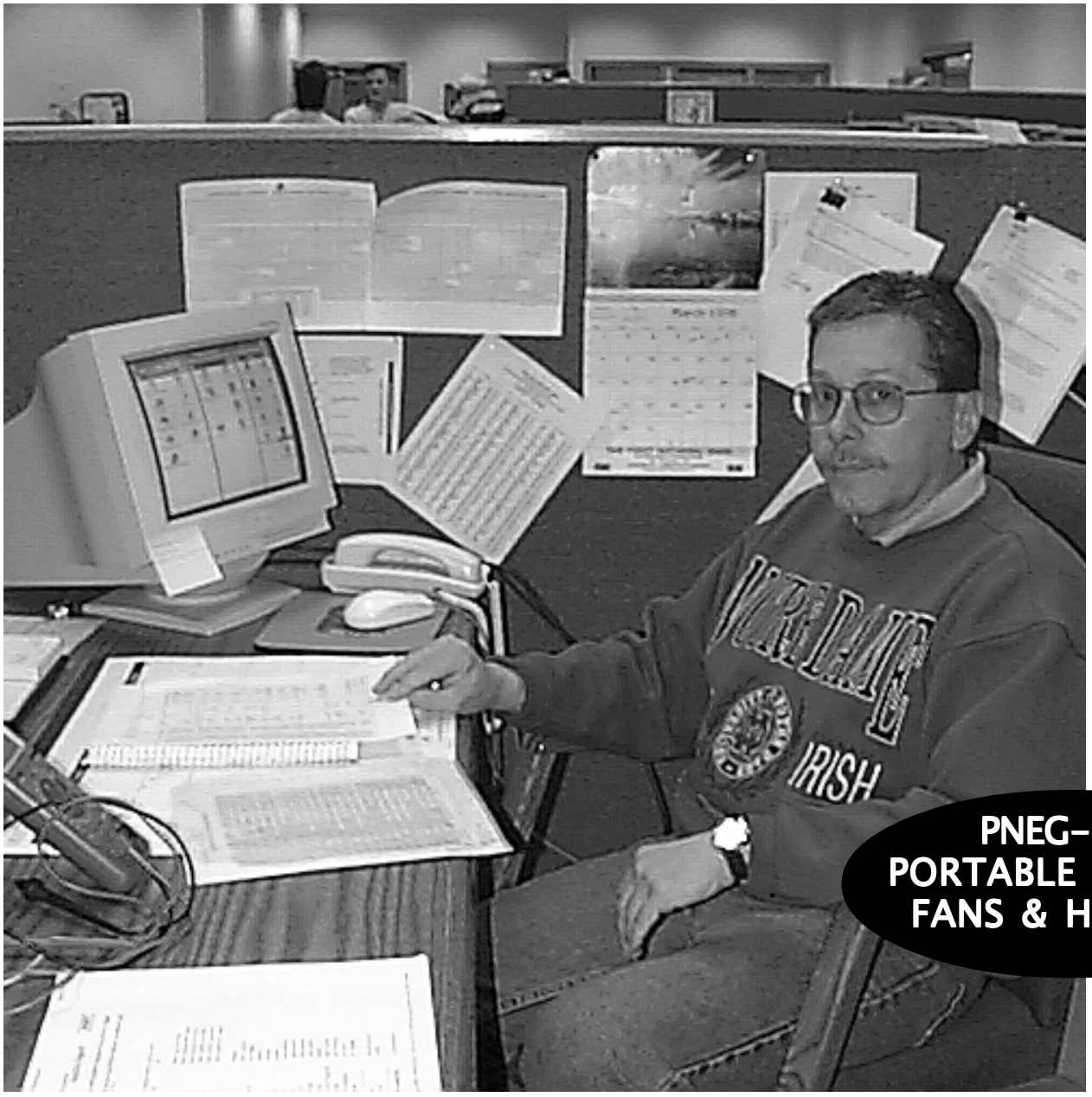
THE GSI GROUP, INC.

1998

SERVICE SCHOOL

GSI DRYING SYSTEMS



PNEG-573
PORTABLE DRYERS, FANS & HEATERS

GSI

a division of

THE GSI GROUP

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AIRSTREAM DRYER SERVICE

Thank you for choosing an Airstream product. These products are the finest built on the market today, and are designed to give excellent performance and service for many years.

This service school manual describes the operation and service for all portable grain dryers, including general grain drying information. Dryer models are available for liquid propane or natural gas fuel supply, with either single phase 230 volt, or three phase 220 or 440 volt electrical power (diesel and 380 volt options also available).

WARRANTY

Grain Systems, Inc. warrants its products to be free of defects in material and workmanship. The only obligation of the manufacturer is to repair or replace components which have been submitted and found to be defective within 24 months after installation of the dryer, and within 12 months of a fan or heater purchase. If so found to be defective, the components will be repaired or replaced without charge, this constituting and entirely fulfilling the warranty obligation. Grain Systems, Inc. assumes no liability for expenses incurred without written authorizations; in no event shall liability include special or consequential damages, or exceed the selling price of the product.

This warranty does not cover products or parts which have been damaged by negligent use, misuse, alteration or accident. Electric motors, tires, and other components supplied by outside manufacturers have separate warranties, from those suppliers. This warranty is exclusive and in lieu of all other warranties, expressed or implied. Grain Systems, Inc. reserves the right to make design or specification changes at any time, without any contingent obligations to purchasers of products already sold.

All instructions shall be construed as recommendation only. Because of the many variable conditions in actual installation, Grain Systems, Inc. assumes no liability for results arising from the use of such recommendations. Any alteration in design or operation of any Grain Systems, Inc. product must be submitted and approved in writing by Grain Systems, Inc. before the alteration is made.

Airstream Service Technician checks the wiring on a single module grain dryer.

SAFETY FIRST

Grain Systems, Inc.'s principle concern is your safety and the safety of others associated with grain handling equipment. This manual was written with that thought in mind. We want to keep you as a customer. This manual is to help you understand safe operating proceedures and some problems which may be encountered by the operator and other personnel.

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

SAFETY ALERT SYMBOL

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

WARNING! BE ALERT!

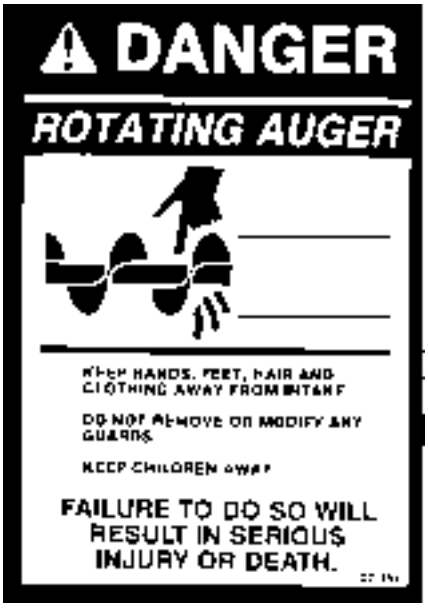
Personnel operating or working around grain drying equipment should read this manual. This manual must be delivered with equipment to its owner. Failure to read this manual and its safety instructions is a misuse of the equipment.

SAFETY ALERT DECALS

Grain Systems, Inc. recommends that you contact your local power company and have a representative survey your equipment installation so your wiring will be compatible with their system and you will have adequate power supplied to your unit.

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

A CAREFUL OPERATOR IS THE BEST INSURANCE AGAINST AN ACCIDENT



SAFETY ALERT DECALS

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

SAFETY PRECAUTIONS

1. Read and understand the operating manual before trying to operate the dryer, fan or heater.

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

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

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

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

6. Set **pressure regulator** to avoid excessive gas pressure applied to burner during ignition and when burner is in operation. See chart for operating procedures. Do not exceed maximum recommended drying temperature.

7. Keep the dryer clean. Do not allow fine material to accumulate in the **plenum chamber**. Also occasionally clean the **outside screens** of the dryer.

8. Keep **auger drive belts** tight enough to prevent slippage.

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

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

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

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

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

READ THESE INSTRUCTIONS BEFORE OPERATION AND SERVICE

SAVE FOR FUTURE REFERENCE

USE CAUTION IN THE OPERATION OF THIS EQUIPMENT

The design and manufacture of a dryer is directed toward operator safety. However, the very nature of a grain dryer having a **gas burner**, high voltage **electrical equipment** and high speed **rotating parts**, does present a hazard to personnel which can not be completely safeguarded against, without interfering with efficient operation and reasonable access to components.

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

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

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

Take special note of the safety precautions listed before attempting to operate a dryer, fan or heater.

C-SERIES DRYER CONTROL PANEL

C-SERIES DRYER CONTROL PANEL

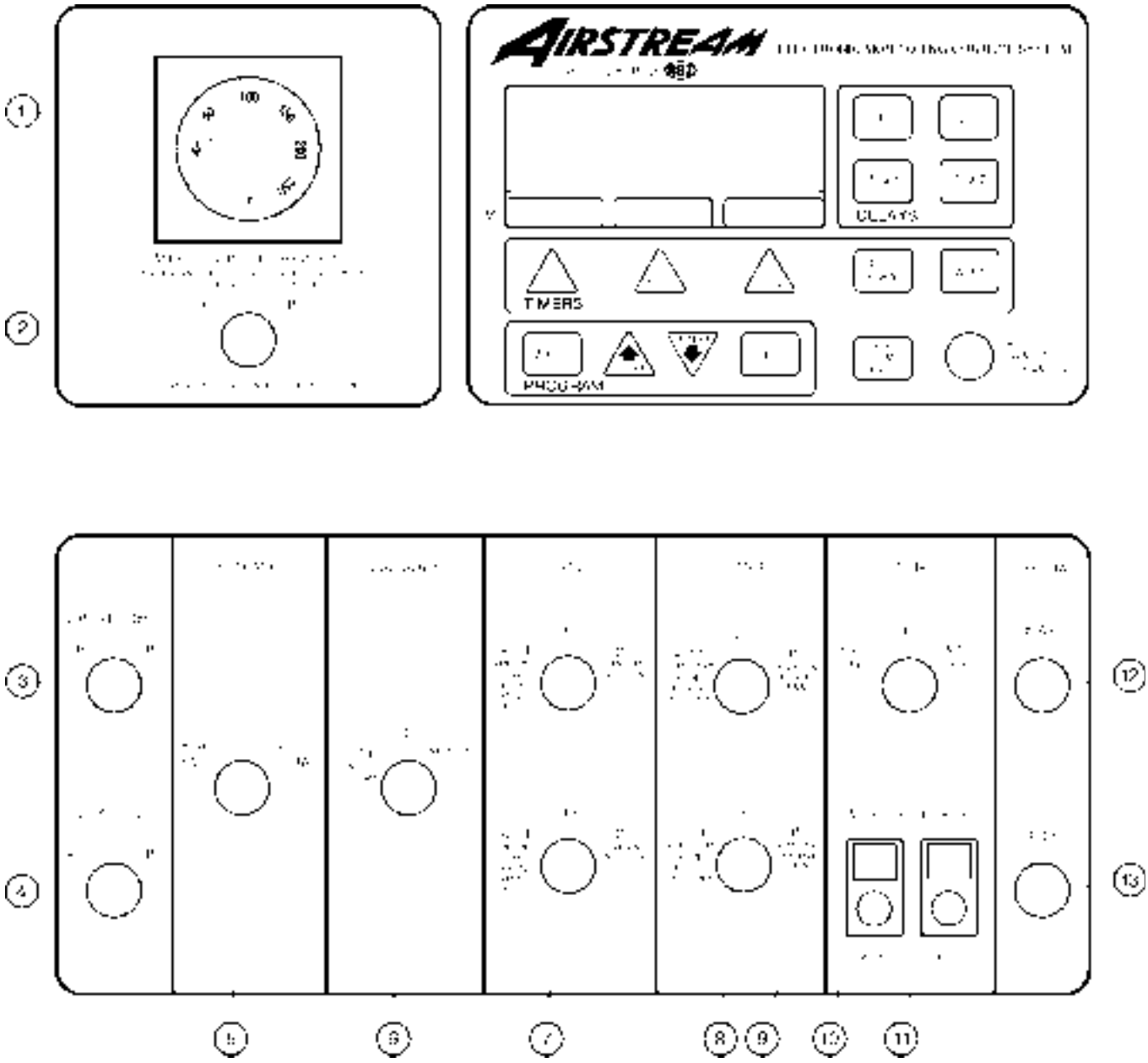


Figure 1: The C-Series grain dryer control panel with the Electronic Monitoring Control System in the upper right panel.

C-SERIES 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(1)

This electronic THERMOSTAT controls the moisture level of discharged grain by sensing grain column temperature.

MOISTURE CONTROL SWITCH(2)

This switch turns the power ON or OFF to the MOISTURE CONTROL THERMOSTAT. It lights up when the grain column temperature is below the thermostat set point.

C-SERIES DRYER CONTROL PANEL

CONTROL POWER SWITCH(3)

The power to the **Electronic Monitoring Control System** is turned ON or OFF with this switch.

OUTSIDE LIGHT(4)

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

DRYING MODE SWITCH(5)

This is used to select STAGED BATCH or CONTINUOUS FLOW drying. The switch will light only after the **Electronic Monitoring Control System** has been turned ON, the safety circuit is okay and the RESET button on the control panel has been pressed.

LOAD AUGER SWITCH(6)

This is used to select the operation of the **load auger**. In both the AUTO and MANUAL position the **load auger** will operate if the dryer is low on grain and will automatically shut off when the dryer is full. In the AUTO position only, the dryer will shutdown after a preset period of time set on the OUT OF GRAIN TIMER, or if grain flow is interrupted to the dryer. The switch will light whenever the **load auger** is operating.

(Note: When this switch is set to AUTO or MANUAL it also controls the operation of any **auxiliary load equipment** being utilized, such as an **auxiliary auger or conveyor.**

FAN SWITCHES(7)

Each **fan** is turned ON or OFF with this switch. The ON position operates the **fan** continuously during STAGED BATCH and CONTINUOUS FLOW modes. The AUTO position operates the **fan** in STAGED BATCH during the dry and cool cycle. The switch will light up whenever the airflow switch is sensing airflow and the dryer is full of grain.

HEATER SWITCHES(8)

This switch is used to turn the **burner** ON or OFF. The AUTO position operates the **burner** in STAGED BATCH during the dry cycle. The ON position will operate the **burner** only when the **fan** is running. The switch will light up only when the flame sensor detects the flame.

UNLOAD SWITCH(9)

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

- In the 2 SPEED position if the MOISTURE CONTROL switch is ON, and the DRYING MODE switch is turned to CONTINUOUS FLOW, the METERING ROLL SPEED will alternate between the HIGH speed metering roll potentiometer setting and the LOW speed metering roll potentiometer setting depending on the control signal from the MOISTURE CONTROL THERMOSTAT. The **discharge auger** will operate continuously.

- In the 1 SPEED position, if the MOISTURE CONTROL switch is ON, and the DRYING MODE switch is turned to CONTINUOUS FLOW, the METERING ROLL SPEED will operate at the HIGH speed metering roll potentiometer setting or turn OFF depending on the control signal from the MOISTURE CONTROL THERMOSTAT. The **discharge auger** will operate whenever the **metering rolls** are operating.

- In both the 1 SPEED or the 2 SPEED position, if the MOISTURE CONTROL THERMOSTAT is OFF, and the DRYING MODE switch is turned to CONTINUOUS FLOW, the METERING ROLL SPEED can be manually controlled by adjusting the HIGH speed metering roll potentiometer. The **discharge auger** will operate continuously.

- If the DRYING MODE switch is turned to STAGED BATCH, the UNLOAD switch should be set to the 1 SPEED position. The **discharge auger and metering rolls** will only operate during the unload cycle of the staged batch operation, and the METERING ROLL SPEED is adjusted using the HIGH speed metering roll potentiometer.

Note: When this switch is set to AUTO or MANUAL it also controls the operation of any **auxiliary load equipment** being utilized, such as an **auxiliary auger or conveyor**.

C-SERIES DRYER CONTROL PANEL

LOW SPEED METERING ROLL POTENTIOMETER(10)

This is used to adjust the LOW speed of the **metering roll** when the 2 SPEED and MOISTURE CONTROL THERMOSTAT are in use.

HIGH SPEED METERING ROLL POTENTIOMETER(11)

This is used to:

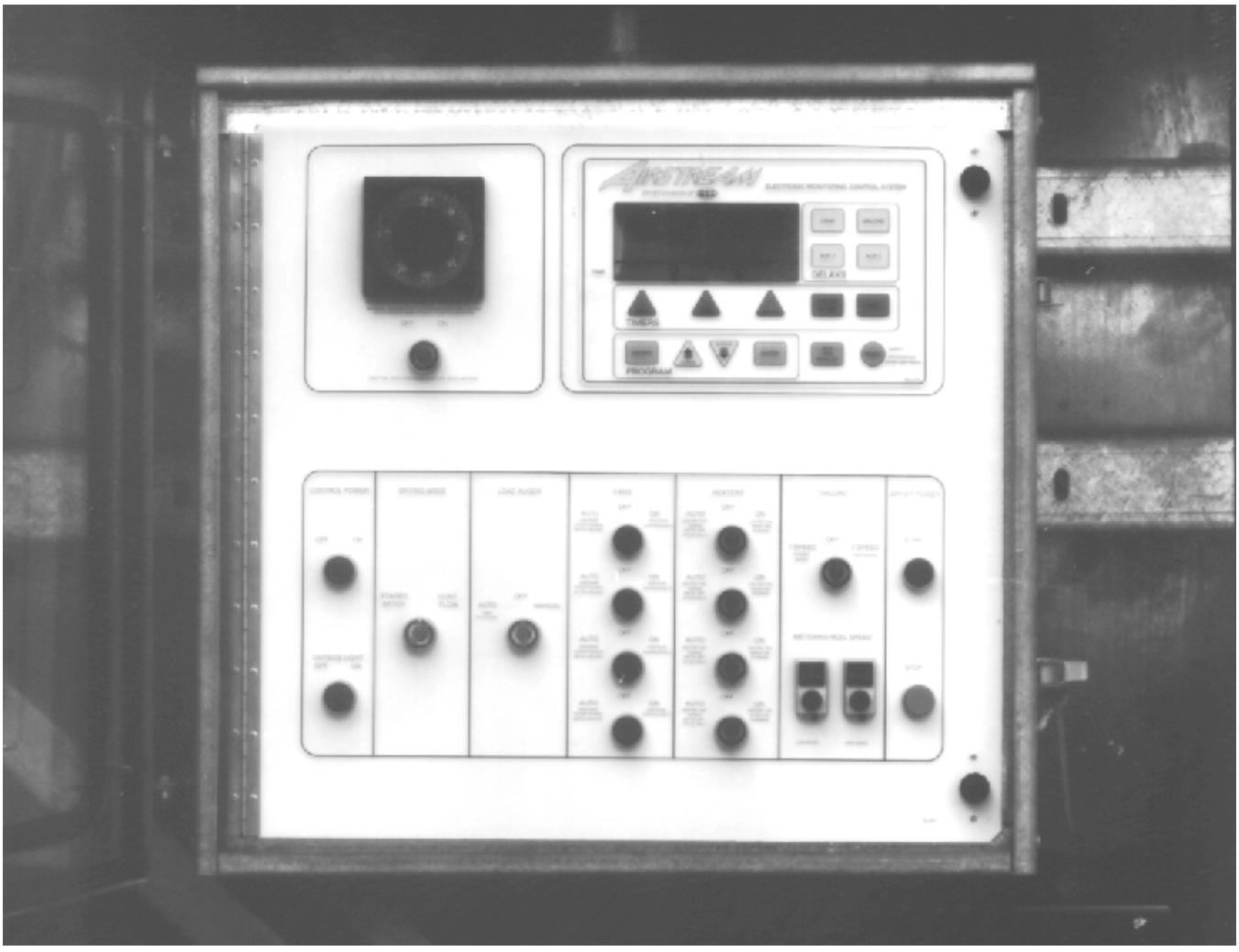
- Set the HIGH speed of the **metering roll** when the 2 SPEED automatic moisture control feature of the dryer is utilized.
- Set the speed of the **metering rolls** when the 1 SPEED automatic moisture control feature of the dryer is utilized.
- Set the speed of the **metering rolls** during continuous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

DRYER POWER START SWITCH(12)

This switch starts and operates the dryer based on switch settings. If other switch settings are in the OFF position, individual dryer components can be operated by turning the DRYING MODE switch to CONTINUOUS FLOW, pressing the DRYER POWER START button and then turning ON the desired dryer component.

DRYER POWER STOP SWITCH(13)

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



An Airstream C-Series Dryer Control Panel (four fan model) mounted on the dryer.

C-SERIES DRYER CONTROL PANEL

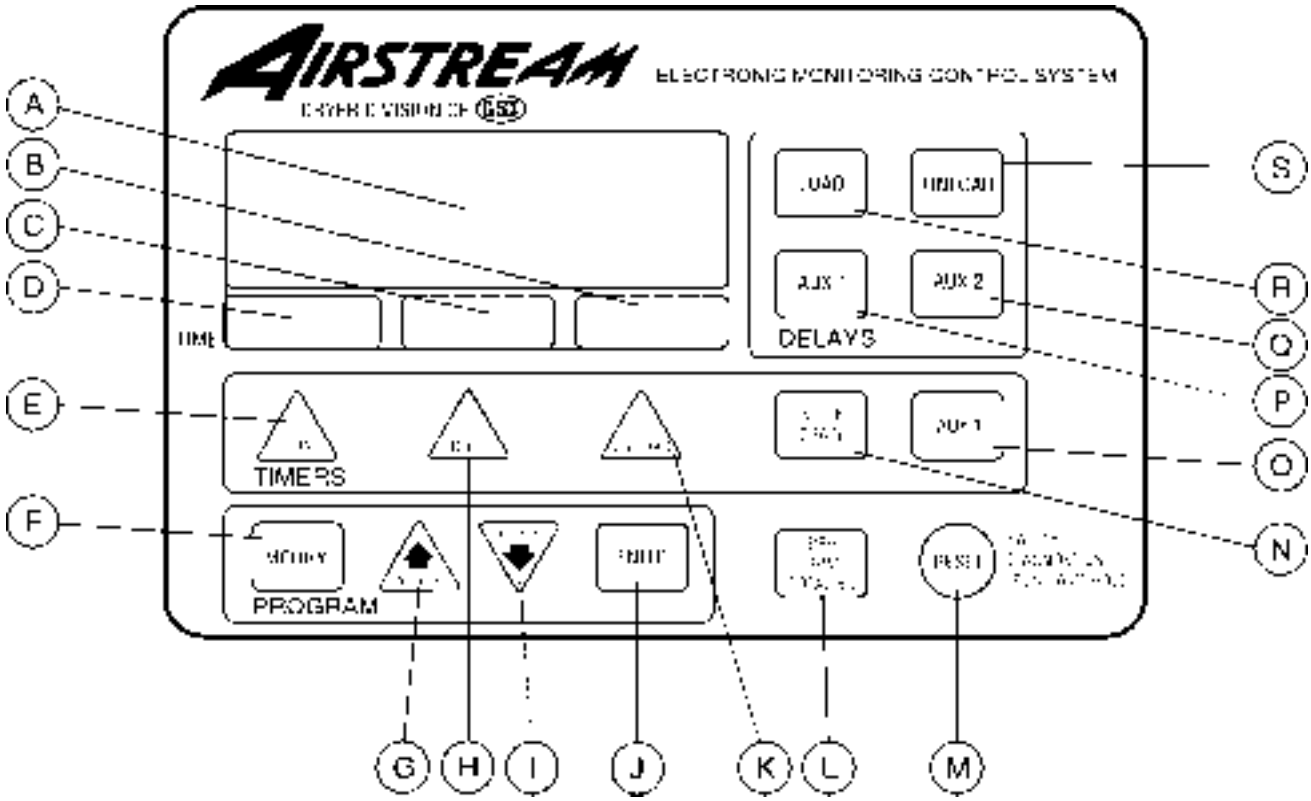


Figure 2: The C-Series Airstream Electronic Monitoring Control System.

ELECTRONIC MONITORING CONTROL SYSTEM

The **Electronic Monitoring Control System** (fig. 2) 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 ON. The monitor will display a copyright message and model number, total running time in hours and minutes and the current time and date (fig. 2-A). To activate the controller press the RESET button (fig. 2-M).

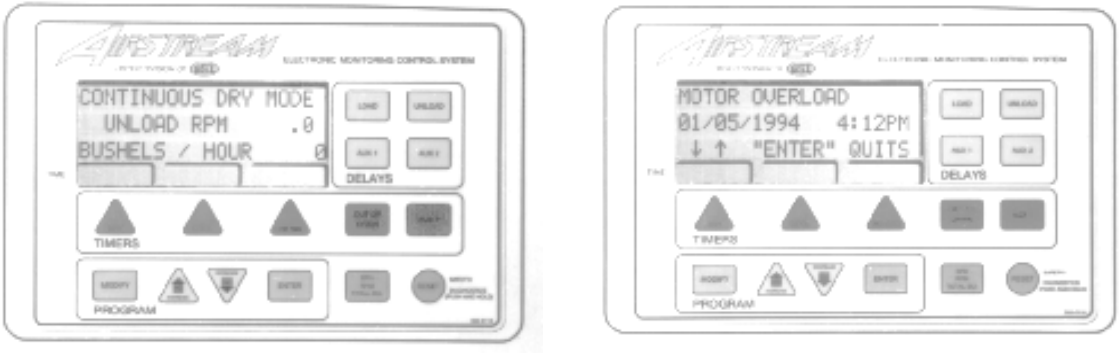
SETTING THE DRY, COOL, UNLOAD AND BATCH TIMERS

The DRY, COOL and UNLOAD timers (fig. 2-E, H, K) are used to set the cycle times in the STAGED BATCH DRYING MODE only. To use and display the settings on these three TIMERS, the DRYING MODE switch (fig. 1-6) must be in the STAGED BATCH position. The current setting on these three TIMERS is displayed directly above each TIMER button (fig. 2-B, C, D). To change the setting of these TIMERS follow these instructions:

1. Press the DRY, COOL or UNLOAD TIMER button (fig. 2-E, H, K).
2. Press the MODIFY button (fig. 2-F).
3. Press the INCREASE or DECREASE (fig. 2-G, I) button to adjust the settings.
4. Press the ENTER button to enter new setting into the controller (fig. 2-J).

After the DRY, COOL or UNLOAD button is pressed, screen messages on the LCD display of the **Electronic Monitoring Control System** direct the dryer operation through the proper sequence for setting the TIMERS. During operation the remaining time on each TIMER is displayed. If the power goes out or if the dryer is stopped, these times are saved by the controller. When the dryer is restarted the TIMERS will continue timing down from these times. They will return to their initial setting if the RESET button (fig. 2, M) is pushed.

C-SERIES DRYER CONTROL PANEL



The Airstream Electronic Monitoring Control System showing several different LCD displays.

SETTING THE OUT OF GRAIN TIMER

If the dryer runs out of grain while the LOAD AUGER switch (fig. 1-7) is in the AUTO position, the OUT OF GRAIN timer (fig. 2-N) automatically shuts OFF the dryer after the period of time preset on the TIMER. When pressed, the display will show the amount of time left on the TIMER and the percentage of time used by the last load. A second screen will appear with the TIMER'S setting, and may be modified as described in the BATCH TIMER section.

SETTING THE LOAD AND UNLOAD DELAYS

The **Electronic Monitoring Control System** has four built in TIMER delays. The LOAD DELAY (fig. 2-R) is used to delay the starting of the **load auger** when the dryer is unloading to prevent the **load auger** from starting and stopping. The UNLOAD DELAY (fig. 2-S) is used to control the amount of time the **unload auger** runs after the **metering rolls** stop to allow for **auger** cleanout. Both the LOAD and UNLOAD DELAYS are set using the same procedure as the TIMERS. The AUX 1 (fig.2-P) and AUX 2 (fig. 2-Q) DELAYS are presently not being used.

