Vision X-Stream Series Dryers

Operators Manual

PNEG-1613
Date: 04-08-14
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1. Introduction

Dryer Operation

Thank you for choosing a GSI Vision X-Stream Series Grain Dryer. These units are among the finest grain dryers ever built; designed to give you excellent operating performance and reliable service for many years.

This manual describes the installation and operation for all standard production model dryers. These dryers are available with liquid propane or natural gas fuel supply, single phase 230 volt, three phase 230 or 460 volt (60 Hz) 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.

Operating Precautions

READ THESE INSTRUCTIONS BEFORE INSTALLATION AND OPERATION
SAVE FOR FUTURE REFERENCE

1. Read and understand the operation manual before attempting to operate the unit.

2. Keep ALL guards, safety decals and safety devices in place. NEVER operate dryer while guards are removed.

3. Keep visitors, children and untrained personnel away from dryer at all times.

4. NEVER attempt to operate the dryer by jumping or otherwise bypassing any safety devices on the unit.

5. Always set the main power supply disconnect switch to OFF and lock it in the OFF position using a padlock before performing any service or maintenance work on the dryer or the auxiliary conveyor equipment.

6. Before attempting to remove and reinstall the fan blade, make certain to read recommended procedure listed within the SERVICING section on Page 67 of the manual.

7. Keep the dryer and wet holding equipment CLEAN. DO NOT allow fine material to accumulate.

8. Set pressure regulator to avoid excessive gas pressure applied to a burner during ignition and when burner is in operation. See Page 30 for operating gas pressures. DO NOT exceed maximum recommended drying temperatures.

9. DO NOT operate the dryer if any gas leak is detected. Shut down and repair before further operation.

10. Clean grain is safer and easier to dry. Fine material can be highly combustible and it also requires removal of extra moisture.

11. Use CAUTION in working around high-speed fans, gas burners, augers and auxiliary conveyors which can START AUTOMATICALLY.
1. Introduction

Operating Precautions (Continued)

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

13. Do not operate in an area where combustible material will be drawn into the fan.

14. The operating and safety recommendations in this manual pertain to the common cereal grains as indicated. When drying any other grain or products, consult the factory for additional recommendations.

15. Routinely check for any developing gas plumbing leaks. Check LP vaporizer for contact with burner vanes.

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 cannot 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 Operating Precautions on Page 5 before attempting to operate the dryer.
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 a hazardous situation which, if not avoided, will result in death or serious injury.

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

CAUTION, used with the safety alert symbol, indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE is used to address practices not related to personal injury.

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.
2. Safety

Emergency Stop Switch

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

**WARNING**

*Pushing the Emergency Stop switch does not interrupt the main power to the upper control box panel.*
The GSI Group, Inc. recommends contacting your local power company and having a representative survey your installation so the wiring is compatible with their system and adequate power is supplied to the 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: 1-217-226-4421

A free replacement will be sent to you.

---

**Decal: DC-1224**

Decal DC-1224 is located in two (2) places on the fan/heater control box. One on the lid and one on the front of the fan heater control box. Another location for this decal is inside the upper control box for the dryer.

**Decal: DC-889**

Decal DC-889 has two (2) locations. One inside the fan/heater control box and another on the dryer upper control box door next to the main power disconnect.
3. Safety Decals

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.

Decal: DC-974

Decal DC-974 has several different locations. Two (2) are located on the front end panel below the fan/heater. Two (2) are located on the rear end panel below the rear access door. Two (2) 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.

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.

Another location for decal DC-971 is on the top of the auger belt guard (one on the belt guard cover and one on the inside belt guard body visible when the belt guard cover is removed).
Decal: DC-973

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

Automatic equipment can start at any time. 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.

Decal: DC-1227

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

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

Decal: DC-1229

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

3. Safety Decals

**Decal: DC-1225**

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

**Decal: DC-388**

Decal DC-388 is located on the hitch tongue.

**Decal: DC-1249**

Decal DC-1249 is located on the hitch tongue.
4. Specifications

Dryer Dimensions

![Diagram of Dryer Dimensions]

**Single Module Transport and Installation Dimensions**

Values are Valid for Transportation of Stack Modules

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<th>Installed Width</th>
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<th>B</th>
<th>C</th>
<th>D</th>
<th>E</th>
<th>F</th>
<th>G</th>
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4. Specifications

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<td>28&quot; 10-13 HP 40&quot; 15 HP</td>
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¹ Actual discharge rate is controlled by meter roll speed adjustment, at 5% to 100% of maximum rate.
² Excludes auxiliary load and unload conveyor equipment.

### 1200S Series Dryer Specifications

<table>
<thead>
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<td>423</td>
<td>470</td>
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<td>Fan</td>
<td>28&quot; 10-13 HP (2)</td>
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<td>8&quot; Dia. 7.5 HP</td>
<td>8&quot; Dia. 5 HP</td>
<td>8&quot; Dia. 10 HP</td>
</tr>
<tr>
<td>Capacity (BHP)</td>
<td>3800</td>
<td>3800</td>
<td>3800</td>
<td>3800</td>
<td>3800</td>
</tr>
<tr>
<td>Bottom Auger</td>
<td>8&quot; Dia. 5 HP</td>
<td>8&quot; Dia. 5 HP</td>
<td>8&quot; Dia. 7.5 HP</td>
<td>8&quot; Dia. 7.5 HP</td>
<td>8&quot; Dia. 10 HP</td>
</tr>
<tr>
<td>Capacity - Maximum Rate¹ (BHP)</td>
<td>1960</td>
<td>2520</td>
<td>2800</td>
<td>3080</td>
<td>3640</td>
</tr>
<tr>
<td>Electrical Load (Fans, Top and Bottom Augers²)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>1 Phase, 220 Volt</td>
<td>142</td>
<td>142</td>
<td>186</td>
<td>186</td>
<td>-</td>
</tr>
<tr>
<td>3 Phase, 220 Volt</td>
<td>93</td>
<td>93</td>
<td>118</td>
<td>118</td>
<td>180</td>
</tr>
<tr>
<td>3 Phase, 220 Volt</td>
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<td>47</td>
<td>60</td>
<td>60</td>
<td>90</td>
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<tr>
<td>3 Phase, 575 Volt</td>
<td>40</td>
<td>33</td>
<td>48</td>
<td>48</td>
<td>72</td>
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<tr>
<td>3 Phase, 380 Volt</td>
<td>50</td>
<td>50</td>
<td>80</td>
<td>80</td>
<td>115</td>
</tr>
</tbody>
</table>

¹ Actual discharge rate is controlled by meter roll speed adjustment, at 5% to 100% of maximum rate.
² Excludes auxiliary load and unload conveyor equipment.
5. Vision Control Panel

Control Power Switch

The control power to energize the Vision Control System is turned ON or OFF with this switch.

NOTE: *This switch does not disconnect the power that is present at the breakers, contactors, transformer(s), fuses or other electrical components found in the upper and lower control boxes. Turn the main disconnect handle to the OFF position prior to servicing any of the installed components.*

Fan Switch

Each 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 operates the fan in staged batch during the dry and cool cycle but the fan will not operate during the unload cycle. The switch will illuminate whenever the air pressure switch is sensing air pressure and the dryer is full of grain.

NOTE: *The bottom fan on the dryer is always Fan 1.*

Heater Switch

Each burner is turned ON or OFF with this switch. The AUTO position operates the burner in staged batch during the dry cycle only. The ON position will operate the burner only when the fan is running. The switch will illuminate only when the flame sensor detects the flame.

NOTE: *The bottom burner on the dryer is always Burner 1.*
5. Vision Control Panel

Load Auger Switch

This is used to select the operation of the fill auger. In both the AUTO and MANUAL positions, 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 load delay is disabled when the Load Auger switch is in the manual position. The switch will light whenever the load auger is operating.

NOTE: If the load auxiliary controls are being used, this switch will also control the operation of the auxiliary equipment.

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 manual position, the meter rolls will operate in 1 speed only. In the AUTO position, the meter rolls switch to a multi-speed mode for moisture control operation. The switch will illuminate whenever the load auger is operating.

NOTE: If the unload auxiliary controls are being used, this switch will also control the operation of the auxiliary equipment.

Outside Light Switch

The dryers outside 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 shut down occurs.

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 Run button and then turning on the desired dryer component.

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. Then, press the Dryer Power Stop button to reset the dryer before restarting.
This section should be read first to familiarize yourself with the vision control computer. The dryer operation section on Page 33 of this manual will refer to instructions.

**Boot Screen**

With the Power switch in the ON position, pushing the Start switch will start the vision computer. The first screen to appear will be the Boot screen. *(See Figure 6A.)* Notice that there are three (3) “buttons” on the Boot screen. The Update/Change Program and Look for New Program on Flash Card buttons are only used for program updates that may be released at a later date. Touching the Start Dryer button will display the Default Operation screen.

![Figure 6A](image)

These two (2) buttons are used to update software. *(See PNEG-1506 Vision programming manual.)*

**Default Operation Screen**

![Figure 6B](image)
6. Vision Touch Screen Display

As you can see the Operation screen is divided into five (5) sections.

1. **Dryer Operation Animation**: Located on the left side of the Operation screen the operation animation shows the status of the fan/heaters, load and unload augers and meter rolls. It will also display the grain temperature, moisture content, M/C set point and bushel counter.

2. **Dryer Status**: Located at the very top of the right side of the Operation screen the dryer status will tell you if the dryer is stopped, started, loading or unloading.

3. **Dryer Status Chart**: Located directly below Dryer Status. This chart will show the grain temperature, moisture in/out, temperature out and Meter Roll Output (M.R.O.) over a period of time.

4. **Plenum(s)**: Located directly below Dryer Status Chart. This will show the plenum temperature set point (SP), actual plenum temperature and burner status.

5. **Setup Buttons**: Located across the bottom of the Operation screen. By touching these buttons the timers, temperature set points, dryer model and moisture control can be set up.

**Select Data Log Sample Time**

Notice the Modify button in the upper left hand side of the Dryer Status Chart. By touching this button the sample time can be changed from 1 minute to 5, 10 or 15 minutes. Select the desired sample time and touch Accept/Exit button to exit. Also notice that the chart can be cleared by selecting the Clear Table button at the bottom.

![Figure 6C](image-url)
Optional Operation Screens

An optional Operation screen can be selected that shows a graph instead of the chart view. (Touching the View button at the bottom of the display will bring up the View Selection window. Notice that you have four (4) selections to choose from.)

1. **Table View:** This is the Default Operation screen. *(See Figure 6C on Page 18.)*

2. **Graph View:** This is the Optional Operation screen. *(See Figure 6E.)*

3. **Owners Manual:** This option is described in greater detail on Page 26.

4. **History:** This option is described in greater detail on Page 27.

5. **System Information:** Touching this button will display the current software version the dryer is running and the time and date.

