pts. | 62 min. | 44 min. | 18 min. | 0 |
| 28% | 13 pts. | 66.5 min. | 48.5 min. | 18 min. | 0 |
| 29% | 14 pts. | 71.5 min. | 53.5 min. | 18 min. | 0 |
| 30% | 15 pts. | 76 min. | 58 min. | 18 min. | 0 |
| 31% | 16 pts. | 81 min. | 63 min. | 18 min. | 0 |
| 32% | 17 pts. | 86 min. | 68 min. | 18 min. | 0 |
| 33% | 18 pts. | 91 min. | 73 min. | 18 min. | 0 |
| 34% | 19 pts. | 96 min. | 78 min. | 18 min. | 0 |
| 35% | 20 pts. | 100 min. | 82 min. | 18 min. | 0 |

## Batch Timer Settings

| Dry & Cool | | | | | |
|---|---|---|---|---|---|
| Initial Moisture | Moisture Removed | Approx. Dry Time | High Heat | Low Heat | Cool |
| 17% | 2 pts. | 18 min. | 7 min. | 11 min. | 18 min. |
| 18% | 3 pts. | 24 min. | 10 min. | 14 min. | 18 min. |
| 19% | 4 pts. | 30 min. | 12 min. | 18 min. | 18 min. |
| 20% | 5 pts. | 35 min. | 14 min. | 21 min. | 18 min. |
| 21% | 6 pts. | 40 min. | 18 min. | 22 min. | 18 min. |
| 22% | 7 pts. | 45 min. | 23 min. | 22 min. | 18 min. |
| 23% | 8 pts. | 50 min. | 28 min. | 22 min. | 18 min. |
| 24% | 9 pts. | 55 min. | 33 min. | 22 min. | 18 min. |
| 25% | 10 pts. | 60 min. | 38 min. | 22 min. | 18 min. |
| 26% | 11 pts. | 65 min. | 43 min. | 22 min. | 18 min. |
| 27% | 12 pts. | 70 min. | 48 min. | 22 min. | 18 min. |
| 28% | 13 pts. | 75 min. | 53 min. | 22 min. | 18 min. |
| 29% | 14 pts. | 80 min. | 58 min. | 22 min. | 18 min. |
| 30% | 15 pts. | 85 min. | 63 min. | 22 min. | 18 min. |
| 31% | 16 pts. | 90 min. | 68 min. | 22 min. | 18 min. |
| 32% | 17 pts. | 95 min. | 73 min. | 22 min. | 18 min. |
| 33% | 18 pts. | 100 min. | 78 min. | 22 min. | 18 min. |
| 34% | 19 pts. | 105 min. | 83 min. | 22 min. | 18 min. |
| 35% | 20 pts. | 110 min. | 88 min. | 22 min. | 18 min. |


102 GST
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## 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.

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 propellor for freedom of rotation and uni form tip clearance. It should also be inspected for dirt and grain dust, especially inside the hub. Any additional weight can seriously effect the balance, and result inharmful vibrations and a short bearing life.

3. Check propellor for free play. Any side play is an indication of defective motor bearings, which should be replaced to prevent a complete motor fail ure. Make sure motor mount bolts are tight.

4. Motor bearings should be lubricated periodically, de pending 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 t he 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 prop erly 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.

## Lube Procedures

If the motor is equipped with an alemite fitting, clean the tip of the fitting and apply 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 inch length of grease string into each hole on motors in NEMA frame and smaller. Insert 3 to 5 inch length on larger motors. On motors having grease drain plugs, remove plug and operate motor for 20 minutes before replacing drain plug.

## 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<br>10 to 40<br>50 to 150 | 5 years<br>3 years<br>1 year |
| Continuous Normal Applications | 1/8 to 7 1/2<br>10 to 40<br>50 to 150 | 1 year<br>3 years<br>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<br>50 to 150 | 6 months<br>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 & B | Medium | Polyurea | Shell Dolium R | 215T & Smaller |
| A & B | Medium | Polyurea | Shell Dolium R | 254 & Larger |
| F & 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.**

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. 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.

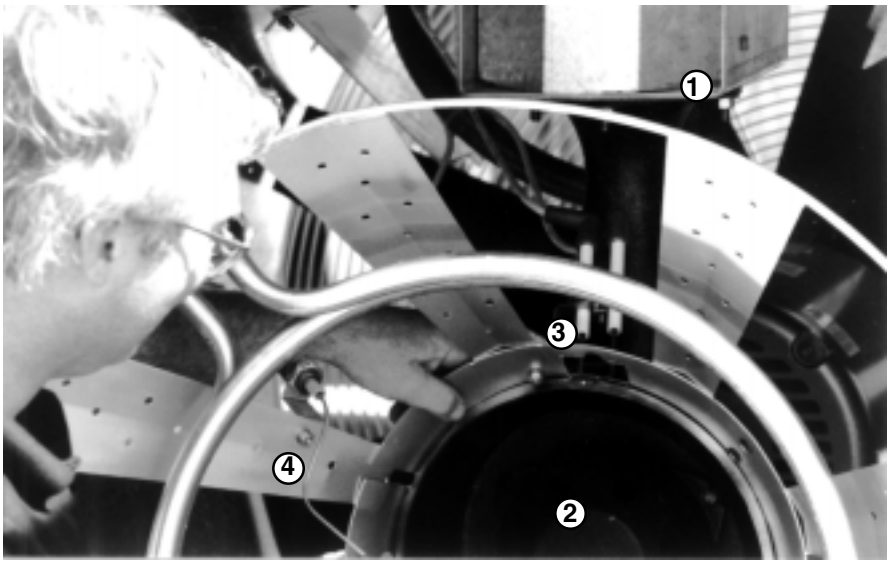
3. If required, inspect ignitor plug and clean the electrodes. Use an ignition point file to remove carbon and rust between the electrode surfaces. Ignitor gap should be about 1/8 inch.