UTILIZING THE BUSHEL COUNTER

When the dryer is operating, the LCD display (fig. 2-A) shows the DRYER MODE OF OPERATION on the first line, the BUSHELS PER HOUR or the METERING ROLL RPM on the second line and the TOTAL BUSHELS DRIED on the third line. By pressing the BPH/RPM/TOTAL BU button (fig. 2-L) the second line will alternate between the METERING ROLL RPM's or the BUSHEL PER HOUR rate that the **metering rolls** are removing grain from the dryer. The TOTAL BUSHELS DRIED reading is the total since the bushel counter was last reset. To reset the BUSHEL COUNTER, press and hold the RESET button (fig. 2-M) for five seconds. Press the ENTER button (fig. 2-J) through the date and time settings, and follow the instructions displayed on the LCD for resetting the counter.

In the BATCH MODE, the first line of the LCD display tells which TIMER is being used, and the second line switches between TOTAL BATCHES, UNLOAD RPM or TOTAL BUSHELS. The third line indicates TOTAL DRY TIME, and the fourth line is TIME REMAINING on the TIMERS.

DRYER SAFETY CIRCUIT

The **Electronic Monitoring Control System** continuously checks all safety circuits on the dryer, and will automatically shut the dryer down should a problem occur. The cause of the dryer shutdown will be displayed on the LCD display (fig. 2-A), and a beeper will sound on the controller. To restart the dryer after a safety shutdown, first correct the reason for the shutdown, and then press the DRYER POWER STOP (FIG. 1-14) button to reset the circuit. Press the START button (fig. 1-13).

The **Electronic Monitoring Control System** stores in its memory the time, date and cause for the last 25 dryer safety shutdowns. To review this information, hold the RESET button in for five seconds. The procedure for reviewing the safety circuit shutdown log will be displayed on the LCD display.

SAFETY CIRCUIT SHUTDOWN MESSAGES

BURNER VAPOR HIGH TEMPERATURE

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

BURNER WARNING FLAME NOT DETECTED

The **flame sensor** has failed to detect a burner flame indicating that the burner has failed to light. There is a problem with the flame sensing circuitry or the dryer is not getting burner fuel. The message will distinguish between burners.

FAN HOUSING HIGH TEMPERATURE

The **temperature high limit** located on the **fan/burner housing** has opened, indicating an over temperature condition has occurred towards the rear of the **fan/heater housing**. This control is set at 200°F and must be manually reset. The message will distinguish between fans.

BURNER SHUTDOWN LOSS OF AIRFLOW

The contacts in the **air switch** have opened due to insufficient airflow for the **burner** to operate. The message will distinguish between burners.

GRAIN DISCHARGE WARNING

The **lid on the grain discharge box** has opened, indicating that grain is backing up into the **discharge box**.

LOWER ADJUSTABLE GRAIN HIGH TEMPERATURE

An over temperature condition has occurred in the **right side** (left and right as viewed from behind the dryer) **grain column** causing the control to shut down the dryer. This control is adjustable from 80° to 220°F, and automatically resets itself when cool.

LOWER FIXED GRAIN HIGH TEMPERATURE

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

MOTOR OVERLOAD

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

OUT OF GRAIN WARNING/ UNLOAD CLEANOUT

The dryer has run low on grain, and the OUT OF GRAIN TIMER has timed out, shutting the dryer down. The **unload auger** will clean out the dryer if it is in continuous flow operation with the unload switch on.

12 VOLT POWER SUPPLY WARNING

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

L1 VOLTAGE LOST

The **left circuit breaker** located on the **input/output board** of the **Electronic Monitoring Control System** has tripped, or one of the hardware timers has shut down the dryer.

METERING ROLL DRIVE SYSTEM FAILURE

The **metering roll drive system** has failed to turn. A broken chain or jammed metering roll is a possible cause.

RIGHT METERING ROLL FAILURE

The **right** (as viewed from behind the dryer) **metering roll** has stopped turning, or the sensor has been damaged.

LEFT METERING ROLL FAILURE

The **left** (as viewed from behind the dryer) **metering roll** has stopped turning, or the sensor has been damaged.

PLENUM HIGH TEMPERATURE

An over temperature condition has occurred inside the **dryer plenum**. This control is a 300°F limit and automatically resets itself when cool. The message will distinguish between plenums.

AUXILIARY SAFETY SHUTDOWN

A shutdown has occurred due to an auxiliary installed safety feature.

FAN FAILURE NO AIRFLOW

The **air switch** contacts have opened. The **fan** may not be turning, or the **air switch** may need adjustment. The message will distinguish between fans.

FAN CANNOT START CHECK AIR SWITCH

The **air switch** contacts have closed prior to the **fan** starting, indicating a freewheeling **blade** or improper setting of the **air switch**. The message will distinguish between fans.

SERIES 2000 DRYER CONTROL PANEL

SERIES 2000 DRYER CONTROL PANEL

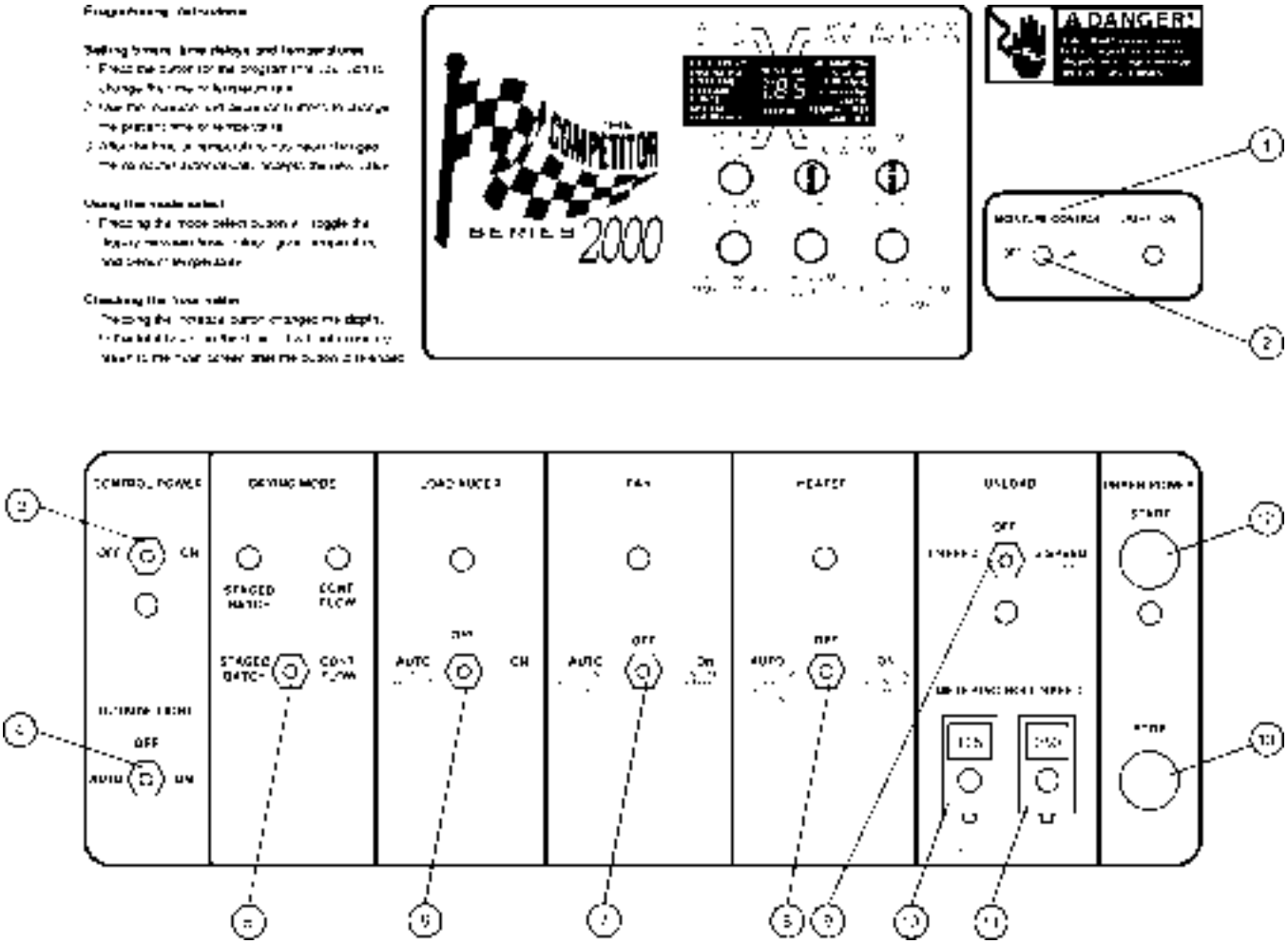


Figure 3: The grain dryer control panel.

DRYER CONTROL PANEL FEATURING THE COMPETITOR SERIES 2000 CONTROL SYSTEM

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

MOISTURE CONTROL(1)

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

MOISTURE CONTROL SWITCH(2)

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

CONTROL POWER SWITCH(3)

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

OUTSIDE LIGHT(4)

The dryer outside light is turned on or off here. In auto the light turns off if the dryer has a shutdown.

DRYING MODE SWITCH(5)

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

LOAD AUGER SWITCH(6)

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

Note: When this switch is set to AUTO or MANUAL it also controls the operation of any **auxiliary load equipment** being utilized, such as an **auxiliary auger or conveyor**.

FAN SWITCH(7)

The **fan** is turned ON or OFF with this switch. The ON position operates the **fan** continuously during STAGED BATCH and CONTINUOUS FLOW modes. The AUTO position operates the **fan** in STAGED BATCH during the dry and cool cycle. The light comes on only when air pressure is sensed.

HEATER SWITCH(8)

This switch is used to turn the **burner** ON or OFF. The AUTO position operates the **burner** in STAGED BATCH during the dry cycle. The ON position will operate the **burner** only when the **fan** is running. The burner light comes on only when flame is detected.

UNLOAD SWITCH(9)

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

- In the 2 SPEED position if the MOISTURE CONTROL switch is ON, and the DRYING MODE switch is turned to CONTINUOUS FLOW, the METERING ROLL SPEED will alternate between the HIGH speed metering roll potentiometer setting and the LOW speed metering roll potentiometer setting depending on the control signal from the MOISTURE CONTROL THERMOSTAT. The **discharge auger** will operate continuously.
- In the 1 SPEED position, if the MOISTURE CONTROL switch is ON, and the DRYING MODE switch is turned to CONTINUOUS FLOW, the METERING ROLL SPEED will operate at the HIGH speed metering roll potentiometer setting or turn OFF depending on the control signal from the MOISTURE CONTROL THERMOSTAT. The **discharge auger** will operate whenever the **metering rolls** are operating.
- In both the 1 SPEED or the 2 SPEED position, if the MOISTURE CONTROL THERMOSTAT is OFF, and the DRYING MODE switch is turned to CONTINUOUS FLOW, the METERING ROLL SPEED can be manually controlled by adjusting the HIGH speed metering roll potentiometer. The **discharge auger** will operate continuously.
- If the DRYING MODE switch is turned to STAGED BATCH, the UNLOAD switch should be set to the 1 SPEED position. The **discharge auger and metering rolls** will only operate during the unload cycle of the staged batch operation, and the speed of the **metering rolls** is adjusted using the HIGH speed metering roll potentiometer.

Note: When this switch is set to AUTO or MANUAL it also controls the operation of any **auxiliary load equipment** being utilized, such as an **auxiliary auger or conveyor**.

LOW SPEED METERING ROLL POTENTIOMETER(10)

This is used to adjust the LOW speed of the **metering roll** when the 2 SPEED automatic MOISTURE CONTROL is in use.

HIGH SPEED METERING ROLL POTENTIOMETER(11)

This is used to:

- Set the HIGH speed of the **metering roll** when the 2 SPEED automatic MOISTURE CONTROL is utilized.
- Set the speed of the **metering rolls** when the 1 SPEED automatic MOISTURE CONTROL is utilized.
- Set the speed of the **metering rolls** during CONTINUOUS FLOW operation when the MOISTURE CONTROL is not used.
- Set the rate of grain discharge from the dryer during the unload cycle of staged batch dryer operation.

DRYER POWER START SWITCH(12)

This switch starts and operates the dryer based on switch settings. If other switch settings are in the OFF position, individual dryer components can be operated by turning the DRYING MODE switch to CONTINUOUS FLOW, pressing the DRYER POWER START button and turning ON the desired dryer component.

DRYER POWER STOP SWITCH(13)

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 button to reset the dryer before restarting.

SERIES 2000 DRYER CONTROL PANEL

SERIES 2000 CONTROL SYSTEM

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

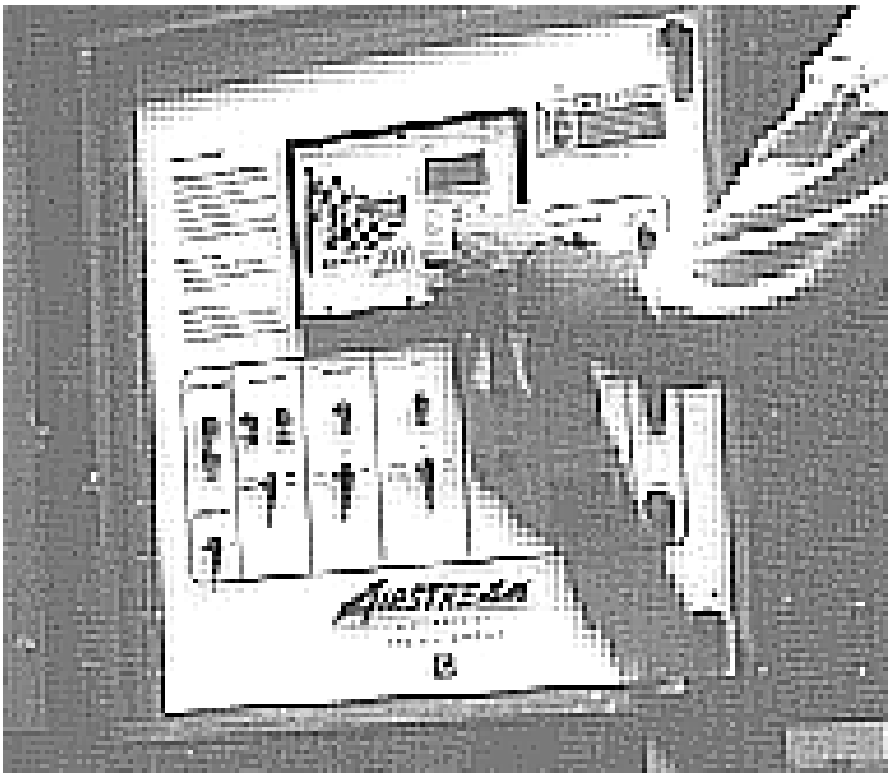
TURNING ON THE SERIES 2000 CONTROL SYSTEM

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

SETTING THE DRY, COOL, UNLOAD AND OUT OF GRAIN TIMERS

The DRY, COOL and UNLOAD timers set cycle times in the STAGED BATCH drying mode only. The DRYING MODE switch must be in the STAGED BATCH position. OUT OF GRAIN sets the length of time the dryer will run before shutting down when the LOAD switch is in the AUTO position. To change the setting of these timers follow these instructions:

1. Press the PROGRAM (TIMERS) button until the "carrot" is above the timer you want to modify.
2. Use the UP and DOWN arrow keys to change the present time to the desired setting. The new time is automatically accepted.
3. Keep pressing the PROGRAM (TIMERS) button until the carrot disappears or press the MODE SELECT button once to exit.



The Airstream Competitor Series 2000 Dryer Control Panel.

During the operation the remaining time on each timer is displayed on the screen. If the power goes out or if the dryer is stopped, these times are saved by the controller. When

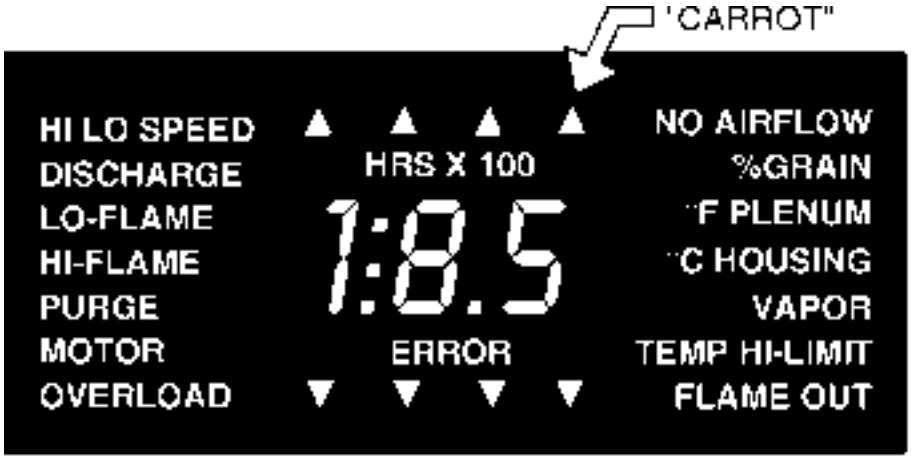


Figure 4: The dryer LCD display.

the dryer is restarted the timers will continue timing down. The timers will return to their initial settings by pressing and holding the STOP button for 5 seconds.

SETTING THE LOAD AND UNLOAD DELAYS

The LOAD DELAY is used to delay the starting of the **load auger** when the dryer is unloading to prevent the **load auger** from starting and stopping too often. The UNLOAD DELAY is used to control the amount of time the **unload auger** runs after the **metering rolls** stop to allow for auger cleanout.

1. Press the PROGRAM (DELAYS) button until the carrot is under the time delay to be changed.

2. Use the UP and DOWN arrow keys to change the present time to the new one. The new time is automatically entered.

3. Keep pressing the PROGRAM (DELAYS) button until the carrot disappears or press the MODE SELECT button once to exit.

SETTING THE MOISTURE CONTROL AND PLENUM SET POINT

1. Press the PROGRAM (TEMPERATURES) button until the carrot is under the temperature setting to be changed.

2. Use the UPand DOWN arrow keys to change the present temperature to the new one. The new time is automatically entered.

3. Keep pressing the PROGRAM (TEMPERATURES) button until the carrot disappears or press the MODE SELECT button once to exit.

DRYER SAFETY CIRCUIT

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

MONITORING GRAIN TEMPERATURES, PLENUM TEMPERATURE OR TIMERS

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

CHECKING THE HOUR METER

Press the UP arrow key and the total hours on the machine are displayed.

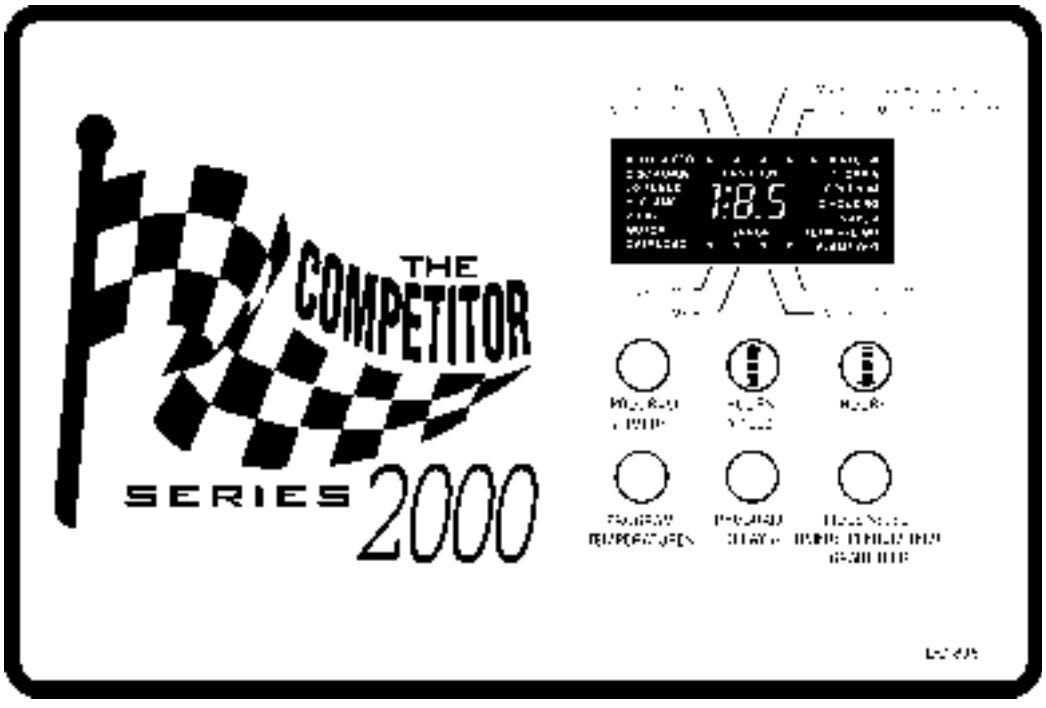


Figure 5: The Competitor Series 2000 Control System

SPECIAL FEATURES

EMERGENCY COOLING MODE

An emergency cooling mode can be entered by switching the next to the top switch (number seven) on the dip switch located inside the **control box** on the back of the **computer control board**. This will enable a mode, allowing the operator to run the dryer **fan** only, in the case there is a plenum temperature or grain high limit warning. When either of these safeties shuts down the dryer, you can run the **fan** to help cool the grain and/or plenum high limit back down to a safe level. After changing the switch press the START button and only the **fan** will run for approximately five minutes.

BURNER ON/OFF OPERATION

The need has developed for an ON/OFF **burner** in recent years, due to changing fuel conditions, and also to aid in drying wheat or other low temperature grains in hot weather.

By moving the third switch (number six) on the dip switch located inside the **control box** on the back of the **computer control board**, the burner can be changed from a HI-LO **burner** to an ON/OFF **burner** operation. The **burner** will operate exactly the same as the HI-LO **burner**, however, when the set point is reached the **burner** is cycled off instead of going to a lower pressure. The vaporizer cools quicker and allows a closer tolerance on the set point.

SAFETY CIRCUIT SHUTDOWN MESSAGES

VAPOR HIGH TEMPERATURE

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

LOSS OF FLAME

The **flame sensor** has failed to detect a burner flame indicating that the **burner** has failed to light, there is a problem with the flame sensing circuitry or the dryer is not getting burner fuel. ***Before trying to reposition the flame probe, turn off the incoming power to the dryer at the main safety disconnect.***

HOUSING HIGH TEMPERATURE

The **temperature high limit** located on the **fan/burner housing** has opened, indicating an over temperature condition has occurred toward the rear of the **fan/heater housing** in an oblong covered electrical box. This control is set at 200°F and must be manually reset.

REAR DISCHARGE WARNING

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

MOTOR OVERLOAD

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

GRAIN HIGH TEMPERATURE

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

OUT OF GRAIN

The dryer has run low on grain, and the OUT OF GRAIN TIMER has timed out, shutting the dryer down. The **unload auger** will clean out the dryer if in CONTINUOUS FLOW operation.

PLENUM HIGH TEMPERATURE

An over temperature condition has occurred inside the **dryer plenum**. This control is a 300°F limit and automatically resets itself when cool. See emergency cooling mode above.

NO AIRFLOW

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

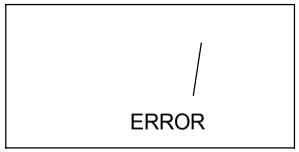
AIR

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

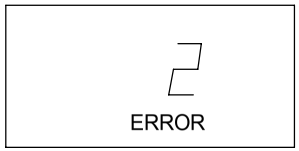
COMPETITOR ERROR CONDITIONS

ERROR CODE BREAKDOWN

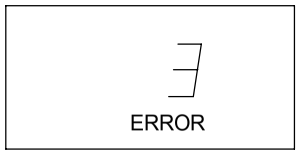
User switched from continuous flow to batch while dryer is running.



Grain temperature sensor open. One or both leads are off (open circuit) (SEE FIGURE 4)

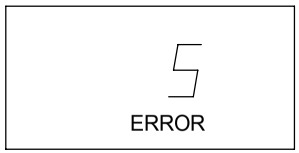


Grain temperature sensor leads are shorted together OR sensor is shorted. (See Figure 4)

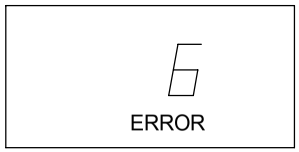


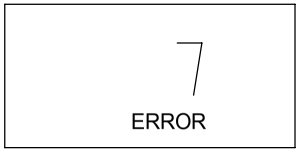
Plenum temperature sensor is open. One or both leads are off (open circuit) (See figure 4)

Plenum temperature senosr leads are shorted together OR sensor is shorted. (See figure 4)

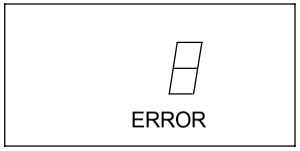


Flame probe shorted to AC ground.

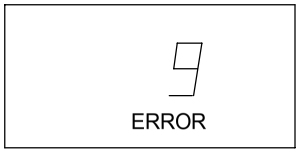




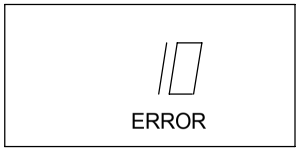
Illegal flame sense. Error 7 is most likely caused by stuck open solenoid. Error 7 will not shut down fan until loss of flame is detected by control. Error 7 may also be caused by a bad ballast resistor (ballast resistor not open between poles). It may also occur if 1 of the 12 volt DC limits is shorted to AC ground, or either temperature senosr is shorted to AC ground.



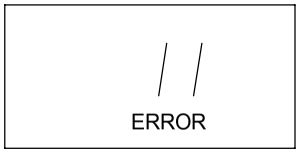
No safety circuit voltage.



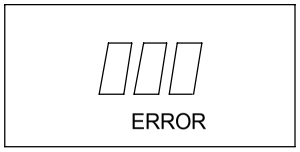
I/O board communication failure
I/O board and master have lost communication.



User supplied safety.



Mercoid gas pressure safety.



This indicates that one of the other on screen errors (vapor, plenum, housing temp hi-limit, flame out, no airflow, motor overload or rear discharge) has occured.

PRE START CHECKS FOR ALL PORTABLE DRYERS

PRE START CHECKS FOR ALL PORTABLE DRYERS

PRE SEASON INSPECTION

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

INSPECT THE METERING ROLLS

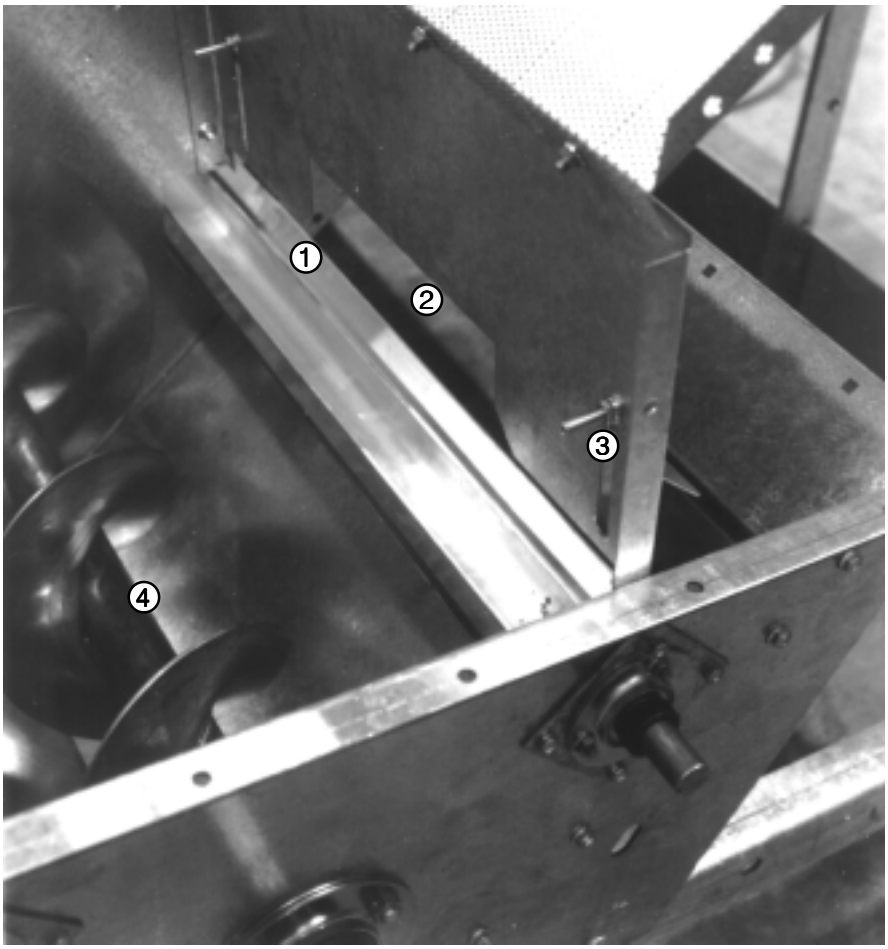
Open all **metering roll access doors** and inspect each compartment for any bolts, nuts or other foreign material, that may cause possible jamming of the **metering rolls**.

