



AUTOMATIC GRAIN DRYER
Continuous Flow / Automatic Batch



Owners Operation Manual
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Congratulations on your purchase of a new Sukup Automatic Dryer! We're pleased to add your name to the growing list of Sukup Dryer customers. Your Sukup Automatic Dryer offers the most advanced automatic operation of any dryer on today's market. You can feel confident that you have purchased your Dryer from a company committed to serving farmers for years to come. Sukup Manufacturing is one of the few family-owned companies in an era of corporate mergers. Our family has more than 40 years of grain drying and handling experience and an excellent reputation for standing behind our products - we appreciate your purchase. You can look forward to many years of superior performance from your Sukup Automatic Dryer!

Limited Warranty

SUKUP MANUFACTURING COMPANY (Sukup) warrants to original retail purchaser that within time limits set forth, new equipment shall be free from defects in material and workmanship. A part will not be considered defective if it substantially fulfills performance specifications. Should any part prove defective within the warranty period, the part will be replaced without charge F.O.B. Sukup Mfg. Co., Sheffield, Iowa or Distribution Centers – Arcola, Illinois; Aurora, Nebraska; Defiance, Ohio; Jonesboro, Arkansas; Kansas City, Missouri; Watertown, South Dakota. To obtain warranty, a copy of original invoice is required.

THE FOREGOING LIMITED WARRANTY IS EXCLUSIVE AND IN LIEU OF ALL OTHER WARRANTIES OF MERCHANTABILITY, FITNESS OR PURPOSE AND OF ANY OTHER TYPE, WHETHER EXPRESSED OR IMPLIED. Sukup neither assumes nor authorizes anyone to assume for it any other obligation or liability in connection with said part, and will not be liable for incidental or consequential damages. THE REMEDIES STATED HEREIN SHALL BE THE EXCLUSIVE REMEDIES AVAILABLE UNDER THIS LIMITED WARRANTY.

Sukup reserves the right to change specifications, add improvements or discontinue manufacture of any of its equipment without notice or obligation to purchasers of its equipment. This warranty gives you specific legal rights. You may also have other rights, which vary according to state or province.

WARRANTY EXCLUSIONS - Labor, transportation, or any cost related to a service call is not provided by Sukup. This Limited Warranty does not apply to damage resulting from misuse, neglect, normal wear, accident or improper installation or maintenance. ITEMS NOT MANUFACTURED BY SUKUP (i.e. Tires, Belts, Motors, etc.) ARE COVERED UNDER WARRANTIES OF THEIR RESPECTIVE MANUFACTURERS AND ARE EXCLUDED FROM COVERAGE UNDER THE SUKUP WARRANTY. Since the down augers are so critical to the successful operation of the stirring machine, Sukup Mfg. will not warranty any machines unless they are equipped with Sukup down augers.

BASIC WARRANTY – All Sukup manufactured products are warranted for one year from date of purchase.

EXTENDED STIRRING MACHINE WARRANTY – Sukup warrants Stirring Machines for two years from date of purchase.

EXTENDED STIRRING AUGER WARRANTY – Stirring Augers are warranted for two years from date of purchase. Must return top 18" of down auger to obtain credit.

EXTENDED FAN WARRANTY - Sukup warrants fans for two years from date of purchase.

EXTENDED GRAIN DRYER WARRANTY - Sukup warrants grain dryers for two years from date of purchase.

EXTENDED HEATER CIRCUIT BOARD WARRANTY - Sukup warrants heater circuit boards for three years from date of purchase.

ELECTRIC MOTOR WARRANTY - The manufacturers of electric motors warranty their motors through authorized service centers. Contact motor manufacturer for nearest location. If motor warranty is refused by a service center based upon date of manufacture, use the following procedure: Have the motor repair shop fill out the warranty report form as if they were providing warranty service. State on the report the reason for the refusal. Send the report, motor nameplate, and proof of purchase date to Sukup. If electric motor warranty is not satisfactorily handled by motor service center, contact Sukup for assistance. Warranty may also be obtained by returning motor to Sukup Mfg. Co. or Distribution Centers with prior authorization.

NOTE: Sukup will not be responsible for unauthorized motor replacement or repair.

WARRANTY CERTIFICATION - Warranty registration card and the Start-up Checklist performed by your dealer upon successful completion should be mailed to certify warranty coverage.

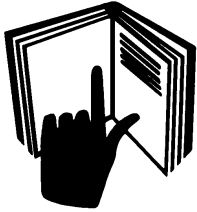
UNAPPROVED PARTS OR MODIFICATION - All obligations of Sukup under this warranty are terminated if: unapproved parts such as stirring augers are used, or if equipment is modified or altered in any way not approved by Sukup.

**GRAIN DRYER
Safety Section**

The above safety-alert means "ATTENTION! Be Alert! Your personal safety is involved" This symbol draws your attention to important instructions concerning your personal safety. Read the message carefully to avoid personal injury or death.

FOLLOW MACHINE SAFETY SIGN & MESSAGES

Observe safe operating practices. Carefully read this manual and all safety signs on your equipment. Safety sign must be kept in good condition. Replace missing or damaged safety decals; available from Sukup Mfg. Co.; Box 677, Sheffield, Iowa 50475 at no charge.



Learn how to use controls and operate machine. Do not let anyone operate unit (especially youth) without thorough training of basic operating and safety procedures.

Make no unauthorized modifications to machine. Modifications may endanger function and/or safety of unit. Keep unit in good working condition.

EMERGENCIES - KNOW WHAT TO DO

Have emergency numbers near your telephone:

For doctors:

Emergency medical squad:

Ambulance service:

Hospital:

Fire department:

Have written directions to your location.

TRANSPORT SAFETY WARNING:

HAULER/TRANSPORTER IS TO PROVIDE APPROVED SAFETY CHAIN WHEN TOWING DRYER.



WARNING: Transporting this equipment on public roads may result in serious injury or death. If road travel is required it is essential that all the following procedures be followed:

1. Read and understand -- operator's manual.
2. Check and comply with state & local regulations.
3. Use required emblems or lights.
4. Travel at a reasonable and safe speed. Reduce speed and/or use lower gear on rough ground or slopes.
5. Stop slowly.
6. Have extended rear angle mirrors on vehicles.
7. Signal & check behind you when turning.



WARNING: Check for other vehicles when turning. **(2/3 of roadway farm accidents occurs when turning.)**

- Use mirrors
- Be sure to have clear visibility,
- Use signal lights



WARNING: do not transport unit in areas of poor visibility --

- Especially on hills,
- During poor weather conditions,
- Or at night

Failure to do so may cause serious injury or death. Use good judgement when transporting. Maintain complete control of unit at all times. Comply with State and local laws governing. Read safety regulations when moving units. Always strive to prevent accidents! Watch out for other vehicles.



WARNING: TO PREVENT EXPLOSION OR FIRE

- Carefully review operators manual.
- Clean under unit, as fines may cause a bin fire.
- Check for gas leaks (spray soapy solution on piping and joints).
- Run fan at least a half minute before starting heater.
- NEVER start heater if you smell gas or hear a hissing sound.
- NEVER run heater with inspection door open.

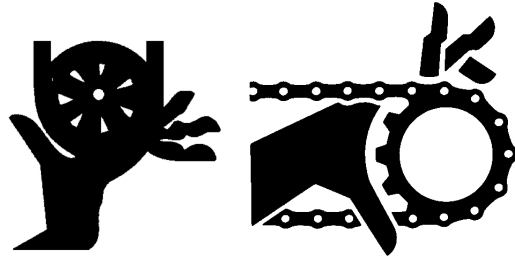


Failure to heed these warnings may cause serious injury or death.



WARNING: KEEP CLEAR OF ALL MOVING PARTS

Keep people (ESPECIALLY YOUTH) away from equipment, particularly during operation. Keep away from all moving parts. Entanglement can cause serious injury or death. Keep inlet guard in place and in good working condition.



Failure to follow the above precautions may cause serious injury or death.

Mount safety decals when unit is assembled. Please check that all decals are in place according to the drawing/picture and in good legible condition.

IMPORTANT!! If suggested locations are not clearly visible, place safety decals in more suitable area. Never cover up any existing safety decals.

Make sure location for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position. To order replacement decals (no charge) contact Sukup Manufacturing Company, P.O. Box 677, Sheffield, Iowa 50475
Phone 641 - 892 - 4222 - Please specify computer number.

1. WARNING - L0281-To Avoid serious injury or death.



WARNING

TO AVOID SERIOUS INJURY OR DEATH:

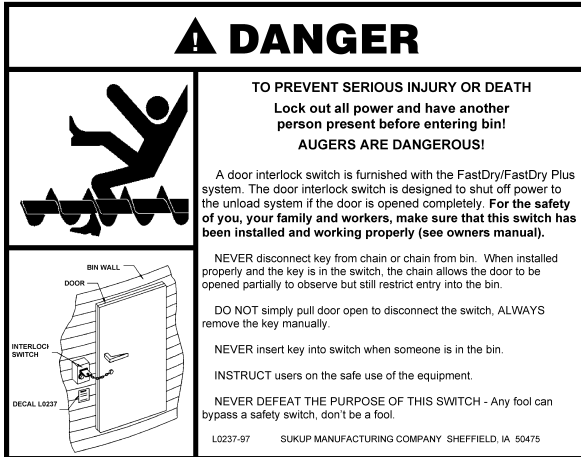
- Read operator's manual before operating & follow all precautions.
- Keep all shields and decals in place.
- Keep clear of all moving parts.
- Allow no children or unqualified persons to operate equipment.
- Know how to shut off power quickly.
- Keep people (especially children) away from unit at all times.
- Lock out all power and have another person present when servicing unit.

Replacement safety shields and decals are available free of charge.

SUKUP MANUFACTURING COMPANY SHEFFIELD, IA 50475

L0281-97

2. **DANGER - L02741-98** - Keep away from any electrical lines, especially when moving unit.



3. **DANGER - L0237** - Door interlock switch. Augers are dangerous.



4. **WARNING - L0166** - Guards & shields in place. Disconnect Electricity. Check fan blade.



5. **DANGER -L0271** - Shield missing, do not operate.

6. WARNING - L0284-98

Keep away from all moving parts.



7. CAUTION - L0285-98

Not intended for use on public roads.
If road travel is required:

8. WARNING - L02831

Lower and secure parking stands before unhitching unit.



9. DANGER - L0301

Rotating augers are dangerous!



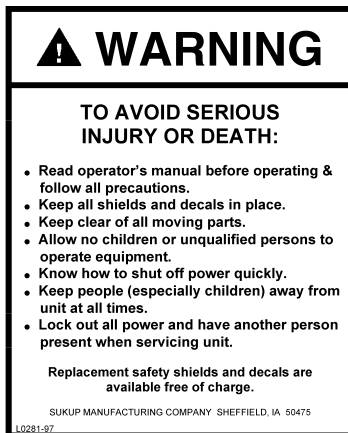
SAFETY DECAL LOCATIONS FOR FAN & HEATER

Safety decals and shields are mounted whenever possible at factory. Please check that all decals are in place according to these drawings and in good legible condition. To order replacement decals or shields (NO CHARGE) contact your dealer or **Sukup Mfg. Co., 1555 - 255th Street - P.O. Box 677 - Sheffield, Iowa 50475**. Please specify computer number.

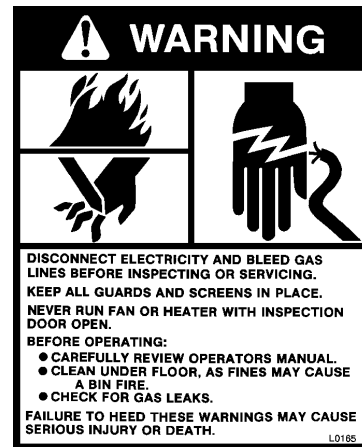
IMPORTANT ! The following safety decals should be mounted on your equipment as shown below. If suggested locations are not clearly visible, place safety decals in more suitable area. Never cover up any existing safety decals.

Make sure location area for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position.

1. WARNING - L0281
Safe operation decal.



2. WARNING - L0165
Disconnect Electricity; Bleed gas



3. WARNING - L0166

Disconnect electricity; guards, shields in place; Check fan blade tight.



4. DANGER - L0204
Close service door.

The numbers on the drawings below refer to the location of the safety decals listed above.

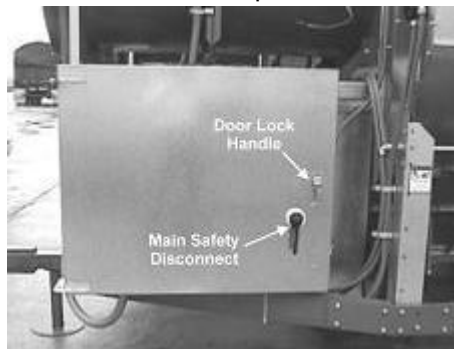
Emergency Shutdown Locations

The power distribution box is located at the front left of the dryer. It contains all of the main power distribution components.

On the outside of the power distribution box, the front door has two latches mounted to it.

The door lock handle secures the door and can be locked with a key.

The main disconnect mechanism prevents the opening of the power box while power is present in the system.



Caution:

Power is still present at the lower side of the main switch when the power box is open.

The picture at right shows the main disconnect in the “on” position, power is present in the system.

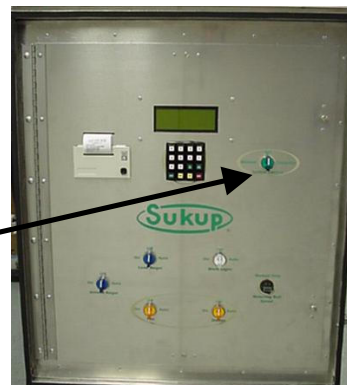
Located on the side of the power distribution box, is the Emergency Stop switch. During operation, the switch is pulled out and is illuminated red.



Pressing the Emergency Stop Switch or turning off the system control switch on the control panel will shut down control system. Main power is still present to the system.



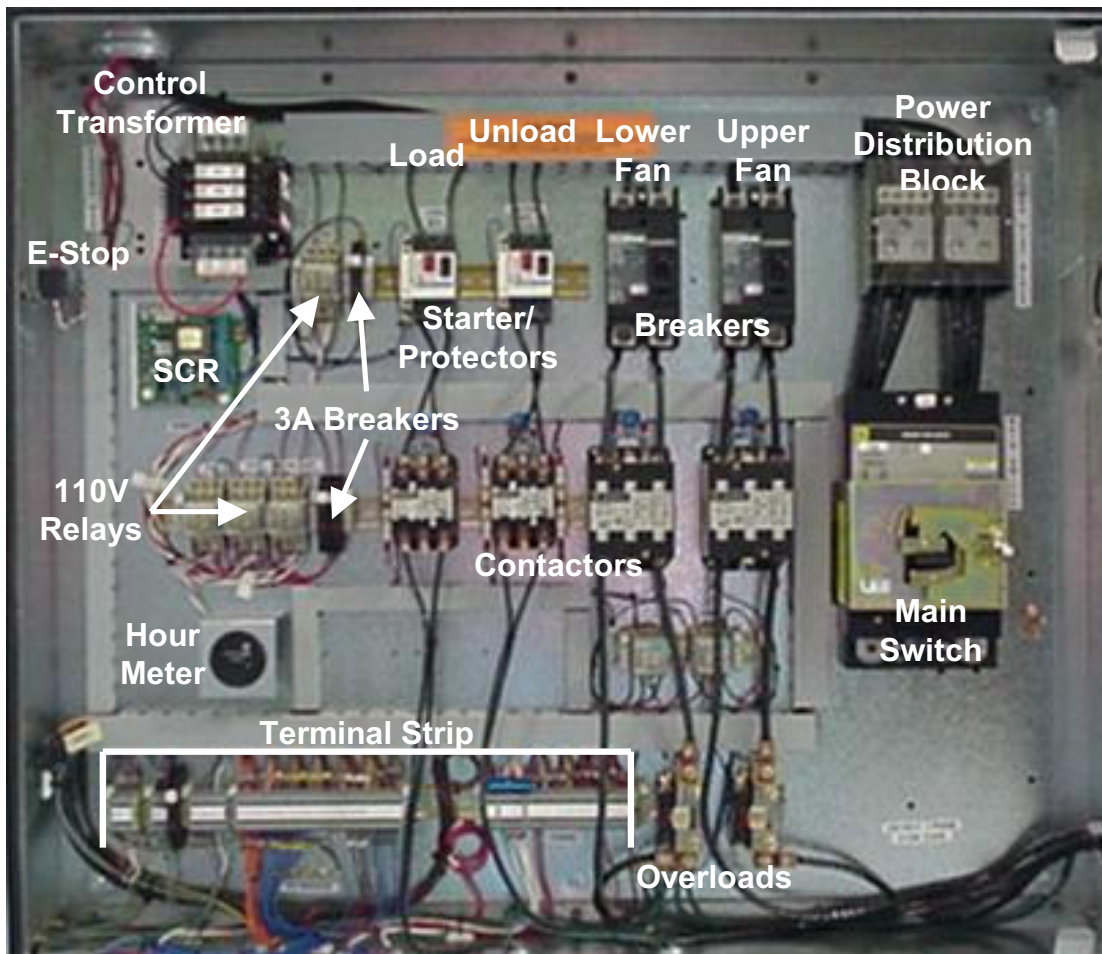
System Control Switch



Power Box Component Location

Power Box Component Location

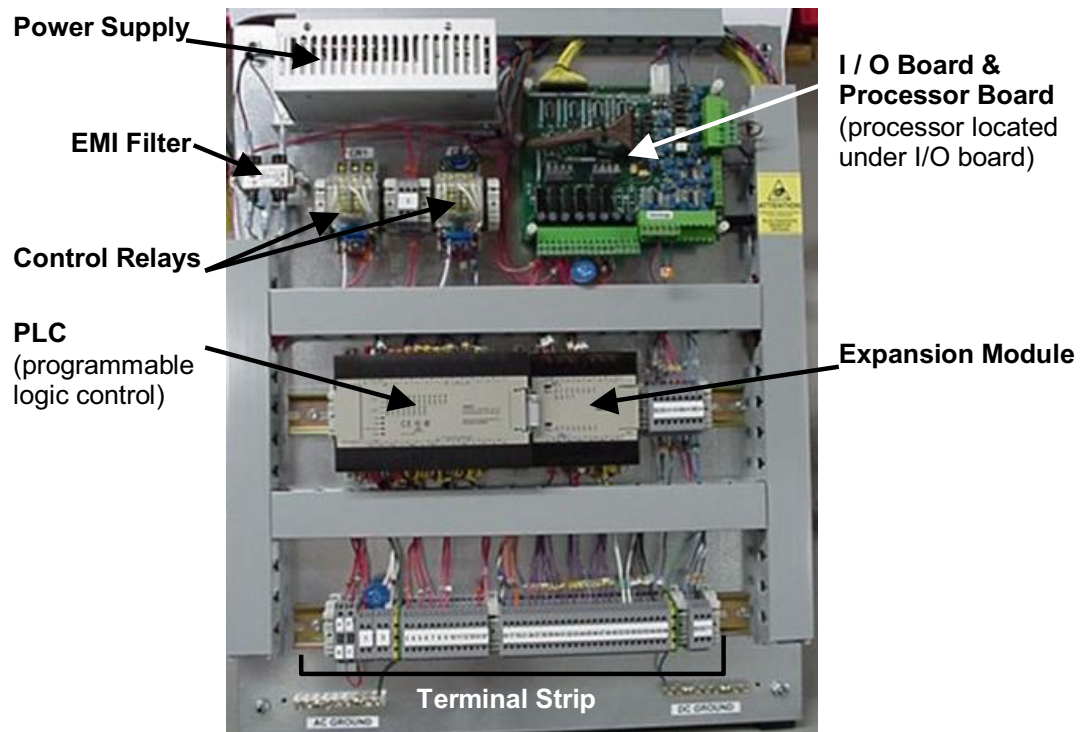
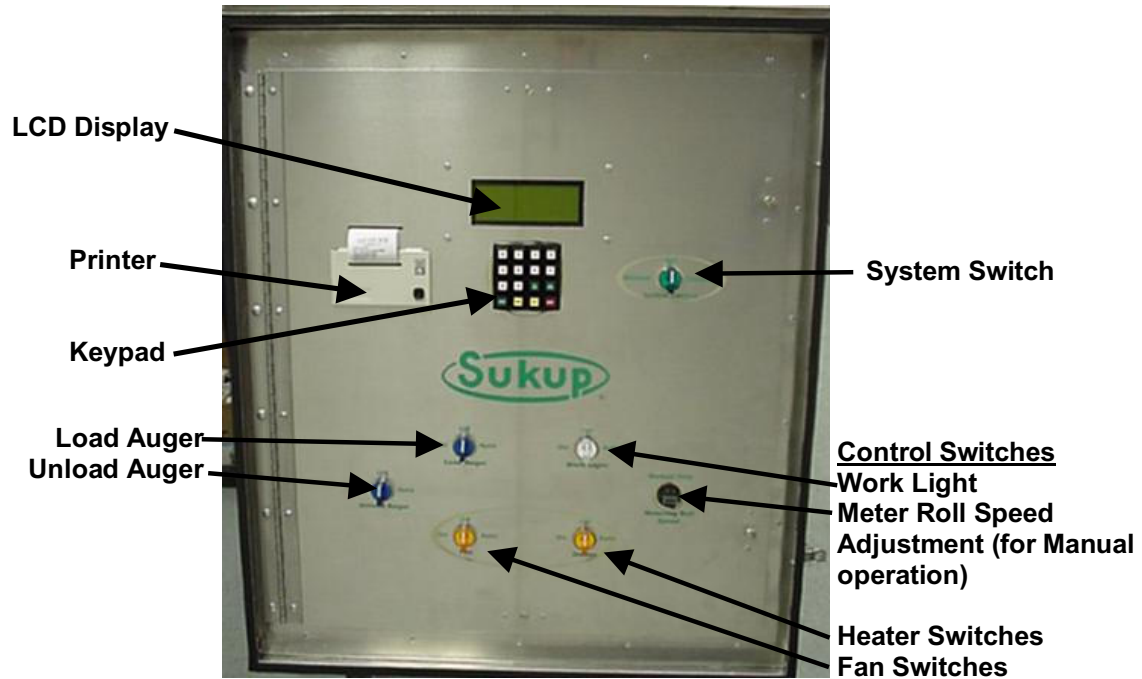
The picture below displays the power box and identifies all of the major components.



Important Note: During initial setup or after relocation of the dryer, it is highly recommended that ALL of the main power wiring connections be inspected for security and tight connections. The wires are tightened at the factory; however the connections should be checked after transport.

Control Box Components Location

Control Box Components Location



**Dryer Installation
Gas and Electric Hook-up**

Initial gas hookups should only be performed by qualified gas service technicians in accordance with all applicable code requirements.

Initial electric hookups should only be performed by qualified electrical service technicians in accordance with all applicable code requirements.

Heater Operation

The heater and fan switches on the control box front panel must be in either the "ON" or "AUTO" position. Power must be applied to the fan before the dryer control box will apply power to the heater.

Purge

After the heater is switched on, an automatic 30-second purge cycle commences. During this cycle, with the fan operating, any residual gas is cleared. The ignition board controls heater startup sequences. The ignition board is located in the heater control box.

Air Pressure Check

If operating in manual or automatic control, the dryer must be filled with grain since without grain, insufficient air pressure will develop and the dryer will shutdown in 5 seconds due to the low air pressure. If operating in the dry fire mode, the air pressure sensor is disabled. No gas is being supplied during the 30-second purge cycle due to the gas solenoids being closed.

Ignition

After the 30-second purge delay, the liquid and the 1st vapor solenoids are opened and a 10-second ignition attempt occurs. At this time, the 2nd vapor solenoid is closed, but gas is being supplied to the heater through an orifice in the 2nd vapor solenoid (See picture on page 23).

Operation

The red power light on the heater box's right side should be on at this time. If a flame is not sensed within 45 seconds (30 second purge delay plus the 10 second ignition attempt), the dryer will shutdown indicating that no flame was sensed or a flame timeout occurred.

Approximately 60 seconds after power was applied to the 1st vapor solenoid, the 2nd vapor solenoid will open supplying full gas pressure to the heater. If the heater successfully ignited and a flame is sensed, the Dryer will be in the "PLENUM TEMPERATURE STABILIZING" countdown.

If the plenum has not reached operating temperature with both vapor solenoids opened, the modulating valve will be fully open.

Plenum Temperature Adjustment Liquid Propane systems

To change the plenum temperature either up or down, locate the Modulating (Mod) Valve on the right side of the heater housing.

Looking down on the T-Handle, to increase the plenum temperature, rotate the T-Handle inward (Clockwise).

To decrease the plenum temperature, rotate the T-Handle outward (Counter Clockwise).

If you cannot reach the desired temperature by adjusting the mod valve, the pressure regulator may need adjustment.



While adjusting the mod valve or pressure regulator, the plenum temperature can be monitored on the digital temperature indicator on the front of the dryer just next to the Mod valve (shown right) or on the control panel LCD display.



Dual fan dryers have a digital temperature indicator for each plenum.

Important Note

Allow at least 5 Minutes after changing the plenum temperature for the Mod Valve to stabilize before re-adjusting.

Liquid Propane systems

The pressure regulator seen below is factory pre-set to 15 P.S.I. If the desired plenum temperature cannot be achieved when the Mod valve is set to the maximum setting, the pressure regulator may be adjusted as follows: Ensure that the Mod Valve T-Handle is rotated to maximum inward (Clockwise). Remove protective cap on top of regulator, and adjust screw to desired pressure as read on gauge to right of Mod Valve. Re-adjust Mod Valve as necessary.

DO NOT EXCEED 25 P.S.I.



WARNING

At no time should the vapor pressure to the Heater, as indicated by the Vapor Pressure Gauge, exceed 25 PSI!

If pressure exceeds 25 psi, adjust the pressure regulator as necessary.

Plenum Temperature Adjustment Natural Gas systems (38" Heaters and 44" Heaters – 15HP Fans)

To change the plenum temperature either up or down, locate the Modulating (Mod) Valve on the right side of the heater housing.

Looking down on the T-Handle, to increase the plenum temperature, rotate the T-Handle inward (Clockwise).

To decrease the plenum temperature, rotate the T-Handle outward (Counter Clockwise).

If you cannot reach the desired temperature by adjusting the mod valve, the gate valve may need adjustment. Make sure the gate valve is fully open.



While adjusting the mod valve, the plenum temperature can be monitored on the digital temperature indicator on the front of the dryer just next to the Mod valve (shown right) or on the control panel LCD Display.



Dual fan dryers have a digital temperature indicator for each plenum.

Important Note

Allow at least 5 Minutes after changing the plenum temperature for the Mod Valve to stabilize before re-adjusting.

Natural Gas systems (44" Heater – 30 and 40 HP Fans)

To change the plenum temperature either up or down, locate the Modulating (Mod) Valve on the right side of the heater housing.

To increase plenum temperature, turn the control knob to a higher temperature setting.

To decrease plenum temperature, turn the control knob to a lower temperature setting.

The temperature on the control knob is for reference only. Use the digital temperature indicator on the dryer to set the temperature.

Important Note

Allow at least 5 Minutes after changing the plenum temperature for the Mod Valve to stabilize before re-adjusting.

Heater Housing Over Temp

The heater housing high limit switch detects excessive temperatures inside the heater housing. It is rated to open above 200°F. If this trips, the dryer will display a housing high temp fault on the LCD.

The heater housing high limit switch must be manually reset. The reset switch, located in the heater box, is shown below.

Caution

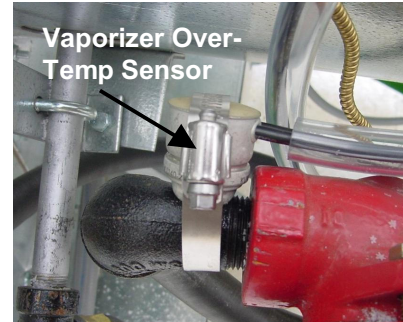
High voltage in heater box! Care must be taken when resetting the switch.



Vaporizer Over-Temp

The heater's vaporizer serves to convert the liquid propane into vapor propane by using the heat from the burner. A vapor high limit fault will shut the dryer down if the vapor fault exceeds 140 °F. The dryer will lock out the system and display the vapor high temp alarm. The limit switch is self-resetting once the vapor temperature drops. The Control Box will latch the fault until the operator acknowledges the fault by pressing the control box keypad "RESET" key.

The vaporizer should be adjusted before operating. Normally, the vaporizer outlet hose should be very warm to the touch but not so hot that it can't be held. To adjust the vaporizer, refer to the next section, Dry Fire Tests.



Caution

Vaporizer may be hot, use extreme caution when handling.

Heater Operation at Low Plenum Temperatures

Operating the dryer at low temperatures, (approximately less than 80° above ambient temperature) requires changing parts on the heater. A symptom of operating at temperatures with original equipment is a rumbling sound. This symptom occurs when the gas pressure is low and the flame is burning back into the port cup. Contact your Sukup dealer to purchase additional equipment to reach lower temperatures.

Caution

Operating the dryer with too low of gas pressure will damage the port cup. Contact dealer if symptoms occur.

Dry Fire Tests

Introduction

The “Dry Fire” mode of operation enables the operator a means of running the dryer when there is no grain. (pre-season tests for troubleshooting). Ensure that the power box main switch is ON. Pull the red emergency stop button out. The emergency stop button should illuminate red, indicating control power is available.

Dryer is NOT susceptible to EMI (electromagnetic interference) due to being shielded by metal boxes.

Caution

While dryer is running, excessive audible noise is present. Hearing protection is strongly recommended.

At the control box, turn the system control switch to the “COMPUTER” position. Place the fan and heater selector switches to the “AUTO” position. The LCD display should show “SYSTEM READY”, meaning the dryer is in the standby mode. If any error messages are displayed, they must be corrected before the dryer can be started. See Faults section for isolation of displayed system faults.

If the LCD contrast is not to the operator’s liking, turn the R99 potentiometer on the I/O board (clockwise to darken, counter-clockwise to lighten). Operator **MUST** be grounded with a grounding strap while turning potentiometers on I/O board.

From the Control Panel, press “MODE” and then “2” for the Dry Fire Mode.

A screen will appear on the LCD prompting the operator as to which 1 of 4 Dry Fire Tests is to be performed.

DRY FIRE OPTIONS
1 = FAN 2 = FAN + HEAT
3 = ROLLER RAMP TEST
9=ROLLER/SCR ADJUST

Fan Only

Selecting 1 at the prompt will energize the fan(s) only. The static air pressure switch is disabled during this test. All other monitored safeties are operational at this time.

Fan and Heater

Selecting 2 for fan and heat will apply power to the fan and heater. First the fan will come on, followed by the heater after a 20-30 second delay. As before, the air pressure switch is bypassed.

Selecting options 1 or 2 will commence a 10 minute timer countdown followed by the fan and if selected, the heater startup. At the end of the 10 minute period, the fan and heater will turn off automatically and return the dryer to the standby mode. The heater may not be started independent of the fan being started.

Note

The screen on the next page will appear if selecting the FAN or FAN+HEAT option on dual fan systems. This allows the operator to test each barrel independently if desired.

On Dual Fan systems, if selecting "BOTH STAGES", the upper fan and heater will start first, followed by a short delay before starting the lower fan and heater.

DRY FIRE OPTIONS
1 = UPPER STAGE
2 = LOWER STAGE
3 = BOTH STAGES

Vaporizer Coil Adjustment (LP Models Only, Not Applicable to Natural Gas)

Adjusting the Heater: Vaporizer Coil

Caution

If vaporizer is not adjusted correctly, piping could be hot!

Selecting the Dry Fire Mode - Option 2 (fan and heater) is required to operate the dryer's fan and heater when there is no grain in the dryer. After the dryer has been allowed to run and the plenum temperature has stabilized, the vaporizer outlet (top) should be warm but not hot to the touch. If the vapor side of the pipe train is hot, or if the dryer has shut down due to a "VAPOR HIGH TEMP ALARM", the vaporizer may need to be adjusted out (away from the flame). To adjust the vaporizer loosen the 2 pivot bolts (1 top, 1 bottom) of the vaporizer adjustment bracket and then pivot the vaporizer either in or out of the flame as necessary to regulate the temperature at the vaporizer outlet. The U-Bolts mounting the vaporizer to the adjustment bracket can also be loosened and vaporizer can be moved in and out to adjust. Viewing hole is present to watch vaporizer adjustment.



Meter Roll Ramp Test WARNING

The Unload auger(s) will come on during the following operations, as well as at any time the Meter Rolls are rotating to avoid stuffing the unload auger.

Before performing either option 3 or option 9 of the Dry Fire operations involving the Meter Rolls, the Control Panel UNLOAD AUGER Switch must be turned to "AUTO".

Selecting Dry Fire (Mode 2) and then Option 3 (Roller Ramp Test) will perform an automated voltage increase of the SCR drive signal, which will cause an incremental step up of the Meter Roll's speed.

The speed will increase from 0 to 99% in 1% increments. The display will show the current roll order in percent speed. The whole process takes about 15 seconds. Pressing "RESET" will stop the test and return the dryer to the standby mode.

Option 9 is only to be used by service technicians for calibration.

Manual Control Operational Check

As part of an installation / pre-season operation checkout, only a limited test may be made of the Manual Control System. This is due to the fact that with no grain in the dryer, static air pressure will be too low, which would cause a fan shutdown and not allow heater operation.

The following items may be checked in manual with no grain in the dryer.

1. Load Auger(s)
2. Unload Auger(s)
3. Meter Rolls
4. Work light



Note

In manual operation **ALL** safety interlock circuits are still monitored by the PLC and should a fault occur, there would be a safety shutdown.

To perform any operational check in manual mode, ensure that power is applied to the power distribution box and the E-stop switch is illuminated.



All manual operations must be performed with the system control switch in the "Manual" position.

1. Load Auger Test.
 - a. Position the load auger switch to "ON" position.
 - b. At this time the load auger should come on, and the light in the load auger switch should illuminate.

Note

The load auger would run for 45 minutes if you were loading the dryer before a loading timeout shutdown would occur.

- c. Position the load auger switch to "OFF"
- d. The load auger should turn off, and the light in the load auger switch should extinguish.



2. Unload Auger Test

- Position the unload auger switch to the "ON" position.
- The unload auger should come on and the light in the unload auger switch should illuminate.
- Position the unload auger switch to "OFF". The unload auger should turn off and the light in the unload auger switch should extinguish.



Note

3. Meter Roller Test

Unload Auger must be "ON" for the Meter rollers to operate.

- Position the unload auger switch to "ON".
- The unload auger should come on and the unload auger light in the switch should illuminate.
- Unlock Meter Roll Potentiometer by moving the lock lever up.
- Dial in any desired meter roll speed.

For example: If you desire 50% meter speed, set the dial to indicate 50.0.

- The meter rollers should be rotating.
- When complete, return Meter Roll Potentiometer to 000 and lock.
- Turn the unload auger switch to "OFF".



4. Work Light Test

- Position the work light to on, the work light on the dryer should illuminate as well as the light in the switch. This light will be on as long as power is applied to the dryer.
- Position the work light switch to "Auto". The work light on the dryer and in the switch will be illuminated as long as there is no fault condition. This is true in either manual or automatic control. Turn work light switch off.



Maintenance and Service Preventative

Performing preventative maintenance on your dryer is very important and can help to ensure that the dryer will perform well throughout the drying season. The following guidelines are the minimum recommended procedures to be performed.

When performing maintenance and using the ladder attached to the dryer, make sure the ladder is dry before climbing. Ladder may be slippery when wet.

Caution

All bolts used to keep enclosures locked **MUST** be tightened beyond hand removal after opening to prevent undesired access.

Prior to Drying season

*Plan well in advance in case repairs or parts are needed !!



Warning

Lock out electrical power before removing any safety shields

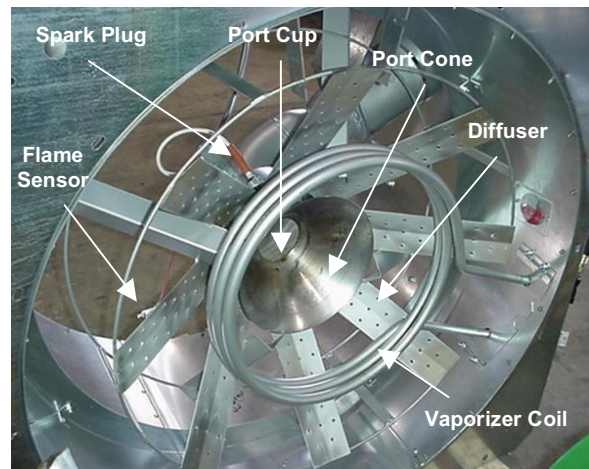
Physical Inspection

1. Remove fan inlet screen. Check for foreign material on fan blade. Check that the fan rotates freely and that all blade tip clearances are the same.
2. Lubricate fan motor bearings every 5000 hours of operation. Use high temperature grease, Shell Dolium R or Chevron SRI3#2. Remove pipe plug each end if so equipped.

Caution

Over greasing either in quantity or speed of injection, can cause premature bearing failure.
Apply .61 to .81 oz. of grease gradually, taking at least 1 minute to do so.

3. Check ventilation openings in motor for any blockage. Reinstall fan inlet screen.
4. Check wiring of fan and heater. Look for loose connections, bare wires or rodent damage. Be sure to check ignition wire and flame sensor wire for damage or short to ground.
5. Examine the flame rod for cracked insulation.
6. Examine spark plug for proper gap and clean the electrodes if required. The gap should be 1/8". Spark plug and flame rod should be examined periodically throughout the drying season.



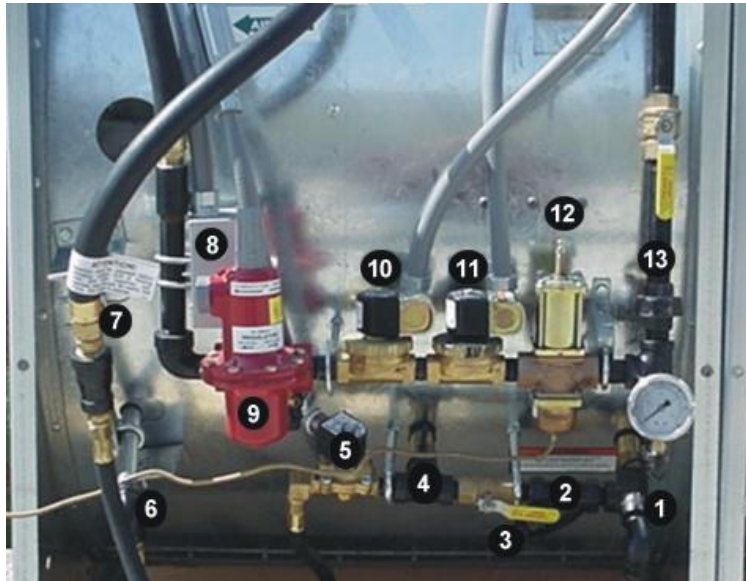
7. Inspect the port cup for any accumulation of foreign material. Clean if required. Foreign material in the port cup will not burn out, and will impair burner operation, (Port cup located behind Port cone)

Inspect Vaporizer, Diffuser, and Port cone for damage and physical integrity.

Caution

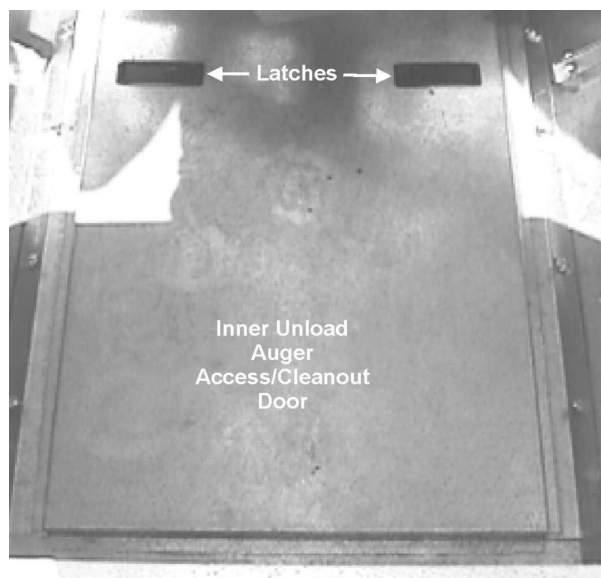
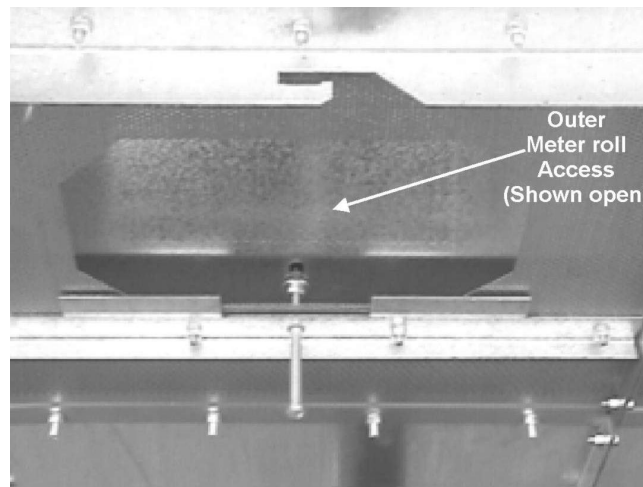
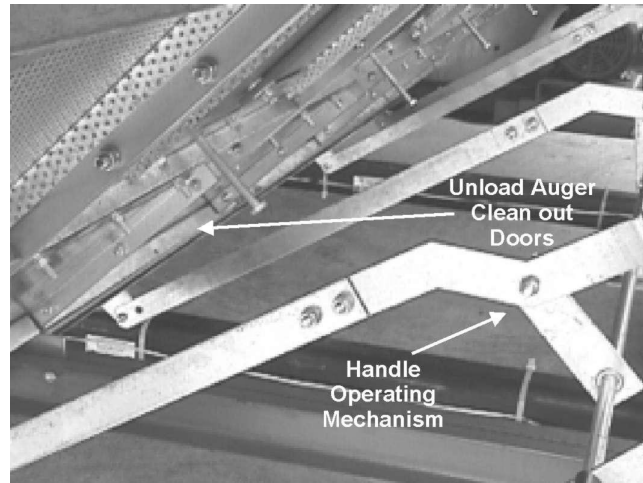
One drop of Liquid propane will expand 270 times as it converts to Vapor. It is very dangerous to have the Vaporizer coil develop a leak during heater operation. Be sure to check the vaporizer coil yearly. The Vaporizer should be replaced every 5 years.

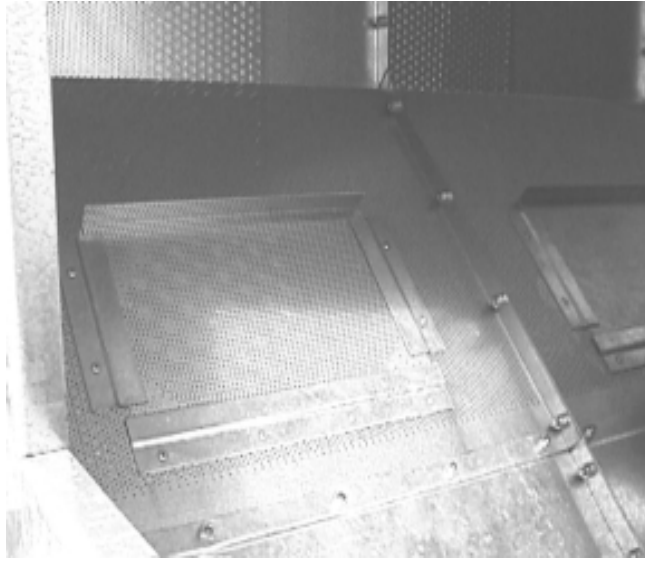
8. Remove and clean the gas strainer.
9. Inspect all valve train components for physical integrity.
10. Inspect all valve train connections for tightness.



1. NPT LP Inlet Fitting
2. LP Gas Strainer
3. Fuel Shutoff Valve
4. LP Over Pressure Relief
5. LP Solenoid
6. Vaporizer Inlet
7. Outlet and Vapor Over-Pressure Relief
8. Vapor High Temp Switch
9. Pressure Regulator
10. 1st Vapor Solenoid
11. 2nd Vapor Solenoid (Timed Orifice)
12. Modulating Valve
13. Vapor Pressure Gauge

11. Open inner and outer unload auger cleanout/access doors, and inner and outer column cleanout /access doors.





12. Remove any accumulation of fines, dirt or foreign material from the bottom auger trough area, meter rolls and lower column.
13. Inspect unload auger, 1 ¼" auger end flange bearings and wooden hanger bearing and flighting for damage and security.
14. Inspect meter rolls for damage and security.
15. Inspect meter roll wood bearings for damage, hole elongation (excessive play), and security.

Note

Auger end flange bearings are lifetime lubricated and do not require service lubrication.
Auger wood hanger bearings are oil-impregnated and do not require service lubrication.
Meter roll bearings are oil-impregnated wood and do not require service lubrication.

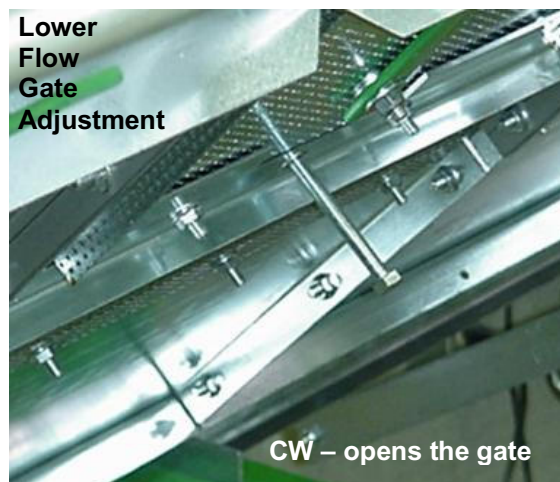
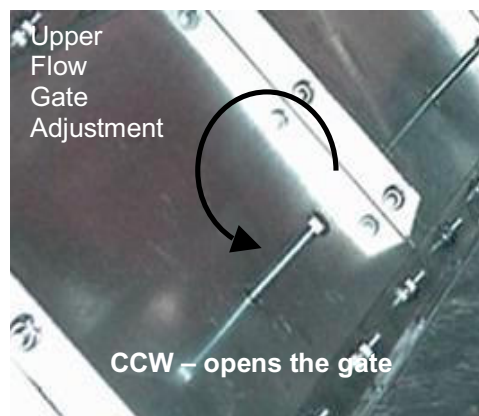
ANY ADJUSTMENTS MADE TO THESE FLOW GATES ARE THE RESPONSIBILITY OF THE PERSON MAKING THESE ADJUSTMENTS. SUKUP MFG. COMPANY WILL NOT BE RESPONSIBLE FOR ANY CIRCUMSTANCE THAT MAY ARISE AS A RESULT OF THESE ADJUSTMENTS.

Note

One full turn of adjustment bolt changes flow gate opening 1/16". Outer flow gate adjustment bolt turns clockwise (CW) to open outer flow gate. Inner flow gate adjustment bolt turns counter-clockwise (CCW) to open inner flow gate.

Caution

When inner flow gate adjustment bolt adjustment reaches 3 1/4" or outer flow gate bolt adjustment reaches 3 1/8" a free flow condition may occur. This is when the grain is able to flow freely over metering rolls.



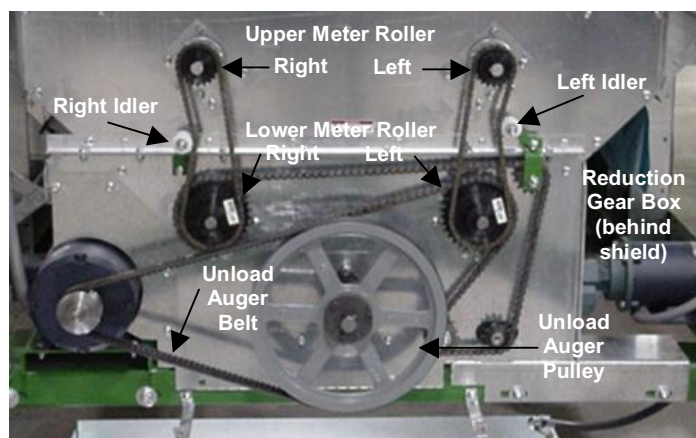
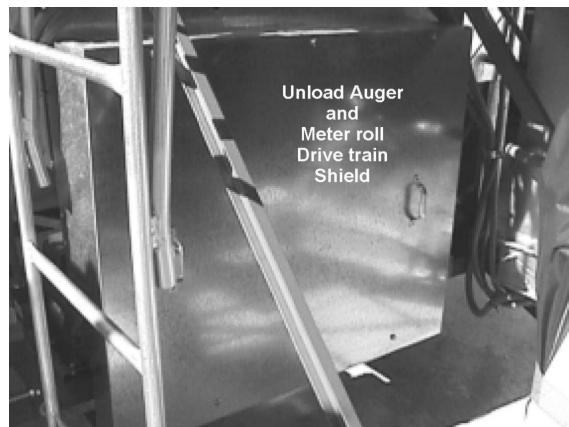
16. Reinstall all clean out / access doors. Close unload auger clean out doors.