4. Inspect flame sensor for possible damage or poor connections. Flame sensor wire must be in good condition.

5. Inspect and manually rotate the top auger paddle assembly. The paddle unit must rotate freely without any indication of sticking or binding.

6. Inspect the top auger and bottom auger drive lines for proper adjustment and condition. Readjust line tension as required.

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




7. 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 trough area.

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

8. Inspect entire dryer for loose, worn or damaged parts. Include check of auger flighting, metering rolls and other internal parts. Check that temperature sensors within air plenum chamber are secured within 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 15 for burner test fire.

**Remove the Blue Burn Optimizer Cone and inspect the 1-collector plate, 2-burner cup, 3-ignitor plug and electrodes and the 4-flame sensor on the heater.**

## 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 the 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 propellor.

2. Remove cover from fan heater control box, and disconnect the motor lead wires from within the box. Note: Tag or otherwise identify wires for ease of re assembly.

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 mo tor requires service, take it to an authorized ser vice 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 re quired, remove the fan blade and fully tighten all four motor mount bolts.
   Note: Make sure to install and tighten the propellor in accordance with previous instruc tions.

**The position of the fan motor provides easy access for service.**

## Heater Parts Removal and Installation

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

1. **Flame sensor**: Disconnect the wire connec tor, and unscrew the flame sensor out of its mounting bracket.

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 isremoved, as the coil may become dam aged due to excessive current flow.

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.

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

4. **Main Gas Orifice:** With fuel shut off and gas purged from system, proceed as follows:

   a. Disconnect the plumbing support brackets from the pipe train.

   b. Disconnect gas solenoid valve oils. Be sure to mark which one goes where.

   c. Lift pipe (with orifice, sole noid valve and other parts at tached), straight up and remove from fan heater housing. Orifice and other parts can now be re moved from pipe train, if desired.

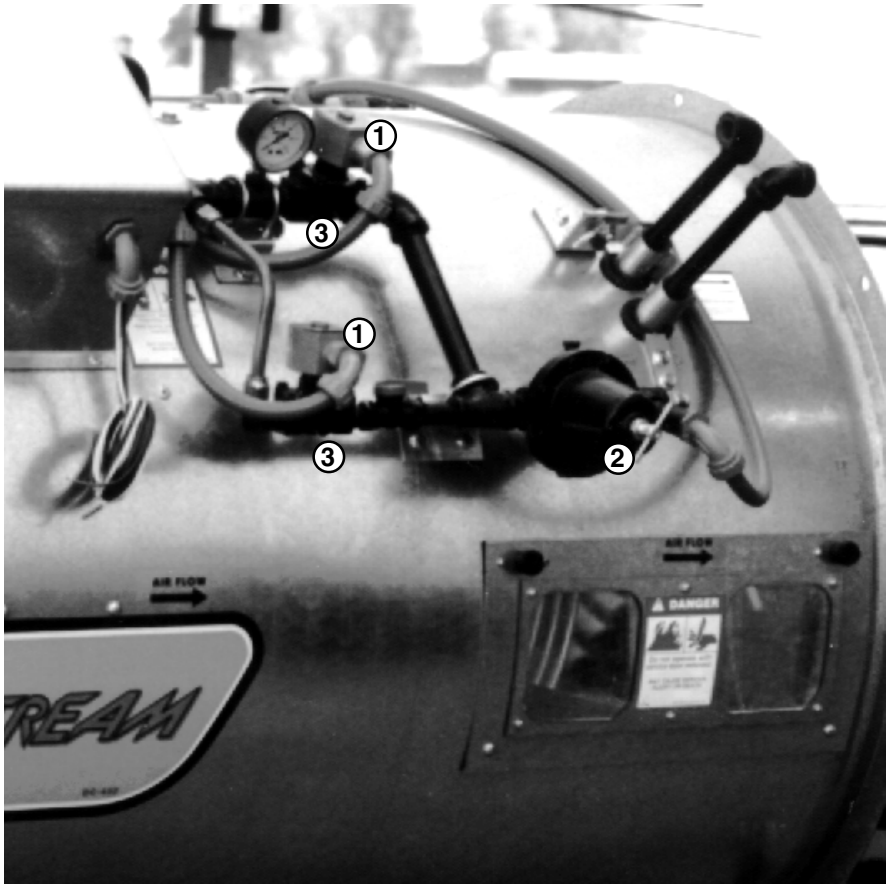
5. **Reassemble**: To reassemble parts, reverse the dis assembly procedure and check the following:

   a. Make sure all parts are thoroughly cleaned and open.

   b. Use a dependable brand of high tempera ture pipe caulking compound when assembling gas connections. Apply only a light coating onto male threaded end of fittings.