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

SET CONTROL SWITCHES

Moisture Control Switch-ON
Moisture Control Thermostat-MINIMUM TEMPERATURE
Adjustable Grain Hi-Limit-MAXIMUM TEMPERATURE*
Load Switch-OFF
Unload Switch-OFF
Fan Switches-OFF
Burner Switches-OFF
Out of Grain Timer-1 MINUTE
Load Delay-30 SECONDS
Unload Delay-30 SECONDS
Metering Roll Speed-LOW AND HIGH SPEED--000
Dry Timer-1 MINUTE
Cool timer-1 MINUTE
Unload timer-30 SECONDS
Mode Switch-CONTINUOUS FLOW

*On multi-fan models



The metering roll access area: 1-Metering roll, 2-Strike-off plate, 3-Adjusting bolt, 4-Unload auger.

ELECTRICAL POWER

Turn ON the **electrical power supply** to the dryer; set all **circuit breakers** to ON, including the **safety disconnect handle** mounted on the front of the **dryer power panel**.

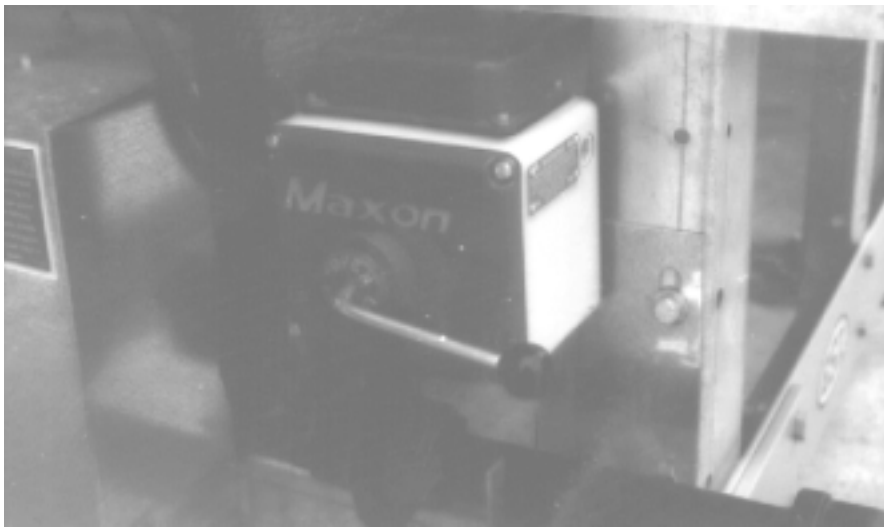
CONTROL POWER SWITCH

Turn the CONTROL POWER switch to ON. The switch will light up. A copyright message, model number, total running time in hours and minutes, current date and time will appear. At this point the controller will lock out all other dryer functions. Once the date and time appear, press RESET and the dryer will perform its safety circuit check. If a fault is found, the cause will be displayed on the LCD. If all are found safe, the controller will supply power to the **electronic fuel shut-off valve**, if so equipped, and the DRYING MODE switch will light up, indicating that the dryer is ready to be started.

POWER START BUTTON

Push the DRYER START button, and all the selector switches on the control panel will be activated.

PRE START CHECKS FOR ALL PORTABLE DRYERS



The Maxon safety shut off valve.

FUEL CHECK

If using LP gas, make sure the tank has plenty of fuel and that the tank does not have a regulator mounted to it. If using natural gas, make sure an adequate supply is available.

If using LP gas, slowly OPEN the main **fuel supply valve** at the tank. If using natural gas, turn ON the **valve** along the supply line. Then, OPEN the electronic **shut off valve** (Maxon valve), if so equipped, or OPEN the manual **shut off valve** on the dryer to allow fuel flow to the dryer. Inspect all **gas lines and connections** for possible leaks. ***Any gas leaks must be fixed immediately!***

LOAD AUGER

With the grain supply SHUTOFF, quickly bump the LOAD AUGER switch to MANUAL, and see if the **load auger** rotates clockwise as viewed from the drive end, or counterclockwise if the dryer is a front load model. If the wet grain supply auxiliary is wired to the dryer it should also rotate in the correct direction at this time. Turn the LOAD AUGER switch to the AUTO (timed shutdown) position. The **top auger** and **wet grain supply auxiliary** should run for one minute, and then the dryer will shutdown leaving the safety shutdown message OUT OF GRAIN WARNING displayed. Press the DRYER POWER STOP button to reset the panel, then press the START button.

ONE SPEED OPERATION

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

MOISTURE CONTROL THERMOSTAT

To check the MOISTURE CONTROL THERMOSTAT leave the UNLOAD switch on 1 SPEED, and slowly turn down the MOISTURE CONTROL THERMOSTAT. As the setting is increased, the indicator light should come on and the **metering rolls** should stop operating. The **bottom auger** will stop after the 30 second clean out delay, providing that the dryer is still being held by the MOISTURE CONTROL THERMOSTAT. Rotate the MOISTURE CONTROL THERMOSTAT down to its minimum setting. The light should go OFF, and the **metering rolls** should restart along with the **bottom auger** if it has stopped.

TWO SPEED OPERATION

To check 2 SPEED operation move the UNLOAD switch to the 2 SPEED position, set LOW speed on 200 and HIGH speed on 600. Slowly turn the THERMOSTAT until the MOISTURE CONTROL switch light comes ON. The metering roll speed is now controlled by the LOW speed dial. Turning the THERMOSTAT the other way until the light goes out leaves the **metering rolls** controlled by the HIGH speed dial.

METERING ROLL OPERATION

To check the **metering roll** operation turn either the LOW speed or HIGH speed knob clockwise, and the metering roll speed should INCREASE. Turning either knob counterclockwise will DECREASE the speed. Make

sure the **drive chain** tension is properly adjusted and all sections of the **metering rolls** rotate. Turn the UNLOAD switch OFF after these checks are complete. The **bottom auger** will continue to run for 30 seconds after the switch is turned OFF to allow for cleanout.

FAN SWITCHES

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

Note: If the dryer is empty, the **fans or burners** will not operate. The **fans** cannot create enough static pressure to engage the **air switch**. You will receive a LOSS OF AIRFLOW message.

BURNER SAFETY

To check the **burner** safety function, first make sure the main GAS VALVE is OFF. Turn the FAN switch ON and allow the **fan** to start. Then, turn the HEATER switch ON for that **fan**. The dryer will shut down after 20 seconds. The safety message, BURNER 1 WARNING FLAME NOT DETECTED will appear. Restart dryer and repeat other **fans/heaters**.

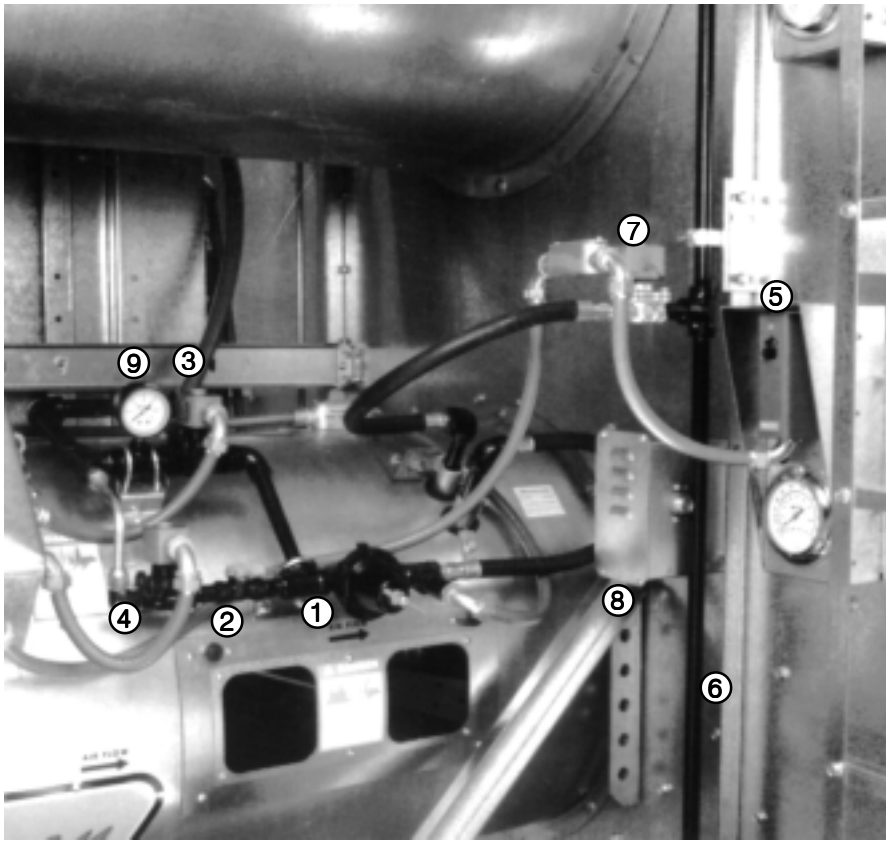
BURNER TEST FIRE

START the **fan** and turn the BURNER switch to ON. Turn ON the FUEL supply, and the **burner** should ignite after a short purge delay of approximately 10 seconds. Gas pressure should be shown on the gauge. Adjust the BURNER HI-LO FIRE THERMOSTAT to 200°F, causing the **burner** to operate on hi-fire. This **thermostat** is located on the front left side of the dryer. Observe the gas pressure on gauge, and turn the **thermostat** to its minimum setting, causing the **burner** to cycle into lo-fire. As the **burner thermostat** is turned down the gas pressure should also show a noticeable drop, indicating that the **hi-fire solenoid** is closed and the **burner** is being supplied with less gas through the **lo-fire control valve.** Set the hi-fire and lo-fire pressure settings. Use the PRESSURE REGULATOR for hi-fire and the ball valve for lo-fire. The **thermostat** should cycle between hi and lo, approximately 4 to 5 times per minute.

Approximate settings should be:

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

If the **burner** remains on hi-fire and does not cycle, INCREASE the regulator setting on the propane models, or the supply valve on the natural gas models in order to reach the **thermostat** setting. If the **burner** remains in lo-fire and does not



The dryer fan and heater controls featuring: 1-pressure regulator, 2-low-fire control valve, 3-high pressure solenoid, 4-low pressure solenoid, 5-hi-low fire thermostat, 6-fuel supply line, 7-LP solenoid or supply ball valve(NG), 8-air pressure switch and 9-liquid filled gauge.

PRE START CHECKS FOR ALL PORTABLE DRYERS

All dryer functions should be checked before operation each season.

cycle, slightly decease gas pressure with the LO-FIRE CONTROL VALVE. If the gas pressure is decreased too much a popping or fluttering sound will be heard. Also, anytime the high pressure side is adjusted, the low pressure side needs to be checked. Repeat the test for each **fan/heater** unit.

STAGED BATCH CHECK

1. Turn the CONTROL POWER switch to the ON position.

2. Turn the DRYING MODE switch to the STAGED BATCH position.

3. Press the RESET button, OPEN the main FUEL SUPPLY VALVE at the tank on an LP dryer, or valve in the FUEL SUPPLY LINE on a natural gas dryer.

4. Turn ON the ELECTRIC SHUT OFF valve to allow fuel flow to the dryer, if so equipped.

5. Turn the LOAD switch to AUTO and UNLOAD switch to 1 SPEED.

6. Push the dryer POWER START button, and the controller will sequentially start all dryer components in their proper order.

If any switches are not in their correct position for STAGED BATCH operation, the dryer will indicate improper switch position, and will not start until the switches are properly set. After starting, all BATCH TIMERS will time down in sequence. When the unload cycle is complete the timers will automatically reset to their original settings, and start the dry timer again.

DRYER SHUTDOWN

To shutdown the dryer, first CLOSE the FUEL SUPPLY VALVE at the tank or valve along the fuel line. If the **burner** is operating, let the dryer run out of fuel, and it will shut down automatically due to loss of flame. CLOSE the FUEL VALVE at the dryer, and press the dryer POWER STOP button. Turn OFF the **safety disconnect handle** on the front of the **power box**, and turn OFF the main POWER to the dryer.

EMERGENCY

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

CONTINUOUS FLOW AND CONTINUOUS BATCH STARTUP PROCEDURE

At the beginning of each harvest and before filling the dryer with grain make sure to inspect the dryer for rodent damage, proper belt and chain tension and missing or damaged safety shields. Test operate the dryer using the pre start check procedures located on pages 23-27.

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

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

3. Turn ON the electrical POWER supply to the dryer, and move the SAFETY DISCONNECT handle mounted on the dryer's **upper power box** to ON.

4. Turn the CONTROL POWER switch to ON. The switch will light up. A copyright message, model number, total running time in hours and minutes, current date and time will appear. At this point the controller will lock out all other dryer functions.

5. Once the date and time appear, press RESET, and the dryer will perform its safety circuit checks. If a fault is found the cause will be displayed on the LCD. If all safeties do not detect a problem, the controller will energize the electronic FUEL SHUTOFF VALVE, if so equipped, and the DRYING MODE switch will light up,indicating that the dryer is ready to be started.

6. Move the LOAD AUGER switch to MANUAL, and push the dryer POWER START switch. The **top auger** will immediately start, and the LOAD AUGER switch will light up. If additional loading equipment is wired to the dryer it will also start immediately.

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

CONTINUOUS FLOW OPERATION

1. Turn the CONTROL POWER switch to ON.

2. After the date and time appear on screen, press the RESET button.

3. Push the dryer POWER START switch.

4. OPEN the main FUEL SUPPLY VALVE on the tank if using LP gas, or OPEN the FUEL SUPPLY LINE if using natural gas. Turn ON the Maxon ELECTRIC SHUTOFF valve, if so equipped, or OPEN the manual SHUTOFF VALVE to allow fuel flow to the dryer.

5. Turn the DRYING MODE switch to CONTINUOUS FLOW.

6. The dryer should already be filled with grain. Turn the LOAD AUGER switch to the AUTO position. In both the AUTO and MANUAL positions, the dryer grain level switch will automatically keep the dryer full of grain. In the AUTO position the dryer will shutdown after a preset time period set on the OUT OF GRAIN timer if grain flow is interrupted to the dryer.

7. Turn each FAN switch to ON. The **fan** will start, and the switch will light up when airflow is detected.

8. Start each **burner** by turning the HEATER switch to ON. After purging for approximately 10 seconds the **burner** will fire, and the HEATER switch will light up. This indicates that the flame sensing circuit is sensing burner flame. For information concern ing **burner** adjustment see the pre start section of this manual.

9. Operate the **heaters** to dry grain for 6-7 minutes per point of moisture to be removed with the plenum temperature set at

120 & 1200 SERIES CONTINUOUS FLOW METERING ROLL SETTINGS

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

These are approximate starting points.

120 & 1200 SERIES CONTINUOUS FLOW METERING ROLL SETTINGS

		Dry & Cool			
Initial Moisture	Moisture Removed	Approx. Dry Time	1 Speed	2 Speed Low	2 Speed High
17%	2 pts.	18 min.	363	187	650
18%	3 pts.	24 min.	272	163	550
19%	4 pts.	30 min	218	145	450
20%	5 pts.	35 min.	187	131	363
21%	6 pts.	40 min.	163	119	272
22%	7 pts.	45 min.	145	109	218
23%	8 pts.	50 min.	131	101	187
24%	9 pts.	55 min.	119	093	163
25%	10 pts.	60 min.	109	087	145
26%	11 pts.	65 min.	101	082	131
27%	12 pts.	70 min.	093	077	119
28%	13 pts.	75 min.	087	073	109
29%	14 pts.	80 min.	082	069	101
30%	15 pts.	85 min.	077	065	093
31%	16 pts.	90 min.	073	061	087
32%	17 pts.	95 min.	069	057	082
33%	18 pts.	100 min.	065	053	077
34%	19 pts.	105 min.	062	049	073
35%	20 pts.	110 min.	059	045	069

These are approximate starting points.

1200S SERIES CONTINUOUS FLOW METERING ROLL SETTINGS

		Full Heat			
Initial Moisture	Moisture Removed	Approx. Dry Time	1 Speed	2 Speed Low	2 Speed High
17%	2 pts.	16 min.	655	333	850
18%	3 pts.	21 min.	499	283	760
19%	4 pts.	26 min	403	252	670
20%	5 pts.	31.5 min.	333	223	580
21%	6 pts.	37 min.	283	205	499
22%	7 pts.	41.5 min.	252	194	403
23%	8 pts.	47 min.	223	181	333
24%	9 pts.	51 min.	205	170	283
25%	10 pts.	54 min.	194	158	252
26%	11 pts.	58 min.	181	147	223
27%	12 pts.	62 min.	170	138	205
28%	13 pts.	66.5 min.	158	129	194
29%	14 pts.	71.5 min.	147	122	181
30%	15 pts.	76 min.	138	115	170
31%	16 pts.	81 min.	129	109	158
32%	17 pts.	86 min.	122	105	147
33%	18 pts.	91 min.	115	099	138
34%	19 pts.	96 min.	109	093	129
35%	20 pts.	100 min.	105	087	122

These are approximate starting points.

1200S SERIES CONTINUOUS FLOW METERING ROLL SETTINGS

		Dry & Cool			
Initial Moisture	Moisture Removed	Approx. Dry Time	1 Speed	2 Speed Low	2 Speed High
17%	2 pts.	18 min.	293	151	420
18%	3 pts.	24 min.	220	132	370
19%	4 pts.	30 min	176	117	320
20%	5 pts.	35 min.	151	106	270
21%	6 pts.	40 min.	132	096	220
22%	7 pts.	45 min.	117	088	176
23%	8 pts.	50 min.	106	081	151
24%	9 pts.	55 min.	096	075	132
25%	10 pts.	60 min.	088	070	117
26%	11 pts.	65 min.	081	066	106
27%	12 pts.	70 min.	075	062	096
28%	13 pts.	75 min.	070	059	088
29%	14 pts.	80 min.	066	056	081
30%	15 pts.	85 min.	062	053	075
31%	16 pts.	90 min.	059	050	070
32%	17 pts.	95 min.	056	048	066
33%	18 pts.	100 min.	053	045	062
34%	19 pts.	105 min.	050	042	059
35%	20 pts.	110 min.	048	039	056

These are approximate starting points.

180°F. Example: Shelled corn starts with 25% moisture and the final moisture content is to be 15% (10% removal). Using the all heat dryeration process, the estimated drying time is 60 minutes (10 x 6).

10. While operating the dryer adjust the METERING ROLL dials to the recommended settings. See the charts on pages 30 through 33.

11. To move grain through the dryer turn the MOISTURE CONTROL switch to ON. The switch will light up.

Note: When the UNLOAD switch is in the 2 SPEED position, and the MOISTURE CONTROL THERMOSTAT switch is OFF, the speed of the **metering rolls** can be manually adjusted by turning the HIGH speed metering roll dial. Turning the dial clockwise will INCREASE the grain discharge rate, counterclockwise will DECREASE the discharge rate. (The numbers on the speed dials indicate the percentage of full speed.)

12. At the end of the startup period, start the flow of grain out of the dryer. Turn the UNLOAD switch to the 2 SPEED position. The **bottom auger** and **metering roll** will immediately start, and the UNLOAD switch will light. If additional unloading equipment is utilizing the unload auxiliary overload supplied with the dryer, this equipment will also immediately start.

13. To shut the dryer down, CLOSE the FUEL SUPPLY VALVE at the fuel tank or fuel source. Let the dryer run until the fuel supply lines drain, and the dryer automatically shuts down due to loss of flame. CLOSE the FUEL VALVE at the dryer. Press the dryer POWER STOP button. Turn OFF the dryer's SAFETY DISCONNECT HANDLE. Turn OFF the main POWER supply

14. In case of emergency push the dryer STOP button. The **fans, burners** and **all augers** will stop immediately.

Note: The **Electronic Monitoring Control System** can be used to automatically start the dryer. Place all the control panel SELECTOR switches in the proper position. OPEN the electric FUEL SHUTOFF VALVE before pressing the dryer POWER START button. The controller will start all dryer components in their proper order.

CONTINUOUS BATCH (STAGED BATCH) OPERATION

1. Turn the CONTROL POWER switch to ON.

2. Make sure the DRYING MODE switch is turned to STAGED BATCH.

3. After the date and time appear, press the RESET button.

4. OPEN the main FUEL SUPPLY VALVE on the tank if using LP gas or the valve in the FUEL SUPPLY LINE if using natural gas. Turn ON the Maxon ELECTRIC SHUTOFF valve, if so equipped, or open the manual SHUTOFF VALVE to allow fuel flow to the dryer.

5. The dryer should already be filled with grain. Turn the LOAD AUGER switch to AUTO. In both the AUTO and MANUAL position, the grain level switch will automatically keep the dryer full of grain. In the AUTO position the dryer will shutdown after the preset time period on the OUT OF GRAIN timer, or if the grain flow to the dryer is interrupted.

6. To set the correct DRY, COOL and UNLOAD time for various moisture content grains. See the charts on pages 36 through 39.

7. If the dryer is being operated in the ALL HEAT mode, turn the FANS switch to the ON position. In this position the **fan** will run continuously during both the dry and unload stages of the STAGED BATCH operation. If the dryer is being operated in the DRY AND COOL mode, the preferred position for the FANS switch is the ON position so that the **fan** will run continuously. When the **fans** start the switch will light up. If desired, the **fan** can be turned OFF during the UNLOAD cycle of the DRY-COOL-UNLOAD sequence by turning the FANS switch to the

AUTO position. When placed in the AUTO position the **fan** operates continuously during both the DRY and COOL cycles and automatically shuts OFF during the UNLOAD cycle.

8. If the dryer is being operated in ALL HEAT , turn each HEATER switch to ON. The **burner** will operate whenever the **fan** is operating. If the dryer is being used in DRY and COOL, turn the HEATER switches to AUTO and the **burner** will automatically shutdown during the cooling and unloading cycles.

9. Turn the UNLOAD switch to the 1 SPEED position. The **bottom auger** and **metering rolls** will start automatically during the unload cycle of the DRY-COOL-UNLOAD mode, along with any grain handling equipment that is wired to the dryer. The speed at which the **metering rolls** operate during the UNLOAD cycle is adjusted by using the HIGH speed metering roll knob. Turning the dial clockwise will INCREASE the grain discharge rate, and counterclockwise will DECREASE the discharge rate.

10. To control the length of the DRY cycle using only the dry time setting programmed into the system, turn the MOISTURE CONTROL setting to OFF. To use the automatic moisture control so that the dry time is determined, not only by the dry time setting, but also by the moisture content of the drying grain, turn the MOISTURE CONTROL switch to ON, and set dial to a beginning setting of 135°F.

11. To start the drying operation push the dryer POWER START button. The controller will start all the dryer components in their proper order. If any of the SELECTED switches are improperly positioned for STAGED BATCH drying, the display will indicate the proper switch position, and will not allow the dryer to operate until the position of the switch is corrected.

12. To shutdown the dryer, CLOSE the FUEL SUPPLY VALVE at the fuel tank or fuel source. If the **burners** are operating, let the dryer run out of fuel causing an automatic shutdown due to a loss of flame. CLOSE the FUEL VALVE at the dryer, and press the dryer POWER STOP button. Turn OFF the dryer's main CIRCUIT BREAKER located on the front of the **power panel**. Turn OFF the main POWER supply to the dryer.

13. In case of an emergency, press the dryer POWER STOP button. The **burners, fans** and all **augers** will stop immediately.

FAN & HEATER SWITCH SETTINGS

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

At the end of the dry cycle in staged batch, the fans and heaters will continue running if in the Auto-Auto setting, until the preset temperature on the moisture control thermostat is reached.

120 & 1200 SERIES BATCH TIMER SETTINGS

		Full Heat Fan & Burner Switches on Manual				Dry & Cool Fans on Manual Burners on Auto			
Initial Moisture	Moisture Removed	Approx. Dry Time	Dry	Cool	Unload*	Approx. Dry Time	Dry	Cool	Unload*
17%	2 pts.	16 min.	6 min.	0	10 min.	18 min.	18 min.	18 min.	10 min.
18%	3 pts.	21 min.	11 min.	0	10 min.	24 min.	24 min.	18 min.	10 min.
19%	4 pts.	26 min	16 min	0	10 min.	30 min	30 min	18 min	10 min.
20%	5 pts.	31.5 min.	21.5 min.	0	10 min.	35 min.	35 min.	18 min.	10 min.
21%	6 pts.	37 min.	27 min.	0	10 min.	40 min.	40 min.	18 min.	10 min.
22%	7 pts.	41.5 min.	31.5 min.	0	10 min.	45 min.	45 min.	18 min.	10 min.
23%	8 pts.	47 min.	37 min.	0	10 min.	50 min.	50 min.	18 min.	10 min.
24%	9 pts.	51 min.	47 min.	0	10 min.	55 min.	55 min.	18 min.	10 min.
25%	10 pts.	54 min.	44 min.	0	10 min.	60 min.	60 min.	18 min.	10 min.
26%	11 pts.	58 min.	48 min.	0	10 min.	65 min.	65 min.	18 min.	10 min.
27%	12 pts.	62 min.	52 min.	0	10 min.	70 min.	70 min.	18 min.	10 min.
28%	13 pts.	66.5 min.	56.5 min.	0	10 min.	75 min.	75 min.	18 min.	10 min.
29%	14 pts.	71.5 min.	61.5 min.	0	10 min.	80 min.	80 min.	18 min.	10 min.
30%	15 pts.	76 min.	66 min.	0	10 min.	85 min.	85 min.	18 min.	10 min.
31%	16 pts.	81 min.	71 min.	0	10 min.	90 min.	90 min.	18 min.	10 min.
32%	17 pts.	86 min.	76 min.	0	10 min.	95 min.	95 min.	18 min.	10 min.
33%	18 pts.	91 min.	81 min.	0	10 min.	100 min.	100 min.	18 min.	10 min.
34%	19 pts.	96 min.	86 min.	0	10 min.	105 min.	105 min.	18 min.	10 min.
35%	20 pts.	100 min.	90 min.	0	10 min.	110 min.	110 min.	18 min.	10 min.

These are approximate starting points.

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

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

Example

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

120 & 1200 SERIES STAGED BATCH TIMER SETTINGS

		Full Heat Fan & Burner Switches on Manual				Dry & Cool #2 Fan on Manual #2 Burner on Auto #1 Fan on Manual #1 Burner on Off			
Initial Moisture	Moisture Removed	Approx. Dry Time	Dry	Cool	Unload*	Approx. Dry Time	Dry	Cool	Unload*
17%	2 pts.	16 min.	2 min.	0	3.5 min.	18 min.	9 min.	3 min.	3.5 min.
18%	3 pts.	21 min.	3.5 min.	0	3.5 min.	24 min.	12 min.	3 min.	3.5 min.
19%	4 pts.	26 min	5.5 min	0	3.5 min.	30 min	15 min.	3 min	3.5 min.
20%	5 pts.	31.5 min.	7 min.	0	3.5 min.	35 min.	17.5 min.	3 min.	3.5 min.
21%	6 pts.	37 min.	9 min.	0	3.5 min.	40 min.	20 min.	3 min.	3.5 min.
		same				#2 Fan on Manual #2 Burner on Manual #1 Fan on Auto #1 Burner on Auto			
22%	7 pts.	41.5 min.	10.5 min.	0	3.5 min.	45 min.	.5 min.	18 min.	3.5 min.
23%	8 pts.	47 min.	12.5 min.	0	3.5 min.	50 min.	2.5 min.	18 min.	3.5 min.
24%	9 pts.	51 min.	13.5 min.	0	3.5 min.	55 min.	4 min.	18 min.	3.5 min.
25%	10 pts.	54 min.	14.5 min.	0	3.5 min.	60 min.	5.5 min.	18 min.	3.5 min.
26%	11 pts.	58 min.	16 min.	0	3.5 min.	65 min.	7.5 min.	18 min.	3.5 min.
27%	12 pts.	62 min.	17.5 min.	0	3.5 min.	70 min.	9 min.	18 min.	3.5 min.
28%	13 pts.	66.5 min.	18.5 min.	0	3.5 min.	75 min.	10.5 min.	18 min.	3.5 min.
29%	14 pts.	71.5 min.	20.5 min.	0	3.5 min.	80 min.	12.5 min.	18 min.	3.5 min.
30%	15 pts.	76 min.	22 min.	0	3.5 min.	85 min.	14 min.	18 min.	3.5 min.
31%	16 pts.	81 min.	23.5 min.	0	3.5 min.	90 min.	15.5 min.	18 min.	3.5 min.
32%	17 pts.	86 min.	25.5 min.	0	3.5 min.	95 min.	17.5 min.	18 min.	3.5 min.
33%	18 pts.	91 min.	27 min.	0	3.5 min.	100 min.	19 min.	18 min.	3.5 min.
34%	19 pts.	96 min.	28.5 min.	0	3.5 min.	105 min.	20.5 min.	18 min.	3.5 min.
35%	20 pts.	100 min.	30 min.	0	3.5 min.	110 min.	22.5 min.	18 min.	3.5 min.