 Warning

Ensure electrical power is locked out

17. Remove unload auger/meter roll drive train shield.

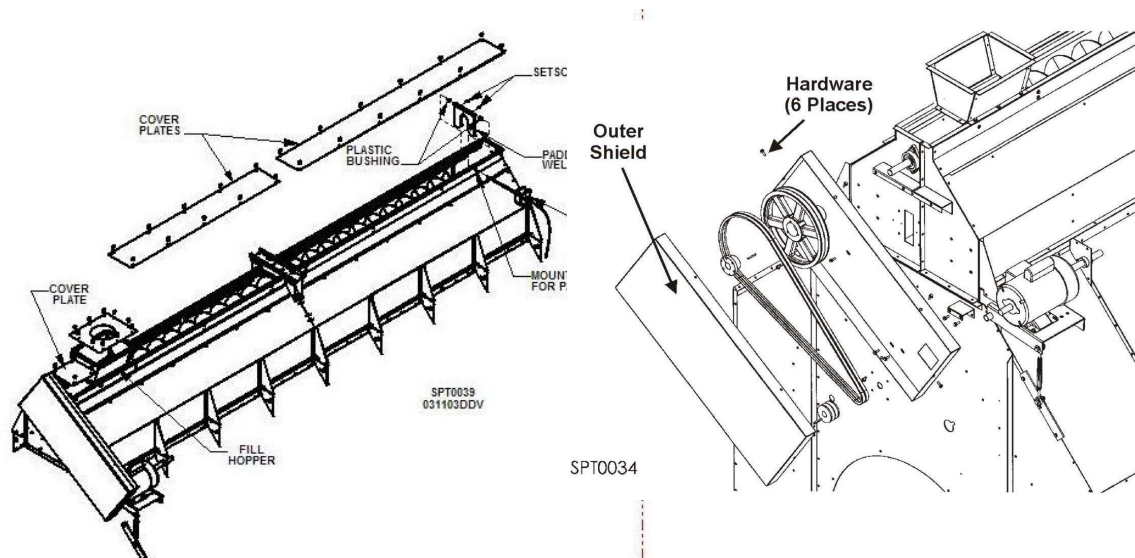
18. Refer to the pictures below when checking the unload auger / meter roll drive train.



19. Inspect unload auger pulleys and meter roll sprockets for wear or damage.
20. Inspect unload auger belts for cracks or breaks. Check belt tension for proper adjustment. For proper belt tension test, press on the belt mid-way between pulleys. Belt should not deflect more than the distance of one belt width.
21. Inspect the chain belt links, and idler rolls for wear or damage.
22. Check that the idlers are adjusted properly to remove slack in drive chains.
23. Check that the reduction gearbox/DC motor is adjusted outward enough to remove slack on lower drive chain
24. Lubricate all meter roll drive chains.

General Dryer Operation

25. Inspect reduction gearbox for damage.
26. Inspect unload auger motor, DC meter roll motor for damage and security.
27. Reinstall unload auger/ meter roll drive train shield.
28. Remove cover from load auger motor drive and covers from top of wet bin.
(see pictures below)



29. Inspect load auger drive pulleys for damage and security
30. Inspect load auger drive belts for cracks and breaks. Check auger drive belts for proper tension. To test for proper tension, press on each belt at the mid-way point between the two pulleys. Belt should not deflect more than the distance of one belt width. Adjust as necessary.
31. Inspect load auger end flange bearings and mid wood hanger bearing for wear or damage.
32. Inspect flighting for wear or damage.

Note

The load auger bearings are lifetime lubricated and do not require service lubrication.

33. Reinstall all covers and shield.
34. Perform overall inspection of the rest of the dryer looking for loose, missing or damaged parts.

Operational Check

35. Perform pre-season operation test of dryer by performing the Dry Fire Test. While the fan and heater are running, perform a leak test of the heater gas train using a soapy water solution.

General Dryer Operation

Continuous Flow

Continuous Flow dryer operation requires creating a gradient of moisture from the top to the bottom of the dryer and is accomplished by three main functions; initial dry, stabilization, and continuous flow. Before the first drying operation is started, the user must enter the incoming moisture and the desired output moisture into the control panel. These moistures are used to calculate the time necessary to perform the initial dry at 160°F temperature, during which no grain is unloaded from the dryer. After initial dry is complete, the user will set the desired drying plenum temperatures and the controller calculates a meter roll speed corresponding to the plenum temperatures entered. The dryer then performs a stabilization routine. During stabilization, a gradient of moisture is established in the dryer by drying and unloading one full load of grain without adjusting the meter roll speed. After stabilization has completed, the dryer enters continuous flow operation. During this operation, the dryer adjusts the meter roll speed for variances seen in the actual output moisture compared to the desired output moisture. When the final dry of the season is achieved, the user simply enters the final dry function and follows the simple instructions listed on the screen of the control panel.

When continuing a drying operation after the dryer has run out of grain or has been shut down, it is often desirable to run with the settings as before the shut down. Therefore, quick methods of restarting the dryer have been developed to meet this demand. Restarting the dryer with or without stabilization, depending upon the particular situation, can be accomplished by following a short series of steps, laid out on the control panel screen during normal startup operation.

Automatic Batch

Automatic batch is a standard feature of the Sukup Automatic Grain Dryer. Batch operations enable operators to dry their grain in a manner that they have become accustomed to, enables them to dry extremely wet grain, allows single fan dryers to be operated in a heat cool manner, and makes it possible to dry grains which require a low plenum temperature.

Two controlling operations of automatic batch have been developed. The first method dries batches according to time entries. The operator enters set times into the control panel during which the dryer will heat, cool, and unload the grain. During unload the dryer calculates the average moisture of each batch and prints it. The user can then adjust the time entries according to the desired output moisture, or have the control system automatically recalculate the time. The second method of operation requires purchasing the temperature control option. The operator enters a desired dry temperature value into the control panel. When the kernel temperature in the column reaches the set temperature, the dryer proceeds to cool the grain, if necessary, and then unload the grain. The set variables

may be changed to the operator's choosing at any time during the batch operation (the new settings take effect the next batch).

Grain Transfer

Increasingly, operators require the dryer to transfer grain through it to reach their storage facilities. A mode of grain transfer has been developed to simplify this process. The control panel display, steps the user through a simple process to begin and end the procedure through normal startup operation.

Manual

Manual operation serves many purposes. When operators want complete control of their dryer, manual operation fulfills this need. Manual operation serves as a redundant control set, allowing the user to operate their dryer while the dealer meets any necessary service demands. Manual operation is a simple procedure of manually turning on fans, heaters, loads, and unloads. The dryer automatically loads the dryer during manual operation while the user has control of the meter roll speeds.

Grain Dryer Control System Menus

Quick Reference Guide V4.0

[SET] Menu: Continuous Flow

**1=CALIBRATE SENSORS
2=PLENUM TEMPERATURE
3=MOIST OUT 4=MST IN
5=CONFIGURATION**

- 1 – Calibrate Moisture/Temperature Sensors
- 2 – Set Plenum Temperatures(s) and Options
- 3 – Set Output Moisture Setpoint
- 4 – Set Input Moisture
- 5 – Set Configuration Parameters

[SET] Menu: Autobatch

**1=CALIBRATE SENSORS
2=PLENUM TEMPERATURE
3=DRY TIMES 4=COOL
-or-
3=DRY TEMPS 4=COOL
5=UNLOAD 6=CONFIG**

- 1 – Calibrate Moisture/Temperature Sensors
- 2 – Set Plenum Temperature(s) and Options
- 3 – Set Dry Cycle Time of Dry Kernel Temperature
- 4 – Set Cool Cycle Time
- 5 – Set Unload Cycle Time
- 6 – Set Configuration Parameters

[1] Calibrate Sensors Menu:

**1=OUTPUT MST 2=TEMP
3=PLENUM RTD TEMP
4=COLUMN RTD TEMP
5=INPUT MST 6=TEMP**

- 1 – Calibrate Output Moisture
- 2 – Calibrate Output Temperature
- 3 – Calibrate Plenum RTD Temp(s) (if applicable)
- 4 – Calibrate Grain Column RTD Temp (if applicable)
- 5 – Calibrate Input Moisture (if applicable)
- 6 – Calibrate Input Temperature (if applicable)

[2] Plenum Temperature Menu:

**1=PLENUM TEMPERATURE
-or (two fan)-
1=UPPER PLENUM TEMP
2=LOWER PLENUM TEMP

3=MIN TMP 4=MAX TMP
5=TMP ADJ INC 6=TIME**

- 1 – Set Single/Upper Plenum Temperature Setpoint (if equipped)
 - 2 – Set Lower Plenum Temperature Setpoint (if equipped)
 - 3 – Set Minimum Plenum Temperature
 - 4 – Set Maximum Plenum Temperature
 - 5 – Set Temperature Adjustment Increment (if applicable)*
 - 6 – Set Temperature Adjustment Time (if applicable)*
- * Adjusts plenum temperature when meter roll speed is at a min/max limit (if equipped with Electronic Mod Valve)

[5] (CF) of [6] (AB)
Configuration Menu:

**1=TIME/DATE 2=LANG
3=ROLL SPD MIN 4=MAX
5=VALVE MIN 6=MAX
7=CLEANOUT 8=FAN DELAY**

- 1 – Set Time and Date
- 2 – Set Language Selection (if applicable)
- 3 – Set Minimum Allowed Meter Roll Speed
- 4 – Set Maximum Allowed Meter Roll Speed
- 5 – Set Minimum Allowed Electronic Mod Valve Opening (if equipped)
- 7 – Set Unload Auger Cleanout Delay Time
- 8 – Set Fan Shutdown Delay Time

[MODE] Menu:

**MODE = ?
1=VALVE 2=DRY FIRE
4=CAL/SETUP 5=SENSOR
6=SET PROC 7=UNITS**

- 1 – Perform Electronic Mod Valve Diagnostics (if applicable)
- 2 – Perform Dryer Dry Fire Diagnostics
- 4 – Monitor Sensors
- 5 – Select Moisture Sensor
- 6 – Select Processor PCB Version
- 7 – Select Temperature Units (F or C)

Caution

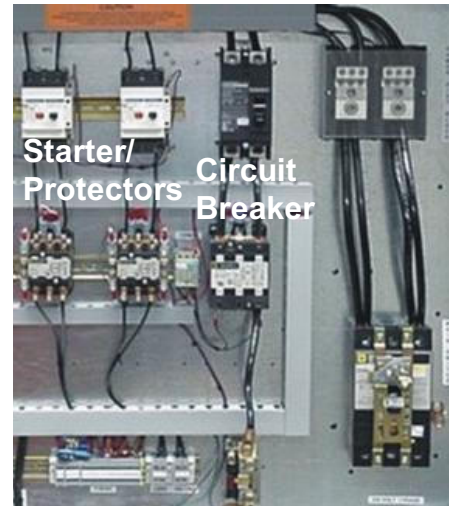
Before Loading or Starting the Dryer

Ensure that all safety shields are in place. Ensure that outside access covers on both sides of Dryer are secured and latched.

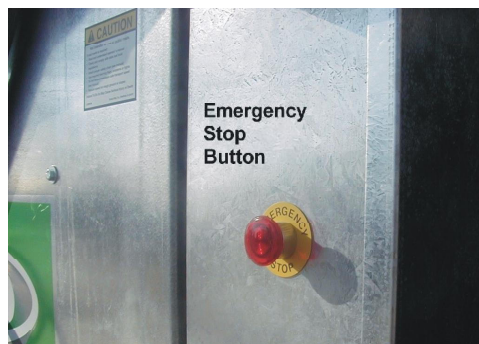
The vaporizer should be adjusted before operating. Refer to Dry Fire operation section for instructions on adjusting the vaporizer.

Dryer Startup Preliminary Steps

1. Prior to starting the dryer, turn the Main Disconnect on the front of the power box to “OFF”.
2. Open the front panel of the power box by turning the chrome cabinet latch 1/4 turn clockwise (see next page).
3. Ensure that all circuit breakers and/or starter/protectors in the power box (shown at right) are turned ON for dryer operation.
4. Close the power box front panel and latch by turning the chrome cabinet latch to the left 1/4 turn.



5. Engage the main disconnect, by turning the lever 45° clockwise indicating “ON”. The main disconnect lever must appear as shown for dryer operation. On the left front side of the power box, pull the red “Emergency Stop” button out. The “Emergency Stop” button illuminates RED if pulled out with the main disconnect “ON”.



Dryer Operation

Four operations have been designed to operate the Sukup Grain Dryer.

1. Continuous Flow
2. Automatic Batch
3. Manual Operation
4. Grain Transfer

To operate continuous flow, automatic batch, or grain transfer, select the computer position of the system control switch on the front panel and auto position for all others. Operating the dryer in manual requires turning the system control switch to manual and all other switches to on. In manual, when turning the other switches to the on position, this will start the corresponding device *immediately*.

Instructions for operation of the dryer are in the following locations:

- Continuous Flow, next page (p. 34)
- Automatic Batch p. 49
- Manual p. 44
- Grain Transfer p. 54

Continuous Flow

Three options exist to begin the operation of continuous flow: Initial Dry, Restart with Stabilization, and Restart. The table below details the starting scenarios to choose the correct method to start the dryer.

Start/Restart scenario	Initial Dry w/ Stabilization	Restart w/ Stabilization	Restart
All wet grain, No gradient established	Yes	No	No
Shutdown greater than 3 Hours, gradient established, grain cool	Yes	No	No
Shutdown 3 to 6 Hours, gradient established, grain warm	No	Yes	No
Shutdown less than 1 Hour, gradient established	No	No	Yes
Change of plenum temperature more than 20°F.	No	Yes	No

Instructions for starting the dryer in continuous flow:

- Initial Dry, below
- Restart with Stabilization and Restart page 36

Initial Dry

During initial dry, two procedures are performed followed by continuous flow operation. The first procedure is to perform an initial dry. Initial dry dries the grain at a specific temperature, 160° F, over a calculated period of time without unloading. The time value is calculated based upon the input moisture entered into the controller. The second procedure performed is stabilization. Stabilization begins unloading the grain and does not adjust the meter rolls until the dryer has completely turned over the grain in the dryer. This meter roll speed is calculated off of the input moisture given and the entered plenum temperatures. The time for stabilization is calculated off of the determined meter roll speed to completely turn the dryer over.

Press start to begin automatic operation, ensuring all of the control switches are turned to the auto position.

** SYSTEM READY **	
SET SWITCHES TO AUTO THEN PRESS START	
8/22/05	12:45PM

From the display outlined here, choose Continuous Flow by pressing 1.

CONT. FLOW	1
AUTOBATCH	2
GRAIN TRANS.	3
FINAL DRY	4

On the next screen, select initial dry by pressing 1.

OPERATION	PRESS
INITIAL DRY	1
STAB & RESTART	2
RESTART	3

A series of menus is then displayed to enter the appropriate settings for the date/time, input moisture, desired output moisture, minimum meter roll speed, and maximum meter roll speed. The previous recorded values will be displayed on these menus, to accept these values press (+), to change these values press (-).

After setting these values, the screen will be displayed as seen.

****DRYER NOT FULL**
START TO BEGIN
OR RESET TO ABORT
OR 1 FOR FINAL DRY**

Press start and the dryer will perform an initial fill if necessary, followed by starting the heaters and fans for initial dry. Pressing reset would take the operator to the start screen. Pressing 1 would allow the operator to perform the end of season final dry procedure.

After pressing start, if the dryer requires filling, the fill will begin. If the fill time exceeds 45 minutes, the fill will shutdown. Ensure that the dryer is filling correctly and that sufficient grain is present to fill the dryer. Press start for another load attempt if necessary. Once the dryer is full, determined by the dryer's paddle switch assembly, the load auger(s) will turn off automatically.

Automated starting of the fans and firing of the heaters is now performed. The upper or single fan is turned on followed by the corresponding heater. The LCD will display 'Starting Fan...' until proper plenum air pressure is detected. If insufficient air pressure is present, the dryer will shutdown with a static air pressure fault. Refer to Shutdown Faults.

STARTING FAN

The dryer will then start the heater. The heater will purge for 20-30 seconds after which ignition will occur. The flame sensor will then attempt to detect a flame. If flame is not sensed within 45 seconds, the dryer will shutdown and display a Flame Timeout Fault. Refer to Shutdown Faults.

**HEATER PURGE IN
PROGRESS FOR LOWER
HEATER PLEASE WAIT**

On two fan dryers, the same procedure is repeated for the second fan and heater.

The dryer will then stabilize the plenum temperature for 100 seconds. During this time, the plenum temperature will exceed the set temperature, and then fall back to the proper setting. This is typical operation of the modulation valve. Often, 100 seconds is not sufficient to stabilize the plenum. The plenum temperature is indicated on the control box and the front of the dryer in sight of the mod valve.

**PLENUM TEMPERATURE
STABILIZING
PLEASE STAND BY
90 SECONDS REMAINING**

The mod valve now needs to be adjusted to reach a plenum temperature of 160° F for each plenum. Instructions to adjust the plenum temperature are located in the Heater Operation section. After adjusting the plenums to achieve 160° F, press start to begin the countdown for the initial dry period.

**ADJUST PLENUM TEMPS
FOR 160F**

START TO CONTINUE

If start is not pressed within 10 minutes, the dryer will shutdown due to inactivity.

**SYSTEM IDLE SHUTDOWN
OPERATOR INPUT REQ'D**

PRESS ANY KEY

The dryer will now perform initial dry.

**INITIAL DRY 160F
TIME = 33:50 MINUTES
31:04 REMAINING
PLENUM TEMP = 160F**

Dryer Stabilization

After initial dry is complete, the dryer enters the stabilization period.

For two fan dryers, select whether to operate the dryer in full heat mode or in heat cool mode. If operating in heat cool, the lower heater will now be shut off.

SELECT OPERATION

1 = FULL HEAT

2 = TOP HEAT ONLY

3 = BOTTOM HEAT ONLY

Single fan units can only operate in heat cool mode in automatic batch operation.

Next, set the operating plenum temperatures within the operating range of 140° F and 220° F. The controller records the last setting the operator had input.

**PLENUM TEMPERATURE
IS SET TO 220F**

OK(+) OR CHG(-)

The table below outlines approximate point removals based on given plenum temperatures. Use it to establish the proper plenum temperatures to maximize output and remain within system output capacity limitations.

Approximate meter roll speed given the plenum temperature and points removal for a single fan.

(This chart is to be used for CORN only)

Pts Removed	Plenum 160	Plenum 170	Plenum 180	Plenum 190	Plenum 200	Plenum 210	Plenum 220
15	6.9%*	7.1%*	7.8%*	8.5%*	9.1%*	9.8%*	10.5%
10	9.7%*	10.7%	11.7%	12.7%	13.7%	14.7%	15.7%
5	19.4%	21.4%	23.4%	25.4%	27.4%	29.4%	31.4%
3	32.3%	35.7%	39.0%	42.3%	45.7%	49.0%	52.3%

***If it is necessary to run the meter rolls lower than 10%, Automatic Batch must be used.**

Upon entering the plenum temperature, the controller calculates the proper meter roll speed. Allowed meter roll speeds are 10% to 99%. If the calculated speed exceeds the maximum meter roll user setting or cannot reach the minimum meter roll speed, the user will be prompted to adjust the plenum temperatures settings or accept the setting with a warning. If the dryer requires operation below 10% meter roll speed and the plenum temperatures have been set to their maximum setting or set to the operator's desired maximum, the dryer must be run in automatic batch operation. Proceed as necessary, press reset to cancel start and begin automatic batch operation.

After setting the temperatures and accepting the calculated meter roll speed, the stabilization countdown will occur. Changing the meter roll speed from the calculated speed for stabilization is not recommended.

When stabilization completes, the dryer will automatically proceed to continuous flow operation. Refer to continuous flow operation section.

Restart With or Without Stabilization

Restart was created to simplify the process of restarting the dryer with settings similar to those previously set. When restarting, the dryer will resume the same full heat or heat cool operation as previously run. Changing between full heat and heat cool requires running the initial dry operation.

When selecting restart without stabilization, it is necessary to check whether the dryer must be re-stabilized. The control panel display will show when the dryer was last shutdown. Use this information, along with the chart on p. 33, to determine whether or not it is necessary to restabilize the dryer. If it is necessary to restablize the dryer, press (-), otherwise press (+).

Once it has been determined whether or not to run stabilization, the display will prompt the operator to approve or change dryer settings. The display will show date/time, minimum and maximum meter roll speeds, previous plenum temperature settings, and last recorded meter roll speed. Upon changing any of the plenum temperatures or the meter roll speed, the operator will be prompted to reset all plenum temperatures and the meter roll speed. This is necessary to prevent the dryer from running in an undesirable manner. If resetting these values, the controller will require the same parameters as those required when entering plenum temperatures for initial dry.

After accepting or resetting the settings, the operator is prompted to press start to perform an initial fill, if necessary, followed by the

****DRYER NOT FULL**
PRESS START TO LOAD
OR RESET TO ABORT
OR '1' FOR FINAL DRY**

immediate starting of the fans and heaters. Pressing reset would take the operator to the standby screen. Pressing 1 would allow the operator to perform the end of season final dry procedure.

After pressing start, if the dryer required filling, the fill will begin. If the fill time exceeds 45 minutes, the fill will shutdown. Ensure that the dryer is filling correctly and that sufficient grain is present to fill the dryer. Press start for another load attempt if necessary. Once the dryer is full, determined by the dryer's paddle switch assembly, the load auger(s) will turn off automatically.

Automated starting of the fans and firing of the heaters is now performed. The upper or single fan is turned on followed by the corresponding heater. The

STARTING FAN

LCD will display 'Starting Fan...' until proper plenum air pressure is detected. If insufficient air pressure is present, the dryer will shutdown with a static air pressure fault. Refer to Shutdown faults section.

The dryer will then start the heater. The heater will purge for 20 seconds after which ignition will occur. The flame sensor will then attempt to detect a flame. If flame is not sensed in 45 seconds, the dryer will shutdown and display a Flame Timeout Fault. Refer to Shutdown faults section

**HEATER PURGE IN
PROGRESS FOR LOWER
HEATER PLEASE WAIT**

On two fan dryers, the same procedure is repeated for the second fan and heater.

If start is not pressed within 10 minutes, the dryer will shutdown due to inactivity.

**SYSTEM IDLE SHUTDOWN
OPERATOR INPUT REQ'D**

PRESS ANY KEY

Dryer Stabilization from restart

If stabilization is required, the dryer will immediately begin stabilization, otherwise, refer below for continuous flow operation.

When stabilization completes, the dryer will automatically proceed to continuous flow operation.

Continuous Flow

During continuous flow, the dryer will begin sampling the grain moisture and temperature. The current moisture, temperature, and meter roll speed are displayed along with a three-minute average moisture.

The desired moisture will also be displayed alternately with the current moisture value.

The average moisture is continuously being monitored and adjustments to the meter roll speed are made as needed to obtain the desired output moisture.

Print-out Information

Once the dryer is running, discharged grain temperature, current moisture, 3-minute moisture average as well as the current roll order will be printed once every 10 minutes.

If a shutdown occurs, the date & time that the shutdown occurred will be printed along with a brief description of the particular shutdown.

Starting operation
InitialDry, Restart,
or Restart with
Stabilization

Moisture setting and
Maximum meter roll setting

Plenum temperature
settings for each plenum

Temperature sensor
calibration adjustment
indicator

Time Initial load started
Time Initial load ended

Time Initial Dry started
Time Initial Dry ended
Dryer stabilization
completed

Computer goes into full
automatic moisture control

Data is printed every
10 minutes

SUKUP AUTO DRYER					
VERSION 4.0					
TWO FAN DRYER 50/50					
CONTINUOUS FLOW OPERATION					
INITIAL DRY					
DATE: 8/22/05 TIME: 8:21AM					
INPUT MOISTURE = 22.5%					
OUTPUT MOISTURE SETPOINT = 16.5%					
MAXIMUM ROLL = 50%					
MINIMUM ROLL = 10%					
UPPER PLENUM TEMP. = 220F					
LOWER PLENUM TEMP. = 190F					
METER ROLL SPEED = 29%					
MOISTURE CAL ADJ= 0.0%					
TEMP CAL ADJ = 0					

9:23AM INITIAL LOAD START					
9:49AM INITIAL LOAD COMPLETE					
INPUT MOISTURE = 20.5%					
9:51AM INITIAL DRY STARTED - 24 MIN.					
10:15AM INITIAL DRY COMPLETE					
10:15AM STABILIZATION DRY - 28.0 MIN					
10:43AM STABILIZATION COMPLETE					

GRAIN 10 MIN PRINTOUT					
DATE	TIME	TEMP	MOIST	ROLL	SPD
8/22	11:00	125F	16.4%	39%	
8/22	11:10	126F	16.6%	39%	
8/22	11:20	125F	16.5%	39%	
11:25PM USER SHUTDOWN					

Program version number

Operation selected
Continuous Flow, Automatic
Batch, or Grain Transfer

Minimum meter roll setting

Meter roll speed setting

Moisture sensor calibration
adjustment indicator

User entered incoming
moisture content

Computer calculated
time for stabilization

Prints date, time, grain
temperature, moisture
content, and meter roll
speed

When ever the dryer shuts
down, it will print the time
and reason for shutdown

Setting's Adjustment During Continuous Flow

Pressing the set key during continuous flow operation allows the user to change the settings listed on the display right.

**1=CALIBRATE SENSORS
2=PLENUM TEMPERATURE
3=COL TEMP 4=MST IN
5=CONFIGURATION**

Output Calibration Procedure During Continuous Flow

Once the dryer has begun sampling and the grain kernel temperature has stabilized, the output moisture sensor's accuracy should be verified.

1. Obtain a sample of discharged grain from the sample spout at the rear of the dryer.
2. Test the temperature and moisture of the sample. The moisture tester should be calibrated with the tester from the location where the grain will be sold.
3. Once samples have been taken, the discharge temperature must be calibrated prior to calibrating moisture. This sequence is **required** as the moisture readout is temperature compensated.
4. To calibrate discharge temperature, press "SET" from the continuous flow operation screen, then press "1" and then "2" to set the temperature. Enter the temperature obtained from the sample.
 - Example: The dryer read 120°F kernel temperature and the actual temperature was 110°F. The difference between the recorded versus the set temperature was minus 10 degrees. After pressing set, the displayed temperature is 115°F. Update the current temperature to read 105°F.
5. To calibrate discharge moisture, press "SET" from the continuous flow operating screen, then press "1" and then "1" again to set the moisture. Enter in the moisture obtained from the sample.
 - Example: The dryer read 16.5 moisture and the actual moisture was 16.0%. The difference between the recorded versus the set moisture was -0.5 %. After pressing set, the displayed moisture was 15.5%. Update the current moisture to read 15.0%.

**CURRENT MOISTURE
VALUE IS 16.0%
DESIRED INDICATED
VALUE ??.%**

Wait a few minutes and obtain another sample to verify. Recalibrate if necessary.

Stopping of Automatic Moisture Control

Continuous flow operation can be stopped by any of the three following methods:

1. User shutdown by pressing the 'Reset' button.
2. Automatic shutdown due to an Out-of-Grain timeout
3. Automatic shutdown due to a fault. Refer to Fault Shutdown section

**OUT OF WET GRAIN
PLC 10 MIN. TIMEOUT
FOR RESTART PRESS 1
FINAL DRY PRESS 2**

Final Dry

The final dry procedure was designed to dry the remaining grain in the dryer and empty the dryer. Since the dryer will not be completely full, the static air switch will be disregarded.

When Final Dry has been selected, the screen will display the following:

**THE CURRENT INPUT
MOISTURE SET = 22.5%

OK(+) OR CHG(--)**

At this point, the last input moisture entry is displayed. The user may either accept this indication or change it by pressing "OK" or "CHG".

The fan and heater will start in sequence, followed by a 100 second Plenum temperature stabilization period.

**PLENUM TEMPERATURE
STABILIZING
PLEASE WAIT...
95 SEC. REMAINING**

You must now manually adjust the heater for a plenum temperature of 140 degrees. Refer to heater operation for instructions.

**ADJUST PLENUM TEMPS
FOR 140F

START TO CONTINUE**

After adjusting the heater press "START" and the following screen will appear: The amount of dry time is calculated by the computer based on 3.0 minutes per point of moisture removal by comparing the incoming moisture content with desired moisture out.

**RECOMMEND 140F DRY
TIME FOR 13.5 MIN.

OK(+) OR CHG(--)**

At this point you can accept the computer's recommendation or change it anywhere between 5 minutes and 60 minutes.

Whether you accept the time recommendation or change it, the next screen to appear will be:

**FINAL DRY 140F
TIME = 13.5 MINUTES
13:29 REMAINING
PLENUM TEMP = 140F**

At this point the Final Dry is in progress.

At the end of the timed sequence, the next screen is listed here.

**HEATER IS NOW OFF
PRESS ANY KEY TO
START FINAL UNLOAD
OR RESET TO ABORT**

Press any key on the keypad to start Final Unload.

The meter rolls will be set to the maximum speed.

The third line displays time remaining for Final Unload.

The fan is still on during Final Unload. It may be turned off by turning the front panel fan selector switch to "OFF".

*** FINAL UNLOAD *
MOIST=16.5% TMP=91F
ROLL ORDER = 50%
REMAINING = 27:25**

After the calculated time is complete, the screen will display "Final Dry Complete Press Any Key". The Final Dry cycle should now be complete and the last of the dried grain will have been transferred. If there is still grain in the dryer, a manual unload can be performed to empty it.

Press any key on the keypad to return to the main screen.

Manual Control Introduction

This mode of operation is provided primarily as a back up for operating the dryer should there be a problem with the automatic controller. However, the dryer may be run in manual at any time.

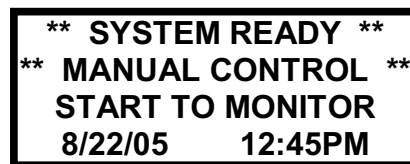
When operating in the manual mode, safety circuits are monitored by the PLC, and a fault condition will cause a system shut down. In the event of a fault, the switches must be turned to the “off” position to reset the control system.

Starting Dryer from Empty

To start the dryer in the manual mode, turn the system power switch to manual and if the computer is operational, the following screen will appear:



The dryer is now ready for manual operation.



Step 1. Load Dryer

Load the dryer, by turning the load auger switch to “ON”. At this time the dryer will load for a maximum of 45 minutes. When the dryer is full, the load auger will shut off automatically. It is not necessary to turn the load auger off with the switch.



During manual operation, the PLC will monitor the dryer and control the load device to automatically fill the dryer during operation.

If the computer is operational, and the operator desires to monitor the moisture and temperature of the output grain, press “START” and the following screen will appear:



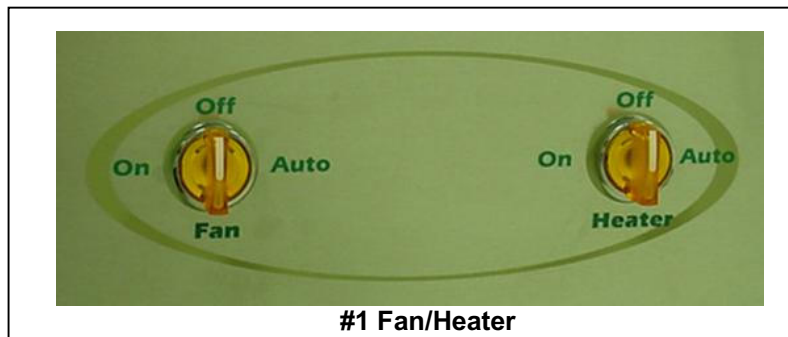
Press any key on keypad to continue to the monitoring function.

Step 2. Starting Fans/Heaters

Next, start the fans and heaters by first turning the fan switch to "ON" and then turning the heater switch to "ON".

Note

The Heater will still have a 30-second purge before starting.



Allow the plenum temperature to stabilize for approximately 100 seconds.

Step 3. Initial Dry Time

Manually adjust the heaters for a plenum temperature of 160 degrees as indicated on the digital temperature indicator.

The amount of time to keep the dryer in this condition is determined by the incoming grain moisture and the desired output moisture.

Use the formula below to determine the Initial Dry time.

(Incoming Moisture Content – Desired Moisture Content Out) x 5 Minutes = Initial Dry Time

Example

(21% Incoming – 16% Desired Out) x 5 Minutes = 5% x 5 Minutes = 25 Minute Initial Dry Time

After the Initial Dry time is complete, it is necessary to allow the dryer to stabilize the moisture gradient. At this time, manually increase the plenum temperature to 140-220 degrees.

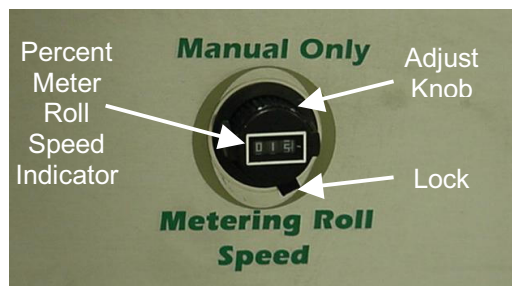
Step 4. Dryer stabilization

After the initial dry time is completed, set the plenum temperature to the operating temperature.

Begin dryer stabilization by turning the unload auger switch to "ON".



Next adjust the Meter Roll Speed to the desired speed. To adjust the meter roll setting, move the locking lever up, and rotate the knob to the desired setting.



The speed setting is indicated by a 3-digit indicator in the center of the knob. This value indicates 000 to 999. Example: If desired speed is 25%, dial indicator to 250.

To determine the correct meter roll speed setting, follow the chart below. If the speed settings require the dryer to run at less than 10% meter roll speed, or a manual setting of 100, it is necessary to dry the grain in the Automatic Batch mode, or increase the plenum temperature.

Approximate meter roll speed given the plenum temperature and points removal for a single fan.

(This chart is to be used for CORN only)

Pts Removed	Plenum 160	Plenum 170	Plenum 180	Plenum 190	Plenum 200	Plenum 210	Plenum 220
15	065 *	071 *	078 *	085 *	091 *	098 *	105
10	097 *	107	117	127	137	147	157
5	194	214	234	254	274	294	314
3	323	357	390	423	457	490	523

*If it is necessary to run the meter rolls lower than 100 and more than 010, Automatic Batch must be used.

Important

At this point it is very important to let the dryer stabilize. DO NOT make any further Meter Roll adjustments until the dryer has turned the grain over completely one time. To determine the amount of time to turn the dryer over one time, refer to the chart below.

Time to Clear Dryer at Given Meter Roll Settings

Roll Setting	Minutes to Unload	Roll Setting	Minutes to Unload	Roll Setting	Minutes to Unload
100	161	450	51.3	800	37.6
150	114	500	48.2	850	36.6
200	90.5	550	45.6	900	35.7
250	76.4	600	43.5	950	34.8
300	67.0	650	41.7	999	34.1
350	60.3	700	40.1		
400	55.3	750	38.8		

At this point a proper moisture gradient will have been established if the roll speed was left alone.

Step 5. Dryer Operating under Manual Meter Roll Control

At the end of the Dryer stabilization period as determined above, monitor the discharge moisture content by either observing the control box display (only if computer is operational) or by performing a manual sample test using the sample spout. Calibrate temperature and moisture readout as described on page 39 if necessary.

This display, detailed here, will monitor the output moisture while running in manual.

SAMPLING...
OUTPUT TEMP = 95F
CURR. MOIST. = 16.0%
AVG. MOIST = 15.9%

If the discharge moisture content is not correct, adjust the meter roll potentiometer according to Figure #1 if moisture content is too high, or according to Figure #2 if moisture content is too low.

Deviation Above Set Point	Decrease Meter Roll Setting
Moisture 0.5% High	Decrease Dial setting 025
Moisture 1.0% High	Decrease Dial setting 050
Moisture 1.5% High	Decrease Dial setting 075
Moisture 2.0% High	Decrease Dial setting 100
Moisture 2.5% High	Decrease Dial setting 125
Moisture 3.0% High	Decrease Dial setting 150
Moisture 3.5% High	Decrease Dial setting 175
Moisture 4.0% High	Decrease Dial setting 200
Moisture 4.5% High	Decrease Dial setting 225

Figure 1

Deviation Below Set Point	Increase Meter Roll Setting
Moisture 0.5% Low	Increase Dial setting 025
Moisture 1.0% Low	Increase Dial setting 050
Moisture 1.5% Low	Increase Dial setting 075
Moisture 2.0% Low	Increase Dial setting 100
Moisture 2.5% Low	Increase Dial setting 125
Moisture 3.0% Low	Increase Dial setting 150
Moisture 3.5% Low	Increase Dial setting 175
Moisture 4.0% Low	Increase Dial setting 200
Moisture 4.5% Low	Increase Dial setting 225

Figure 2

Important

After adjusting the meter roll speed, allow at least 15 minutes of operation before re-checking moisture and/or re-adjusting meter speed again.

Step 6. Dryer Shut Down

To shut the dryer down when in manual operation, perform the following steps in sequence.

- a. Set meter roll potentiometer to "000" and lock.
- b. Turn the heater switch to "OFF".
- c. Turn the load auger switch to "OFF".
- d. Turn the unload auger switch to "OFF".
- e. Turn the fan switch to "OFF".
- f. Turn the system power switch to "OFF".

Starting the Dryer after a Shut down

The following table is a guideline for restarting the dryer after a shutdown.

Start/Restart scenario	Initial Dry w/ Stabilization	Restart w/ Stabilization	Restart
All wet grain, No gradient established	Yes	No	No
Shutdown greater than 3 Hours, gradient established, grain cool	Yes	No	No
Shutdown 3 to 6 Hours, gradient established, grain warm	No	Yes	No
Shutdown less than 1 Hour, gradient established	No	No	Yes
Change of plenum temperature more than 20°F.	No	Yes	No

The method used for restarting the dryer depends on how long the dryer has been shut down.

Automatic Batch Control

Note

Two-fan/heater operation is the same as a single fan/heater, except for controlling and monitoring the second fan and heater. Operator must set both plenum's at the same temperature.

To start the dryer, turn all switches to 'Auto' and press start.

Begin automatic batch by pressing 2.

CONT. FLOW	1
AUTOBATCH	2
GRAIN TRANSFER	3
FINAL DRY	4

Set Date/Time

If the date and time are correct, press OK(+). If you wish to change the date or time, press CHG(-) and follow the screen instructions.

02/14/03	02:37:47 PM
ARE THE DATE/TIME	
OK(+) OR CHG(-)?	

Set Input Moisture

Accept or change the incoming grain moisture content.

THE CURRENT INPUT MOISTURE SET=20.5%
OK(+) OR CHG(-)?

Set Max Roll Speed

The Maximum Roll Speed will now be displayed. If the speed of the unload matches the capability of the unload system, press OK(+). To change the maximum meter roll speed setting press CHG(-) and follow the screen instructions.

MAXIMUM ROLL SPEED IS SET TO 50%
OK(+) OR CHG(-)?

Full Heat or Heat Cool

Select full heat or heat/cool operation. The cool operation is always controlled by a user settable time value. During full heat operation, the heaters will remain on continuously. When heat/cool is chosen, the heaters are turned off during the cool cycle and the unload cycle.

FOR FULL HEAT – PRESS 1 FOR HEAT/COOL – PRESS 2
--

Set Batch Number

Each batch is assigned a batch number and used on the printout for reference. Set the starting three-digit batch number.

PREVIOUSLY ASSIGNED BATCH NUMBER = 1 RESUME FROM PREVIOUS? OK(+) OR CHG(-)?
--

Dryer Fill

After accepting or resetting the settings, the operator is prompted to press start to perform an initial fill, if necessary, followed by the

immediate starting of the fans and heaters. Pressing reset would take the operator to the main standby screen.

****DRYER NOT FULL**
PRESS START TO LOAD
OR RESET TO ABORT
OR '1' FOR FINAL DRY**

After pressing start, if the dryer requires filling, the fill will begin. If the fill time exceeds 45 minutes, the fill will shutdown. Ensure that the dryer is filling correctly and that sufficient grain is present to fill the dryer. Press start for another load attempt if necessary. Once the dryer is full, determined by the dryer's paddle switch assembly, the load system will turn off automatically.

Fan and Heater Start-up

Automated starting of the fans and firing of the heaters is now performed. The upper or single fan is turned on followed by the corresponding heater. The

LCD will display 'Starting Fan...' until proper plenum air pressure is detected and if insufficient air pressure is present, the dryer will shutdown with a static air pressure fault. Refer to Shutdown faults section.

STARTING FAN

The dryer will then start the heater. The heater will purge for 20-30 seconds after which ignition will occur. The flame sensor will then attempt to detect a flame. If flame is not sensed in 45 seconds, the dryer will shutdown and display a Flame Timeout Fault. Refer to Shutdown faults section

**HEATER PURGE IN
PROGRESS FOR LOWER
HEATER PLEASE WAIT**

On two-fan dryers, the same procedure is repeated for the second fan and heater.

If start is not pressed within 10 minutes, the dryer will shutdown due to inactivity.

**SYSTEM IDLE SHUTDOWN
OPERATOR INPUT REQ'D

PRESS ANY KEY**

The following table provides suggested guidelines for various start/restart scenarios.

Start/Restart scenario	Change Dry Time	Dry Cycle RESTART
All wet grain	No	Yes
Shutdown greater than 6 Hours, grain cool	Yes Possibly lower dry time (Check printer tape).	Yes
Shutdown 1 to 6 Hours, grain warm	Yes Possibly lower dry time (Check printer tape).	Yes
Change of plenum temperature more than 20°F.	No (Check moisture of next batch)	No
Shutdown less than 1 Hour	Yes Possibly lower dry time (Check printer tape).	Yes

The plenum should now be adjusted to the desired drying temperature.

**PLENUM TEMPERATURE
IS SET TO 220F**

OK(+) OR CHG(-)?

Time and/or Temperature Selection

Choose the method of operation for automatic batch. If the dryer does not have the temperature option installed, the only option given on this screen will be the timed batch option.

**GRAIN DISCHARGE BY –
TIME ONLY = ENTER 1
TEMP ONLY = ENTER 2**

If TIME ONLY is selected, all functions, dry, cool and unload are controlled by a time setting.

If TEMP ONLY is selected, the dry function is controlled by a set temperature with a maximum two hour batch limit. Upon failure to reach the set temperature in two hours, the dryer is shut down. The cool function, if selected, and unload function remain time controlled.

Set Batch Variables

For the time option, the time to dry must now be entered.

**BATCH DRY TIME
IS SET TO __ MIN.**

OK(+) OR CHG(-)?

If the TIME option is selected, the operator can choose to have the dry cycle time recalculated for the next batch based on the batch's average

moisture. The computer will then add or subtract drying time to achieve the desired moisture output after each batch has finished unloading. If this option is selected, the operator will be prompted for the desired output moisture.

**RECALCULATE DRY TIME
BASED ON PREVIOUS
BATCH AVG. MOISTURE?
YES(+) OR NO(-)?**

For the temp option the desired dry temperature must now be entered.

**DESIRED GRAIN COLUMN
DRY DISCHARGE TEMP
IS SET TO 125F
OK(+) OR CHG(-)?**

If heat cool has been selected, the controller will prompt the operator to enter the desired cooling time.

**BATCH COOL TIME
IS SET TO __ MIN.**

OK(+) OR CHG(-)?

The unload time must now be set. A recommended time has been calculated from the maximum meter roll speed.

**BATCH UNLOAD TIME
IS SET TO __ MIN.
RECOMMENDED = __ MIN
OK(+) OR CHG(-)?**

After beginning operation, any of the settings listed below can be altered by pressing the set key. Changing values will immediately affect the batch operation.

**1=CALIBRATE SENSORS
2=PLENUM TEMPERATURE
3=DRY TIMES/TMP 4=COOL
5=UNLOAD 6=CONFIG**

1. Calibrate Sensors – Moisture, temperature, etc.
2. Operating plenum temperature
3. Dry Time (time mode) or Dry Temp (temp mode)
4. Cool Time
5. Unload Time
6. Configuration Settings – Time/Date, Min/Max Roll, etc.

Drying in Automatic Batch

As automatic batch operation begins drying, the remaining time or current kernel temp will be displayed.

When the dry cycle is completed, the cool cycle, if running in heat/cool, will begin. The remaining time will be displayed.

During unload, the average moisture and current temperature will be displayed, as shown here.

**UNLOAD TIME = 30 MIN.
MOIST=15.5% TMP=92F
COLUMN TEMP. = 91F
29:59 AVG. MST = 15.2%**

Unload Cycle

After unloading the first batch, a display informs the user the batch is finished and begins the drying operation for the next batch. A printout is then given showing average temperature and moisture of the entire batch.

A screen displaying the next batch number will come up when the dryer is ready to begin the next batch.

**READY TO DRY BATCH
NUMBER 2**

Note

Please remember to refer back to the parameters printed out by the printer for each batch number to determine if a change is required for the next batches or if one of the following has occurred. If the option is selected to recalculate dry time, the dry time will be automatically adjusted for the next batch based on the previous output moisture and desired output moisture.

1. The input moisture of the grain changes.
2. The plenum temperature has been increased or decreased.
3. A shutdown occurred due to a fault.
4. A drastic change in climate (ambient temperature, winds, etc).

Grain Transfer Introduction

Increasingly, operators require the dryer to transfer grain through it to reach their storage facilities. A mode of grain transfer has been developed to simplify this process. During grain transfer the dryer will not run the fans, heaters, or moisture sensing equipment. All relevant safety circuits are monitored.

Starting Grain Transfer

Press "3" to continue with the Grain Transfer mode.

CONT. FLOW	1
AUTOBATCH	2
GRAIN TRANS.	3
FINAL DRY	4

Set the Maximum Meter Roll Speed. This speed will be used to transfer grain as quickly as possible.

**MAXIMUM ROLL SPEED
IS SET TO 50%**

OK(+) OR CHG(-)?

The operator is then prompted to press start to perform an initial fill, if necessary.

****DRYER NOT FULL**
PRESS START TO LOAD
OR RESET TO ABORT
OR '1' FOR FINAL DRY**

After pressing start, if the dryer requires filling, the fill will begin (Completely filling the dryer is necessary in order to still monitor safety functions by the PLC). If the fill time exceeds 45 minutes, the fill will shut down. Ensure that the dryer is filling correctly and that sufficient grain is present to fill the dryer. Press start for another load attempt if necessary. Once the dryer is full, determined by the dryer's paddle switch assembly, the load system will turn off automatically.

After the meter roll speed has been set, and the dryer filled, the operator will be prompted to press start to begin transferring grain.

**READY TO START
UNLOADING
PRESS ANY KEY
TO START**

The operator is asked whether the 30-minute "Out of Wet Grain" timeout is to be used. If selected, the load system will automatically be shut down after 30 minutes of no grain being detected by the paddle switch. The unload system will continue to run for another 10 minutes to clean out.

**IS 30 MINUTE OUT
OF WET GRAIN
TIMEOUT DESIRED?
YES(+) OR NO(-) ?**

The grain transfer operating screen will display the meter roll speed, as shown here. To end the Grain Transfer mode, press "RESET".

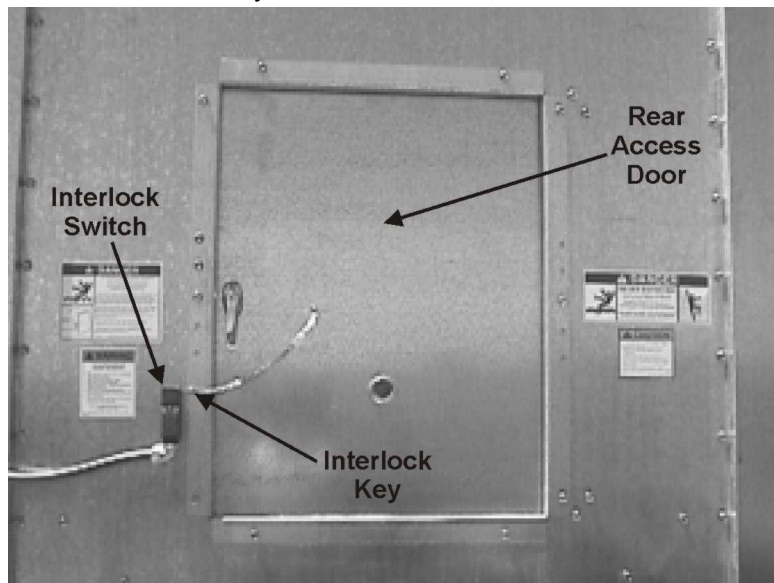
****GRAIN TRANSFER**
MOIST=16.5% TMP=66F
ROLL ORDER = 50%
TO EXIT PRESS RESET**

Functional Maintenance Requirements

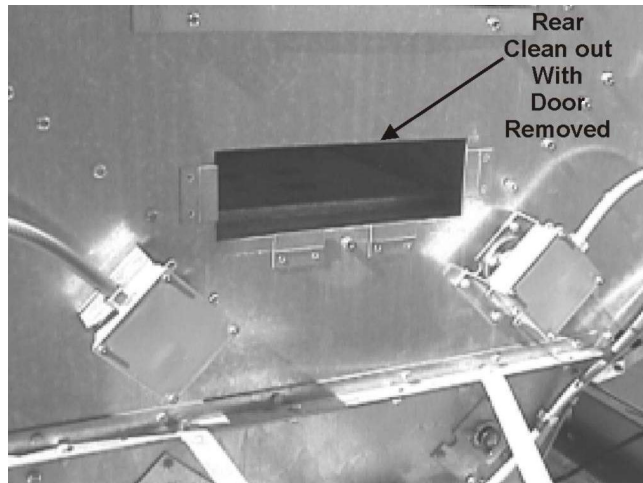
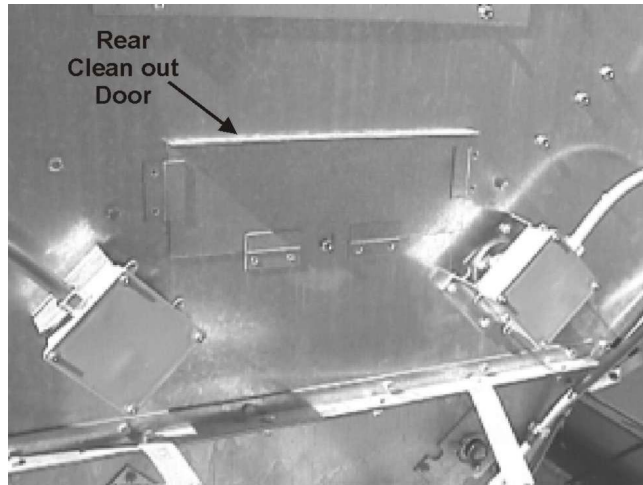
Daily Maintenance requirements

This assumes 24-hour day operation during harvest.