Touch the Graph View button then touch the Exit button. The Optional Operation screen will appear. Notice that the Dryer Status Chart and the Plenum(s) sections have been replaced by the graph view. *(See Figure 6E.)* You can choose what the graph will display by touching any of the colored buttons under the graph (i.e. Moisture In, Moisture Out, Dryer Temperature, Grain Temperature In, Grain Temperature Out and Meter Rolls). Touching these buttons once will display them on the graph and touching them again will remove them from the graph. The Setup button will bring up the Graph Setup window and allow you to choose the length of time (1, 2, 4 or 8 hours) for the horizontal scale.
Setting the Timers

Setting the timers for the dryer is a simple procedure. To set the timers touch the Timers button at the bottom of Operation screen. A new screen will appear called the Select Timers to Modify screen. (See Figure 6F.) As you can see there are four (4) timers that you can modify.

1. **Load Delay**: (Default setting - 2 minutes) This delay is used to delay the starting of the load auger when the dryer is unloading to prevent the load auger from cycling to often. The load delay is active only when the Load Auger switch in the AUTO position.

2. **Out of Grain (OOG) Timer**: (Default setting - 8 minutes) The OOG timer should be set to the maximum time it takes for the dryer to refill during continuous or batch drying modes. Note that the computer will display the time required to fill the dryer on the previous load operation to aid you in setting an accurate time. If the dryer runs out of grain while the Load Auger switch is in the AUTO position, the OOG timer automatically shuts off the dryer after the period of time preset on the timer.

3. **Fan Delay**: (Default setting - 3 seconds) The Fan Sequence Delay timer controls the amount of time between each fan start-up to reduce the dryer start-up amperage.

4. **Unload Delay**: (Default setting - 1 minute) The Unload Delay timer is used to control the amount of time the unload auger runs after the metering rolls stop to allow the unload auger to clean itself out.
To setup a timer touch, the button of the timer you wish to modify. The Modify Timer Set Point screen will then be displayed. *(See Figure 6G.)* Note that there are two (2) number pads on this Modify screen. The left number pad is used to modify the minutes and the right number pad will modify the seconds. Touching the Default button will automatically set the timer to the default set point for that timer. The Accept button will save the timer set point displayed in the time display. Touching cancel will exit the Modify Timer Set Point screen without saving any changes and the timer will stay at the currently saved set point.

Once you have the timer set points set touching the Exit button at the bottom of the Modify Timer Set Point screen will return you to the Operation screen.

*Figure 6G*
6. Vision Touch Screen Display

Setting the Temperatures

Setting the temperature set points for the dryer is a simple procedure. To adjust the temperature set points touch the Temp button at the bottom of Operation screen. A new screen will appear called the Select Temperature Set Point to Modify screen. As you can see you modify the set point for each of the plenums by touching the desired Plenum button.

**NOTE:** *The bottom plenum is plenum 1 on a two (2) fan dryer.*

![Figure 6H](image)

The plenum temperature set point range is 80°F - 250°F and the current temperature set point for each plenum is displayed next to the corresponding Plenum button.

The grain temperature set point range is 80°F - 150°F and the current temperature set point for the grain temperature is displayed next to the Grain Temperature button.

Modifying a temperature set point is much like setting a timer described on Page 20. Touch the desired button of the set point you wish to change. The Modify Temperature Set Point screen will appear. Enter the desired temperature using the displayed number pad then touch the Accept button. Touching the Exit button at the bottom of the Select Temperature Set Point to Modify screen will return you to the Operators screen.
6. Vision Touch Screen Display

The Setup Screen

The Setup screen will allow you to setup other parameters of the dryer. To use the Setup screen touch the Setup button. The Select Hardware Setup Parameter to Modify screen will now be displayed. As you can see there several different parameters that can be modified on this screen:

1. **Drying Mode**: Touching the Drying Mode button will display the Select Drying Mode window. Touch the desired Drying Mode button (Continuous Flow or Staged Batch). A check mark is displayed next to the currently selected drying mode.

2. **Set Time/Date**: Touching the Set Time/Date button will display the Set Time/Date window. Use the up and down buttons to change each of the parameters for date and time. Touch Accept/Exit to save settings and return to the Select Hardware Parameter To Modify screen.

3. **Dryer Model**: Touching the Dryer Model button will display the Dryer Hardware Setup window. In order for the dryer operate properly the following items must be entered correctly:
   a. Number Fan/Heaters
   b. Load System
   c. Dryer Length (ft.)
   d. Number Modules
   e. Fuel

   Touch the select button until a check mark appears next to the parameter corresponding to the dryer model.

4. **M/C Setup**: The M/C Setup operations are described in greater detail in the dryer operation section on Page 33 of this manual.

5. **Temp Scale**: Touch the Temp Scale button to choose either English units or SI units temperature scales. Depending what temperature scale you now operating in touching this button will display a popup window asking if you want to switch to SI (Celsius, metric tons, etc.,) or English units (Fahrenheit, bushels, etc.).
6. **Vision Touch Screen Display**

6. **Diagnostics:** The Diagnostics operations are described in greater detail in the service section on Page 67 of this manual.

7. **Burner Mode:** Touching the Burner Mode button will display the Select Burner Mode screen. (See Figure 6I.)

   **NOTE:** The bottom fan heater on a two (2) fan dryer is always fan heater one.

   The Select Burner Mode screen will allow the operator to select the type of burner operation for each burner. In the HI/LO mode the burner will switch from high heat to low heat when the plenum temperature set point has been reached. In the ON/OFF mode the burner will shut off when the upper temperature set point has been reached. To select either the HI/LO or ON/OFF modes touch the Select button for the fan heater you wish to change. Touching the All HI/LO button will set all burners to HI/LO mode and touching all ON/OFF will set all burners to ON/OFF mode. Touch the Accept button to save any changes and return to the Setup screen or touch Cancel to return to Setup screen without saving any changes to the burner modes.

8. **Differential:** Touching the Differential button will display the Modify Burner Differential Settings screen. (See Figure 6J.) Adjusting the burner differential settings allows the operator to keep the plenum temperature within a certain range. For example: If you have the temperature set point at 180° and you select ± 3°s as the burner differential, then the burner will switch to low heat at 183° and back to high heat at 177°. To modify a burner differential setting first touch the Plenum button you wish to modify, then select one of the five (5) differential setting button on the right side of the Modify Burner Differential Settings screen. Touch the Accept/Exit button to save settings and return to the Select Hardware Setup Parameter to Modify screen.

![Figure 6J](image-url)
9. **BHP Calibration**: Touching the BHP Calibration button will display the Unload Bushels Setup screen. *(See Figure 6K.)* As you can see the bushel counter can be cleared by touching the CLEAR button. However if the bushel counter is out of calibration it can be calibrated by touching the INCREASE and DECREASE buttons.

Example: If you ran 1000 bushels through the dryer but the bushel counter on the dryer reads 900 bushels then touch the DECREASE button until the calibration reads 90% or if you ran a 1000 bushels and the counter reads 1100 bushels then touch the INCREASE button until the calibration reads 110%.

When you are finished with the calibration or clearing the bushel counter touch the ACCEPT button to return to the Hardware Setup Parameter screen.

10. **Meter Roll Reverse**: Touch the Meter Roll Reverse button to reverse the metering rolls. Reversing the metering rolls aids in cleaning out the fine material that builds up over the course of the drying season. Just touching this button will toggle between normal meter roll operation and reversed meter roll operation.
6. Vision Touch Screen Display

**Viewing the Owners Manuals on the Display Screen**

The operators and parts manuals can be viewed on the display screen. To view a manual touch the View button. When the View Selection window appears touch the Owners Manual button. A new display will appear called an explorer window. *(See Figure 6L.)* The explorer window will show the manuals that are stored in the computer memory. In this case they are PNEG-1403 (2 Fan Vision Parts) and PNEG-1456 (1 and 2 Fan Vision Operators). To select a manual to view you must “double tap” the desired manual icon. Much like double clicking a mouse on the computer. Once selected it may take a few seconds for the manual to be displayed. Once the manual is displayed use the scroll bars on the right to scroll through the pages of the manual. To exit the manual and return to the Operation screen touch the “X” button in the upper right corner of the screen.

![Figure 6L](image-url)
Viewing the Dryer Shut Down History

The dryer will keep track of all safety shut down warnings. To view the Shut down History touch the View button. When the View Selection window appears touch the History button. A new window called shut down History will appear. A list of all shut down warnings are listed. This list can be sorted by: by touching any of the three (3) sort by buttons.

1. Warning
2. Date/Time
3. Node

The whole list can be copied to a USB flash drive and transferred to a personal computer as a text file by touching the Copy To USB Flash Card button. (See Figure 6M.)

![Figure 6M](image)

The list can also be cleared to start a new list by touching the Clear History button.

To return to the Operators screen touch the Exit button.
7. Test Firing

Dryer Pre-Season Checks

This section gives a series of checks to be carried out on the dryer before starting for the first time in the drying season. If any of the checks fail to produce the stated result, you should consult your dealer.

You should not attempt to use the dryer unless all the pre-start checks have been successfully completed.

*WARNING*
*Before attempting to operate the dryer, make sure all safety shields are in place, all bottoms are cleaned out and rear access doors are closed and all personnel are clear of the dryer.*

Inspect the Metering Rolls

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.

Check Control Panel Switches

Before applying electrical power to the dryer, be sure that all switches on the dryer control panel are in the OFF position.

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 power panel.

Control Power Switch

Turn the Control Power switch to ON. At this point the controller will lock out all other dryer functions. Once the Boot screen appears (*See Figure 7C*), touch the Start Dryer button and the dryer will perform a safety circuit check. If a fault is found, the cause will be displayed on the Main screen. If all are found safe, the controller will supply power to the electronic fuel shut-off valve (Maxon), if so equipped and the Start switch will illuminate, indicating that the dryer is ready to be started.

Start Switch

Push the Dryer Start switch and all the selector switches on the control panel will be activated.

Fuel Check

If using LP gas, make sure the tank has plenty of fuel and that the tank *does not* have a regulator mounted on the liquid line. Slowly open the main fuel supply valve at the tank. Then, open the electronic shut off valve (Maxon valve), if so equipped or open the manual shut off valve on the dryer to allow fuel flow to the dryer.

If using natural gas, make sure an adequate supply is available. Turn ON the valve along the supply line. Then, open the electronic shut off valve (Maxon valve). Inspect all gas lines and connections for possible leaks.

*WARNING*
*Any gas leaks must be fixed immediately.*
7. Test Firing

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 eight (8) minutes and then the dryer will shut down leaving the safety shut down message (out of grain warning) displayed. Press the Dryer Power Stop button to reset the panel, then press the Start button.

Unload Auto Operation

To check auto operation place the Unload switch in the AUTO setting. Turn the meter roll dial until the meter rolls start rotating. The bottom auger should rotate counterclockwise as viewed from the drive end. The meter 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.

Unload Manual Operation

To check manual operation move the Unload switch to the MANUAL position. Turn the meter roll dial until the meter rolls start rotating. The bottom auger should rotate counterclockwise as viewed from the drive end. The meter 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.

Meter Roll Operation

To check the meter roll operation turn the knob clockwise and the meter roll speed should increase. Turning the knob counter clockwise will decrease the speed. When the meter rolls are set to maximum (1000) the meter roll speed should be 17.5 RPM for 8” (20 cm) discharge augers. Make sure the drive chain tension is properly adjusted and all sections of the meter rolls rotate. Turn the Unload switch OFF after these checks are complete. The bottom auger will continue to run for 60 seconds (default clean out delay setting) after the switch is turned OFF to allow for clean out.

