Pre-Series 2000 Autoflow Operation Manual

PNEG-804

a division of

THE GSI GROUP

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Roof Damage Warning and Disclaimer

GSI DOES NOT WARRANT ANY ROOF DAMAGE CAUSED BY EXCESSIVE VACUUM OR INTERNAL PRESSURE FROM FANS OR OTHER AIR MOVING SYSTEMS. ADEQUATE VENTILATION AND/OR "MAKEUP AIR" DEVICES SHOULD BE PROVIDED FOR ALL POWERED AIR HANDLING SYSTEMS. GSI DOES NOT RECOMMEND THE USE OF DOWNWARD FLOW SYSTEMS (SUCTION). SEVERE ROOF DAMAGE CAN RESULT FROM ANY BLOCKAGE OF AIR PASSAGES. RUNNING FANS DURING HIGH HUMIDITY/COLD WEATHER CONDITIONS CAN CAUSE AIR EXHAUST OR INTAKE PORTS TO FREEZE.

Fan/Heater Installation & Operating Instructions

Thank you for choosing a Top Dry Series Autoflow. It is designed to give excellent performance and service for many years.

This manual describes the operation of all standard production Top Dry single fan, multi-fan and Heater Control units. Different models are available for liquid propane or natural gas fuel supply, with either single-phase 230 volt, or three-phase 208, 220, 380, 460 or 575 volt electrical power.

The principal concern of The GSI Group, Inc. ("GSI") is your safety and the safety of others associated with grain handling equipment. This manual is written to help you understand safe operating procedures and some of the problems that may be encountered by the operator or other personnel.

As owner and/or operator, it is your responsibility to know what requirements, hazards and precautions exist, and to inform all personnel associated with the equipment or who are in the fan area. Avoid any alterations to the equipment. Such alterations may produce a very dangerous situation, where serious injury or death may occur.

All personnel that may come into contact with the equipment should read the manual and sign-off on the sheet on page 8.

Safety Alert Symbol

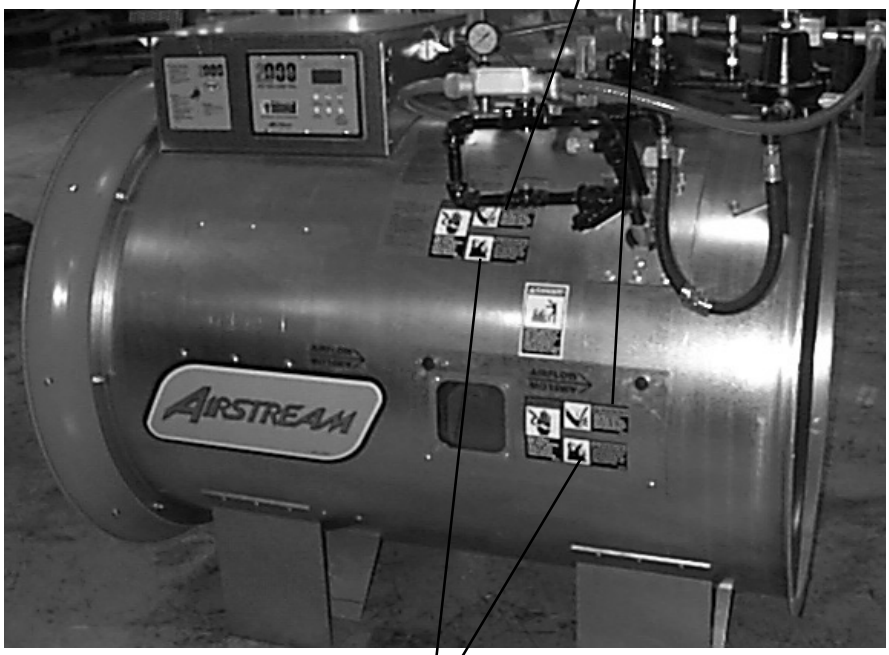
The symbol shown is used to call your attention to instructions concerning your personal safety. Watch for this symbol; it points out important safety precautions. It means "ATTENTION", "WARNING", "CAUTION", and "DANGER". Read the message and be cautious to the possibility of personal injury or death.

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.

SAFETY/DECAL PLACEMENT

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 your unit.

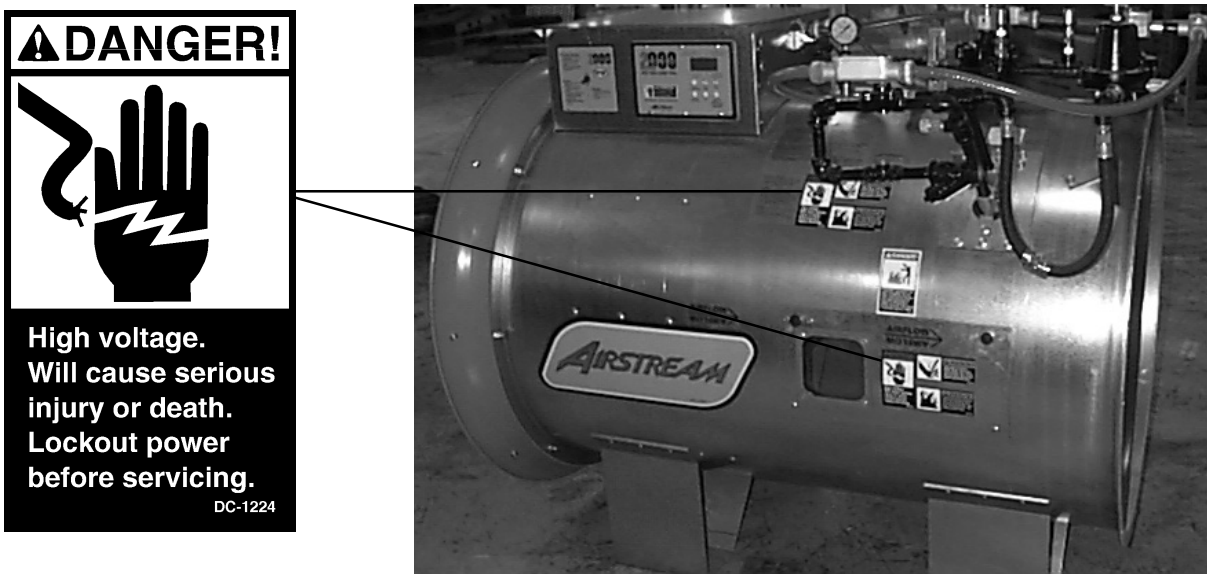
Safety decals should be read and understood by all people in the grain handling area. The rotating blade, fire warning decals and voltage danger decal must be displayed on the fan can. The bottom right decal should be present on the inside bin door cover of the two-ring door, 24" porthole door cover and the roof manway cover.

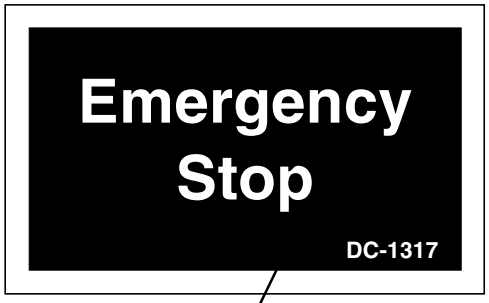


If a decal is damaged or is missing,contact:

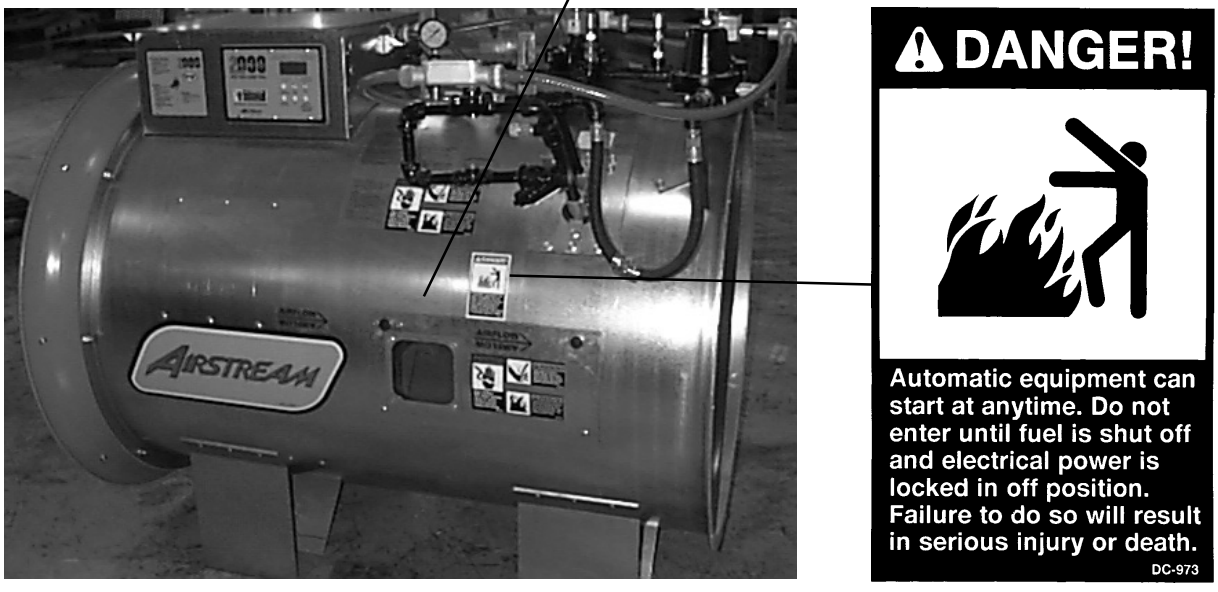
The GSI Group Inc.
1004 E. Illinois St.
Assumption, IL 62510
217-226-4421

A free replacement will be sent to you.





Emergency Stop sticker will be placed above the panel door



Read These Instructions Before Operation And Service Save For Future Reference

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

2. Power supply should be OFF for service of electrical components. Use CAUTION in checking voltage or other procedures requiring power to be ON.

3. Check for gas leaks at all gas pipe connections. If any leaks are detected, do not operate the dryer. Shut down and repair before further operation.

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

5. Set pressure regulator to avoid excessive gas pressure applied to burner during ignition and when burner is in operation. Do not exceed maximum recommended drying temperature.

6. Keep the dryer clean. Do not allow fine material to accumulate in the plenum or drying chamber.

7. Use CAUTION in working around high speed fans, gas burners, augers and auxiliary conveyors which START AUTOMATICALLY.

8. Do not operate in any area where combustible material will be drawn into the fan.

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

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

This product is intended for the use of grain handling only. Any other use is considered a misuse of the product.

Use Caution in the Operation of this Equipment

The design and manufacture of this dryer is directed toward operator safety.

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

KEEP THE DRYER CLEAN
DO NOT ALLOW FINE
MATERIAL TO ACCUMULATE
IN THE PLENUM CHAMBER
OR SURROUNDING THE
OUTSIDE OF THE DRYER

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

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

This product has sharp edges! These sharp edges may cause serious injury. To avoid injury handle sharp edges with caution and use proper protective clothing and equipment at all times.

Date	Employer's Signature	Employee

All personnel that may come into contact with the equipment should read this manual and sign-off on the sheet.

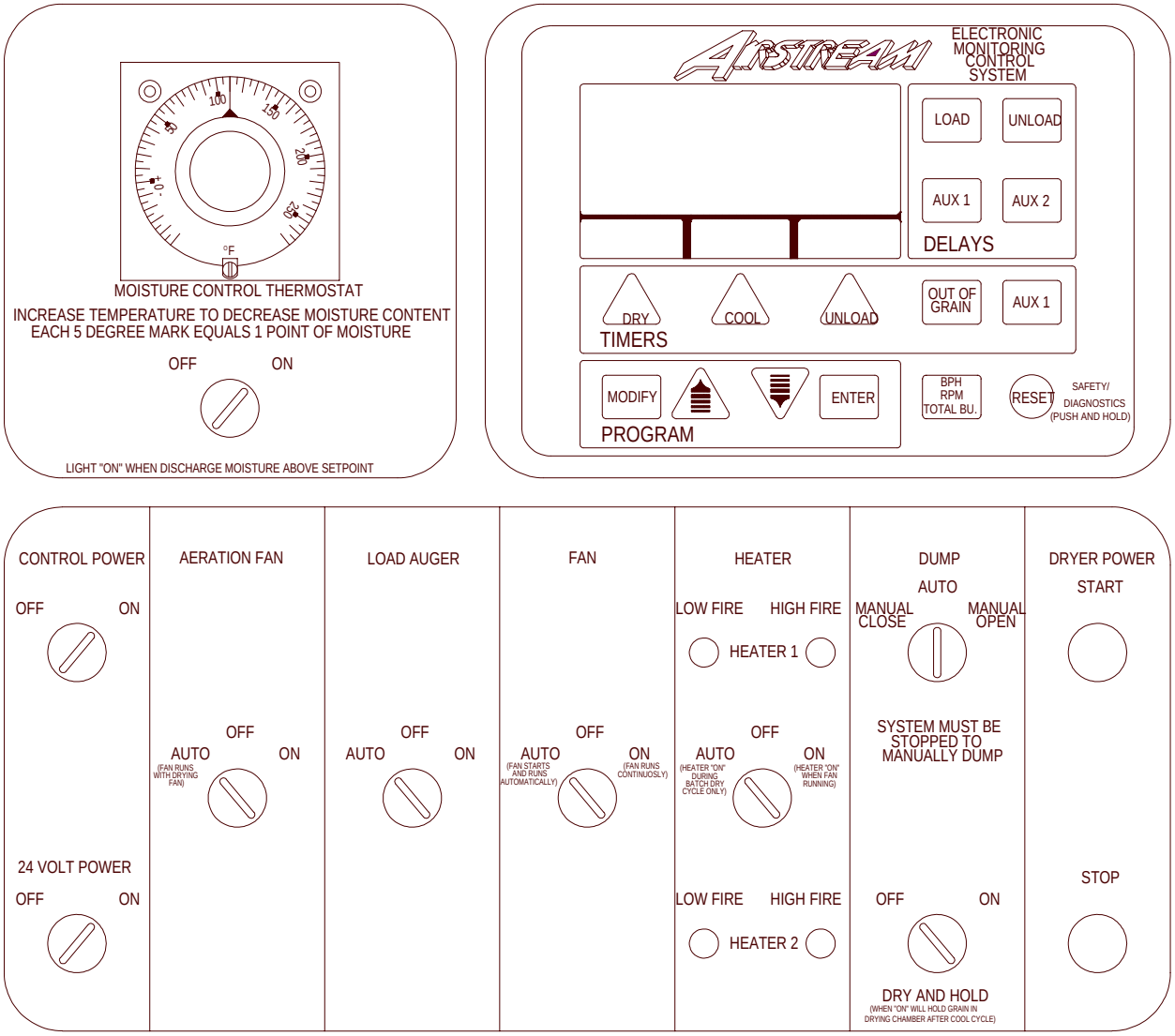
Power Supply

An adequate power supply and proper wiring are important factors for maximum performance and long life of the dryer. Electrical service must be adequate enough to prevent low-voltage damage to motors and control circuits.