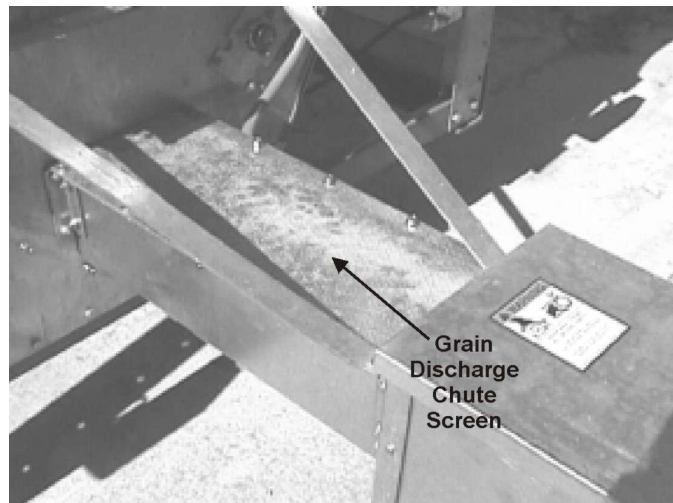
1. Clean foreign material from fan air inlet screen.
2. Sweep off top of exhaust slope where fines may have accumulated on the outer perforated skins.
3. Visually inspect for an even grain movement along all perforated panels of the lower outer grain column slope. If grain in one section is not moving, or it is moving slowly, check for obstructions in the flow gate area or columns. Pay particular attention to the area directly under the wet grain bin, where excessive amounts of fines and foreign material can accumulate.
4. Perform plenum cleanout where fines and foreign material may have accumulated. **Shut the Dryer down.** Open rear access door. Sweep all fines and debris from front of plenum area to the rear plenum area. Close rear access door and insert interlock key.



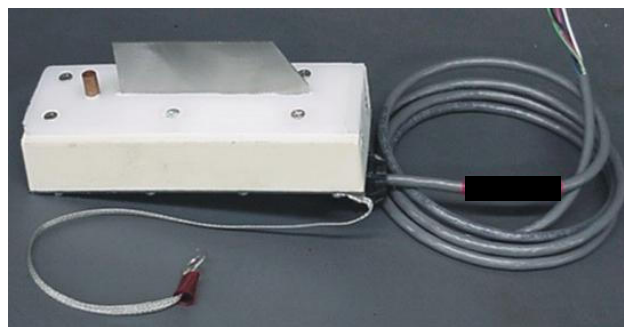
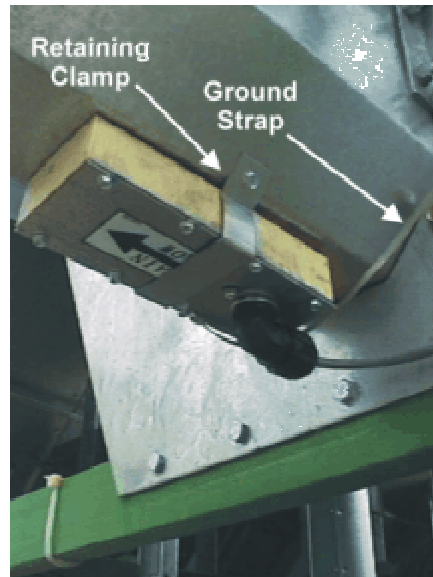
5. Open rear clean out door



6. Operate the fan only by either running it in the Dry Fire mode or in the manual mode. Continue running the fan until no more fines / debris come out of the rear clean out.
7. Turn fan off.
8. Reinstall rear clean out door.
9. Sweep fines / debris of discharge chute screen.



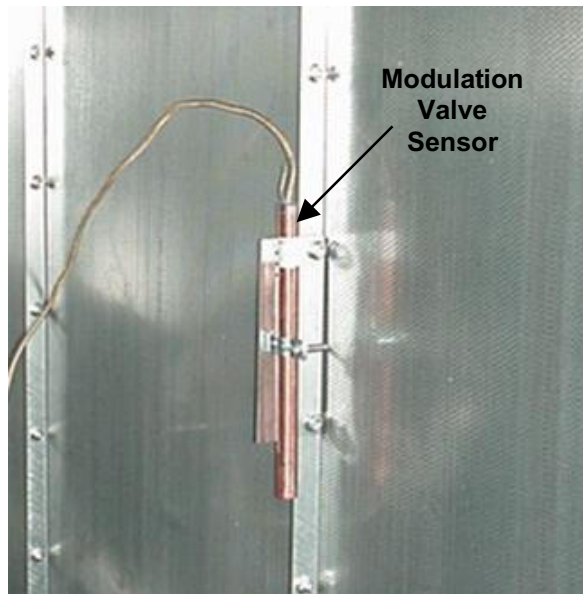
10. Remove discharge moisture sensor and clean sensor flag and copper tube.



Reinstall moisture sensor.

Functional Maintenance Requirements

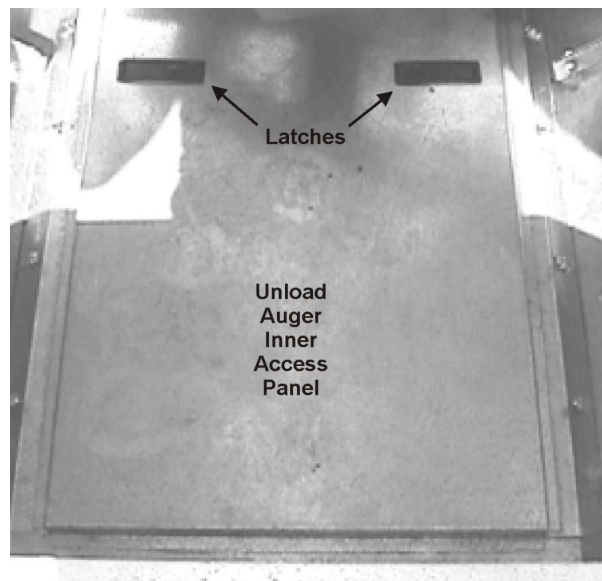
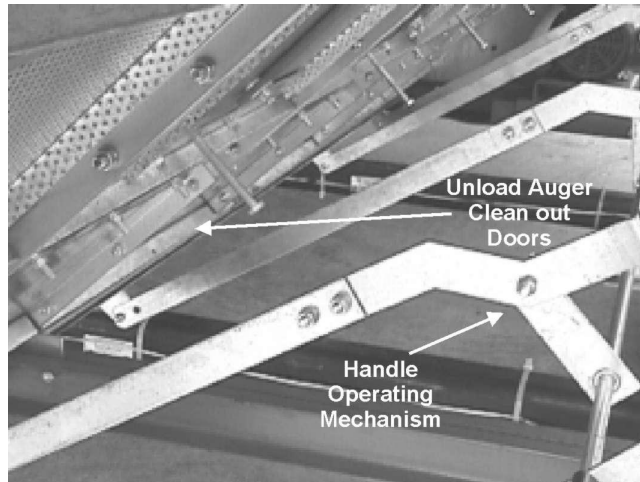
11. Inspect modulation valve sensor and the temperature sensor wire. Clean if necessary.



12. Restart dryer operation per automatic control or per manual control

Semi-weekly Maintenance requirements

1. Perform all steps of daily maintenance requirements as listed in previous section, except step 12, restarting dryer.
2. Open inner and outer unload auger clean out / access doors.



3. Inspect unload auger area and meter roll area for obstructions, fines, and debris. Clean as necessary. Close inner and outer unload auger cleanout / access doors.
4. Restart dryer operation per automatic control or per manual control.

Weekly Maintenance requirements

1. Unload grain from dryer by performing Final Dry in automatic.
2. Perform all steps from the Daily and Semi-weekly requirements except for restarting dryer.
3. Thoroughly inspect grain columns for accumulation of trash and fines, at peak of inner perforated grain walls, and above meter roll flow gates.
4. Check tension of load and unload auger drive belts.
5. Restart the dryer per automatic control (Initial Load, Initial Dry).

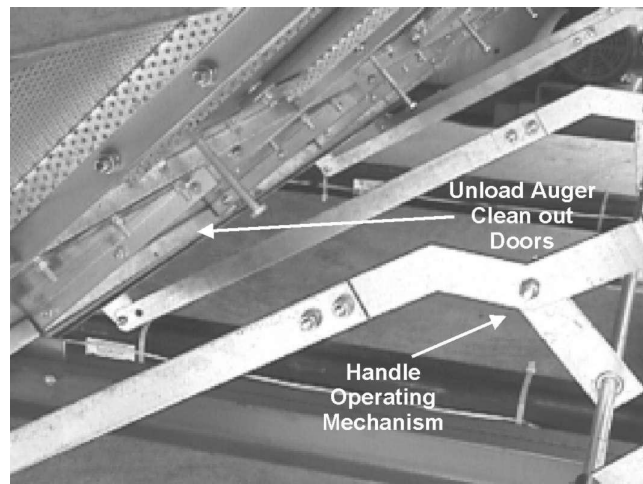
End of Season Maintenance requirements

1. After dryer is unloaded for the last time, open all access doors and panels. Thoroughly clean the entire dryer by sweeping and using compressed air. Ensure cleaning of the wet bin trash pan.

Caution

Do not blow compressed air directly into static air pressure switch.

2. Perform all steps listed in prior to season maintenance inspection.
3. Reinstall all access panels and doors with one exception. **Leave the Unload Auger clean out doors open for water drainage.**



4. Lock out electrical power.
5. Install a cover on fan inlet screen to keep debris from entering the fan and to keep the fan from windmilling.
6. Install a cover on control box. Ensure that whatever cover is installed that the control box can still "breathe".
7. Remove discharge moisture sensor from grain discharge chute and secure to dryer (sensor could be covered in standing water if left on).

Year-Round Maintenance requirements**Once a month – Dry Fire**

1. Remove fan inlet cover and control box cover. Apply electrical power.
2. Operate the fan, load auger, unload auger and meter rolls for 10 minutes using the **Dry Fire** mode (see page 17). This will redistribute the grease in the motor bearings, auger bearings, reduction gearbox and meter roll drive train.
3. Remove and lock out electrical power, reinstall covers.

Shutdown Faults

Shutdown Faults



Warning

Upon fault detection, whether in Automatic or Manual operation, the LCD will display which fault(s) caused the shutdown and a print-out will be given.

If necessary, when a fault occurs, power must be disconnected from the dryer and gas must be turned off before correcting the fault. If at all unsure, contact your Sukup dealer. Be cautious of other people or objects around the dryer.

Upon shutdown, the dryer unload may be allowed to run an additional period of time to clear the unload auger of grain. To change this amount of time, see Out of Wet Grain Fault.

All fault messages are latched, meaning that they will remain on screen until the operator acknowledges the message by pressing the reset key. This is useful in the event of a nuisance trip that may have otherwise reset by the time the operator realizes that the dryer has shut down. A summary of all on-screen faults follows:

Grain Discharge Chute / Unload Auger Warning

**DISCHARGE CHUTE OPEN
OR UNLOAD
AUGER STOPPED
PRESS ANY KEY**

Possible Problems	Possible Solutions
Grain Discharge lid opened	✓ Return lid to a closed position
Grain overflow of discharge	✓ Slow maximum roll speed. (Grain may over dry) ✓ Ensure that take-away system is operating properly. ✓ Lower plenum temperature, (if necessary) to prevent grain from over drying. Maximum roll speed is indicated by an asterisk on screen following roll order %.
Broken or jammed unload auger	✓ Check unload auger for broken flighting or foreign material. ✓ Check motor and belts.

Rear Access Door Open

**REAR ACCESS DOOR IS
OPEN--CHECK DOOR AND
INTERLOCK SWITCH
PRESS ANY KEY**

Possible Problems	Possible Solutions
Interlock key removed from rear door switch	✓ Replace Key

Housing High Temperature Alarm

**HOUSING HIGH TEMP
INSPECT HTR HOUSING
AND/OR TEMP SETTING**

Possible Problems	Possible Solutions
Housing temperature has exceeded 200°F	✓ Manually reset switch in heater box of proper heater after temperature has gone down. Refer to heater operation section. ✓ Check for plugged fan grill. ✓ Check for defective MOD valve.

Vaporizer High Temperature Alarm

**VAPOR HIGH TEMP
ADJ. VAPORIZER COIL
AND CHK FUEL SUPPLY**

Possible Problems	Possible Solutions
Vapor coil exceeded 140°F	✓ Supply tank may be low. Fill tank ✓ Vaporizer misadjusted, readjust, refer to the heater operation section. ✓ Fan airflow obstructed. Check for obstructions.

Plenum High Temperature Alarm

**PLENUM HIGH TEMP
INSPECT PLENUM AREA
AND/OR TEMP SETTING**

Possible Problems	Possible Solutions
Plenum temperature exceeded 300°F for single point, 325°F for capillary	✓ Check plenum by placing back of hand near rear door, checking for heat. If ok, remove interlock key and assess problem. ✓ Plenum temperature set too high (adjust setting).

Grain Column High Temperature Alarms

**COLUMN HIGH TEMP
POSSIBLE CLOG OR
TEMPERATURE SETTING**

Possible Problems	Possible Solutions
Column temperature exceeds 210°F	✓ Check for stagnant column that has overheated. Unplug if necessary. ✓ Lower plenum temperature if no columns are plugged.

Shutdown Faults

Motor Thermal Overload Alarm

**MOTOR OVERLOAD ALARM
CHK THERM OVERLOADS
IN POWER OR AUX BOX**

Possible Problems	Possible Solutions
Motor overload occurred for fan, load or unload auger, or auxiliary device.	✓ Check overload devices in power and auxiliary box for fault. Check faulted device for possible overheating conditions caused by an obstruction in the auger or a bad bearing in the motor or auger.

Output Sensor Not Found

**MOISTURE SENSOR
NOT FOUND SHUTDOWN

PRESS ANY KEY**

Possible Problems	Possible Solutions
Current moisture or temperature reading is outside the boundaries of normal operation.	✓ Check sensor calibration adjustments. ✓ Perform calibration procedure as described on Pg 40 or enter calibration offsets from start screen "SET" menu. ✓ Check if motor is rotating. ✓ Check if sensor is placed in operating position.

Meter Roller Failure

**SYSTEM SHUTDOWN
METER ROLL FAILURE
CHECK PROX OR I/O
PRESS ANY KEY**

Possible Problems	Possible Solutions
Meter rolls have stopped turning	✓ Check for obstruction in meter rolls. ✓ Check chain linkage for broken chain.

Low Static Air Pressure

**LOW STATIC PRESSURE
CHECK FAN/AIR SWITCH

PRESS ANY KEY**

Possible Problems	Possible Solutions
Internal plenum pressure could not be reached upon start-up.	✓ Dryer is not filling. Check load auger for proper operation.
Internal plenum pressure was lost during operation.	✓ Wet bin has run out of grain and allowed inner plenum to release air pressure before out of wet grain timeout occurs.
Air switch out of calibration	✓ Contact your Sukup Dealer to adjust air switch.

Out of Wet Grain (Dryer is not full)

**OUT OF WET GRAIN
PLC 10 MIN. TIMEOUT
FOR RESTART PRESS 1
FINAL DRY PRESS 2**

Possible Problems	Possible Solutions
Wet bin has been emptied	✓ Run Final Dry if end of season
Fill device has failed	✓ Check all fill devices
Dryer unloading faster than filling	✓ Adjust load auger secondary fill time delay off. Refer to instructions on below.

Unload Auger Time Delay Off and Secondary Auxiliary Time Delay Off Adjustment

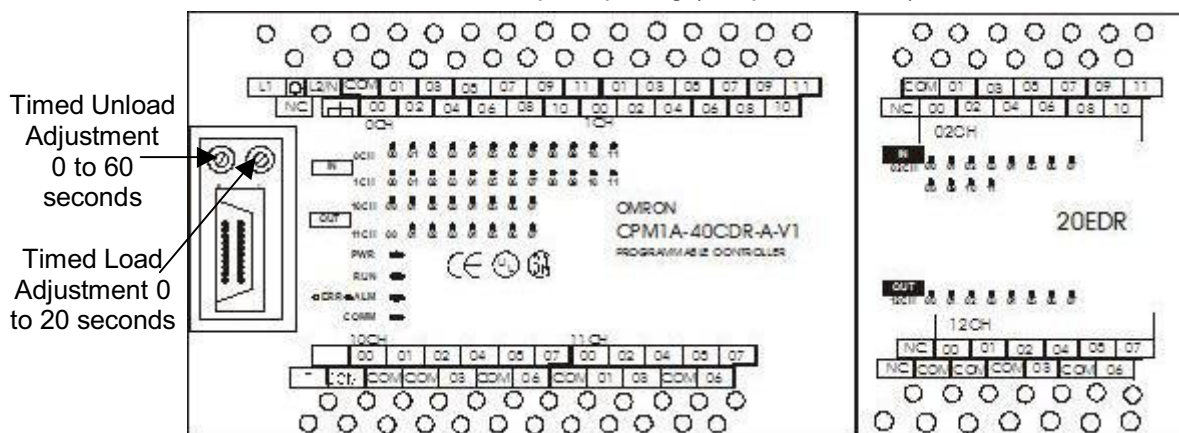
If you desire to have your unload system have a timed delay off function, (To clear augers so as not to heavily load them on restart), this is provided. This feature is adjustable from 0 to 60 seconds of "Off Delay".

If you desire to have your second fill auxiliary have a timed delay off function, (To allow additional grain to unload from bin before turning off secondary fill) this is also provided. This feature is adjustable from 0 to 20 seconds of "Off Delay".

Note

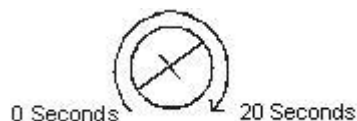
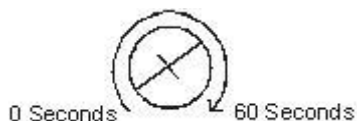
The unload and fill system will still shut off immediately under the following fault conditions. 1.) Rear Door open. 2.) Grain discharge chute open. 3.) Motor Overload.

1. Gain access to the inside of the control box by opening the front door and the inner panel.
2. Locate the Programmable Logic Controller, (PLC), which is on the middle of the back panel. Refer to component location section.
3. Open the access door by lifting up on the right side (hinged on left). (Refer to picture below)
4. There are two adjustable potentiometers located at the top of opening (see picture below).



Shutdown Faults

The potentiometer on the left side is the adjustment for the timed unload, the right is for the adjustment of the secondary fill auxiliary. Both are factory pre-set to 0.



To change the setting to a timed delay, rotate the potentiometer clock-wise, (see the diagram above) to the desired amount of "Delay Off" time.

5. Close the access door on the PLC.
6. Close control box inner door.

**15 Minutes Without Fill Timeout
(Dryer is full)**

**DRYER FILL SHUTDOWN
GRAIN NOT UNLOADING**

PRESS ANY KEY

Possible Problems	Possible Solutions
Dryer must fill at least every 15 minutes when unloading for Continuous Flow or Automatic Batch	✓ Unload Auger is turned off ✓ Broken unload or meter roll

2 Hour Maximum Batch Timeout

**SYSTEM SHUTDOWN
2 HR DRY LIMIT**

PRESS ANY KEY

Possible Problems	Possible Solutions
Batch temperature setting has not been reached in 2 hour period	✓ Heat set too low (Increase heat) ✓ Temperature set point too high (Decrease temperature) ✓ Contact Dealer if problem continues

Defaults Set

**DEFAULTS SET
CURRENT VALUES
OUT OF RANGE
PRESS ANY KEY**

Possible Problems	Possible Solutions
Battery backed data has corrupted	✓ If displayed multiple times when starting the dryer, contact your Dealer for battery backed data part replacement.

Air Timeout

This will occur when the fan is started and static air pressure is not detected within 5 seconds.

**UPPER AIR TIMEOUT
CHECK FAN/AIR SWITCH**

PRESS ANY KEY

Heater Fault

This will occur on upper heater start if flame is not sensed within 45 seconds

**UPPER HEATER FAULT
PLC 45 SEC TIMEOUT**

PRESS ANY KEY

Out of Grain timeout

This will occur on initial dryer loading if dryer does not fill within 45 minutes

**LOADING TIMEOUT
EXCEEDED - DRYER IS
NOT FULL OF GRAIN
PRESS ANY KEY**

Appendix A – Auxiliary Motor Operation and Installation

Auxiliary controls can be set up in a number of configurations. Three control circuits exist, one for the auxiliary unload and two for the auxiliary fill. For the unload, a single control circuit is used to start an external unload device at the same time as the unload of the dryer. The auxiliary fill operations have two control circuits. When turning the fill of the dryer on, a delay of 5 seconds exists between the start of each motor, the dryer fill motor, the first auxiliary load, and the second auxiliary load. The fill paddle will send a signal to the controls that the dryer is nearly full, a switch is triggered to turn the second auxiliary load off. This operation can be delayed by up to 20 seconds with a simple setting on the PLC, explained in detail on page 64. Upon receiving the signal that the dryer is completely full, all auxiliary motors are shut off. If the second auxiliary is within its delay period, it will shut off when the dryer is full.

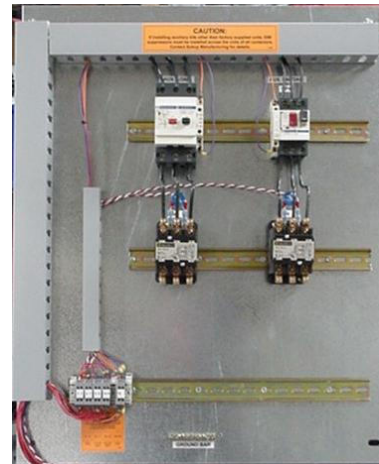
Caution

Auxiliary components should not be installed in the power box, only in auxiliary box located above the power box.

Installing the components

When installing the components into the box, the starter/protector is mounted on the top DIN rail and the contactor is mounted on the middle DIN rail directly below.

If the components kits are purchased from Sukup Manufacturing, the starter/protector and contactors will be pre-wired together.



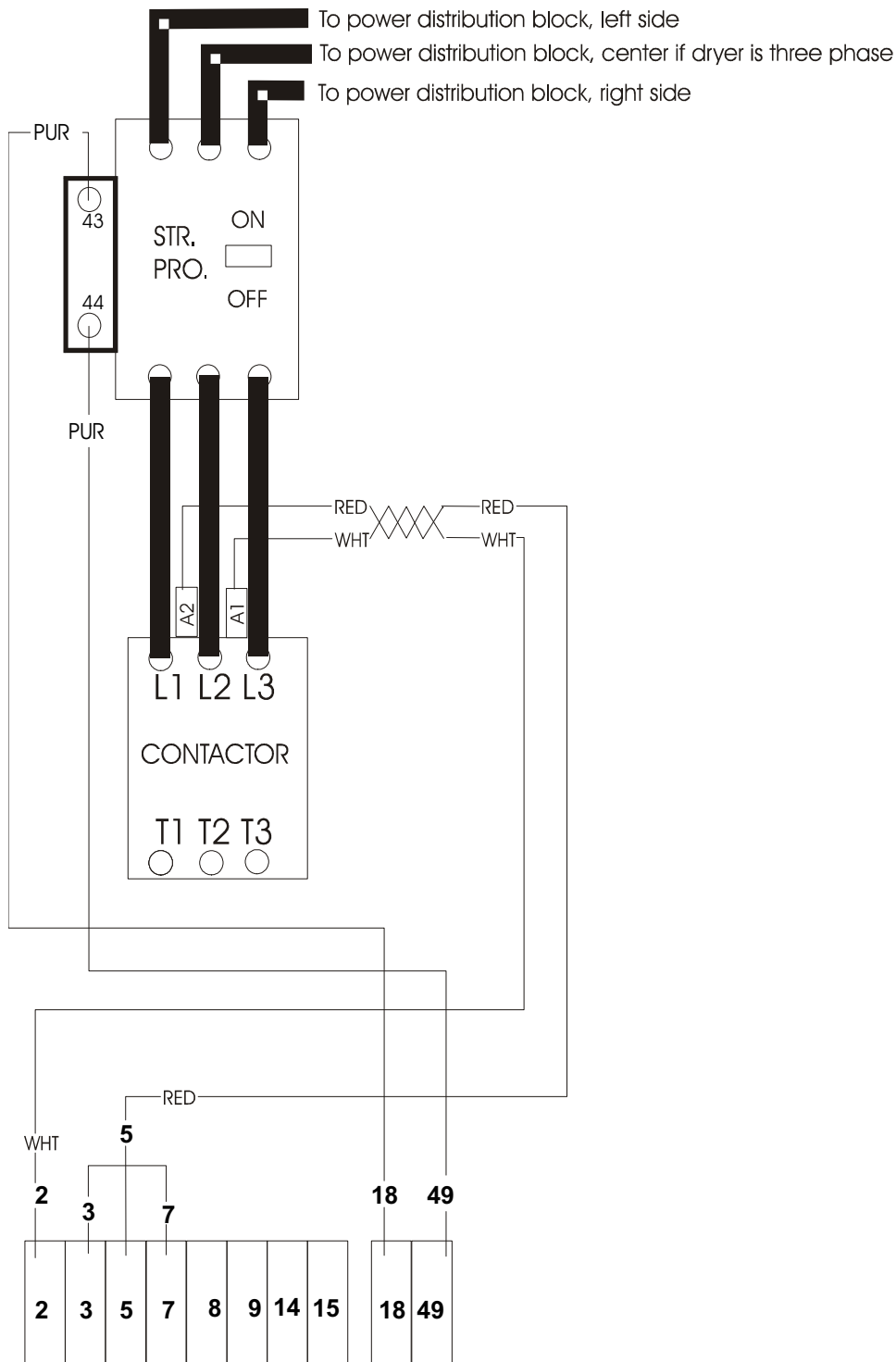
Wiring the components

Three sets of wires must be installed for the auxiliaries:

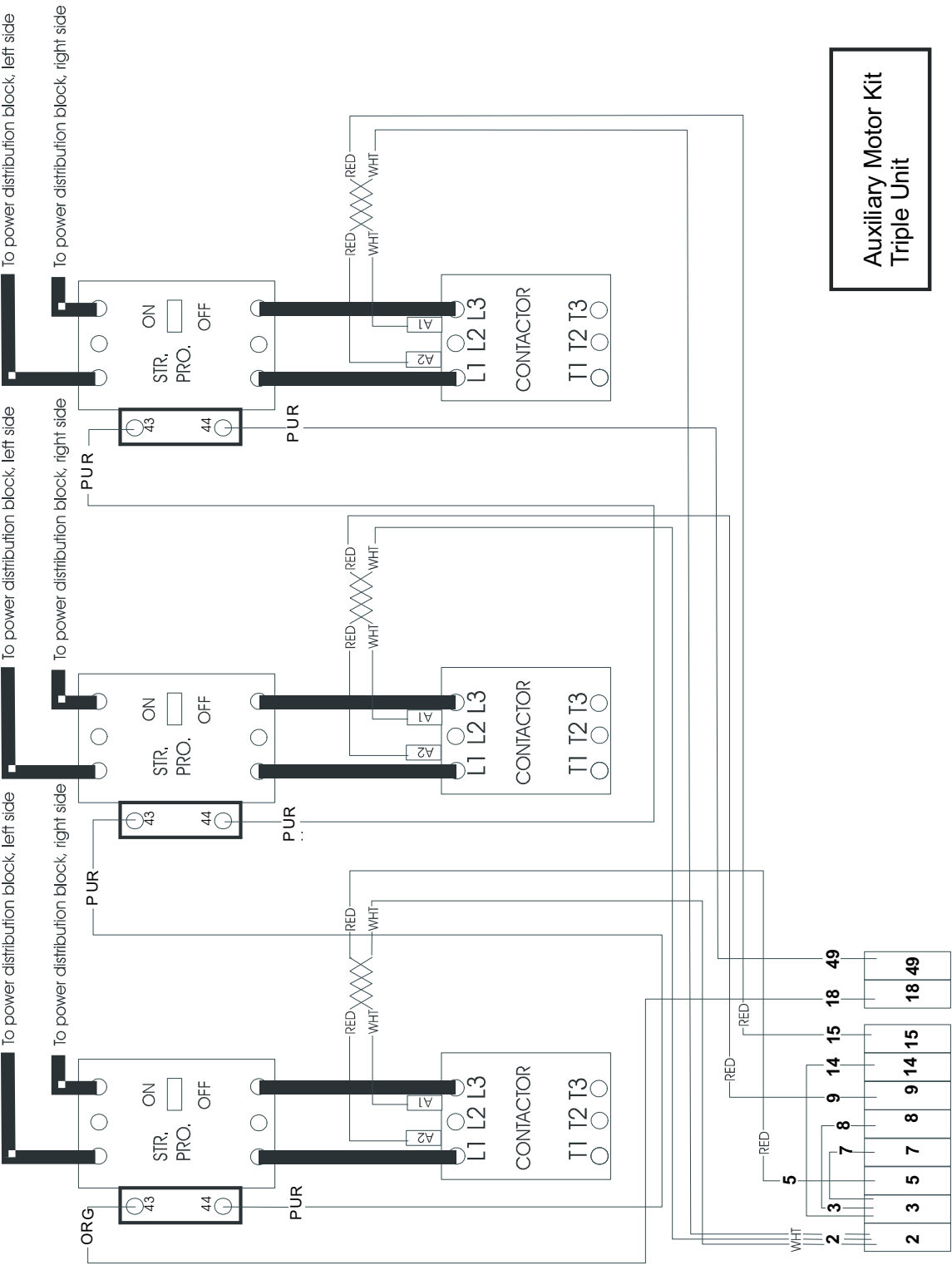
1. Control wiring, including jumpers to terminal 3 across the terminal strip
 - Wire 5 – Auxiliary load one (nearest the dryer)
 - Wire 9 – Auxiliary load two
 - Wire 15 – Auxiliary unload
2. Fault protection wiring
 - Wire 18 – Fed from terminal into first auxiliary N/O contact
 - All contacts are then wired in series
 - Wire 49D – Taken from last contact to terminal strip
3. Power wiring
 - Installed similar to those located in power box
 - Direct wire leaving space from transformer as the it heats up slightly during operation.

Caution

If contacts installed are not purchased from Sukup Manufacturing, fault protection must be installed. Contact Sukup Manufacturing to purchase these components.

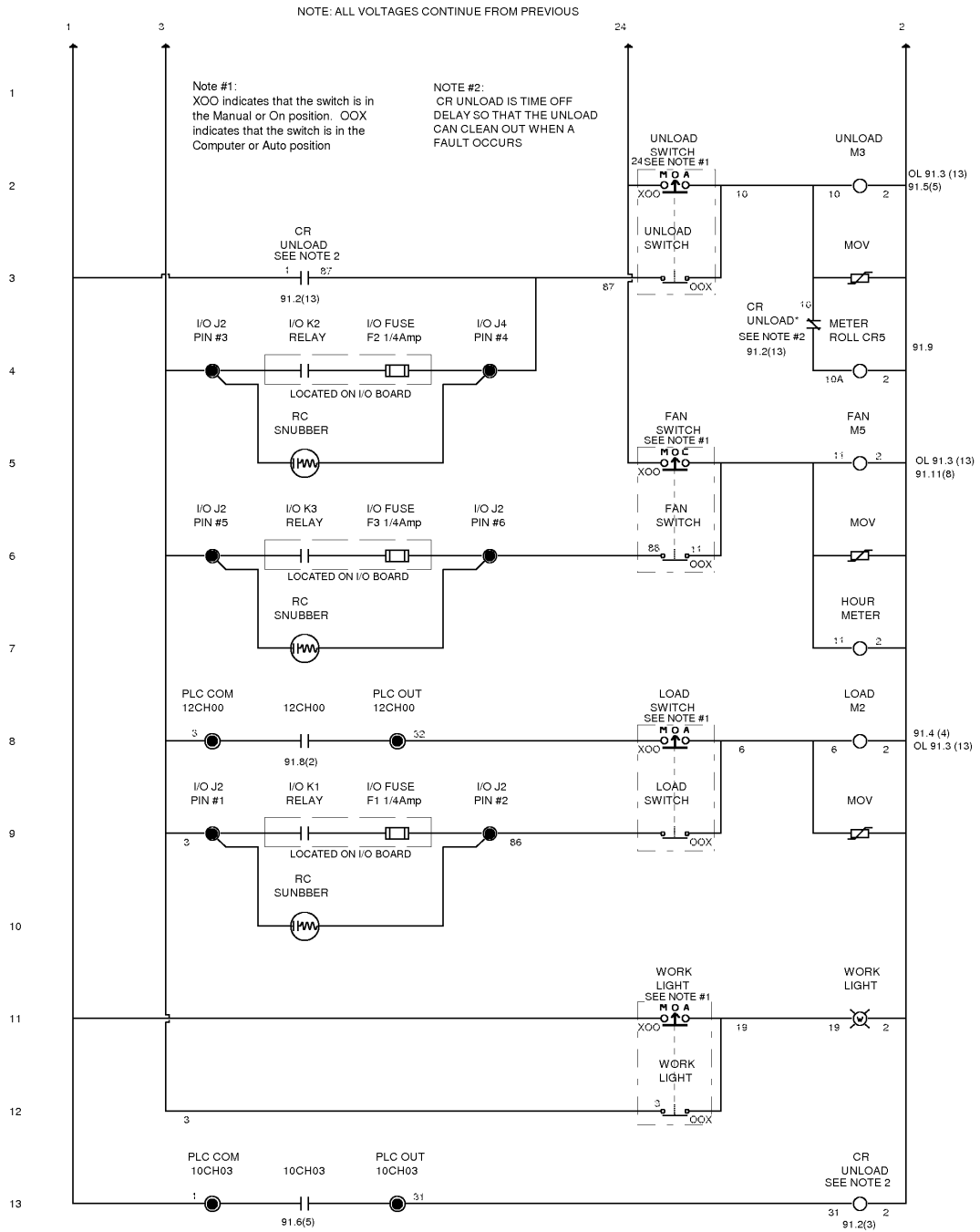


**Auxiliary Motor Kit
Single Unit**

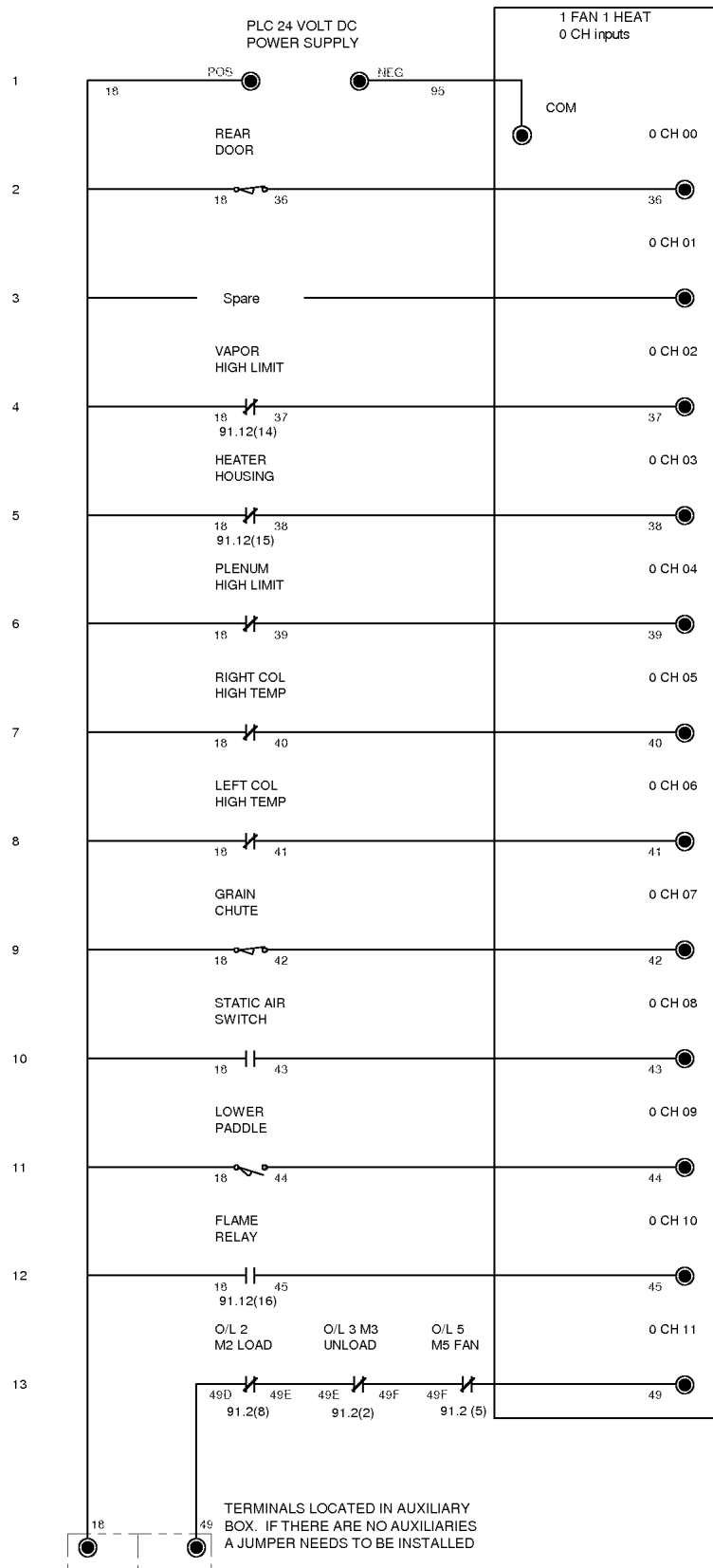




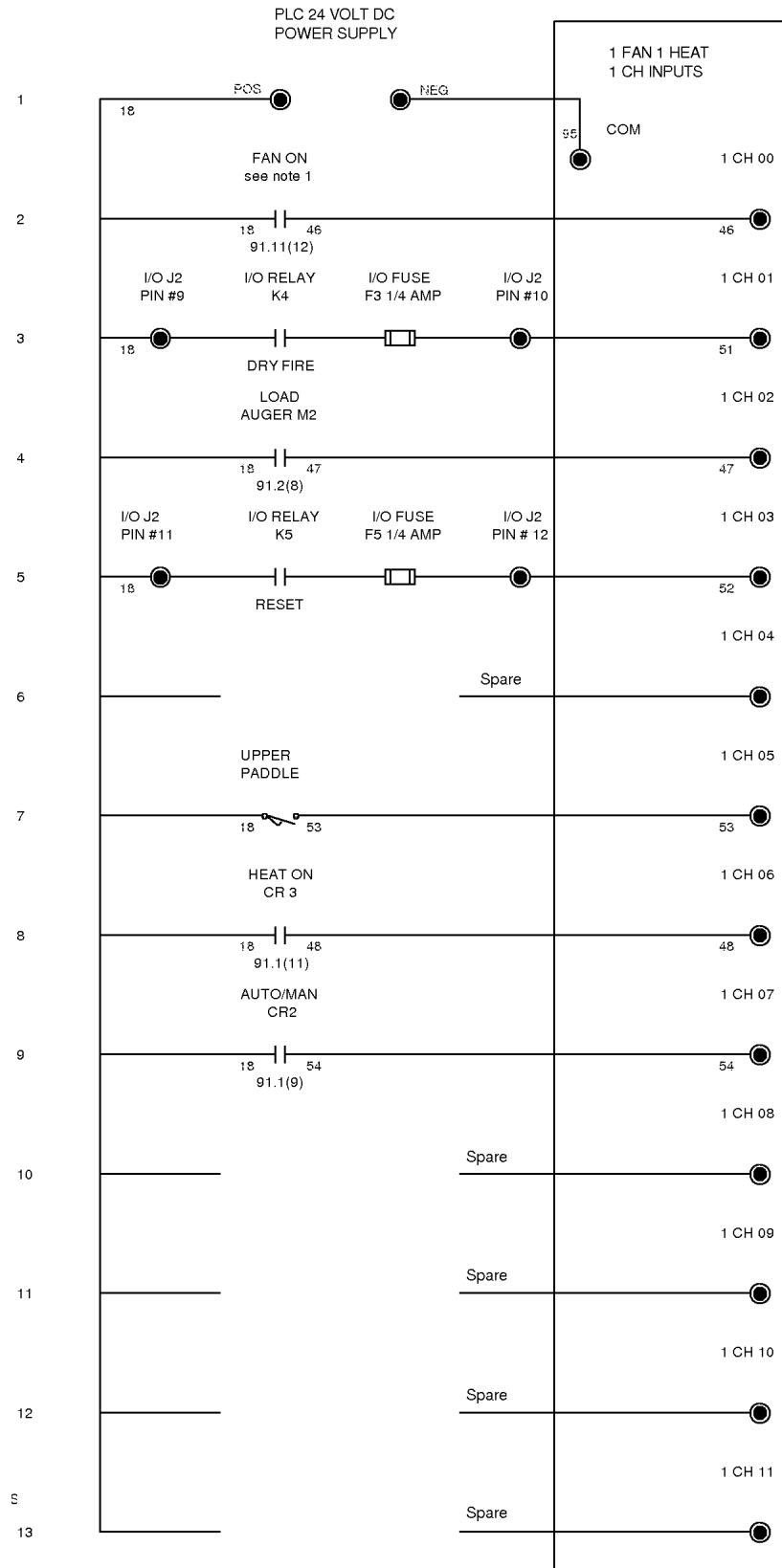
91.2 120 Volt Control (cont.) (Single Fan)



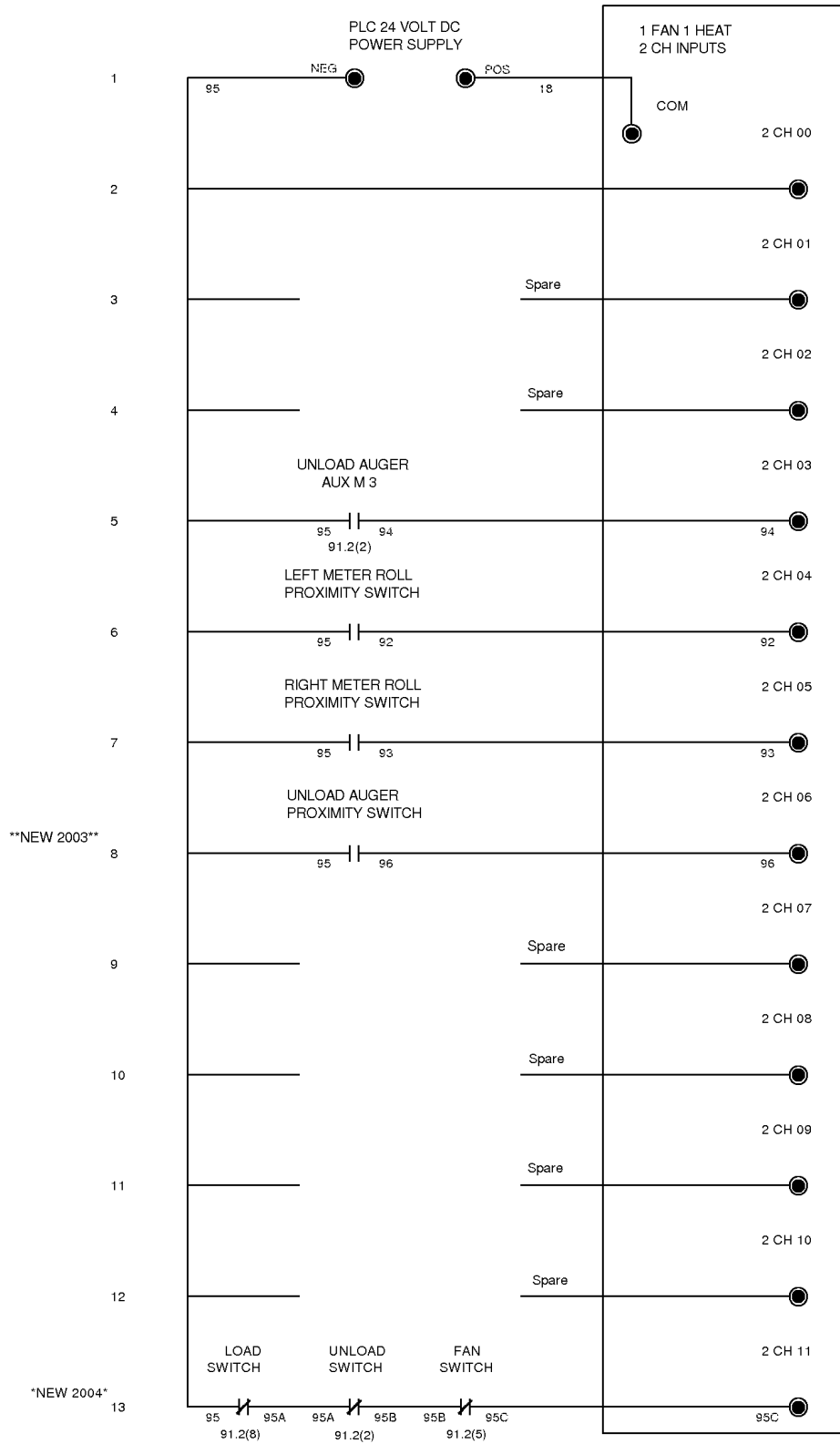
91.3 PLC Inputs CH0 (Single Fan)



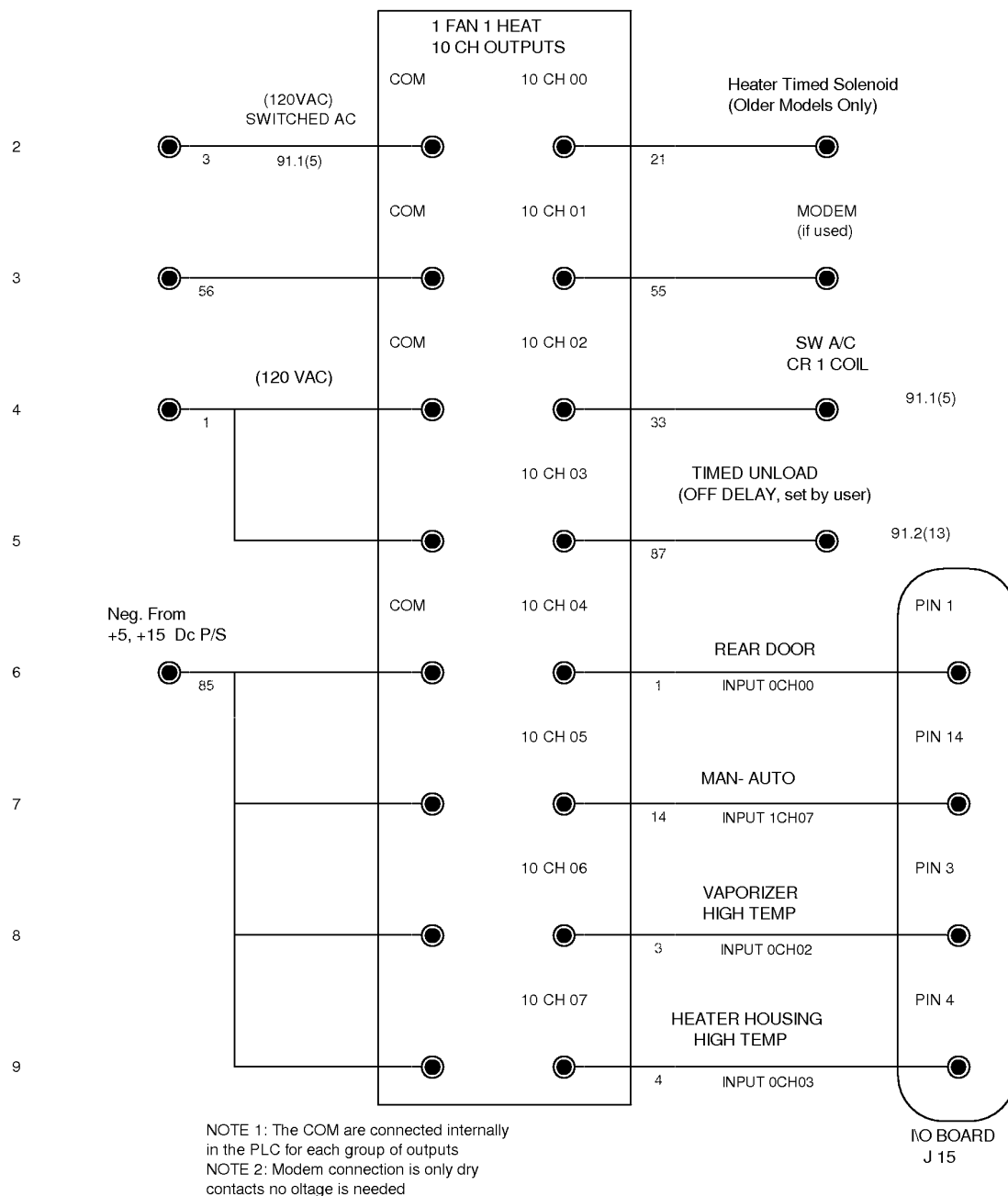
91.4 PLC Inputs CH1 (Single Fan)