These are approximate starting points.

*Set unload meter roll high speed setting to 999. If unload equipment cannot adequately keep up, lower the speed setting and add time to the unload timer setting to completely unload the batch. In full heat mode, the time added to the unload timer will need to be substracted from the dry timer. For additional cooling, set #1 fan switch on manual. If you need more time between dumps use batch mode.

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

Example

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

1200S SERIES BATCH TIMER SETTINGS

		Full Heat Fan & Burner Switches on Manual				Dry & Cool Fans on Manual Burners on Auto			
Initial Moisture	Moisture Removed	Approx. Dry Time	Dry	Cool	Unload*	Approx. Dry Time	Dry	Cool	Unload*
17%	2 pts.	16 min.	6 min.	0	10 min.	18 min.	18 min.	18 min.	10 min.
18%	3 pts.	21 min.	11 min.	0	10 min.	24 min.	24 min.	18 min.	10 min.
19%	4 pts.	26 min	16 min	0	10 min.	30 min	30 min	18 min	10 min.
20%	5 pts.	31.5 min.	21.5 min.	0	10 min.	35 min.	35 min.	18 min.	10 min.
21%	6 pts.	37 min.	27 min.	0	10 min.	40 min.	40 min.	18 min.	10 min.
22%	7 pts.	41.5 min.	31.5 min.	0	10 min.	45 min.	45 min.	18 min.	10 min.
23%	8 pts.	47 min.	37 min.	0	10 min.	50 min.	50 min.	18 min.	10 min.
24%	9 pts.	51 min.	47 min.	0	10 min.	55 min.	55 min.	18 min.	10 min.
25%	10 pts.	54 min.	44 min.	0	10 min.	60 min.	60 min.	18 min.	10 min.
26%	11 pts.	58 min.	48 min.	0	10 min.	65 min.	65 min.	18 min.	10 min.
27%	12 pts.	62 min.	52 min.	0	10 min.	70 min.	70 min.	18 min.	10 min.
28%	13 pts.	66.5 min.	56.5 min.	0	10 min.	75 min.	75 min.	18 min.	10 min.
29%	14 pts.	71.5 min.	61.5 min.	0	10 min.	80 min.	80 min.	18 min.	10 min.
30%	15 pts.	76 min.	66 min.	0	10 min.	85 min.	85 min.	18 min.	10 min.
31%	16 pts.	81 min.	71 min.	0	10 min.	90 min.	90 min.	18 min.	10 min.
32%	17 pts.	86 min.	76 min.	0	10 min.	95 min.	95 min.	18 min.	10 min.
33%	18 pts.	91 min.	81 min.	0	10 min.	100 min.	100 min.	18 min.	10 min.
34%	19 pts.	96 min.	86 min.	0	10 min.	105 min.	105 min.	18 min.	10 min.
35%	20 pts.	100 min.	90 min.	0	10 min.	110 min.	110 min.	18 min.	10 min.

These are approximate starting points.

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

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

Example

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

1200S SERIES STAGED BATCH TIMER SETTINGS

		Full Heat Fan & Burner Switches on Manual				Dry & Cool #2 Fan & Burner Switches on Manual #1 Fan & Burner Switches on Auto			
Initial Moisture	Moisture Removed	Approx. Dry Time	Dry	Cool	Unload*	Approx. Dry Time	Dry	Cool	Unload*
17%	2 pts.	16 min.	3 min.	0	5 min.	18 min.	0 min.	13 min.	5 min.
18%	3 pts.	21 min.	5.5 min.	0	5 min.	24 min.	.5 min.	18 min.	5 min.
19%	4 pts.	26 min.	8 min	0	5 min.	30 min	3.5 min.	18 min	5 min.
20%	5 pts.	31.5 min.	11 min.	0	5 min.	35 min.	6 min.	18 min.	5 min.
21%	6 pts.	37 min.	13.5 min.	0	5 min.	40 min.	8.5 min.	18 min.	5 min.
22%	7 pts.	41.5 min.	16 min.	0	5 min.	45 min.	11 min.	18 min.	5 min.
23%	8 pts.	47 min.	18.5 min.	0	5 min.	50 min.	13.5 min.	18 min.	5 min.
24%	9 pts.	51 min.	20.5 min.	0	5 min.	55 min.	16 min.	18 min.	5 min.
25%	10 pts.	54 min.	22 min.	0	5 min.	60 min.	18.5 min.	18 min.	5 min.
26%	11 pts.	58 min.	24 min.	0	5 min.	65 min.	20.5 min.	18 min.	5 min.
27%	12 pts.	62 min.	26 min.	0	5 min.	70 min.	23.5 min.	18 min.	5 min.
28%	13 pts.	66.5 min.	28 min.	0	5 min.	75 min.	26 min.	18 min.	5 min.
29%	14 pts.	71.5 min.	31 min.	0	5 min.	80 min.	28.5 min.	18 min.	5 min.
30%	15 pts.	76 min.	33 min.	0	5 min.	85 min.	31 min.	18 min.	5 min.
31%	16 pts.	81 min.	35.5 min.	0	5 min.	90 min.	33.5 min.	18 min.	5 min.
32%	17 pts.	86 min.	38 min.	0	5 min.	95 min.	36 min.	18 min.	5 min.
33%	18 pts.	91 min.	40.5 min.	0	5 min.	100 min.	38.5 min.	18 min.	5 min.
34%	19 pts.	96 min.	43 min.	0	5 min.	105 min.	41 min.	18 min.	5 min.
35%	20 pts.	100 min.	45 min.	0	5 min.	110 min.	43.5 min.	18 min.	5 min.

These are approximate starting points.

*Set unload meter roll high speed setting to 999. If unload equipment cannot adequately keep up, lower the speed setting and add time to the unload timer setting to completely unload the batch. In full heat mode, the time added to the unload timer will need to be substracted from the dry timer. For additional cooling, set #1 fan switch on manual.

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

Example

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

STARTUP & OPERATION FOR ALL PORTABLE DRYERS

OPERATING TIPS

EQUIPMENT NEEDED

- Moisture Tester (table top style) Dole Motomco or better (most portables are inconsistent over 90 deg.)
- Thermometer 80-200 deg. minimum (digital preferred: A. W. Sperry DT-5A or TAYLOR 9800)
- 2.5 gallon bucket (for all heat operation)

GRAIN REQUIRED

6'-8' grain columns 800-1000 bu.
10'-12' grain columns 1000-2000 bu.
14'-20' grain columns 2000-4000 bu.
22'-26' grain columns 3000-5000 bu.

THINGS TO REMEMBER

1. Check all electrical connections on **all controls, starters** and **breakers** in the **control box** for tightness before operating!
2. Check to be sure the **burner** or **burners** are still exactly centered and tight after shipping.
3. Check to be sure your dryer model is displayed in the second screen after turning ON power.
4. On LP gas machines check **gas pipe** temperatures and adjust **vaporizer coils** if necessary. Too hot will cause a shutdown with a vapor high temperature safety message.*
5. The **burner hi-limit** is located on top of the **fan housing** inside a **LRL electrical junction box**. Unscrew cover to hit RESET. This switch will sometimes pop open in shipping. Please check it.
6. Lifting cover at **discharge auger** will shutdown dryer requiring a complete restart. Use only as an emergency shutdown device.*
7. **Fans** pull more amperage when empty than when full of grain, and may trip overload. Overloads are adjustable up or down 15%.
8. The OUT OF GRAIN TIMER should be set between 5 and 15 minutes.
9. The MOISTURE CONTROL setting controls the temperature of the grain, and therefore the output moisture. The SPEED control does not effect moisture output unless speed is out of adjustment either too high, too low or the MOISTURE CONTROL switch is OFF. Use the SPEED control to keep the MOISTURE CONTROL hold light cycling ON or OFF. If the light is cycling properly it will be on 10 to 50% of the time.

*not on older models

OPERATING PRESSURES

APPROXIMATE SETTINGS

Component		Pressures
LP Gas	HI-FIRE	6-15 lbs.
	LO-FIRE	2-6 lbs.
Natural Gas	HI-FIRE	6-10 lbs.
	LO-FIRE	1-3 lbs.

(Use no more pressure than is necessary to achieve temperature) Extreme cold weather may require LP pressures up to 30 lbs. or natural gas pressures up to 20 lbs.

STARTUP & OPERATION FOR ALL PORTABLE DRYERS

GAS/HEAT ADJUSTMENT

The hi-lo fire thermostat

The drying temperature from the **fan /heater** unit is controlled by the HI-LO FIRE THERMOSTAT located on the front right hand side of the dryer.

The THERMOSTAT senses the plenum air temperature and cycles the **burner** from hi-fire to low-fire to maintain the desired drying temperature as indicated by the THERMOSTAT.

When the **heater** is operating on hi-fire, the **burner** is supplied with a relatively large flow of gas through both the HIGH PRESSURE SOLENOID valve and the LOW PRESSURE SOLENOID valve. When operating on lo-fire, the HIGH PRESSURE SOLENOID closes and only the LOW PRESSURE SOLENOID supplies the flow of gas to sustain **burner** operation.

Burner cycling

When the **burner** is operating properly, it should automatically cycle at regular intervals from hi to lo-fire, as indicated by the corresponding pressure change on the **gas pressure gauge**. The **burner** should cycle 4 to 5 times a minute. If the **burner** remains on hi-fire and does not cycle, INCREASE the gas regulator setting on propane models, or the main GAS SUPPLY VALVE on natural gas models, in order to reach the THERMOSTAT setting. Do not exceed 30 PSI for propane models or 20 PSI for natural gas.

If the **burner** remains in lo-fire and does not cycle, DECREASE the lo-fire gas pressure slightly by readjusting the lo-fire control valve. Note: Do not DECREASE the pressure settings to the extent that a noticeable **burner** flutter or popping noise can be heard, as caused by flame backfire in the **burner cup**. Also anytime the high pressure is adjusted the low pressure may need adjustment.

BURNER TEMPERATURES
APPROXIMATE SETTINGS

	1100 SERIES	
Drying Method	**Commercial Corn**	**Waxy Corn**
Dry/Cool	180-200	160
All Heat	190-210	160

Waxy Corn (estimated) Confirm with viability testing immediately.

MOISTURE CONTROL SETTING
(COMMERCIAL CORN TO 15%)

Dry/Cool--135 degrees **All Heat--95 degrees**

MOISTURE CONTROL TIPS

1. Moisture control is in proper range when it cycles back and forth between the two green lights at the 12 o'clock position on its dial.

2. Red lights to the left of the set point indicate the left speed dial (LOW SPEED) needs to be lower.

3. Red lights to the right of the set point indicate the right speed dial (HIGH SPEED) needs to be higher.

4. After adjustment of 30-50 bushels has been made change the other speed dial to maintain a relationship between HIGH speed and LOW speed of 2 to 1.

STARTUP & OPERATION FOR ALL PORTABLE DRYERS

20–30% MOISTURE CORN (CONTINUOUS FLOW)

Manual Speed Settings*		1108-1112		1114-1126
Dry/Cool	20%	Batch Mode Only		Batch Mode Only
	25%			
	30%			
		6" Auger	8" Auger	8" Auger
All Heat	20%	60.0	31.0	31.0
	25%	39.0	20.0	20.0
	30%	25.0	13.0	13.0

Set LOW SPEED dial to 10.0, or half of outside speed. Operate at stated speed for first hour of operation with MOISTURE CONTROL switch in ON position. Then increase speed 20% to start the MOISTURE CONTROL light cycling. Cycle light 20% on and 80% off by varying speed. Do not let light stay on more than 50% (set slower speed).

*Set SCR board at 0 volts D. C. at 0%, and 180 volts D. C. at 100% of speed (17.5 RPM) except on 1108, 1110 and 1112 with 6" augers where it's 92.5 volts D. C. at 100% of speed (9 RPM).

DRYING CORN USING THE ALL HEAT PROCESS

Grain temperature is proportional to what the final moisture will be after the grain is cooled in the bin. Though no two farms or bins will be the same there are some starting points. Moisture testers will read from 17% to 19% after temperature correction.

Commercial Corn 15%	125-130 degrees
White Corn 15%	120-125 degrees
Waxy Corn 15%*	110-120 degrees
Each 5-7 degrees	1 point of moisture

*Waxy may lose no points of moisture in bin

Wet corn being augered into the grain dryer.

DRYERATION PROCESS

If the startup steps on the previous pages are followed the MOISTURE CONTROL settings adjust accordingly to get 130° corn out back of dryer. On rare occasions hard drying, or immature corn may require higher temperatures. Always use MOISTURE TESTER to confirm temperature reading. Use a large sample (2.5 gallon) and an accurate THERMOMETER (A. W. Sperry model DT-5A digital preferred) to determine actual temperature. Smaller containers bleed off temperature before the THERMOMETER reaches true temperature.

Bins should have:

- A full **aeration floor**
- 1/3 to 1/2 CFM of air when the bin is full
- A **grain spreader**

Normally let 2 to 3 feet of warm grain enter bin before turning on **fans** to give heat a head start. Small dryers or very large bins may take too long. Do not start **fans** longer than 2-4 hours after starting dryer. On bins with high air flow (above 1/2 CFM), **fans** may need to be cycled two hours on, two hours off throughout the day to maintain a thick enough hot grain layer to get proper moisture loss in the bin. Large dryers (1000 bu/hr and larger) may require at least 1/2 CFM and immediate starting of **fans**. Follow these procedures each time you start putting grain in the bin. Continue aeration until grain is completely cooled.

Fill each bin completely. Do not alternate bins. Alternating would cause different layers the moisture in the bin. The first morning after starting, take a cooled sample from bin and test it. Grain will be within .2% to .5% of final moisture at this time. Check again 24 and 48 hours later, always use this test as the final decision maker as to what moisture setting to use.

If test is too wet turn moisture control up (higher temperature). If test is too dry turn MOISTURE CONTROL down (lower temperature). Each small mark on the face of the MOISTURE CONTROL dial is approximately ONE POINT of moisture. If you want 15% and your test mark was 14% turn MOISTURE CONTROL down one small mark, and retest the next morning.

At the bottom of the bin the airflow is rather high. As the bin fills moisture will be taken out. This is somewhat offset by the grain at the bottom getting more hours of aeration. Overdrying is common the first year, and settings can be altered the second year.

It is very important to write down every setting for comparison year to year, and for a preset starting point of the dryer each year.

Starting a dryer full of wet grain.

STARTUP & OPERATION FOR ALL PORTABLE DRYERS

STARTUP WITH DRYER FULL OF WET GRAIN

1. Run all **fans** at 180° to 200° whenever grain is not moving.

2. Grain will take five to seven minutes per point of moisture to be removed. Five minutes for 25% and up, six minutes for 20% to 25% and seven minutes for 15% to 20%.

Example:

25-15% = 10pt. removal or 60 minutes of **burner** operation.

3. Running dry and cool will be by batch mode for single **fan** dryers.

4. Set speed control as close to expected capacity as possible, or use the chart on page 36. Set moisture control as listed on page 36. Adjust temperatures to those listed on page 36. Start unloading grain with the moisture control switch in the ON position. Run for 1 hour, then increase speed by 20% to start the MOISTURE CONTROL hold light cycling. Reset LOW speed to 1/2 of HIGH speed dial.

Example:

25% Wet grain dryed to 15%-model 1114 all heat.

- Set moisture control switch to the ON position.
- Set MOISTURE CONTROL to 95°
- Set speed control at 20% of full speed.
- Set LOW speed dial at 10% of full speed or 1/2 of HIGH speed.

5. Dryer will cycle erratically for an hour after speeding up. Adjust speed so the MOISTURE CONTROL hold light is on 10% to 50% of the time. After the moisture control light has cycled for at least an hour check moisture, and adjust moisture control accordingly.

END OF SEASON DRYER SHUTDOWN

EMPTYING DRYER

1. Set OUT OF GRAIN timer for 6-8 minutes.

2. Run hopper tank out of grain and allow timer to shutdown dryer.

3. With **lower auger** OFF run **burners** for 5-6 minutes per point of moisture to be removed to completely dry grain. Cool, then empty dryer.

DRYER CLEANUP

General outside areas

- Power wash dryer if possible.

Thermostat/thermometer

- Blowout or brush clean.

Metering rolls

- Swing open hinged **bottom covers**.
- Hose or blowout around **metering roll access doors**.
- Oil all **metering roll bushings** (use lubricating oil only not WD40 or cutting type oils).
- Change oil in WINN SMITH SCR **gear boxes**.
- Oil and grease chain and all other grease points.

Gas lines

- Empty and clean **screens and traps**.

- Inspect and clean **burner orifice and cup.**

Motors

- Grease sparingly both **end bearings.**

Control Cabinets

- Vacuum and clean all **cabinets**.
- Check **door seals**.
- Check all other **electrical box covers and seals.**

Augers

- Check **hanger bearings** for looseness and inspect for damage.

SCR SPEED INFORMATION

Dryer	Minimum Speed		Maximum Speed	
	D. C. Volts	RPM	D. C. Volts	RPM
1108-1112 (6" Auger)	0	0	92.5	9
1108-1112 (8" Auger)	0	0	180	17.5
1114-1126 (8" Auger)	0	0	180	17.5

Note: 1993 models 1108-1112 have standard 6" auger flighting.
1994 Models 1108-1112 have standard 8" auger flighting.

CAPACITY INFORMATION
(FOR USE IN INITIAL SPEED CONTROL SETTINGS)

Maximum Capacity — Dryer Basket Length

BU/HR	8'	10'	12'	14'	16'	18'	20'	22'	26'
6" Auger	580	720	860	---	---	---	---	---	---
8" Auger	1120	1400	1680	1960	2240	2520	2800	3080	3640

Moisture Removal
All Heat — Approximate bushels per hour and % of full speed

5 Points	**335**	**420**	**560**	**650**	**710**	**815**	**910**	**990**	**1150**
6" Auger	58%	58%	65%	---	---	---	---	---	---
8" Auger	31%	31%	31%	31%	31%	31%	31%	31%	31%
10 Points	**205**	**260**	**345**	**410**	**450**	**510**	**575**	**610**	**715**
6" Auger	35%	36%	40%	---	---	---	---	---	---
8" Auger	20%	20%	20%	20%	20%	20%	20%	20%	20%
15 Points	**130**	**170**	**215**	**265**	**290**	**330**	**375**	**395**	**465**
6" Auger	22%	23%	25%	---	---	---	---	---	---
8" Auger	13%	13%	13%	13%	13%	13%	13%	13%	13%

Dry/Cool — For batch mode, set unload for highest possible rate

5 Points	**400**	**465**	**505**	**560**	**640**	**725**
8" Auger	20%	20%	20%	20%	20%	20%
10 Points	**250**	**290**	**315**	**345**	**395**	**450**
8" Auger	13%	13%	13%	13%	13%	13%
15 Points	**160**	**190**	**205**	**225**	**2555**	**290**
8" Auger	8%	8%	8%	8%	8%	8%

FUEL FORMULA CONSTANTS

GAS CALCULATION

1 gallon liquid propane	= 91,500 BTU's	1 gallon average $0.60
1 cubic foot natural gas	= 1,040 BTU's	
1 kw electricity	= 3,413 BTU's	1 kilowatt average $0.05
1,000 cubic feet of natural gas	= 1 therm	1 therm average $4.90
1 therm of natural gas	= 1,040,000 BTU's	

ELECTRIC CALCULATION

amps x volts = watts
watts/1,000 = kilowatts

For 230 volt single phase motors	amps = total HP x 4.2
For 230 volt three phase motors	amps = total HP x 2.7
For 460 volt three phase motors	amps = total HP x 1.35

Motors average 88% efficiency

OTHER INFORMATION

1,044 btu are required to evaporate one pound of free water at 100% efficiency.

Approximately 1400 to 2000 BTU's are required to remove 1 pound of water from 25% moisture corn when drying it down to 15% moisture content. Type of dryer, method of operation, grain density, grain quality and outside conditions will vary requirements.

APPROXIMATE BUSHELS PER GALLON OF FUEL AT 10 POINT REMOVAL

Dry & cool	6-7
Dry & cool with heat recovery	8-9
All heat	8-9
All heat with heat recovery	9-10
Top Dry cooling in bottom	9-11

MAINTAINING GRAIN QUALITY

To properly maintain the quality of stored grain, it is necessary to keep the grain dry, cool and insect free. Any of these problems can contribute to spoilage. Wet, warm grain promotes insect growth as well as grain spoilage. Cool dry grain can keep for long periods of time if properly maintained.

It is recommended that the grain be kept cool (Avoid freezing. It can reduce grain quality). Grain should be cooled through the fall and winter, warmed in the spring and summer.

Average grain temperature should be above 35°F in the winter and below 65°F in the summer. Always try to keep the grain within 10°F-15°F of the average monthly outside temperature. This means grain may need to be aerated on warm days during the winter to stay above 35°F when freezing temperatures are predominate. During the summer, it may be necessary to aerate the grain on cool nights, so the 65°F temperature is not exceeded during the hot days of summer.

Conditions and requirements may vary from area to area. We suggest that you contact your local agriculture extension office or state agriculture university for more exact guidelines in your area.

If the grain is to be stored for more than one year, it has to be recooled the following fall and winter, repeating the process as long as the grain is in storage. Frequent and regular inspection (at least weekly during fall and spring) is the best prevention against grain spoilage.

EQUILIBRIUM MOISTURE CHART

Air Temperature — **Relative Humidity - Percent**

	35	40	45	50	55	60	65	70	75	80	85	90	95	100
20°F	11.2	11.7	12.7	13.7	14.5	15.1	16.2	17.1	18.0	19.6	21.2	23.5	25.8	29.1
30°F	10.8	11.3	12.2	13.1	13.9	14.6	15.5	16.4	17.4	18.7	20.2	22.5	25.0	28.3
40°F	10.5	11.0	11.7	12.5	13.3	14.0	14.8	15.5	16.6	17.8	19.4	21.5	24.2	27.5
50°F	10.1	10.6	11.3	12.0	12.7	13.3	14.1	14.8	15.8	16.9	18.6	20.5	23.4	26.7
60°F	9.7	10.2	10.9	11.6	12.1	12.7	13.4	14.2	15.0	16.0	17.8	19.5	22.6	25.9
70°F	9.0	9.7	10.4	11.1	11.5	12.0	12.8	13.5	14.5	15.4	16.8	18.5	21.3	24.5
80°F	8.3	9.1	9.8	10.5	10.8	11.2	12.1	13.0	13.9	14.8	15.8	17.4	20.0	22.8

Safe moisture for normal winter storage of shelled corn is about 15%. Grain to be stored through the summer or long term, needs to be 1 to 3 points dryer.

APPROXIMATE ALLOWABLE HOLDING TIME
(FOR FIELD, SHELLED CORN TO MAINTAIN GRADE AT VARIOUS TEMPERATURE AND MOISTURE LEVELS)

Grain Temperature (°F) — Corn Moisture And Amount Of Days

	15%	18%	20%	22%	24%	26%	28%	30%
40°F	898	195	85	54	38	28	24	20
50°F	451	102	46	28	19	16	13	11
60°F	242	63	26	16	10	8	6.5	5.5
70°F	147	37	13	8	5	4	3.5	3
80°F	109	27	10	6	4	3	2.5	2

Drying fronts and/or temperature fronts move through grain at different rates depending on bin size, fan size, moisture levels and temperature.

The table below lists the approximate time required to completely change the temperature of a bin. Conditions at the time can cause the length of time to vary greatly. Therefore this chart should only be used as a guide.

It may be necessary to run the fan only part of a day, because of changing weather conditions. It would be necessary to run it a few hours each day on several different days to complete the temperature change.

APPROXIMATE HOURS OF FAN OPERATION TO CHANGE BIN TEMPERATURE

Fan HP — Bin Diameter (22 Feet Tall To Eaves) And Hours Of Fan Operation — 32 Feet To Eave

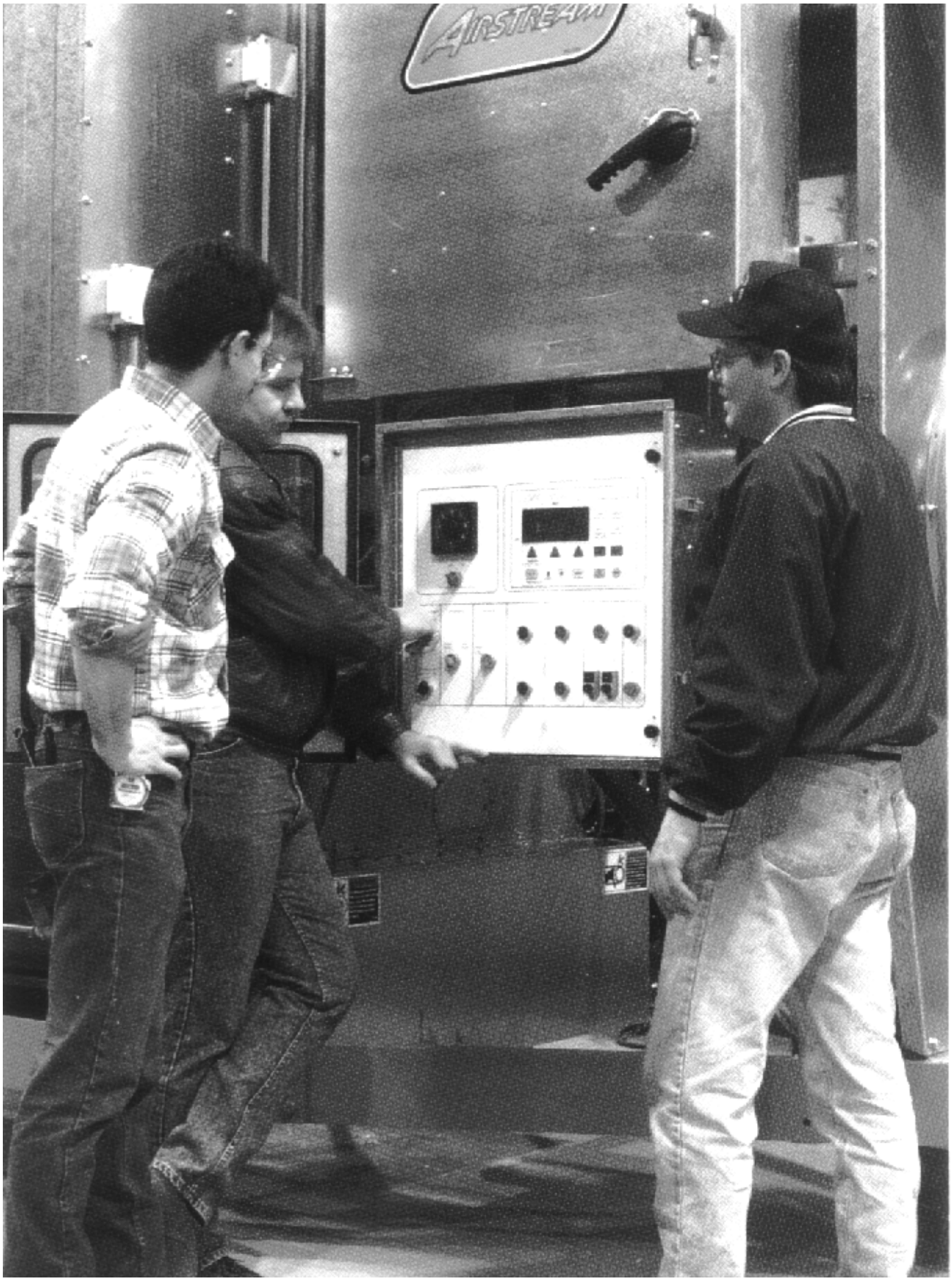
	18	21	24	27	30	33	36	42	48	36	42	48
1	73	79	90	NR	NR	NR	NR	NR	NR	NR	NR	NR
1.5	56	61	65	66	76	82	92	NR	NR	NR	NR	NR
3	44	51	52	57	63	69	78	93	NR	NR	NR	NR
5-7	38	42	44	47	52	56	61	71	81	79	93	NR
7.5-10	35	37	41	42	45	49	53	62	71	72	82	92
10-15	30	32	35	39	40	42	45	54	63	62	70	80
BU*	4,500	6,500	8,500	11,000	13,500	16,500	19,500	27,000	35,500	28,800	38,500	50,500

*Bushels are rounded and approximate.