Transformer and Wiring Voltage Drop

It is necessary to know the distance from the unit to the available transformer, and the horsepower of your fan unit. Advise the service representative of your local power supplier that an additional load will be placed on the line. Each fan motor should be wired through a fuse or circuit breaker disconnect switch. Check on KVA rating of transformers, considering total horsepower load. The power supply wiring, main switch equipment and transformers must provide adequate motor starting and operating voltage. Voltage drop during motor starting should not exceed 14% of normal voltage, and after motor is running at full speed, it should be within 8% of normal voltage. Check Electrical Load Information for HP ratings and maximum amp loads to properly size wire and fusing elements. Standard electrical safety practices and codes should be used. (Refer to National Electrical Code Standard Handbook by National Fire Protection Association).

Electronic Monitoring Control System



Dryer Control Panel Featuring the Electronic Monitoring Control System

The control panel provides easy access to gauges and controls, and the illuminated switches provide a quick reference for every operating function. The patent pending Electronic Monitoring Control System is a computerized control system that gives instant information regarding dryer operation.

Moisture Control Thermostat

This electronic thermostat controls the moisture level of discharged grain by sensing grain column temperature using the four (4) RTD temperature sensors located in the drying chamber. The moisture control thermostat indicates the current grain temperature in the drying chamber with LEDs. The grain temperature setpoint is set on the moisture control thermostat. In the Autoflow mode, when the grain temperature reaches the grain temperature setpoint, and the dry timer has reached zero, the dryer will dump the third driest portion of grain from the drying chamber into the storage chamber. In the Autobatch mode the dryer will dump all of the grain into the storage chamber.

Moisture Control Switch

This switch turns the power on or off to the moisture control thermostat. When placed in the "on" position, the dryer will not enter the dump cycle until the grain temperature has reached the grain temperature setpoint on the moisture control thermostat and the dry timer has reached zero. When placed in the "on" position, the moisture control switch lights up when the grain temperature is below the grain temperature set point on the moisture control thermostat. When placed in the "off" position, the dryer ignores the grain temperature and operates strictly off the dry timer. When placed in the "off" position, the moisture control switch does not light up.

Control Power Switch

The power to the Electronic Monitoring Control System is turned on or off with the control power switch. The switch lights up when placed in the "on" position. If the switch is placed in the "on" position, and the light does not light up, make sure that the emergency stop switches located on the Autoflow control box is pulled out.

24-Volt Power Switch

This switch turns the power on or off to the actuator control box. The switch lights up when placed in the "on" position. If the switch is placed in the "on" position, and the light does not light up, make sure that the emergency stop switch located on the actuator control box is pulled out (1997 model only).

Aeration Fan Switch

This switch controls the operation of the aeration fan located at the bottom of the bin. The switch lights up when the aeration fan comes on. When placed in the "auto" position, the aeration fan starts and stops with the main drying fans. When placed in the "off" position, the aeration fan will not run. When placed in the "on" position, the aeration fan comes on when the dryer is running.

Load Auger Switch

This switch controls the operation of the fill system(s) that load grain into the drying chamber. The switch lights up when the fill system(s) are running. When placed in the "auto" position, the fill system(s) start and stop automatically depending on the level of grain relative to the drying chamber high level rotary switch. When operating in the Autobatch mode, the fill system(s) will shut off 2/3 (two-thirds) of the way through the dry cycle, even if grain has not reached the drying chamber high level rotary switch. When placed in the "off" position ,the fill system(s) will not run. When placed in the "on" position, the fill system(s) come on and stay on when the dryer is running.

Fan Switch

This switch controls the operation of the main drying fan(s). The switch lights up when the airswitch located in the sidewall next to the master drying fan

Dryer Control Panel, continued

senses an increase in static pressure and closes. In the Autoflow mode, when placed in the "auto" position, the main drying fan(s) start when grain reaches the drying chamber low level rotary switch and do not stop until the dryer shuts down or is stopped manually by pressing the stop switch. In the Autobatch mode the drying fan(s) will not run. When placed in the "on" position, the main drying fan(s) come on and stay on when the dryer is running.

Heater Switch

This switch controls the operation of the burner(s). The switch lights up when the burner is on. When the burner is on, small lights above and below the heater switch indicate if the burner(s) are in high fire or low fire. In the Autoflow mode, when placed in the "auto" position, the burner(s) fire when grain reaches the drying chamber low level rotary switch and do not stop until the dryer shuts down or is stopped manually by pressing the stop switch. In the Autobatch mode, the burner(s) shut off automatically in the cool and dump cycle. When placed in the "off" position, the burner(s) will not fire. When placed in the "on" position, the burner(s) fire anytime the main drying fan(s) are running.

Dump Switch

This switch controls the operation of the linear actuator housed in the actuator control box. The switch lights up when the linear actuator is moving. When placed in the "manual close position", the linear actuator in the actuator control box retracts, raising the dump chutes. When placed in the "auto" position, the linear actuator extends at the beginning of the dump cycle- lowering the dump chutes, and retracts at the end of the dump cycle, raising the dump chutes. When placed in the "manual open" position, the linear actuator extends, lowering the dump chutes. This switch is disabled when the dryer is running. The dryer must be stopped to manually dump.

Dry And Hold Switch

When placed in the "on" position, the grain in the drying chamber will not be dumped into the storage chamber at the end of the dry cycle, and the dryer will stop. This switch can be used to hold the last batch of grain in the drying chamber and stop the dryer. When placed in the "off" position, the dryer will operate normally. The switch lights up when placed in the "on" position.

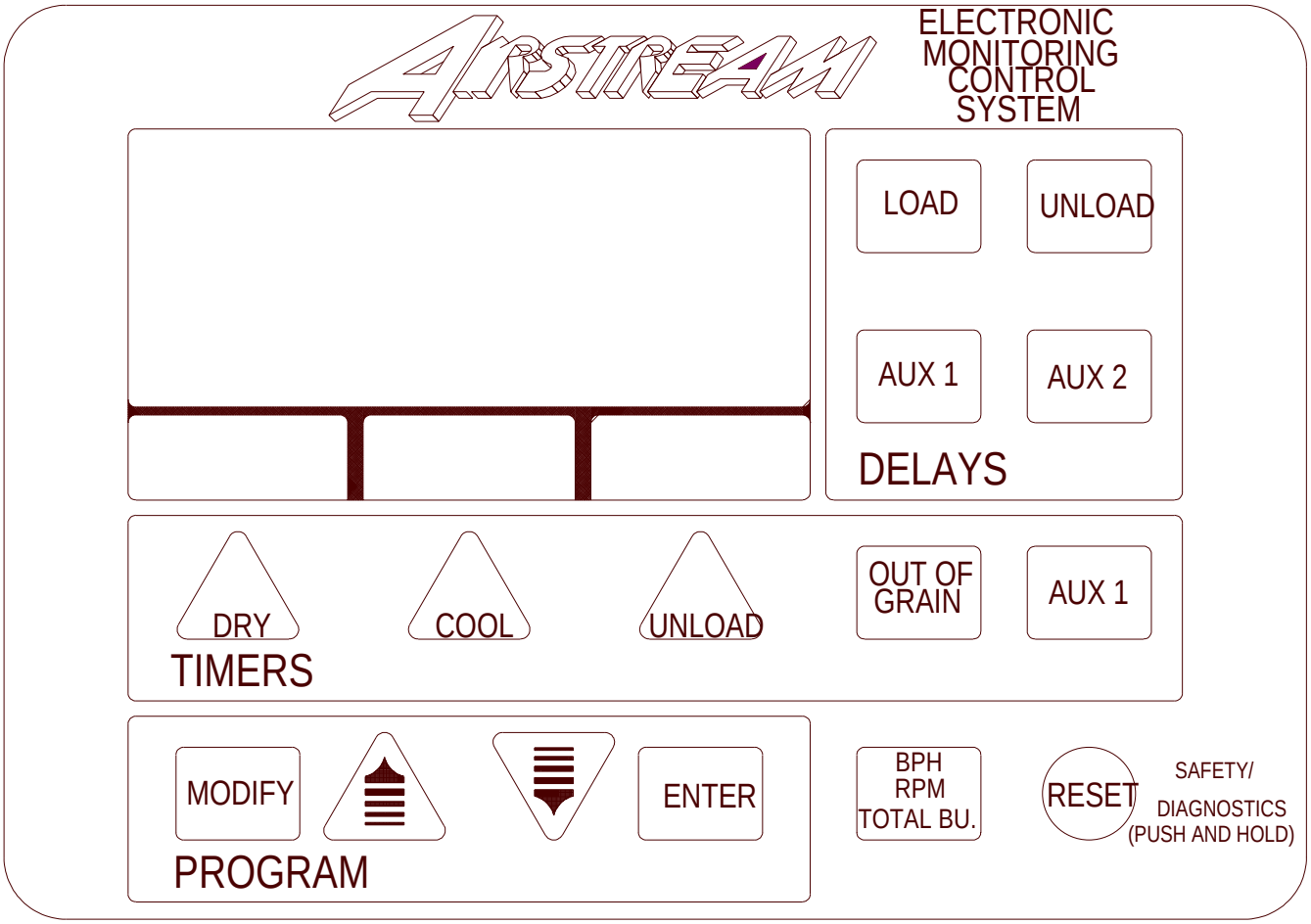
Dryer Power Start Switch

This switch starts and operates the dryer based on switch settings. The switch lights up when the dryer is running. The dump switch is disabled after this switch has been pushed.

Dryer Power Stop Switch

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

Electronic Monitoring Control System



Electronic Monitoring Control System

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

Turning On The Electronic Monitoring Control System

Turn the control power switch to the "on" position. The monitor will display a copyright message, software version number, total running time in hours and minutes and the model number, and the serial number and current time and date. When the serial number and current time and date are displayed, press the reset button to activate the controller and enter the main drying screen.

Setting The Dry, Cool And Unload Timers

These timers are used to set the dry, cool and dump cycle times. The current settings on these timers are displayed directly above their timer button. To change the setting of these timers do the following:

1) Press the dry, cool or unload timer button.
2) Press the modify button.
3) Press the increase or decrease button to adjust the settings.
4) Press the enter button.
5) To enter the new value into memory immediately, press the reset button.

During operation, the remaining time on each timer is displayed on the screen. If the power goes out or the dryer is stopped, these times are saved by the controller. When the dryer is restarted, the timers will continue timing down. The timers will return to their initial settings by pressing the reset button. The cool timer is not used in an Autoflow system.

Setting The Aux. 1 Timer

The value set on the aux. 1 timer acts as a buffer to allow grain to fall away from the drying chamber low level rotary switch after the drying fans start without giving an error. When grain reaches the drying chamber low level rotary switch, the drying cycle starts (if the fan switch is placed in the "auto" or "on" position) and the aux. 1 timer begins to time down. If grain falls away from the drying chamber low level rotary switch before the time on the aux 1 timer reaches zero, no error is given and the dryer continues in the drying cycle. If grain falls away from the drying chamber low level rotary switch after the aux. 1 timer reaches zero, a drying chamber no grain error is given and the dryer shuts down. The aux. 1 timer should be set long enough so that the fill system(s) have sufficient time to make up the grain that falls away from the drying chamber low level rotary switch when the fan(s) and heater(s) start; but, should not be set too long. If the linear actuator fails to retract the dump chutes, and grain runs directly from the drying chamber to the storage chamber without being dried, the grain would fall away from the drying chamber low level rotary switch and a drying chamber no grain error would be given. If the aux. 1 timer is set too long and the linear actuator failed to retract, an unacceptable amount of wet grain could flow from the drying chamber to the storage chamber before a drying chamber no grain error is given and the dryer shuts down. The aux. 1 timer is set using the same procedure as the dry and unload timers, but the reset button does not need to be pressed to enter the new values into memory immediately.

Setting the Out of Grain Timer

In an Autobatch system the value set on the out of grain timer is the amount of time that grain has to reach the drying chamber low level rotary switch when the dryer is refilling after the dump cycle in an Autobatch system. When the dump cycle is complete, the out of grain timer begins to count down. If grain does not reach the drying chamber low level switch before the out of grain timer reaches zero, the dryer will give an out of grain error and shut down. The out of grain timer is not used in an Autoflow system.

Setting the Load Delay

The value set on the load delay is the amount of time that fill system number two runs after grain reaches the drying chamber high level rotary switch. This delay is not used when only one fill system is controlled by the Autoflow. The load delay should be set long enough so that the drying chamber high level rotary switch is covered with enough grain that the fill systems do not start and stop frequently in the dry cycle due to settling or shrinkage; but, the load delay should be set short enough so that grain does not reach the drying chamber overflow rotary switch. The load delay is set using the same procedure as the dry and unload timers, but the reset button does not need to be pressed to enter the new values into memory immediately.

Setting the Aux. 1 Delay

In units that the Autoflow controls one fill system, the value set on the aux. 1 delay is the amount of time that fill system number one runs after grain reaches the drying chamber high level rotary switch. The aux.1 delay should be set long enough so that the drying chamber high level rotary switch is covered with enough grain that the fill system does not start and stop frequently in the dry cycle due to settling or shrinkage; but, the aux. 1 delay should be set short enough so that grain does not reach the drying chamber overflow rotary switch.