NOTE: Due to the nature of the DC drive motor used on the meter rolls, it is possible for the brushes inside the motor to become corroded if the dryer has not been operated for several months. This will cause the meter rolls not to function. To fix this problem, use a rubber mallet or a piece of wood to tap the DC drive motor. The shock is usually all the motor needs to start working again. You should not have any more problems with this during the rest of the drying season.

Fan Switches

Momentarily turn each fan switch to ON 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. All power should be switched and locked OFF before attempting to reverse the connections. Reverse the two (2) outside wires, L1 and L3 and leave the middle one in the same position.

NOTE: The bottom fan on the dryer is always referred to as fan 1.
7. Test Firing

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 for that fan. The dryer will shut down after 20 seconds. The safety message, “Ignition Failure Fan #” will appear. Reset the dryer and repeat for the other fan/heater(s).

Burner Test Fire

To perform this test the dryer will need to be full of grain or the air switch need to be disabled. Test fire each burner by starting the fan. Turn ON the fuel supply then, turn the burner switch to ON 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 plenum set point to 200°F (93°C), causing the burner to operate on High-Fire. Observe the gas pressure on the gauge and lower the plenum set point until it causes the burner to cycle into Low-Fire. When the plenum temperature set point is met, the gas pressure should show a noticeable drop, indicating that the cycle solenoid is closed and the burner is being supplied with less gas through the cycle solenoid bypass port. At this time set the High-Fire and Low-Fire pressure settings. Use the pressure regulator (for LP models) or the supply line ball valve (for natural gas models) for High-Fire and the adjustment screw on the cycle solenoid for Low-Fire. (See Figure 7C.) The computer should cycle the burners between high and low, approximately 1 to 3 times per minute.

*Only use pressure required to obtain desired temperature.*

<table>
<thead>
<tr>
<th>Approximate setting should be:</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>LP Gas</td>
<td></td>
</tr>
<tr>
<td>High-Fire 6 - 15 PSI (41 - 102 kPa)</td>
<td></td>
</tr>
<tr>
<td>Low-Fire 2 - 6 PSI (14 - 41 kPa)</td>
<td></td>
</tr>
<tr>
<td>Natural Gas</td>
<td></td>
</tr>
<tr>
<td>High-Fire 6 - 10 PSI (41 - 69 kPa)</td>
<td></td>
</tr>
<tr>
<td>Low-Fire 1 - 3 PSI (7 - 20 kPa)</td>
<td></td>
</tr>
</tbody>
</table>

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 plenum set point. If the burner remains in Low-Fire and does not cycle, slightly decrease gas pressure with the Low-Fire adjustment screw on the cycle solenoid. If the gas pressure is decreased too much a popping or fluttering sound will be heard. This popping and fluttering should not be allowed to continue or damage to the burner will occur. Also, anytime the high pressure side is adjusted, the low pressure side needs to be checked. Repeat the test for each fan/heater unit.
Figure 7A LP Pipe Train

Figure 7B NG Pipe Train
Dryer Shut Down

To shut down the dryer,

1. Close the fuel supply valve at the tank or valve along the fuel line.
2. If the burner is operating, let the dryer run out of fuel and it will shut down automatically due to loss of flame.
3. Close the fuel valve at the dryer and press the Dryer Power Stop button.
4. Turn OFF the control power.
5. 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 Stop button or the Emergency Stop button. This will interrupt power to the control panel and the fan, burner and all augers will stop immediately.
Dryer Start-Up and Operation Full Heat Drying

Full Heat Operation
With this type of drying, the grain is discharged hot, with no cooling. Drying capacity is substantially higher with FULL HEAT than the DRY AND COOL process.

Final Moisture
From 1% to 3% apparent moisture is usually removed in the cooling process, so hot shelled corn is removed from the dryer at about 17% moisture if the final desired moisture content is 15%.

Drying Temperatures

Shelled Corn
For shelled corn with an initial moisture content of 25%-30%, the recommended maximum drying temperature is 220°F-240°F (104°C-116°C) for the top fan and 170°F-190°F (77°C-88°C) for the bottom fan.

Small Grain
For drying small grain (wheat, oats, milo), 150°F (66°C) is suggested.

Soybeans
Drying temperatures are critical in drying rice and soybeans. A temperature of 130°F (54°C) is recommended to keep grain temperature low.

Drying Efficiency
The general rule for obtaining the highest drying efficiency is to use the highest possible drying temperatures which will not adversely affect grain quality.

Dryer Shut Down

Cooling Hot Grain
If the dryer is to be shut down while filled with grain, it is recommended that hot grain be cooled for 10 to 15 minutes, especially in cold weather, to prevent water vapor condensation and possible freezing of such condensate following shut down.

Initial Setup Parameters
Turn the control power switch to ON. When the Boot screen appears touch the Start Dryer button. The computer will run a quick check of the system network after which the Operation screen will appear.

Timer and Delay Settings
Setting the timers for the Vision Dryer is a simple procedure. To set the timers touch the Timers Button at the bottom of Operation screen. A new screen will appear called the Select Timers to Modify screen on Page 21 for instructions on how to set the timer and delays.
8. Dryer Operation - Start-Up

Setting the Temperatures

Setting the temperature set points for the dryer is a simple procedure. To adjust the temperature set points touch the Temp Button at the bottom of Operation screen. A new screen will appear called the Select Temperature Set point to Modify screen on Page 22 for instructions on how to set the temperatures.

Start-Up

Start-Up Procedure

At the beginning of each harvest and before filling the dryer with grain make sure to inspect the dryer for rodent damage, proper belt and chain tension and missing or damaged safety shields. Test operate the dryer using the pre-start check procedures.

1. Before attempting to operate the dryer make sure that all safety shields are in place, all plenum bottom closure panel doors are closed, all rear access doors are closed and all personnel are clear of the grain dryer and grain handling machinery.

2. Turn all selector switches on the control panel to the OFF position.

3. Turn ON the electrical power supply to the dryer and move the safety disconnect handle mounted on the dryer’s upper power box to ON.

4. Turn the Control Power switch to ON. The switch will illuminate. The control computer will boot up. At this point the controller will lock out all other dryer functions. Once the Boot screen appears, touch the Start Dryer button and the dryer will perform its safety circuit checks. If a fault is found the cause will be displayed on the Display screen (Touch screen). If all safeties do not detect a problem the controller will allow the electronic fuel shut off valve (Maxon) to be manually opened, if so equipped. The dryer is ready to be started.

5. Move the Load Auger switch to manual and push the dryer start switch. The top auger will immediately start and the load auger switch will illuminate. If additional loading equipment is wired to the dryer it will also start immediately.

6. When the dryer is full of grain the top auger will stop automatically and any auxiliary loading equipment wired to the dryer will also stop.

The dryer is now ready to begin drying grain. There are three (3) moisture control options to use in the dryer operation:

1. Dryer Operation - Basic Moisture Control on Page 35.


Continuous Flow Drying mode Using Basic Moisture Control

Full Heat - Continuous Flow Operation

This section begins with Step 7 and it is assumed that Step 1 through Step 6 in the start-up procedure described on Page 34 have been completed.

7. Touch the SETUP button at the bottom of the Dryer Operation screen. Once the Hardware Parameter screen is displayed touch the DRYING MODE button. When the Select Drying Mode window appears touch the CONTINUOUS FLOW button to select continuous flow drying mode. Then touch the EXIT button and return to the Hardware Parameter screen. Touch the M/C SETUP button. When the Moisture Control Selection window appears select the BASIC: REGULATION OF GRAIN TEMPERATURE: 2 MR SET POINTS moisture control option. Touch the EXIT button and return to the Dryer Operation screen.

8. Make sure the UNLOAD switch is OFF.

9. 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.

10. The dryer should already be filled with grain. Turn the LOAD AUGER switch to the AUTO position. In both the AUTO and manual positions, the dryer grain level switch will automatically keep the dryer full of grain. In the AUTO position, the dryer will shut down after a preset time period using the out of grain timer.

11. Turn each FAN switch to ON. The fan will start and the switch will illuminate when air pressure is detected.

12. Start each burner by turning the HEATER switch to ON. After purging for approximately 10 seconds the burner will fire and the Heater switch will illuminate. This indicates that the flame sensing circuit is sensing burner flame. For information concerning burner adjustment, see the dryer pre-start checks section on Page 28 of this manual. Set the plenum temperature set points to 180°F.

13. Look in the Drying Charts section starting on Page 52 for the FULL HEAT chart settings that correspond to the model of dryer. You will see the settings for (Initial Moisture) (Moisture Removed) (Approximate Dry Time) (1 Speed) (2 Speed Low) (2 Speed High) pick the line that has the initial starting moisture. These are the settings we will be referring to during this start-up procedure.

14. Run the fan(s) and heater(s) for about 10% longer than the (APPROXIMATE DRYING TIME) required for the moisture you are trying to dry.

15. Take the remaining number of burners to be started, divide that into the total drying time required, working up, start each burner that many minutes apart. Run them about 10% longer than the (APPROXIMATE DRYING TIME) total required for the moisture you are trying to dry.

16. Example: 10% removal would be about 54 minutes, 15% removal would be about 76 minutes and 20% removal would be about 100 minutes. Add 10 minutes to insure that the grain is dry.
17. After the time in Step 14 on Page 35, turn the UNLOAD AUGER switch to MANUAL and set the METER ROLL SPEED, (MANUAL SPEED). To do this push on the Meter Roll Adjustment knob. When the Modify Meter Roll Set Points window appears (See Figure 8A) turn the Meter Roll Adjustment knob until the speed indicator is set to the speed suggested for 1 Speed. Grain should begin to run at this time. Run time for this is about 10% longer than the (APPROXIMATE DRYING TIME) required for the moisture you are trying to dry. This allows the moisture in the dryer to reach an even gradient top to bottom without having any highs or lows in it. It will however, over dry some of the grain.

![Figure 8A](image)

18. Increase the drying temperature to 190°F for single fans or for multiple fan dryers set the heat chambers 30° to 60° apart. Hottest at the top, most cool at the bottom. (See setting the temperatures on Page 22.)

19. DO NOT TRY TO ADJUST THE DRYER FOR MOISTURE DURING THIS PROCESS OR YOU WILL ESTABLISH HIGH AND LOW SWINGS IN THE MOISTURE CONTROL. IT WILL TAKE SEVERAL HOURS TO WORK ITSELF OUT.

20. After the run time in Step 17, you are ready to set up the moisture control. Turn the UNLOAD switch to AUTO. Push the Meter Roll Adjustment knob. When the Modify Meter Roll Set Points window appears (See Figure 8B on Page 37) check that two (2) speed is selected. Set the low speed by pushing the Meter Roll Speed Adjustment knob until the low speed Indicator is red and then turn the knob to the desired low speed setting. When low speed is set push the Meter Roll Adjustment knob until the high speed Indicator is red then turn knob to the desired high speed setting. Touch the Accept/Exit button and return to the Dryer Operation screen.
IMPORTANT: The high speed setting must be a higher value than the low speed.