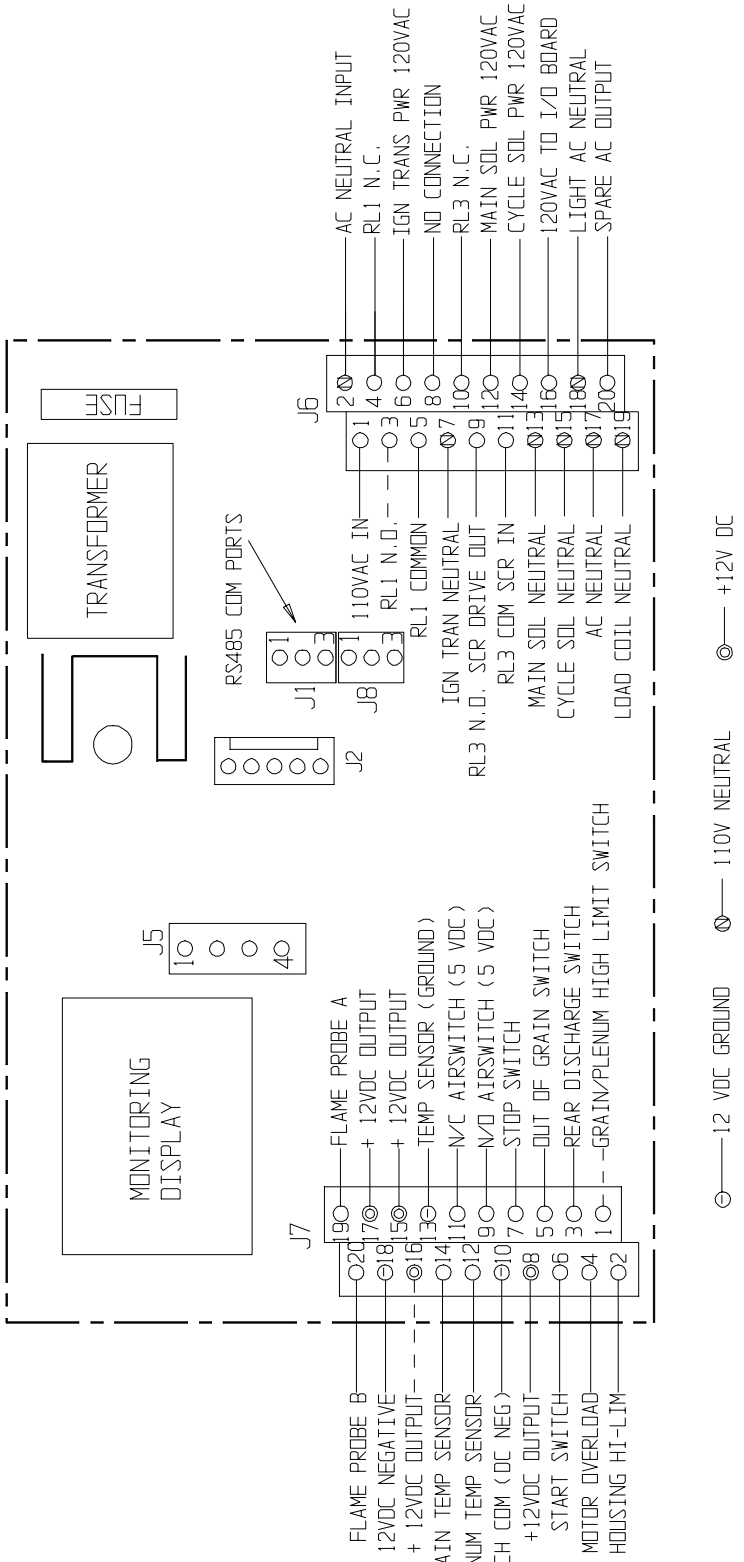
   c. Solenoid valves and gas regulators are direc tional and must be properly installed. Do not at tempt to connect gas solenoid valve by apply ing force to the valve core stem as it may ruin the unit.

   d. Make sure all electrical wires are properly con nected. Refer to wiring diagrams.