In units that the Autoflow controls two fill systems, the value set on the aux. 1 delay is the amount of time that fill system number one runs after fill system number two shuts off. Fill system number one is the fill system that directly puts grain in to the drying chamber. The aux. 1 delay should be set long enough so that all grain present in fill system number one is loaded into the drying chamber before it shuts off. This will decrease the current required to start fill system number one the next time the dryer calls for grain. The aux. 1 delay is set using the same procedure as the dry and unload timers, but the reset button does not need to be pressed to enter the new values into memory immediately.

Setting the Unload Delay

The value set on the unload delay is the amount of time that both fill system number one and fill system number two run after grain falls away from the wet supply rotary switch before the unit shuts down and gives a wet supply hopper empty error. In units that the Autoflow controls only one fill system, the value set on the unload delay is the amount of time that fill system number one runs after grain falls away from the wet supply rotary switch. The unload delay should be set long enough so that the fill system(s) clean out before the dryer shuts down; but, should be set short enough to avoid running the fill system (s) empty for an excessive amount of time. The unload delay is set using the same procedure as the dry and unload timers, but the reset button does not need to be pressed to enter the new values into memory immediately.

Setting the Aux. 2 Delay

The aux. 2 delay is not currently being used.

Viewing operation time and total cycles

The total operation time and total cycles can be viewed at any time the dryer is in the main drying screen by pressing the increase button.

Diagnostics Mode-Resetting Batch Counter

The Electronic Monitoring Control System can perform a self-diagnostic exam. With the dryer stopped and in the main drying screen, press and hold down the reset button for several seconds. After the self-diagnostic exam is complete, the display will read the results of the exam and will then give the user the option to reset the batch counter. The batch counter can be cleared by pressing the reset button or left as-is by pressing the enter button. After choosing an option, the user is taken to the shutdown history retrieval. To view past shutdowns and the time and date the shutdown occurred, press the decrease button. Press the enter button at any time to return to the main drying screen.

Set-up Mode

The set-up mode is used to program the computer with different variables that influence how the dryer will operate. With the dryer stopped and in the main drying screen, press the increase and decrease buttons at the same time to enter the set-up mode.

1). The first variable to be set is the number of fill system that are to be controlled by the dryer. Use the increase and decrease buttons to toggle between one or two fill systems. Press the enter button when the number of fill systems displayed on the screen equals the number of fill systems that the computer will be controlling. If one fill system is selected, only one fill system will be controlled by the computer. The aux. 1 delay will be used to delay the shut off of the fill system after the drying chamber is full. The load delay will have no effect on the operation of the fill system. If two fill systems are selected, two fill systems will be controlled by the computer. Both the load delay and the aux. 1 delay are used by the computer to delay the shut-off of the fill system(s) after the drying chamber is full.

2). The second variable to set is whether the drying fan(s) will start with the drying chamber high level or drying chamber low level rotary switch. Use the increase and decrease buttons to toggle between starting the fan(s) with the high or low level rotary switch. Press the enter button when the correct rotary switch is displayed. In most situations, the fan(s) should be started with the drying chamber low level rotary switch. If the drying chamber high level rotary switch is selected to control the starting of the main drying fan(s), the dry cycle and main drying fan(s) will not start until grain reaches the drying chamber high level rotary switch. Again, this mode of operation is not recommended.

3). The third variable to set is the dryer model. Use the increase and decrease buttons to select one of the four model types that fits your system. The four models are as follows:

AF2-Autoflow with two main drying fans
AF1-Autoflow with one main drying fans
AB2-Autobatch with two main drying fans
AB1-Autobatch with one main drying fans

Most systems will be either an Autoflow with one fan or an Autoflow with two fans. Press the enter button when the correct model number is displayed.

4). The fourth variable is the current year. Use the increase and decrease buttons to select the correct year. Press the enter button when the correct year is displayed.

5). The fifth variable is the current month. Use the increase and decrease buttons to select the correct month. Press the enter button when the correct month is displayed.

6). The sixth variable is the current day of the month. Use the increase and decrease buttons to select the correct day of the month. Press the enter button when the correct day is displayed.

7). The seventh variable is the current hour. Use the increase and decrease buttons to select the correct hour. Press the enter button when the correct hour is displayed.

8). The eighth variable is the current minute. Use the increase and decrease buttons to select the correct minute. Press the enter button when the correct minute is displayed.

9). The ninth variable is the airswitch test. Use the increase and decrease buttons to toggle between yes or no. If no is selected, the dryer does not require proof of airflow before the burner lights. If yes is selected, the dryer requires proof of airflow to light the burner. Each time the dryer control power is shut off, the airswitch test defaults to yes. (Not applicable in European units)

10). The tenth variable is the fan delay. The fan delay is the delay in seconds between the starting of the master fan unit and the slave fan unit. In systems with 220v 1-ph electrical power, the fan delay should be set at small value, less than 3 seconds. If the fan delay is set too long, the slave fan could rotate fast enough backwards to start in a reverse rotation. Use the increase and decrease buttons to select the fan delay. Press the enter button when the correct fan delay is displayed. In single fan units the fan delay is not applicable.

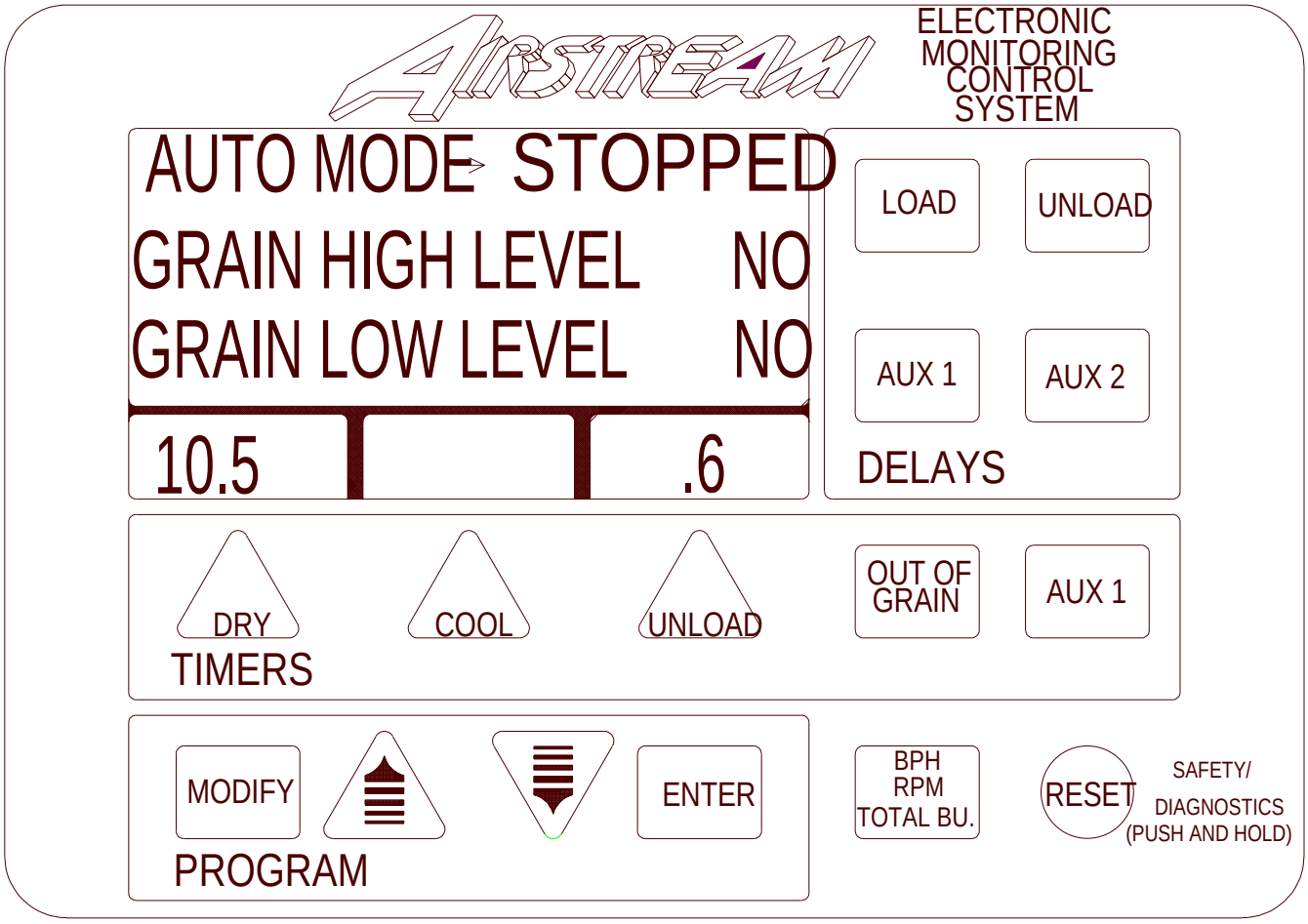
11). The eleventh variable is the high flame delay. The high flame delay is the amount of time the burner remains in low fire on ignition. In normal operation the high flame delay is set at one second. Use the increase and decrease buttons to select the high flame delay. Press the enter button when the correct high flame delay is displayed.

12). The twelfth variable is the status of the wet grain and drying chamber low level rotary switches. By pressing the dry timer switch, the user can directly enter the shutdown history retrieval. By pressing the unload timer switch, the status of these two rotary switches can be altered. Use the increase and decrease buttons to make the selection. Press the enter button when the correct selection is displayed. When the wet supply test is on, the dryer monitors the wet supply rotary switch. When the wet supply test is off, the dryer does not monitor the wet supply rotary switch. The computer responds as though there is wet grain in the wet storage tank. When the chamber low test is off, the dryer does not monitor the drying chamber low level rotary switch. The computer responds as though there is grain in the drying chamber against the low level rotary switch. When the chamber low test is off, the display on the dryer control panel reads “yes” at the grain low level status line.

After the set-up mode is complete the user is taken directly to the shutdown history retrieval. To view past shutdowns and the time and date the shutdown occurred, press the decrease button. Press the enter button at any time to return to the main drying screen.

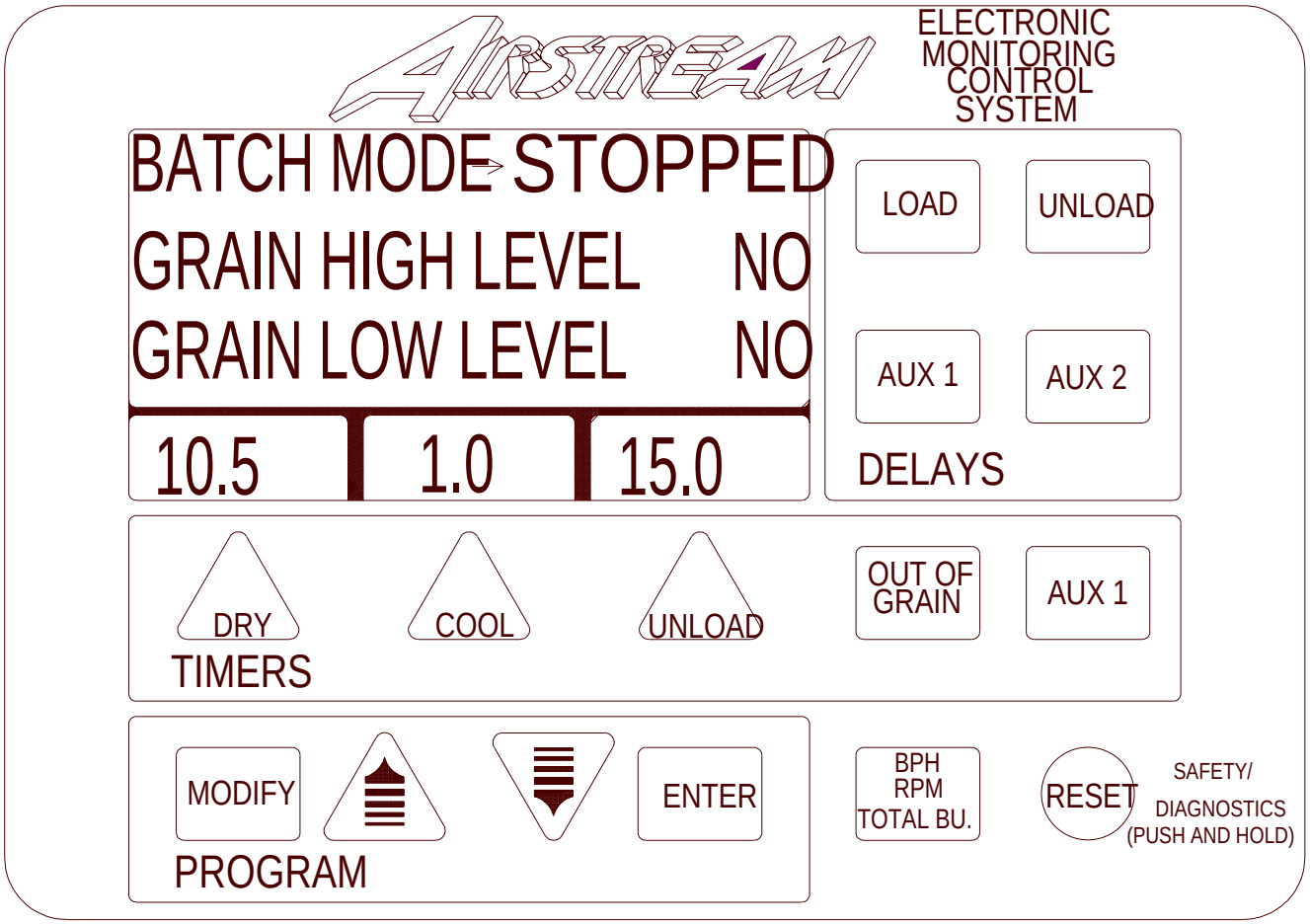
Autoflow Display

Dryer stopped with no grain against the drying chamber low level rotary switch, and no grain against the drying chamber high level rotary switch.