21. Now that the UNLOAD AUGER switch is in the AUTO position the moisture control is active. Now touch the M/C button at the bottom of the Dryer Operation screen. When the Modify Temperature Set Point window appears set the temperature to about 105°F (See Figure 8C). Let the dryer run on these settings before trying to adjust moisture or meter roll settings. These settings will not have the grain moisture adjusted exactly where you want it, but will be a good place to start initially. A little different moisture at the bottom of the storage bin is not usually a problem as long as you have full floor aeration.

22. After the run time in Step 21, you are ready to adjust the moisture control and the meter roll speeds if required. Each time you make an adjustment to the moisture control it will take about the time shown in the drying charts to see the results of this adjustment. For every 5° change in temperature, moisture will change by 1 point.
8. Dryer Operation - Start-Up

Dry and Cool - Continuous Flow Operation

This section begins with Step 7 and it is assumed that Step 1 through Step 6 in the start-up procedures described on Page 34 have been completed.

7. Touch the SETUP button at the bottom of the Dryer Operation screen. Once the Hardware Parameter screen is displayed touch the DRYING MODE button. When the Select Drying Mode window appears touch the CONTINUOUS FLOW button to select continuous flow drying mode. Then touch the EXIT button and return to the Hardware Parameter screen. Touch the M/C SETUP button. When the Moisture Control Selection window appears select the BASIC: REGULATION OF GRAIN TEMPERATURE: 2 MR SET POINTS moisture control option. Touch the EXIT button and return to the Dryer Operation screen.

8. Make sure the UNLOAD switch is OFF.

9. Open the main fuel supply valve on the tank if using LP gas or open 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.

10. The dryer should already be filled with grain. Turn the LOAD AUGER switch to the AUTO position. In both the AUTO and manual positions, the dryer grain level switch will automatically keep the dryer full of grain. In the AUTO position, the dryer will shut down after a preset time period on the out of grain timer.

11. Turn each FAN switch to ON. The fan will start and the switch will illuminate when air pressure is detected.

12. Start each burner by turning the HEATER switch to ON. After purging for approximately 10 seconds the burner will fire and the heater switch will illuminate. This indicates that the flame sensing circuit is sensing burner flame. For information concerning burner adjustment, see the Dryer pre-start checks section on Page 28 of this manual. Set the plenum temperature set points to 180°F.

13. Look in the drying charts section starting on Page 52 for the DRY AND COOL chart settings that correspond to the model of dryer. You will see the settings for (Initial Moisture) (Moisture Removed) (Approximate Dry Time) (1 Speed) (2 Speed Low) (2 Speed High) pick the line that has the initial starting moisture. These are the settings we will be referring to during this start up procedure.

14. Run the bottom fan(s) and heater(s) (to be used for cooling later) for about 20 minutes. This will start the bottom drying so we can cool it before we begin to discharge grain.

15. Take the remaining number of burners to be started, divide that into the total drying time required, working up, start each burner that many minutes apart. Run them about 10% longer than the (APPROXIMATE DRYING TIME) total required for the moisture you are trying to dry.

16. Example: 10% removal would be about 60 minutes, 15% removal would be about 85 minutes and 20% removal would be about 110 minutes. Add 10 minutes to insure that the grain is dry.

17. 20 minutes before the required drying time is finished turn the bottom heater OFF but let the fan run and cool this section for about. Set the upper plenum thermostats to the decreed temperature (190°F - 230°F).

18. Turn the UNLOAD AUGER switch to MANUAL and set the METER ROLL SPEED, (MANUAL SPEED). To do this push on the Meter Roll Adjustment knob. When the Modify Meter Roll Set Points window appears turn the Meter Roll Adjustment knob until the speed indicator is set to the speed suggested for 1 Speed. (See Figure 6D on Page 39.) Grain should begin to run at this time. Run time for this is about 10% longer than the (APPROXIMATE DRYING TIME) required for the moisture you are trying to dry. This allows the moisture in the dryer to reach an even gradient top to bottom without having any highs or lows in it. It will however, over dry some of the grain a little.
19. DO NOT TRY TO ADJUST THE DRYER FOR MOISTURE DURING THIS PROCESS OR YOU WILL ESTABLISH HIGH AND LOW SWINGS IN THE MOISTURE CONTROL. IT WILL TAKE SEVERAL HOURS TO WORK ITSELF OUT.

20. After the run time in Step 18 you are ready to set up the moisture control. Turn the UNLOAD switch to AUTO. Push the Meter Roll Adjustment knob. When the Modify Meter Roll Set Points window appears check that Two (2) speed is selected (See Figure 8E) Set the low speed by pushing the Meter Roll Speed Adjustment knob until the Low Speed Indicator turns red and then turning the knob to the desired low speed setting. When low speed is set push the Meter Roll Adjustment knob until the High Speed Indicator turns red then turn knob to the desired high speed setting. Touch the ACCEPT/EXIT button and return to the Dryer Operation screen.

**IMPORTANT:** The high speed setting must be a higher value than the low speed.

21. Now that the UNLOAD AUGER switch is in the AUTO position the moisture control is active. Now touch the M/C button at the bottom of the Dryer Operation screen. When the Modify Temperature Set Point window appears set the temperature to about 130°F (See Figure 8E). Let the dryer run on these settings before trying to adjust moisture or meter roll settings. These settings will not have the grain moisture adjusted exactly where you want it, but will be a good place to start initially. A little different moisture at the bottom of the storage bin is not usually a problem as long as you have full floor aeration.

22. After the run time in Step 21 you are ready to adjust the moisture control and the meter roll speeds if required. Each time you make an adjustment to the moisture control it will take about the time shown in drying charts to see the results of this adjustment. For every 5° change in temperature, moisture will change by 1 point.
8. Dryer Operation - Start-Up

Continuous Flow Drying Mode Using Intermediate Moisture Control

Full Heat - Continuous Flow Operation

This section begins with *Step 7* and it is assumed that *Step 1* through *Step 6* in the start-up procedure described *on Page 34* have been completed.

7. Touch the SETUP button at the bottom of the Dryer Operation screen. Once the Hardware Parameter screen is displayed touch the DRYING MODE button. When the Select Drying Mode window appears touch the CONTINUOUS FLOW button to select continuous flow drying mode. Then touch the EXIT button and return to the Hardware Parameter screen.

8. Touch the M/C SETUP button. When the Moisture Control Selection window appears select the INTERMEDIATE: REGULATION OF MOISTURE: 3 Speed moisture control option. Now touch the EXTENDED SETUP button. When the Set Unload Rate Limits window appears set the MAXIMUM Unloading Rate to a value lower than the rated BPH of any auxiliary unloading equipment connected to the dryer. Next set the MINIMUM Unloading Rate. The minimum unloading rate is used so that any auxiliary unloading equipment does run empty. By setting a minimum unloading rate the dryer unloading system will never completely stop. This saves wear and tear on any auxiliary unloading equipment. Once the values have been changed to the desired rate, press the “ACCEPT” button.

---

**Figure 8E**

Intermediate: Regulation of moisture: 3 MR set points button

Extended setup button: touching this button will bring up the SETTING UNLOAD RATE LIMITS window.

Set maximum unload rate

Set minimum unload rate
9. You should now be back in the Moisture Control Selection window. Touch the BIN #/GRAIN TYPE button. When the Storage Parameters window appears select the type of grain that is to be dried and select the storage bin to be used. (The bin number is for reference only and has nothing to do with the control of moisture.) Then touch the EXIT button and return to the Moisture Control Selection window.

10. The printer can also be enabled or disabled by touching the PRINTER SETUP button. After you have made the selection, press the EXIT button to accept and exit.

![Figure 8F](image.png)

11. You will also see a button to calibrate the moisture sensors. Do not calibrate the sensors at this time.

12. Now press the exit button at the bottom of the screen and return to the Dryer Operation screen.

   The setup is almost complete and you are now ready to begin drying using the Intermediate moisture control system. The following steps start the flow of grain through the dryer and finish setting up the moisture control.

13. Make sure the UNLOAD switch is **OFF**.

14. 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.

15. The dryer should already be filled with grain. Turn the LOAD AUGER switch to the **AUTO** position. In both the auto and manual positions, the dryer grain level switch will automatically keep the dryer full of grain. In the AUTO position, the dryer will shut down after a preset time period using the out of grain timer.

16. Look in the Drying Charts section starting **on Page 52** for the FULL HEAT chart settings that correspond to the model of dryer. You will see the settings for (Initial Moisture) (Moisture Removed) (Approximate Dry Time) (1 Speed) (2 Speed Low) (2 Speed High) pick the line that has the initial starting moisture. These are the settings we will be referring to during this start up procedure.

17. Turn each FAN switch to **ON**. The fan will start and the switch will illuminate when air pressure is detected.
8. Dryer Operation - Start-Up

18. Start each burner by turning the HEATER switch to ON. After purging for approximately 10 seconds the burner will fire and the Heater switch will illuminate. This indicates that the flame sensing circuit is sensing burner flame. For information concerning burner adjustment see the dryer pre-start checks section on Page 28 of this manual. Set the plenum temperature set points to 180°F.

19. Run the fan(s) and heater(s) for about 10% longer than the (APPROXIMATE DRYING TIME) required for the moisture you are trying to dry.

20. Example: 10% removal would be about 54 minutes, 15% removal would be about 76 minutes and 20% removal would be about 100 minutes. Add 10 minutes to ensure that the grain is dry.

21. After the time in Step 19, turn the UNLOAD AUGER switch to MANUAL and set the METER ROLL SPEED, (MANUAL SPEED). Remember that Manual is a true Manual operation, with no moisture control. The meter rolls will run at the speed that you select using the Meter Roll Speed Encoder. To do this push on the Meter Roll Adjustment knob. When the Modify Meter Roll Set Points window appears turn the Meter Roll Adjustment knob until the speed indicator is set to the speed suggested for 1 Speed. Grain should begin to run at this time. Run time for this is about 10% longer than the (APPROXIMATE DRYING TIME) required for the moisture you are trying to dry. This allows the moisture in the dryer to reach an even gradient top to bottom without having any highs or lows in it. It will however, over dry some of the grain a little.

22. After the run time in Step 21 begin to test the moisture content with a Moisture Tester you consider to be accurate. Test at least three (3) samples for accuracy. Having determined the average discharge moisture, you may now calibrate the incoming and outgoing moisture sensors on the dryer. To do this you will need to press the SETUP button again and return to the Hardware Parameter screen. Press the M/C SETUP button and then press the CALIBRATE MOISTURE SENSORS button. The Moisture Sensor Calibration window will appear. (See Figure 8H.) Follow the example below to adjust the dryer to the moisture tester.
Example: The moisture tester gives you an average moisture of 17% but the moisture sensor on the dryer is reading 18.3%. You would then calibrate the dryer’s moisture sensor (-1.3%), that would make the moisture screen read 17% the same as the moisture tester.

Figure 8H

23. Once the moisture reading at the discharge is where you want it to be, turn the UNLOAD switch to AUTO.

24. Now that the UNLOAD AUGER switch is in the AUTO position, the INTERMEDIATE MOISTURE CONTROL is active. Now touch the M/C button at the bottom right of the Dryer Operation screen. When the Moisture Set Point window appears set the moisture set point to the output moisture you desire. Let the dryer run on these settings before trying to adjust moisture or meter roll settings.