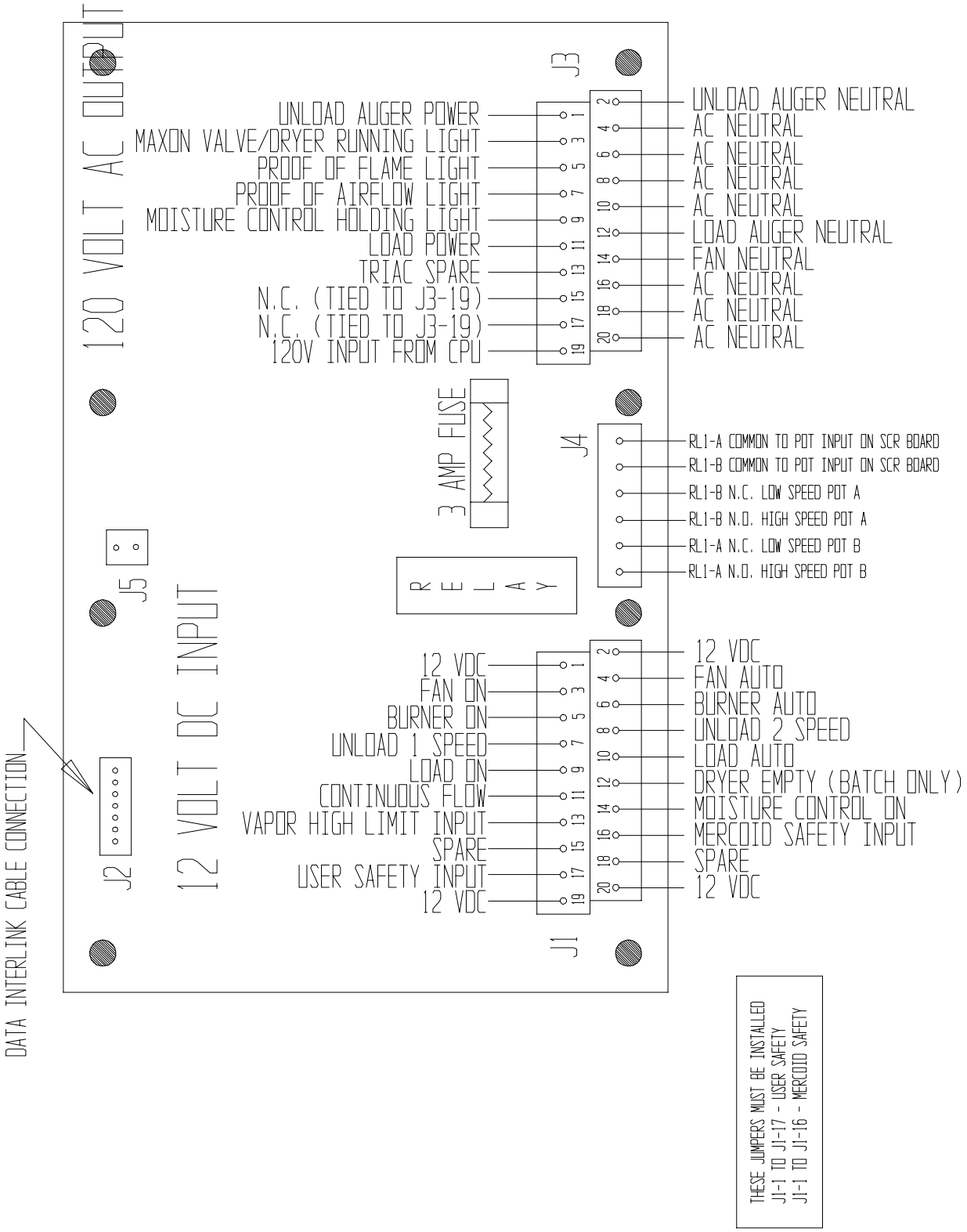



**This view of the dryer heater shows 1-gas solenoid valve coils and 2-gas regulator and 3-gas solenoid valves.