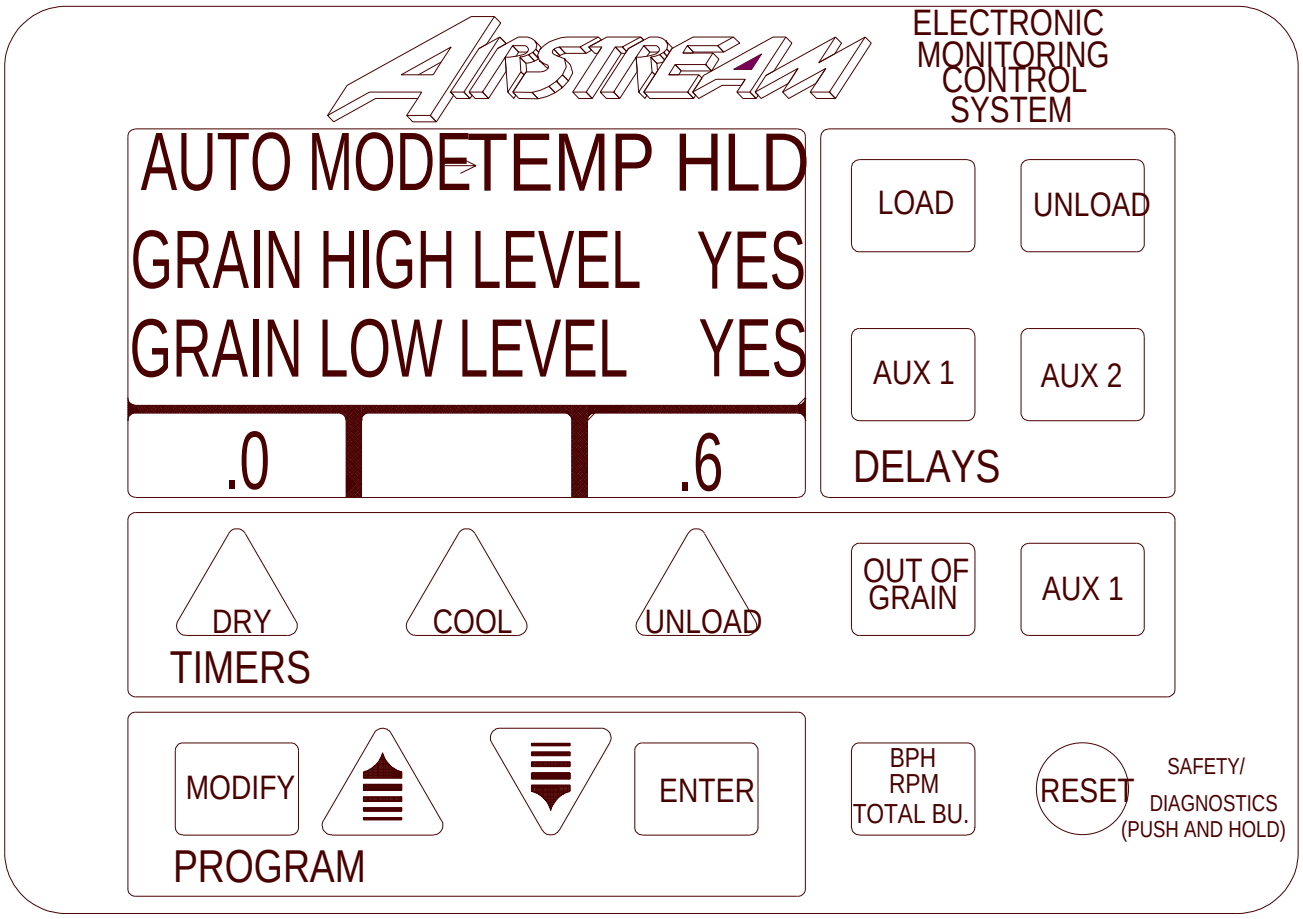
Auto Batch Display

Dryer stopped with no grain against the drying chamber low level rotary switch, and no grain against the drying chamber high level rotary switch.



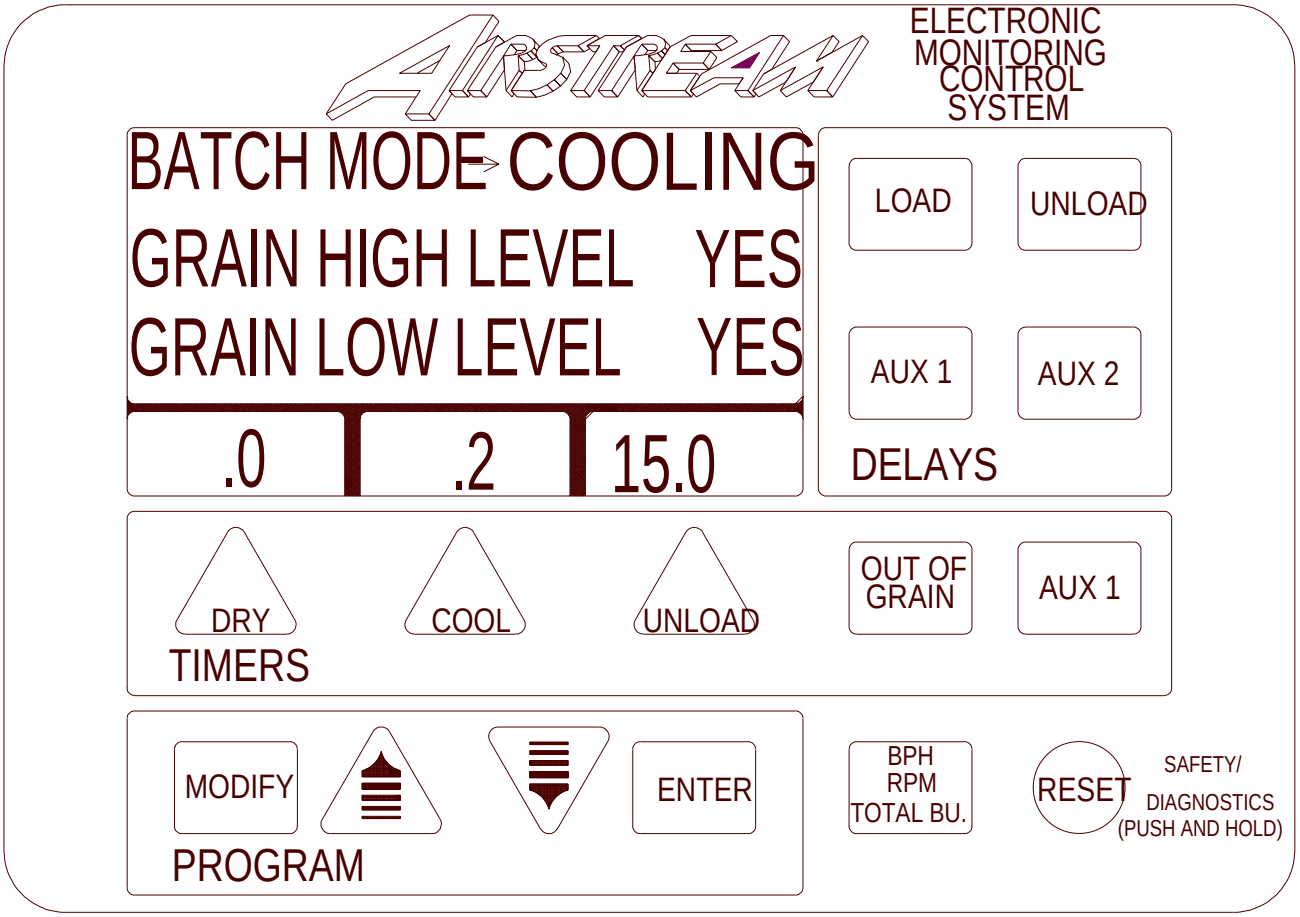
Autoflow Display

Dryer running in temperature hold with grain against the drying chamber low level and high level rotary switches.



Auto Batch Display

Dryer running in the cool cycle with grain against the drying chamber high level and low level rotary switches.



Dryer Status

By viewing the display on the dryer control panel the user can quickly determine what mode of operation the dryer is in, what cycle the dryer is in, the location of grain relative to the drying chamber rotary switches, and the current status of the dryer. The Electronic Monitoring Control System flashes the current status of the dryer on the display on the dryer control panel. When the system is running, information about the operation of the dryer and the location of grain can be obtained with a quick glance at the dryer control panel. The displayed dryer conditions are as follows:

Batch Mode

When the display on the dryer control panel reads "batch mode", the dryer has been programmed to operate as an automatic batch dryer. When operating as an automatic batch dryer all the grain in the drying chamber is dumped into the storage chamber during the dump cycle, and a cooling cycle is available after the dry cycle. This is not the standard mode of operation. The user must enter the set-up mode to change the dryer model from AB1 or AB2 to AF1 or AF2, to change from Autobatch to Autoflow.

Auto Mode

When the display on the dryer control panel reads "auto mode", the dryer has been programmed to operate as an automatic staged batch dryer. When operating as an automatic staged batch dryer, only the driest third of grain is removed from the drying chamber during the dump cycle, and once the drying process starts it does not stop until the dryer is stopped. This is the standard mode of operation.

Grain High Level YES

When the display on the dryer control panel reads "grain high level yes", the grain in the drying chamber has reached the drying chamber high level rotary switch. If the load switch on the dryer control panel is in the "auto" position, the fill system(s) should be stopped or in the process of stopping.

Grain High Level NO

When the display on the dryer control panel reads "grain high level no", the grain in the drying chamber has not reached the drying chamber high level rotary switch. If the load auger switch on the dryer control panel is in the "on" or "auto" position, the fill system(s) should be running.

Grain Low Level YES

When the display on the dryer control panel reads "grain low level yes", the grain in the drying chamber has reached the drying chamber low level rotary switch. If the fan switch on the dryer control panel is in the "auto" or "on" position the dry timer begins to count down and the dry cycle begins, if the fans are to start with the low level.

Grain Low Level No

When the display on the dryer control reads "grain low level no", the grain in the drying chamber has not reached the drying chamber low level rotary switch and the drying process has not started.

Stopped

When the display on the dryer control panel is flashing "stopped" the dryer is not running. The set-up mode can be entered into when the dryer status is "stopped."

Purging

When the display on the dryer control

panel is flashing “purging”, the dryer is running, the fan is running there is proof of airflow and the burner is getting ready to ignite.

Unload

When the display is flashing “unload”, the dump chutes have been lowered and the dryer is in the dump cycle.

Temp HLD

When the display on the dryer control panel is flashing “temp hld” the dryer is in the dry cycle, the dry timer has reached zero, and the current grain temperature is below the grain temperature setpoint on the moisture control thermostat. If the dryer is stopped when “temp hld” is flashing on the screen, two minutes will be entered into the dry timer when the dryer is re-started.

Loading

When the display on the dryer control panel is flashing “loading”, the fill system(s) are running.

Drying

When the display on the dryer control panel is flashing “drying”, the dryer is in the dry cycle, the main drying fan(s) are running, and the load augers are not running.

Cooling

When the display on the dryer control panel is flashing “cooling”, the dryer has been set-up as an Autobatch unit and is in the cool cycle.

Error Messages

When the dryer shuts down, the user can quickly determine what caused the shutdown by viewing the display on the dryer control panel. The Electronic Monitoring Control System displays the error message and sounds a warning signal to alert the user. The displayed error conditions and their electrical cause are as follows:

Burner 1 Warning Flame Not Detected (Error 1)

The flame sensor in burning number one has failed to detect flame. Either the burner failed to light or the flame sensor needs to be adjusted. The flame sensor is the sensor attached to the burner, it has a single lead. If the burner is lighting but the unit it still shutting down; due to loss of flame, the flame sensor needs to be adjusted. The flame sensor can be adjusted by bending it so it is immersed in flame. If the burner is not lighting, make sure that the dryer is getting fuel, all solenoids are opening, and the ignitor is sparking. Electrically there is a loss of 12vDC+ on J1-9 on the input/output board.

Burner 2 Warning Flame Not Detected (Error 2)

The flame sensor in burner number two has failed to detect flame. Either the burner failed to light or the flame sensor needs to be adjusted. The flame sensor is the sensor attached to the burner, it has a single lead. If the burner is lighting but the unit is still shutting down; due to loss of flame, the flame sensor needs to be adjusted. The flame sensor can be adjusted by bending it so it is immersed in flame. If the burner is not lighting, make sure that the dryer is getting fuel, all solenoids are opening, and the ignitor is sparking. Electrically there is a loss of 12vDC+ on J1-10 on the input/output board.

Burner 1-Vapor High Temperature (Error 13)

The LP gas vapor temperature sensor, located on the gas pipe train downstream from the vaporizer coil, on fan and heater number one has opened, indicating that the vaporizer coil is running too hot and must be adjusted. This sensor is set at 200 degrees Fahrenheit and automatically resets itself when cool. The vaporizer is adjusted by

loosening the bolt and moving the vaporizer coil away from the flame. Electrically there is a loss of 12vDC+ on J1-5 on the input/output board.

Burner 2 Vapor High Temperature (Error 14)

The LP gas vapor temperature sensor located on the gas pipe train downstream from the vaporizer coil, on fan and heater number two has opened, indicating that the vaporizer coil is running too hot and must be adjusted. This sensor is set at 200 degrees Fahrenheit and automatically resets itself when cool. The vaporizer is adjusted by loosening the bolt and moving the vaporizer coil away from the flame. Electrically there is a loss of 12vDC+ on J1-6 on the input/output board.

Fan 1 Housing High Temperature (Error 19)

The temperature high limit, located on the housing, on fan and heater number one has opened, indicating that the fan housing towards the bin has overheated. The high limit sensor is set at 200 degrees Fahrenheit and must be manually reset. Electrically there is a loss of 12vDC+ on J1-7 on the input/output board.