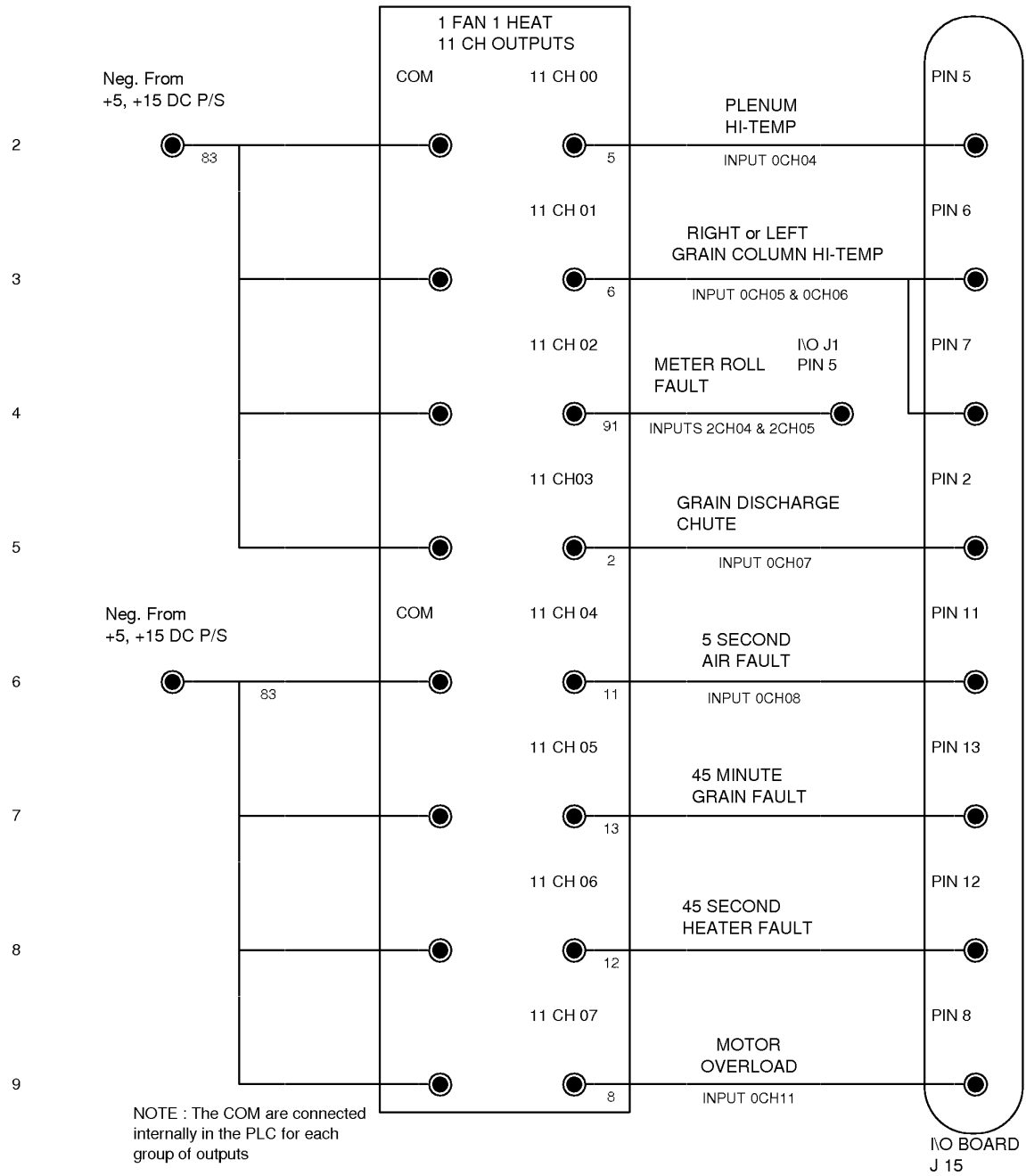
91.5 PLC Inputs CH2 (Single Fan)



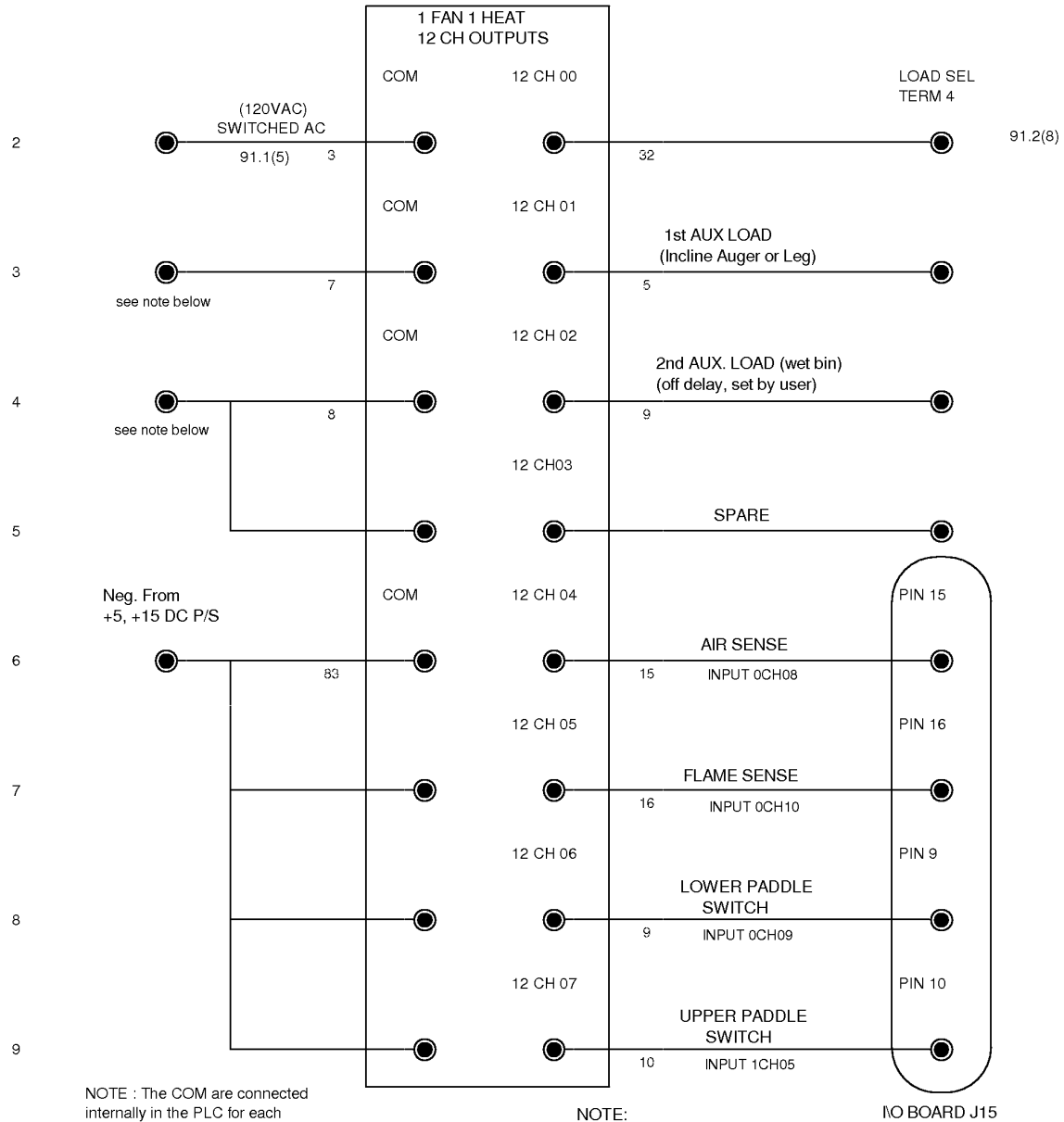
91.6 PLC Outputs CH10 (Single Fan)



91.7 PLC Outputs CH11 (Single Fan)

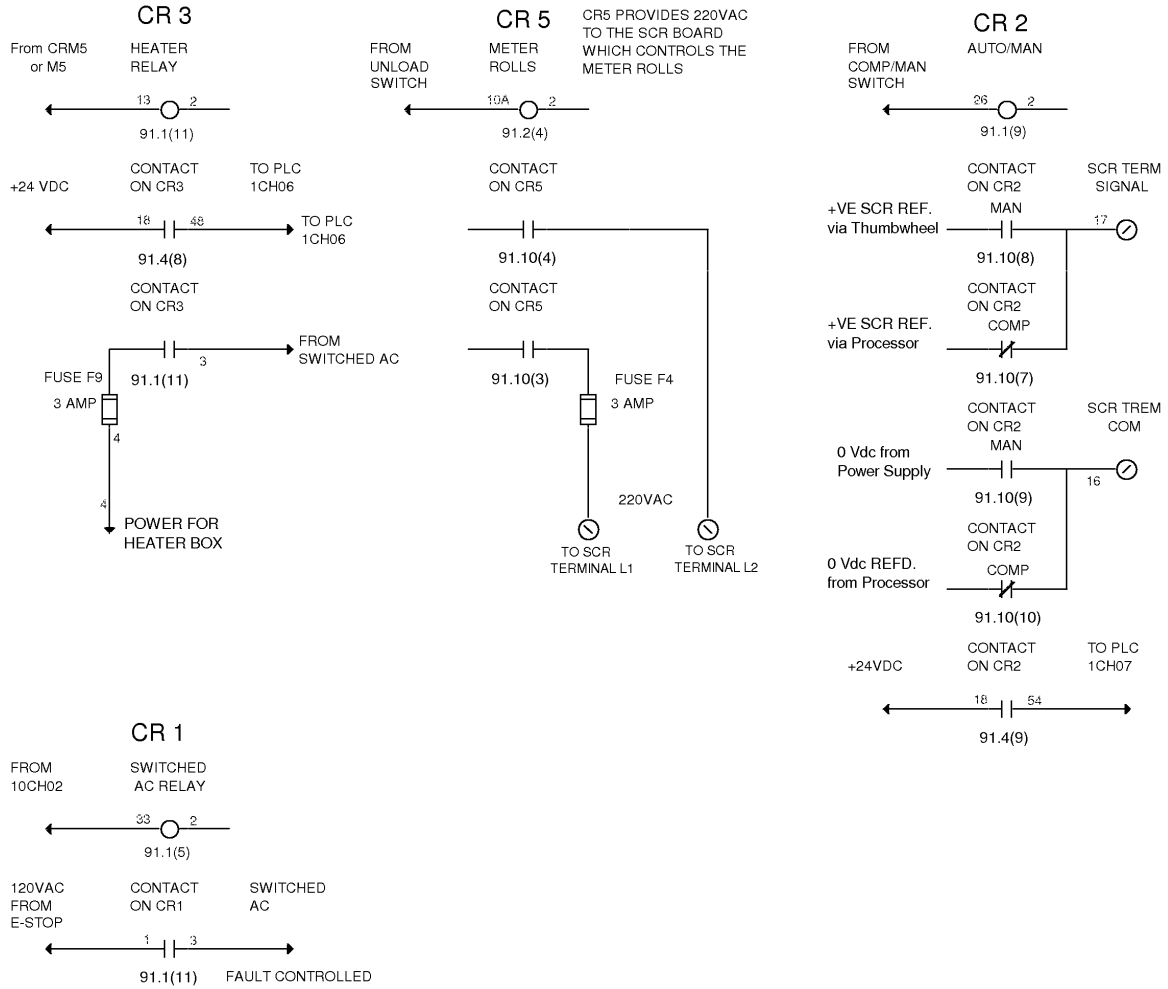


91.8 PLC Outputs CH12 (Single Fan)

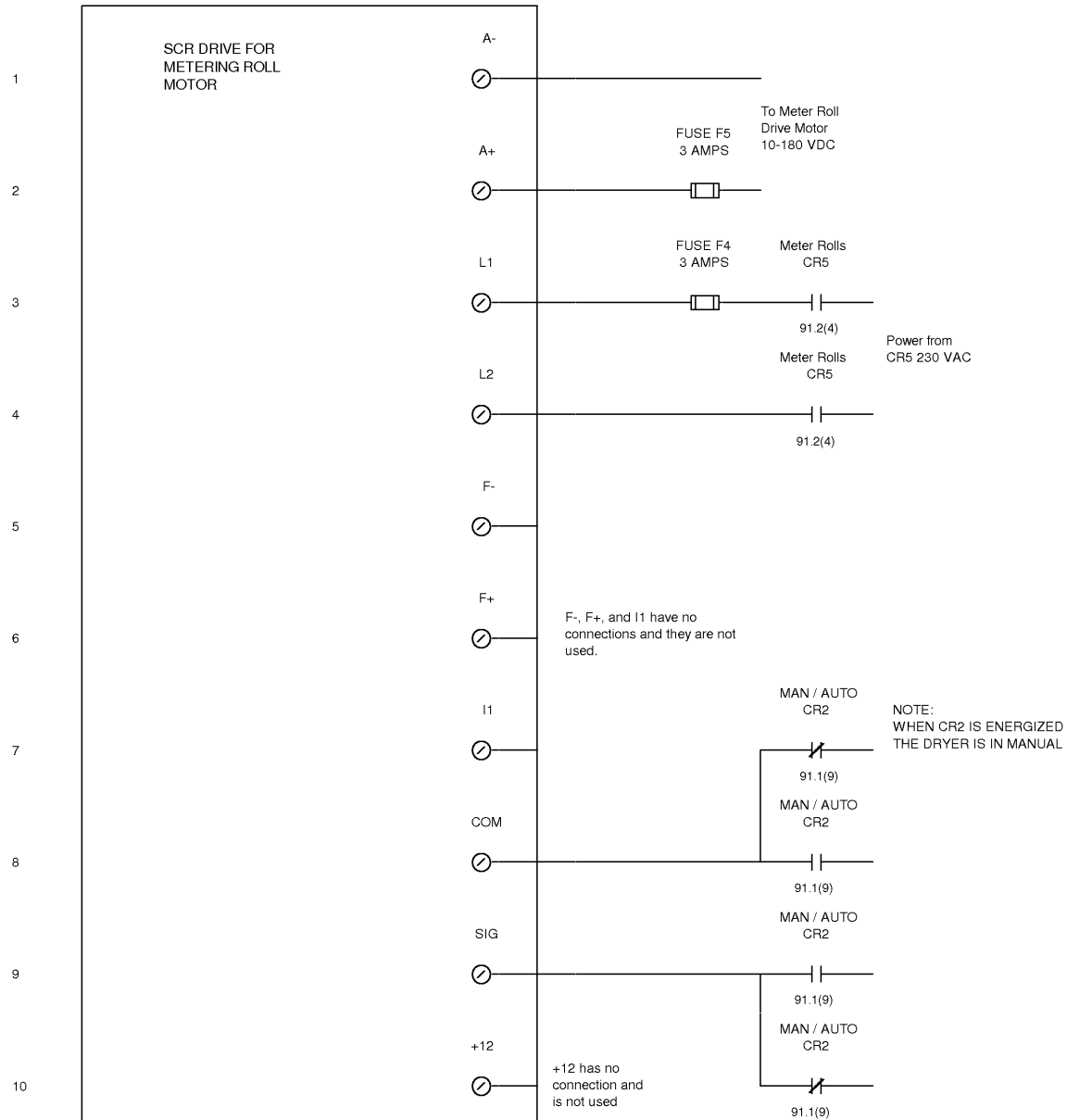


91.9 Control Contacts (Single Fan)

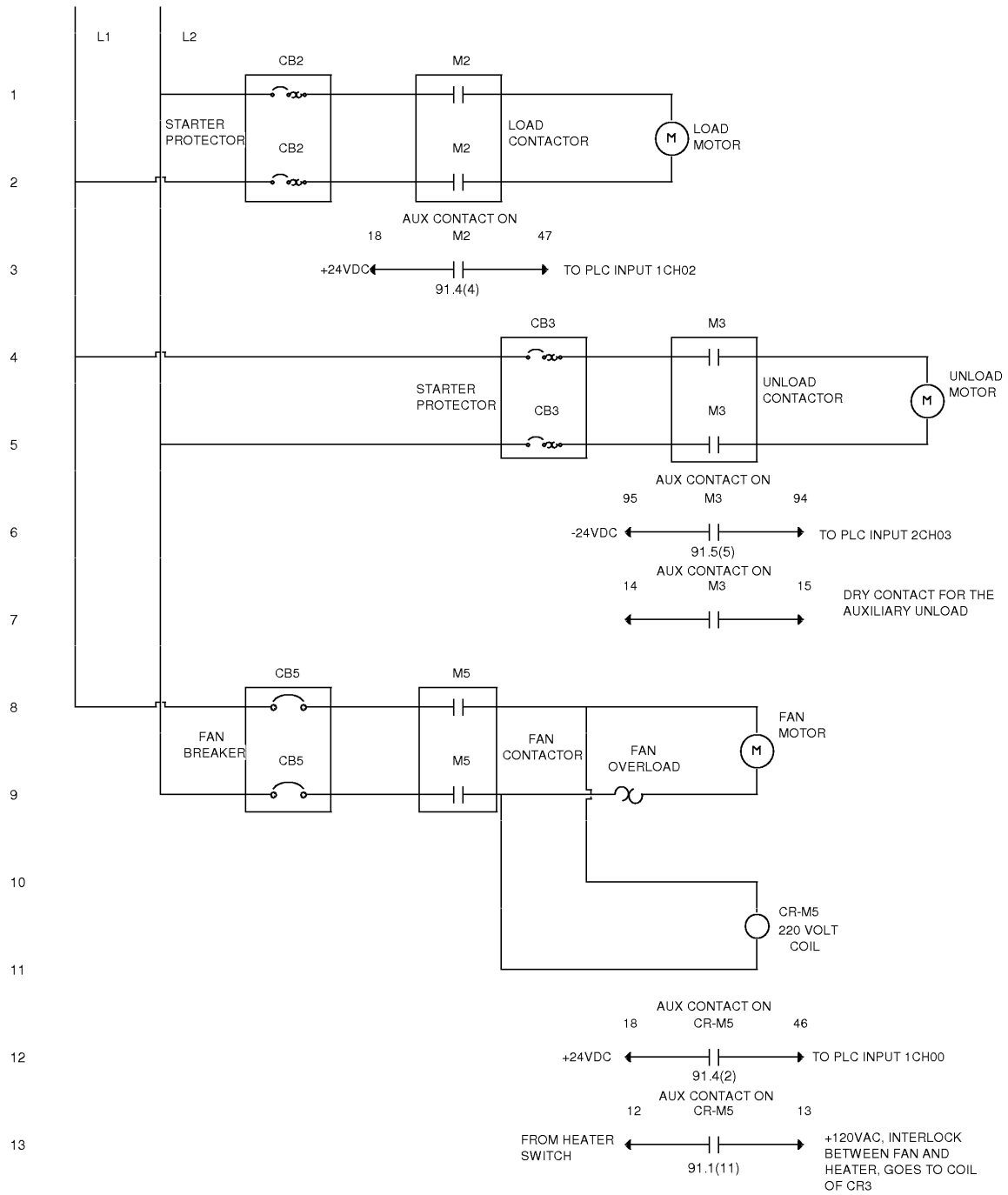
1 FAN 1 HEAT RELAY and CONTROL CONTACTS



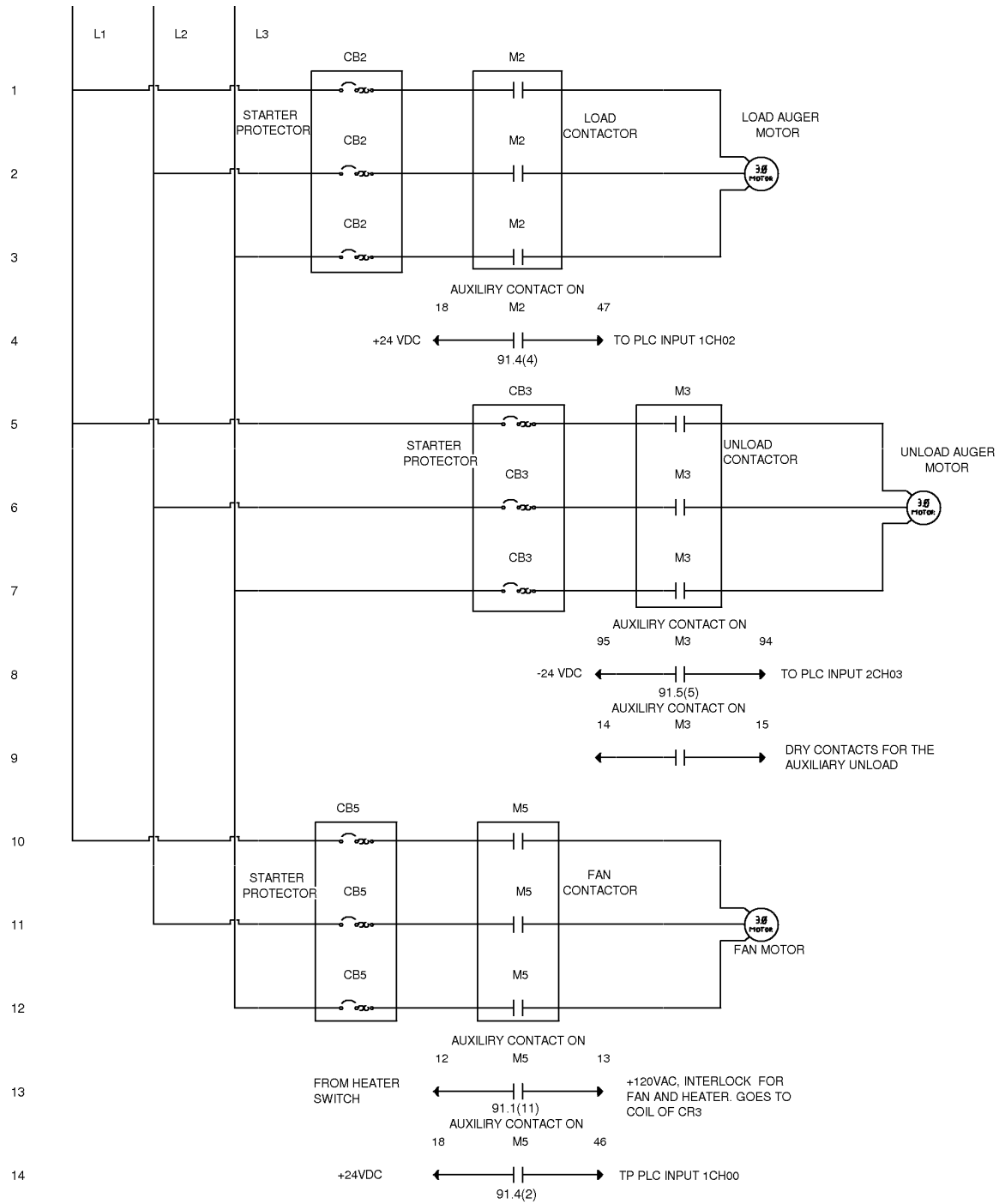
91.10 SCR Connections (Single Fan)



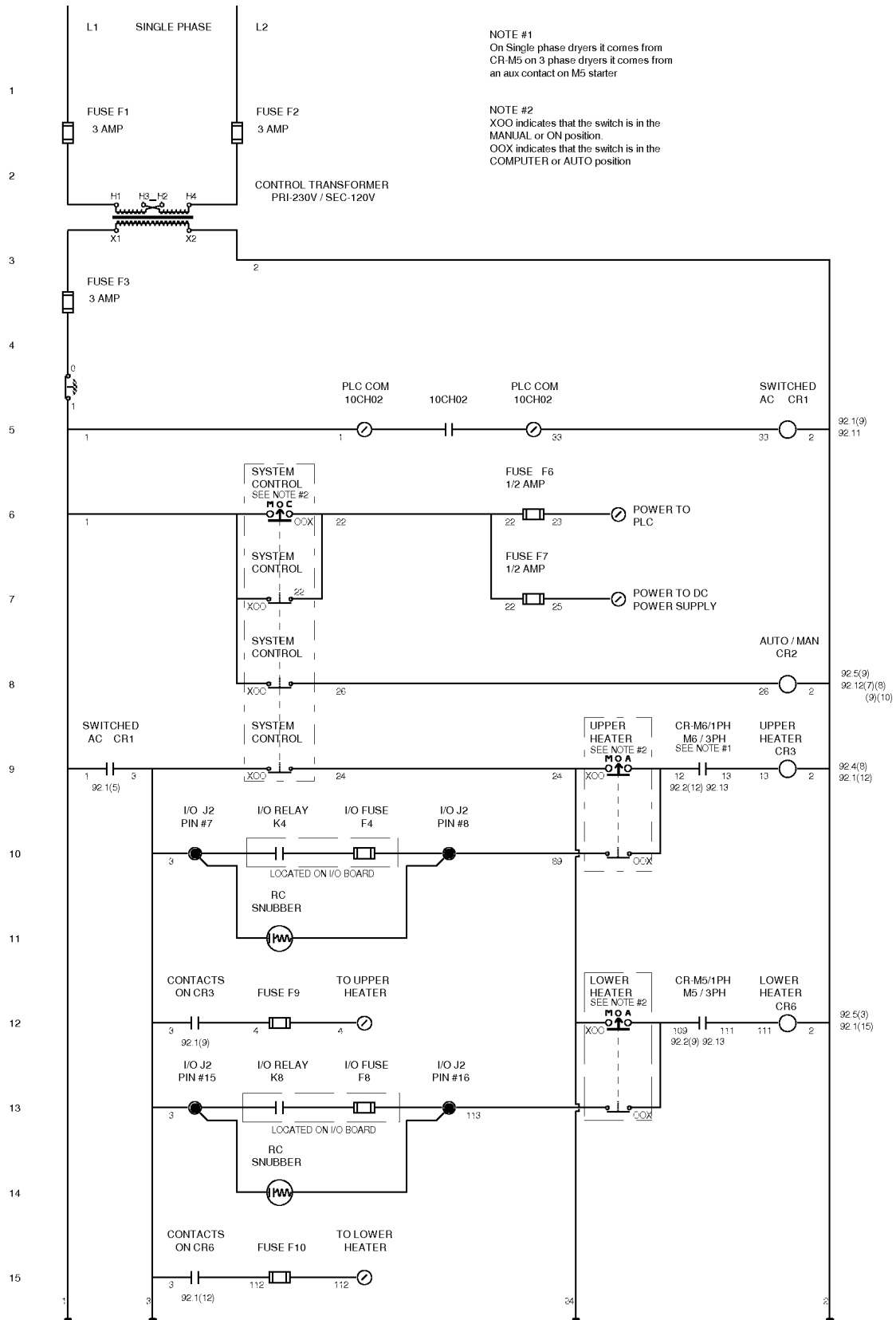
91.11 Power Wiring 1 Phase (Single Fan)



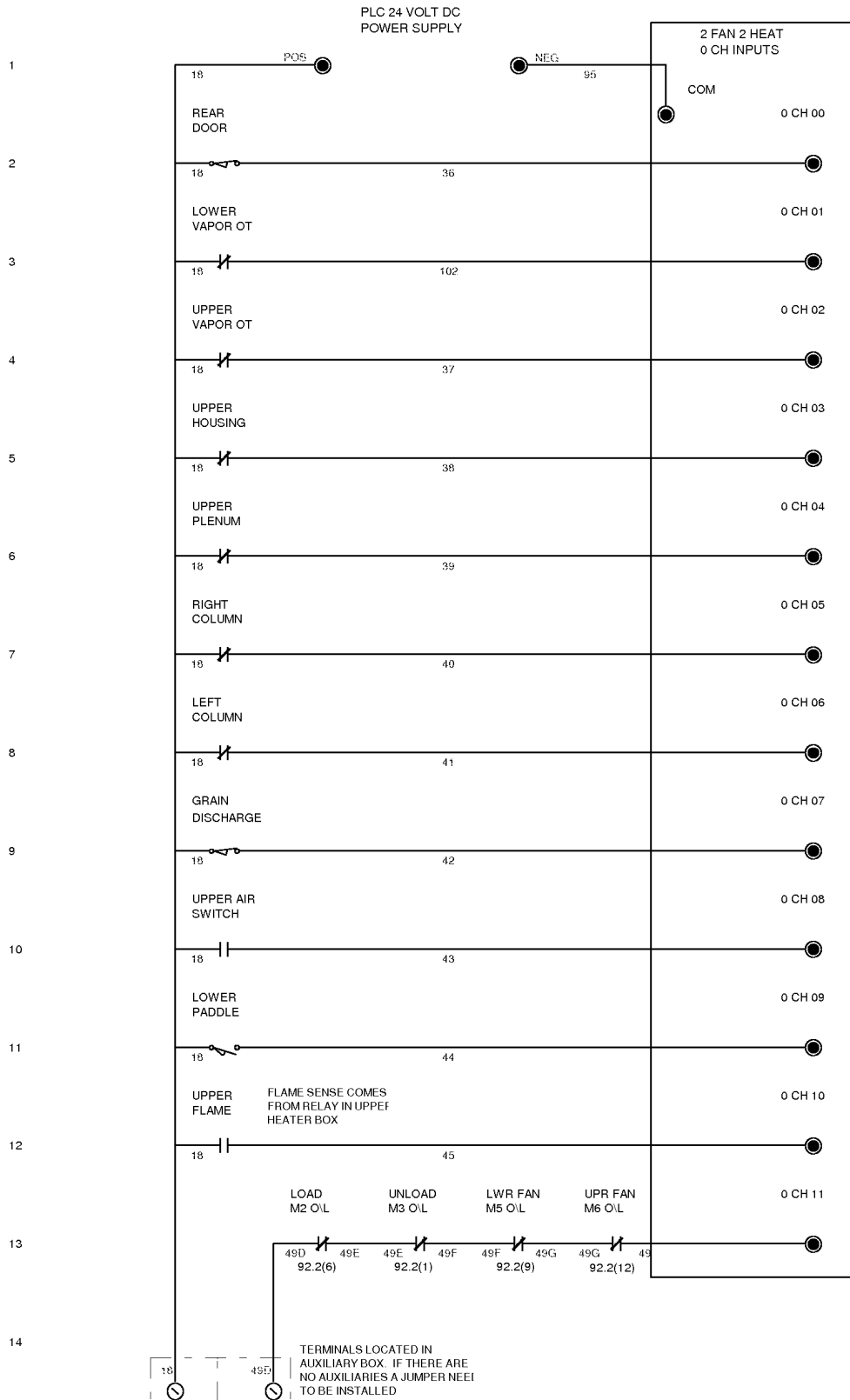
91.11 Power Wiring 3 Phase (Single Fan)



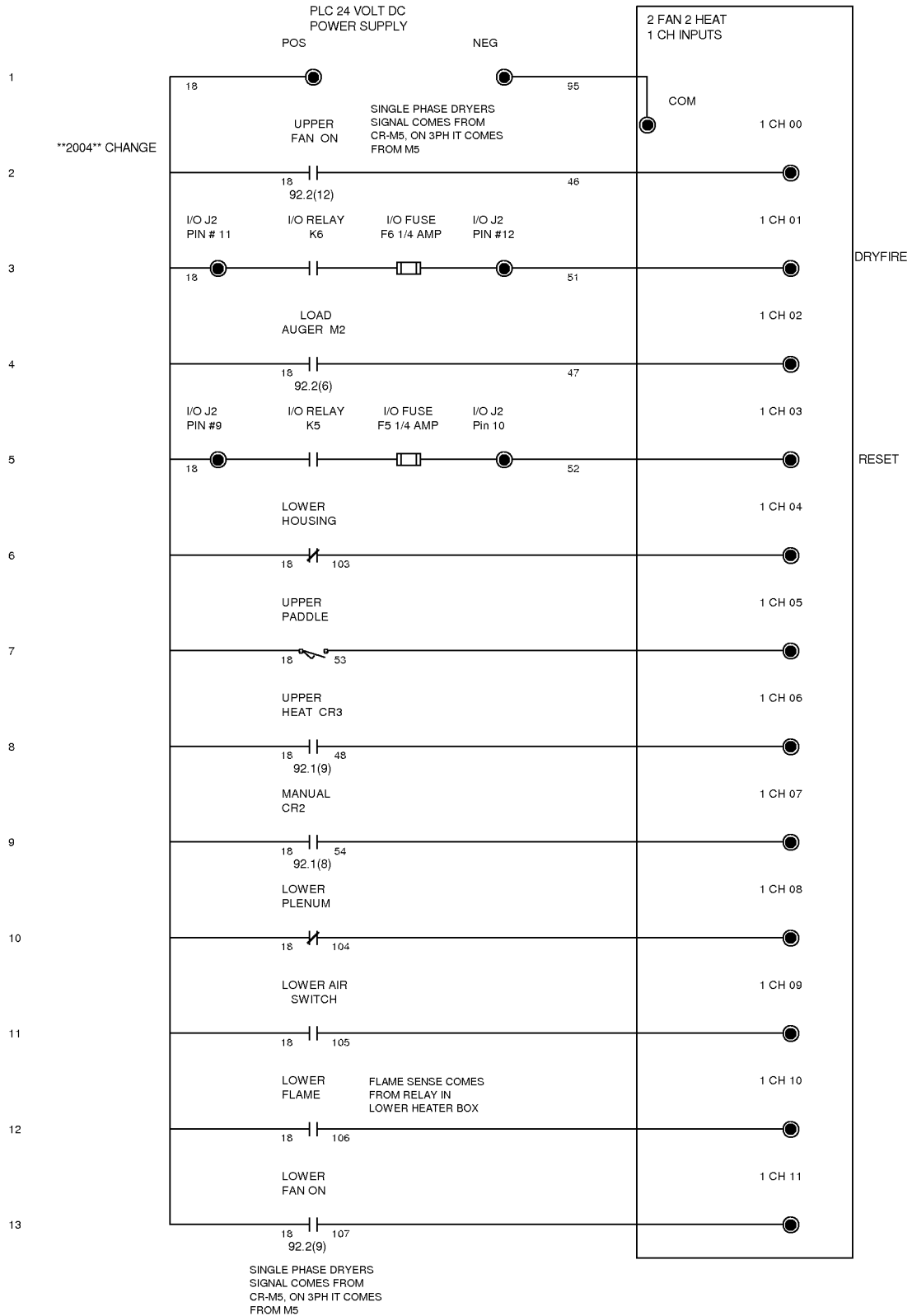
92.1 120 Volt Control 1PH (Two Fan)



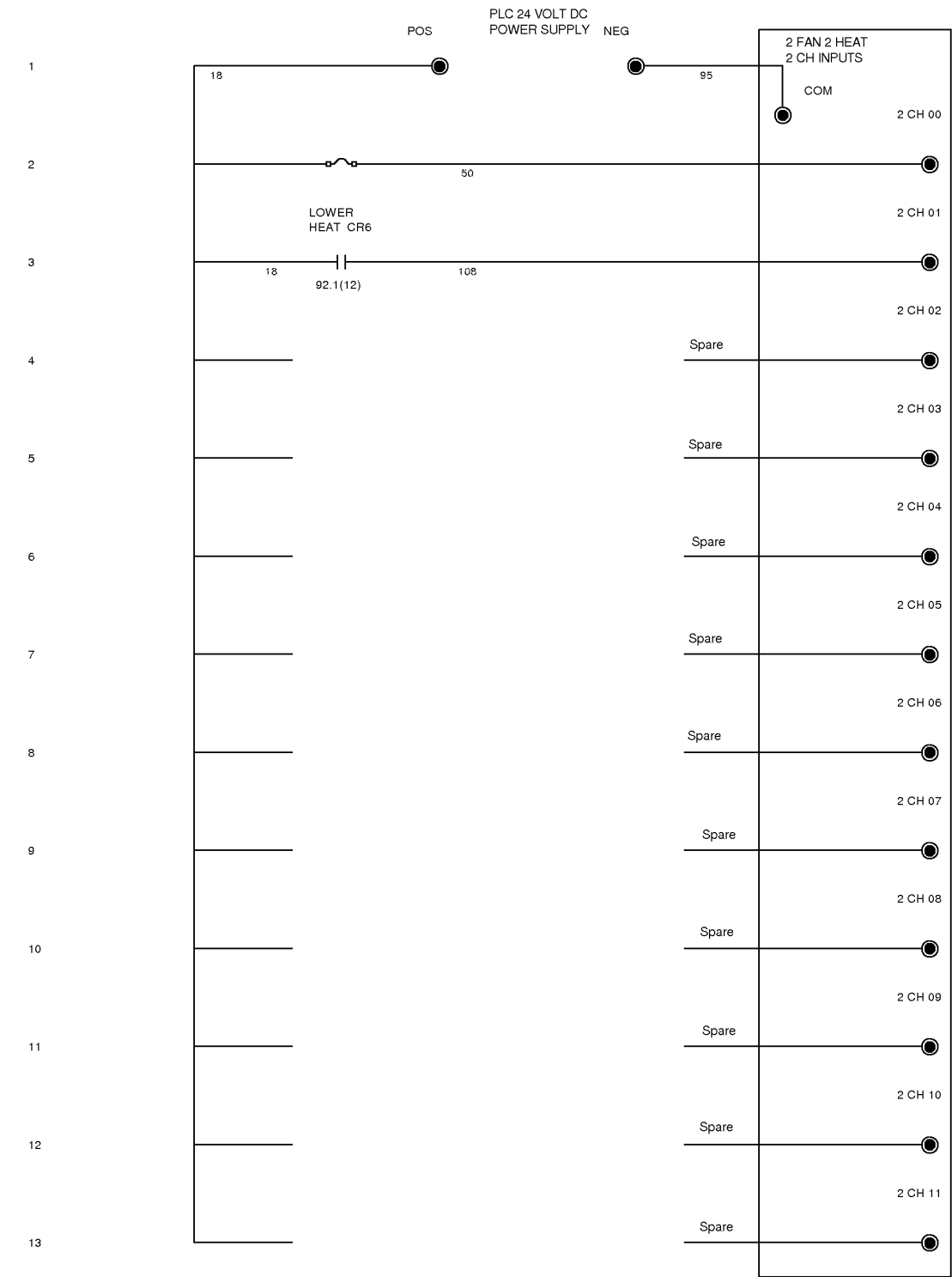
92.3 PLC Inputs CH0 (Two Fan)



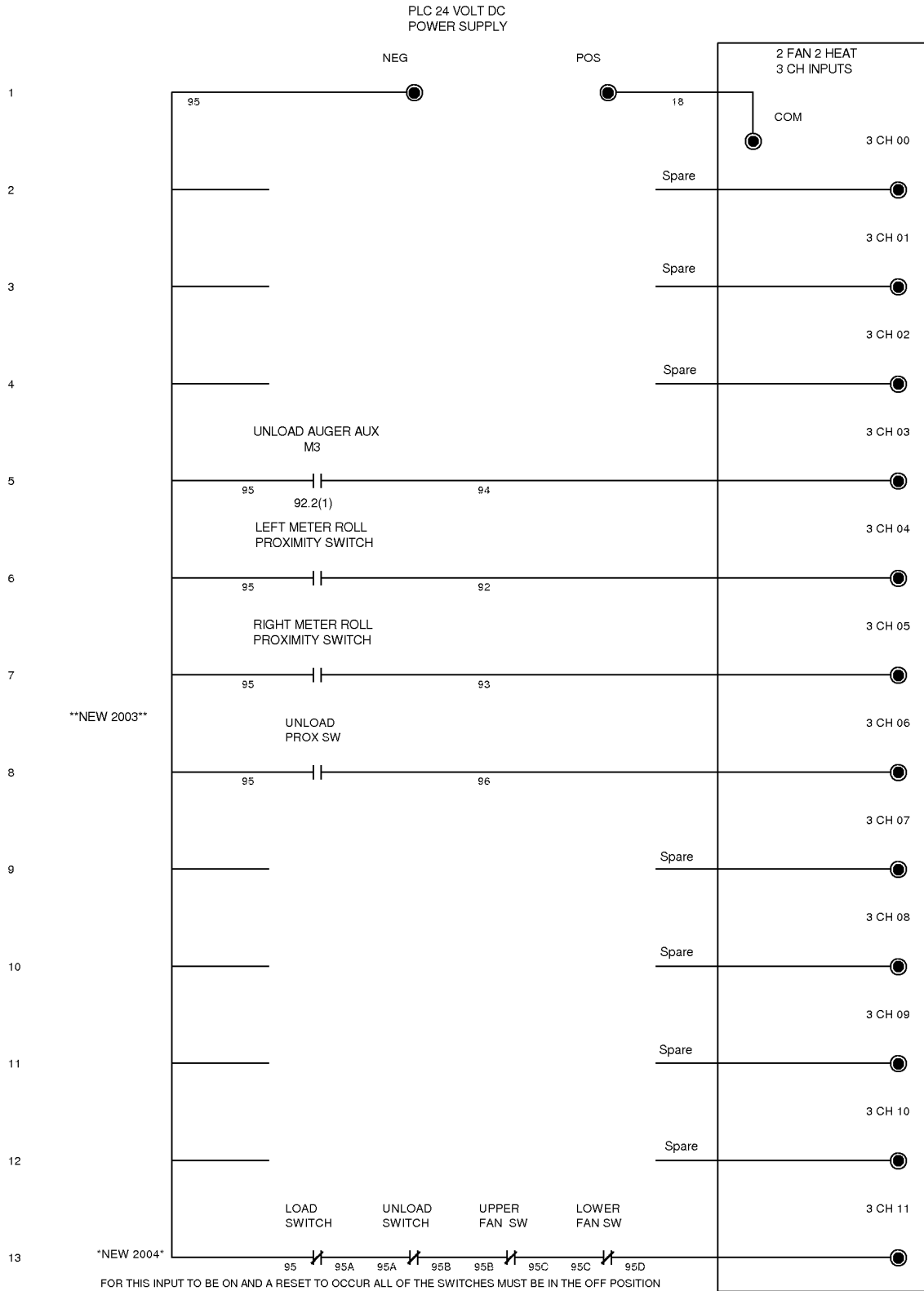
92.4 PLC Inputs CH1 (Two Fan)



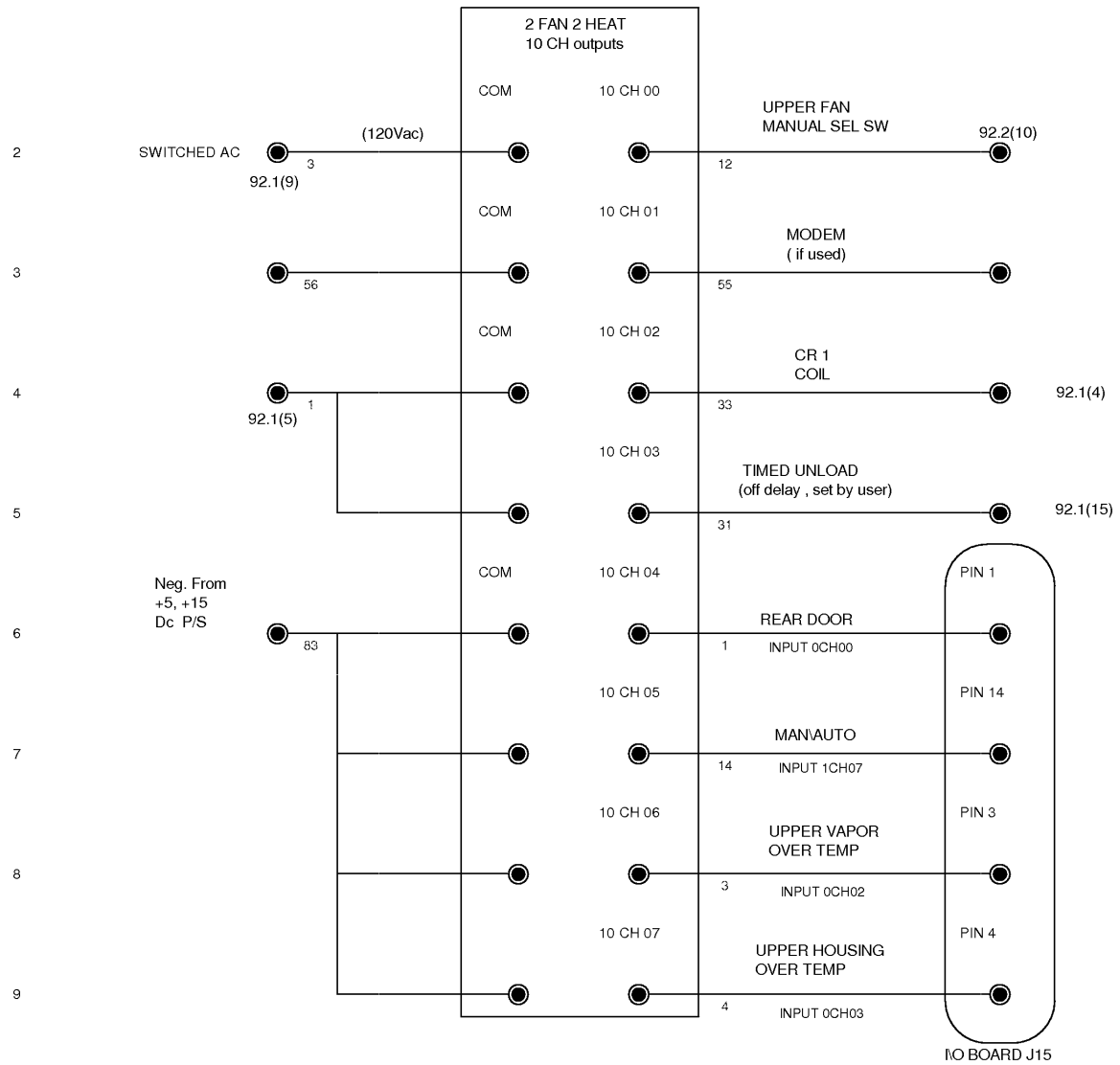
92.5 PLC Inputs CH2 (Two Fan)



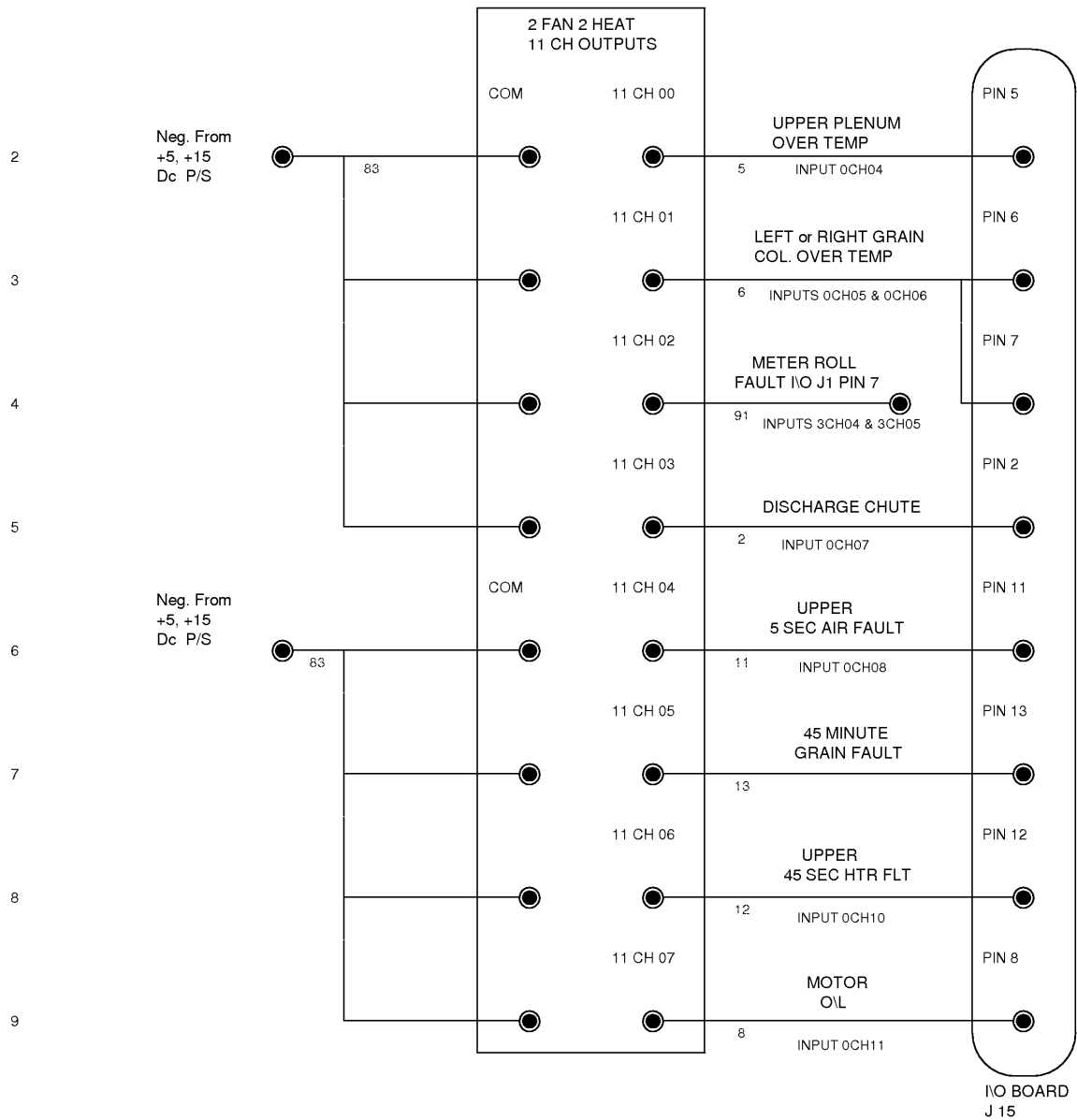
92.6 PLC Inputs CH3 (Two Fan)