**

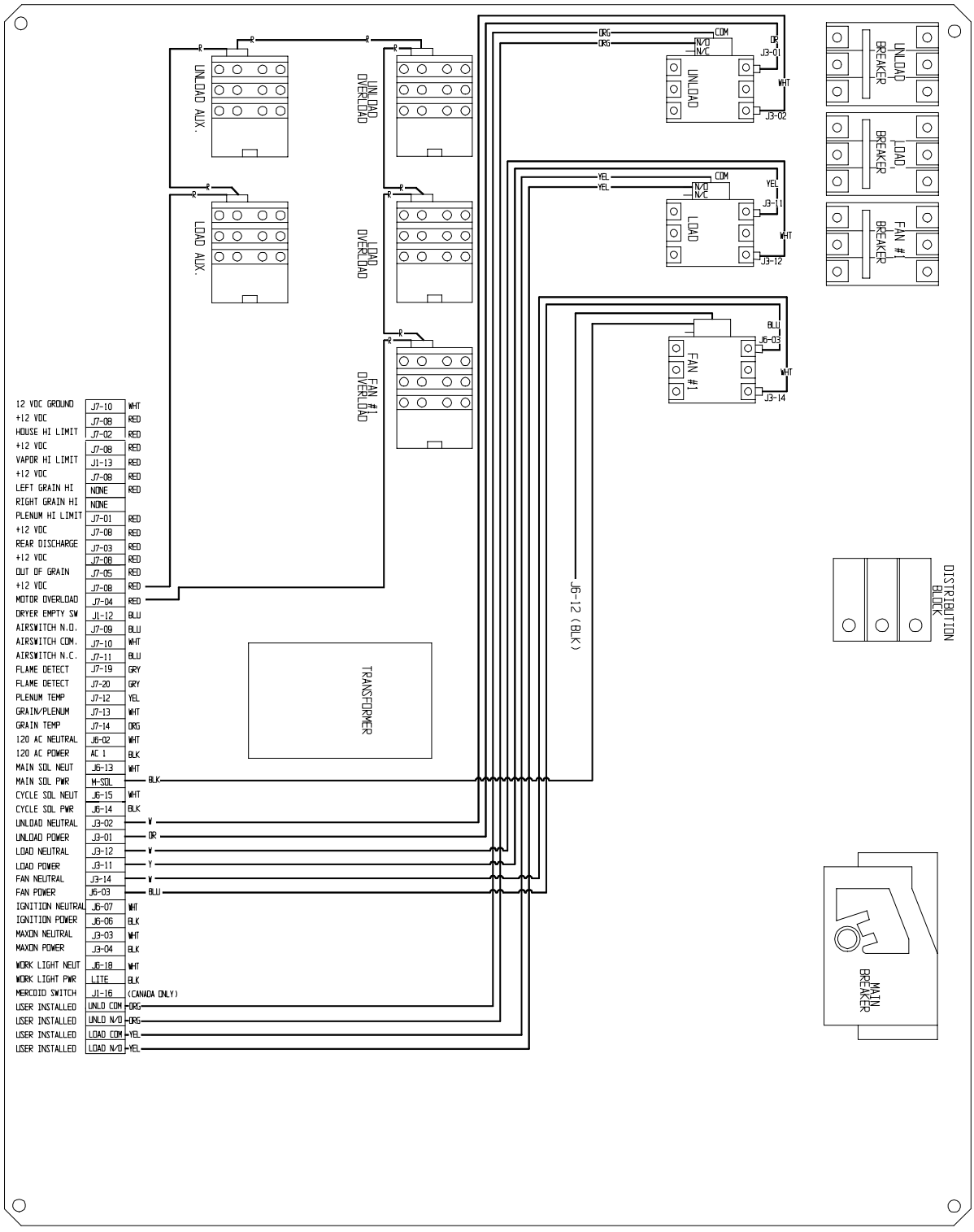
## Competitor Computer Board



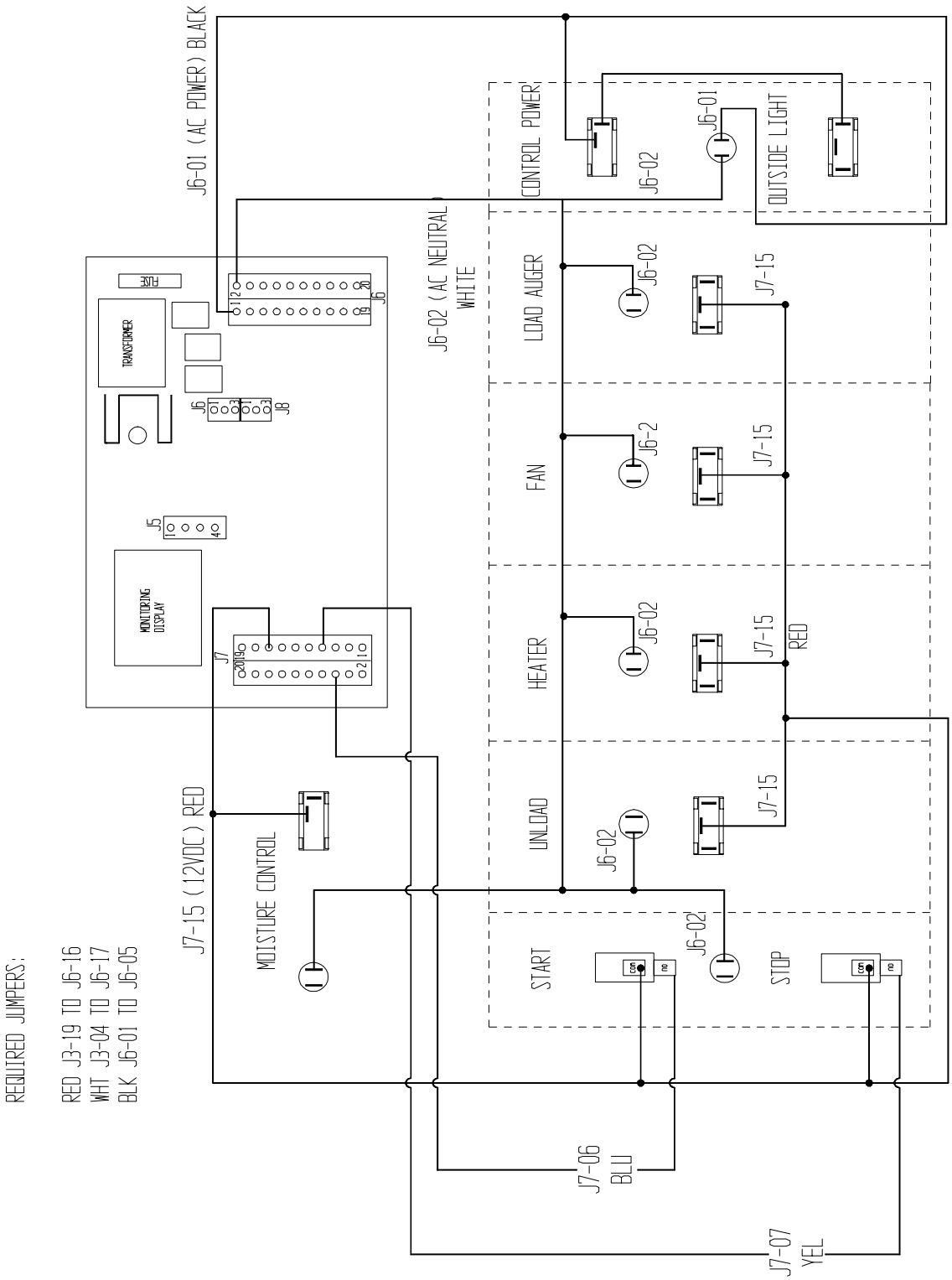
## Input/Output Board