Fan 2 Housing High Temperature (Error 20)

The temperature high limit, located on the housing, on fan and heater number two has opened, indicating that the fan housing towards the bin has overheated. This high limit sensor is set at 200 degrees Fahrenheit and must be manually reset. Electrically there is a loss of 12vDC+ on J1-8 on the input/output board.

Plenum High Temperature (Error 25)

An over temperature condition has occurred inside the dryer plenum. The plenum high limit is set automatically on the Hi-Lo thermostat when the cycle set-point is adjusted and resets automatically when cooled. The lo-fire pressure needs to be lowered, or the cycle setpoint on the Hi-lo thermostat needs to be increased, if the error is displayed frequently. Electrically there is a loss of 12vDC+ on J1-11 on the input/output board.

12 volt power supply warning (Error 32)

The right circuit breaker, located on the input/output board, has tripped.

L1 Voltage Lost (Error 33)

The left circuit breaker, located on the input/output board, has tripped or one of the hardware timers has shut down the dryer. The overload must be reset manually. Electrically there is a loss of 12vDC+ on J5-6, or J5-10 on the input/output board.

Fan 1 Motor Overload (Error 35)

The thermal overload in the control box on fan number one, has tripped, indicating an overcurrent condition. The overload must be reset manually. Electrically there is a loss of 12vDC+ on J4-12 on the input/output board.

Fan 2 Motor Overload (Error 53)

The thermal overload in the control box on fan number two has tripped, indicating an overcurrent condition. The overload must be reset manually. Electrically there is a loss of 12vDC+ on J4-18 on the input/output board.

Fan Shutdown Loss of Airflow (Error 37)

The contacts on the airswitch, located in the bin sidewall and attached to fan and heater number one, have opened due to the fan not turning, or the airswitch may need to be adjusted. Electrically there is a loss of 12vDC+ on J1-13 on the input/output board.

Drying Chamber Overflow (Error 45)

The grain level in the drying chamber has reached the drying chamber overflow rotary switch.

Grain will have to be dumped from the drying chamber to the storage chamber before the unit can be re-started. This error indicates that either the drying chamber high level rotary switch is faulty or the time on the Load delay or Aux.1 delay needs to be lowered. Electrically there is the presence of 12vDC+ on J4-6 on the input/output board.

Storage Chamber Full (Error 46)

The grain level in the storage chamber has reached the storage chamber high level rotary switch located 3 feet(.91 meters) below the fan and heater(s). Grain will have to be removed from the storage chamber before the unit can be restarted. Electrically there is the presence of 12vDC + on J4-4 on the input/output board.

Wet Supply Hopper Empty (Error 48)

The grain in the wet supply tank has fallen below the wet supply rotary switch. If there is grain against the drying chamber low level rotary switch, the dryer can be restarted by pressing the stop switch to clear the error and then the start switch. Electrically there is a loss of 12vDC+ on J4-2 on the input/output board.

Wet Supply Empty Press<Enter>to Dry Remaining Grain

This message is displayed when the start button is pushed and grain has fallen away from the wet supply rotary switch and there is still grain against the drying chamber low level rotary switch. If the enter button is pushed, the dryer will restart, but the fill system(s) will not restart. Electrically there is a loss of 12vDC+ on J4-2 and the presence of 12vDC+ on J4-8 on the input/output board.

Out of Grain Warning (Error 31)

This message is displayed after the dump cycle when the dryer has been restarted by pressing the enter button, after a “wet supply empty error” has been given.

Cannot Start Dryer Wet Supply Empty

This message is displayed when the start button is pushed and grain has fallen away from the wet supply rotary switch and there is no grain against the drying chamber low level rotary switch. Grain will have to be put into the wet supply tank or the drying chamber to start the dryer. Electrically there is a loss of 12vDC on J4-2 and a loss of 12vDC+ on J4-8 on the input/output board.

Drying Chamber Low Grain (Error 49)

This message is displayed when grain falls away from the drying chamber low level rotary switch after the Aux. 1 timer has reached zero. If the error is being caused due to the settling of grain after the fans start, the time on the Aux.1 timer can be lengthened. Electrically there is a loss of 12vDC+ on J4-8 on the input/output board.

Load Auger Motor Overload (Error 52)

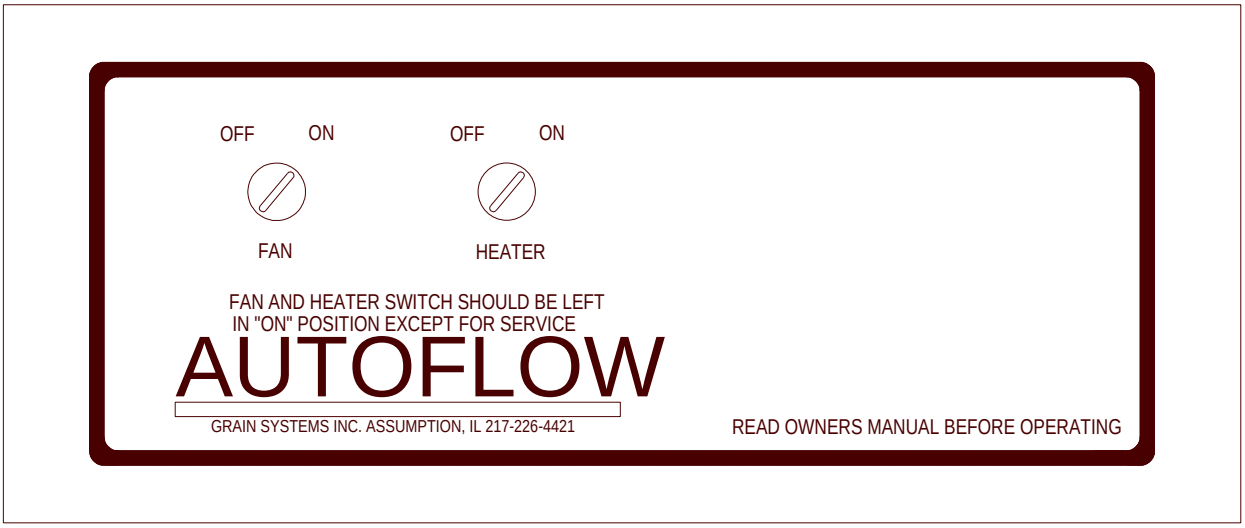
The thermal overload in the fill system control box for fill system number one has tripped, indicating an overcurrent condition. The overload must be reset manually. Electrically there is a loss of 12vDC+ on J4-16 on the input/output board.

Auxiliary Fill Motor Overload (Error 50)

The thermal overload, in the fill system control box for fill system number two; has tripped, indicating an over current condition. The overload must be reset manually. Electrically there is a loss of 12vDC on J4-16 on the input/output board.

Aeration Fan Motor Overload (Error 51)

The thermal overload, in the fill system control box for the aeration fan; has tripped, indicating an overcurrent condition. The overload must be reset manually. Electrically there is a loss 12vDC+ on J4-17 on the input/output board.



Autoflow Fan and Heater Control Box

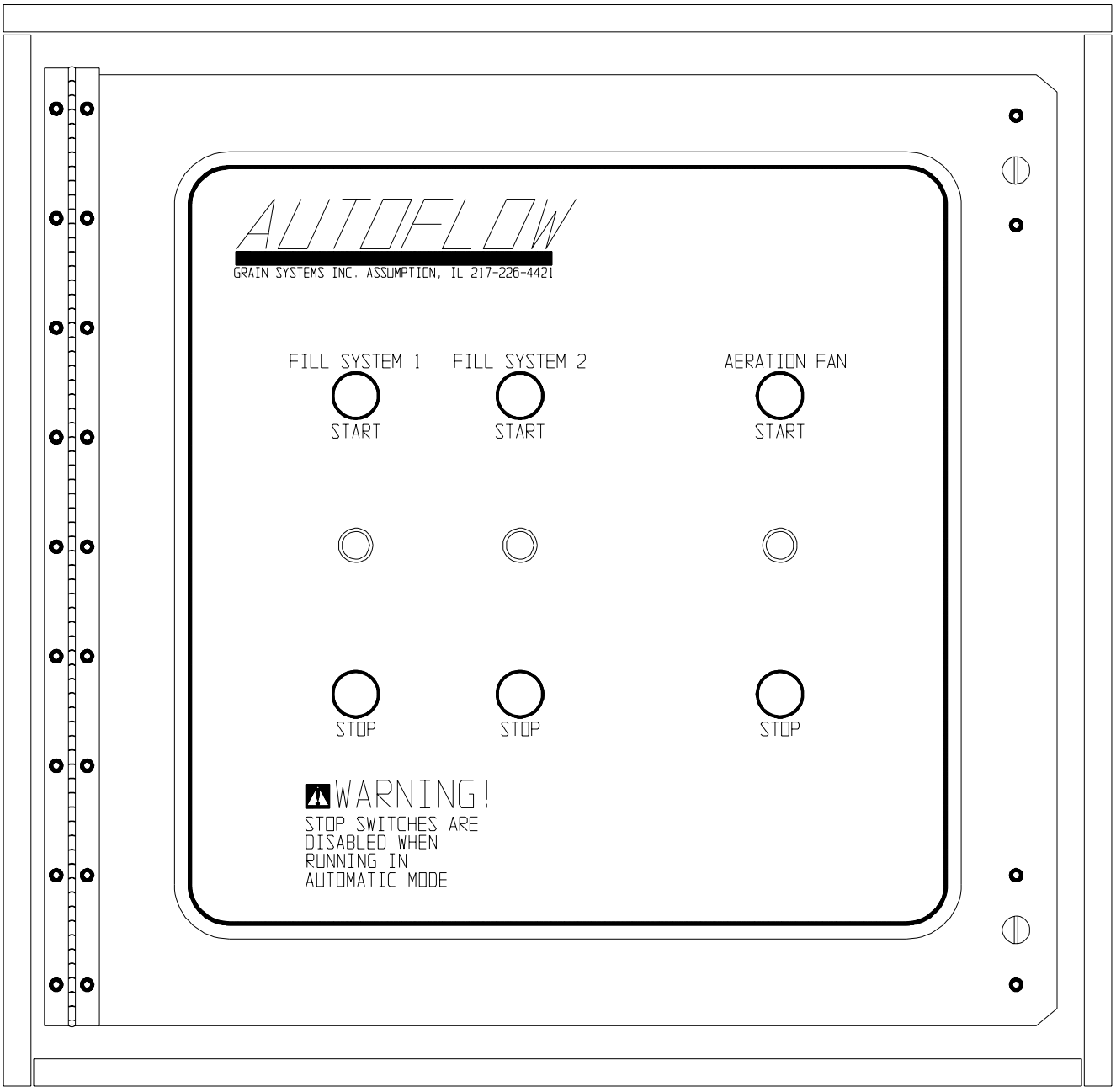
The Autoflow fan and heater control box mounted on the fan heater unit(s), houses the motor starter, Fenwall ignition-flame detection board, and all circuitry involved with the control of the fan and heater unit. Two service switches are located on the front panel of the Autoflow fan and heater control box.

Fan

This switch allows the user to turn off the drying fan while at the fan and heater unit. It the Autoflow is running, and the fan is running, the fan will stop when the fan service switch is placed in the “off” position, but the dryer will continue running as though the fan was on. If the burner is running when the fan service switch is placed in the “off” position, the burner will shut off also. The fan service switch light on the master fan lights up when the airswitch closes. In normal operation the fan service switch should be left in the “on” position.

Heater

This switch allows the user to turn off the burner while at the fan and heater unit. If the Autoflow is running, and the burner is running, the burner will stop when the heater service switch is placed in the “off” position, but the dryer will continue running as though the burner was on. When the heater service switch is placed in the “off” position, the fan does NOT shut off. When the heater service switch is placed back to the ”on” position, the unit reignites after the purge delay. The heater service switch light lights up when the burner is on. In normal operation, the heater service switch should be left in the “on” position.


AUTOFLOW
GRAIN SYSTEMS INC. ASSUMPTION, IL 217-226-4421
FILL SYSTEM 1
FILL SYSTEM 2
AERATION FAN
START
START
START
STOP
STOP
STOP
WARNING!
STOP SWITCHES ARE
DISABLED WHEN
RUNNING IN
AUTOMATIC MODE

Fill System Control Box

The fill system control box houses the motor starters for fill system #1, fill system #2 and the aeration fan. Start and stop switches are located on the front of the fill system control box. The emergency stop switch is located on the side of the control box.

Fill System #1

The start and stop switches are used to control fill system #1 manually. In order to use the start and stop switches for fill system #1 the control power switch on the Autoflow control box must be placed in the "on" positon. The start and stop switches are disabled when the dryer is running.

Fill System #2

The start and stop switches are used to control fill system #2 manually. In order to use the start and stop switches for fill system #2 the control power switch on the Autoflow control box must be placed in the "on" positon. The start and stop switches are disabled when the dryer is running.

Aeration Fan

The start and stop switches are used to control the aeration fan manually. In order to use the start and stop switches for the aeration fan the control power switch on the Autoflow control box must be placed in the "on" positon. The start and stop switches are disabled when the dryer is running.

Emergency Stop Switch

This switch will stop the dryer when pushed.

Set Control Switches

♦ MOISTURE CONTROL Switch	On
♦ AERATION FAN Switch	Off
♦ LOAD AUGER Switch	Off
♦ FAN Switch	Off
♦ HEATER Switch	Off
♦ DUMP Switch	Auto
♦ DRY and HOLD Switch	Off
♦ Autoflow Emergency Stop Switch	Out
♦ Actuator Emergency Stop Switch	Out
♦ Fill System Control Box Emergency Stop Switch	Out
♦ Fan/Heater Emergency Stop Switch (CE units only)	Out
♦ 24 VOLT POWER Switch	On
♦ Fill System Control Boxes Switches	On

Control Power Switch

Turn the control power switch on. The switch will light up. The screen will display a copyright message and software version number, total running time in hours and minutes and the model number, and the serial number and current time and date. At this time, the controller will lock out all other dryer functions. Once the date and time are displayed, press the reset button and the dryer will perform its safety circuit check. If a fault is found, an error message will be displayed on the screen. If all are found safe, the main drying screen will be displayed.