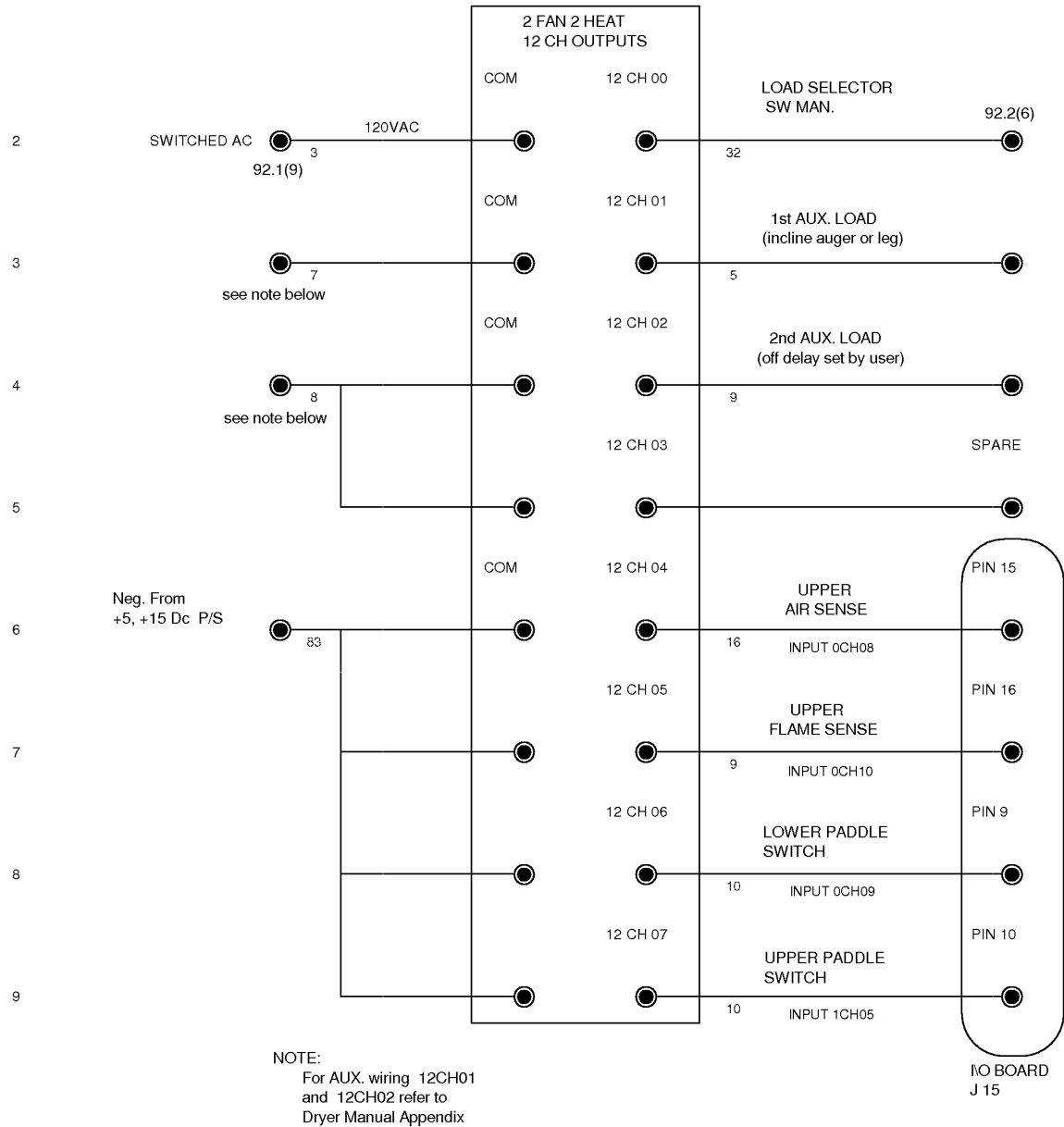
92.7 PLC Outputs CH10 (Two Fan)



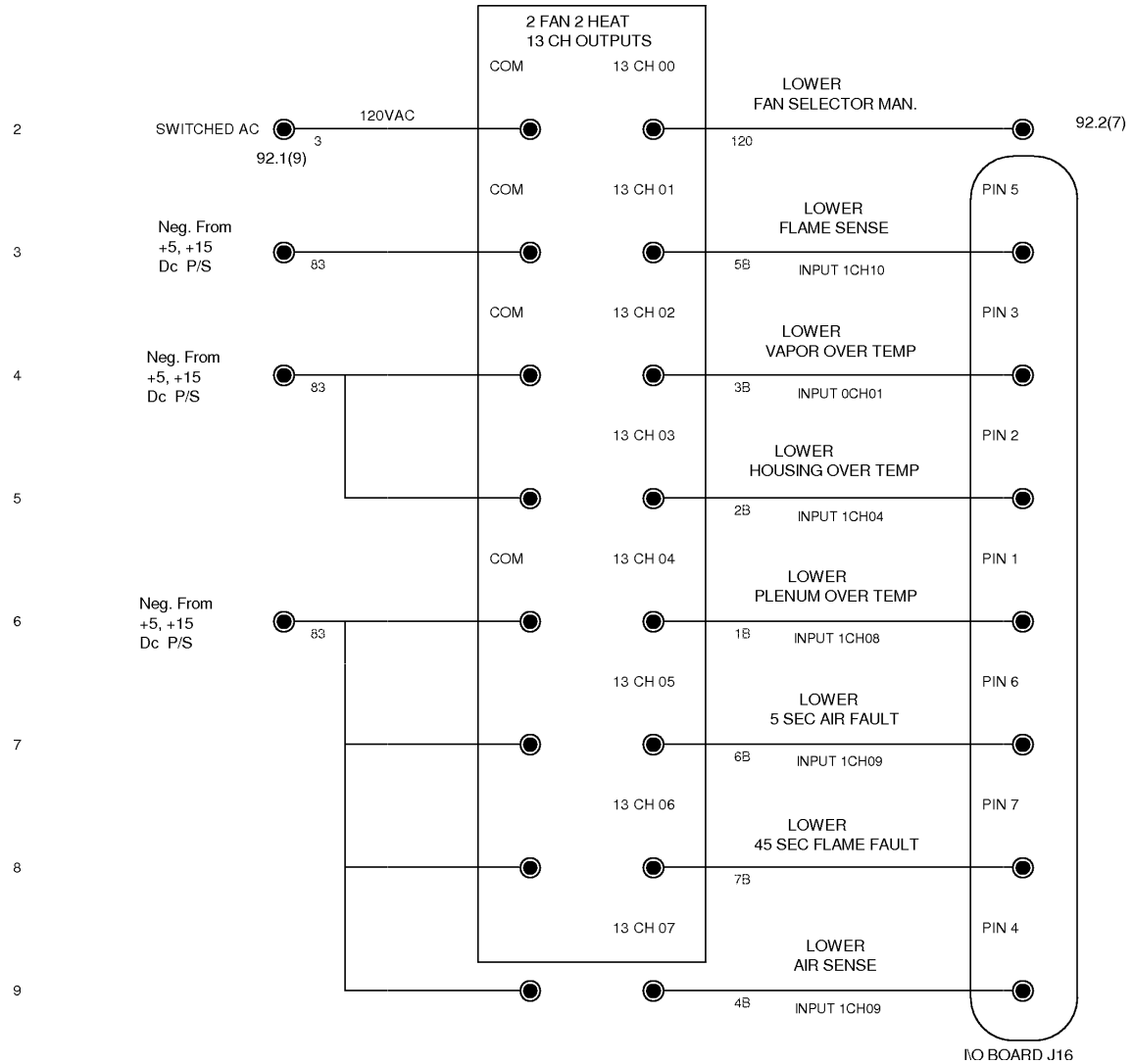
92.8 PLC Outputs CH11 (Two Fan)



92.9 PLC Outputs CH12 (Two Fan)

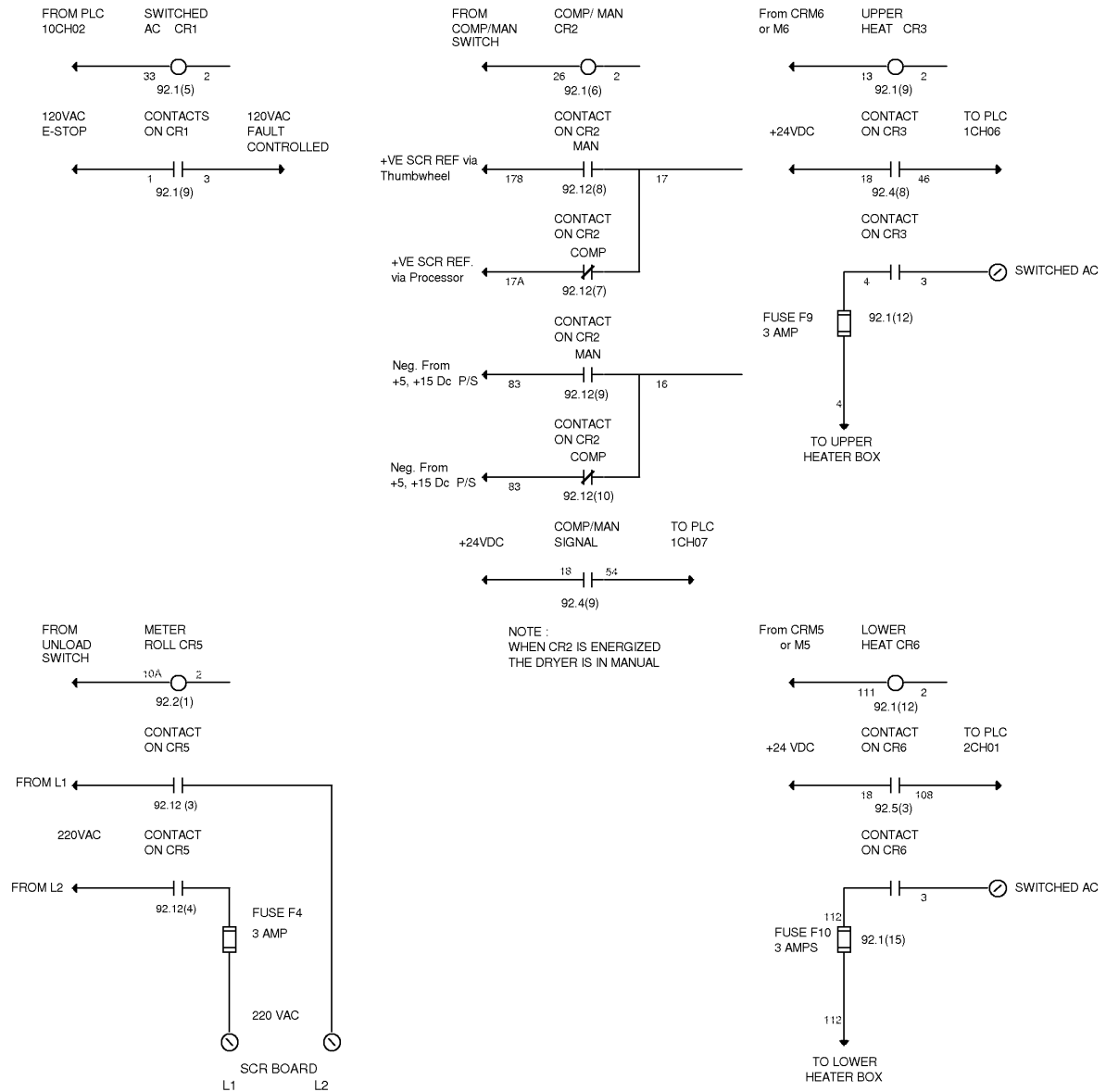


92.10 PLC Outputs CH13 (Two Fan)

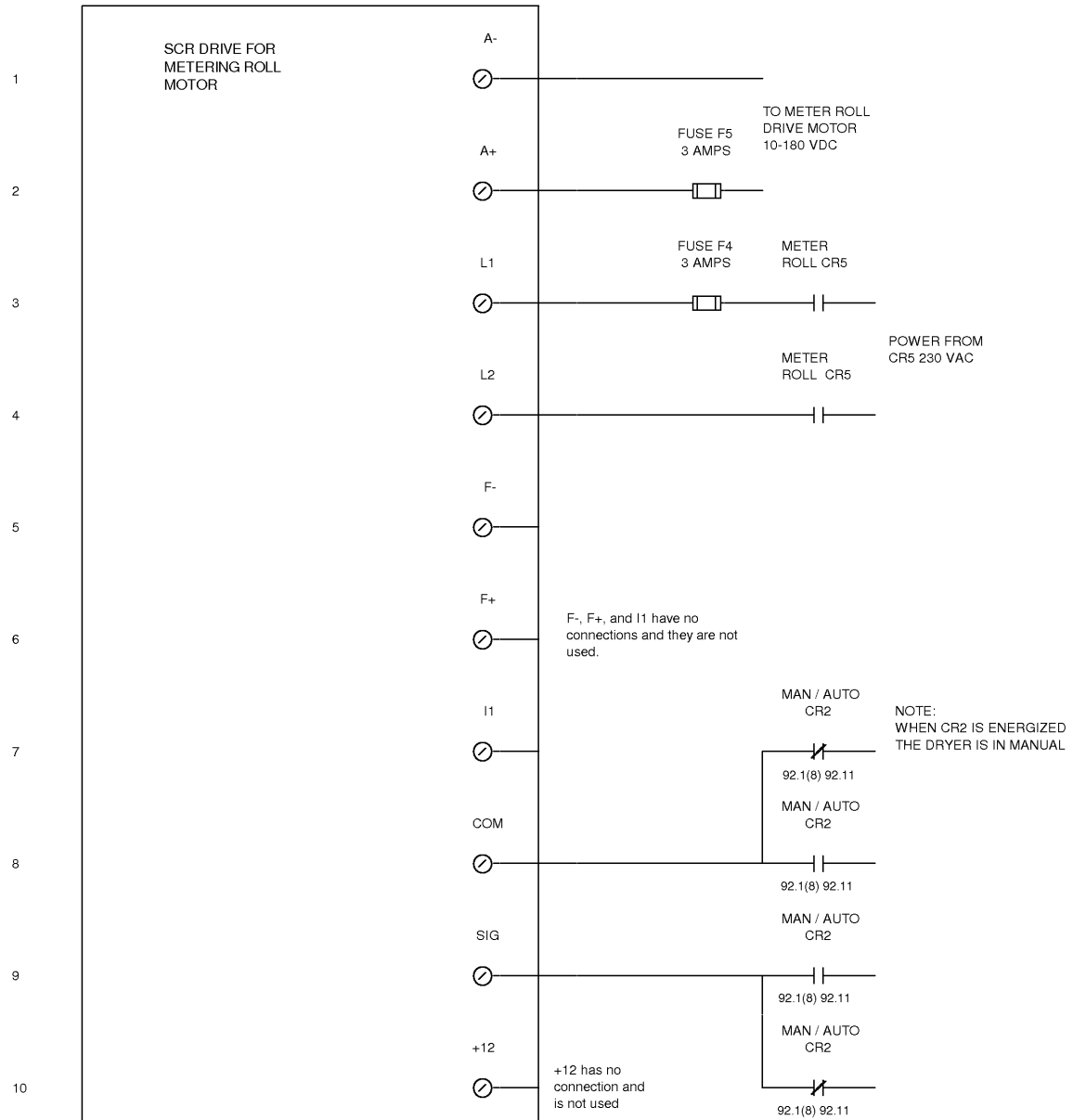


92.11 Control Relay Contacts (Two Fan)

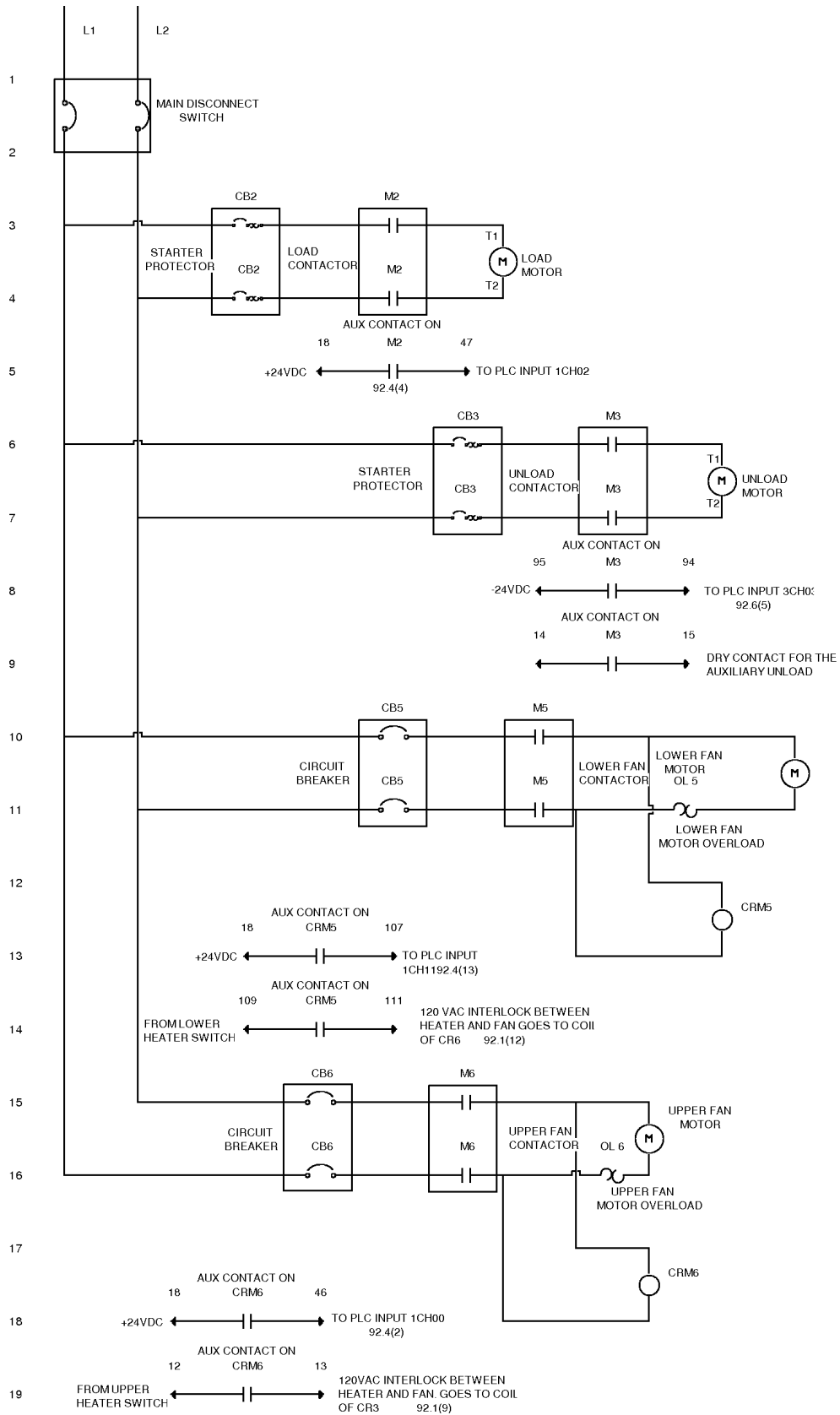
2 FAN 2 HEAT RELAYS and CONTROL CONTACTS



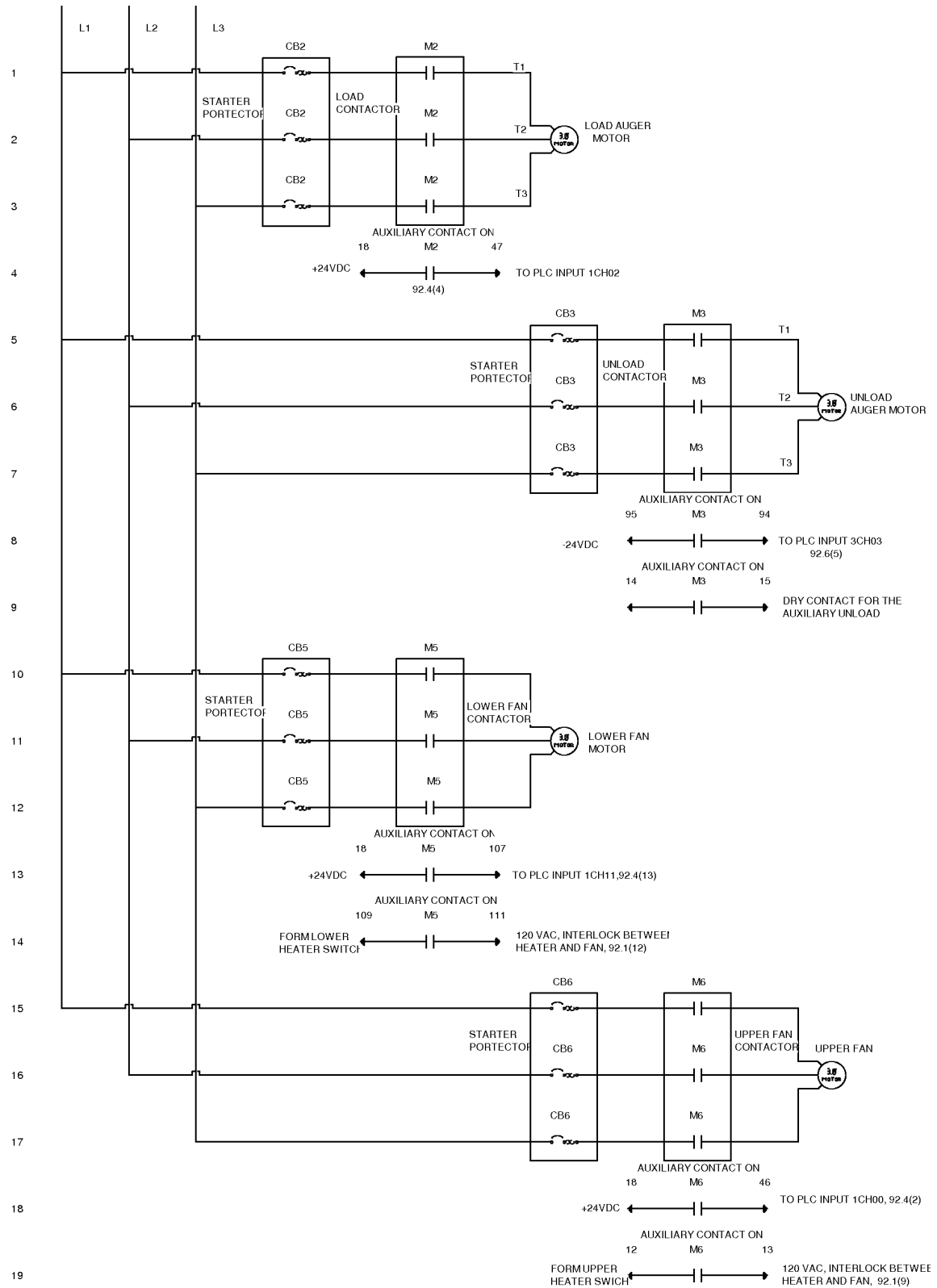
92.12 SCR Board Connections (Two Fan)



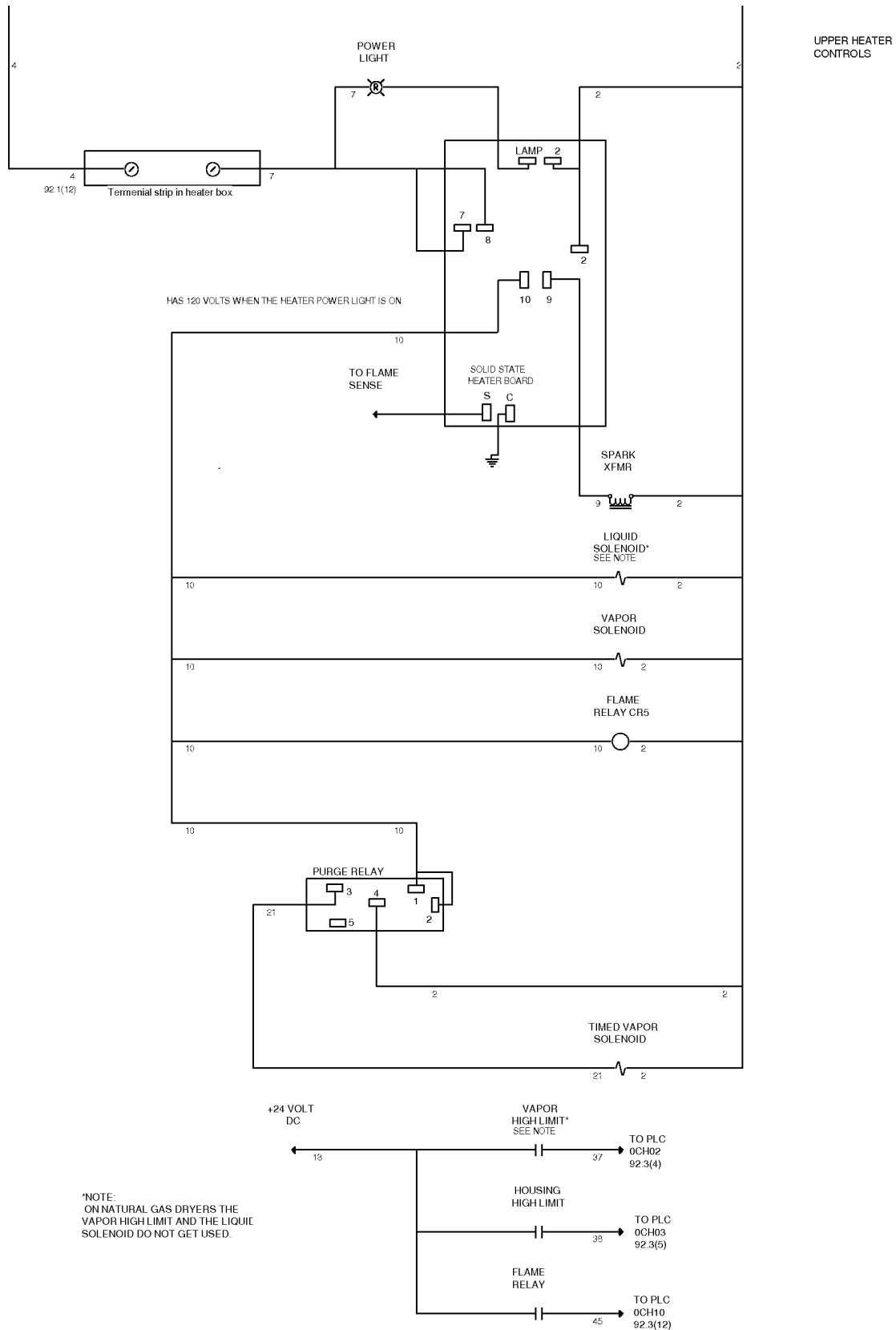
92.13 Power Wiring 1PH (Two Fan)



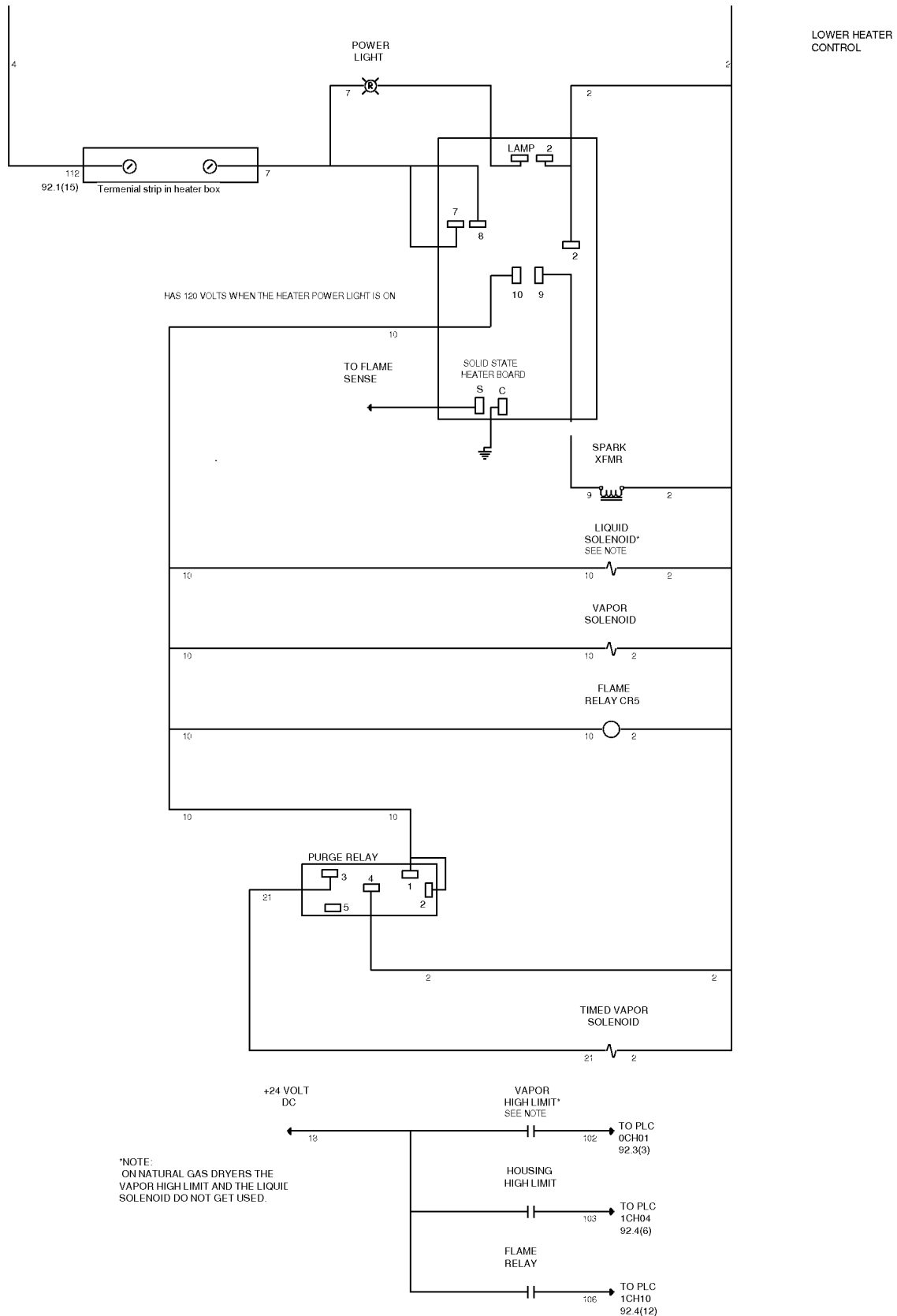
92.13 Control Wiring 3PH (Two Fan)



92.14 Upper Heater Controls & Faults (Two Fan)



92.15 Lower Heater Controls & Faults (Two Fan)



Appendix C

Appendix C – Bushels per Hour Information**Approximate Bushels per Hour Information for each Module**

Dryer	12 Foot 1 Module	16 Foot 1 Module	20 Foot 1 Module	24 Foot 1 Module	16 Foot 2 Module	20 Foot 2 Module	24 Foot 2 Module	20 Foot 3 Module	24 Foot 3 Module
10% Meter Roll	120	160	200	240	240	300	360	300	360
20% Meter Roll	240	320	400	480	480	600	720	600	720
30% Meter Roll	360	480	600	720	720	900	1,080	900	1,080
40% Meter Roll	480	640	800	960	960	1,200	1,440	1,200	1,440
50% Meter Roll	600	800	1,000	1,200	1,200	1,500	1,800	1,500	1,800
60% Meter Roll	720	960	1,200	1,440	1,440	1,800	2,160	1,800	2,160
70% Meter Roll	840	1,120	1,400	1,680	1,680	2,100	2,520	2,100	2,520
80% Meter Roll	960	1,280	1,600	1,920	1,920	2,400	2,880	2,400	2,880
90% Meter Roll	1,080	1,440	1,800	2,160	2,160	2,700	3,240	2,700	3,240
100% Meter Roll	1,200	1,600	2,000	2,400	2,400	3,000	3,600	3,000	3,600

The above chart is an APPROXIMATION only.

Appendix D – Dryer Startup Checklist

Following are the minimum operator actions required to successfully start the Dryer

Warning

Augers, fans, and heaters will start with out warning at the appropriate times. Please use caution around dryer.

1. Open the power box and ensure that all internal breakers are turned on. Close the door to the power box, close the latch and turn the master disconnect "ON".
2. On the power box, pull the Emergency Stop button out. It should illuminate red.
3. On the control box front panel, turn system control switch to the "COMPUTER" position. Turn all other front panel switches to "AUTO".
4. The Display should show "SYSTEM READY". All faults must be cleared before the dryer can start. Press "START" if there are no faults.
5. The display will give the options of selecting Continuous Flow "1", Automatic Batch "2", or Grain Transfer "3". Press "RESET" to abort dryer startup.

For Continuous Flow

- Operator must select Initial Dry, Restart & Stabilization, or Restart.

Initial Dry

- Date/Time, Input Moisture Set, Output Moisture Set, Maximum Roller Speed, Minimum Roller Speed must be accepted or changed
- A 160°F plenum temperature is required for an Initial Dry
- It is **HIGHLY RECOMMENDED** that the operator be at the dryer to verify the grain moisture accuracy once sampling has started and adjust if necessary.
- If an output sensor moisture or temperature calibration adjustment is necessary, while the dryer is sampling, press "SET" and select OUTPUT MOIST to change the moisture or TEMP CAL ADJUST to change the temperature. Once the required calibration adjust has been entered, the dryer will recommence with the moisture sampling. Allow 30 minutes for the dryer to stabilize before repeating this procedure.

Restart & Stabilization

- Date/Time, Input Moisture Set, Output Moisture Set, Maximum Roller Speed, Minimum Roller Speed must be accepted or changed.
- Plenum temperatures and meter roll speed must be accepted or changed.
- Dryer will run through stabilization. This choice is **recommended** if dryer has been off for longer than three (3) hours and the grain in the dryer is partially dry.

Restart

- If dryer has been off for less than three (3) hours, it is **recommended** that this option be used.
- If dryer is off for more than three (3) hours, the operator can choose to use stabilization or can skip that option.

For Automatic Batch

- If user has the “Temperature Option”, the user must choose if the dryer will run in Time Setting or Temperature Setting.
- When the Time Option is chosen, user must decide the times for heating and cooling of the grain.
- If the Temperature Option is present and chosen, user must decide the temperature for heating and time for cooling the grain.
- When the dryer unloads the grain, the meter rolls will run at the maximum meter roll setting given by the operator.

For Grain Transfer

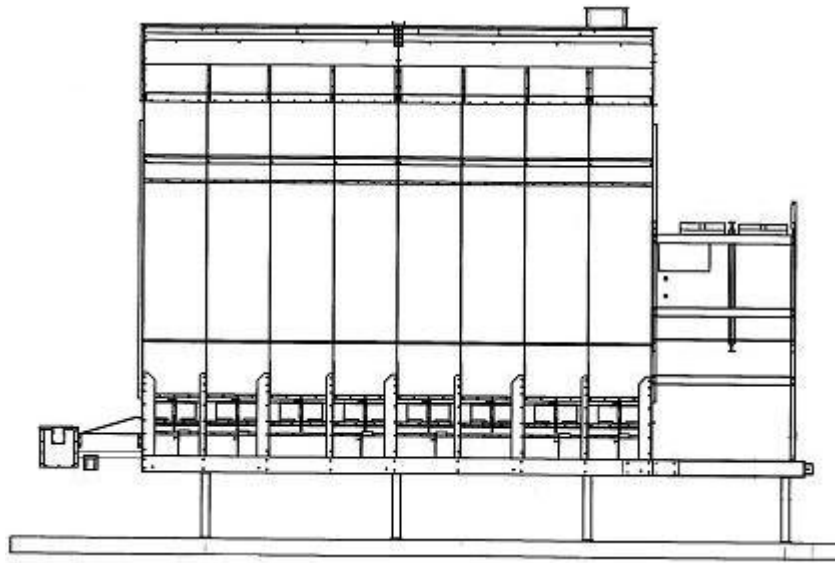
- Dryer operator must decide the maximum meter roll speed for this option.
- **Do not** exceed unload system capability.

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AUTOMATIC GRAIN DRYER
Continuous Flow / Automatic Batch



Installation / Service Manual
Sukup Manufacturing Company
1555 - 255th Street P.O. Box 677
Sheffield, Iowa 50475
Phone 641 – 892 – 4222
Fax 641 – 892 – 4629

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Installation and Pre-operational Check out

Dryer set up / supports

Warning

The wheel transport kit is for transport only and is NOT to be used when operating the dryer. The dryer MUST be mounted and supported in an approved manner.

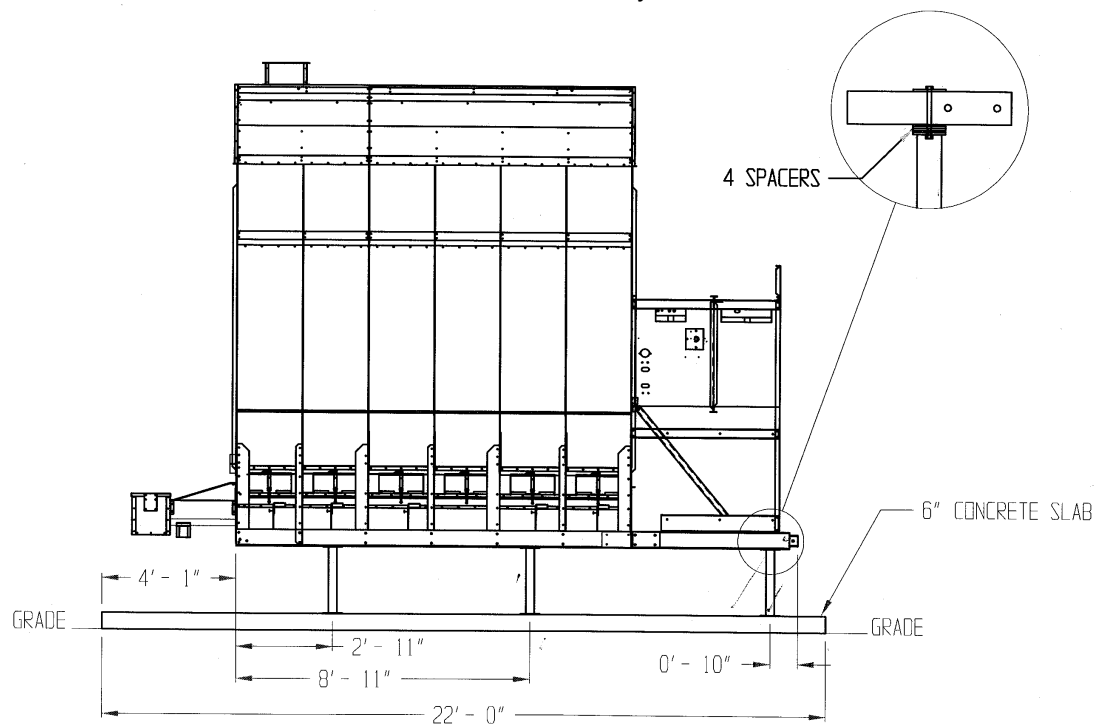
The dryer must be mounted a minimum of 16 inches above the surface to allow for clean out.

Optional dryer supports are available from Sukup Mfg. in 2-foot, 3-foot, and 4-foot lengths. The support kits come with the necessary hardware needed to attach the supports to the dryer frame. The customer must supply the hardware necessary for attachment to the concrete pad. (Recommend 1/2" or 5/8" hardware).

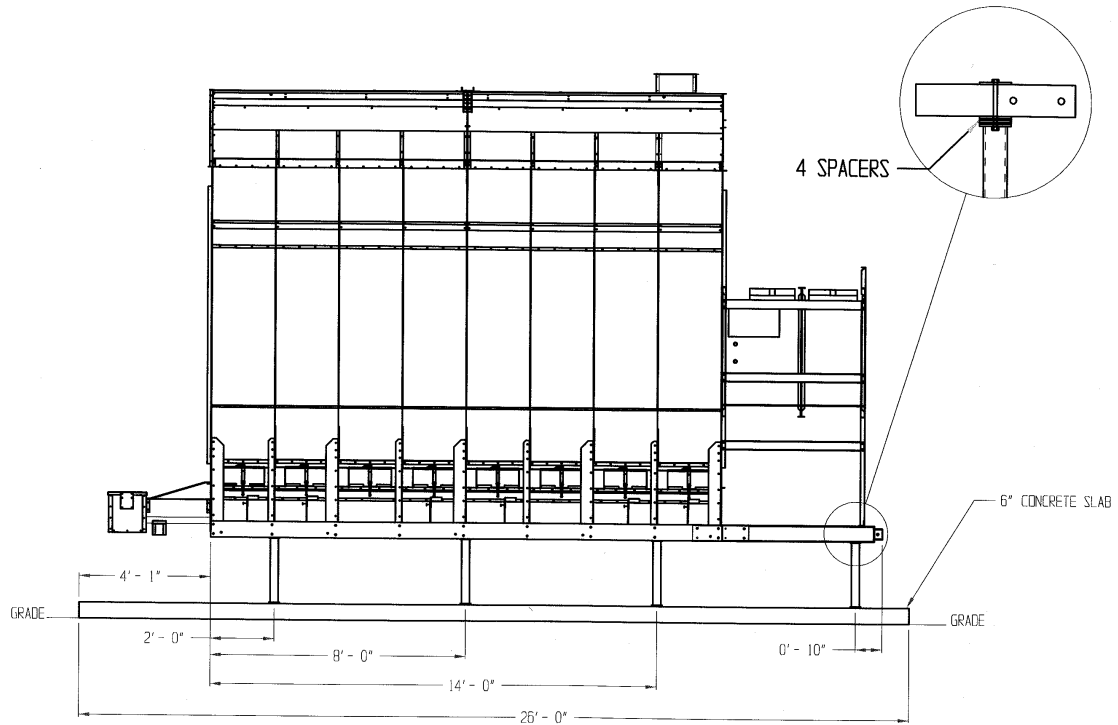
Ladder extensions are included with the 3 & 4 foot leg extension kit. The same length of ladder extension is supplied with the 4 foot kit as the 3 foot kit. For the 3 foot kit cut off excess ladder length for your application.

Contact your Sukup Dealer to order either the supports and / or extra ladder extensions.

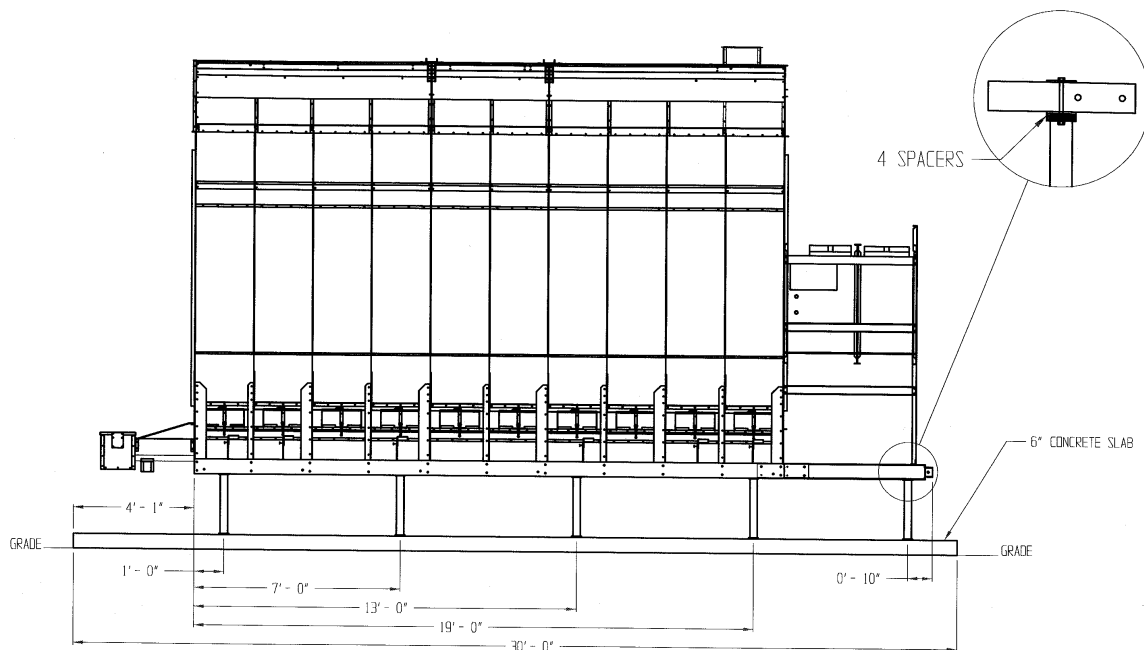
The following five drawings show proper support leg locations for 12, 16, 20 and 24 foot dryers.



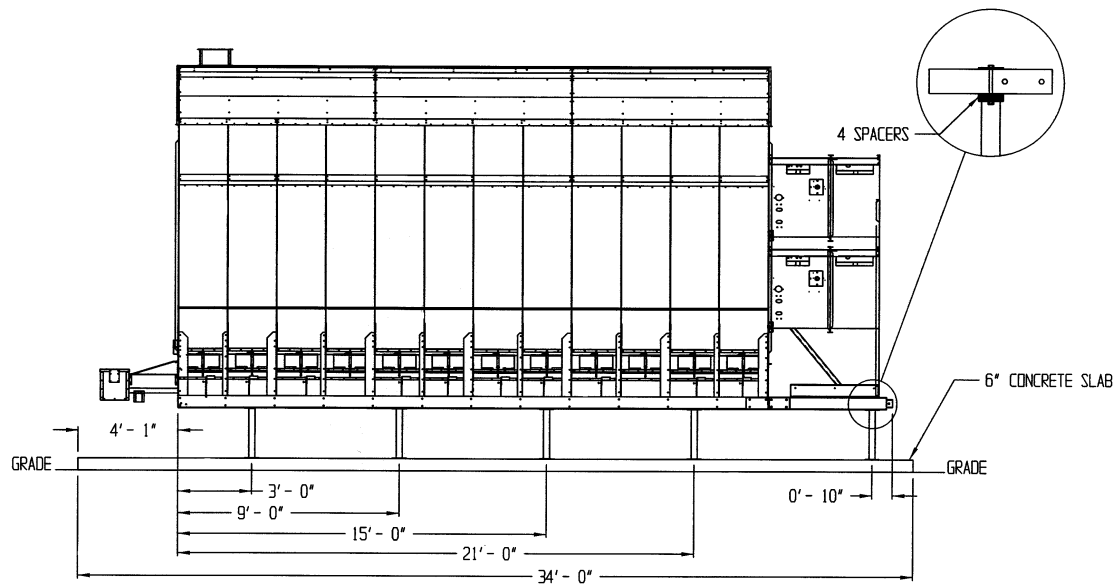
12 Foot Dryer



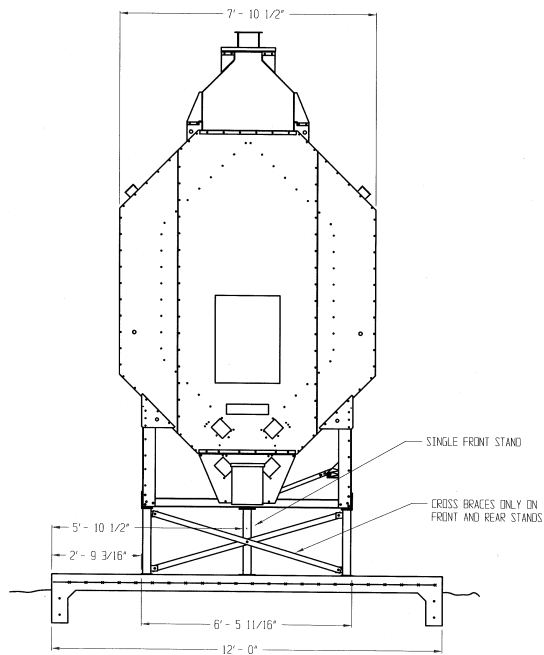
16 Foot Dryer



20 Foot Dryer



24 Foot Dryer



Cross support braces and Front stand

If the dryer is not mounted using Sukup Mfg supports, the following guidelines must be followed:

- Supports under grain columns must be at least every 6 feet
- Support under front hitch
- Fasten dryer down to foundation using brackets or turnbuckles

Wet Bin assembly

1. Position the half of the wet bin, without the auger, into the upright position first, then pivot the side with the auger into the upright position. Bolt the wet bin together at the end plate seams, side seams, pivot seams, and top hanger support.
2. Bolt the trash pan brackets into the wet bin on filling end of dryer. Bolt the trash pan to the trash pan brackets. Refer to Figure SPT0036.

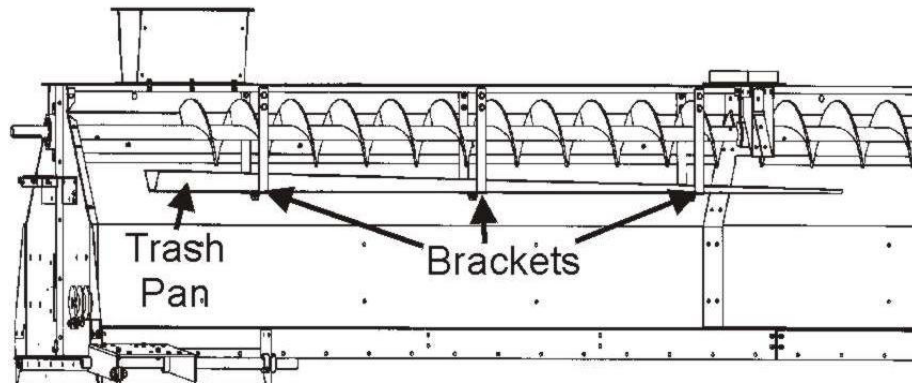


Figure SPT0036

3. Attach the fill auger paddle switch assembly. Locate the holes for the paddle switch in the wet bin on the end opposite the filling end.

Note

Holes are pre-punched for mounting at either end. Remove desired plastic plugs. Leave plugs in opposite end not being used.