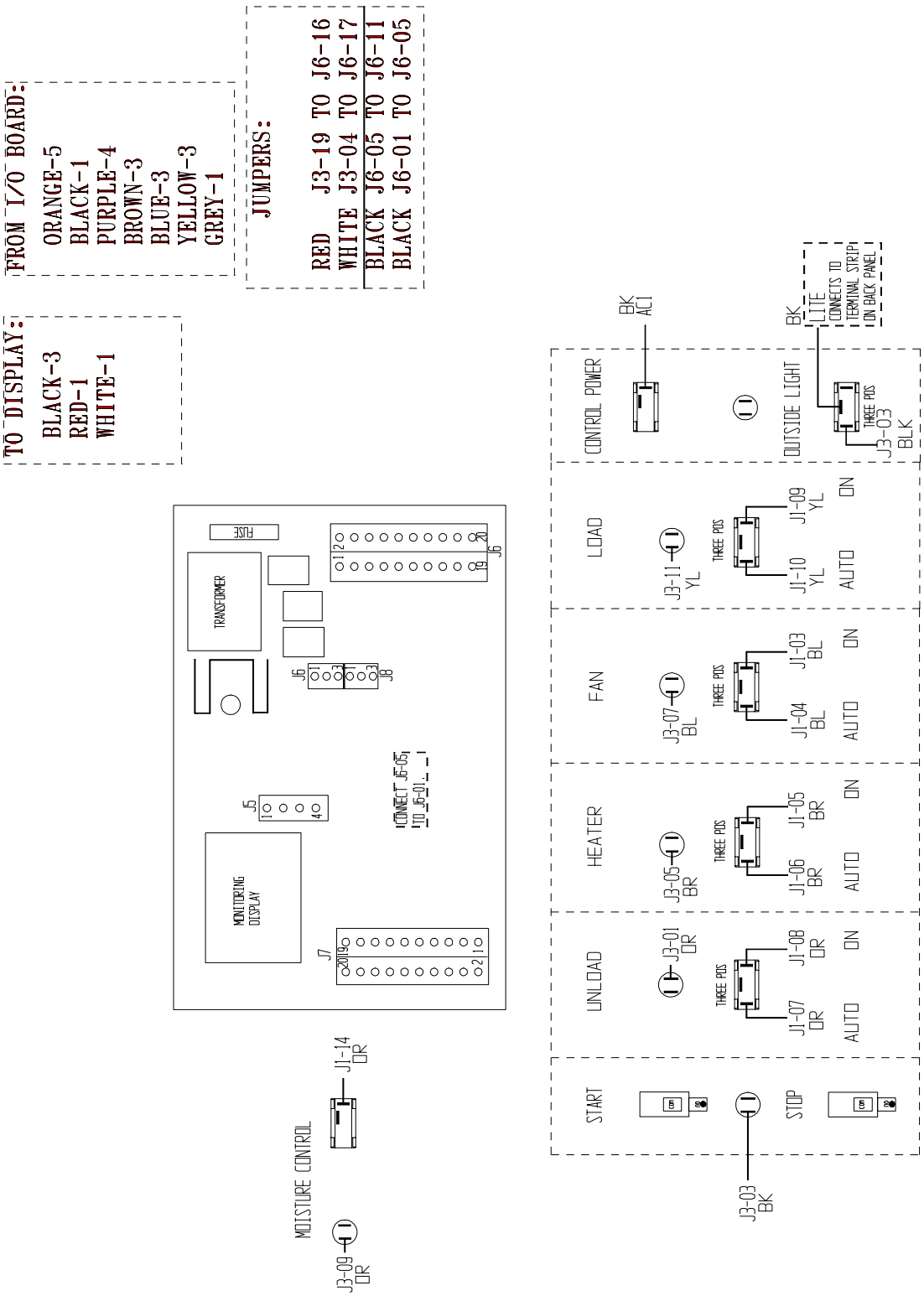
# Competitor Batch Upper External Wiring



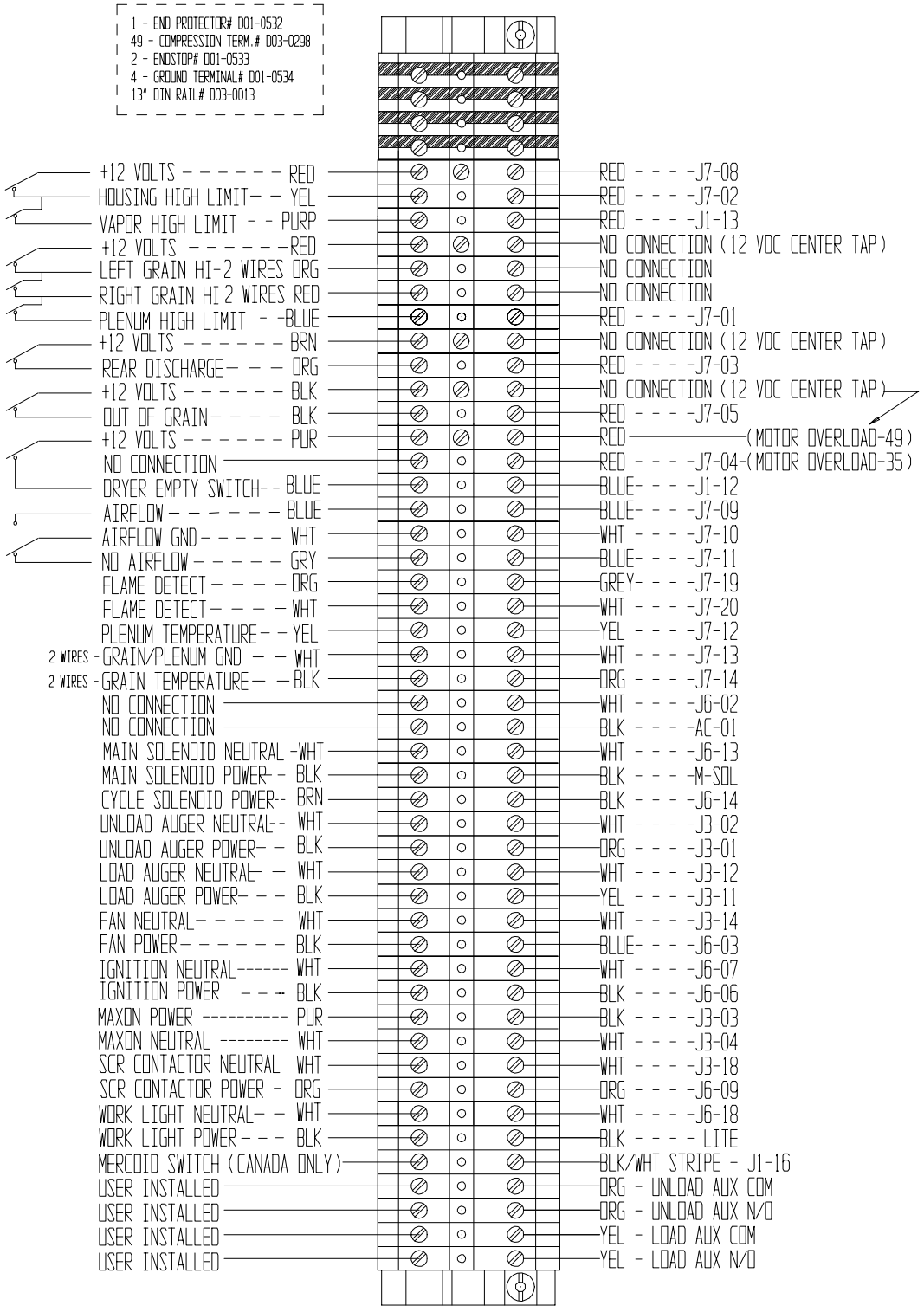
## Competitor Batch Lower Internal Wiring