Drying Chamber

Enter the drying chamber and inspect each dump hopper for obstructions that may inhibit the flow of grain into the dump chutes. Make sure that the gap between the discharge flow plates and the floor sheets is a minimum of 1-1/2". All discharge flow plates should be adjusted evenly around the bin. Inspect each discharge flow plate and make sure that the bottom brackets on each flow plate have not collapsed, due to pressure from walking around the drying chamber. Inspect the leveling bands. Make sure that all leveling bands are installed properly and are in good shape.

Rotary Switches

View the drying chamber switches from the peak hole on top of the dryer. Make sure that all three rotary switches are spinning freely. Double check the seal on each rotary switch top. The number one cause of switch failure is water. Make sure when the electrician replaced the top on the rotary switch that no creases formed in the gasket. Inspect both the storage and wet supply rotary switches for operation and proper seal.

Dump Chutes

Enter the storage chamber. Make sure that all dump chutes are adjusted evenly. When one chute is level, make sure that all chutes are level. This is very critical to the correct operation of the dryer. The center plate, that all the dump chute chains attach to, should be no greater than 12" from the pulley when the chutes are level. If the center plate is further than 12" from the pulley when the chutes are closed, the chains must be lengthened.

Linear Actuator

Turn the dump switch on the Autoflow control box to the "manual open" position. Use a

tape measure to measure the stroke on the linear actuator. The stroke should be between 12" and 14". If the stroke on the actuator is not 12" to 14", the actuator should be adjusted. Make sure that all pulleys and cables are able to move freely when the actuator is moving. With the actuator extended, enter the storage chamber. View each dump chute individually. Make sure that each dump chute opened completely when the actuator extended. If a dump chute does not open completely, the double nuts on the bolt that the chutes hinge on, needs to be loosened. The dump chutes should hinge smoothly. After the chutes have been inspected turn the dump switch on the Autoflow control box to the "Auto" position and press the stop switch. The chutes should raise.

Power Start Button

Before the dryer start button is pushed, make sure there is grain in the wet supply tank. If there is no grain in the wet supply tank, the dryer will not start. Push the dryer start button. The screen should no longer be flashing "STOPPED".

Fuel Check

If using LP gas, make sure the tank has plenty of fuel. If using natural gas, make sure adequate supply is available. If using LP gas, slowly open the main fuel supply valve at the tank. If using natural gas, turn on the valve along the supply line. Then open the ball valve on the fan heater unit(s). Inspect all gas lines and connections for possible leaks. Any gas leaks need to be fixed immediately!

Fan

Make sure that the fan and heater service switches on the main drying fan(s) are in the "on" position. Bump the fan switch on the Autoflow control box and observe the fan rotation. The fan should run counterclockwise. Sometimes on three phase models the motor will run backwards. This can easily be reversed by first turning off and locking out the power at the main disconnect, then interchanging any two of the three power supply wires coming into the motor starter in the fan control box. Reverse the two outside wires, L1 and L3, and leave the middle one in the same position. If the dryer is empty, the unit will not operate. The fans cannot create enough static pressure to engage the airswitch. You will receive a loss of airflow message.

Aeration Fan

Bump the aeration fan switch on the autoflow control box and observe the aeration fan rotation. The aeration fan should run counterclockwise. Sometimes on three phase models the motor will run backwards. This can easily be reversed by first turning off and locking out the power at the main disconnect, then interchanging any two of the three power supply wires coming into the motor starter in the fill system control box. Reverse the two outside wires, L1 and L3, and leave the middle one in the same position.

Fill System

Prepare the wet storage tank to deliver grain to the dryer. Make sure all personnel are away from any machinery that is controlled by the Autoflow. Place the load auger switch in the "Auto" position. The fill system(s) should begin to load grain from the wet supply tank to the dryer. When the display on the Autoflow control box reads "GRAIN LOW LEVEL YES", close the valve that supplies the fill system(s) with wet grain from the wet supply tank. After the fill system(s) have cleaned out, place the load auger switch in the "off" position.

Airswitch

Place the fan and heater service switches on the main drying fan(s) in the "off" position. Place the fan switch on the Autoflow control box in the "on" position. Place the aeration fan switch on

the Autoflow control box in the "on" position. Go to the master fan and heater unit. Place the fan service switch in the "on " position. The master fan should start. In two fan units, the slave fan should start after the fan delay. In single fan units the light on the master fan service switch should light up after the master fan reaches half speed. If the service switch light lights up before the fan reaches half speed, adjust the airswitch by turning it clockwise. If the service switch light does not light up, adjust the airswitch by turning it counter-clockwise. In two fan units, the light on the master fan service switch should light up after the slave fan reaches half speed. If the service switch light lights up before the fan reaches half speed, adjust the airswitch by turning it clockwise. If the service switch light does not light up, adjust the airswitch by turning it counter-clockwise.

Burner Test Fire

Make sure the heater service switch on the main drying fan(s) is in the "off" position. Place the heater switch on the Autoflow control box in the "on" position. Start the main drying fan(s), if they are not already running. Make sure the fuel supply is on. Go to the fan and heater unit(s) and place the heater service switch in the "on" position. The burner should ignite after a short purge delay. Gas pressure should be shown on the gauge. Adjust the high fire gas pressure by turning the regulator in and out on LP units; or, by opening and closing the main ball valve on natural gas units. The high fire pressure should be approximately 6-15 lbs. for LP units and 6-10 lbs. for natural gas units. At this time adjust the Hi-Lo thermostat all the way to the right. Watch the thermometers. When the temperature in dryer gets to the desired setpoint (160°-180°, for corn), turn the knob back to the left until the heater cycles from high fire to low fire. While the heater is in low fire, adjust the low fire gas pressure by opening or closing the valve located on top of the pipetrain. The low fire gas pressure should be approximately 2-6 lbs. for LP units and 1-3 lbs. for natural gas units. If the burner remains in low fire and does not cycle, slightly decrease the gas pressure at the low fire gas valve. Any time the high fire gas pressure is adjusted, the low fire gas pressure needs to be checked. The basic rule-of-thumb for setting gas pressure is as follows: make sure that the temperature in the bin is increasing at a rapid rate when in high fire, and the temperature in the bin is falling at a rapid rate while in the low fire.

Dryer Shutdown

To shut down the dryer, first close the fuel supply valve at the tank or the valve along the fuel supply line. If the burner is operating, let the dryer run out of fuel. It should shut down due to loss of flame. Press the dryer stop button to clear the error, and turn off the main power disconnect at the entrance panel.

Emergency

In case of an emergency push the emergency stop switch located on the side of the Autoflow control box. This will shut everything, that is controlled by the dryer, off immediately.

Top Dry Autoflow Theory of Operation

Control Panel Switch Status:

Control Power:	On
24v Power:	On
Moisture Control Thermostat:	On
Aeration Fan:	Auto
Load Auger:	Auto
Fan:	Auto
Heater:	Auto
Dump:	Auto
Dry & Hold:	Off

Emergency Stop Switch Status

Autoflow Control Box Emergency Stop: “pulled out”
Fill System Control Box Emergency Stop: “pulled out”
Actuator Control Box Emergency Stop: “pulled out” (CE only)
Fan/Heater emergency Stop: “pulled out” (CE only)

When the Top Dry is in a ready state; that is, with no grain in the *Drying Chamber* and wet grain in the *Wet Storage Tank, Fill System #1* and *Fill System #2* will start to fill the *Drying Chamber* with wet grain when the start switch is pressed on the *Dryer Control Panel.* In single fill system units *Fill System #1* will start. When grain reaches the *Drying Chamber Low Level Rotary Switch* the *Aeration Fan,* and the *Master Drying Fan* will come on, and the *Fan Delay* will start to count down. When the *Fan Delay* reaches zero the *Slave Drying Fan* will start, the *Airswitch* will close, and the *Dry Timer* will start to count down. In single fan units the *Fan Delay* will not count down and the *Airswitch* will close after the *Master Drying Fan* starts. After a twenty second *Purge Delay* the fan/heater unit(s) will ignite. When the *Plenum Temperature* reaches the *Cycle Setpoint* on the *Hi-Lo Thermostat* the fan/heater unit(s) will cycle to *Low-Fire*. When the *Plenum Temperature* falls ten degrees below the *Cycle Setpoint* the fan/heater unit(s) will cycle back to *High-Fire.* The fan/heater unit(s) will continue to cycle throughout the drying process.

When grain reaches the *Chamber High Level Rotary Switch* the *Load Delay* will begin to count down. When the *Load Delay* reaches zero *Fill System #2* will shut off and the *Aux. 1 Delay* will begin to count down. When the *Aux. 1 Delay* reaches zero *Fill System #1* will shut off.

If the *Chamber High Level Rotary Switch* becomes exposed due to shrinkage of grain in the *Drying Chamber*, the fill system(s) will start and refill the *Drying Chamber*. When grain reaches the *Chamber High Level Rotary Switch* the fill system(s) will shut off after the delays.

When the *Dry Timer* reaches zero and the *Grain Temperature Setpoint* on the *Moisture Control Thermostat* has not been reached the unit will go into *Temperature Hold.* When the grain temperature reaches the *Grain Temperature Setpoint* on the *Moisture Control Thermostat* the unit will continue to the *Dump Cycle*. In the *Dump Cycle* the *Linear Actuator* in the *Actuator Control Box* extends, the dump chutes lower, and

grain is dumped from the *Drying Chamber* into *Storage Chamber*. Immediately after the dump chutes open the *Unload Timer* begins to count down. When the *Unload Timer* reaches zero the dump chutes raise and grain stops dumping from the *Drying Chamber* into the *Storage Chamber.* During the *Dump Cycle,* 1/3 of the grain is dumped into the *Storage Chamber.*

After the *Dump Cycle,* the unit returns to the beginning of the *Dry Cycle*, the *Fill system(s)* refill the *Drying Chamber* and the process begins again. If the *Dry Timer* reaches zero after the grain temperature reaches the *Grain Temperature Setpoint* on the *Moisture Control Thermostat* the unit does not enter *Temperature Hold.* It goes right to the *Dump Cycle.*

The unit continues with the same operation until either no grain is present against the *Wet Supply Rotary Switch,* or the *Storage Chamber* becomes full.

If the *Wet Storage Tank* becomes empty while the fill systems are running, the *Unload Delay* starts to count down. When the *Unload Delay* reaches zero the fill system(s) shut off along with the dryer and a *Wet Supply Hopper Empty* error is displayed on the *Dryer Control Panel* screen. If there is grain against the *Drying Chamber Low Level Rotary Switch* the unit can be restarted by pressing the start switch. When the start switch is pressed the screen on the *Dryer Control Panel* will read "Press Enter to Dry Remaining Grain". If the enter button is pushed the dryer will restart without running the fill system(s). The dryer will remain running until the completion of the next *Dump Cycle,* after which an "out of Grain" error is displayed on the *Dryer Control Panel* and the dryer stops.

If the *Storage Chamber High-Limit Rotary Switch* becomes covered with grain during the *Dump Cycle* the dryer will continue through the *Dump Cycle* and will continue to the next *Dry Cycle*. When the *Dry Cycle* is complete the unit will not continue to the *Dump Cycle.* A "Storage Chamber Full" error will be displayed on the screen and the dryer will stop. The unit will not dump automatically until grain has been removed from the *Storage Chamber*.

Items In Italics Are Defined In the Dryer Terminology Section.

Top Dry Autobatch Theory of Operation

Control Panel Switches Status:

Control Power:	On
24v Power:	On
Moisture Control Thermostat:	On
Aeration Fan:	Auto
Load Auger:	Auto
Fan:	Auto
Heater:	Auto
Dump:	Auto
Dry & Hold:	Off

Emergency Stop Switches Status

Autoflow Control Box Emergency Stop: “pulled out”
Fill System Control Box Emergency Stop: “pulled out”
Actuator Control Box Emergency Stop: “pulled out”
Fan/Heater Emergency Stop: “pulled out” European only

When the *Top Dry* is in a ready state; that is, with no grain in the *Drying Chamber* and wet grain in the *Wet Storage Tank*, *Fill System #1* and *Fill System #2* will start to fill the *Drying Chamber* with wet grain when the start switch is pressed on the *Dryer Control Panel*. In single fill system units only *Fill System #1* will start. When grain reaches the *Drying Chamber Low Level Rotary Switch* the *Aeration Fan* , and the *Master Drying Fan* will come on, and the *Fan Delay* will start to count down. When the *Fan Delay* reaches zero the *Slave Drying Fan* will start, the *Airswitch* will close, and the *Dry Timer* will start to count down. In single fan units the *Fan Delay* will not count down and the *Airswitch* will close after the *Master Drying Fan* starts. After twenty second *Purge Delay* the fan/heater unit(s) will ignite. When the *Plenum Temperature* reaches the *Cycle Setpoint* on the *Hi-Lo Thermostat* the fan/heater unit(s) will cycle to *Low-Fire.* When the *Plenum Temperature* falls ten degrees below the *Cycle Setpoint* the fan/heater unit(s) will cycle back to *High-Fire.* The fan/heater unit(s) will continue to cycle throughout the drying process.

When grain reaches the *Chamber High Level Rotary Switch* the *Load Delay* will begin to count down. When the *Load Delay* reaches zero *Fill System #2* will shut off and the *Aux. 1 Delay* begins to countdown when the Aux. 1 delay reaches zero *Fill System #1* will shut off. If grain does not reach the drying chamber high level rotary switch before 2/3. of the dry cycle is complete the fill systems will shut off automatically.

If the *Chamber High Level Rotary Switch* becomes exposed due to shrinkage of grain in the *Drying Chamber*, the fill system(s) will start and refill the *Drying Chamber*. When grain reaches the *Chamber High Level Rotary Switch* the fill system(s) will shut off after the delays.