4. Slide a plastic bushing on each side of wet bin from inside out. Slide the shaft with the mercury switch box through the bushing on one side of the wet bin. Position the paddle weldment inside of the wet bin, and slide the shaft through the pipe of paddle weldment. Slide the shaft through the bushing on the other side of the wet bin. Tighten set screws of paddle weldment onto shaft, making sure the paddle and box on shaft are square, and paddle can pivot freely. Refer to Figure SPT0038

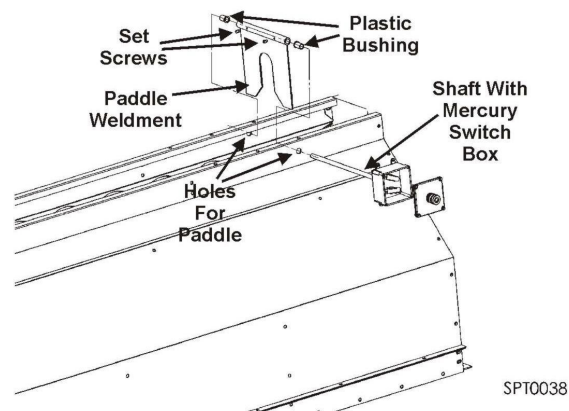
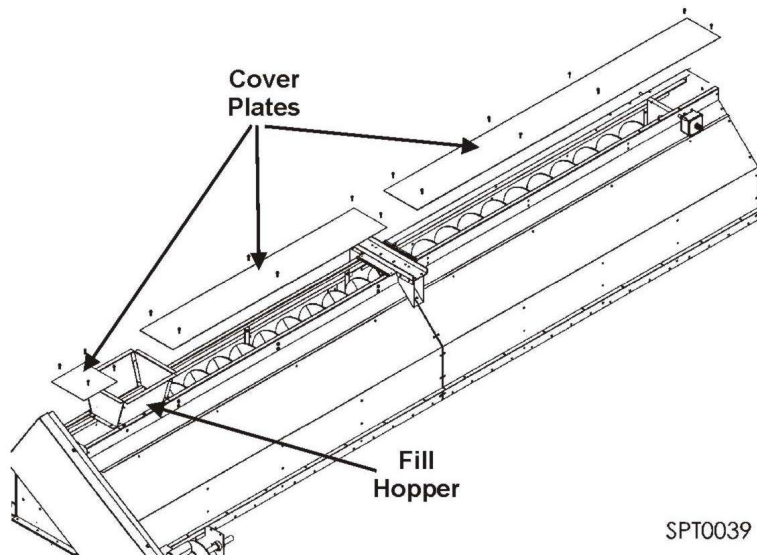


Figure SPT0038

Wet Bin Assembly (Continued)

5. Bolt the top fill hopper to the top of the wet bin on the filling end of the dryer. Place the cover plates on top and attach with $\frac{1}{4}$ x 1" self drill screws. Refer to Figure SPT0039.



SPT0039

Figure SPT0039

Top Load Auger Motor and Shields

1. Bolt the lower shield bracket to the end of the dryer, using $\frac{5}{16}$ x 1" bolts and $\frac{5}{16}$ nuts. Refer to Figure SPT0031.

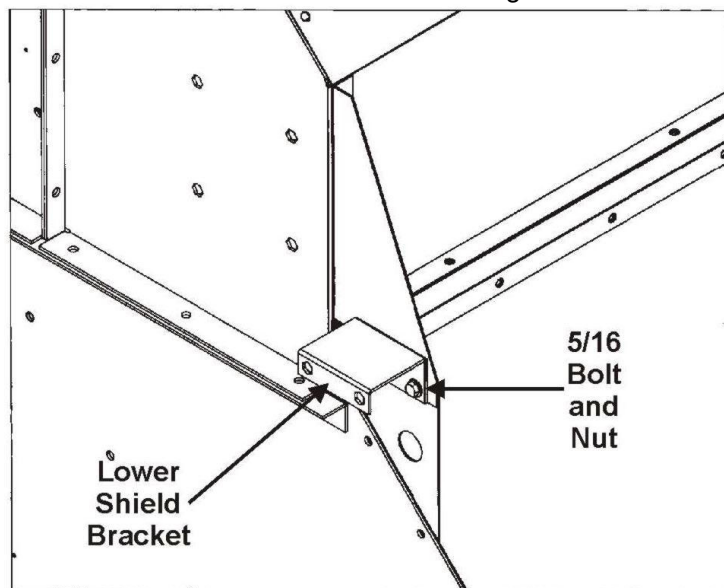


Figure SPT0031

2. Hold the motor mount up to the holes on the side of the wet holding bin. Slide a 1" conduit tube through the motor plate holes of the dryer. Refer to Figure SPT0034.

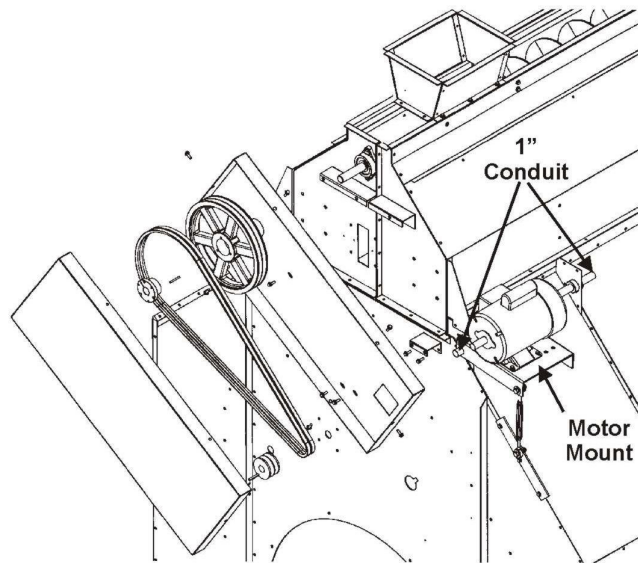


Figure SPT0034

3. Slide the shaft collars on each side of the wet holding bin plate. Refer to Figure SPT0035.

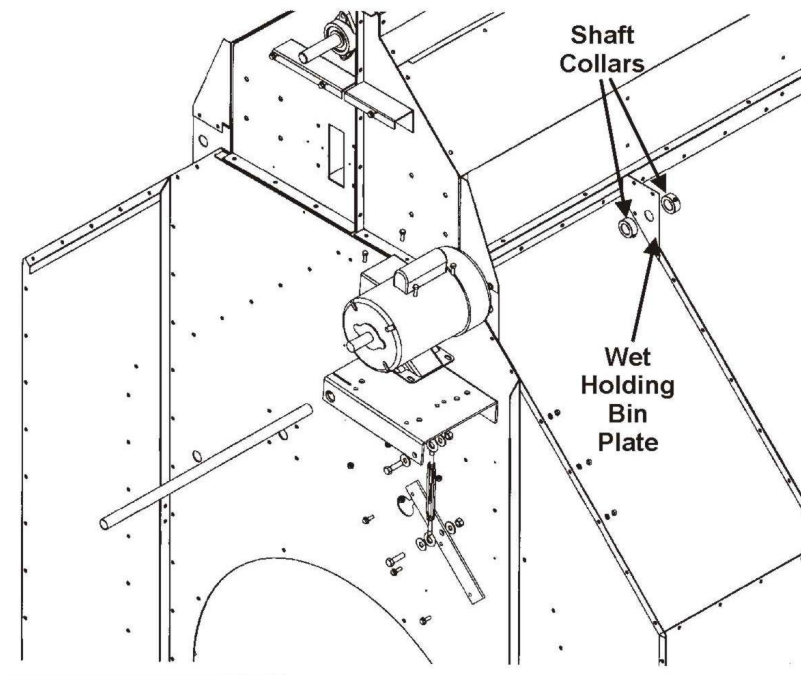
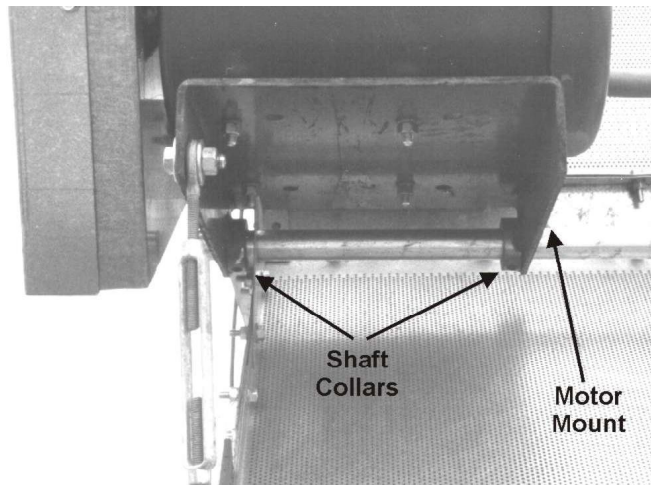


Figure SPT0035

4. Tighten the shaft collars under the motor mount and on each side of the wet holding bin plate. Make sure the motor mount can pivot. Refer to picture below.



5. Bolt the turnbuckle plate to the side of the dryer. Refer to Figure SPT0034.

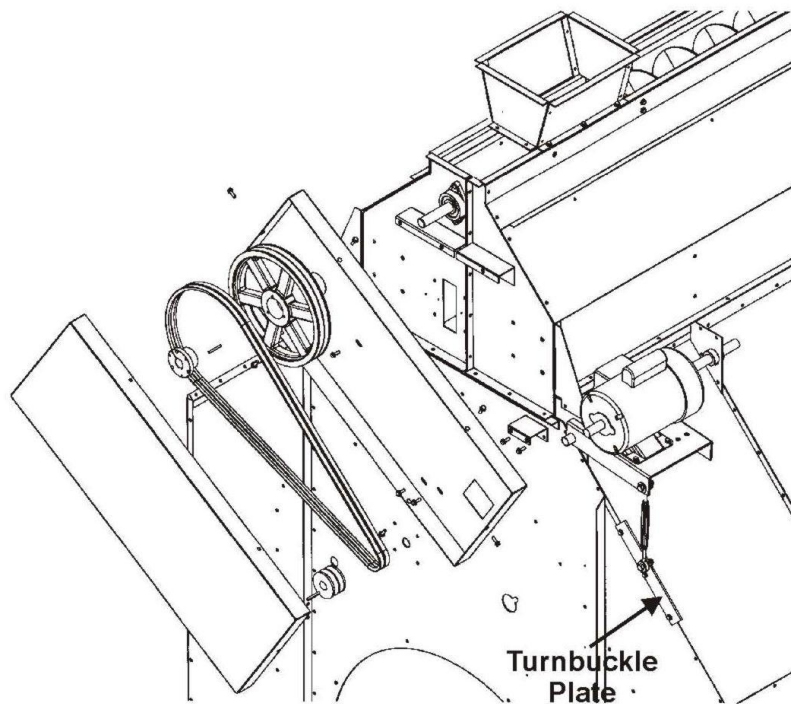


Figure SPT0034

6. Bolt the turnbuckle between the motor mount and the turnbuckle plate using $\frac{1}{2}$ x $1\frac{3}{4}$ " bolts and $\frac{1}{2}$ " flat washers and $\frac{1}{2}$ " lock nuts. Refer to Figure SPT0035.

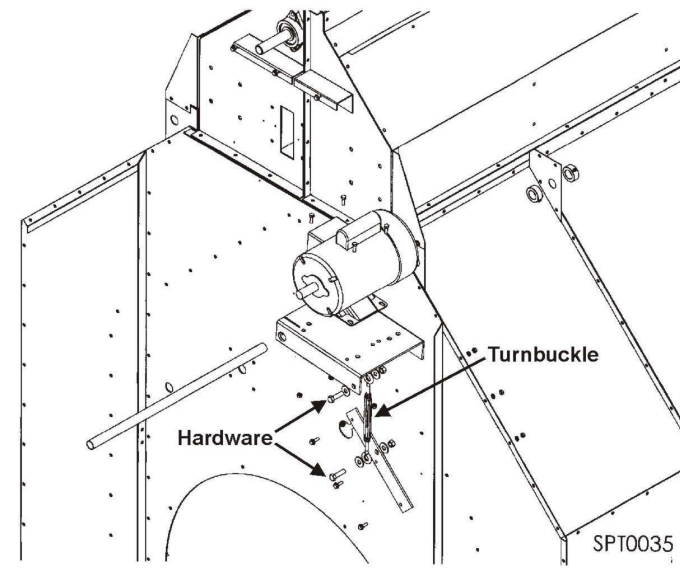


Figure SPT0035

7. Bolt the motor to the motor mount using $\frac{5}{16}$ x 1" bolts and $\frac{5}{16}$ nuts and washers. Refer to Figure SPT0034.

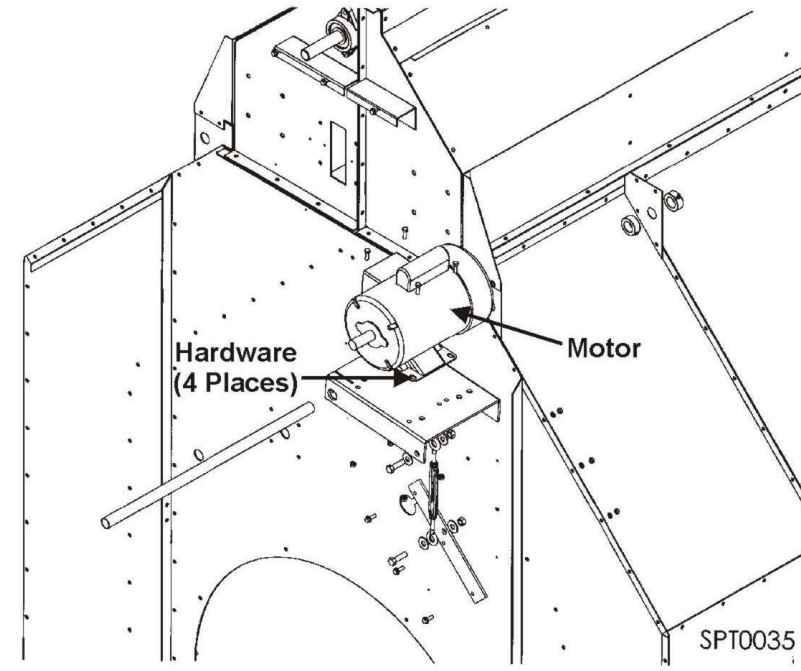


Figure SPT0035

8. Bolt the inner shield to the upper and lower brackets using $\frac{5}{16}$ bolts, washers, and nuts. Refer to Figure SPT0034.

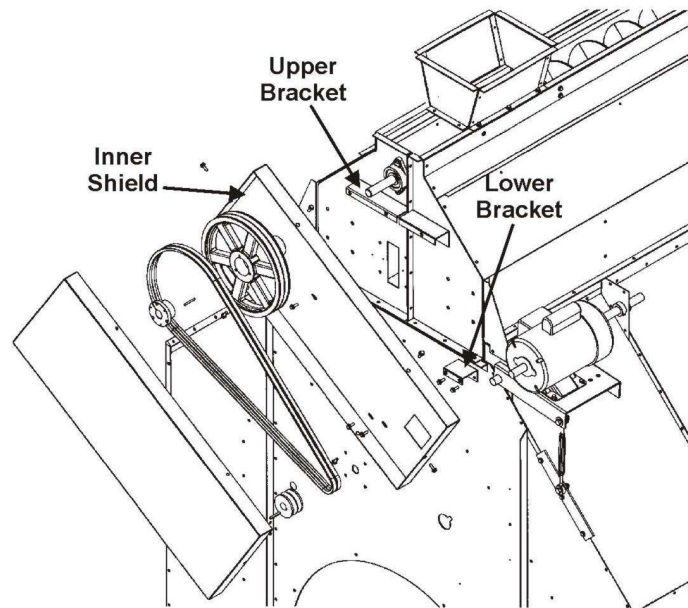


Figure SPT0034

9. Attach a 3.5" O.D. pulley to the motor shaft with a 1/4" key and attach the 15 3/4" O.D. pulley to the top load auger with a taper lock bushing. Attach 2 B95 belts between the auger pulley and the motor pulley. Tighten the turnbuckle to tighten the belts Refer to Figure SPT0034.

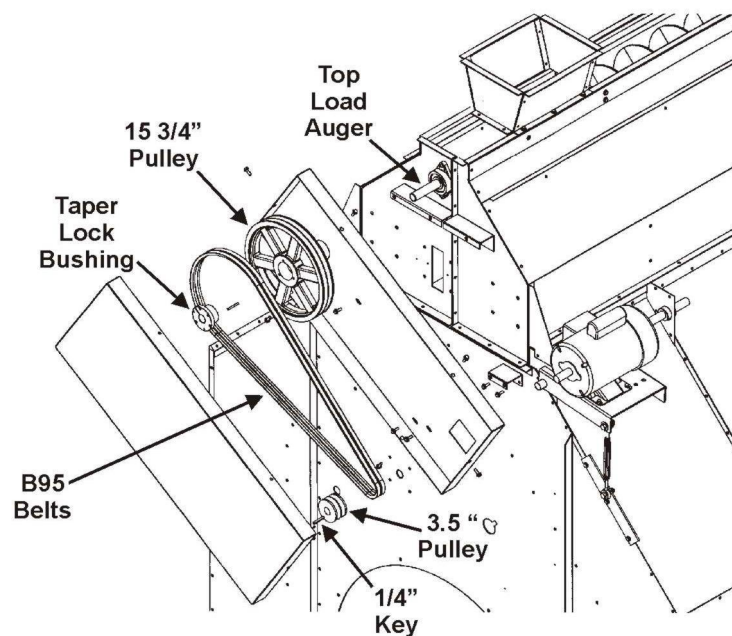
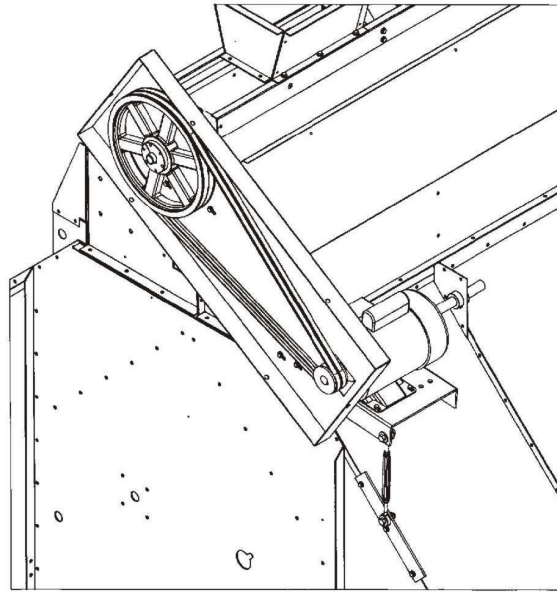


Figure SPT0034

10. The Final assembly should appear as below.

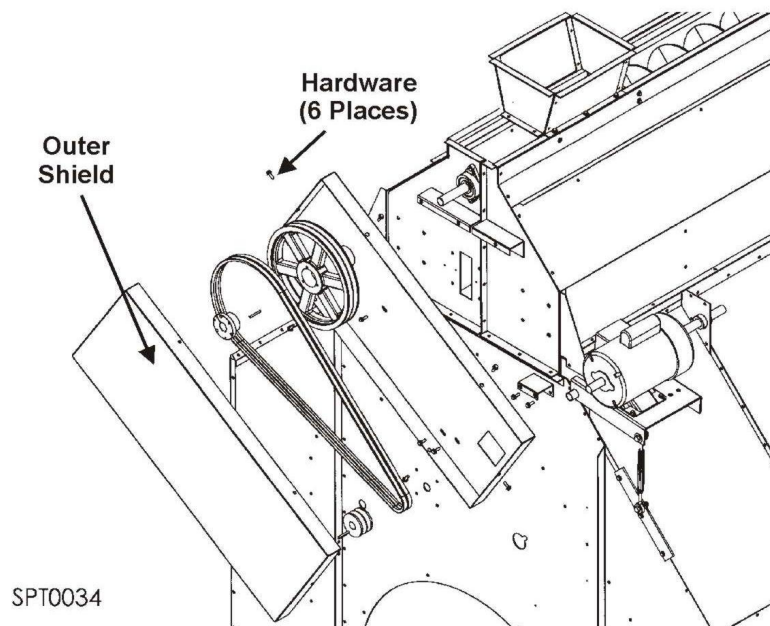


SPT0033

Figure SPT0033

11. Slide the outer shield around the outside of the inner shield and attach with 6 – 5/16 x 1" bolts.

Refer to Figure SPT0034.



SPT0034

Safety shields / Access doors and covers

Warning

It is extremely important to operate the dryer with all safety shields installed.

1. Safety Shields

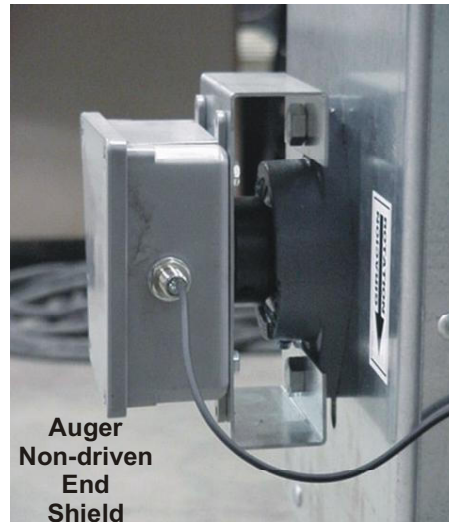


The load auger safety shield is located on the top of the Dryer and it functions to cover the load auger drive pulleys, motor, and belts.

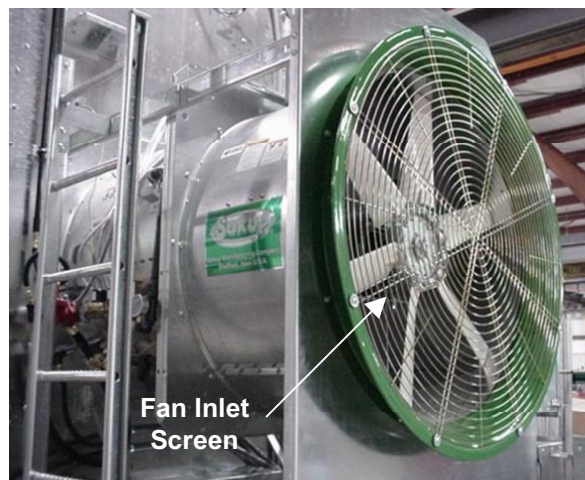


The unload auger and meter roll drive safety shield is located on the front of the dryer and functions to cover the unload auger motor, pulleys and belts. It also covers the meter roll sprockets and drive chains.

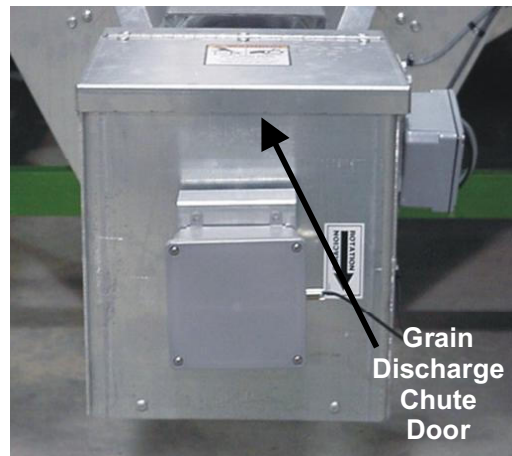
The non-driven end of the load auger has a safety shield and is located at the rear of the dryer. The shield also serves as a mount for the unload proximity junction box.



The fan inlet screen is located at the intake of the fan. It prevents foreign material from being drawn into the fan.

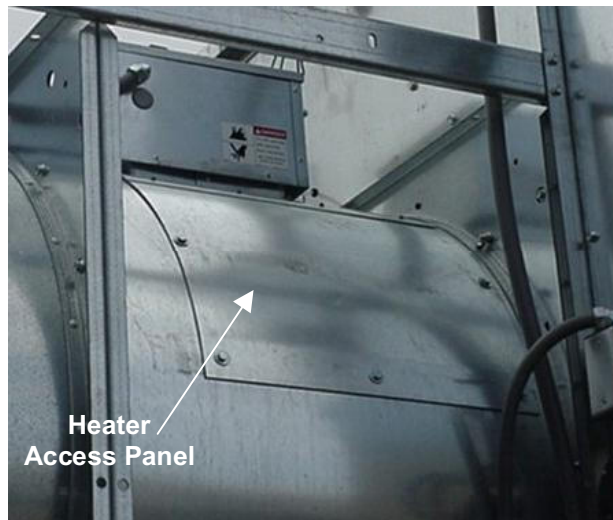


The grain discharge chute door is located at the rear of the dryer, on the top of the grain discharge chute. It prevents access to the unload auger while dryer is in operation and opens on grain overflow if the takeaway system fails.

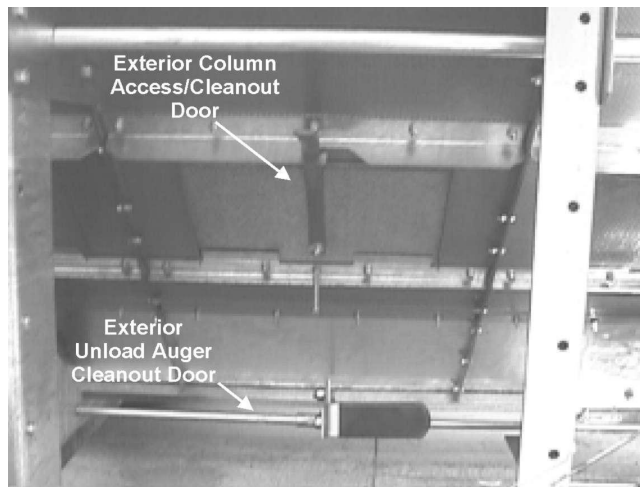


2. Access doors/covers

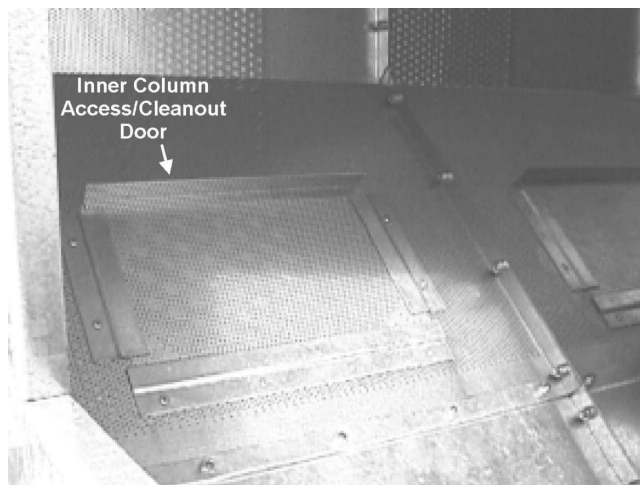
The heater access panel is located on the upper left side of the heater and allows access to the inside of the heater barrel.



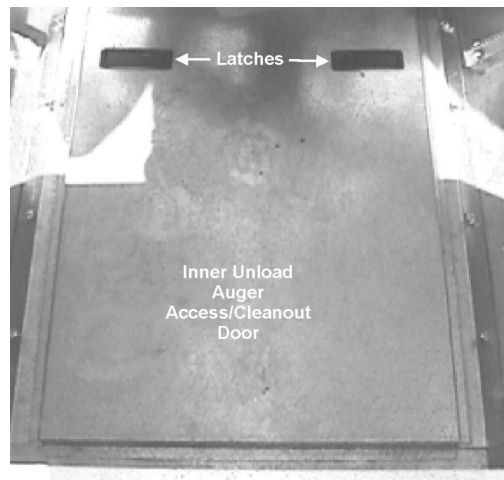
The exterior grain column access and cleanout doors and the exterior unload auger access and cleanout doors are located on the bottom portion of the dryer.



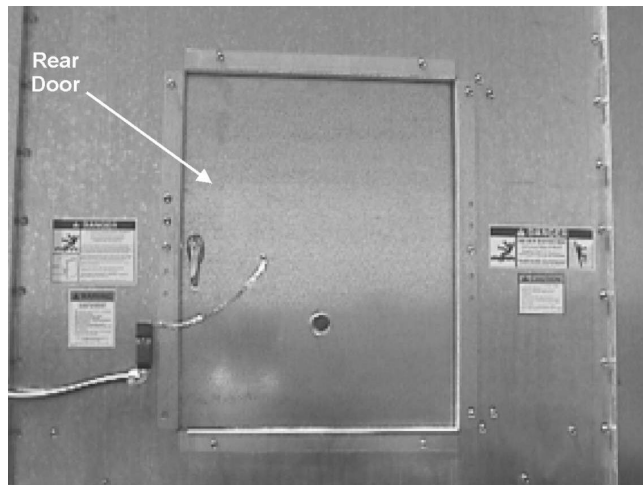
The inner grain column access doors are located in the plenum area on each column, both sides.



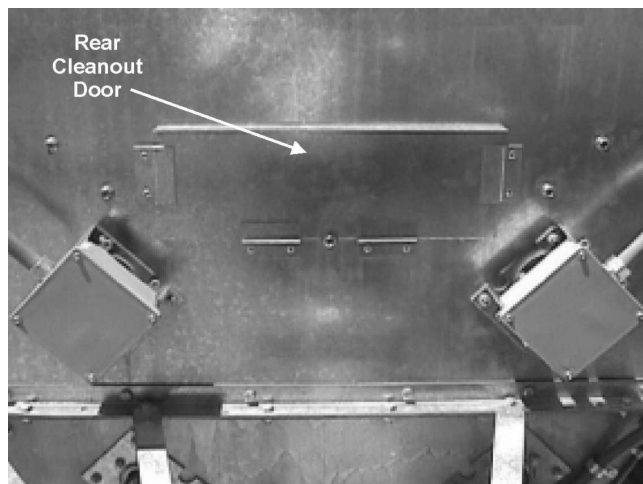
The unload auger inner access panels are located in the plenum, on the floor.



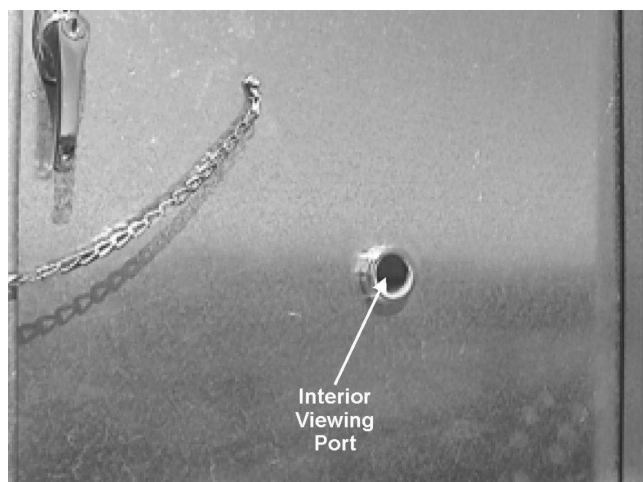
The plenum access door is located at the rear of the dryer.



The clean out door is located at the rear of the dryer just below the plenum access door. It is used to clean the plenum out. With the fan running and standing to the side, lift the door and fines and debris will be blown out.



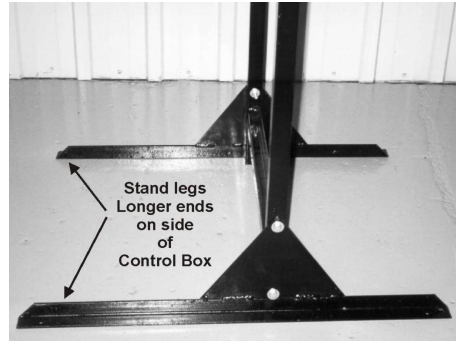
The rear viewing port is located in the plenum access door and is used to view the interior of the dryer during operation.



Control Box Stand Assembly

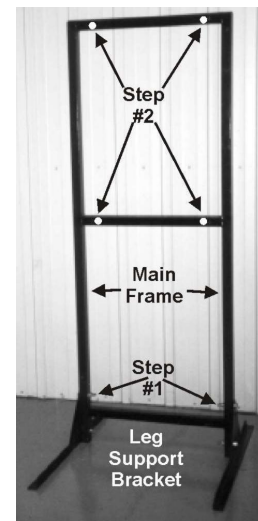
The optional control box stand will come disassembled and packaged in the rear of the Dryer. Remove the stand components which include the following:

- a. Stand Main frame
- b. Left leg support bracket
- c. Right leg support bracket
- d. Hardware bag



Assembly Instructions:

1. Bolt the stand legs to the stand frame with the 3/8 x 3 bolts, nuts, and washers (See picture at right).
2. Slide the 4-3/8 x 3 bolts and the 4 flat washers through the 2 holes in top and middle cross-braces of the stand, with the bolt-heads on the side of the stand with the shorter legs. This is so that the control box will be mounted on the stand with the longer side of the legs under the control box. Fasten the bolts to the stand with flat washers and nuts. (See Picture at right).
3. Unbolt the control box from the inside of the fan support plate.
4. Bolt the control box to the stand with the 3/8 nuts and washers.
5. Position the stand with the control box where desired.



Caution

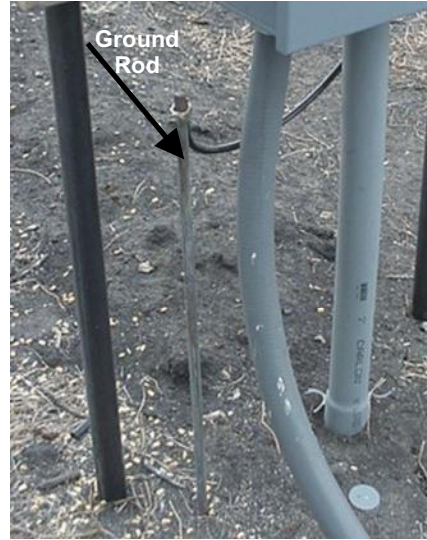
Anchor the stand to the concrete or stake the stand to the ground to prevent the stand from moving or tipping over. The stand, with control box attached, can be very unstable, especially with windy conditions.



Ground Rod Installation

A system ground rod and clamp are supplied with the dryer and can be found in the rear of the dryer. The rod is copper, 8 Feet long, and ½ inch diameter.

1. The installation of the ground rod and ground wire must conform to National Electrical Code Handbook procedures.
2. Install the ground rod within 8 feet of the dryer and attach it to the power distribution box ground lug located in the lower right corner. The ground rod located at the power pole will *not* provide sufficient grounding for the dryer.
3. The proper grounding will provide added safety in case of any short.



Service Manual

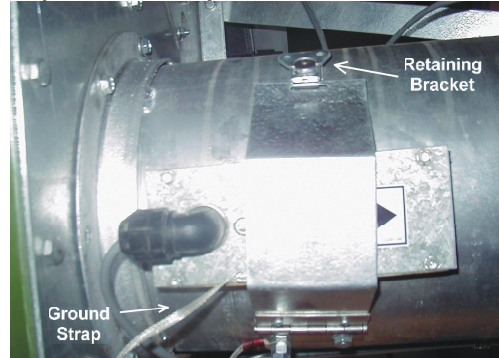
Sensor Installation and Removal Instructions

A. Discharge Moisture Sensor

This sensor is used to monitor the grain's moisture as it exits the dryer.

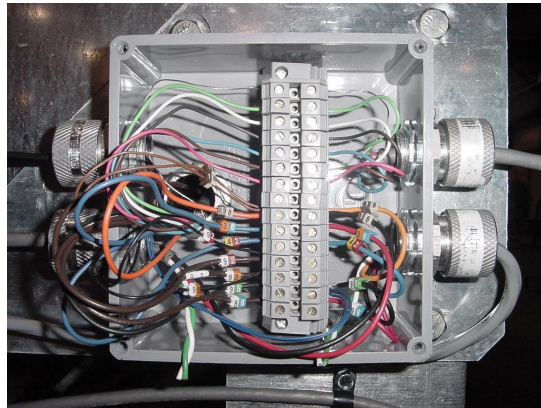
Removal:

1. Turn power off at the power box.
2. Locate the discharge moisture sensor on the bottom of the grain discharge chute.
3. Disconnect the sensor ground strap connected to the dryer with a locking nut.
4. Release the sensor retaining clamp and remove the sensor from the discharge tube.
5. Remove the wire cable retaining clips fastening the wire to the dryer all the way back to the junction box located at the right rear of the dryer.
6. Remove the junction box cover by removing the four screws.
7. Disconnect the sensor wires from the dryer wiring.



Installation:

1. Obtain a new moisture sensor and place it into the grain discharge tube. Secure the sensor by tightening the holding clamp.
2. Connect the ground strap to the dryer frame, and tighten the lock nut.
3. Route the wire cable to the junction box using the cable clamps to secure the cable to the dryer.
4. Connect the sensor wiring to the dryer wiring.
Red to Red. Brown to Brown. Blue to Blue. Black to Black. White to White. Green to Green. Shield to Shield.
5. Install junction box cover by tightening four screws.

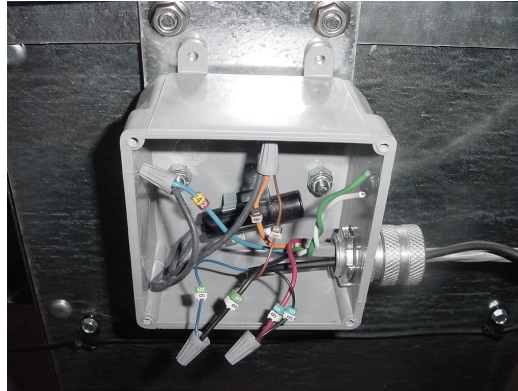


B. Grain Discharge Chute Sensor

This sensor is used to detect a plugged take-away system. Should the take-away system malfunction, the grain would push up the discharge chute door, causing a fault condition.

Removal

1. Turn the power off at the power box.
2. Locate the grain discharge chute sensor junction box.
3. Remove the cover by removing the four screws.
4. Disconnect the two sensor wires from the dryer wiring.
5. Remove the switch from the retaining clip.

**Installation**

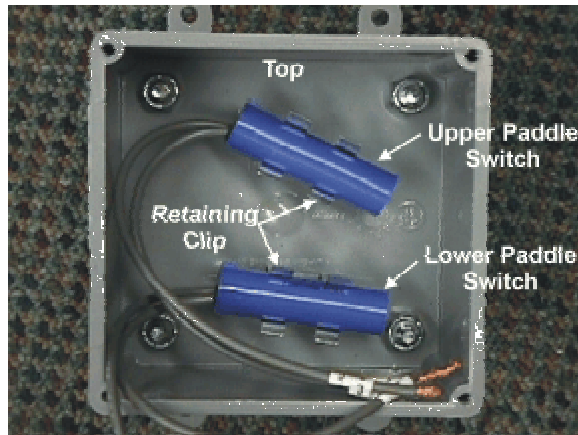
1. Obtain a new sensor and insert the sensor into the retaining clip.
2. **IMPORTANT:** The sensor must be installed exactly as shown in the picture. The wires coming from the sensor must be down and to the left of the retaining clip, or dryer will not operate properly.
3. Connect the two sensor wires to the dryer wiring.
4. Reinstall cover when finished (See Discharge Chute Switch Adjustment in the Component Calibration section to calibrate).

C. Grain Level Sensor

Used to detect when the dryer is full of grain.

Removal

1. Turn power off at the power box.
2. Locate the grain level sensor junction box. Found on the right side of the wet bin, opposite the fill end.
3. Remove the cover by removing the four screws.
4. For either upper or lower switch, disconnect the two wires from the dryer wiring.
5. Remove the switch from the retaining clip.



Installation

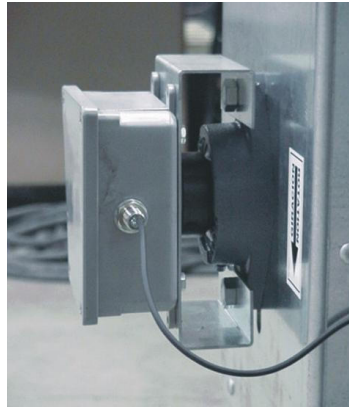
1. Obtain a new switch and insert into the retaining clip.
2. **IMPORTANT:** Switches must be installed as shown in the picture. Switch wires must be to the left. If not installed properly, the dryer will not function correctly.
3. Connect the wires in the following manner – All #18's together. #44 to #44. #53 to #53.
4. When finished, reinstall the cover by tightening the four screws.

D. Unload Auger Sensor

This sensor monitors the rotation of the unload auger. Should the unload auger stop turning for 5 seconds, a fault condition will occur.

Removal

1. Turn power off at the power box.
2. Locate the unload auger sensor on the end of the grain discharge chute.
3. Remove the cover by removing four screws.
4. Loosen and remove the inside lock nut and remove the proximity switch from the box.
5. Follow the wiring to the junction box located on the side of the grain discharge chute and remove the cover by removing four screws.
6. Disconnect the sensor wires from the dryer wiring.

**Installation**

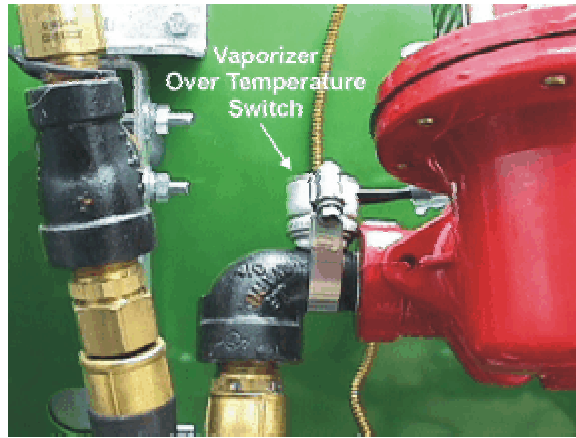
1. Obtain a new sensor and remove the first locknut. Slide the sensor into the hole and secure with the locknut just removed.
2. **IMPORTANT:** The gap between the tip of the rotating target and the proximity sensor must be between 6.4 mm +/- 10% inch.
3. Route the wiring in the same manner as before and connect the sensor wires to the dryer wiring. Blue to #95 Black. Brown to #18 Orange. Black to #96 Red.
4. Turn power on at the power box and turn the control box selector switch to manual. Turn the unload auger switch to on. Unload auger should now be turning. If installation was NOT successful, a fault message will appear on the LCD screen within 5 seconds and the unload auger will shut down. See photo of Grain Discharge Chute Sensor (Section B), page 21.
5. Reinstall the cover by tightening the four screws.

E. Vaporizer Over-Temperature Sensor

This sensor monitors the vapor temperature as it exits the vaporizer coil. Should the temperature exceed a specific temperature, the sensor opens the circuit, causing a fault condition.

Removal

1. Turn the power off at the power box.
2. Locate the vaporizer over-temperature switch on the heater pipe train, on the vaporizer coil.
3. Loosen the worm clamp holding the sensor in position.
4. Follow the wiring to the heater box and remove cover. See photo in Section H, Heater High Limit.
5. Disconnect the red #18 wire attached to the housing high limit switch. A new crimp terminal end should be used.
6. Disconnect the red #37 wire, which is also attached to a blue #37 wire by removing the blue wire nut.

**Installation**

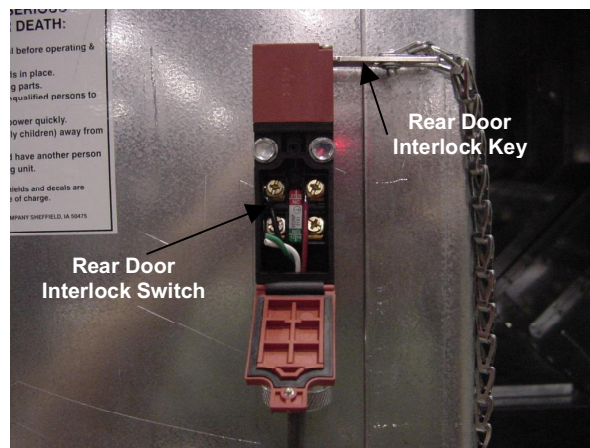
1. Obtain a new over-temperature switch and position the new switch in the same position as the old switch and secure by tightening the worm clamp.
2. Route the new switch wiring to the heater control box.
3. Attach the red #18 wire to the housing high-temperature switch where #18 blue connects.
4. Attach the red #37 wire to the blue #37 wire.

F. Rear Door Interlock Switch

Should the interlock key be removed from the switch, a fault condition will occur.

Removal

1. Turn the power off on the front of the power box.
2. Locate the rear door at the back of the dryer.
3. Pull the interlock key out of the switch.
4. Remove a small, gold colored Philips screw which will allow the cover to open downward.
5. Loosen the two wire terminals and remove the wires.
6. Remove the two 5/16 mounting screws securing the switch to the dryer.
7. Loosen the liquid tight strain relief collar and pull the wire from the switch. Remove the switch from the dryer.
8. Remove the liquid tight fitting from the bottom of the switch.



Installation

1. Obtain a new switch and check the head for the proper position.
2. If needed, rotate the head 90 degrees to match the old switch position.
3. Install the liquid tight strain relief collar into the bottom of the new switch.
4. Remove the small, gold Philips screw, which will allow the cover to open downward.
5. Feed the wires through the liquid tight fitting and up into the switch.
6. Attach the wires to the top two terminals. (N.C.)
7. Close the cover and secure with the Philips screw.
8. Attach the switch assembly to the dryer using the two 5/16 hold down screws.
9. Check the interlock key. The key may or may not require changing depending on the key design.
10. Insert the interlock key into the switch.

G. Grain column over temperature sensors

The removal and installation procedure is identical for both grain column over temperature sensors. Refer to the photos below.

Removal:

1. Remove the junction box cover for the appropriate sensor.
2. Locate the sensor wires and remove the blue wire nuts connecting the sensor to the dryer wiring.
3. Remove the sensor by removing the 5/16" nuts holding the sensor to the junction box, see photo for details.
4. While removing the sensor, coil the small copper tube for easy handling.



Installation:

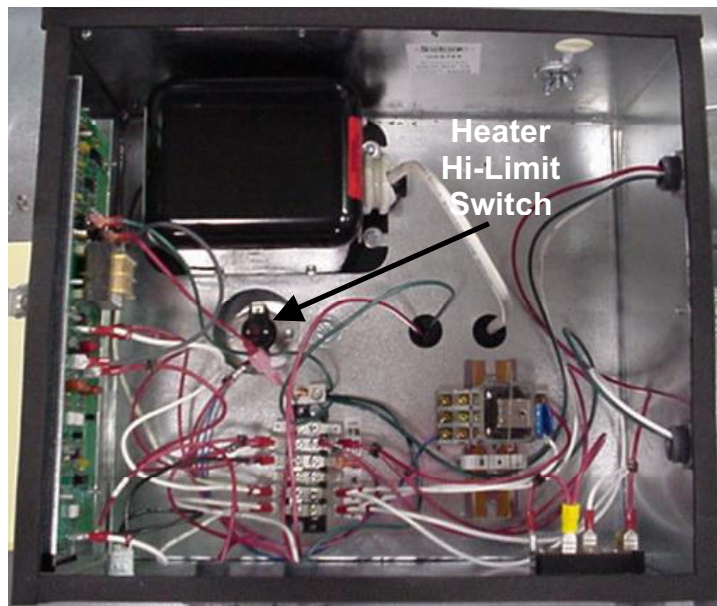
1. Install the new sensor by carefully uncoiling the small copper tube into the conduit inside the junction box.
2. Using extreme care not to bend the copper tube. Attach the switch to the back of the junction box using the 5/16" nuts.
3. Reconnect the wires. There should be orange #18 and blue #40 or blue #41 depending upon side of the dryer.
4. Reinstall the junction box cover when completed.

H. Heater Housing Hi-Limit Switch

The heater housing hi-limit switch is located inside the heater box. The switch is mounted on the housing between the spark transformer and the terminal block and monitors the temperature of the heater housing.

Removal:

1. Open the heater box cover by flipping the J clip on each side of the box.
2. Locate the housing high limit switch.
3. Remove the wires from the switch by pulling on the crimped connectors.
4. Remove the two hold down screws.
5. Remove the switch.



Installation:

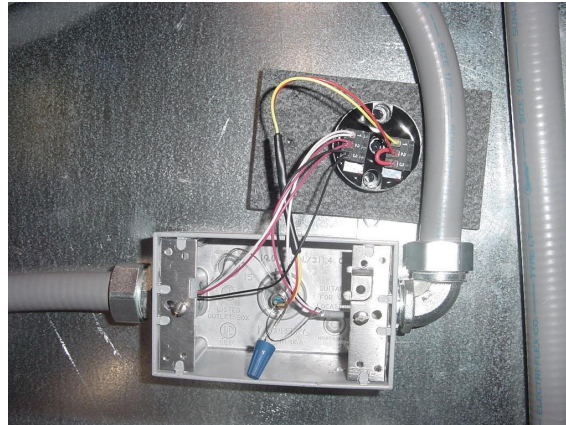
1. Insert the new switch into position and secure with two hold down screws.
2. Attach the crimped connectors to the tabs on the switch. There should be a blue #38 to one side and a red #18 and blue #18 to the other side of the housing high limit switch.
3. Reinstall the heater box cover when complete.

I. Plenum Temperature Sensor

This sensor monitors the temperature of the plenum area. If the temperature exceeds a value determined by the sensor used a fault condition will exist.

Removal:

1. Locate the sensor junction box mounted to the front of the plenum area on the front of the dryer.
2. Open the junction box and disconnect the wires from the transmitter attached to the cover.
3. Remove the two bolts on the two tabs holding the junction box to the dryer.
4. Remove the conduit fittings from the ends of the junction box.
5. Remove the clips holding the sensor tube to the inside wall of the plenum area. Gently set aside the plenum over temperature capillary.
6. Pull the sensor out leaving the grommet on the dryer and coil the tube from the sensor for ease of removal.