NR = Not recommended: Bins in the NR range, may require fan(s) of a different size to get the cool time into the acceptable range.

The hours required are based on clean grain. High moisture grain and grain containing fines or foreign material will require more time to complete the air change.

Bins requiring more than 100 hours of aeration to totally change the temperature may require continuous aeration at about 1/10th cfm per bushel or some other acceptable method.


AIRSTREAM

SERVICE GUIDE FOR ALL PORTABLE DRYERS

SEASONAL INSPECTION AND SERVICE

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

1. SHUTOFF electrical power. Open **power box** and **control box**, and inspect for moisture, rodent damage or accumulated foreign material. Remove any fo-r eign material. Inspect and tighten any loose terminal connections. Replace any damaged or deteriorated wiring.

2. CHECK each **propellor** for freedom of rotation and uniform tip clearance. They should also be inspected for dirt and grain dust, especially inside the hub. Any additional weight can seriously effect the balance, and result in harmful vibrations and a short bearing life. Fan performance is best when inside of housing is free of dirt build up.

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

4. **Motor bearings** should be LUBRICATED periodically, depend ing on operating conditions. Under normal usage the motor should be cleaned, checked and bearings repacked by an authorized service station every two to three seasons. If the unit is operated continuously service should be performed each year.

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

LUBE PROCEDURES

If the **motors** are equipped with an **alemite fitting**, CLEAN the tip of the fitting and grease with a grease gun. Use 1 or 2 full strokes on motors in NEMA 215 frame and smaller. Use 2 to 3 strokes on NEMA 254 through NEMA 365 frame. Use 3 to 4 strokes on NEMA 404 frames and larger. On motors having drain plugs, remove drain plug and operate motor for 20 minutes before replacing drain plug.

On **motors** equipped with **slotted head grease screw**, remove screw and apply grease tube to hole. Insert 2 to 3 inch length of grease string into each hole on motors in NEMA frame and smaller. Insert 3 to 5 inch length on larger motors. On **motors** having **grease drain plugs**, remove plug and operate motor for 20 minutes before replacing drain plug.

LUBRICATION INSTRUCTIONS FOR BALL BEARING MOTORS

SUGGESTED LUBRICATION INTERVALS*

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

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

SUGGESTED LUBRICANTS

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

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

1. Remove and CLEAN the **gas line strainers**. Make certain **gas valves** are CLOSED and that gas is purged from the system be fore attempting disassembly.

2. Inspect the **collector plate** at the top of the burner casting and the **burner cup** for any accumulation of foreign material. CLEAN if required. Foreign material in the burner cup or cast ing will not burn out and will impair burner operation.

3. If required, inspect **ignitor plug** and CLEAN the **electrodes**. Use an ignition point file to remove carbon and rust between the **electrode surfaces**. **Ignitor gap** should be about1/8 inch.

4. Inspect **flame sensors** for possible damage or poor con nections. **Flame sensor wires** must be in good condition.

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

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

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

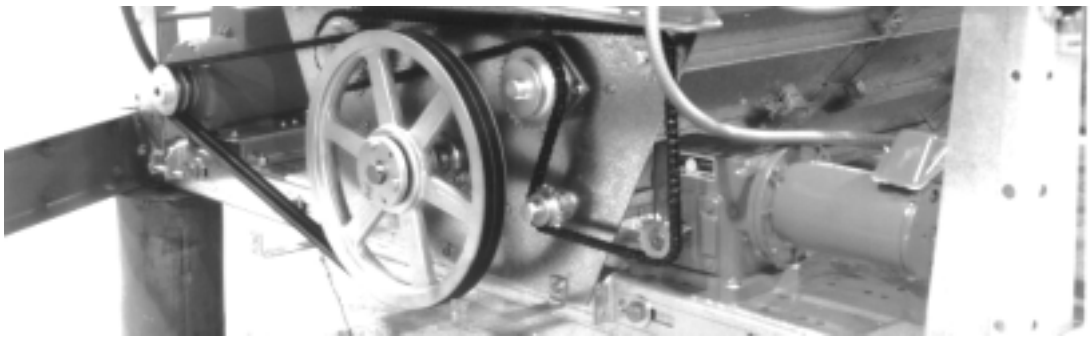
7. OPERATE dryer **cleanout levers**, and CHECK **cleanout hatch** mechanism for proper operation. With hatch open, inspect and remove any dirt, fines or foreign material from the **bottom auger trough** area.

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

8. Inspect entire dryer for loose, worn or damaged parts. Include check of **auger flighting, metering rolls** and other internal parts. Check that **temperature sensors** within air plenum chamber are secured within insulated clamps, and do not chafe on other metal parts.

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

10. TEST FIRE the **dryer** several weeks ahead of the drying season. CHECK for possible **gas** leaks. See page 26 for burner test fire.



Bottom Auger Drive

FAN PROPELLOR REMOVAL AND INSTALLATION

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

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

THREADED BUSHING HOLES

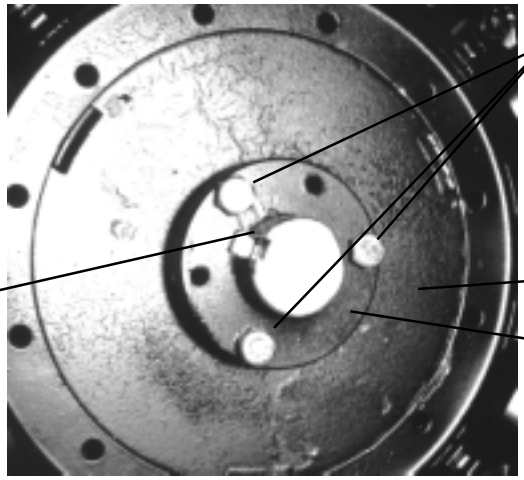
The threaded holes within the **bushing** are provided for disassembly purposes only. Do not attempt to use these holes for reassembly. *They will not allow the parts to lock onto the shaft thereby causing a hazardous operating condition.*

CLEARANCE HOLES

When reassembling parts, the **cap screws** must be installed through the untapped clearance holes as shown. This will cause the **propellor** to be pulled forward onto the **tapered bushing**, thus locking the parts securely onto the **motor shaft**.

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

1. LOCK OUT the **fan** power supply, and REMOVE the **fan guard** and the **venturi**, as required on some models.



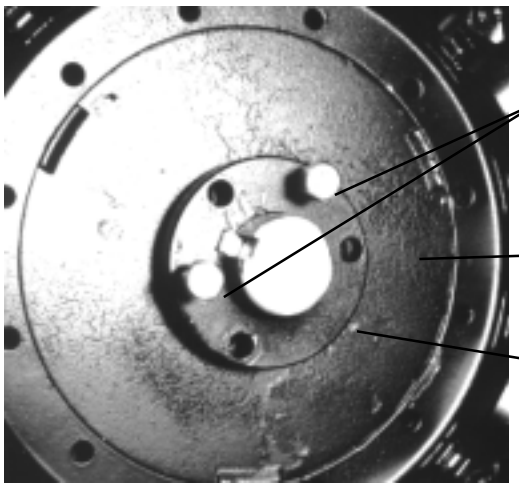
Fan blade installation

2. REMOVE the three **cap screws** from the clearance holes in the **taper-lock bushing**.

3. INSTALL two grade 5 **cap screws** into the threaded holes in **bushing**. TURN **caps** by hand until they bottom against the front surface of the **propellor**.

4. BLOCK **propellor** to prevent it from turning, and gradually TURN the **cap screws** (up to 1/4 turn at a time) until the **propellor** breaks loose from the **bushing** and **motor shaft**. Carefully REMOVE **bushing** and **propellor**. With the **propellor** free from the **bushing**, a wheel can be used to PULL the **bushing** off the **motor shaft**. REATTACH **bushing** onto **propellor** to prevent the loss of parts.

Note: During manufacture the propellor and bushing are balanced together and are marked with two small dots to identify their original alignment position. CHECK the **bushing** and **propellor** to make sure they have alignment marks. MARK the alignment of the **propellor** and **bushing**, if necessary.



Fan blade removal

FAN MOTOR REMOVAL AND INSTALLATION

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

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

1. Make certain power is SHUT-OFF and locked out. REMOVE **fan guard** and **propellor**.

2. REMOVE cover from **fan/heater control box**, and DISCONNECT the **motor lead wires** from within the box. TAG or otherwise identify **wires** for ease of reassembly.

3. REMOVE **motor mount bolts**. If there are shims between the motor and its base, note their location so they can be properly installed during reassembly.

4. DISCONNECT the upper end of the **motor conduit**, then carefully PULL the **wires** through the hole in the **fan/ heater housing**. REMOVE **motor** from the **fan/ heater unit** with the **conduit** still attached. If motor requires service, take it to an authorized service station.

5. To reinstall **motor**, SLIDE onto motor **base plate** and REPLACE shims (if required) between **motor base** and **plate**. REINSTALL **motor mount bolts** and **washer**, but do not fully tighten at this time.

6. REINSTALL **conduit** and **wires** through hole in **fan/heater housing** and carefully CONNECT all **electrical wiring**.

7. ADJUST position of **motor**. Temporarily MOUNT **fan blade** on **motor shaft**. ROTATE **fan blade** by hand, making the necessary adjustments, so the tip clearance between blade and housing is uniform. If required, REMOVE the **fan blade** and fully TIGHTEN all four **motor mount bolts**.

Note: Make sure to INSTALL and TIGHTEN the **propellor** in accordance with previous instructions.

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

HEATER PARTS REMOVAL AND INSTALLATION

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

1. **Flame sensor**: DISCONNECT the **wire connector**, and UNSCREW the **flame sensor** out of its **mounting bracket**.

2. **Gas Solenoid valve coil(s)**: UNSNAP either the plastic cap, or the metal clip on the **gas valve**, and SLIDE the **housing** and **coil** off the valve stem and body. Do not energize the coil when it is removed, as the coil may become damaged due to excessive current flow.

3. **Regulator and gas solenoid valve(s)**: The **gas regulator** and **solenoid valve(s)** are directional and must be CONNECTED as in dicated by the markings near the port openings. Make sure gas is SHUTOFF and purged from the system before removing parts.

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

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

   a. DISCONNECT the **plumbing support brackets** from the **pipe train**.

   b. DISCONNECT **gas solenoid valve coils**. Be sure to MARK which one goes where.

   c. LIFT **pipe** (with **orifice, solenoid valve and other parts** attached), straight up and REMOVE from **fan/heater housing**. **Orifice** and other parts can now be removed from **pipe train**, if desired.

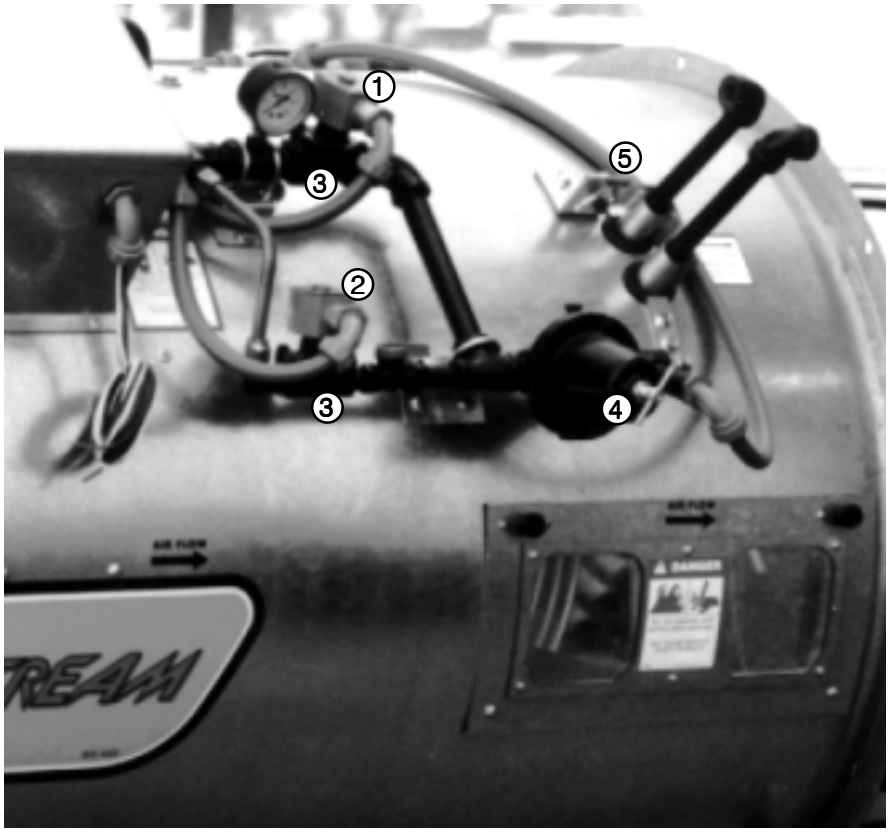
5. **Reassemble**: Reverse the disassembly procedure and CHECK the following:

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

   b. Use a dependable brand of high temperature pipe caulking compound when assembling **gasconnections**. Apply only a light coating onto male threaded end of fittings.

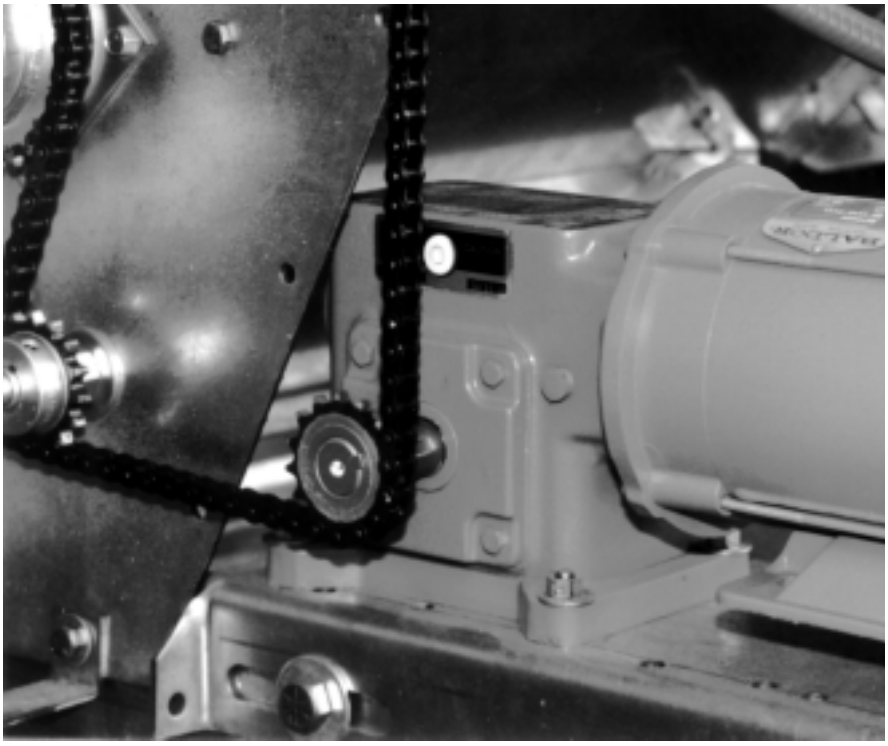
   c. **Solenoid valves** and **gas regulators** are directional and must be properly installed. *Do not attempt to connect gas solenoid valve by applying force to the valve core stem as it may ruin the unit.*

   d. Make sure all **electrical wires** are properly connected. Refer to wiring diagrams.



This view of the dryer heater shows 1-high pressure gas solenoid, 2-low pressure gas solenoid, 3-gas solenoid valves, 4-gas regulator and 5-vaporizer adjustment bracket

METERING ROLL SERVICING



The speed reducer gear box.

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

MAIN CONTROLS

1. **SCR speed control**: The **metering roll speed potentiometer** on the front of the **control box** regulates the speed of the **DC motor** which drives the **metering rolls.**

The markings on the scale from 0 to 999 represent the flow of grain past the **metering rolls** as a percent of the maximum grain discharge rate for the dryer. The maximum setting of 999 provides a maximum 100% discharge of 1960 BPH for 1214, 2240 BPH for 1216, 2520 BPH for 1218, 2800 BPH for 1220, 3080 BPH for 1222, 3640 BPH for 1226 model dryers.

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

2. **DC electric motor**: The 3/4 HP **direct current (DC) motor** provides the drive for the **metering roll**,and is located on the front left hand side of standard model dryers. The output **shaft** of the motor is connected directly to the **gear box assembly**. The DC motor requires no operational adjustment as it is completely controlled from the **control box**.

3. **Speed reducer gear box**: The **direct drive gear box** provides the required speed reduction, and transmits power to the metering rolls through a **drive chain** arrangement. The **gear box** does not require adjustment. The d**rive chain** should also be periodically LUBRICATED and RETENSIONED.

4. **Unload auger time delay**: The delay controls the **bottom auger** system and causes the **unload auger** (and any connected auxiliary unloading conveyors) to continue operating for the programmed amount of time, even after the **metering rolls** stop. This feature permits the clean out of grain within the unload ing equipment at the end of all discharge cycles.

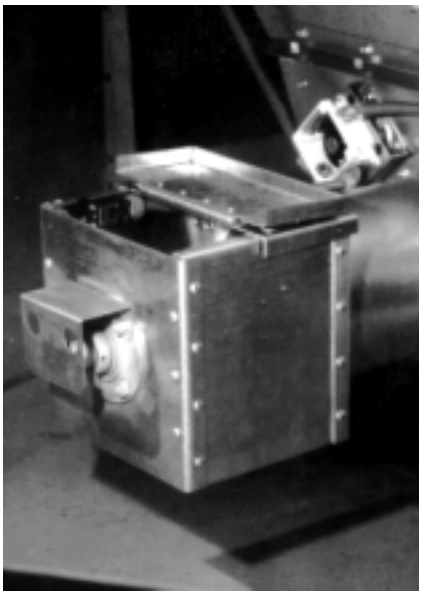
5. If a foreign object becomes lodged in the **metering rolls** and jams the system, the **unloading auger** stays in motion, the **metering roll drive** stops and the **DC motor** should stall out. The **Electronic Monitoring Control System** shuts down the dryer after a two minute period. If any one **metering roll** or **sensor** malfunctions, the control will display a left or right METERING ROLL FAILURE warning.

HOW TO DETERMINE A METERING ROLL PROBLEM

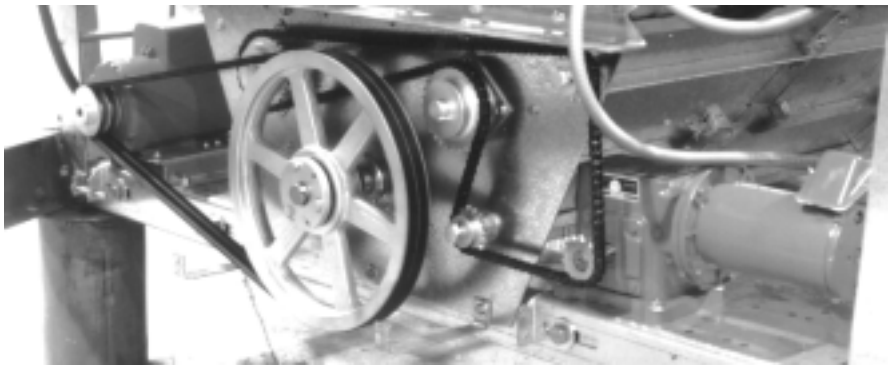
To determine if the metering problem is from blockage, perform the following test with the POWER OFF.

REMOVE the **drive chain** by LOOSENING the **motor mounting bolts**. Refer to photo, and place a pipe wrench on the **hub of the roller chain sprocket**, on the **left hand metering roll** at the drive end of the dryer. Apply up to 100 ft. lbs. of force, and attempt to ROTATE the roll toward the inside of the dryer. If the **metering roll** will turn, then repeat for right hand side. If the **metering roll** will turn, it can be assumed that no blockage exists, and the problem is from some other cause. CHECK for a break in the **power train, chain, drive key, pin,** etc.

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



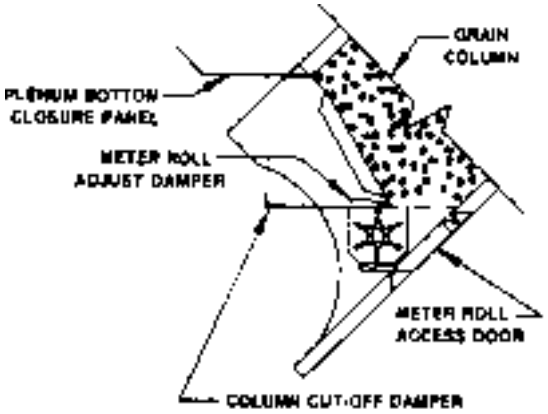
The auger discharge switch.



The metering roll drive.

HOW TO CLEAR A JAMMED METERING ROLL

Place a pipe wrench on the hub of the sprocket of the jammed **metering roll** and TURN the roll. First, backward, and then, forward several times in an attempt to dislodge the object, and clear it through the roll. If this is not successful, have an assistant TURN the **metering roll**, and attempt to locate the jam by sound. SHUTDOWN the **fan/heater**, and eliminate any other noise when making this check. Once the location is determined, the roll can be reached from the outside by OPENING the **access door** to remove the foreign object causing the jam. The **service tool** must be INSERTED before opening doors. (See below).Swing open the **plenum bottom closure panel**. INSERT the **service tool** above the **metering roll**.



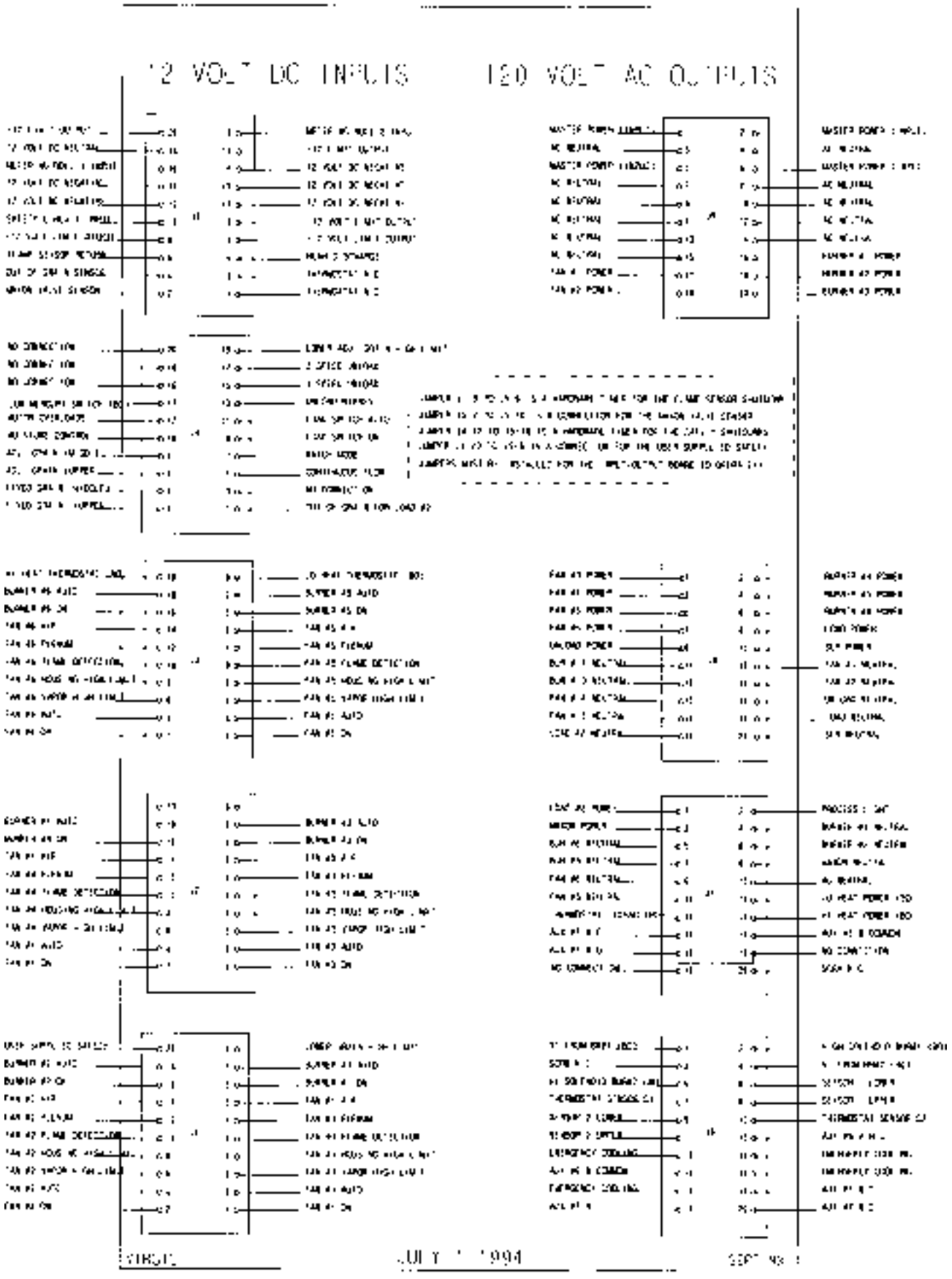
SERVICE TOOL

This column cutoff **damper** is designed to insert through the grain column (from the inside of the dryer) immediately above the **metering roll**. This permits opening of the **metering roll access door**. For service or inspection without unloading the dryer, the **plenum bottom closure panel** and **metering roll** adjust damper must be REMOVED prior to using **service tool**.