When the *Dry Timer* reaches zero and the *Grain Temperature Setpoint* on the *Moisture Control Thermostat* has not been reached, the unit will go into *Temperature Hold.* When the grain temperature reaches the *Grain Temperature Setpoint* on the *Moisture Control Thermostat* the unit will continue to the *Cool Cycle*. In the *Cool Cycle* the burner will shut off, the *Cool Timer* will begin to count down, and the main drying fans will continue to run, cooling the grain. When the *Cool Timer* reaches zero the dryer will continue to the *Dump Cycle*. In the

Dump Cycle the main drying fans will shut off, the *Linear Actuator* in the *Actuator Control Box* extends, the dump chutes lower, and grain is dumped from the *Drying Chamber* into the *Storage Chamber*. Immediately after the dump chutes open, the *Unload Timer* begins to count down. When the *Unload Timer* reaches zero the dump chutes raise. During the *Dump Cycle* all of the grain is dumped into the *Storage Chamber.*

After the *Dump Cycle* the unit returns to the beginning of the *Dry Cycle*, the Out of Grain Timer begins to count down, the fill system(s) refill the *Drying Chamber* and the process begins again. If grain does not reach the *Drying Chamber Low Level Rotary Switch* before the *Out of Grain Timer* reaches zero, the dryer will give an "Out of Grain" error and shut down. If the *Dry Timer* reaches zero after the grain temperature reaches the *Grain Temperature Setpoint* on the *Moisture Control Thermostat* the unit does not enter *Temperature Hold*. It goes right to the *Cool Cycle*.

The unit continues with the same operation until either no grain is present against the *Wet Supply Rotary Switch*, or the *Storage Chamber* becomes full.

If the *Wet Storage Tank* becomes empty while the fill system(s) are running, the *Unload Delay* start to count down. When the *Unload Delay* reaches zero the fill system(s) shut off along with the dryer and a "Wet Supply Hopper Empty" error is displayed on the *Dryer Control Panel* screen. If there is grain against the *Drying Chamber Low Level Rotary Switch* the unit can be restarted by pressing the start switch. When the start switch is pressed the screen on the *Dryer Control Panel* will read "Press Enter to Dry Remaining Grain". If the enter button is pushed the dryer will restart without running the fill system(s). The dryer will remain running until the completion of the next *Dump Cycle*, after which an "Out of Grain" error is displayed on the *Dryer Control Panel* and the dryer stops.

If the *Storage Chamber High-Limit Rotary Switch* becomes covered with grain during the *Dump Cycle* the dryer will continue through the *Dump Cycle* and will continue to the next *Dry Cycle*. When the *Dry Cycle* is complete the unit will not continue to the *Dump Cycle*. A "Storage Chamber Full" error will be displayed on the screen and the dryer will stop. The unit will not dump automatically until grain has been removed from the *Storage Chamber.*

Items in Italics are Defined in the Dryer Terminology Section

Top Dry Autoflow Terminology

Actuator Control Box-The actuator control box houses the linear actuator that controls the dump chutes. The actuator also houses the two 12vDC batteries and the 24vDC battery charger. The actuator control box is mounted to the bin sidewall.

Aeration Fan-The aeration fan is located at the bottom on the outside of the bin and is used to cool grain in the storage chamber. The aeration fan is designed to deliver about 1/4 cubic feet of air per minute per bushel of grain in the storage chamber. The motor starter for the aeration fan is located in the Fill System Control Box.

Aeration Fan Bypass Switch-The aeration fan by pass switch is located on the side of the fill system control box. When the aeration fan bypass switch is placed in the "continuos" position the aeration fan does not shut off with the dryer. When the aeration fan bypass switch is placed in the "automatic" position the aeration fan shuts off when the dryer stops (Domestic units only).

Aux. 1 Delay-The aux. 1 delay is used in both single fill and double fill systems. The aux. 1 delay is located on the dryer control panel next to the display screen. In single fill systems the aux. 1 delay controls how long fill system #1 runs after grain reaches the drying chamber high level rotary switch. In units with two fill systems the aux. 1 delay controls how long fill system #1 runs after fill system #2 shuts off. This allows fill system #2 to clean out before stopping.

Airswitch-The airswitch is used to tell the computer when the drying fan(s) have started so the burner can be ignited or remain ignited. The airswitch is attached to the master drying fan and is mounted in the bin sidewall even with the master drying fan. The airswitch operates by sensing the increase in static pressure in the bin after the drying fan(s) have started. In two fan units the airswitch should be adjusted so that it does not close until after the slave fan reaches half speed.

Cycle Setpoint-The cycle setpoint is the plenum temperature that the fan and heater unit(s) will try to maintain in the bin. The cycle setpoint is the plenum temperature that the burner will cycle from high-fire to low-fire. The cycle setpoint is set on the hi-lo thermostat.

Cool Cycle-The cool cycle is the cycle that the dryer enters into after the dry cycle is completed on Autobatch units. The dryer will not enter into the cool cycle until both the dry timer has reached zero and the grain temperature has reached the grain temperature setpoint set on the moisture control thermostat. If the moisture control thermostat switch is placed in the "off" position the dryer will ignore the grain temperature setpoint. During the cool cycle the burner(s) are off an the main drying fan(s) are running. When the cool timer reaches zero the dryer enters the dump cycle. There is not cool cycle on Autoflow units.

Cool Timer-The cool timer is located on the dryer control panel below the display screen. On Autobatch units it is a digital timer and controls how long to cool the grain in the drying chamber before dumping it into the storage chamber. There is no cool timer on Autoflow units.

Dry Cycle-The dry cycle is the cycle that the dryer is in when time is remaining on the dry timer or when the dryer is in temperature hold. The dry cycle start as soon as grain is above the drying chamber low level rotary switch and the fan and heater units are running.

Dry Timer-The dry timer is located on the dryer control panel below the display screen. On Autoflow units it is a digital timer and controls how long to dry the grain in the drying chamber before dumping it into the storage chamber. On Autobatch units it controls how long to dry the grain before cooling it in the cool cycle.

Dryer Control Panel-The dryer control panel is

located on the Autoflow Control Box. It contains the start and stop switches and the selector switches for the dryer. The dryer control panel also contains the screen where the dyer status and error messages are displayed.

Drying Chamber-The drying chamber is the section of the dryer where the drying of grain takes place. It is located in the upper chamber of the dryer and is separated from the storage chamber by a perforated drying floor. The fan and heater unit(s) are located below the drying floor and force air through the perforated floor to dry the grain. Leveling bands in the drying chamber keep the grain depth at 16"on Autoflow units and 32" on Batch units.

Drying Chamber High Level Rotary Switch-The drying chamber high level rotary switch is one of three rotary switches located in the drying chamber. The drying chamber high level rotary switch has a shaft of medium length when compared to the other two drying chamber rotary switches. The drying chamber high level rotary switch tells the computer when the drying chamber is full so the fill system(s) can be stopped, and also tells the computer when grain is needed in the drying chamber so the fill system(s) can be started.

Drying Chamber Low Level Rotary Switch-The drying chamber low level rotary switch is one of three rotary switches located in the drying chamber. The drying chamber low level rotary switch has the longest shaft of the three drying chamber rotary switches. The drying chamber low level rotary switch tells the computer when grain has covered the peak in the drying chamber so the drying fan(s) can start, and warns the computer if the drying chamber were to empty unexpectedly.

Drying Chamber Overflow Rotary Switch-The drying chamber overflow rotary switch is one of three rotary switches located in the drying chamber. The drying chamber overflow rotary switch has the shortest shaft of the three drying chamber rotary switches. The drying chamber overflow rotary switch warns the computer when grain is getting too high in the drying chamber.

Dump Cycle-On Autoflow units the dump cycle is the cycle entered into after completion of the dry cycle. The dryer will not enter into the dump cycle until both the dry timer has reached zero and the grain temperature has reached the grain temperature setpoint set on the moisture control thermostat. If the moisture control thermostat switch is placed in the "off" position the dryer will ignore the grain temperature setpoint. On Autobatch units the dump cycle is entered into after the cool cycle.

Fan Delay-The fan delay is not used in single fan units. In two fan units it is the delay between the starting of the master drying fan and the starting of the slave drying fan. The fan delay is used to prevent the excessive current draw experienced when two large fan motors start at the same time. The fan delay is programmed into the computer by the user in the set-up mode detailed later.

Fill System #1-Fill system #1 is the fill system that is controlled by the Autoflow and loads wet grain directly into the drying chamber. Fill system #1 is always present in an Autoflow system. The motor starter for fill system #1 is located in the Fill System Control Box.

Fill System #2-Fill system #2 is the fill system that is controlled by the Autoflow and loads grain into fill system #1. Fill system #2 shuts down in normal operation before fill system #1 to allow fill system #1 to clean out before it shuts off. Fill system #2 is not required for proper operation of the Autoflow unit; however, the computer must be instructed on the number of fill systems the unit has. This is done in the set-up mode detailed later. The motor starter for fill system #2 is located in the Fill System Control Box.

Fill System Control Box-The fill system control box houses the motor starters for the fill system(s) and the aeration fan. The fill system control box is mounted on the bin sidewall.

Grain Temperature Setpoint-On Autoflow units the grain temperature setpoint is the temperature that the grain must reach before the dryer will continue from the dry cycle to the dump cycle. On Autobatch units the grain temperature setpoint is the temperature that the grain must reach before the dryer will continue to the cool cycle. The grain temperature setpoint is set at the moisture control thermostat on the dryer control panel.

High-Fire-High fire is the state the burner is in when the plenum temperature is below the cycle setpoint set on the hi-lo thermostat. When the unit is in high-fire the plenum temperature should be on an upward climb. When the unit is in high-fire the gas pressures should be set around 15 lbs. for liquid propane units and 6 lbs. for natural gas units. The gas pressures required to obtain the desired temperature rise may vary with ambient air conditions.

Hi-Lo Thermostat-The hi-lo thermostat is used by the unit to monitor the current plenum temperature. The cycle setpoint is set on the hi-lo thermostat. The hi-lo thermostat is also responsible for monitoring the plenum high limit detailed later. The hi-lo thermostat is attached to the master drying fan and is mounted on the bin sidewall even with the master drying fan. In two fan units do not mount the hi-lo thermostat between the master and slave fan and heater units.

Linear Actuator-The linear actuator is attached to the cable that controls the dump chutes. When the dryer enters into the dump cycle the linear actuator extends giving slack to the dump chute cable. When slack is given to the dump chute cable the dump chutes open dumping grain from the drying chamber into the storage chamber. The linear actuator is located in the actuator control box.

Load Delay-The load delay is not used in single fill systems. The load delay is located on the dryer control panel next to the display screen. The load delay controls how long fill system #2 runs after grain has reached the chamber high level rotary switch in units with two fill systems.

Low-Fire-Low-fire is the state the burner is in when the plenum temperature meets or exceeds the cycle setpoint on the hi-lo thermostat. When the unit is in low-fire the plenum temperature should be declining. When the unit is in low-fire the gas pressure should be set around 5 lbs. for liquid propane and 2 lbs. for natural gas. The gas pressure required to make the temperature fall in the plenum may vary with ambient air conditions.

Master Drying Fan-The master drying fan is located on the fan platform just beneath the drying chamber on the outside of the bin and is used to force heated air through the grain to dry it. The master drying fan is the only fan and heater in a single fan unit. In two fan units the master drying fan is the fan and heater with the airswitch and hi-lo thermostat.

Moisture Control Thermostat-The moisture control thermostat is located on the dryer control panel. The moisture control thermostat uses four temperature sensors located in the drying chamber to sense the grain temperature. The grain temperature setpoint is set on the moisture control thermostat.

Out of Grain Timer-The value set on the out of grain timer is the amount of time that grain has to reach the drying chamber low level rotary switch when the dryer is refilling after the dump cycle in an Autobatch system. When the dump cycle is complete the out of grain timer begins to count down. If grain does not reach the drying chamber low level switch before the out of grain timer reaches zero the dryer will give an

out of grain error and shut down. The out of grain timer is not used in an Autoflow system. The out of grain timer is located on the dryer control panel next to the display.

Plenum Temperature-The plenum temperature is the temperature of the air coming out of the fan and heater unit(s) that is being forced through the grain in the drying chamber. The plenum temperature is sensed by the hi-lo thermostat.

Purge Delay-The purge delay is a built-in delay used to prevent the ignition of the burner with raw gas in the bin. After proof of airflow has been established the computer starts counting down the purge delay to allow the fans to disperse any gases that may have accumulated in the bin before igniting. When the purge delay reaches zero the burner ignites and the drying begins. The purge delay is not set by the user.

Slave Drying Fan-The slave drying fan is not present in single fan units. In two fan units the slave drying fan is the fan and heater without the airswitch and hi-lo thermostat.

Storage Chamber-The storage chamber is the chamber where grain is cooled and stored. Hot dry grain is dumped from the drying chamber into the storage chamber during the dump cycle. A rotary switch warns the computer when the storage chamber is full.

Storage Chamber High Level Rotary Switch-The storage chamber high level rotary switch is located in the storage chamber, below the fan and heater unit(s). The storage chamber high level rotary switch warns the computer when the storage chamber is full.

Temperature Hold-Temperature hold is the state the dryer is in when the dry timer has reached zero but the grain temperature on the moisture control thermostat has not reached the grain temperature setpoint. The dryer will not enter into temperature hold unless the moisture control thermostat switch is placed in the "on" position. When the dryer is in temperature hold "temp hold" will be displayed on the screen on the dryer control panel.

Unload Delay-The unload delay is used in both single fill and double fill systems. The unload delay is located on the dryer control panel next to the display screen. In single fill systems the unload delay controls how long fill system #1 runs after the wet supply tank is emptied. In units with two fill systems the unload delay controls how long fill system #1 and fill system #2 run after the wet supply tank is emptied.

Unload Timer-The unload timer is located on the dryer control panel below the display screen. It is a digital timer and controls how long the dump chutes remain open during the dump cycle. The setting of the unload timer will be detailed later.

Wet Storage Tank-the wet storage tank temporarily stores the wet grain that is to be loaded into the drying chamber and dried. A wet storage tank can be a hopper tank or a flat bottom bin.

Wet Supply Rotary Switch- The wet supply rotary switch is located in the wet storage tank. The wet supply rotary switch warn the computer when the wet storage tank is empty.