Installation:

1. Uncoil the new sensor carefully. Any kinks will damage the new sensor.
2. Feed the sensor tube through the junction box into the plenum.
3. Attach the sensor tube to the inside wall of the plenum area similar as removal.
4. Attach the junction box to the outside of the dryer after reattaching the conduit.
5. Reusing the clips from the inside of the dryer install the new sensor tube to the inside wall of the plenum area. During installation of sensor tube, reinstall the plenum over temperature capillary. The over temperature capillary and the plenum temperature sensor are designed to be mounted to the same clip inside the plenum area.
6. Wire the transmitter to the wires from the conduits and install the junction box cover. Make sure to connect braided shield wires together using wire nuts.

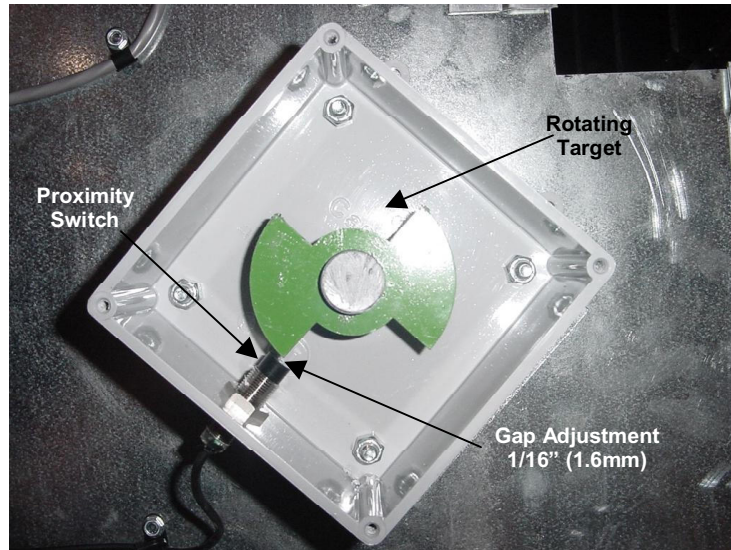


J. Metering roll proximity switches:

The removal and installation procedure is identical for either the left or right metering roll proximity switch. This sensor monitors the rotation of the meter rolls. During operation the light on the proximity switch and appropriate input on the PLC will flash indicating rotation. Due to the slow rotation of the meter rolls, the lights might flash slowly. If removal of the target is necessary, install using fresh anti-seize compound.

Removal:

1. Remove the cover to the appropriate metering roll junction box at the rear of the dryer.
2. Remove the inner lock nut on the proximity switch.
3. Remove the switch from the box.
4. Remove the hold-down clamps for the wires and remove the cover to the right rear junction box.
5. Disconnect the wiring from the right rear junction box.
6. Loosen the liquid tight strain relief collar connector freeing the wires
7. Remove the wires from the junction box.



Installation:

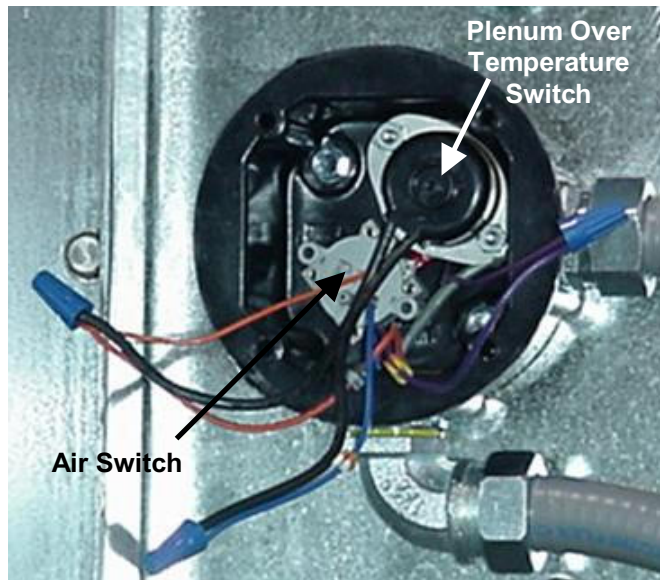
1. Installation of the new proximity switch is opposite to that of removal.
2. **Caution:** Adjustment of the proximity switch is critical. See Proximity Switch Calibration in the Component Calibration section to calibrate. The gap from the tip of the switch to the rotating target MUST be 1/16 inch (1.6mm), see the above photo.
3. Reinstall the covers.

K. Static Air Pressure Sensor

The static air pressure sensor detects that, during operation, there is enough static air pressure within the plenum area to dry properly.

Removal:

1. Locate the junction box on the front plenum area.
2. Remove the cover and disconnect the orange and purple wires from the switch by removing the blue wire nuts.
3. Remove the screen filter from the backside of the switch from inside the plenum area of the dryer.
4. Remove the air switch.



Installation:

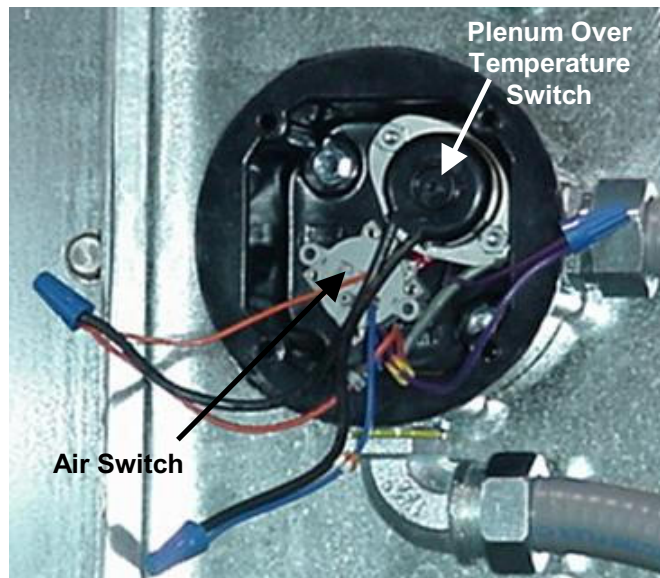
1. Reinstallation of the switch is opposite of assembly.
2. New switches should be pre-calibrated and ready for installation.
3. After switch installation, reinstall wires, screen filter, and the junction box cover.

L. Plenum Over Temperature Sensor

The plenum over temperature sensor trips when the temperature of the plenum area rises above a temperature determined by the sensor. Removal of the plenum over temperature sensor is similar to the removal of the plenum temperature indication sensor.

Removal:

1. Locate the sensor junction box mounted to the front of the plenum area on the front of the dryer.
2. Open the junction box and disconnect the blue and orange wires from the sensor.
3. Remove the clips holding the sensor capillary to the inside wall of the plenum area. Gently set aside the plenum temperature indicator tube.
4. Pull the sensor free and coil the copper capillary from the sensor for ease of removal.

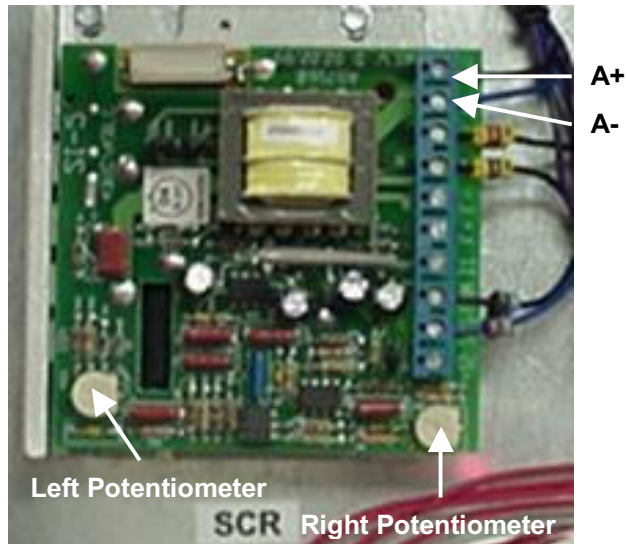


Installation:

1. Uncoil the new sensor carefully. Kinks may damage the sensor.
2. Feed the new copper capillary through the junction box into the plenum.
3. Attach the sensor capillary to the inside wall of the plenum area similar as removal.
4. Reusing the clips from the inside of the dryer install the new sensor capillary to the inside wall of the plenum area. During installation of the sensor capillary, reinstall the plenum over temperature capillary. The over temperature capillary and the plenum temperature sensor are designed to be mounted to the same clip inside the plenum area.
5. Connect the blue and orange wires, using blue wire nuts, to the sensor.

Component Calibration

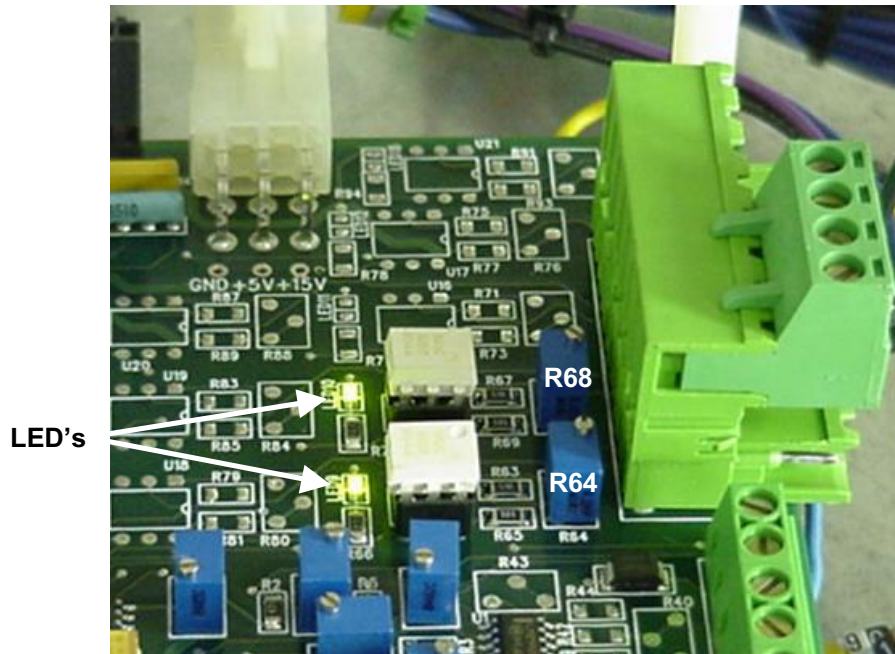
1. SCR Calibration Adjust



To calibrate the SCR board to factory standards:

- a. **With the E-Stop pushed in**, disconnect wire #94 in the power box from the Unload Auxiliary Contact. This will disconnect the safety circuit.
- b. Pull out the E-Stop and turn the System switch and Unload switch on the control box to AUTO. On the keypad, press MODE and "2" (Dry Fire Options). Then press option "9" for the S.C.R. Adjust.
- c. Enter 10% initially and using a Digital Multimeter (DMM) set to DC Volts, measure A+ and A- on the SCR board (red lead on A+, black on A-). This measurement should be approximately 18 VDC. If it is not, adjust the **left** potentiometer on the SCR board until it is approximately 18VDC.
- d. Enter 99% and using the DMM, measure A+ and A- again. This measurement should be approximately 180VDC. If it is not, adjust the right potentiometer on the SCR board to approximately 180VDC.
- e. When one potentiometer is adjusted, the other adjusts also so steps c and d need to be repeated until both 10% and 99% are accurate. Press RESET when finished and turn the System switch and Unload switch to OFF.
- f. **With the E-Stop pushed in**, reconnect wire #94 in the power box to the Unload Auxiliary Contact. Close the power box door and turn on power.

2. I/O Board Meter Roll Adjustment



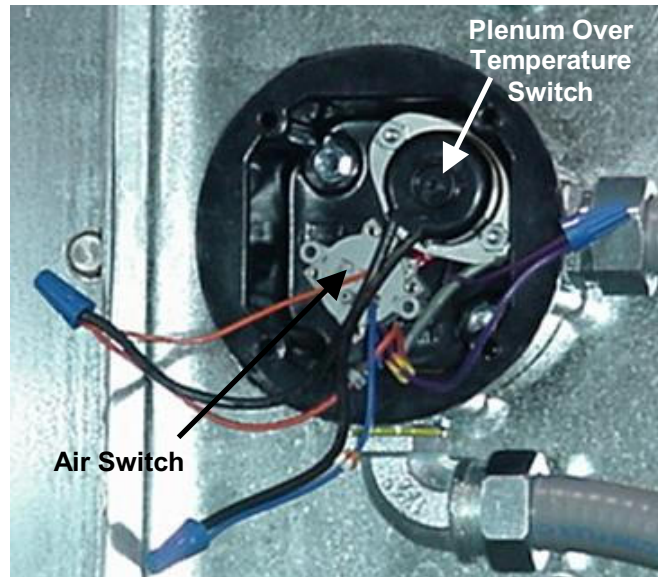
To change the meter roll adjustment, do the following:

- Locate R64 and R68 potentiometers on the upper right of the I/O board. These will look like small blue cubes with a screw out of the top. They will be to the right of two small white chips.
- With the System switch turned on**, turn R64 and R68 screws counter-clockwise until the LED (LED9 and LED10) located to the left of the white chip to the left of the potentiometer is lit. Then turn the potentiometer screws **one full turn** counterclockwise further.

3. Moisture Sensor Calibration

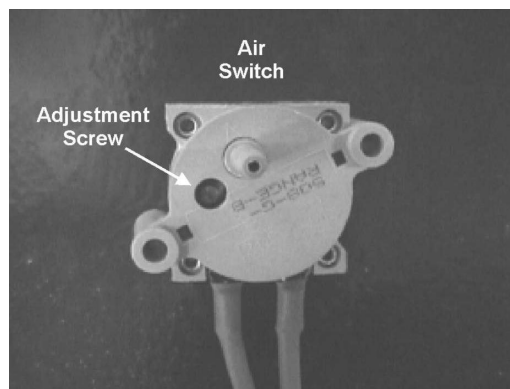
See Output Calibration Procedure During Continuous Flow Section in the Continuous Flow section in the Operators Manual

4. Air Switch Adjustment Calibration

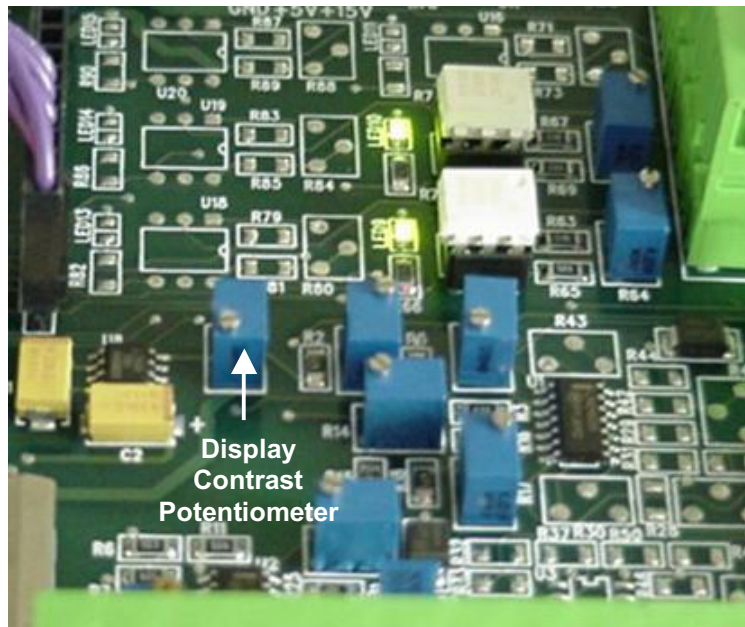


It may become necessary to adjust the static air pressure switch. Follow these instructions:

- a. Find the switch located on the upper front plenum in a 4" black circular junction box (see above).
- b. The switch is adjustable between 0 to 3 inches of static pressure. It is a normally open switch that closes when the set pressure is reached.
- c. To increase the pressure set point, turn the adjustment screw **counter-clockwise** (see below).
- d. To decrease the pressure set point, turn the adjustment screw **clockwise** (see below).

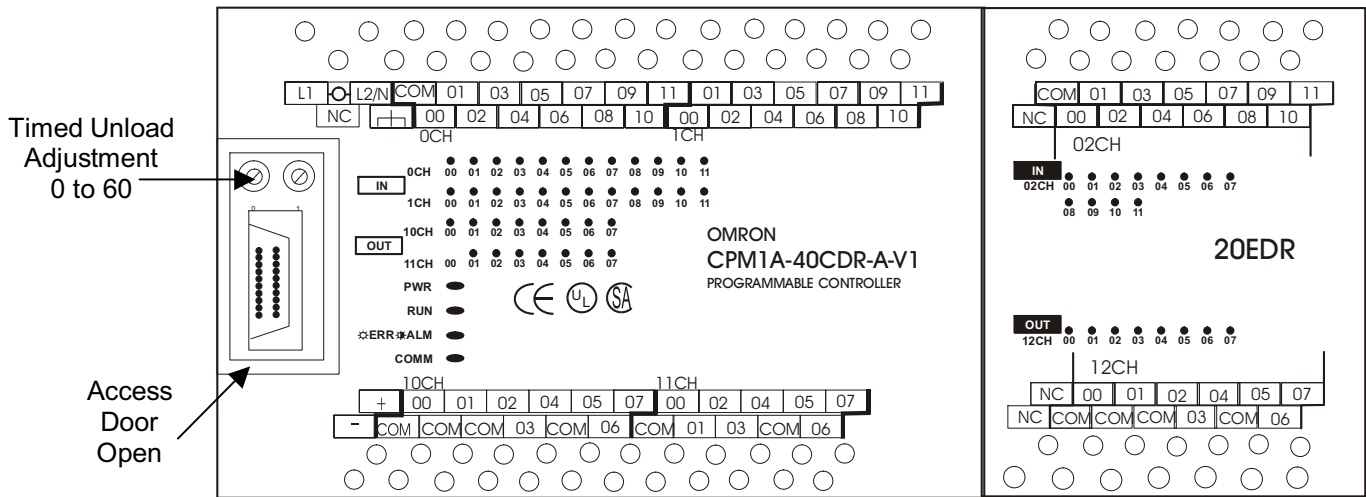


5. Contrast Adjustment Calibration



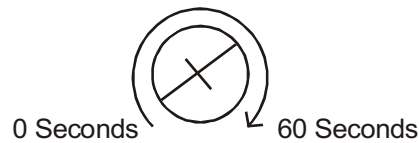
- Locate the I/O board inside the control box on the upper right corner of the panel.
- Locate R99 potentiometer on the upper right of the I/O board. The potentiometer will look like a small blue cube with a screw out of the top.
- To darken the display, turn the screw on the top of R99 clockwise. To make the display lighter, turn the screw counter-clockwise.

6. Unload Auger Time Delay Off Adjustment



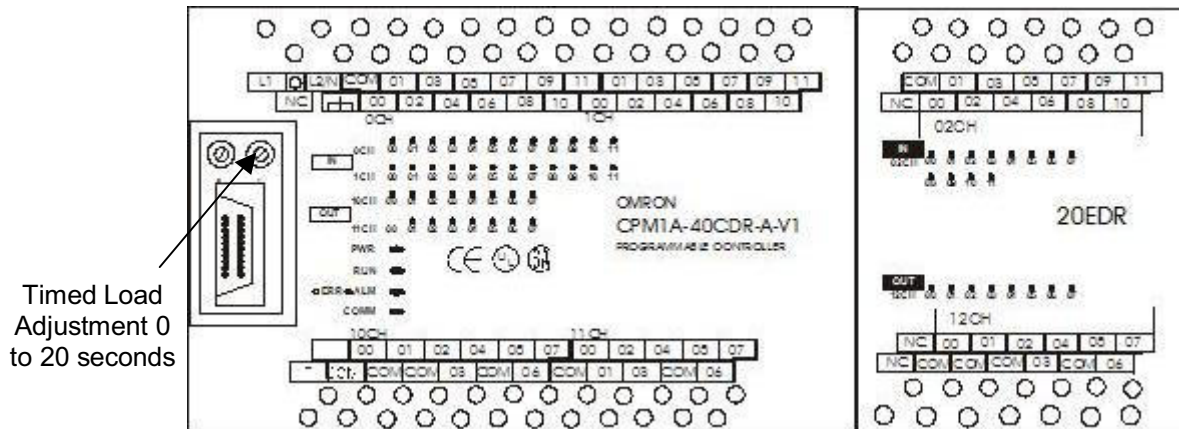
To add a timed delay (up to 60 seconds) to the auxiliary unload, follow these steps:

- Gain access to the inside of the control box by opening the inner panel.
- Locate the Programmable Logic Controller (PLC), which is on the middle of the back panel (see above).
- Open the access door by lifting up on the right side (hinged on the left). See picture above.
- Locate the two adjustable potentiometers located at the top of the opening (see above). The potentiometer on the left side is the adjustment for the timed unload. It is factory pre-set to 0.
- To change the setting to the timed delay, rotate the potentiometer clock-wise, (see diagram below) to desired amount of delay time.



- Close the access door on the PLC and close the Control box inner panel.

7. Secondary Fill Adjustment Calibration



To add a secondary fill adjustment (up to 20 seconds) to the auxiliary load, follow these steps:

- Gain access to the inside of the control box by opening the inner panel.
- Locate the Programmable Logic Controller (PLC), which is on the middle of the back panel (see above).
- Open the access door by lifting up on the right side (hinged on the left). See picture above.
- Locate the two adjustable potentiometers located at the top of the opening (see above). The potentiometer on the right side is the adjustment for the timed load. It is factory pre-set to 0.
- To change the setting to the timed delay, rotate the potentiometer clock-wise, (see diagram below) to desired amount of delay time.

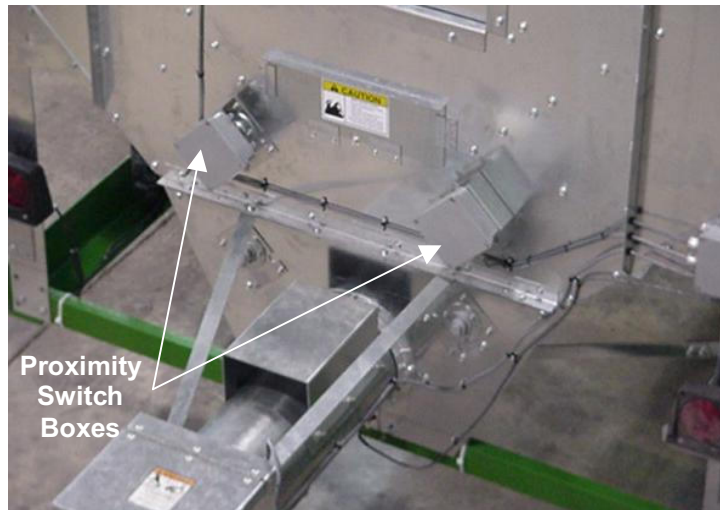


- Close the access door on the PLC and close the Control box inner panel.

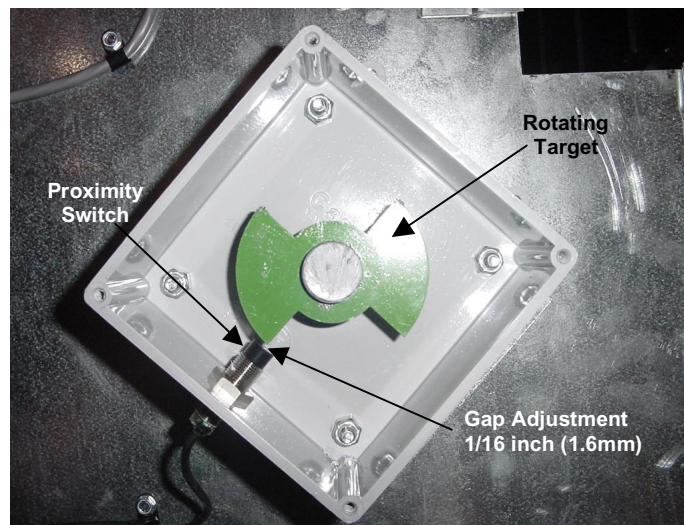
8. Proximity Switch Calibration

When calibrating the proximity switch, a tape measure will be needed.

- a. Locate the box at the end of the discharge chute on the dryer. The proximity switch and rotating target will be located inside this box. See below:



- b. Once the box is opened, a green rotating target and the proximity switch can be found inside.
- c. To calibrate the proximity switch, loosen the locking nut on the switch.

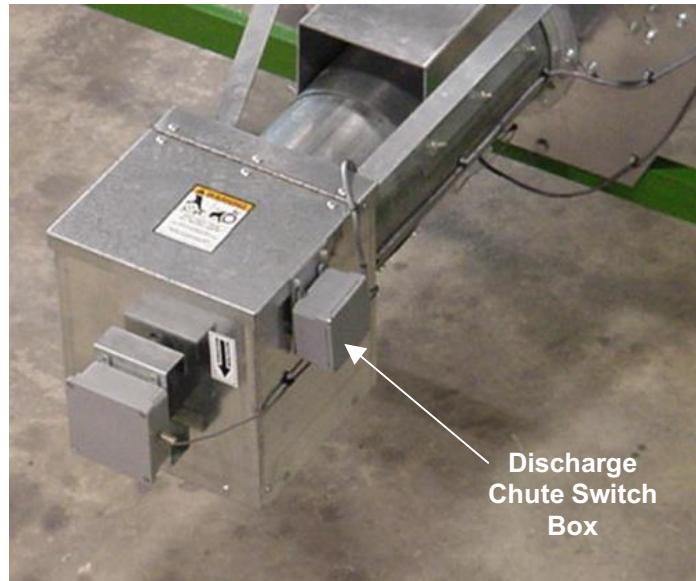


- d. Using a tape measure, shift the switch so that it is 1/16 of an inch (1.6mm) from target. This measurement is very important for accuracy. The switch must be this distance so that it can read the target as it turns.
- e. Once the switch is in place, tighten the locking nut and replace the cover on the box.

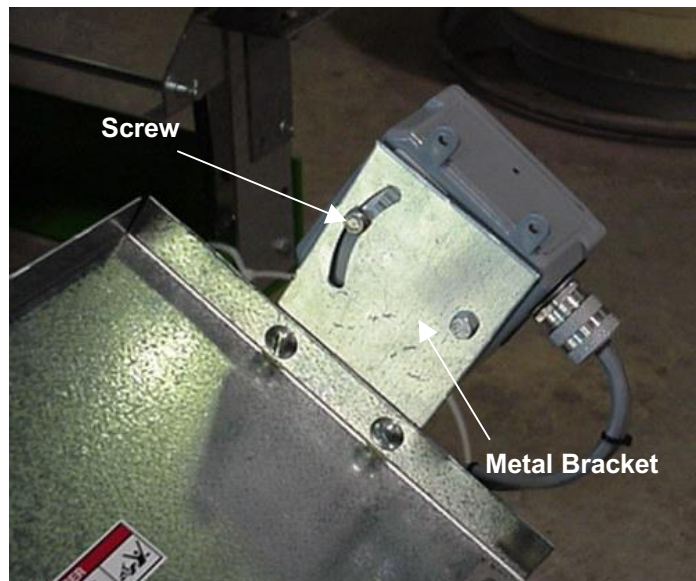
9. Rear Discharge Chute Switch Adjustment

When adjusting the Rear Discharge Chute switch, a 7/16 socket wrench will be needed.

- a. Locate the box on the discharge chute at the rear of the dryer and open the discharge chute lid. See below:



- b. Attached to the lid of the discharge chute is a metal bracket with the box fastened to it. Using a 7/16 socket wrench, loosen the screw holding the box in place. See below:



- c. Adjust the box so that the chute door will trip when the door opens by sliding it along the metal plate slot. Once the position has been found, tighten the screw to hold the box in place.

Heater operation at low plenum temperatures

If you are trying to operate the heater on your dryer at low temperatures (at 140 degrees or less), you may experience some difficulty. If you hear rumbling sounds and / or see the flames are burning yellow instead of blue, then the pressure is too low and the flame is burning back into the port cup. If you desire to operate at the lower temperature range, two parts on the heater must be changed. Contact your Sukup dealer.

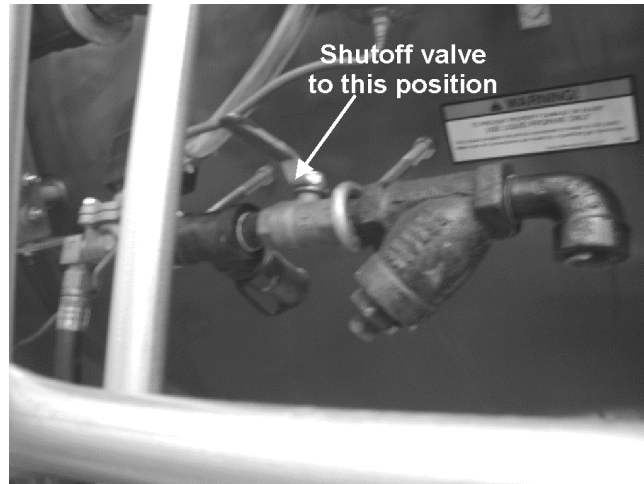
Caution

The following procedure is to be performed by *qualified* service personnel only.

The following procedure is a modification of the heater that involves changing the gas line orifice and the port cup.

Step 1. Operate the dryer fan and heater. While it is running turn the fuel shutoff lever to the off position. (See figure below) Allow heater to flame out (purge gas lines).

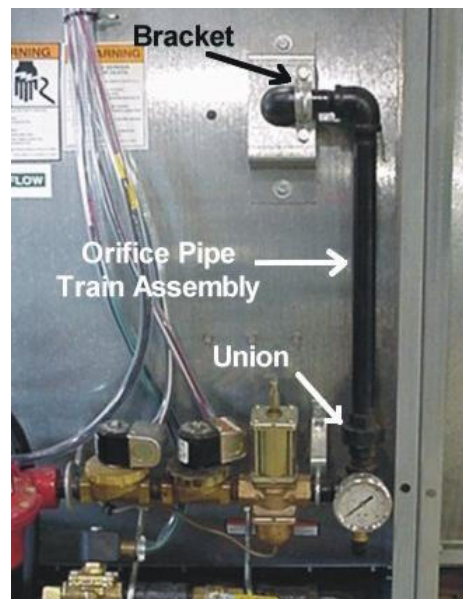
Step 2. Lock out all electrical power and gas lines



Step 3. Locate the orifice pipe train assembly (refer to picture at right)

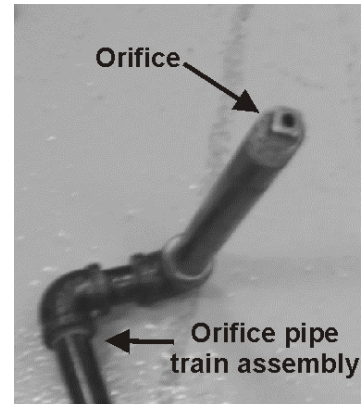
Step 4. Loosen the union located at the bottom of the orifice pipe train assembly (refer to picture at right)

Step 5. Remove the bracket located at the top of the orifice pipe train assembly. (refer to picture at right)



Step 6. Remove the orifice pipe train assembly by lifting out and up at the bottom of the assembly, and pulling the top of the assembly straight out of the heater housing.

Step 7. With orifice pipe train removed from heater housing, locate the threaded orifice (refer to picture below).



Step 8. Remove the threaded orifice by rotating it CCW.

Step 9. From the table below select the appropriate orifice for your dryer. Select from the column labeled "Low Temperature Orifice".

Heater Type	Standard Orifice & Part #	Low Temperature Orifice & Part #
44" 30 HP	23 / 64" D7113	19 / 64" D7112
44" 15 HP	19 / 64" D7112	13 / 64" D7110
38" 15 HP	19 / 64" D7112	13 / 64" D7110
28" 15 HP	13 / 64" D7110	11 / 64" D7125

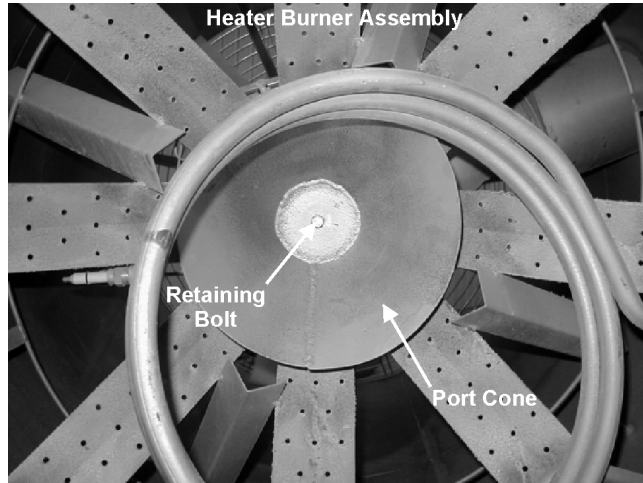
Step 10. Install new orifice into pipe train assembly.

Step 11. Re-install orifice pipe train assembly into heater housing by reversing steps 4 through 6 above.

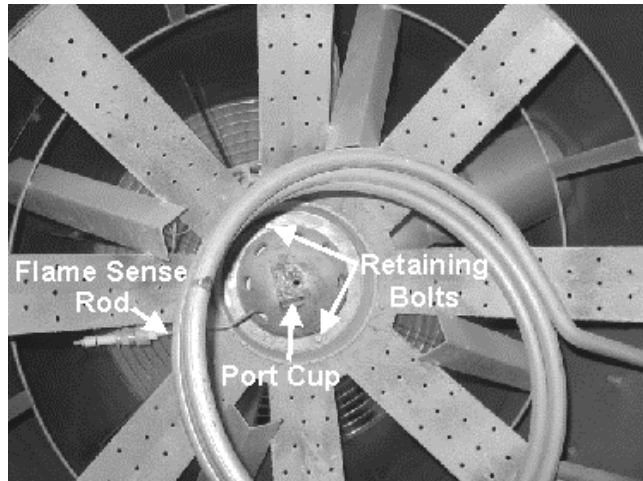
Caution

Ensure that the union is re-tightened properly to prevent gas leaks

Step 12. Access the dryer plenum area by entry through the rear door. Locate the heater burner assembly. Remove the port cone by removing the bolt located in the center of the cone. (Refer to picture below)



Step 13. Note mounting position of flame sense rod (for re-installation). Remove flame sense rod from it's mount bracket. Remove the two port cup retention bolts. Remove port cup. (refer to picture at below)



Step 14. From the table below select the appropriate port cup for your dryer. Select from the column labeled "Low Temperature Port Cup"

Heater Type	Standard Port Cup & Part #	Low Temperature Port Cup & Part #
44" 30 HP	3 / 4" D4044	3 / 8" D4041
44" 15 HP	3 / 4" D4044	3 / 8" D4041
38" 15 HP	3 / 4" D4044	3 / 8" D4041
28" 15 HP	9 / 16" D4027	3 / 8" D4025

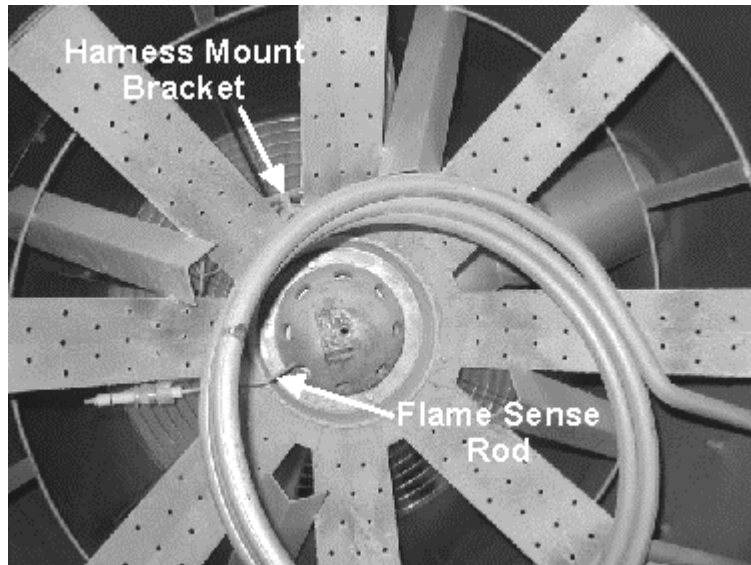
Step 15. Install new port cup by reversing the items in Step 11.

Important

When re-installing the top bolt be sure to re-attach the heater harness bracket, located at the rear of the burner assembly.

Important

When re-installing the flame sense rod, ensure that the rod is not grounded out and that the rod is in the flame path.
(see picture below)

**Note**

Do NOT re- install the port cone as it is not needed in lower temperature applications.

Step 16. Restore electrical power to the dryer and open the fuel valves.

Step 17. Start fan and heater. When heater turns on, inspect for gas leaks around the union area using soapy water.

Step 18. Re-adjust mod valve and vaporizer coil as needed.

Step 19. Inspect heater flame. Look for nice clean flame, blue in color. Minor yellow coloring at the tips of the flame is acceptable.

Dryer can now be restored to service.

Temperature Controlled Automatic Batch Add – On Kit

Temperature Controlled Automatic Batch Add - On Kit

The Automatic Batch program for “timed” batches is included in all single / two fan dryers. The owner has the option of installing the Temperature Controlled kit that provides the ability to monitor the temperature of the grain while running in Automatic Batch. This kit includes the following parts:

Quantity	Part Description	Part Number
1	½” Straight Conduit Connector	J4085
1	½” 90 Degree Conduit Connector	J4090
2	Feed Through Terminal	J67504
2 Ft	18 Gauge Stranded Pink Wire	K6593
2.5 Ft	½” Flex Conduit	K6604
8 Ft	18 Gauge Stranded Orange Wire	K6600
52 Ft	18 Gauge Stranded Blue Wire	K6603
15 Ft	22 Gauge, 3 Conductor Cable	K6647
1	?? Ft. RTD Sensor Assembly *	T170XX *

* The length of the RTD sensor will depend upon the length of the dryer and will be included in this kit. See chart below for part numbers of the RTD sensor assembly given in this kit.

Part Number	Part Description
T17024	12 Ft. RTD Sensor Assembly
T17022	16 Ft. RTD Sensor Assembly
T17023	20 Ft. RTD Sensor Assembly
T17021	24 Ft. RTD Sensor Assembly

If the length or any part is incorrect in this kit, please contact your local Sukup Manufacturing Dealer.

The following steps are on how to install the Temperature Controlled Automatic Batch Kit.



Rear view of dryer before Automatic Batch kit installation.

Rear Box Modification and Conduit Installation

Addition of the automatic batch temp control RTD requires reversal of the capillary switch to make provisions for the RTD sensor. Begin by removing the box cover for the capillary tube opening at the right rear of the dryer. Uncoil any of the extra copper tubing in the box. Take extreme care not to kink the tubing, as this will ruin the switch and will need replacing. See photo 1.1 for details.



Photo 1.1: Removal of rear column over temperature box

Remove the rear capillary junction box by removing the four hex screws and the nut holding the conduit fitting on the inside. Using a punch or equivalent drill, make a $\frac{3}{4}$ " hole in the side of the rear capillary junction box that was just removed providing for connecting the supplied conduit elbow. Connect the elbow end of the conduit to the hole made in the right rear junction box and tighten the conduit nut on the inside of the box securing the conduit to the junction box. Reattach the grey junction box to the dryer and reinstall the nut to the capillary conduit. Photo 1.1 shows the removal of the junction box then see photo 1.2 for connection of the supplied conduit to the junction box.



Photo 1.2: Reinstallation of right rear column over temperature junction box after attaching supplied conduit

Capillary Reversal

Remove the box cover and nuts retaining the capillary switch for the right front of the dryer. This is the box connected directly below the work light. After removing the wire nuts on wires #18 and #40, remove the capillary switch completely. Take care not to kink the small copper tube as it is removed from the length of the dryer. Photo 1.3 shows the right front junction box and removal of the capillary switch.



Photo 1.3: Removal of right front column high limit

Reverse the direction of the capillary switch by installing the copper tube in from the rear of the dryer. Attach the high limit capillary switch to the inside of the right rear high limit junction box using two self tapper screws drilling through the grey box and into the dryer.



Photo 1.4: Installation of the high limit switch to the right rear of the dryer

The photo 1.4 shows the installation of the capillary tube in the right rear junction box. The copper capillary tube may stick out the front of the dryer into the right front high limit junction box, carefully coil any extra tubing inside the box keeping the center clear for the RTD sensor. Use caution to not kink the tubing, permanent damage will result and replacement of the capillary switch will be required.

Conduit Installation (Cont.)

For the following step, there will need to be a hole made for the other end of the supplied conduit to attach to the right rear junction box. The other end of the supplied conduit from the right rear capillary box will need to be attached through a hole just to the left of the terminals and mini din rail inside the right rear junction box. It might be possible to drill the hole for the other end of the supplied conduit with the right rear junction box attached to the dryer. Be sure to take care not to cut or nick any wiring within the box. If your unsure about it, disconnect the wiring and remove the right rear junction box. After drilling, attach the conduit to the right rear junction box and tighten the conduit nut. The photo 1.5 shows the right rear junction box and straight end of the supplied conduit. Center the hole front to back and to the left of the mini din rail and terminals as indicated in photo 1.5.

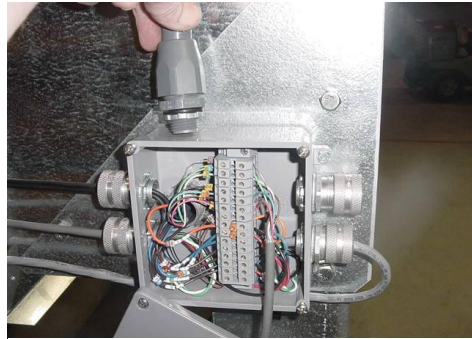


Photo 1.5: Right rear junction box and straight end of supplied conduit indicating hole placement

Automatic Batch Wiring

Feed the short piece of orange wire from the right rear junction box to the rear capillary box through the supplied conduit that was just installed. Label the wire #18 and wire to the capillary switch using a blue wire nut. Referring to photo 1.6, connect the orange wire and blue to the column high limit switch that was installed previously. Connect the other end of the orange #18 to the mini terminal with other wires numbered 18 as shown in photo 1.7 below. There should be other wires located there that are labeled #18. There may or may not be a jumper connecting two terminals in the right rear junction box depending on when the dryer was built.

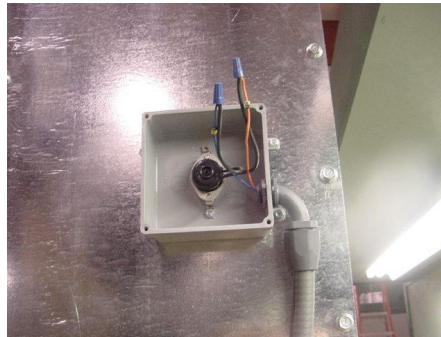


Photo 1.6: Orange and blue wires fed through the supplied conduit from the right rear junction box to the right rear capillary box

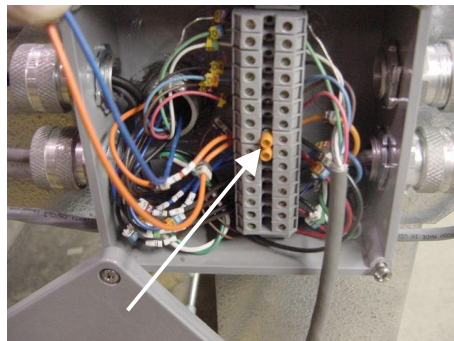


Photo 1.7: Right rear junction box showing possible orange jumper where wires #18 connect.

Feed the long length of blue wire included with the kit with the other wires along the length of the dryer through the $\frac{3}{4}$ " aluminum conduit. Leave the extra wire hanging out the front black junction box located just above the unload auger motor. Feed the end at the back of the dryer through the supplied conduit with the orange #18 to the right rear capillary box. The blue length of wire is the replacement for #40 that continues through the front right black box to the power box. Label this wire #40 and connect to the capillary switch as indicated earlier and in photo 1.6.

Automatic Batch Wiring (cont.)

Move the original blue #40 from the right front capillary box to the front lower right black junction box. Do this by pulling the appropriate blue wire through the short piece of conduit linking the two boxes.

Use the existing blue #40 wire to pull the new blue wire and the three-conductor wire to the power box. Hook the end of the original blue #40 wire to the new blue #40 and three-conductor gray wire and tape together tightly. Gently pull the old blue #40 wire from the power box end pulling the new wires, the replacement for #40 and the three-conductor, toward the power box.

Caution

If the wire sticks part way through, do not pull too hard, for it may break the wire off within the conduit before you get the other end. If the wire breaks you will have to disconnect the wires for that conduit from the power box and remove the conductors from the conduit to fix. It may need to be loosened from the conduit holding clamps and the conduit moved slightly while pulling the new wires to avoid snags.

Note

For new dryers simply replace the blue wire before installing the wires into the conduit. The new blue wire is longer for the extra length needed to reach the back of the dryer.

For dryers with terminal #70 installed

After pulling the new wires, label the blue wire #40 and connect to terminal #40 in the power box. Remove appropriate shielding and connect the three-conductor wire to terminals #85, #83, and terminal #70 in the power box. Photo 1.8 shows a typical automatic batch terminal strip with terminal #70 and the white wire from the RTD transmitter.

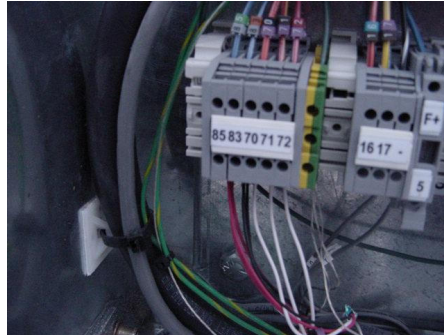


Photo 1.8: Terminal strip within the power box and terminal #70, the automatic batch signal connection

Avoid cutting the braided ground conductor; instead, connect the braided conductor to the yellow/green ground terminal. The red wire of the three-conductor wire connects to #85, the black wire connects to #83, and the white wire connects to terminal #70. If the dryer does not have a terminal #70 in the power box, use the following instructions for dryers without terminal #70.

For dryers without terminal #70

After pulling the new wires, label the blue wire #40 and connect to terminal #40 in the power box. Remove appropriate shielding and connect the three-conductor wire to terminals #85 and #83. Terminal #70 will need to be installed before connecting the final wire.

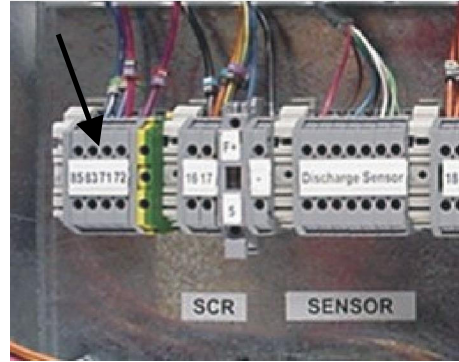


Photo 1.9: Power Box DC terminals. Also shows an extra terminal for a two-fan unit. Terminal 72 is only on two-fan units.

To install terminal #70, use one of the terminals provided in the kit and place in the Power Box between terminals #83 and #71 in the DC terminal strip. See Photo 1.9.

Now, connect the white wire from the three-conductor cable to terminal #70.

Terminal #70 will also have to be installed in the Control Box. To do this, use the other terminal provided in the kit and install it in the Control Box between the terminals #83 and #71 in the DC terminal strip.

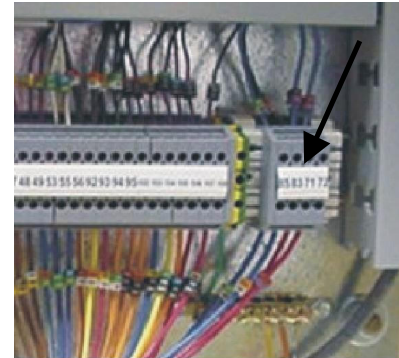


Photo 1.10: Control Box DC terminals. Also shows an extra terminal for a two-fan unit. Terminal 72 is only used on two-fan units.

Once terminal #70 is installed in the Control Box, the pink 18-gauge wire included in the kit can be wired into the terminal. The other end of the wire will be wired into the processor board, which is located beneath the I/O board. The following instructions will explain how to remove the I/O board. ESD safety equipment *must* be used in this procedure.

I/O board removal procedures

1. Gain access to inner Control box by opening Exterior door and inner front panel.
2. Remove I/O Board using a small screwdriver and remove the two wires from Terminal J9 (brown and purple).
3. Disconnect encoder connector J1 by sliding to the right.
4. Disconnect D.C. Power connector J14 by pinching retaining clip and pulling up
5. Disconnect cable harnesses J12, J13 and J15 by gently but firmly pulling out (a brown, gray, and yellow harness).
6. Remove all connectors at the bottom of the I/O board (the order is important so remember which position they were in when connecting them to the new board).
7. Remove the four retaining screws from the four corners of the I/O board. Gently pull the I/O board free of the Processor.

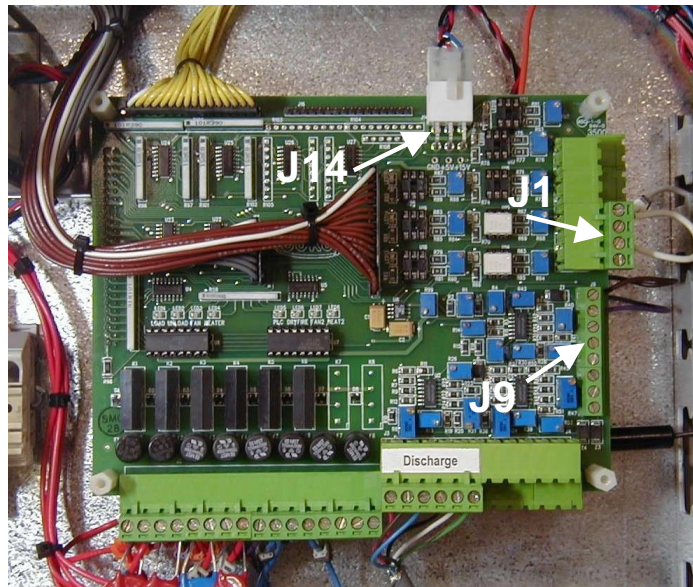


Photo 1.11: I/O board with harnesses labeled.