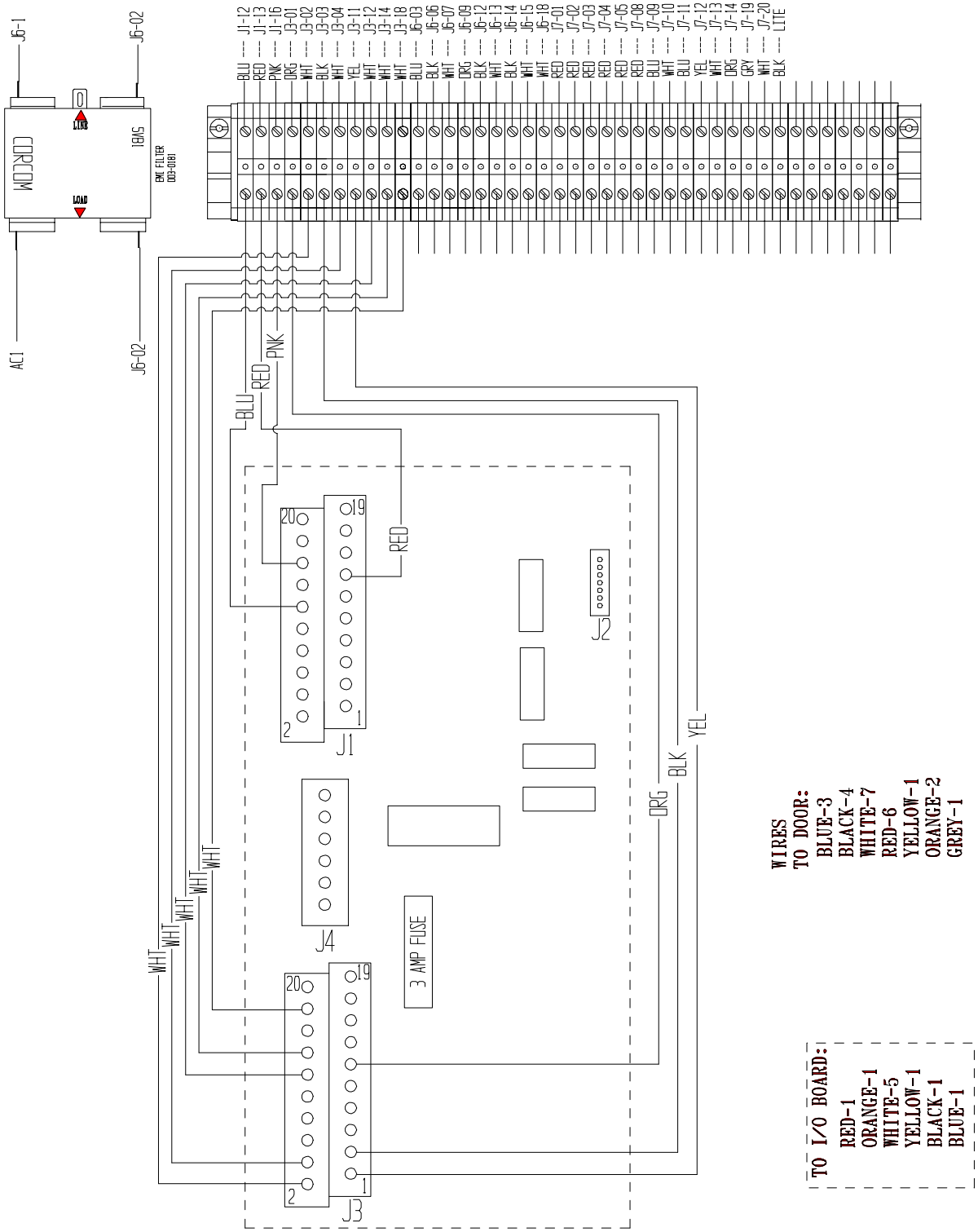
# Competitor Batch Lower External Wiring



# Competitor Batch External Wiring



# Competitor Batch Lower Back Panel Wiring



A multimeter is required for some of the following check-out procedures. Before performing any tests, make certain 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 D. C.
- When checking these circuits, measure voltage be tween the circuit test location and to ground.
- D. C. circuits should be measured between the test location and its respective D. C. ground.

Refer to wiring diagrams and the parts list for identification of parts and the electrical terminals.