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, and system integrity. Enter the drying chamber and check each dump hopper. Remove any obstructions. Test operate the dryer using the pre-season checklist.

There are three fundamental things to control with the Autoflow Top Dry (or any dryer); the drying rate, grain flow rate, and the drying air temperature. We consider the best temperature to be the highest one where the desired grain quality is maintained. Corn used for live stock consumption is dried at a maximum recommended temperature of 200° Fahrenheit. Corn used for different applications, and other grains may require lower drying temperatures. By selecting a drying air temperature a drying rate is established. To achieve a desired final grain moisture content, the grain flow rate is adjusted to match the drying rate.

Initial Dryer Start Up

1) Be sure the control power switch is off. Turn on the main power supply disconnect for the Autoflow control box, fan and heaters, and all fill systems.

2) Pull out the emergency stop switches on the Autoflow control box, fill systems control box, actuator control box, and fan/ heater.

3) Set the switches on the Autoflow control box as follows:

Moisture Control switch	*On*
Aeration Fan switch	*Auto*
Load Auger switch	*Off*
Fan switch	*Auto*
Heater switch	*Auto*
Dump switch	*Auto*
Dry and Hold switch	*Off*
24 Volt Power switch	*On*

4) Make sure there is wet grain in the wet supply tank.

5) Turn the control power switch to the “on” position.

6) The screen will display a copyright message and software version number, total running time in hours and minutes and the model number, and the serial number and c current time and date.

7) When the serial number and current time and date are displayed press the reset button twice to get to the main drying screen. The screen should read “STOPPED”. The chamber high level and the chamber low level should both read “NO”.

8) Set the dry timer using the following charts for specific bin size, fan and heater size, drying temperature and grain input moisture content.

9) Set the unload timer as follows:

18’ diameter bin=30 seconds
21’ diameter bin=33 seconds
24’ diameter bin=36 seconds
27’ diameter bin=39 seconds
30’ diameter bin=42 seconds
36’ diameter bin= 36 seconds

10) Set all other delays and timers as prescribed in the Electronic Monitoring Control section of this manual.

11) Press the reset button for timer changes to take effect immediately.

12) Set the grain temperature setpoint on the moisture control thermostat according to the chart below.

13) Press the start switch on the dryer control panel.

14) CAUTION! Be sure all personnel are clear of fill systems. Place the load auger switch on the dryer control panel to the "auto" position.

15) The fill system(s) should start immediately.

16) When the grain reaches the drying chamber low level rotary switch the fan and heater(s) should start.

17) When the grain reaches the drying chamber low level rotary switch reaches the drying chamber high level rotary switch, the fill system(s) should stop.

18) When the dry timer reaches zero, the display should read "TEMP HOLD"

19) When the grain temperature reaches the grain temperature setpoint on the moisture control thermostat the dryer should continue to the dump cycle.

20) The dump chutes should lower, grain should dump from the drying chamber into the storage chamber, and the fill system(s) should start.

21) After the dump cycle the dryer should continue to the beginning of the next dry cycle.

22) Gather a large sample of grain.

23) Test the moisture of the grain sample.

24) If the moisture of the grain is too high increase the grain temperature setpoint on the moisture control thermostat five degrees for each additional point of moisture to be removed.

25) If the moisture of the grain is too low decrease the grain temperature setpoint on the moisture control thermostat five degrees for each additional point of moisture to be added.

26) After the moisture control thermostat is adjusted, decrease the time on the dry timer by one-half. The dry timer should not be set lower than the amount of time it takes the dryer to refill after the dump cycle.

27) Restart the dryer. The time on the dry timer should expire before the grain reaches the temperature setpoint on the moisture control thermostat.

28) Any time a change is made on the moisture control thermostat the dryer must dump four times before the full effect of the change will be made on the moisture of the grain.

180° drying temperature	=	100° grain temperature setpoint
170° drying temperature	=	103° grain temperature setpoint
160° drying temperature	=	105° grain temperature setpoint
150° drying temperature	=	108° grain temperature setpoint
140° drying temperature	=	110° grain temperature setpoint*
130° drying temperature	=	113° grain temperature setpoint*
120° drying temperature	=	115° grain temperature setpoint*

*When drying at a temperature lower than 150° the grain temperature setpoint on the moisture control thermostat may require a lower setting at night.

Last Fill

1) Stop the dryer when all the wet grain has been loaded into the drying chamber.

2) Set the time on the dry timer for twice the recommended amount using the following charts for the specific bin size, fan and heater size, drying temperature and grain input moisture content.

3) Push the reset button.

4) Turn the dry and hold switch to the “on” position.

5) Turn the load auger switch to the “off” position.

6) Press the start switch.

7) When the dryer shuts down install the fan inlet cover(s).

8) Let the aeration fan cool the grain in the top and store, or manually dump into the storage chamber.

TOP DRY AUTOFLOW SERIES
DRYING RATES FOR SHELLED CORN

AUTO FLOW SERIES			18' Dia.	1-Fan	21' Dia.	1-Fan	24' Dia.	1-Fan	24' Dia.	2-Fan	27' Dia.	1-Fan	27' Dia.	2-Fan
FAN & HEATER Unit(s)	**Plenum Temperature (fahrenheit)**	**Moisture Content Wet Basis**	**BU/HR**	**Minutes Between Dumps**	**BU/HR**	**Minutes Between Dumps**	**BU/HR**	**Minutes Between Dumps**	**BU/HR**	**Minutes Between Dumps**	**BU/HR**	**Minutes Between Dumps**	**BU/HR**	**Minutes Between Dumps**
		20%	401	15.9					729	15.6			783	18.4
	160	25%	254	25.2					462	24.6			496	29.1
10 - 12 H.P.		30%	159	40.4					288	39.5			310	46.6
36" FAN		20%	* 513	* 12.4					933	12.2			1,002	14.4
3.5 MILLION	180	25%	* 325	* 19.7					591	19.2			634	22.7
BTU/HR		30%	* 203	* 31.5					369	30.9			396	36.4
		20%	* 601	* 10.6					* 1,092	* 10.4			* 1,173	*12.3
3 hp 18"	200	25%	* 381	* 16.8					* 692	* 16.4			* 743	* 19.4
Inline Centrifugal		30%	* 238	* 26.9					* 432	* 26.3			* 464	* 31.1
		20%	428	14.9	499	17.4	528	21.6			541	26.6	882	16.3
	160	25%	271	23.6	316	27.6	334	34.1			343	42.0	559	25.8
10-16 H.P.		30%	169	37.8	197	44.2	209	54.6			214	67.4	349	41.3
36" FAN		20%	548	11.6	639	13.6	* 675	* 16.8			* 692	* 20.8	1,129	12.7
4.5 MILLION	180	25%	347	18.4	404	21.5	* 428	* 26.6			* 439	* 32.8	715	20.1
BTU/HR		30%	217	29.5	253	34.5	* 267	* 42.6			* 274	* 52.6	446	32.3
		20%	642	9.9	* 748	* 11.6	* 791	* 14.4			* 811	* 17.7	1,321	10.9
3 hp 18"	200	25%	406	15.7	* 474	* 18.4	* 501	* 22.7			* 514	* 28.0	837	17.2
Inline Centrifugal		30%	254	25.2	* 296	* 29.5	* 313	* 36.4			* 321	* 44.9	523	27.6
		20%			584	14.9	648	17.5			682	21.1		
	160	25%			370	23.5	411	27.7			432	33.4		
10-16 H.P.		30%			231	37.7	256	44.4			270	53.5		
42" FAN		20%			748	11.6	* 830	* 13.7			* 872	* 16.5		
5.75 MILLION	180	25%			473	18.4	* 525	* 21.6			* 552	* 26.1		
BTU/HR		30%			296	29.5	* 328	* 34.7			* 345	* 41.8		
		20%			* 875	* 9.9	* 971	* 11.7			* 1,021	* 14.1		
3 hp 18"	200	25%			* 554	* 15.7	* 615	* 18.5			* 647	* 22.3		
Inline Centrifugal		30%			* 346	* 25.2	* 384	* 29.6			* 404	* 35.7		
		20%					675	16.8			710	20.3		
	160	25%					428	26.6			449	32.1		
20 H.P.		30%					267	42.6			281	51.3		
42" FAN		20%					864	13.1			908	15.8		
6.75 MILLION	180	25%					547	20.8			575	25.0		
BTU/HR		30%					342	33.3			359	40.1		
		20%					1,012	11.2			* 1063	* 13.5		
3 hp 18"	200	25%					641	17.7			* 673	* 21.4		
Inline Centrifugal		30%					400	28.4			* 421	* 34.3		
		20%					740	15.4			758	19.0		
	160	25%					469	24.3			480	30.0		
30 H.P.		30%					293	38.9			300	48.0		
42" FAN		20%					947	12.0			970	14.8		
8.75 MILLION	180	25%					600	19.0			615	23.4		
BTU/HR		30%					375	30.4			384	37.5		
		20%					1,109	10.2			1,136	12.6		
3 hp 18"	200	25%					702	16.2			720	20.0		
Inline Centrifugal		30%					439	25.9			449	32.1		
		20%									865	16.6		
	160	25%									548	26.3		
40 H.P.		30%									342	42.1		
42" FAN		20%									1,107	13.0		
10.25 MILLION	180	25%									701	20.5		
BTU/HR		30%									438	32.9		
		20%									1,296	11.1		
3 hp 18"	200	25%									821	17.5		
Inline Centrifugal		30%									513	28.1		

*Insufficient burner BTUs for 45 deg. ambient temp.

Est. at ambient temp 45 deg. F, rel.humidity 65%
Use only as a guide, conditions will vary capacities.

1/4 cfm cooling

TOP DRY AUTOFLOW SERIES
DRYING RATES FOR SHELLED CORN

AUTO FLOW SERIES			30' Dia.	1-Fan	30' Dia.	2- Fan	36' Dia.	1-Fan	36' Dia.	2-Fan
FAN & HEATER Unit(s)	**Plenum Temperature (fahrenheit)**	**Moisture Content Wet Basis**	**BU/HR**	**Minutes Between Dumps**	**BU/HR**	**Minutes Between Dumps**	**BU/HR**	**Minutes Between Dumps**	**BU/HR**	**Minutes Between Dumps**
		20%			819	21.7				
	160	25%			519	34.3				
10 - 12 H.P.		30%			324	54.9				
36" FAN		20%			* 1,048	* 16.9				
3.5 MILLION	180	25%			* 664	* 26.8				
BTU/HR		30%			* 415	* 42.9				
		20%			* 1,227	* 14.5				
5-7 hp 24"	200	25%			* 777	* 22.9				
Inline Centrifugal		30%			* 486	* 36.6				
		20%	557	31.9	939	18.9			993	25.8
	160	25%	353	50.4	595	29.9			629	40.7
10-16 H.P.		30%	220	80.8	371	47.9			393	65.2
36" FAN		20%	* 713	* 24.9	1,202	14.8			1,271	20.1
4.5 MILLION	180	25%	* 451	* 39.4	761	23.4			805	31.8
BTU/HR		30%	* 282	* 63.1	475	37.4			503	51.0
		20%	* 835	* 21.3	* 1,407	* 12.6			* 1,488	* 17.2
5-7 hp 24"	200	25%	* 529	* 33.6	* 891	* 19.9			* 943	* 27.2
Inline Centrifugal		30%	* 330	* 53.9	* 557	* 32.0			* 589	* 43.5
		20%	711	25.0	1,154	15.4			1,269	20.2
	160	25%	450	39.5	731	24.3			803	31.9
10-16 H.P.		30%	281	63.3	457	39.0			502	51.1
42" FAN		20%	* 909	* 19.5	1,477	12.0			1,623	15.8
5.75 MILLION	180	25%	* 576	* 30.9	936	19.0			1,028	24.9
BTU/HR		30%	* 360	* 49.5	584	30.4			642	39.9
		20%	* 1,065	* 16.7	* 1,730	* 10.2			* 1,901	* 13.4
5-7 hp 24"	200	25%	* 674	*26.4	* 1,096	* 16.2			* 1,204	* 21.3
Inline Centrifugal		30%	* 421	* 42.2	* 684	* 26			* 752	* 34.1
		20%	753	23.6					1,355	18.9
	160	25%	477	37.3					858	29.8
20 H.P.		30%	298	59.8					536	47.8
42" FAN		20%	963	18.4					1,734	14.7
6.75 MILLION	180	25%	610	29.1					1,098	23.3
BTU/HR		30%	381	46.7					686	37.4
		20%	* 1,128	* 15.7					* 2,030	* 12.6
5-7 hp 24"	200	25%	* 714	* 24.9					* 1,286	* 19.9
Inline Centrifugal		30%	* 446	* 39.9					* 803	* 31.9
		20%	806	22.0			819	31.3	1,452	17.6
	160	25%	511	34.8			519	49.4	920	27.8
30 H.P.		30%	319	55.8			324	79.1	574	44.6
42" FAN		20%	1,032	17.2			1,048	24.4	1,858	13.8
8.75 MILLION	180	25%	653	27.2			664	38.6	1,177	21.7
BTU/HR		30%	408	43.6			415	61.8	735	34.8
		20%	1,208	14.7			1,227	20.8	2,176	11.7
5-7 hp 24"	200	25%	765	23.2			777	32.9	1,378	18.6
Inline Centrifugal		30%	478	37.2			486	52.8	861	29.8
		20%	920	19.3			950	26.9		
	160	25%	583	30.5			602	42.6		
40 H.P.		30%	364	48.9			376	68.2		
42" FAN		20%	1,178	15.1			1,216	21.0		
10.25 MILLION	180	25%	746	23.8			770	33.3		
BTU/HR		30%	466	38.2			481	53.3		
		20%	1,379	12.9			1,424	18.0		
5-7 hp 24"	200	25%	873	20.3			902	28.4		
Inline Centrifugal		30%	545	32.6			563	45.5		

*Insufficient burner BTUs for 45 deg. ambient temp. Est. at ambient temp 45 deg. F, rel.humidity 65% 1/4 cfm cooling
Use only as a guide, conditions will vary capacities.

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