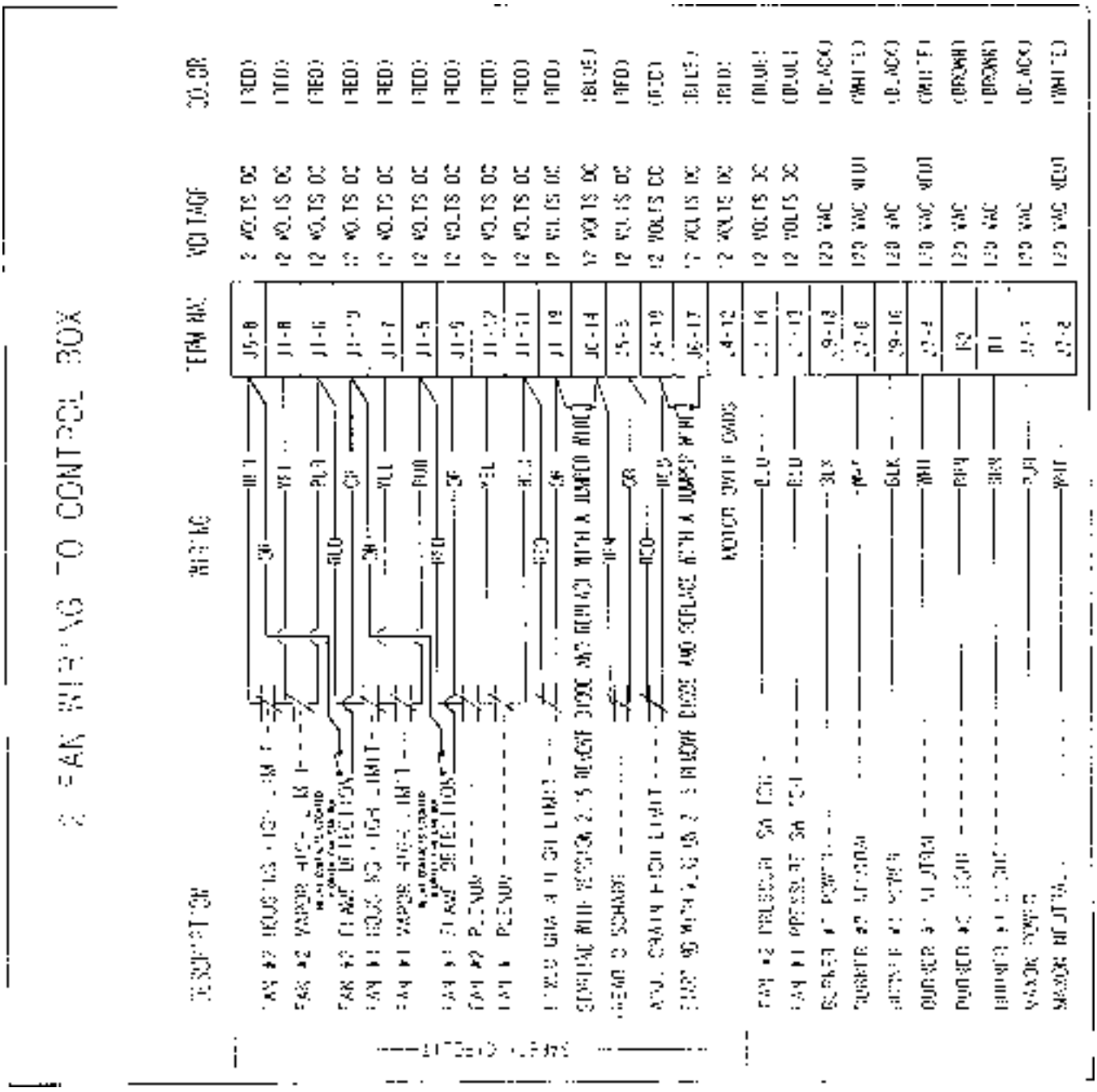
1200 & 1200S C-SERIES WIRING DIAGRAMS

1200 & 1200S C-SERIES WIRING DIAGRAMS

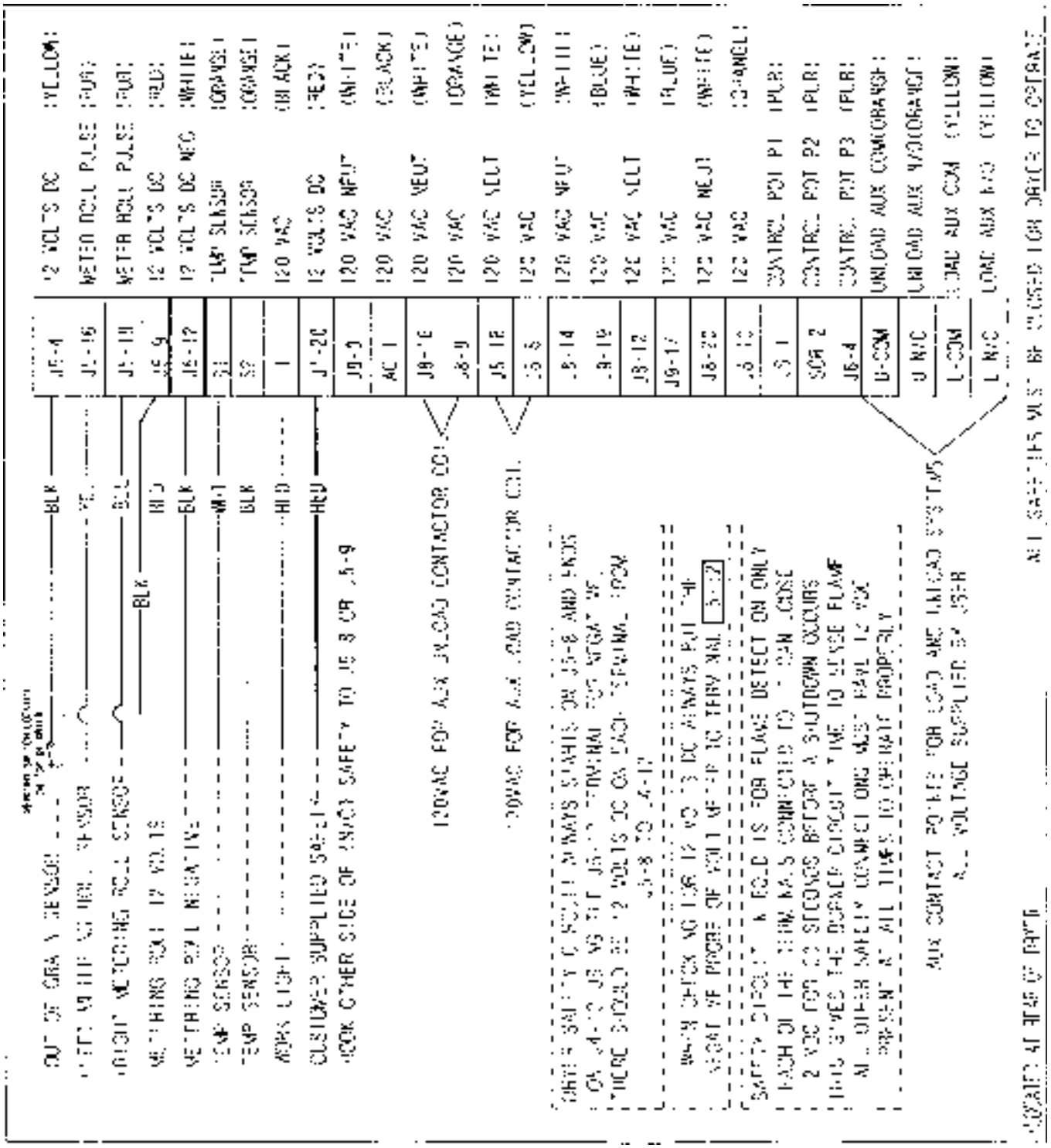
INPUT/OUTPUT BOARD TERMINAL IDENTIFICATION



1200 & 1200S SERIES TWO FAN WIRING TO CONTROL BOX

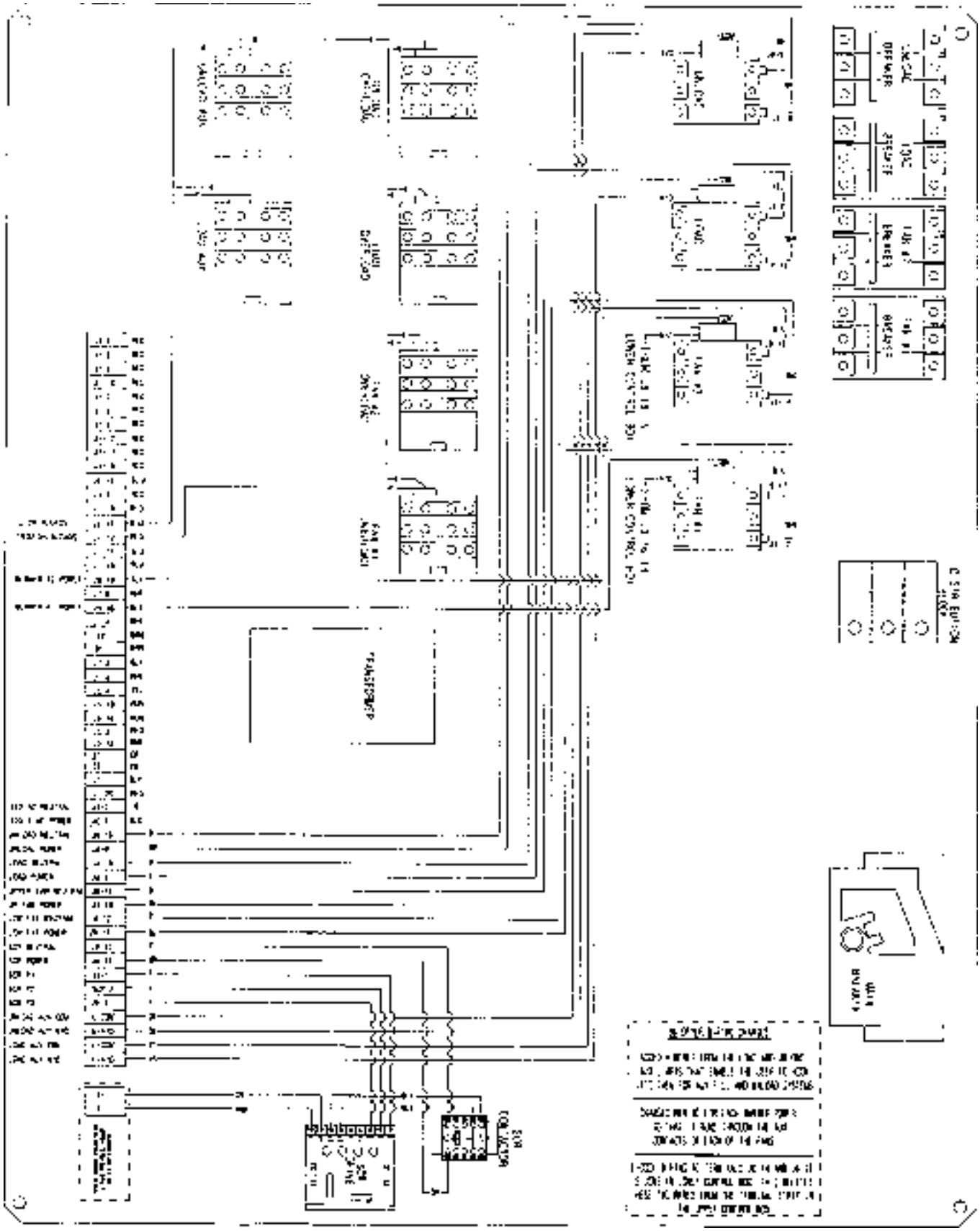


1200 & 1200S SERIES TWO FAN WIRING TO CONTROL BOX

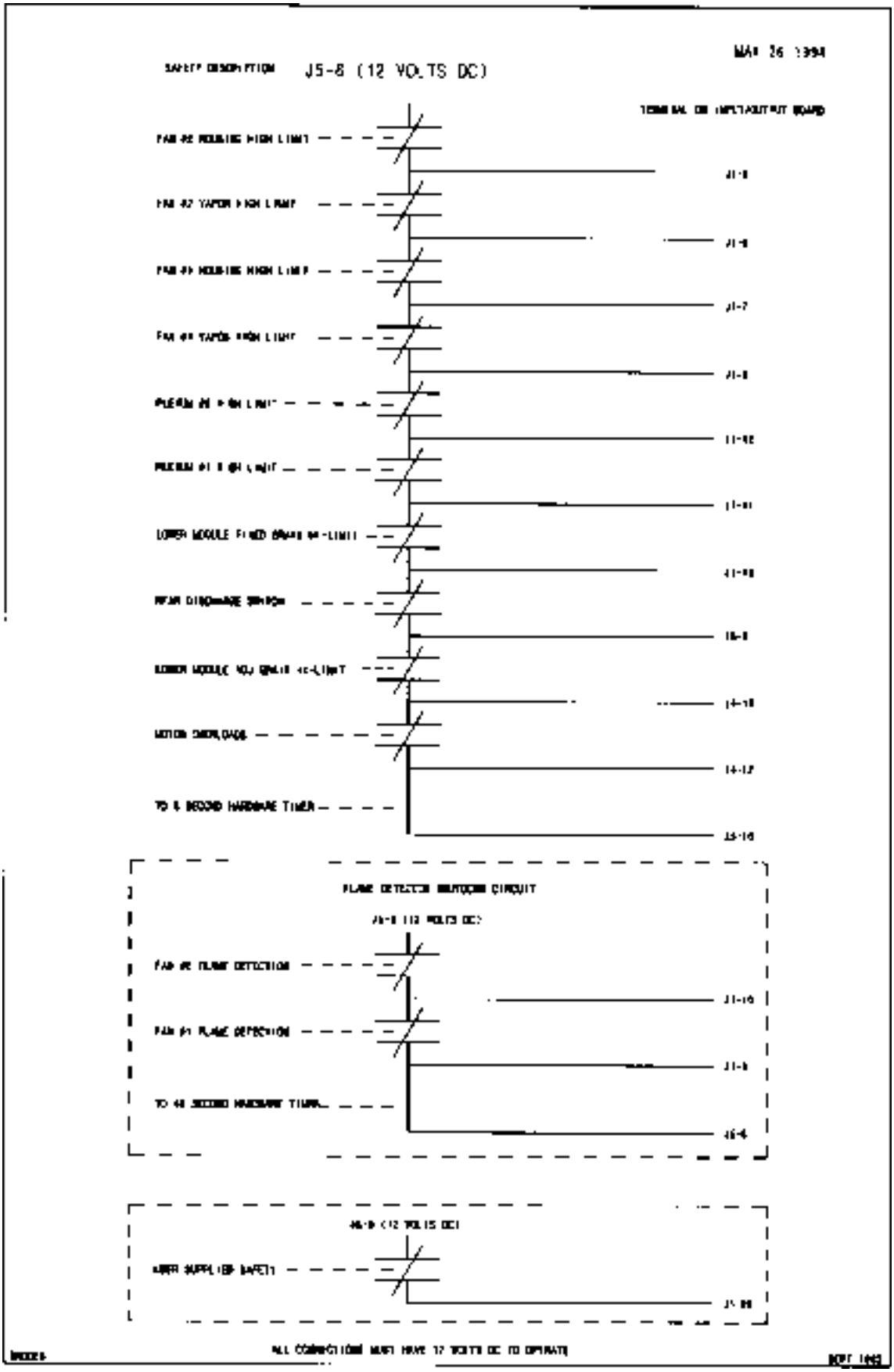


1200 & 1200S C-SERIES WIRING DIAGRAMS

1200 & 1200S SERIES CONTROL WIRING

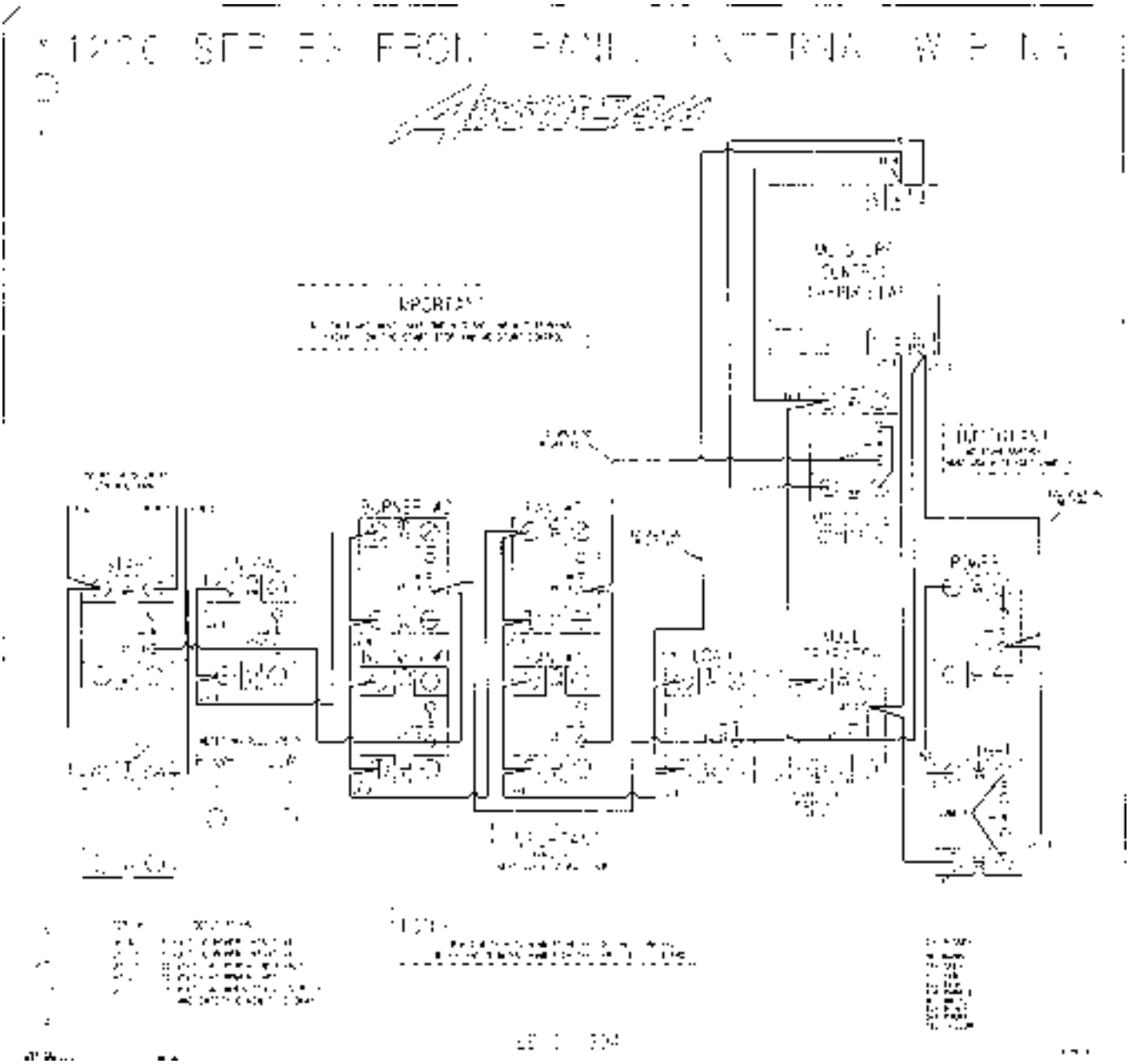


1200 & 1200S SERIES SAFETY WIRING DIAGRAM



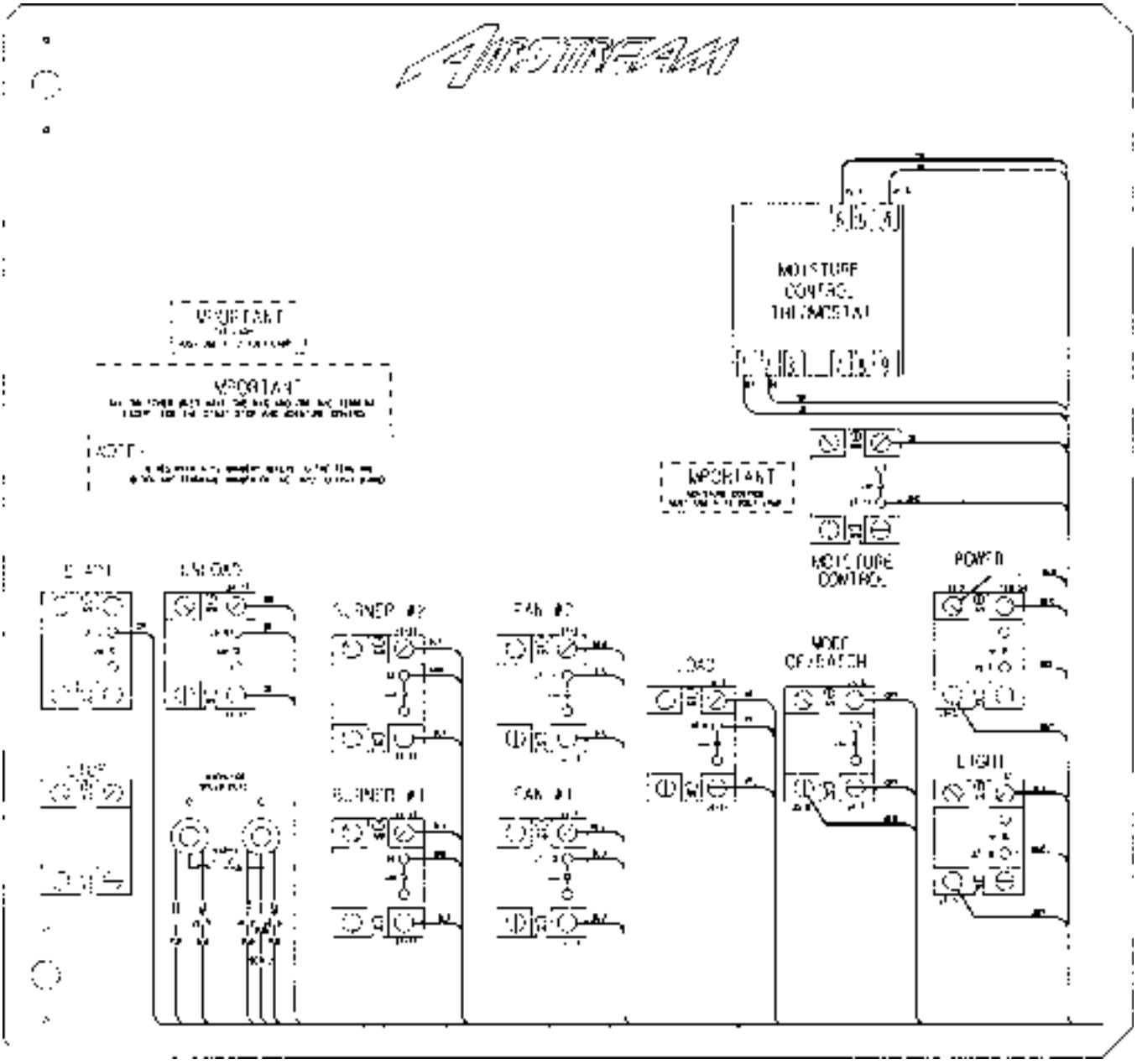
1200 & 1200S C-SERIES WIRING DIAGRAMS

1200 & 1200S SERIES FRONT PANEL INTERNAL WIRING

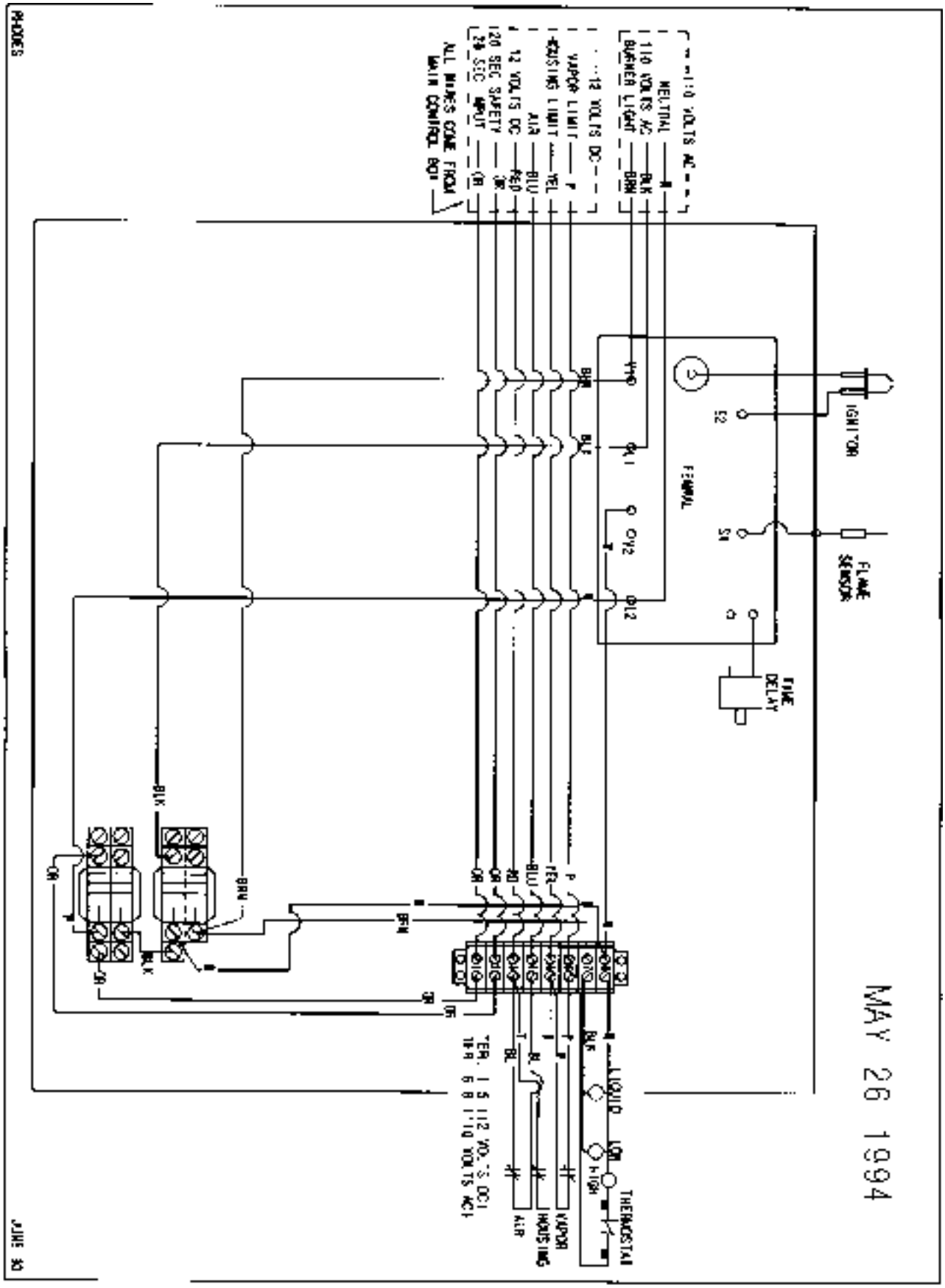


1200 & 1200S C-SERIES WIRING DIAGRAMS

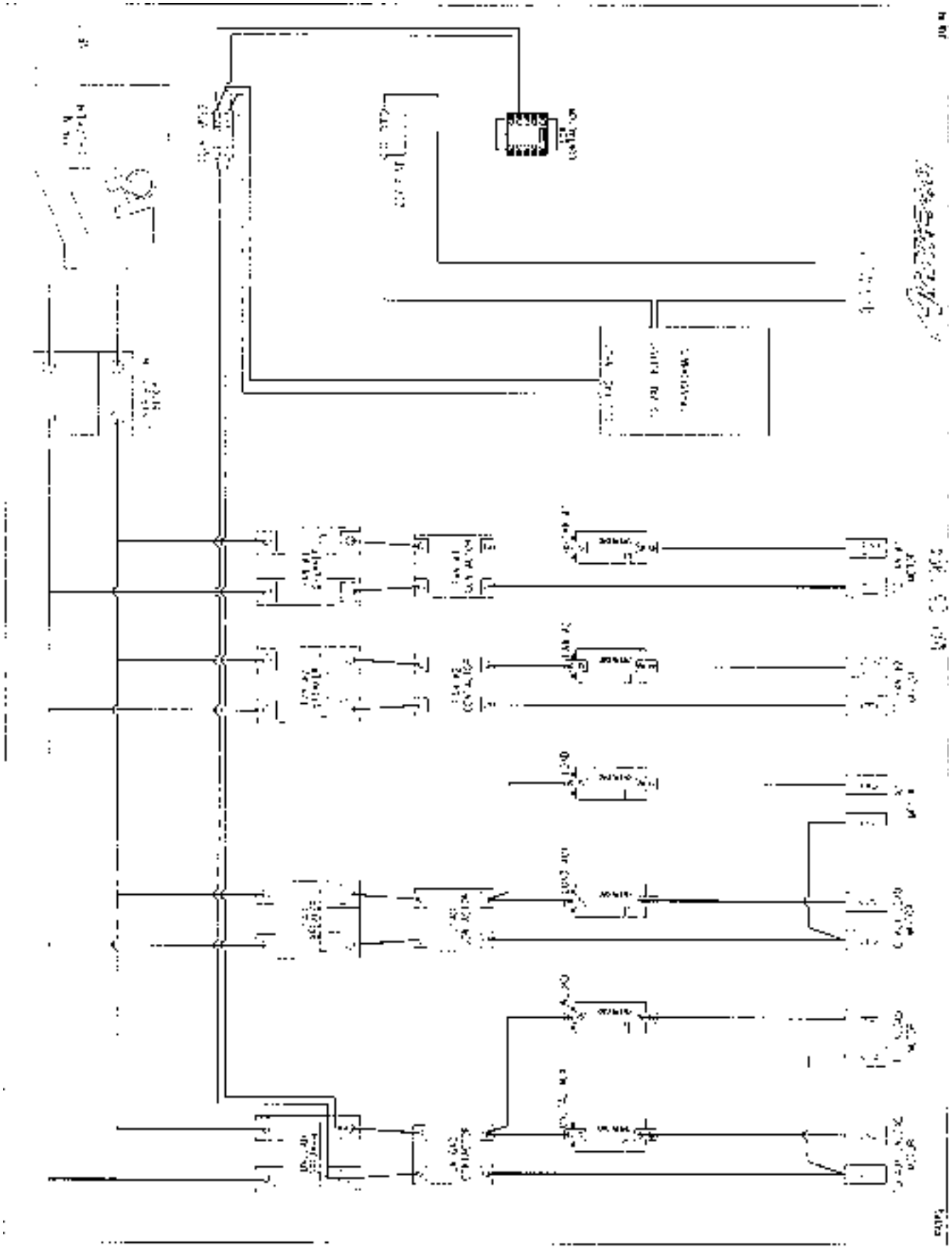
1200 & 1200S SERIES FRONT PANEL EXTERNAL WIRING