**CAUTION: 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 switch light off. | 1. Check that main power and circuit breakers are turned on. Check for tripped breaker.<br>2. Check for blown 5 amp fuses.<br>3. Defective transformer or wiring.<br>4. Check for a defective power switch.<br>5. Check wiring |
| Control power light is on, start button has been pressed, drying mode light off.<br><br>This indicates control power is present at input/output board, but no power is being transferred through the I/O board. | 1. **Power interruption:** Incoming power to the dryer has been interrupted.<br>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.<br>3. **Input/output board:** The input/output board has developed a problem that requires its replacement. |
| No display on LCD screen. | 1. Check for a defective power switch.<br>2. Check wiring between fuses and input/output board.<br>3. 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 will not operate. | 1. **Press the dryer power** start button.<br>2. Refer to the problem listed for load auger, fan heater and unload auger in the following sections. |

| Problem | Possible Cause |
|---|---|
| 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 vaporizor 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. |
| Display shows **" HOUSING HIGH TEMPERATURE"** message. | The temperature high limit located ontop of 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 **"GRAIN DISCHARGE "** message. | The cover on the grain discharge box has opened, indicating that grain is backing up into the discharge box. |
| Display shows **" F IXED GRAIN HIGH TEMPERATURE"** message. | An over temperature condition has occurred inside the right or left side grain column. (This control is a 210°F limit which automatically resets when it cools). |
| 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. 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 **" ERROR 10 '** message. | A shutdown has occurred due to a user installed safety feature. This circuit is located between J1-8 and J1-17 terminals on the input/output board. |
| Display shows **" LOSS OF AIRFLOW"** message. | The air switch contacts have opened, indicating insufficient airflow for burner to operate. |
| Display shows **" AIR "** message. | The air switch contacts have closed prior to the fan starting, indicating a freewheeling blade or improper setting of air switch. |

| Problem | Possible Cause |
|---|---|
| Fan motor will not start. | 1. Check that the fan circuit breaker and the fan switch are on. Also, check for defective switch or bad wiring connections.<br>2. If lighted switch does not light, the air switch needs adjustment, or the bulb may be burned out.<br>3. Verify closing of fan motor contactor. Check voltage on load side of contactor. See appropriate power wiring circuit diagram for terminal numbers. Inspect contactor for defective points or a burned out coil.<br>4. Inspect connections, and check voltage applied to the motor leads in the fan heater box to determine if the motor is defective.<br>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 will not start. | 1. Check that the top auger circuit breaker and the load auger switch are turned on.<br>2. If lighted switch does not light, the output power to the contactor is missing. Check connections, or if the bulb is burned out.<br>3. Check position of the upper auger paddle switch. It must be down to start auger.<br>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.<br>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.<br>6. Inspect connections, and check voltage applied to motor leads in motor junction box to determine if motor is defective.<br>7. Check that the mercury switch box is in the proper position. |
| Bottom auger will not start. | 1. Check that the bottom auger circuit breaker is on.<br>2. If the lighted switch does not light, the output power to the contractor is missing. Check connections, and check to see if the bulb is burned out.<br>3. Check that the unload switch is on (1 or 2 speed).<br>4. Verify closing of bottom auger contactor; check voltage on load side of contactor.<br>5. If using the moisture control, check for proper setting, or defective operation of the control.<br>6. Check for any loose wire connections in unload auger and moisture control thermostat circuits. |
| Grain not moving through columns. | 1. Check the dryer for fine material buildup inside the columns.<br>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. |

| Problem | Possible Cause |
|---|---|
| Grain not moving through columns. | 1. Check the dryer for fine material buildup inside the columns.<br>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.<br>3. Empty the dryer. Keep the dryer clean! Do not allow fine material to gather in the plenum chamber.<br>4. It may be necessary to open the strike off plates in the affected columns in half inch intervals. |
| Uneven drying-Some kernels appear brown while others are under dried.<br><br>Uneven heat exiting from dryer columns. | 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.<br>2. Check for proper burner alignment (side to side). Vibration during shipment may have caused misalignment. |
| Burner will not fire with fan operating. | 1. Burner switch must be on.<br>2. Check for power to ignition board. |
| Heater switch light and gas solenoids go on and off erratically-The light blinks on and off while the solenoids "chatter". | 1. The blinking light indicates the flame sensor is not detecting flame.<br>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 will not fire-No gas pressure with fan operating at least 15 seconds (gas supply or fan heater malfunction). | 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.<br>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).<br>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 will not fire-But gauge shows gas pressure. | 1. Fenwal Ignition Board: Check board for spark by removing ignition wire from board, and holding aninsulated 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.<br>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 hi-fire to off (without going to lo-fire). | 1. Make sure the low flow control valve is not completely closed. Valve must be adjusted open to provide the proper lo-fire gas pressure listed in this manual.<br>2. Check lo-fire solenoid valve for proper operation. |

| Problem | Possible Cause |
|---|---|
| Burner operates-But will not cycle from hi-fire to lo-fire. | 1. Check the gas pressure reading on the gauge. Problem may be due to insufficient gas regulator setting. Temporarily decrease the hi-lo 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.<br>2. Hi-lo fire thermostat control may be defective. If the burner still will not cycle to lo-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.<br>3. If the burner continues to operate on hi-fire, check the hi-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. |
| Burner operates-But will not cycle from lo-fire to hi-fire. | 1. Check for an excessive lo-fire gas pressure setting. Observe pressure setting shown on gauge, and compare reading with recommended low pressure settings listed in this manual. Readjust lo-fire setting on flow control valve, if necessary.<br>2. Check for improperly adjusted or defective hi-lo 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.<br>3. Check for improperly connected or faulty hi-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 hi-fire solenoid valve, or its coil, if defective. |

# NOTES

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