25. The dryer will immediately switch to the intermediate 3 Speed moisture control. If you press the meter roll knob you will now notice that there are three different meter roll speeds. The computer has automatically set the low and high speed set points to 15% above and below the middle speed. The middle speed is the same as the manual speed that you had entered when staging the grain for the correct exiting moisture content.
8. Dryer Operation - Start-Up

How the Intermediate Moisture Control Works

The controller continuously monitors the moisture coming in and out of the dryer and the column grain temperature at the end of the drying section. However, the control action is based on the dry sensor at the outlet of the dryer. If the moisture coming out of the dryer is not right at the target, the controller will speed up or slow down the unload accordingly. How the meter rolls react depends on the set point and the actual moisture coming out of the dryer. So long as the outgoing moisture is 3 tenths above or below the set point, the meter rolls run on the middle speed. Once the moisture begins to drift from the set point by over 3 tenths above or below the set point, the speed will automatically switch between middle and low or middle and high speed. This is a very fast response and will bring grain back towards the set point quickly.

The controller does not have enough information of the grain in the dryer in the first pass after the dryer is started. It controls the dryer by using the manual speed setting as the starting point. In other words, the manual speed setting is most responsible for the first pass of drying. Therefore, set the manual unloading speed as close as it should be for the grain currently in the dryer before switching to moisture control mode. The manual speed setting does not have to be adjusted after the moisture control is activated.
Continuous Flow Drying Mode Using Advanced Moisture Control

Full Heat - Continuous Flow Operation

This section begins with Step 7 and its is assumed that Step 1 through Step 6 is in the start-up procedure described on Page 34 have been completed.

7. Touch the SETUP button at the bottom of the Dryer Operation screen. Once the Hardware Parameter screen is displayed touch the DRYING MODE button. When the Select Drying Mode window appears touch the CONTINUOUS FLOW button to select continuous flow drying mode. Then touch the EXIT button and return to the Hardware Parameter screen.

8. Touch the M/C SETUP button. When the Moisture Control Selection window appears select OF MOISTURE: VARIABLE MR SPEED moisture control option. Now touch the SETUP button. When the Set Unload Rate Limits window appears set the MAXIMUM Unloading Rate to a value lower than the rated BPH of any auxiliary unloading equipment connected to the dryer. Next set the MINIMUM Unloading Rate. The minimum unloading rate is used so that any auxiliary unloading equipment does run empty. By setting a minimum unloading rate the dryer unloading system will never completely stop. This saves wear and tear on any auxiliary unloading equipment. Once the values have been changed to the desired rate, touch the ACCEPT/EXIT button.

![Figure 8J](image)
9. You should now be back in the Moisture Control Selection window. Touch the BIN #/GRAIN TYPE button. When the Storage Parameters window appears select the type of grain that is to be dried and select the storage bin to be used (the bin number is for reference only and has nothing to do with the control of moisture). Then touch the EXIT button and return to the Moisture Control Selection window.

10. The printer can also be enabled or disabled by touching the PRINTER SETUP button. After you have made the selection, touch the EXIT button to accept and exit.

11. You will also see a button to calibrate the moisture sensors. Do not calibrate the sensors at this time.

![Figure 8K](image-url)

12. Now touch the EXIT button at the bottom of the screen and return to the Dryer Operation screen. The setup is almost complete and you are now ready to begin drying grain using the Advanced moisture control system. The following steps start the flow of grain through the dryer and finish setting up the moisture control.

13. Make sure the UNLOAD switch is OFF.

14. 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.

15. The dryer should already be filled with grain. Turn the LOAD AUGER switch to the AUTO position. In both the AUTO and MANUAL positions, the dryer grain level switch will automatically keep the dryer full of grain. In the AUTO position, the dryer will shut down after a preset time period using the out of grain timer.

16. Look in the Drying Charts section starting on Page 52 for the FULL HEAT chart settings that correspond to the model of dryer. You will see the settings for (Initial Moisture) (Moisture Removed) (Approximate Dry Time) (1 Speed) (2 Speed Low) (2 Speed High) pick the line that has the initial starting moisture. These are the settings we will be referring to during this start up procedure.
17. Turn each FAN switch to ON. The fan will start and the switch will illuminate when air pressure is detected.

18. Start each burner by turning the HEATER switch to ON. After purging for approximately 10 seconds the burner will fire and the Heater switch will illuminate. This indicates that the flame sensing circuit is sensing burner flame. For information concerning burner adjustment see the Dryer pre-start checks section of this manual. Set the plenum temperature set points to 180° F.

19. Run the fan(s) and heater(s) for about 10% longer than the (APPROXIMATE DRYING TIME) required for the moisture you are trying to dry.

   Example: 10% removal would be about 54 minutes, 15% removal would be about 76 minutes and 20% removal would be about 100 minutes. Add 10 minutes to ensure that the grain is dry.

20. After the time in Step 19 turn the UNLOAD AUGER switch to MANUAL and set the METER ROLL SPEED, (MANUAL SPEED). Remember that Manual is a true manual operation, with no moisture control. The meter rolls will run at the speed that you select using the Meter Roll Speed Encoder. To do this push on the Meter Roll Adjustment knob. When the Modify Meter Roll Set Points window appears turn the Meter Roll Adjustment knob until the speed indicator is set to the speed suggested for 1 SPEED. Grain should begin to run at this time. Run time for this is about 10% longer than the (APPROXIMATE DRYING TIME) required for the moisture you are trying to dry. This allows the moisture in the dryer to reach an even gradient top to bottom without having any highs or lows in it. It will however, over dry some of the grain a little.

21. After the run time in Step 20 begin to test the moisture content with a Moisture Tester you consider to be accurate. Test at least three (3) samples for accuracy. Having determined the average discharge moisture, you may now calibrate the incoming and outgoing moisture sensors on the dryer. To do this you need to touch the SETUP button again and return to the Hardware Parameter screen. Touch the M/C SETUP then touch the CALIBRATE SENSORS button. Follow the example below to adjust the dryer to the moisture tester.
Example: The moisture tester gives you an average moisture of 17% but the moisture sensor on the dryer is reading 18.3%. You would then calibrate the dryer's moisture sensor (-1.3%), that would make the moisture sensor read 17% the same as the moisture tester.

Figure 8M

22. Once the moisture reading at the discharge is where you want it to be, turn the UNLOAD switch to AUTO.

23. Now that the UNLOAD AUGER switch is in the AUTO position, the ADVANCED MOISTURE CONTROL is active. Now touch the M/C button at the bottom of the Dryer Operation screen. When the Moisture Set Point window appears set the moisture set point to the output moisture you desire. Let the dryer run on these settings before trying to adjust moisture or meter roll settings.

24. The dryer will run in MANUAL for the first 30 minutes after you turn the AUTO position. This will again make sure that the grain is flowing through the dryer on an even basis. After the 30 minute period the Moisture Control will automatically switch to advanced and take full control of the dryer. There is a count down screen in the upper right hand of the main display that shows the time remaining before the advanced moisture control begins.
8. Dryer Operation - Start-Up

Dry and Cool - Continuous Flow Operation

This section begins with Step 7 and it is assumed that Step 1 through Step 6 is in the start-up procedure described on Page 34 have been completed.

7. Touch the SETUP button at the bottom of the Dryer Operation screen. Once the Hardware Parameter screen is displayed touch the DRYING MODE button. When the Select Drying Mode window appears touch the CONTINUOUS FLOW button to select continuous flow drying mode. Then touch the EXIT button and return to the Hardware Parameter screen.

8. Touch the M/C SETUP button. When the Moisture Control Selection window appears select the ADVANCED: REGULATION OF MOISTURE: VARIABLE MR SPEED moisture control option. Now touch the SETUP button. When the Set Unload Rate Limits window appears set the MAXIMUM Unloading Rate to a value lower than the rated BPH of any auxiliary unloading equipment connected to the dryer. Next set the MINIMUM Unloading Rate. The minimum unloading rate is used so that any auxiliary unloading equipment does run empty. By setting a minimum unloading rate the dryer unloading system will never completely stop. This saves wear and tear on any auxiliary unloading equipment. Once the values have been changed to the desired rate, touch the ACCEPT/EXIT button.

9. You should now be back in the Moisture Control Selection window. Touch the BIN #/GRAIN TYPE button. When the Storage Parameters window appears select the type of grain that is to be dried and select the storage bin to be used. (The bin number is for reference only and has nothing to do with the control of moisture.) Then touch the EXIT button and return to the Moisture Control Selection window.

10. The printer can also be enabled or disabled by touching the PRINTER SETUP button. After you have made the selection, touch the EXIT button to accept and exit.

11. You will also see a button to calibrate the moisture sensors. Do not calibrate the sensors at this time.

12. Now touch the EXIT button at the bottom of the screen and return to the Dryer Operation screen.

The setup is almost complete and you are now ready to begin drying grain using the Advanced moisture control system. The following steps start the flow of grain through the dryer and finish setting up the moisture control.

13. Make sure the UNLOAD switch is OFF.

14. Open the main fuel supply valve on the tank if using LP gas or open 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.

15. The dryer should already be filled with grain. Turn the LOAD AUGER switch to the AUTO position. In both the AUTO and manual positions, the dryer grain level switch will automatically keep the dryer full of grain. In the AUTO position, the dryer will shut down after a preset time period on the out of grain timer.

16. Look in the Drying Charts section starting on Page 52 for the DRY AND COOL chart settings that correspond to the model of dryer. You will see the settings for (Initial Moisture) (Moisture Removed) (Approximate Dry Time) (1 Speed) (2 Speed Low) (2 Speed High) pick the line that has the initial starting moisture. These are the settings we will be referring to during this start up procedure.

17. Run the bottom fan(s) and heater(s) (to be used for cooling later) for about 20 minutes. This will start the bottom drying so we can cool it before we begin to discharge grain.
18. Take the remaining number of burners to be started, divide that into the total drying time required, working up, start each burner that many minutes apart. Run them about 10% longer than the (APPROXIMATE DRYING TIME) total required for the moisture you are trying to dry.

   Example: 10% removal would be about 60 minutes, 15% removal would be about 85 minutes and 20% removal would be about 110 minutes. Add 10 minutes to insure that the grain is dry.

19. 20 minutes before the required drying time is finished turn the bottom heater OFF but let the fan run and cool this section for about. Set the upper plenum thermostats to the decreed temperature (190°F-230°F).

20. Turn the UNLOAD to MANUAL and set the METER ROLL SPEED (MANUAL SPEED). Remember that Manual is a true Manual operation, with no moisture control. The meter rolls will run at the speed that you select using the Meter Roll Speed Encoder. To do this push on the Meter Roll Adjustment knob. When the Modify Meter Roll Set Points window appears turn the Meter Roll Adjustment knob until the speed indicator is set to the speed suggested for 1 SPEED. Grain should begin to run at this time. Run time for this is about 10% longer than the (APPROXIMATE DRYING TIME) required for the moisture you are trying to dry. This allows the moisture in the dryer to reach an even gradient top to bottom without having any highs or lows in it. It will however, over dry some of the grain a little.