DRYER FAN CAN CONTROL WIRING

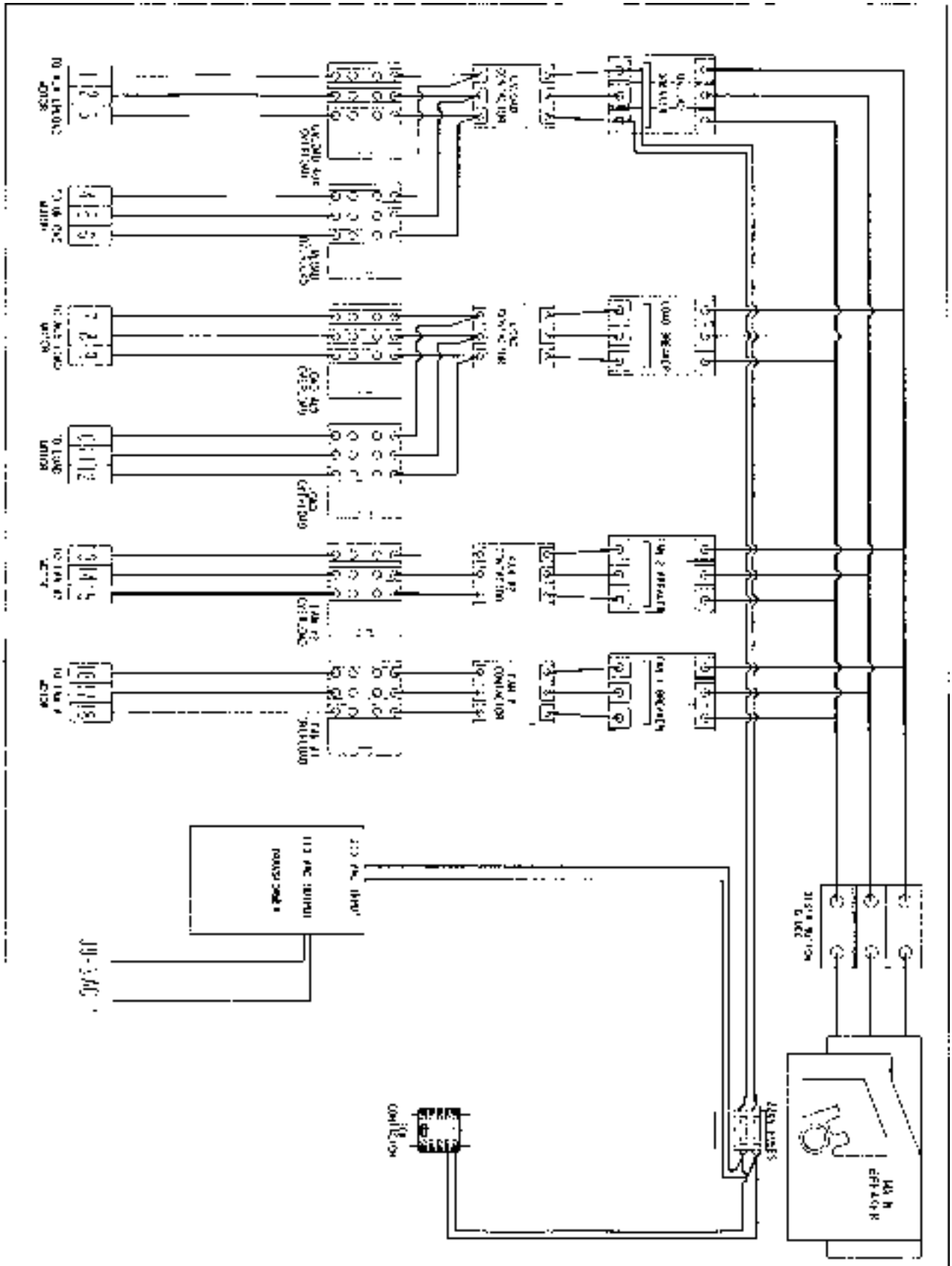


1200 & 1200S SERIES 220 VOLT SINGLE PHASE CONTROL WIRING



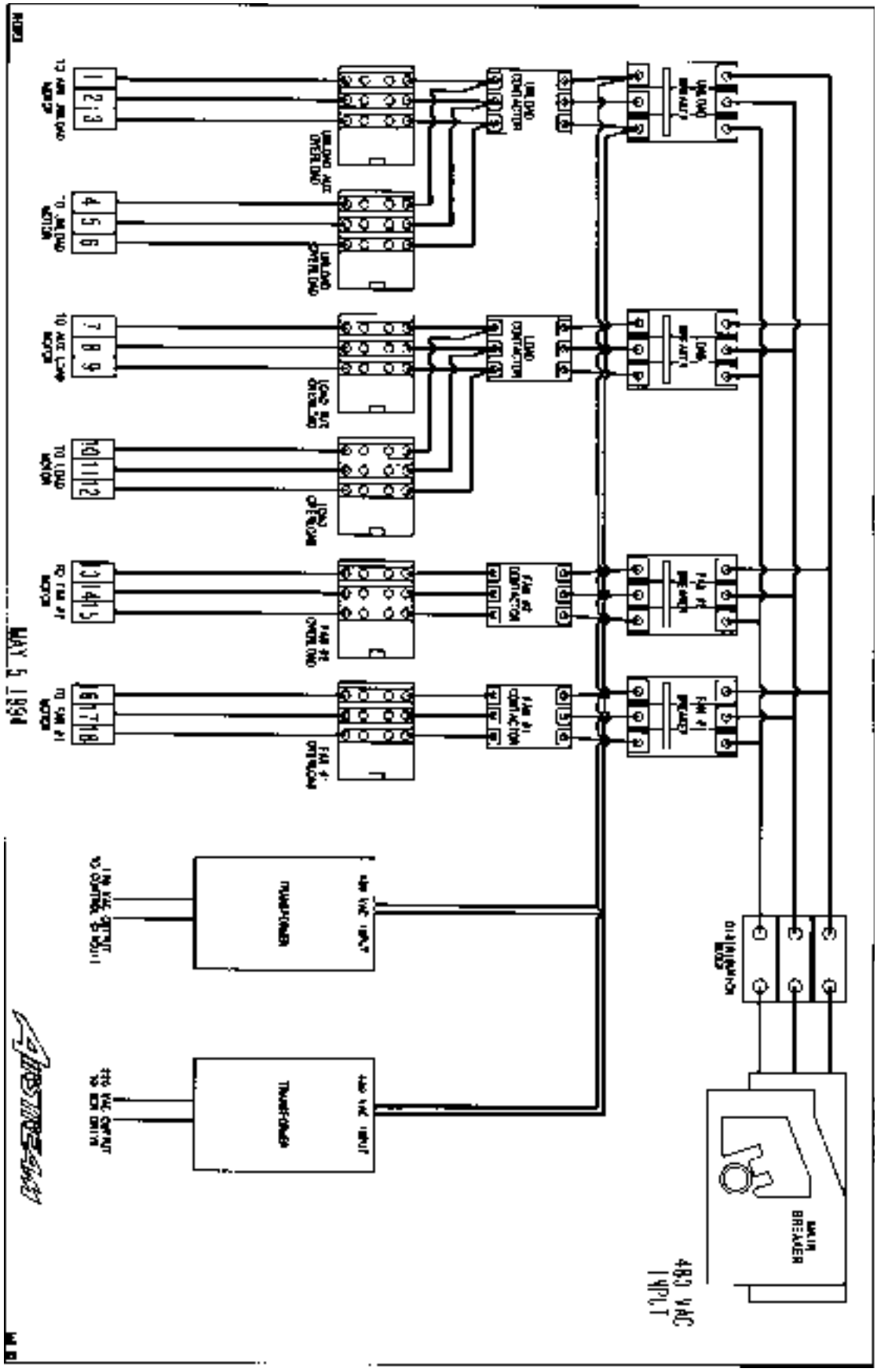
1200 & 1200S C-SERIES WIRING DIAGRAMS

1200 & 1200S SERIES 220 VOLT 3 PHASE POWER WIRING



1200 & 1200S C-SERIES WIRING DIAGRAMS

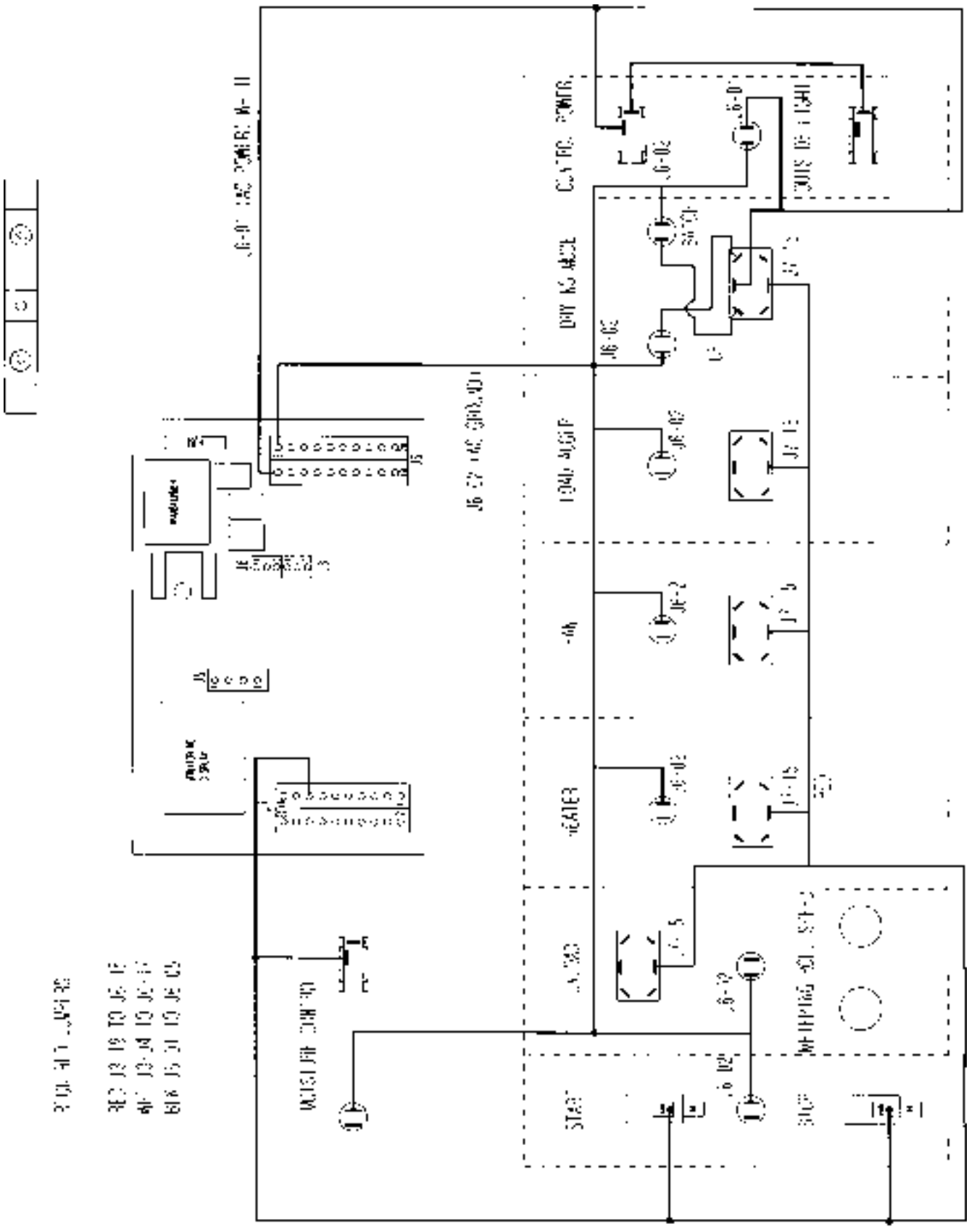
1200 & 1200S SERIES 440 VOLT 3 PHASE POWER WIRING