21. After the run time in Step 20 begin to test the moisture content with a Moisture Tester you consider to be accurate. Test at least three (3) samples for accuracy. Having determined the average discharge moisture, you may now calibrate the incoming and outgoing moisture sensors on the dryer. To do this you need to touch the SETUP button again and return to the Hardware Parameter screen. Touch the M/C SETUP then touch the CALIBRATE SENSORS button. Follow the example below to adjust the dryer to the moisture tester.

   Example: The moisture tester gives you an average moisture of 17% but the moisture sensor on the dryer is reading 18.3%. You would then calibrate the dryers moisture sensor (-1.3%), that would make the moisture sensor read 17% the same as the moisture tester.

22. Once the moisture reading at the discharge is where you want it to be, turn the UNLOAD switch to AUTO.

23. Now that the UNLOAD AUGER switch is in the AUTO position the ADVANCED MOISTURE CONTROL is active. Now touch the M/C button at the bottom of the Dryer Operation screen. When the Moisture Set Point window appears set the moisture set point to the output moisture you desire. Let the dryer run on these settings before trying to adjust moisture or meter roll settings.

24. The dryer will run in MANUAL for the first 30 minutes after you turn the AUTO position. This will again make sure that the grain is flowing through the dryer on an even basis. After the 30 minute period the Moisture Control will automatically switch to advanced and take full control of the dryer. There is a count down screen in the upper right hand of the main display that shows the time remaining before the advanced moisture control begins.
How the Advanced Moisture Control Works

The controller continuously monitors the moisture coming in and out of the dryer and the column grain temperature at the end of the drying section. However, the control action is mainly based on the dry sensor at the outlet of the dryer. If the moisture coming out of the dryer is not right at the target, the controller will speed up or slow down the unload accordingly. The wet sensor and the column grain temperature sensor are intended to detect moisture spikes coming into the dryer so that the moisture controller can react ahead of time. For example, if the wet sensor detect a jump of moisture coming into the dryer, the controller will start to slow down the unload speed right away. However, the controller does not act to the full scale immediately. Instead, it slows down the dryer gradually so that the grain currently in the dryer would not get overdried.

The controller does not have enough information of the grain in the dryer in the first pass after the dryer is started. It controls the dryer by using the manual speed setting as the starting point. In other words, the manual speed setting is most responsible for the first pass of drying. Therefore, set the manual unloading speed as close as it should be for the grain currently in the dryer before switching to moisture control mode. The manual speed setting does not have to be adjusted after the moisture control is activated.
### 9. Drying Time Tables

#### 1200 Series Continuous Flow Full heat

<table>
<thead>
<tr>
<th>Initial Moisture</th>
<th>Moisture Removed (PTS)</th>
<th>Approximate Dry Time (Min.)</th>
<th>1 Speed</th>
<th>2 Speed Low</th>
<th>2 Speed High</th>
</tr>
</thead>
<tbody>
<tr>
<td>17%</td>
<td>2</td>
<td>16.0</td>
<td>625</td>
<td>317</td>
<td>875</td>
</tr>
<tr>
<td>18%</td>
<td>3</td>
<td>21.0</td>
<td>476</td>
<td>270</td>
<td>775</td>
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## 9. Drying Time Tables

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9. Drying Time Tables

1200S Series Continuous Flow Dry and Cool

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## 1200 Series Staged Batch

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<td>10.0</td>
<td>19%</td>
<td>4</td>
<td>30.0</td>
<td>30.0</td>
<td>18.0</td>
<td>10.0</td>
</tr>
<tr>
<td>31.5</td>
<td>21.5</td>
<td>0</td>
<td>10.0</td>
<td>20%</td>
<td>5</td>
<td>35.0</td>
<td>35.0</td>
<td>18.0</td>
<td>10.0</td>
</tr>
<tr>
<td>37.0</td>
<td>27.0</td>
<td>0</td>
<td>10.0</td>
<td>21%</td>
<td>6</td>
<td>40.0</td>
<td>40.0</td>
<td>18.0</td>
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</tr>
<tr>
<td>41.5</td>
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<td>10.0</td>
<td>22%</td>
<td>7</td>
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<td>10.0</td>
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<tr>
<td>47.0</td>
<td>37.0</td>
<td>0</td>
<td>10.0</td>
<td>23%</td>
<td>8</td>
<td>50.0</td>
<td>50.0</td>
<td>18.0</td>
<td>10.0</td>
</tr>
<tr>
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<td>47.0</td>
<td>0</td>
<td>10.0</td>
<td>24%</td>
<td>9</td>
<td>55.0</td>
<td>55.0</td>
<td>18.0</td>
<td>10.0</td>
</tr>
<tr>
<td>54.0</td>
<td>44.0</td>
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<td>10.0</td>
<td>25%</td>
<td>10</td>
<td>60.0</td>
<td>60.0</td>
<td>18.0</td>
<td>10.0</td>
</tr>
<tr>
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<td>26%</td>
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<td>10.0</td>
</tr>
<tr>
<td>62.0</td>
<td>52.0</td>
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<td>27%</td>
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<td>70.0</td>
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<td>10.0</td>
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<tr>
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<td>0</td>
<td>10.0</td>
<td>29%</td>
<td>14</td>
<td>80.0</td>
<td>80.0</td>
<td>18.0</td>
<td>10.0</td>
</tr>
<tr>
<td>76.0</td>
<td>66.0</td>
<td>0</td>
<td>10.0</td>
<td>30%</td>
<td>15</td>
<td>85.0</td>
<td>85.0</td>
<td>18.0</td>
<td>10.0</td>
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<td>81.0</td>
<td>71.0</td>
<td>0</td>
<td>10.0</td>
<td>31%</td>
<td>16</td>
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<td>18.0</td>
<td>10.0</td>
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<td>86.0</td>
<td>76.0</td>
<td>0</td>
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<td>10.0</td>
</tr>
<tr>
<td>91.0</td>
<td>81.0</td>
<td>0</td>
<td>10.0</td>
<td>33%</td>
<td>18</td>
<td>100.0</td>
<td>100.0</td>
<td>18.0</td>
<td>10.0</td>
</tr>
<tr>
<td>96.0</td>
<td>86.0</td>
<td>0</td>
<td>10.0</td>
<td>34%</td>
<td>19</td>
<td>105.0</td>
<td>105.0</td>
<td>18.0</td>
<td>10.0</td>
</tr>
<tr>
<td>100.0</td>
<td>90.0</td>
<td>0</td>
<td>10.0</td>
<td>35%</td>
<td>20</td>
<td>110.0</td>
<td>110.0</td>
<td>18.0</td>
<td>10.0</td>
</tr>
</tbody>
</table>
Supply Line (LP Shown)

Figure 10A

- Fan/Heater control box
- Left grain High-Limit thermo
- Supply line (liquid) solenoid
- Plenum air pressure switches
- Lower fan/heater (front end of dryer)
- Supply line (liquid) solenoid
- Fan/Heater control box
- Plenum air pressure switches
- Upper fan/heater (rear end of dryer)
LP Fan/Heater Pipe Train

Figure 10B
LP Vaporizer Coil Adjustment

Loosen this bolt to adjust the vaporizer coil.

NG Fan/Heater Pipe Train

Figure 10C

Loosen this bolt to adjust the vaporizer coil.

Figure 10D

Orifice is attached here

Low-fire gas pressure adjustment screw

Pressure gauge

Cycling solenoid valve

Main solenoid valve

Firing valve
NG High-Fire Adjustment

Adjust the high-fire gas pressure at this valve on NG models.
Fan/Heater Control Box

Top Auger Drive

Check top auger drive belt tension after several hours of initial operation. Check periodically thereafter.
Discharge Safety Switch

Figure 10H

Meter Roll Speed Sensor

Figure 10I
Upper Control Box

Figure 10J
10. Illustration

Control Panel (Rear)

Figure 10K

- Display I/O board
- Moisture control printer module (Optional)
- Control panel switches
10. Illustration

Lower Control Box (Back Panel)

Figure 10L

12 Volt power supply

5 Volt power supply

Moisture control board
Before starting any repairs or maintenance on the dryer, observe the following safety steps:

1. Isolate the whole system from the electrical supply by switching OFF the power isolator and locking it.
2. Isolate the dryer from the gas supply by shutting OFF the main gas valve (if necessary lock the valve).
3. Keep the keys in the possession.
4. Augers and drives to augers may be under some degree of tension. Avoid touching these parts with the hands until you are sure that they are free.
5. Do not reconnect the power supply until all work is completed and all guards are correctly refitted.

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 each blade for freedom of rotation and uniform tip clearance. They should also be inspected for dirt and grain dust, especially inside the hub. Any additional weight can seriously effect the balance and result in harmful vibrations and a short bearing life.
3. Check each blade 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 (2) to three (3) seasons. If the unit is operated continuously through most of the year, this service should be performed each year.
5. Remove and clean the gas line strainers. Make certain gas valves are closed and that gas is purged from the system before attempting to disassemble anything.
6. 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.
7. 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 1/4” (3 mm).
8. Inspect flame sensors for possible damage or poor connections. Flame sensor wires must be in good condition.
9. Inspect and manually rotate the top auger paddle assembly. The paddle unit must rotate freely without any indication of sticking or binding.
10. Inspect the top auger and bottom auger drive lines for proper adjustment and condition. Re-adjust line tension as required.
11. 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 tough area. It may adversely affect metal parts.*

12. 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.

13. Make sure all dryer guards and warning decals are securely installed. Make certain guards do not interfere with moving parts. If guards or warning decals are missing, contact your dealer for a free replacement.

14. Test fire the dryer several weeks ahead of the drying season. Check for possible gas leaks. *(See Page 30).*

**NOTE:** *If on site bearing lubrication 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 Procedure

If the motors are equipped with an Alemite fitting, clean the tip of the fitting and 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 5 cm to 8 cm length of grease string into each hole on motors in NEMA frame and smaller. Insert 8 cm to 13 cm length on larger motors. On motors having grease drain plugs, remove plug and operate motor for 20 minutes before replacing drain plug.

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

### Suggested Lubrication Schedules*

<table>
<thead>
<tr>
<th>Hours of Service per Year</th>
<th>HP Range</th>
<th>Kw Range</th>
<th>Suggested Lube Interval</th>
</tr>
</thead>
<tbody>
<tr>
<td>5000</td>
<td>1/8 to 7-1/2</td>
<td>0.1 to 5.6</td>
<td>5 years</td>
</tr>
<tr>
<td></td>
<td>10 to 40</td>
<td>7.5 to 29.8</td>
<td>3 years</td>
</tr>
<tr>
<td></td>
<td>50 to 150</td>
<td>37.3 to 111.9</td>
<td>1 year</td>
</tr>
<tr>
<td>Continuous Normal Applications</td>
<td>1/8 to 7-1/2</td>
<td>0.1 to 5.6</td>
<td>1 year</td>
</tr>
<tr>
<td></td>
<td>10 to 40</td>
<td>7.5 to 29.8</td>
<td>3 years</td>
</tr>
<tr>
<td></td>
<td>50 to 150</td>
<td>37.3 to 111.9</td>
<td>9 years</td>
</tr>
<tr>
<td>Seasonal Service (motor is idle for 6 months or more)</td>
<td>All</td>
<td>All</td>
<td>1 year-beginning of season</td>
</tr>
<tr>
<td>Continuous high ambient temperatures, dirty or moist locations, high vibrations or when shaft gets hot</td>
<td>1/8 to 40</td>
<td>0.1 to 29.8</td>
<td>6 months</td>
</tr>
<tr>
<td></td>
<td>50 to 150</td>
<td>37.3 to 111.9</td>
<td>3 months</td>
</tr>
</tbody>
</table>

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

<table>
<thead>
<tr>
<th>Insulation Class</th>
<th>Consistency</th>
<th>Type</th>
<th>Grease</th>
<th>Frame Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>A and B</td>
<td>Medium</td>
<td>Polyurea</td>
<td>Shell Dolium R</td>
<td>215T and smaller</td>
</tr>
<tr>
<td>A and B</td>
<td>Medium</td>
<td>Polyurea</td>
<td>Shell Dolium R</td>
<td>254 and larger</td>
</tr>
<tr>
<td>F and H</td>
<td>Medium</td>
<td>Polyurea</td>
<td>Shell Dolium R</td>
<td>All</td>
</tr>
</tbody>
</table>

**Fan Blade Removal and Installation**

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

The fan blade is secured to the motor shaft by the use of a taper-lock bushing, motor shaft key and cap screws. The size, quantity and torque of cap screws required will depend on the model of the fan.

*Although the taper-lock method of retaining the blade onto the motor shaft is very simple and obvious, it is essential that the following points be read carefully and fully understood, as improper installation can result in serious or fatal injury caused by a loose, fast flying blade.*

**THREADED BUSHING HOLES:** The threaded holes within the bushing are provided for disassembly purposes only. Do not attempt to use these holes for re-assembly, as they will not allow the parts to become locked onto the shaft, thereby causing an extremely hazardous operating condition.

**CLEARANCE HOLES:** When re-assembling parts, the cap screws must be installed through the UNTAPPED CLEARANCE HOLES to cause the blade to be pulled forward onto the tapered bushing, thus locking the parts securely onto the motor shaft. Refer to Page 72 (under installation section) for assembly details.

**Removing the Fan Blade Assembly**

1. Lock out and tagout the main power to make sure the dryer cannot be started during servicing.
2. Remove the grill guard.
3. If there is a safety washer present, remove the bolt, lock washer and safety washer.
4. Remove the bolts from the unthreaded holes of the bushing. Do not use these bolts for bushing removal.
5. Using an allen wrench, undo the set screw (if present) and remove the key from the keyway.
6. Install grade 5 or stronger bolts into the threaded holes in the bushing and gradually apply torque to each bolt to loosen the bushing.
7. Remove the bushing and fan blade assembly.
11. Service

Installing the Fan Blade Assembly

1. Clean the motor shaft, key, bushing and the bore of the hub with a non-residual cleaner, such as brake parts cleaner or electric parts cleaner. It is important that these mating surfaces be clean and dry and no grease or oil is present. The parts must be assembled dry for maximum friction.

2. Insert bolts into bushing holes and ensure the shoulder portion of the bolt is NOT protruding the hole.

3. Install the fan blade assembly onto the motor shaft.

4. Align the keyway in the bushing with the key and slide the bushing onto the motor shaft.

   **NOTE:** *Do not use excessive force to drive the bushing onto the shaft.*

5. Align bushing and hub keyways with the key. Bushing should be flush with the end of the motor shaft.

6. Loosely install the bolts through the unthreaded holes in the bushing into the threaded holes of the hub.

7. Find the applicable torque for the bushing in the chart *on Page 71*. The bushing type is etched into the face of the bushing.

8. Torque the bushing gradually to evenly seat it inside the hub and onto the motor shaft. Set the torque wrench to 1/3 of the required torque setting and tighten each bolt in a circular pattern three (3) times. Increase the torque setting on the wrench to 2/3 of the required torque and tighten each bolt in a circular pattern three (3) times. Increase the setting on the torque wrench to the final required torque setting and tighten each bolt in a circular pattern three (3) times.

9. If there is a safety washer present, install the washer, lock washer and bolt.

10. Turn the fan blade assembly by hand to make sure there is freedom of movement and uniform clearance around the inlet.

11. Install the grill guard and turn ON the main power source.

12. Operate the fan for 30 minutes.

13. Stop the fan and lock out and tagout the main power to make sure the dryer cannot be started during servicing.

14. Remove the grill guard and re-tighten the bolts in a circular pattern one time at the final required torque setting.

15. Install the grill guard and turn ON the main power source.

---

*CAUTION*

*Do not use any lubricant or thread locking compound during installation. The use of such products will cause improper bolt torque and will crack the fan hub.*
Installing the Fan Blade Assembly (Continued)

Figure 11A Vane Axial Fan

**CAUTION**

Do not exceed the torque specifications listed on the bushing bolt torque chart. Exceeding the recommended torque will crack the fan hub.

<table>
<thead>
<tr>
<th>Bushing</th>
<th>Bolt Thread</th>
<th>Bolt Torque Foot - Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>JA</td>
<td>10-24</td>
<td>5</td>
</tr>
<tr>
<td>G</td>
<td>1/4&quot;-20</td>
<td>6</td>
</tr>
<tr>
<td>H</td>
<td>1/4&quot;-20</td>
<td>6</td>
</tr>
<tr>
<td>SH</td>
<td>1/4&quot;-20</td>
<td>8</td>
</tr>
<tr>
<td>SD</td>
<td>1/4&quot;-20</td>
<td>9</td>
</tr>
<tr>
<td>SDS</td>
<td>1/4&quot;-20</td>
<td>9</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Bushing</th>
<th>Bolt Thread</th>
<th>Bolt Torque Foot - Pounds</th>
</tr>
</thead>
<tbody>
<tr>
<td>P-1</td>
<td>5/16&quot;-18</td>
<td>13</td>
</tr>
<tr>
<td>SK</td>
<td>5/16&quot;-18</td>
<td>15</td>
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<tr>
<td>SF</td>
<td>3/8&quot;-16</td>
<td>23</td>
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<tr>
<td>Q-1</td>
<td>3/8&quot;-16</td>
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</tr>
<tr>
<td>R-1</td>
<td>3/8&quot;-16</td>
<td>29</td>
</tr>
</tbody>
</table>
11. Service

Installing the Fan Blade Assembly (Continued)

![Figure 11B Cutaway Drawing of Typical Propeller Installation](image1)

![Figure 11C Cap Screw Arrangement for Disassembly](image2)

<table>
<thead>
<tr>
<th>Ref #</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Rotation</td>
</tr>
<tr>
<td>B</td>
<td>Propeller</td>
</tr>
<tr>
<td>C</td>
<td>Taper-Lock Bushing</td>
</tr>
<tr>
<td>D</td>
<td>Cap Screw (Grade 5)</td>
</tr>
<tr>
<td>E</td>
<td>Key</td>
</tr>
<tr>
<td>F</td>
<td>Threaded Holes in Bushing</td>
</tr>
<tr>
<td>G</td>
<td>Cap screws installed into threaded holes to force propeller off bushing.</td>
</tr>
<tr>
<td>H</td>
<td>Cap screws installed through clearance holes of bushing. (See text on Page 71 for proper torque.)</td>
</tr>
</tbody>
</table>
Fan Motor Removal

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 owners 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 blade.
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 reassembly.

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 blade in accordance with previous instructions.
11. 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 connector and unscrew the flame sensor out of its mounting bracket.

2. **Gas Solenoid valve coil(s)**: 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.

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 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, reverse the disassembly procedure and check the following:
   a. Make sure all parts are thoroughly cleaned and open.
   b. 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.
   c. Solenoid valves and gas regulations 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.
   d. Make sure all electrical wires are properly connected. Refer to wiring diagram.

Metering Roll Servicing

This dryer is equipped with SCR 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.
Main Controls

1. **SCR Speed Control:** The metering roll speed pots on the front of the control box regulate the speed of the DC motor which drives the metering rolls. The scale of adjustment is from 0 to 999 which represents the flow of grain past the metering rolls as a percent of the maximum grain discharge rate for the dryer.

   **NOTE:** When the control is set to the maximum discharge rate (999), the metering roll speed should be 17.5 RPM for 8" discharge auger.

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

3. **Speed Reducer Gearbox:** 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 tightened as necessary.

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 a programmed amount of time, even after the metering rolls stop. This feature permits the clean out of grain within the unloading equipment at the end of all discharge cycles.

5. If a foreign object becomes lodged in the metering rolls and jams the system, the unloading auger will stay in motion. However, the metering roll drive will stop and the DC motor should stall out. The Vision Control System will shut down the dryer after a 2 minutes period.

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 photo 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 attempt to rotate the roll toward the inside of the dryer. If the metering roll will turn, then repeat for right hand side. If the metering roll will turn, 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.

**CAUTION**

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

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. Shut down the fan/heater and eliminate any other noise when making this check. Once the location is determined, the roll can be reached from inside plenum by opening the access door for the column that has the jam and loosen the two (2) nuts holding the metering roll slide gate high enough to reach in and remove the object causing the jam.
Fan and Heater Generated Errors

The following is a list of errors that are generated with the fan and heater controller. Each fan/heater has its own set of safeties which are listed below. You will need to inspect the controller associated with the error. Example: If you get the warning shown above, touching the HELP button will display the shut down Help window.

Air Switch x Stuck

The air switch contacts have closed prior to the fan starting, indicating a freewheeling blade or improper setting of the air switch. The message will distinguish between which fan caused the shut down. This indicates that 12 VDC has been lost to terminal J4-04 on the Fan/Heater board.
Fan x Loss of Airflow

This error message is displayed when airflow (air pressure) has been established but was lost for some reason. This could happen if while during the dryers operation the grain has settled or shrinkage in the grain columns causing a loss of air pressure in the plenum chamber.

Fan x No Airflow

Contacts in the air switch have never opened due to the fan not turning or the air switch may need adjustment. The message will distinguish between which fan caused the shut down.

Flame Loss x

The flame sensor has failed to detect a burner flame which had been established but was lost for some reason and there is a problem with the flame sensing circuitry or the dryer is not getting burner fuel. The message will distinguish between which burner caused the shut down. The reference to the number one is telling you that it is burner number 1 which is the bottom most fan.

Grain Temp Short x

This error indicates there is a shorted condition with one of the grain temperature sensors located inside the left or right grain columns. This could be a shorted sensor or the sensor wires could be shorted.

Grain x Overheat

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 (99°C) and automatically resets itself when cool. This can be caused from a grain column plugged with trash or the meter rolls may be adjusted to slow. Feel the grain columns to determine which one may be causing the problems. If all the columns are hot to the touch then you will probably need to check the meter roll settings. If not, then examine the column that feels hot, make sure you can see the grain moving down the column screens. For more information on service, see meter roll servicing on Page 74.

Housing x High-Limit

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 (93°C) and must be manually reset. The message will distinguish between which fan housing caused the shut down. The reference to the number one is telling you that it is fan number 1 which is the bottom most fan.