COMPETITOR SERIES 2000 WIRING DIAGRAMS

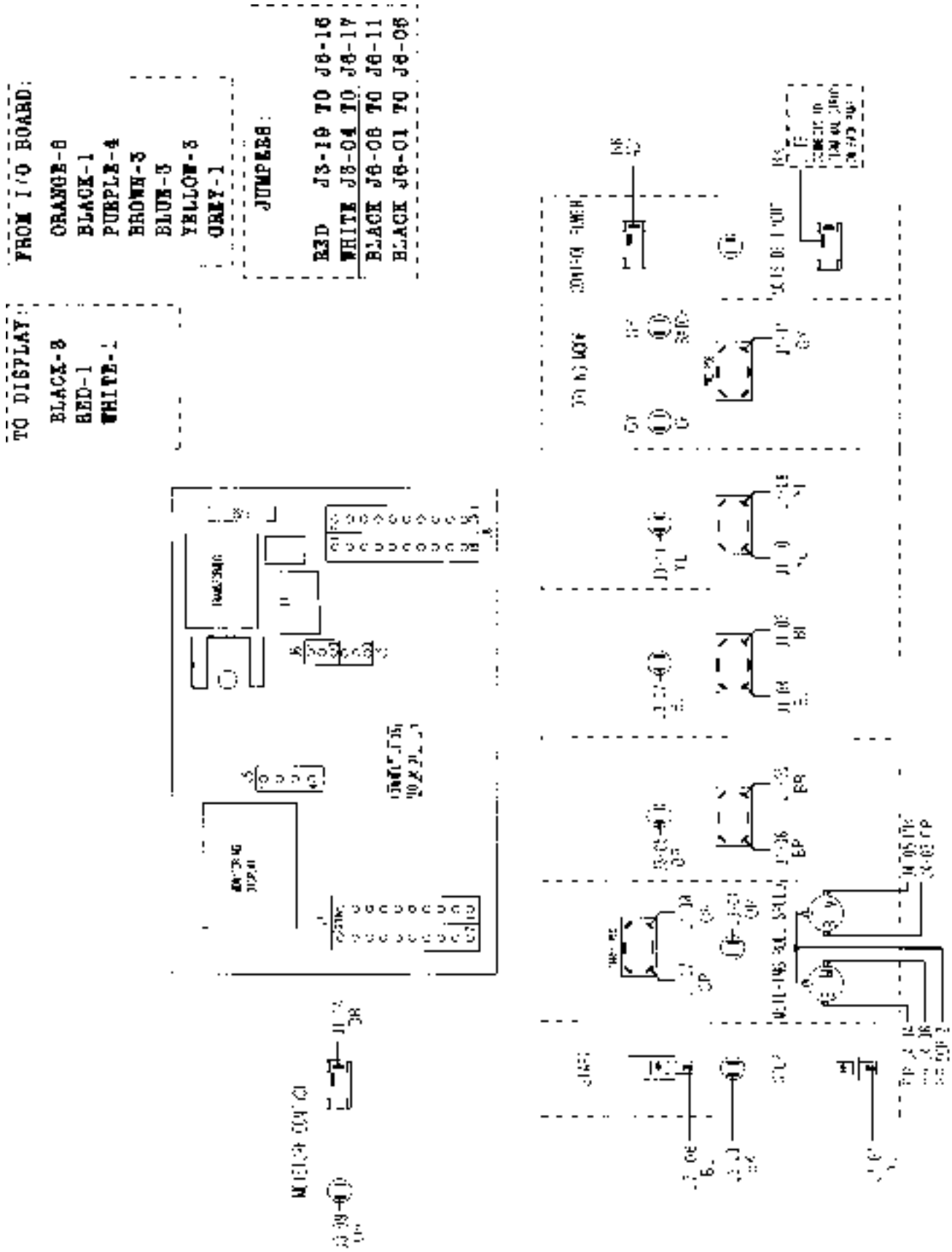
COMPETITOR SERIES 2000 WIRING DIAGRAMS

FRONT PANEL INTERNAL WIRING



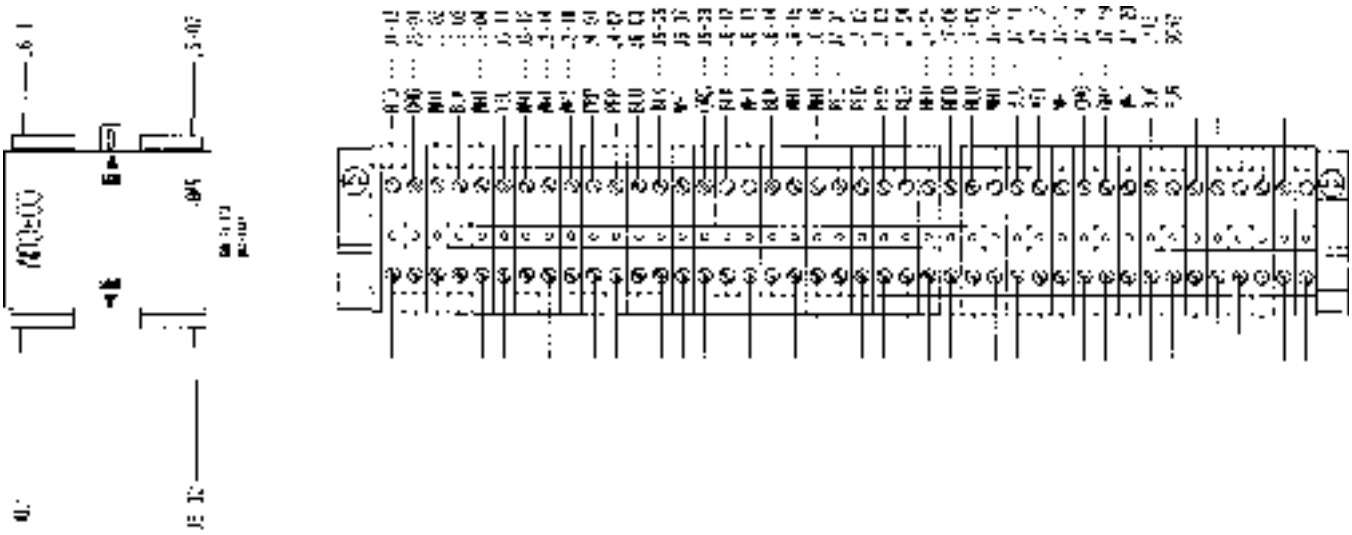
COMPETITOR SERIES 2000 WIRING DIAGRAMS

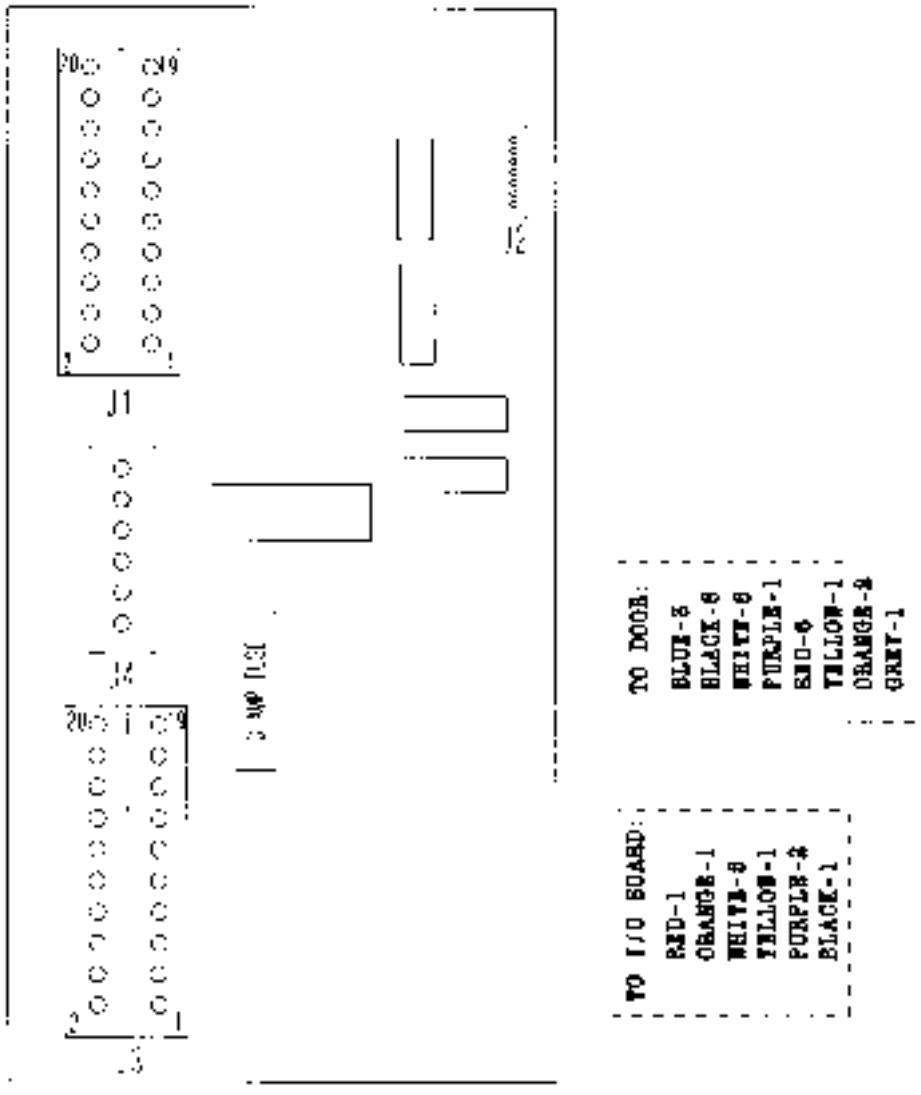
FRONT PANEL EXTERNAL WIRING



COMPETITOR SERIES 2000 WIRING DIAGRAMS

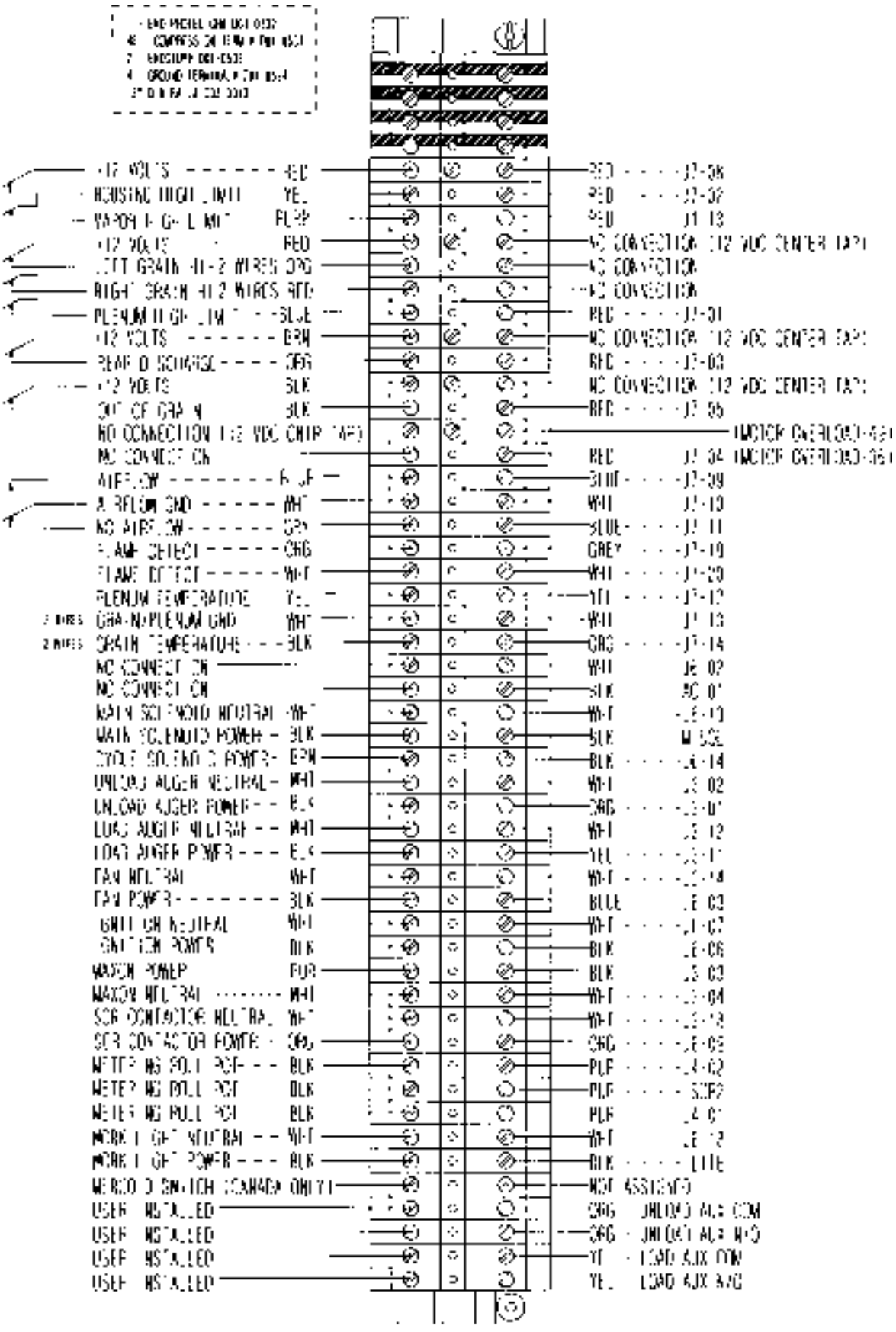
BACK PANEL I/O BOARD





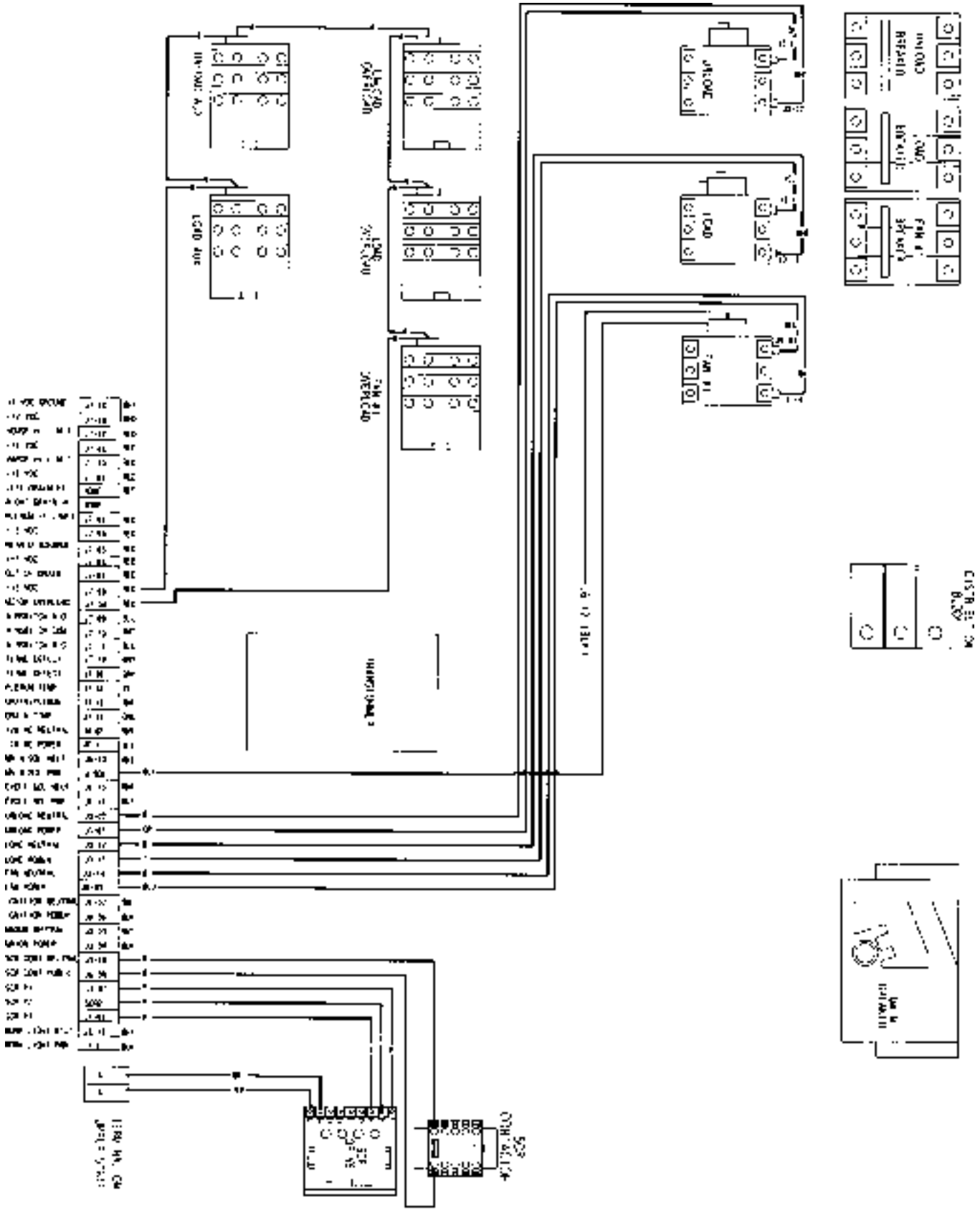
COMPETITOR SERIES 2000 WIRING DIAGRAMS

UPPER PANEL CONTROL STRIP



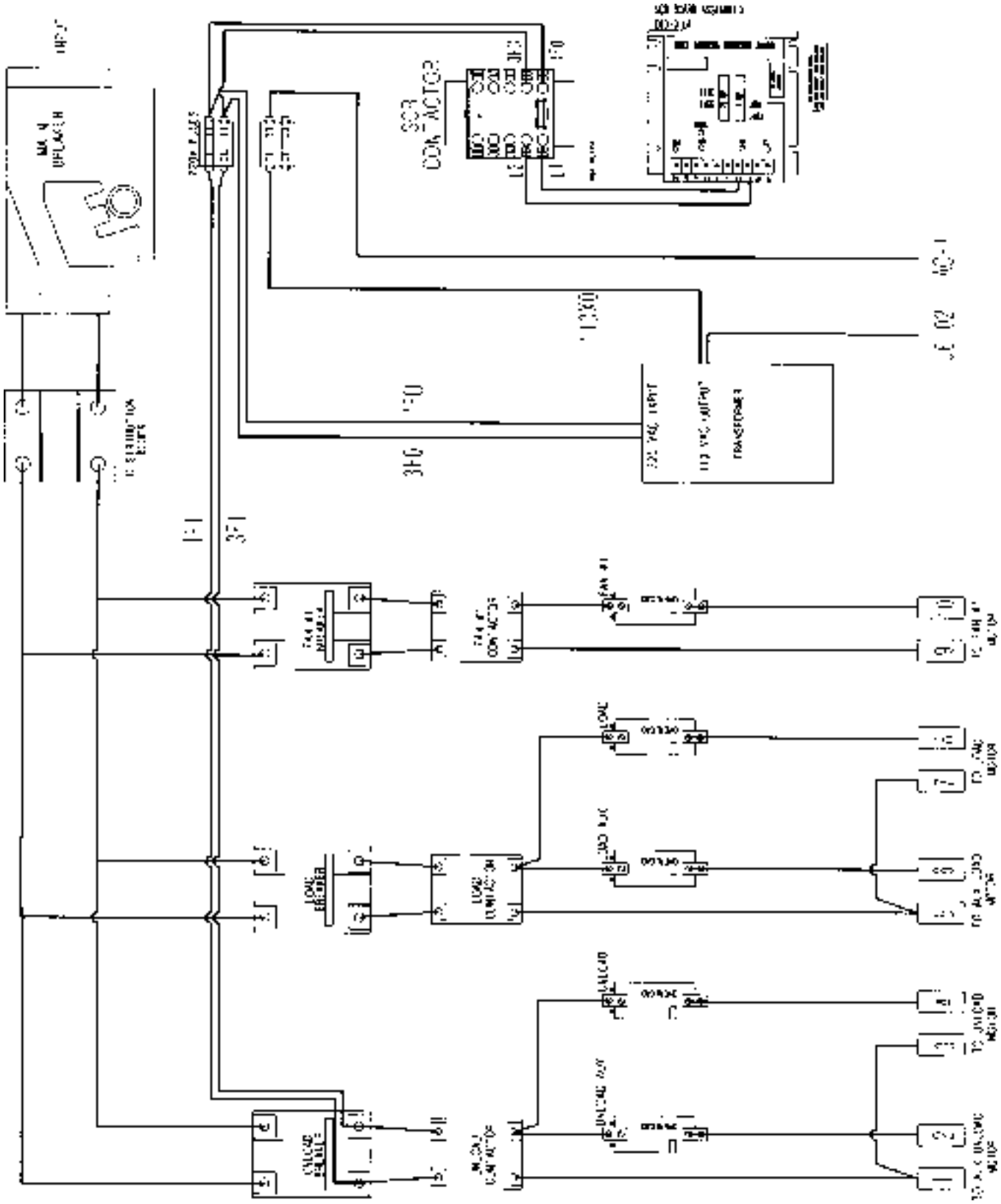
COMPETITOR SERIES 2000 WIRING DIAGRAMS

UPPER PANEL INTERNAL CONTROL WIRING



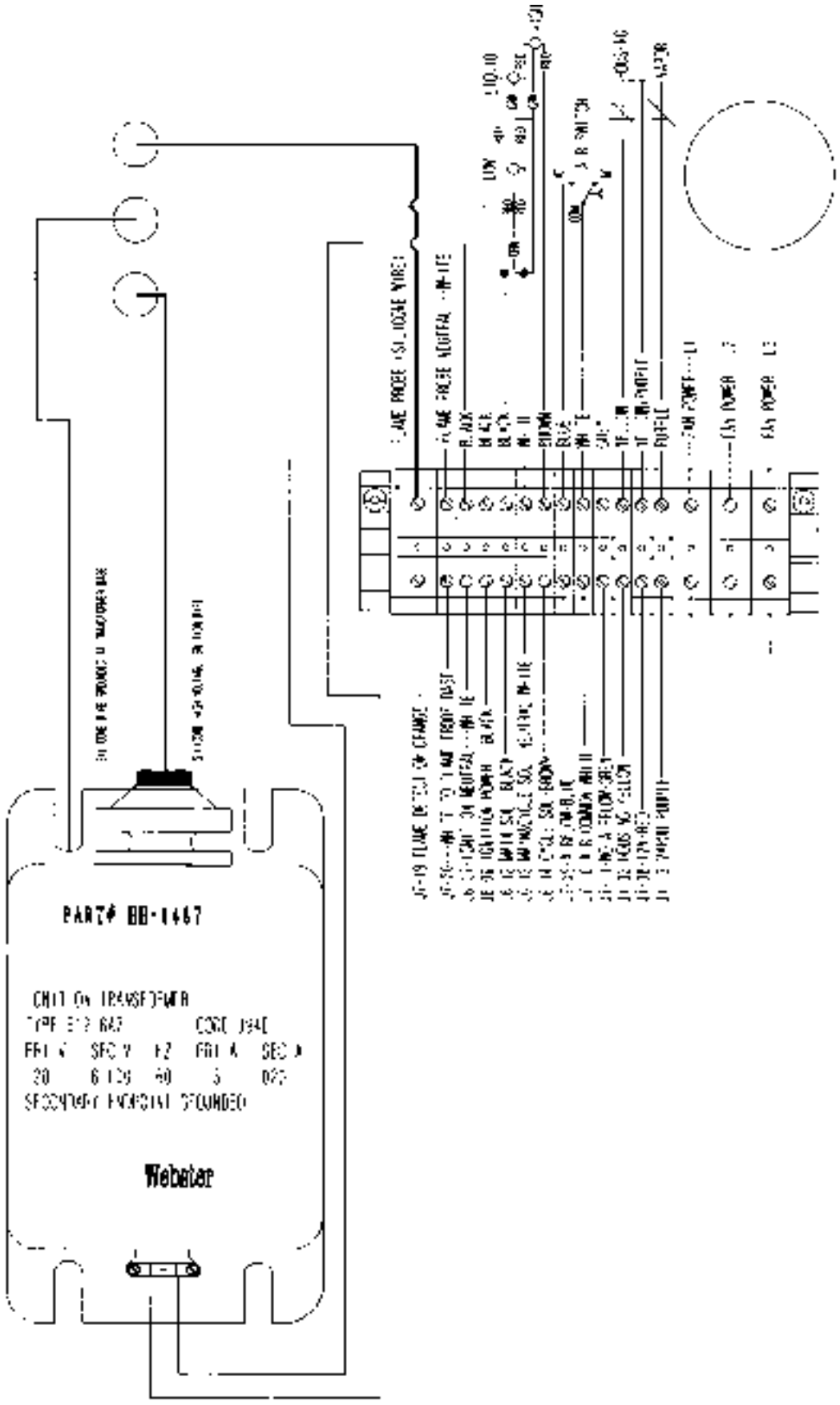
COMPETITOR SERIES 2000 WIRING DIAGRAMS

UPPER PANEL POWER CONNECTIONS

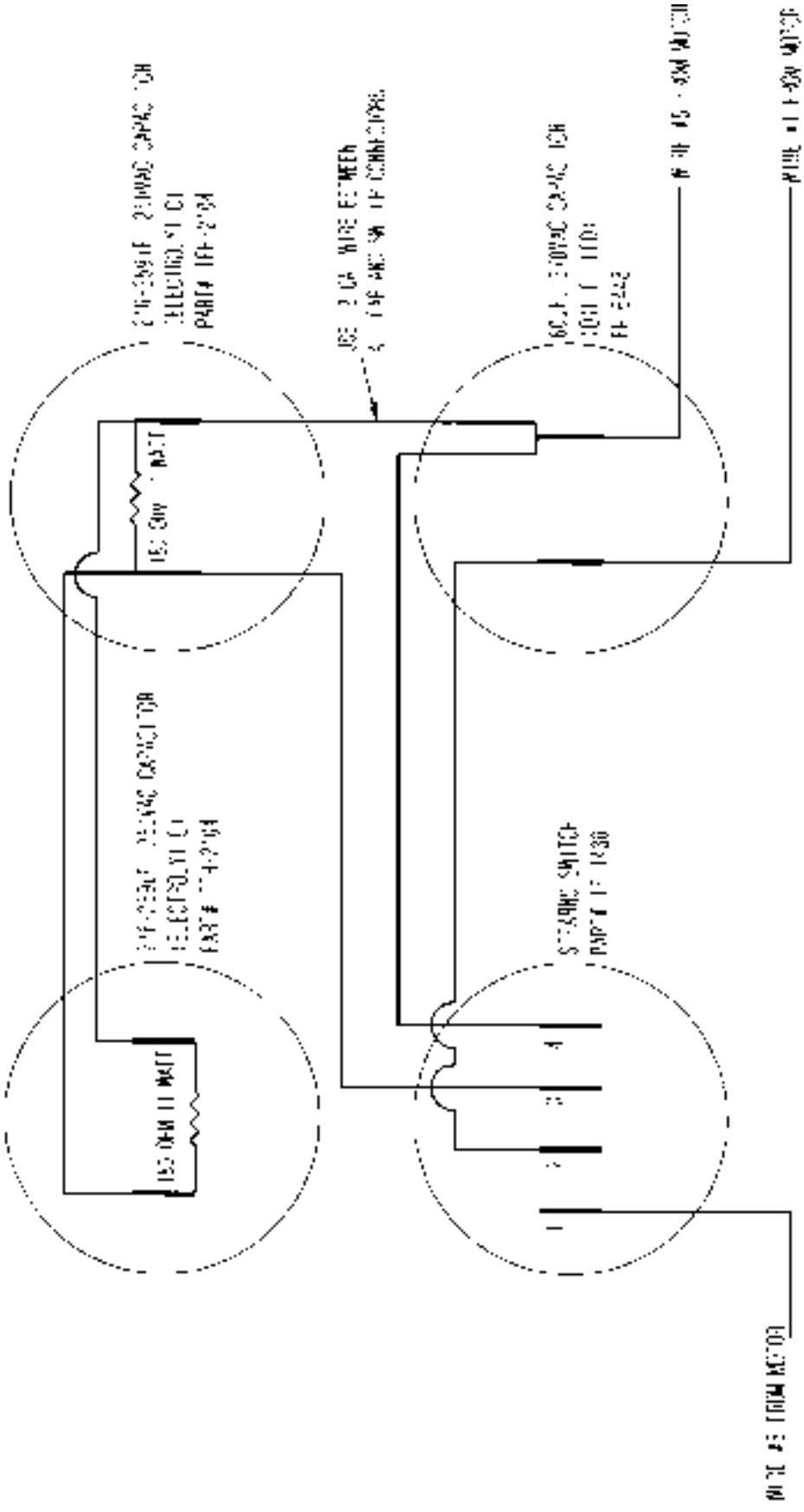


COMPETITOR SERIES 2000 WIRING DIAGRAMS

FAN CAN CONTROL BOX



CAPACITOR WIRING FOR 10 TO 17 MOTOR



TROUBLE ANALYSIS FOR ALL PORTABLE DRYERS

TROUBLE ANALYSIS FOR ALL PORTABLE DRYERS

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

- The **burner circuit** is 120 volts AC on all standard U. S. production models.
- The **control circuit** to the motor starters is 120 AC volts.
- The **safety circuit** is 12 volts DC
- When checking these circuits, measure voltage between the circuit test location and to ground.
- DC circuits should be measured between the test location and its respective DC ground.

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

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

Problem	Possible Cause
Control power switch light OFF.	1. Check that main power and circuit breakers are turned on. Check for tripped breaker. 2. Check for blown 5 amp fuses. 3. Monitor relay is defective. 4. Defective transformer or wiring. 5. Check for a defective power switch. 6. Check wiring between fuses and input/output board. Refer to wiring diagram for test locations.
Control power light is ON, reset button has been pressed, drying mode light OFF. This indicates control power is present at input/output board, but no power is being transferred through the I/O board.	1. **Power interruption:** Incoming power to the dryer has been interrupted. The display screen will show the date and time if this has occured, once power has returned. 2. **Display not finished initial setup:** The monitor will display a copyright message and model number, total running time in hours and minutes and then the current date and time. To activate the controller press the reset button. 3. **Input/output board:** The input/output board has developed a problem that requires its replacement.
No display on LCD screen.	1. Check for a defective power switch. 2. Check wiring between fuses and input/output board. 3. Check for 120 volts AC between points J9-3 and AC-1. 4. The display may have a malfunction requiring its replacement.
Control power light is ON, drying mode light is ON--load auger, fan, heater, unload auger will not operate.	1. **Press the dryer power** start button. 2. Refer to the problem listed for load auger, fan heater and unload auger in the following sections.
Display shows **"L1 VOLTAGE LOST"** message.	The left circuit breaker located on the input/output board of the Electronic Monitoring Control System has tripped, or one of the hardware timers on the Electronic Monitoring Control System has shut down the dryer.
Display shows **"12 VOLT POWER SUPPLY WARNING"** message.	The right circuit breaker located on the input/output board of the Electronic Monitoring Control System has tripped.
Display shows **"MOTOR OVERLOAD"** message.	The thermal overload on the fan motor, load motor, unload motor or an auxiliary motor has opened indicating an overloaded motor. (The overloads must be manually reset).

TROUBLE ANALYSIS FOR ALL PORTABLE DRYERS

Problem	Possible Cause
Display shows **"BURNER 1 OR 2 VAPOR HIGH TEMPERATURE"** message.*	The LP gas vapor temperature sensor located in the gas train downstream from the vaporizor has opened, indicating that the vaporizer is running too hot and must be readjusted. (This control is a 200°F limit which automatically resets when it cools).
Display shows **"BURNER 1 OR 2 WARNING FLAME NOT DETECTED"** message.*	The flame sensor has failed to detect a burner flame, indicating that the burner has failed to light, there is a problem with the flame sensing circuitry or the dryer is not getting burner fuel.
Display shows **"FAN 1 OR 2 HOUSING HIGH TEMPERATURE"** message.*	The temperature high limit located on the fan/burner housing has opened, indicating an over temperature condition has occurred towards the rear of the fan/heater housing. (This control is a 200°F limit control that must be manually reset).
Display shows **"GRAIN DISCHARGE WARNING"** message.	The cover on the grain discharge box has opened, indicating that grain is backing up into the discharge box.
Display shows **"LOWER ADJ. GRAIN HIGH TEMPERATURE"** message.	An over temperature condition has occurred inside the left side grain column. (This control is a 210°F limit which automatically resets when it cools).
Display shows **"LOWER FIXED GRAIN HIGH TEMPERATURE"** message.	An over temperature condition has occurred inside the right side grain column. (This control is a 210°F limit which automatically resets when it cools).
Display shows **"OUT OF GRAIN"** message. Display shows **"OUT OF GRAIN-UNLOAD CLEANOUT.."** message.	The dryer has run low on grain, and the out of grain timer has timed out shutting the dryer down. The unload auger will then clean out the dryer, if the unload switch is on during continuous flow operation. Check the out of grain timer setting, and if necessary adjust. Also, before restarting, inspect load equipment for possible damage or adjustment.
Display shows **"PLENUM 1 OR 2 HIGH TEMPERATURE"** message.*	An over temperature condition has occurred inside the dryer plenum. (This control is a 300°F limit which automatically resets when it cools).
Display shows **"METER ROLL DRIVE SYSTEM FAILURE"** message.	The metering roll drive system has failed to turn within two minutes. A faulty D. C. motor, broken chain or jammed roll is a possible cause of this message.
Display shows **"RIGHT METERING ROLL FAILURE"** message.	The right metering roll has stopped rotating, or the sensor has been damaged.
Display shows **"LEFT METERING ROLL FAILURE"** message.	The left metering roll has stopped rotating, or the sensor has been damaged.
Display shows **"AUXILIARY SAFETY SHUTDOWN"** message.	A shutdown has occurred due to a user installed safety feature. This circuit is located between J5-8 and J1-20 terminals on the input/output board.
Display shows **"BURNER 1 OR 2 SHUTDOWN LOSS OF AIRFLOW"** message.*	The air switch contacts have opened, indicating insufficient airflow for burner to operate.

* The number in the warning message designates the fan, burner or plenum where the problem is located. All areas are numbered from the bottom up. For example, the bottom fan is number 1, and the top fan is number 2.

TROUBLE ANALYSIS FOR ALL PORTABLE DRYERS

Problem	Possible Cause
Display shows **"FAN 1 OR 2 FAILURE-NO AIRFLOW"** message.*	The air switch contacts have opened, indicating the fan may not be turning. The air switch may need adjustment.
Display shows **"FAN 1 OR 2 CANNOT START-CHECK AIR SWITCH"** message.*	The air switch contacts have closed prior to the fan starting, indicating a freewheeling blade or improper setting of air switch.
Fan motor will not start.	1. Check that the fan circuit breaker and the fan switch are on. Also, check for defective switch or bad wiring connections. 2. If lighted switch does not light, the air switch needs adjustment, or the bulb may be burned out. 3. Verify closing of fan motor contactor. Check voltage on load side of contactor. See appropriate power wiring circuit diagram for terminal numbers. Inspect contactor for defective points or a burned out coil. 4. Inspect connections, and check voltage applied to the motor leads in the fan heater box to determine if the motor is defective. 5. Check capacitors on single phase motors, and replace if defective. If motor starts slowly, check for low voltage during starting due to excessive voltage drop in power supply wiring.
Top auger will not start.	1. Check that the top auger circuit breaker and the load auger switch are turned on. 2. If lighted switch does not light, the output power to the contactor is missing. Check connections, or if the bulb is burned out. 3. Check position of the upper auger paddle switch. It must be down to start auger. 4. Inspect for secure mounting and wiring of mercury switch in the terminal box on the top auger paddle switch shaft. Include check for a defective mercury switch. 5. Verify closing of the top auger contactor. Check voltage on load side of contactor. Inspect contactor for defective points, or a burned out coil. 6. Inspect connections, and check voltage applied to motor leads in motor junction box to determine if motor is defective. 7. Check that the mercury switch box is in the proper position.
Bottom auger will not start.	1. Check that the bottom auger circuit breaker is on. 2. If the lighted switch does not light, the output power to the contractor is missing. Check connections, and check to see if the bulb is burned out. 3. Check that the unload switch is on (1 or 2 speed). 4. Verify closing of bottom auger contactor; check voltage on load side of contactor. 5. If using the moisture control, check for proper setting, or defective operation of the control. 6. Check for any loose wire connections in unload auger and moisture control thermostat circuits.
Grain not moving through columns.	1. Check the dryer for fine material buildup inside the columns. 2. Avoid leaving the dryer columns full for long periods at a time (2-3 days) while not operating the dryer, or during rainy weather.

* The number in the warning message designates the fan, burner or plenum where the problem is located. All areas are numbered from the bottom up. For example, the bottom fan is number 1, and the top fan is number 2.

TROUBLE ANALYSIS FOR ALL PORTABLE DRYERS

Problem	Possible Cause
Grain not moving through columns.	1. Check the dryer for fine material buildup inside the columns. 2. Avoid leaving the dryer columns full for long periods at a time (2-3 days) while not operating the dryer or during rainy weather. 3. Empty the dryer. Keep the dryer clean! Do not allow fine material to gather in the plenum chamber. 4. It may be necessary to open the strike off plates in the affected columns in half inch intervals.
Uneven drying-Some kernels appear brown while others are under dried. Uneven heat exiting from dryer columns.	1. Check plenum thermostat temperature setting. Some varieties of grain are more sensitive to higher operating temperatures. It may be necessary to lower the plenum operating temperature to accommodate this. 2. Check for proper burner alignment (side to side). Vibration during shipment may have caused misalignment.
Burner will not fire with fan operating.	1. Burner switch must be on. 2. Check for power to ignition board.
Heater switch light and gas solenoids go ON and OFF erratically-The light blinks ON and OFF while the solenoids "chatter".	1. The blinking light indicates the flame sensor is not detecting flame. 2. The "chattering" solenoids are caused by the loss of flame detection, and the thermostat and Fenwal ignition board trying to reestablish a flame. Check for loose wires on flame sensor; replace or repair wires or sensor.
Burner will not fire-No gas pressure with fan operating at least 15 seconds (gas supply or fan heater malfunction).	1. Check gas supply. Also, check gas filter and gas line for possible obstruction or closed valves. Refill tank; replace or repair parts, as required. 2. Inspect gas solenoid valves (including liquid valve on LP units) for defective coils or improper wiring. Replace valve or coil if valve will not open with proper voltage applied (120 volts). 3. Check for proper voltage. 120 volts across L1 and L2 incoming voltage to the Fenwal Ignition Board, and 115 volts outgoing across V1 and V2 to the solenoids.
Burner will not fire-But gauge shows gas pressure.	1. Fenwal Ignition Board: Check board for spark by removing ignition wire from board, and holding aninsulated screwdriver against the output terminal and 1/4" away from the control box casing. There should be a strong spark. Check board wire connections. Replace the Fenwal board, if necessary. 2. Ignitor: Check that the ignitor is properly gapped to 1/8" and that it has a strong spark. Inspect the porcelain and electrodes for damage or cracking. Replace or clean if necessary.
Burner maintains desired drying temperature-but cycles from hi-fire to OFF (without going to lo-fire).	1. Make sure the low flow control valve is not completely closed. Valve must be adjusted open to provide the proper lo-fire gas pressure listed in this manual. 2. Check lo-fire solenoid valve for proper operation.

TROUBLE ANALYSIS FOR ALL PORTABLE DRYERS

Problem	Possible Cause
Burner operates-But will not cycle from hi-fire to lo-fire.	1. Check the gas pressure reading on the gauge. Problem may be due to insufficient gas regulator setting. Temporarily decrease the hi-lo fire thermostat setting to verify that the thermostat will function and cause the burner to cycle. If burner will cycle at the reduced thermostat setting, it indicates that the problem was due to insufficient heat to satisfy the original setting. Increase the gas regulator setting for additional heat output. Do not exceed the maximum pressure listed in this manual. 2. Hi-lo fire thermostat control may be defective. If the burner still will not cycle to lo-fire after decreasing the thermostat, the problem may be due to a broken or kinked thermostat sensor tube. Observe reading on the thermometer. Replace control assembly if it cannot be set to cause its switch to go to the open circuit position with normally hot air plenum temperatures. 3. If the burner continues to operate on hi-fire, check the hi-fire gas solenoid valve for a stuck or blocked open condition, or for reversed gas pipe connections. The solenoid valve must not allow gas flow when its coil is not energized.
Burner operates-But will not cycle from lo-fire to hi-fire.	1. Check for an excessive lo-fire gas pressure setting. Observe pressure setting shown on gauge, and compare reading with recommended low pressure settings listed in this manual. Readjust lo-fire setting on flow control valve, if necessary. 2. Check for improperly adjusted or defective hi-lo fire thermostat control. Temporarily increase the temperature setting. If the heater will still not cycle, check for problem in the control wire connections. The control wires should be connected to terminals R and B of the thermostat, so the switch will open upon temperature rise. If the burner will cycle with these two wires connected together, the thermostat is faulty. 3. Check for improperly connected or faulty hi-fire gas vapor solenoid valve. Correct any poor connections or defective wiring. If wiring appears proper, problem may be caused by a burned out valve coil or defective valve. Replace hi-fire solenoid valve, or its coil, if defective.

ELECTRONIC MONITORING CONTROL SYSTEM

Important! To activate the controller after turning on the CONTROL POWER, press the RESET button.

Setting the DRY, COOL, UNLOAD and OUT OF GRAIN TIMERS:

- Press the DRY, COOL, UNLOAD or OUT OF GRAIN button
- Press the MODIFY button
- Press the INCREASE or DECREASE button to get desired setting
- Press the ENTER button when desired setting is reached

Setting the LOAD and UNLOAD delays:

- Press the LOAD or UNLOAD button
- Press the MODIFY button
- Press INCREASE or DECREASE button to get desired setting
- Press the ENTER button when desired setting is reached

Pressing the INCREASE and DECREASE buttons simultaneously will access the following programming features:

- Safety circuit shutdown log
- Dryer model number
- Fan delay
- BPH factor
- Metering roll monitor disabling feature
- Air switch disabling feature

These features are accessed sequentially as listed above. Press the INCREASE or DECREASE buttons to change a setting. Press the ENTER button to move from feature to feature.

Pressing and holding the RESET button for five seconds will access the following programming features:

- Calendar year setting
- Calendar month setting
- Calendar day setting
- Clock hour setting
- Clock minute setting
- Bushel counter reset
- Batch counter reset

These features are accessed sequentially as listed above. Press the INCREASE or DECREASE buttons to change a setting. Press the ENTER button to move from feature to feature.

Change the marquee on the LCD display:

- Press and hold the MODIFY button while turning on the CONTROL POWER
- To change a character press the INCREASE or DECREASE button
- To move the cursor to the right press the UNLOAD button
- To move the cursor to the left press the DRY button
- To delete a character press the COOL button.
- Press ENTER when the desired marquee is displayed

To RESET the computer to the original default setting, turn OFF the computer, press and hold the green AUX 1 button and turn ON the computer. NOVRAM will appear on the LCD display. The year, date, time and minutes may be changed now, and the shutdown history may also be cleared. Note: If the history is cleared the dryer model number must be RESET or only the **bottom fan** will operate.

Dryer owner and Airstream associates check the Electronic Monitoring Control System.

NOTES

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