Ignition Failure x

This condition happens during the initial ignition of the burner. If the burner fails to light, check to make sure that the gas has been turned ON and/or the Maxon valve has been turned ON. The reference to the number one is telling you that it is burner number 1 which is the bottom most fan.

Illegal Flame x

This message is displayed when the flame detection circuit of the heater is sensing flame when the burner is supposed to be OFF. Example, if you shut down the dryer and the heater continues to burn due to a solenoid stuck in an open state, it will generate this type of error.
Motor Overload x

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. The message will distinguish between which fan overload caused the shut down. The reference to the number one is telling you that it is fan number 1 which is the bottom most fan.

Vapor x High-Limit

The LP gas vapor temperature sensor located in the gas pipe train downstream from the vaporizer, has opened indicating that the vaporizer is running too hot and must be readjusted. This sensor is set at 200°F (93°C) and automatically resets itself when cool. The message will distinguish between which burner caused the shut down. The reference to the number one is telling you that it is burner number 1 which is the bottom most fan/heater unit, is where the malfunction is located. Try adjusting the vaporizer coils farther away from the burners flame. You may also want to try switching the burner mode from High/Low to ON/OFF, especially on warmer days.

Input/Output Generated Errors

The following is a list of errors that are generated with the Input/Output board located in the upper control box.

Air System Failure

A shut down has occurred due to a air system that was installed with an integral safety switch that was in the unit. The air system safety connections are located in the upper control box on the terminal strip. This can occur if this safety looses 12 VDC to terminal J1-10 on the I/O board. This input is jumpered on the terminal strip when it leaves the factory and is usually installed in the field by a qualified electrician.

Aux Load Overload

The motor overload relay has tripped on the Aux Load Motor circuit located in the upper control box. This can occur if this safety looses 12 VDC to terminal J1-05 on the I/O board. Push the red button on the overload to reset this error. This is caused from the motor operating with to much of a work load, which in turn uses more current (amperage). If the problem reoccurs then check the motor to make sure it is not being overworked. You may need to call an electrician to measure the motors full load amps (FLA).

Aux Unload Overload

The motor overload relay has tripped on the Aux Unload Motor circuit located in the upper control box. This can occur if this safety looses 12 VDC to terminal J1-04 on the I/O board. Push the red button on the overload to reset this error. This is caused from the motor operating with to much of a work load, which in turn uses more current (amperage). If the problem reoccurs then check the motor to make sure it is not being overworked. You may need to call an electrician to measure the motors full load amps (FLA).

Grain Discharge Warning

The lid on the grain discharge box has opened, indicating that either the grain is not being taken away fast enough from the discharge box or the take away auger system connected to the dryer may be causing the problem. This can also occur if this safety looses 12 VDC to terminal J1-08 on the I/O board.
Load Motor Overload

The motor overload has tripped on the Load Motor Overload located in the upper control box. This can occur if this safety looses 12 VDC to terminal J1-03 on the I/O board. Push the red button on the overload to reset this error. This is caused from the motor operating with too much of a work load, which in turn uses more current (amperage). If the problem reoccurs then check the motor to make sure it is not being overworked. You may need to call an electrician to measure the motors full load amps (FLA).

Meter Rolls Failed

If you have the meter roll speed adjustment turned too low (not turning), this will cause this error message. It also could indicate that you have a defective meter roll sensor, the metering roll drive system has failed to turn or broken chain or jammed metering roll is a possibility. This can occur if the input is not receiving a 5 volt pulse on terminal J4-04 on the I/O board.

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 continue to run so it can clean out the remaining grain before shutting down.

Unload Motor Overload

The motor overload has tripped on the Unload Motor Overload located in the upper control box. This indicates that 12 VDC has been lost to terminal J1-02 on the I/O board. Push the red button on the overload to reset this error. This is caused from the motor operating with too much of a work load, which in turn uses more current (amperage). If the problem reoccurs then check the motor to make sure it is not being overworked. You may need to call an electrician to measure the motors full load amps (FLA).

User Safety

A shut down has occurred due to a user installed safety switch that was installed on the dryer. The user installed safety connections are located in the upper control box on the terminal strip. This also indicates that 12 VDC has been lost to terminal J2-01 on the I/O board. This input is jumpered on the terminal strip when it leaves the factory and is usually installed in the field by a qualified electrician.

Master Display Generated Errors

The following is a list of errors that are generated with the Master Display Board located in the lower control box.

Cont-Batch Mode Chng

This error occurs when you switch the dryer mode switch from the Cont. Flow to the Staged Batch position while the dryer is running in the Continuous Flow Mode. To avoid this shut down, stop the dryer before switching modes. Press Stop to clear the error.

Network Failed FH x

This error is generated whenever Fan/Heater board has lost its communications link with the Input/Output board (upper control panel) and the Master Display board (lower control panel). Check the ethernet cable jacks to make sure they are plugged in tightly. An ethernet cable is a computer communication cable that looks like the phone cable in the home. (See Page 80.) The reference to the number one (FH1) is telling you that it is fan number 1 which is the bottom most fan.
11. Service

Network Failed I/O
This error is generated whenever Input/Output board (upper control panel) has lost its communications link with the master (lower control panel door) and the fan/heater boards. Check the ethernet cable jacks to make sure they are plugged in tightly. There are three (3) LED lights next to this plug, one indicates power and the other two (2) indicate data being transmitted. These two (2) labeled RXD and TXD, should be flashing randomly back and forth indicating network activity.

![Network Failed I/O](image)

**Figure 11G**

Network Failed Mast
This error is generated whenever Master Display board (lower control panel) has lost its communications link with the Input/Output board (upper control panel door) and the fan/heater boards. Check the ethernet cable jacks to make sure they are plugged in tightly.

Network Failed 01 MC Failure
This error is generated whenever the Master Display (lower control panel, rear) has lost its communication link with the Moisture Control board (lower control box back panel). Check the ethernet cable jacks to make sure they are plugged in tightly. If the ethernet cables are plugged in and does not seem to be the problem, then the Moisture Control board can be temporarily bypassed by disconnecting power to the Moisture Control board and running the dryer in Temperature Control mode or Manually. To disconnect power to the Moisture Control board just pull the terminal plug on the M/C board that has wires J1-1 and J1-2 which are the 12VDC power and Power Supply ground.

Plenum Temp Open x
This error indicates there is a open condition with the plenum temperature sensor located inside the plenum chamber. This could be a open sensor or the sensor wires could have a open connection.

Plenum Temp Short x
This error indicates there is a shorted condition with the plenum temperature sensor located inside the plenum chamber. This could be a shorted sensor or the sensor wires could be shorted.

Plenum x Overheat
An over temperature condition has occurred inside the dryer plenum. This control is a 300°F (149°C) limit and automatically resets itself when cool. The message will distinguish between which plenum caused the shut down.
GSI Group, LLC Limited Warranty

The GSI Group, LLC ("GSI") warrants products which it manufactures to be free of defects in materials and workmanship under normal usage and conditions for a period of 12 months after sale to the original end-user or if a foreign sale, 14 months from arrival at port of discharge, whichever is earlier. The end-user’s sole remedy (and GSI’s only obligation) is to repair or replace, at GSI’s option and expense, products that in GSI’s judgment, contain a material defect in materials or workmanship. Expenses incurred by or on behalf of the end-user without prior written authorization from the GSI Warranty Group shall be the sole responsibility of the end-user.

Warranty Extensions:

The Limited Warranty period is extended for the following products:

<table>
<thead>
<tr>
<th>Product</th>
<th>Warranty Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>AP Fans and Flooring</td>
<td></td>
</tr>
<tr>
<td>Performer Series Direct Drive Fan Motor</td>
<td>3 Years *</td>
</tr>
<tr>
<td>All Fiberglass Housings</td>
<td>Lifetime</td>
</tr>
<tr>
<td>All Fiberglass Propellers</td>
<td>Lifetime</td>
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<tr>
<td>AP and Cumberland</td>
<td></td>
</tr>
<tr>
<td>Flex-Flo/Pan Feeding System Motors</td>
<td>2 Years</td>
</tr>
<tr>
<td>Cumberland Feeding/Watering Systems</td>
<td></td>
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<tr>
<td>Feeder System Pan Assemblies</td>
<td>5 Years **</td>
</tr>
<tr>
<td>Feed Tubes (1-3/4&quot; and 2.00&quot;)</td>
<td>10 Years *</td>
</tr>
<tr>
<td>Centerless Augers</td>
<td>10 Years *</td>
</tr>
<tr>
<td>Watering Nipples</td>
<td>10 Years *</td>
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<tr>
<td>Grain Systems</td>
<td></td>
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<tr>
<td>Grain Bin Structural Design</td>
<td>5 Years</td>
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<tr>
<td>Grain Systems Farm Fans Zimmerman</td>
<td></td>
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<tr>
<td>Portable and Tower Dryers</td>
<td>2 Years</td>
</tr>
<tr>
<td>Portable and Tower Dryer Frames and Internal Infrastructure †</td>
<td>5 Years</td>
</tr>
</tbody>
</table>

GSI further warrants that the portable and tower dryer frame and basket, excluding all auger and auger drive components, shall be free from defects in materials for a period of time beginning on the twelfth (12th) month from the date of purchase and continuing until the sixtieth (60th) month from the date of purchase (extended warranty period). During the extended warranty period, GSI will replace the frame or basket components that prove to be defective under normal conditions of use without charge, excluding the labor, transportation, and/or shipping costs incurred in the performance of this extended warranty.

Conditions and Limitations:

THERE ARE NO WARRANTIES THAT EXTEND BEYOND THE LIMITED WARRANTY DESCRIPTION SET FORTH ABOVE. SPECIFICALLY, GSI MAKES NO FURTHER WARRANTY OF ANY KIND, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE OR USE IN CONNECTION WITH: (I) PRODUCT MANUFACTURED OR SOLD BY GSI OR (II) ANY ADVICE, INSTRUCTION, RECOMMENDATION OR SUGGESTION PROVIDED BY AN AGENT, REPRESENTATIVE OR EMPLOYEE OF GSI REGARDING OR RELATED TO THE CONFIGURATION, INSTALLATION, LAYOUT, SUITABILITY FOR A PARTICULAR PURPOSE, OR DESIGN OF SUCH PRODUCTS.

GSI shall not be liable for any direct, indirect, incidental or consequential damages, including, without limitation, loss of anticipated profits or benefits. The sole and exclusive remedy is set forth in the Limited Warranty, which shall not exceed the amount paid for the product purchased. This warranty is not transferable and applies only to the original end-user. GSI shall have no obligation or responsibility for any representations or warranties made by or on behalf of any dealer, agent or distributor.

GSI assumes no responsibility for claims resulting from construction defects or unauthorized modifications to products which it manufactured. Modifications to products not specifically delineated in the manual accompanying the equipment at initial sale will void the Limited Warranty.

This Limited Warranty shall not extend to products or parts which have been damaged by negligent use, misuse, alteration, accident or which have been improperly/inadequately maintained. This Limited Warranty extends solely to products manufactured by GSI.

Prior to installation, the end-user has the responsibility to comply with federal, state and local codes which 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.