Processor Wiring

Once the processor is exposed, the pink wire should be wired into the terminal block J9, position 8. See photo 1.12.

After wiring the pink wire into the processor board, reattach the I/O board using the previous steps for removal in opposite order.



Photo 1.12: Processor board once the I/O board is removed. J9 is labeled and an arrow shows position 8.

When the I/O board is completely replaced, an umbilical wire needs to be attached from the Power Box to the Control Box. Use the Orange wire with the Blue stripe on it that is in the ground bar to connect the two boxes. Connect this wire into the bottom of both terminals in each box. If possible, check continuity between both boxes to ensure correct termination. This will complete the procedure for both the Control Box and Power Box.

Final RTD Wiring

Carefully uncoil the RTD sensor and feed into the conduit starting from where the high limit capillary was removed. The aluminum RTD junction box, usually supplied with the RTD sensors, must be removed if not previously done. Feed the RTD sensor through the conduit using a small amount of silicone to hold the sensor in place. See Photo 1.13 for details.



Photo 1.13: RTD sensor installation

Finally, using epoxy or double stick tape, attach the RTD transmitter to the cover of the front capillary junction box. Photo 1.14 shows placement of the transmitter and attachment to the cover using some double stick tape. Attach the wires from the RTD (red and yellow) to the appropriate terminals on the transmitter. Careful, the labeling of the terminal numbers are the same for both sets of terminals. Follow the printed white label on the side of the transmitter for the correct connections. Check to be sure there is a red jumper wire between terminals 2 & 3 (com). The order of the red and yellow wires does not matter and will attach to terminals 1 & 2. There should now be two wires on terminal #2 on the sensor side of the transmitter.

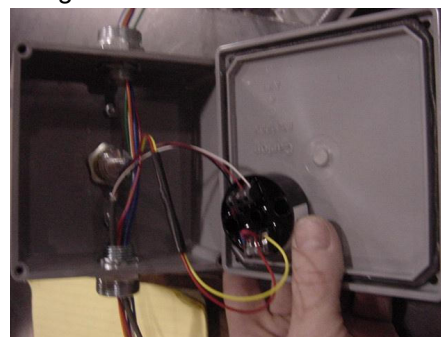


Photo 1.14: Placement and wiring of the RTD transmitter to the cover of the front right column overlimit switch

The white wire from the shielded three-conductor wire connects to terminal 1 labeled: output: 1-5 VDC. The red wire from the shielded three-conductor wire connects to terminal 2 labeled (+) and the black wire connects to terminal 3 (-).

Re-secure the conduit if any were removed from the clamps and install the covers to all of the boxes. This completes installation of the automatic batch option for the dryer. The next time the dryer is start-up for automatic batch, the display should show time and temp. If not, contact your dealer or call Sukup Manufacturing.

Phone Modem Alarm System**Table of Contents**

Step #	Topic	Pages
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Phone Modem Alarm Kit

The optional Phone Modem alarm kit is a valuable addition to the Grain Dryer. When it is installed and the Dryer is operating normally, should a shutdown occur, the Phone Modem alarm system will dial out to an operator selected phone number and give an alarm tone. It will do so every 15 minutes until acknowledged by the operator.

Note

It is the customer's responsibility to provide the phone service line to the Phone Modem Alarm.

Features

- Automatically dials out when Grain Shutdown Fault occurs.
- Operates on rotary or touch tone phone lines
- FCC approved
- User entered "Call to" telephone number, up to twelve digits.

Specifications:

Power Requirements: 9-volt battery (Included)

Weight: 7.5 oz.

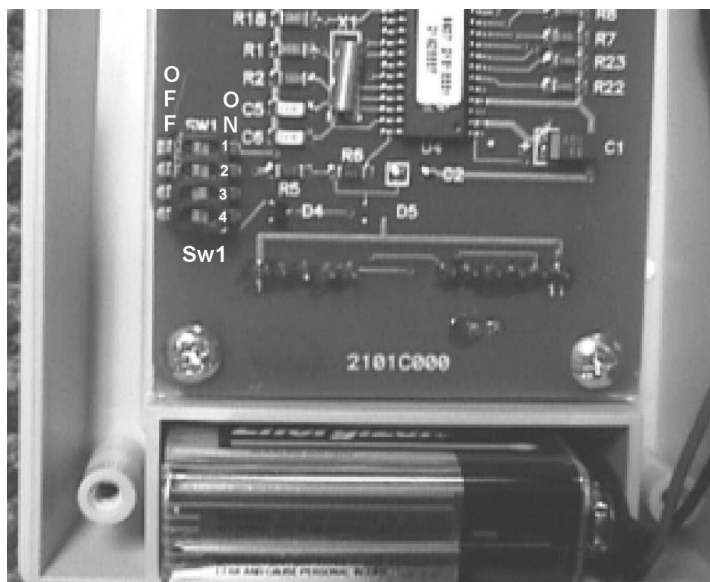
Step A. Installation:

1. Remove the four screws from the back cover and install the supplied 9-volt alkaline battery.

Warning

Batteries should be replaced annually. Failure to do so will cause malfunction.

2. The Phone Modem Alarm is factory set to call out every 15 minutes. However if you would like to change this to call every three hours, locate the four switches on the lower left side of the circuit board. (See picture below.)



3. On the switch labeled SW 1 there are four switch levers labeled #1 through #4 from top to bottom. Switches 1,2,and 4 should always be set to the "OFF" position or to the left.

Phone Modem Installation Kit Instructions

- Switch # 3 is the switch used to select 15-minute call cycle or 3 hour call cycle. Position Switch # 3 to "OFF" for 15-minute call or to "ON" for a 3 hour call cycle.

Note

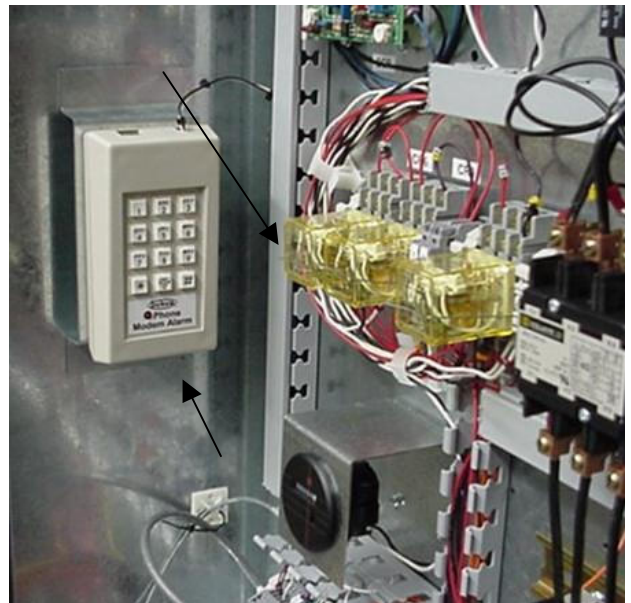
The switch is factory preset to "OFF" for a 15 minute call cycle.

- Reinstall rear cover and secure with four screws.

- Open Power distribution box and locate the position of the bracket. Two screws must first be mounted through the holes of the bracket with four nuts before attaching the bracket. The screws should extend from the bracket approximately $\frac{1}{4}$ ". Install the mounting bracket on the left side of the box with the adhesive tape included in the package (see picture at right).

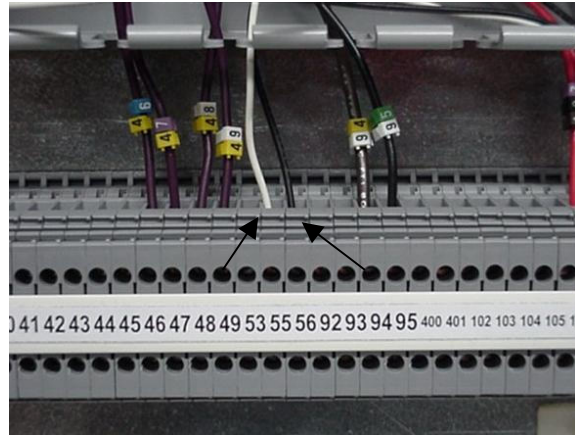


- Install Phone Modem Alarm onto mounting bracket and slide down to secure. Remove wire raceway covers and route the two wires down to the terminal area. (Refer to picture at right)



Phone Modem Installation Kit Instructions

8. Trim the wires to the proper length and insert into terminals. The White wire into terminal #55 and the Black wire into terminal #56. (See picture at right)



9. Route customer supplied Phone service line into power distribution box and insert into modem phone jack. (See picture at right)



Caution

Ensure to route incoming phone line service on the left side of the power box only. Keep away from power wires on the right side. This reduces the chance of EMI/RFI interference.

Caution

The Phone Modem Alarm System requires a single telephone line, but does not require this line to be dedicated to the Phone Alarm System use only, it can share a direct phone line with a telephone. A dual plug adapter (Not included) is required and is available at most hardware stores.

Warning

The Phone Modem Alarm System IS NOT compatible with PBX or other multi-line business telephone systems. Connecting the Phone Modem Alarm System to a commercial telephone system may cause damage to both systems.

Step B. Programming (following installation):

1. Press and hold the Star (*) key on the Phone Modem Alarm System keypad.
2. While continuing to hold the Star (*) key, enter the telephone number of the location that you want the Alarm to dial ("call out" telephone number)

Note

Be sure to enter proper number of digits depending on whether it will be a local or long distance call

3. Once the "call out" telephone number is entered, release the Star (*) key.
4. The unit is now programmed.



Important

The Phone Modem Alarm System must be fully tested after initial programming is completed. (See Functional test below)

Step C. Functional test:

1. Press the pound key (#) on the Phone Modem Alarm System keypad until the red indicator light comes ON. Next release the pound (#) key.

Note

If red light does not come on, ensure phone line is in service.

2. After @ 2 to 5seconds, the red indicator light will start pulsing, indicating that the Phone Modem Alarm System is dialing the "call out" number. If the red light does not pulse, repeat the programming sequence above.

Important

For proper testing, it is important that a person at the "call out" location receives this alarm and confirms it. The alarm will be a constant loud tone heard when the phone is picked up.

3. Perform an actual Dryer fault test by inducing a Dryer Fault. Turn the Dryer system switch to computer. When "System Ready" is displayed, lift grain discharge chute door. Phone Modem Alarm System should activate within 20 to 45 seconds.
4. If the unit does not function properly, refer to the troubleshooting section.

Step D. Disabling the Phone Modem Alarm System:

1. In the event of a Grain Dryer fault shutdown, the Phone Modem Alarm System will repeatedly dial the "call out" location every 15 minutes (or 3 hours depending on switch setting) until disabled.
2. To disable the alarm, dial the modem phone number and let the phone ring 10 to 16 times. The Phone Modem Alarm will transmit a short tone to let you know that it is disabled.

Phone Modem Installation Kit Instructions

Step E. Resetting the Phone Modem Alarm:

Once the fault condition on the Grain dryer has been cleared and the dryer reset, the Phone Modem Alarm System will automatically reset.

Note

This reset can take up to two minutes.

Step F. Answering machines at Monitor location:

Do not use an answering machine on the same telephone line as the Phone Modem Alarm System. The System can not receive calls when sharing a telephone line with an answering machine. As a result, the Phone Modem Alarm System cannot be tested or disabled.

Step G. Answering machines at “call to” locations

To best assist you in protecting your dryer operation, the Phone Modem Alarm System is designed to communicate with you personally. The Phone Modem Alarm System will continue to operate, however, it will not leave the alarm tone message on an answering machine.

Step H. Remote Status Check:

1. Dial the Phone Modem Alarm System telephone number.
2. If the telephone rings 10 to 16 times and then stops with no tone transmitted, it means that the Phone Modem Alarm System is not in an alarm condition.
3. If the Phone Modem Alarm System answers after 10 to 16 rings and you hear an alarm tone, the unit has been disabled by a previous call, and the alarm condition still exists.

Step I. Troubleshooting:

PROBLEM	PROBABLE CAUSE
1. Unit does not function	Check battery, phone line service, and cord connections. Verify that switches are set properly. (Installation steps 2-4) Make sure that the system is connected to a single phone line system.
2. Cannot disable alarm callout	Verify phone number
3. Unit tests o.k. using the pound key, but dryer shutdown does not cause alarm.	Check wiring to PLC in control Box Check that 10CH01 light on PLC is illuminated during a fault condition.

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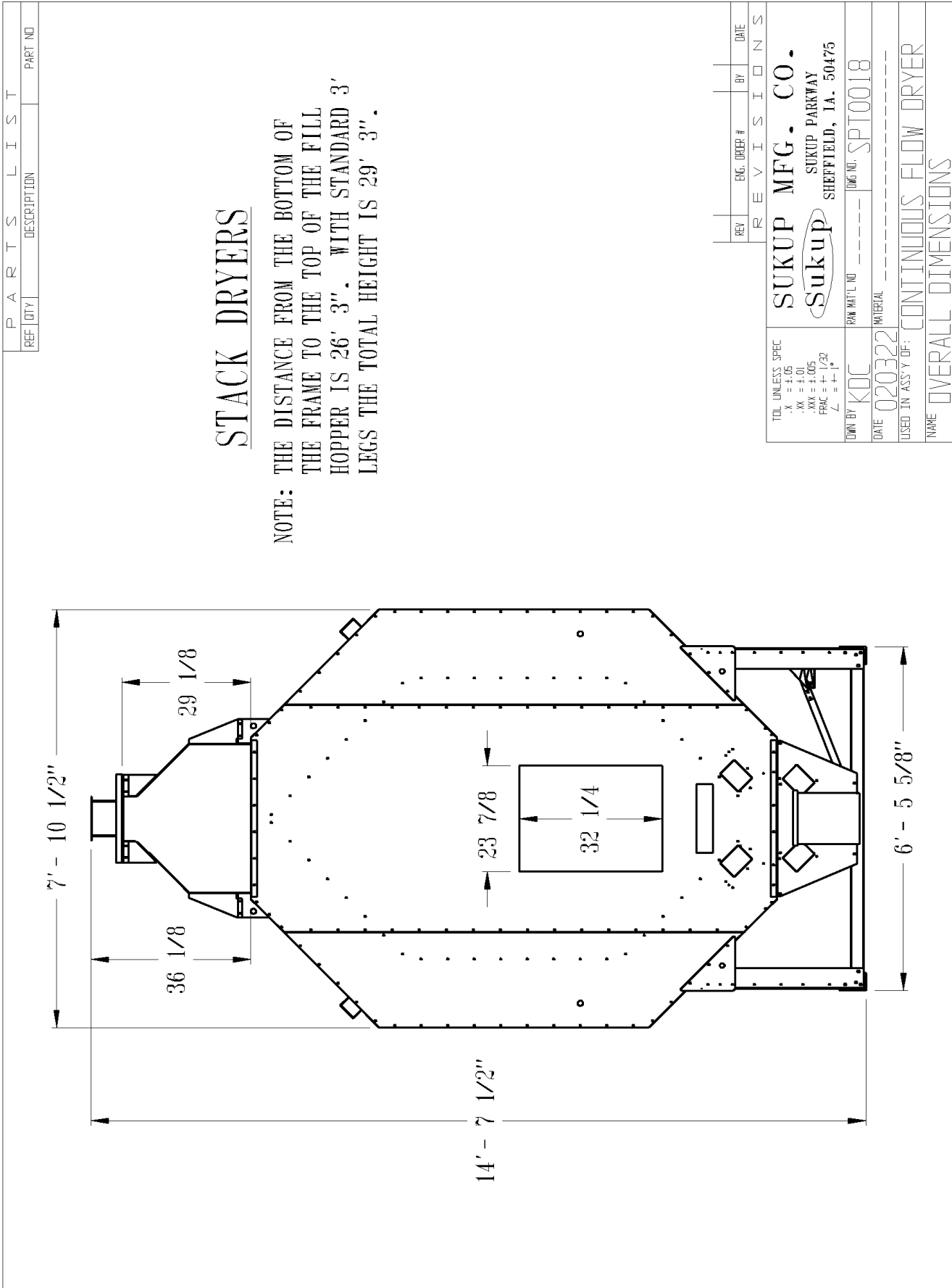
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SUKUP DRYER CATALOG TECHNICAL DATA

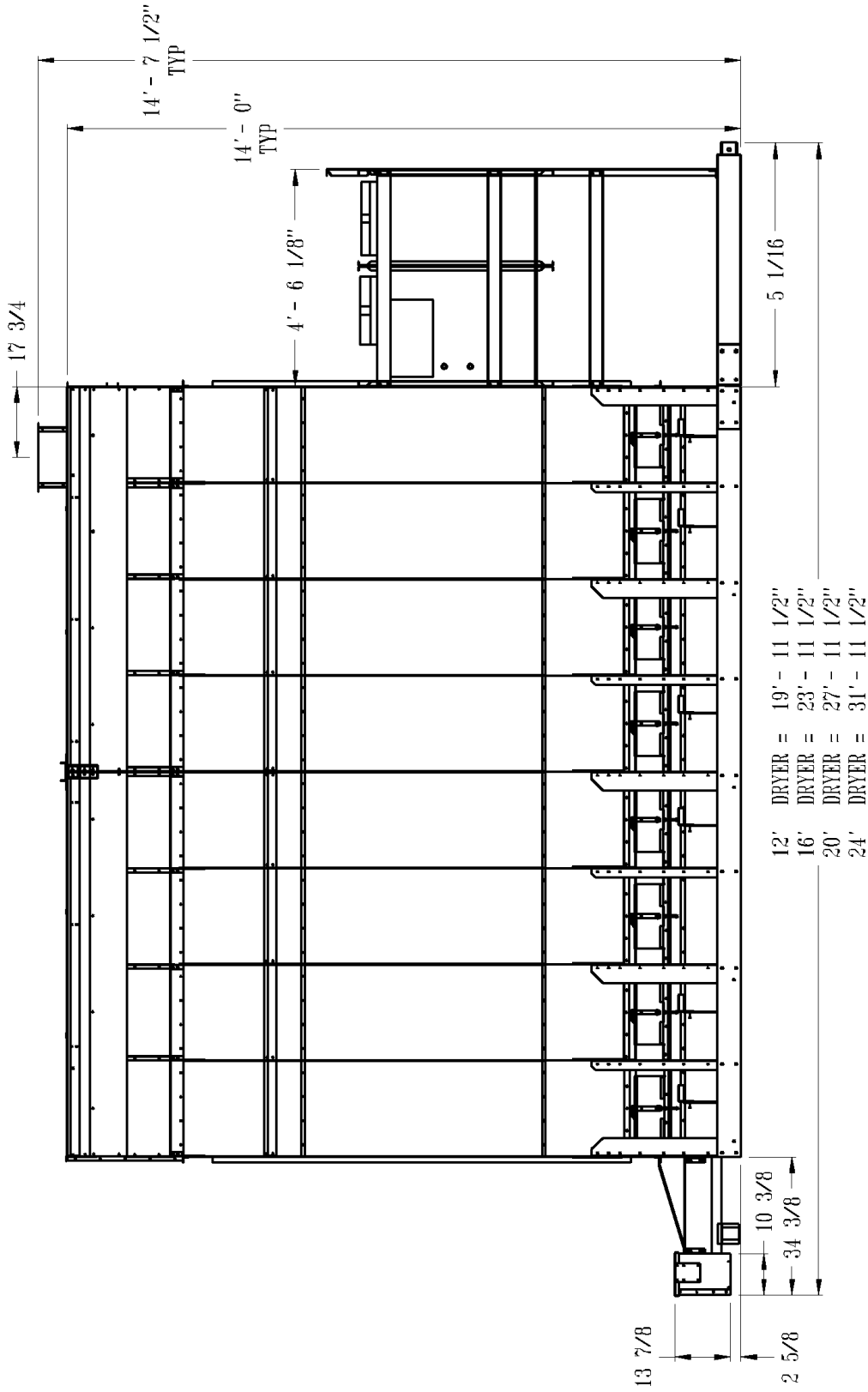
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Dimensional Drawings



P A R T S L I S T		
REF	QTY	DESCRIPTION
		PART NO



TOL UNLESS SPEC	SUKUP MFG. CO.			
.X = ±.05	Sukup SUKUP PARKWAY SHEFFIELD, IA. 50475			
.XX = ±.01				
.XXX = ±.005				
PERC = ±.1/2%				
Z = ±.1°				
OWN BY KOC				DWG NO. SPT0017
DATE 020322				MATERIAL
USED IN ASS'Y OF:	CONTINUOUS FLOW DRYER			
NAME	OVERALL DIMENSIONS			

REV	ENG. ORDER #	BY	DATE
R E V I S I O N S			



SUKUP DRYER SPECIFICATIONS

Dryer Specifications

SINGLE FAN MODELS

PART #	HP	FAN DIAMETER	FUEL	VOLT	PH	PLENUM	10 PT FULL HEAT	5 PT FULL HEAT	10 PT HEAT/COOL	5 PT HEAT/COOL	HOLD CAPACITY	BTU/HR	LOAD HP	UNLOAD HP
T1211A	10-15	38"	LP	230	1	Single	345	560	---	---	330bu	5 mill	3	3
T1211B	10-15	38"	LP	230	3	Single	345	560	---	---	330bu	5 mill	3	3
T1211C	10-15	38"	LP	460	3	Single	345	560	---	---	330bu	5 mill	3	3
T1212A	10-15	38"	NG	230	1	Single	345	560	---	---	330bu	5 mill	3	3
T1212B	10-15	38"	NG	230	3	Single	345	560	---	---	330bu	5 mill	3	3
T1212C	10-15	38"	NG	460	3	Single	345	560	---	---	330bu	5 mill	3	3
T1611A	10-15	44"	LP	230	1	Single	440	710	---	---	440bu	6 mill	3	3
T1611B	10-15	44"	LP	230	3	Single	440	710	---	---	440bu	6 mill	3	3
T1611C	10-15	44"	LP	460	3	Single	440	710	---	---	440bu	6 mill	3	3
T1612A	10-15	44"	NG	230	1	Single	440	710	---	---	440bu	6 mill	3	3
T1612B	10-15	44"	NG	230	3	Single	440	710	---	---	440bu	6 mill	3	3
T1612C	10-15	44"	NG	460	3	Single	440	710	---	---	440bu	6 mill	3	3
T2011B	30	44"	LP	230	3	Single	560	905	---	---	550bu	7 mill	5	5
T2011C	30	44"	LP	460	3	Single	560	905	---	---	550bu	7 mill	5	5
T2012B	30	44"	NG	230	3	Single	560	905	---	---	550bu	7 mill	5	5
T2012C	30	44"	NG	460	3	Single	560	905	---	---	550bu	7 mill	5	5

TWO FAN MODELS

PART #	HP	FAN DIAMETER	FUEL	VOLT	PH	PLENUM	10 PT FULL HEAT	5 PT FULL HEAT	10 PT HEAT/COOL	5 PT HEAT/COOL	HOLD CAPACITY	BTU/HR	LOAD HP	UNLOAD HP
T1631A	(1) 15hp-38", (1) 15hp-28"		LP	230	1	2/3, 1/3	500	820	310	490	440bu	5 mill/3 mill	3	3
T1631B	(1) 15hp-38", (1) 15hp-28"		LP	230	3	2/3, 1/3	500	820	310	490	440bu	5 mill/3 mill	3	3
T1632A	(1) 15hp-38", (1) 15hp-28"		NG	230	1	2/3, 1/3	500	820	310	490	440bu	5 mill/3 mill	3	3
T1632B	(1) 15hp-38", (1) 15hp-28"		NG	230	3	2/3, 1/3	500	820	310	490	440bu	5 mill/3 mill	3	3
T2031A	(1) 15hp-44", (1) 15hp-28"		LP	230	1	2/3, 1/3	600	970	355	580	550bu	6 mill/3 mill	5	5
T2031B	(1) 15hp-44", (1) 15hp-28"		LP	230	3	2/3, 1/3	600	970	355	580	550bu	6 mill/3 mill	5	5
T2032A	(1) 15hp-44", (1) 15hp-28"		NG	230	1	2/3, 1/3	600	970	355	580	550bu	6 mill/3 mill	5	5
T2032B	(1) 15hp-44", (1) 15hp-28"		NG	230	3	2/3, 1/3	600	970	355	580	550bu	6 mill/3 mill	5	5
T2021A	(2) 15hp	38"	LP	230	1	50/50	620	1000	300	470	550bu	(2) 5 mill	5	5
T2021B	(2) 15hp	38"	LP	230	3	50/50	620	1000	300	470	550bu	(2) 5 mill	5	5
T2022A	(2) 15hp	38"	NG	230	1	50/50	620	1000	300	470	550bu	(2) 5 mill	5	5
T2022B	(2) 15hp	38"	NG	230	3	50/50	620	1000	300	470	550bu	(2) 5 mill	5	5
T2431B	(1) 30hp-44", (1) 15hp-28"		LP	230	3	2/3, 1/3	710	1025	435	690	660bu	7 mill/3 mill	5	5
T2432B	(1) 30hp-44", (1) 15hp-28"		NG	230	3	2/3, 1/3	710	1025	435	690	660bu	7 mill/3 mill	5	5
T2421B	(2) 20hp	38"	LP	230	3	50/50	740	1180	350	570	660bu	(2) 5 mill	5	5
T2422B	(2) 20hp	38"	NG	230	3	50/50	740	1180	350	570	660bu	(2) 5 mill	5	5

STREAMLINE SINGLE FAN MODELS

PART #	HP	FAN DIAMETER	FUEL	VOLT	PH	PLENUM	10 PT FULL HEAT	5 PT FULL HEAT	10 PT HEAT/ COOL	5 PT HEAT/ COOL	HOLD CAPACITY	BTU/HR	LOAD HP	UNLOAD HP
T1213A	10-15	38"	LP	230	1	Single	345	560	---	---	330	5 mill	3	3
T1213B	10-15	38"	LP	230	3	Single	345	560	---	---	330	5 mill	3	3
T1213C	10-15	38"	LP	460	3	Single	345	560	---	---	330	5 mill	3	3
T1214A	10-15	38"	NG	230	1	Single	345	560	---	---	330	5 mill	3	3
T1214B	10-15	38"	NG	230	3	Single	345	560	---	---	330	5 mill	3	3
T1214C	10-15	38"	NG	460	3	Single	345	560	---	---	330	5 mill	3	3
T1613A	10-15	44"	LP	230	1	Single	440	710	---	---	440bu	6 mill	3	3
T1613B	10-15	44"	LP	230	3	Single	440	710	---	---	440bu	6 mill	3	3
T1613C	10-15	44"	LP	460	3	Single	440	710	---	---	440bu	6 mill	3	3
T1614A	10-15	44"	NG	230	1	Single	440	710	---	---	440bu	6 mill	3	3
T1614B	10-15	44"	NG	230	3	Single	440	710	---	---	440bu	6 mill	3	3
T1614C	10-15	44"	NG	460	3	Single	440	710	---	---	440bu	6 mill	3	3
T2013B	30	44"	LP	230	3	Single	560	905	---	---	550bu	7 mill	5	5
T2013C	30	44"	LP	460	3	Single	560	905	---	---	550bu	7 mill	5	5
T2014B	30	44"	NG	230	3	Single	560	905	---	---	550bu	7 mill	5	5
T2014C	30	44"	NG	460	3	Single	560	905	---	---	550bu	7 mill	5	5



SUKUP STACK DRYER SPECIFICATIONS

DOUBLE STACK MODELS

PART #	FAN	FUEL	VOLT	PH	PLENUM	10 PT FULL HEAT	5 PT FULL HEAT	10 PT HEAT/ COOL	5 PT HEAT/ COOL	HOLD CAPACITY	BTU/HR	LOAD HP	UNLOAD HP
T1651A	2 - 10 HP, 1 - 15 HP	LP	230	1	3	1000	1600	680	1080	850	13 mill	3	3
T1651B	2 - 10 HP, 1 - 15 HP	LP	230	3	3	1000	1600	680	1080	850	13 mill	3	3
T1651C	2 - 10 HP, 1 - 15 HP	LP	460	3	3	1000	1600	680	1080	850	13 mill	3	3
T1652A	2 - 10 HP, 1 - 15 HP	NG	230	1	3	1000	1600	680	1080	850	13 mill	3	3
T1652B	2 - 10 HP, 1 - 15 HP	NG	230	3	3	1000	1600	680	1080	850	13 mill	3	3
T1652C	2 - 10 HP, 1 - 15 HP	NG	460	3	3	1000	1600	680	1080	850	13 mill	3	3
T2051B	2 - 15 HP, 1 - 30 HP	LP	230	3	3	1250	2020	860	1380	1050	16.5 mill	5	5
T2051C	2 - 15 HP, 1 - 30 HP	LP	460	3	3	1250	2020	860	1380	1050	16.5 mill	5	5
T2052B	2 - 15 HP, 1 - 30 HP	NG	230	3	3	1250	2020	860	1380	1050	16.5 mill	5	5
T2052C	2 - 15 HP, 1 - 30 HP	NG	460	3	3	1250	2020	860	1380	1050	16.5 mill	5	5
T2061B	2 - 15 HP, 2 - 15 HP	LP	230	3	4	1250	2020	860	1380	1050	16.5 mill	5	5
T2061C	2 - 15 HP, 2 - 15 HP	LP	460	3	4	1250	2020	860	1380	1050	16.5 mill	5	5
T2062B	2 - 15 HP, 2 - 15 HP	NG	230	3	4	1250	2020	860	1380	1050	16.5 mill	5	5
T2062C	2 - 15 HP, 2 - 15 HP	NG	460	3	4	1250	2020	860	1380	1050	16.5 mill	5	5
T2451B	2 - 20 HP, 1 - 40 HP	LP	230	3	3	1525	2450	1030	1670	1250	20 mill	5	5
T2451C	2 - 20 HP, 1 - 40 HP	LP	460	3	3	1525	2450	1030	1670	1250	20 mill	5	5
T2452B	2 - 20 HP, 1 - 40 HP	NG	230	3	3	1525	2450	1030	1670	1250	20 mill	5	5
T2452C	2 - 20 HP, 1 - 40 HP	NG	460	3	3	1525	2450	1030	1670	1250	20 mill	5	5
T2461B	2 - 20 HP, 2 - 20 HP	LP	230	3	4	1525	2450	1030	1670	1250	20 mill	5	5
T2461C	2 - 20 HP, 2 - 20 HP	LP	460	3	4	1525	2450	1030	1670	1250	20 mill	5	5
T2462B	2 - 20 HP, 2 - 20 HP	NG	230	3	4	1525	2450	1030	1670	1250	20 mill	5	5
T2462C	2 - 20 HP, 2 - 20 HP	NG	460	3	4	1525	2450	1030	1670	1250	20 mill	5	5

TRIPLE STACK MODELS

PART #	FAN	FUEL	VOLT	PH	PLENUM	10 PT FULL HEAT	5 PT FULL HEAT	10 PT HEAT/ COOL	5 PT HEAT/ COOL	HOLD CAPACITY	BTU/HR	LOAD HP	UNLOAD HP
T1681B	2-10HP, 1-15HP, 1-15HP	LP	230	3	4	1475	2380	915	1460	1200	20 mill	5	5
T1681C	2-10HP, 1-15HP, 1-15HP	LP	460	3	4	1475	2380	915	1460	1200	20 mill	5	5
T1682B	2-10HP, 1-15HP, 1-15HP	NG	230	3	4	1475	2380	915	1460	1200	20 mill	5	5
T1682C	2-10HP, 1-15HP, 1-15HP	NG	460	3	4	1475	2380	915	1460	1200	20 mill	5	5
T2081B	2-15HP, 1-30HP, 1-30HP	LP	230	3	4	1830	2950	1125	1810	1525	25 mill	7.5	7.5
T2081C	2-15HP, 1-30HP, 1-30HP	LP	460	3	4	1830	2950	1125	1810	1525	25 mill	7.5	7.5
T2082B	2-15HP, 1-30HP, 1-30HP	NG	230	3	4	1830	2950	1125	1810	1525	25 mill	7.5	7.5
T2082C	2-15HP, 1-30HP, 1-30HP	NG	460	3	4	1830	2950	1125	1810	1525	25 mill	7.5	7.5
T2091B	2-15HP, 2-15HP, 2-15HP	LP	230	3	6	1830	2950	1125	1810	1525	25 mill	7.5	7.5
T2091C	2-15HP, 2-15HP, 2-15HP	LP	460	3	6	1830	2950	1125	1810	1525	25 mill	7.5	7.5
T2092B	2-15HP, 2-15HP, 2-15HP	NG	230	3	6	1830	2950	1125	1810	1525	25 mill	7.5	7.5
T2092C	2-15HP, 2-15HP, 2-15HP	NG	460	3	6	1830	2950	1125	1810	1525	25 mill	7.5	7.5
T2481B	2-20HP, 1-40HP, 1-40HP	LP	230	3	4	2250	3600	1380	2225	1810	30 mill	7.5	7.5
T2481C	2-20HP, 1-40HP, 1-40HP	LP	460	3	4	2250	3600	1380	2225	1810	30 mill	7.5	7.5
T2482B	2-20HP, 1-40HP, 1-40HP	NG	230	3	4	2250	3600	1380	2225	1810	30 mill	7.5	7.5
T2482C	2-20HP, 1-40HP, 1-40HP	NG	460	3	4	2250	3600	1380	2225	1810	30 mill	7.5	7.5
T2491B	2-20HP, 2-20HP, 2-20HP	LP	230	3	6	2250	3600	1380	2225	1810	30 mill	7.5	7.5
T2491C	2-20HP, 2-20HP, 2-20HP	LP	460	3	6	2250	3600	1380	2225	1810	30 mill	7.5	7.5
T2492B	2-20HP, 2-20HP, 2-20HP	NG	230	3	6	2250	3600	1380	2225	1810	30 mill	7.5	7.5
T2492C	2-20HP, 2-20HP, 2-20HP	NG	460	3	6	2250	3600	1380	2225	1810	30 mill	7.5	7.5

Pre-Installation Requirements

Location:

Location of the dryer is a very important decision to make. Numerous factors should be taken into consideration when determining where to install the Dryer. Factors to consider when selecting your site are:

1. Wet grain supply
2. Dry grain discharge
3. Location of storage bins
4. Other grain handling equipment
5. Minimum of 3 feet clearance from other structures on the side of the Dryer and 5 feet minimum clearance from other structures at the fan inlet.
6. Minimize handling distances of load and unload systems
7. Locate Dryer and storage bins in a well drained area
8. Electrical requirements (See Section 3.3)

Warning: Do not install the dryer inside a building or any other area where fuel installation regulations, and or electrical codes, and or insurance requirements do not allow.



Warning: Do not operate the dryer in an area where combustible material can be drawn into the Fan, or where load and unload augers can come in contact with power lines.



Foundation:

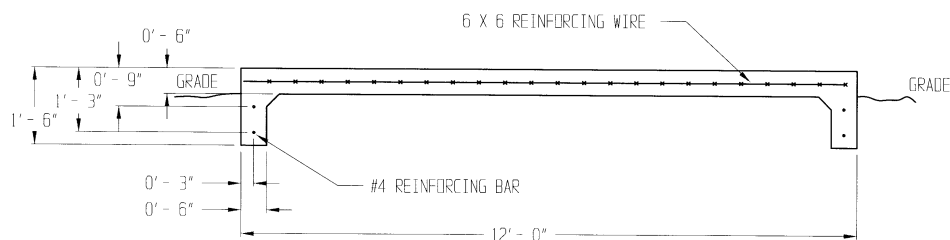
A reinforced concrete pad is recommended for dryer stability.

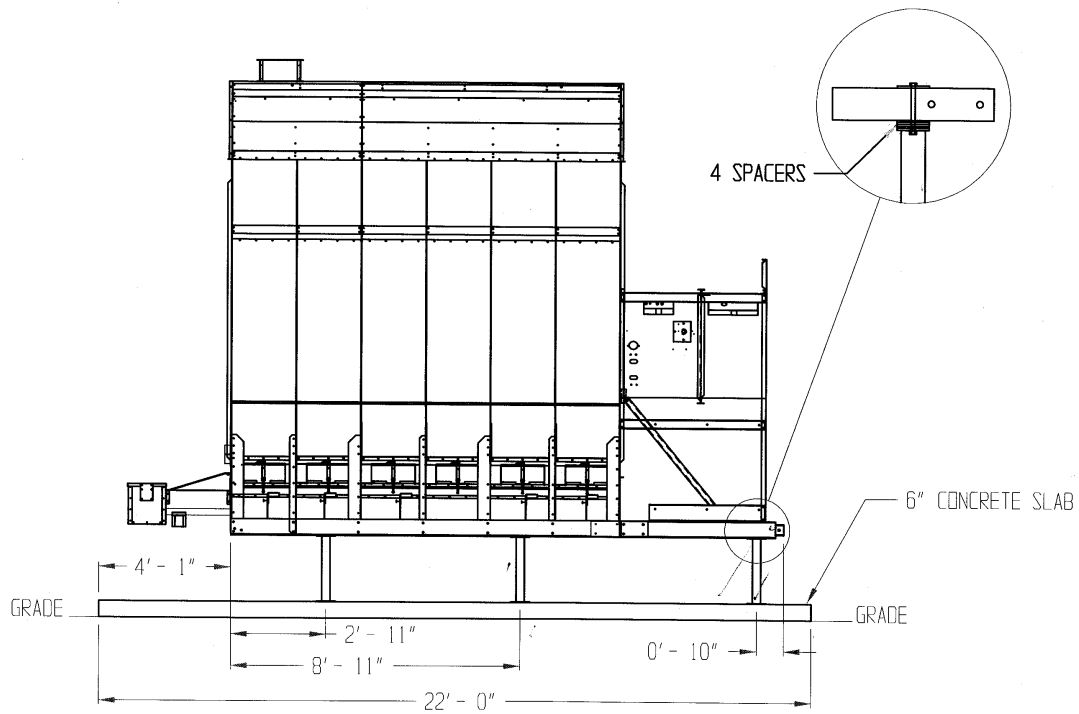
The following table is a basic guideline for materials required for each size dryer pad.

	Concrete Pad Size	Yards of Concrete
12 Foot Dryer	12' x 22'	7.1
16 Foot Dryer	12' x 26'	8.3
20 Foot Dryer	12' x 30'	9.5
24 Foot Dryer	12' x 34'	10.7

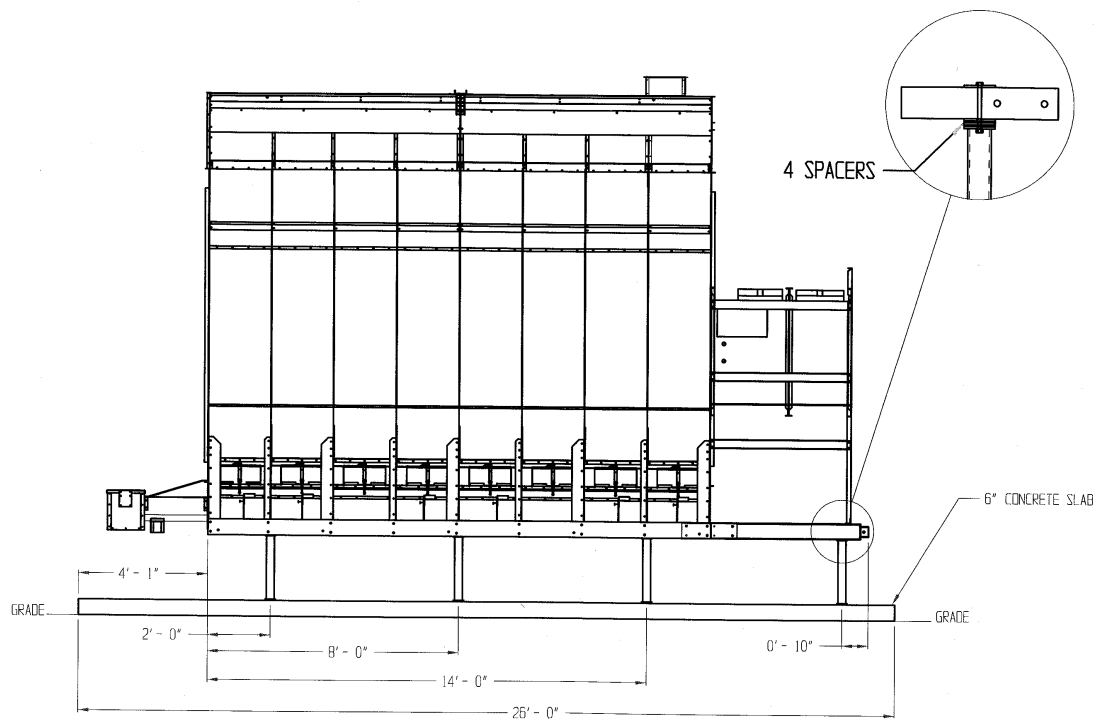
Quantities are approximate and requirements may vary due to site elevations

Foundation:

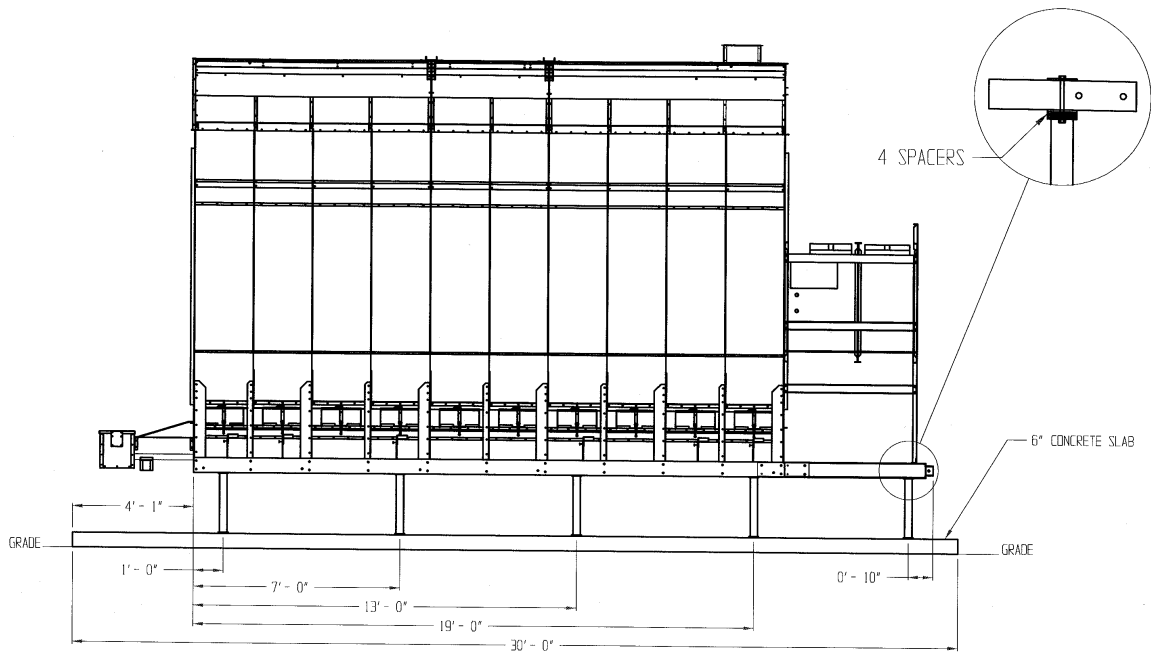




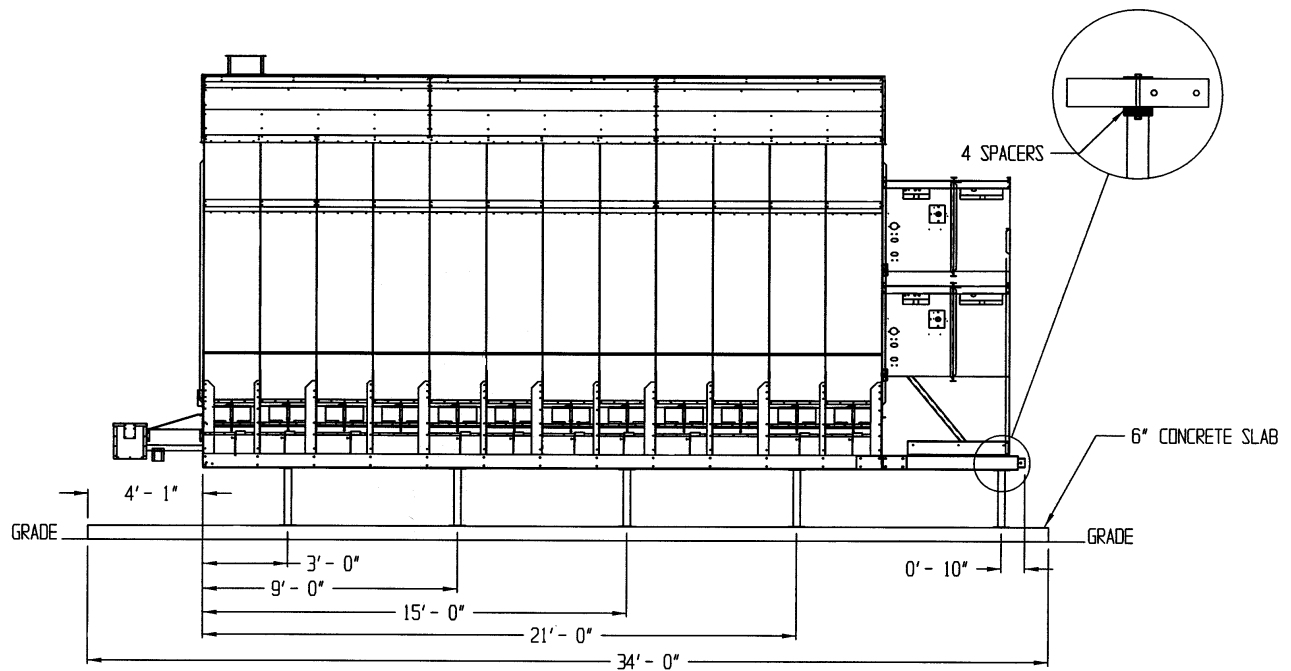
12 Foot Dryer, 22 foot long concrete pad



16 Foot Dryer, 26 foot long concrete pad



20 Foot Dryer, 30 Foot concrete pad



24 Foot Dryer, 34 Foot concrete pad

Electrical Load Requirements, Single Module Dryers

Note: A Service Rated Disconnect needs to be installed leading into the Dryer power distribution box. This disconnect is not included with the dryer and should be installed by a qualified electrician.

The following charts provide information for the electrician wiring the Grain Dryer. It is recommended that you contact your local Power Company and have a representative inspect the installation to see that your wiring is compatible with their system and that sufficient power is supplied to your dryer.

Caution: The only thing connected to the recommended service amps should be your Grain Dryer.

Standard electrical safety practices and codes should be used. Refer to the National Electrical

Code Standard Handbook by the National Fire Protection Association.

Only a qualified electrician should make all electrical wiring installation.

SINGLE FAN MODELS

T0811A - 12 Foot Dryer – Single Fan/Heater - 230 Volt – 1 Phase Main Switch = 250 Amps

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 19.0 FLA	3HP/#10 19.0 FLA	15 HP/#2 78 FLA	136 Amps	250 Amps

**** See Auxiliary Kits section for options**

T1011A - 12 Foot Dryer – Single Fan/Heater - 230 Volt – 1 Phase Main Switch = 250 Amps

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 19.0 FLA	3HP/#10 19.0 FLA	15 HP/#2 78 FLA	136 Amps	250 Amps

**** See Auxiliary Kits section for options**

T1211A - 12 Foot Dryer – Single Fan/Heater - 230 Volt – 1 Phase Main Switch = 250 Amps

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 19.0 FLA	3HP/#10 19.0 FLA	15 HP/#2 78 FLA	136 Amps	250 Amps

**** See Auxiliary Kits section for options**

T1211B - 12 Foot Dryer – Single Fan / Heater - 230 Volt – 3 Phase Main Switch = 250 Amps

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#14 8.8 FLA	3 HP/#14 8.8 FLA	15 HP/#6 42 FLA	71 Amps	250 Amps

**** See Auxiliary Kits section for options**

T1211C - 12 Foot Dryer – Single Fan / Heater - 460 Volt – 3 Phase Main Switch = 100 Amps

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#14 4.1 FLA	3 HP/#14 4.1 FLA	15 HP/#6 19.5 FLA	33 Amps	100 Amps

**** See Auxiliary Kits section for options**

**T1212A - 12 Foot Dryer – Single Fan/Heater - 230 Volt – 1 Phase, Natural Gas
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 19.0 FLA	3HP/#10 19.0 FLA	15 HP/#2 78 FLA	136 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T1212B - 12 Foot Dryer – Single Fan / Heater - 230 Volt – 3 Phase, Natural Gas
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#14 8.8 FLA	3 HP/#14 8.8 FLA	15 HP/#6 42 FLA	71 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T1212C - 12 Foot Dryer – Single Fan / Heater - 460 Volt – 3 Phase, Natural Gas
Main Switch = 100 Amps**

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#14 4.1 FLA	3 HP/#14 4.1 FLA	15 HP/#6 19.5 FLA	33 Amps	100 Amps

**** See Auxiliary Kits section for options**

**T1611A - 16 Foot Dryer – Single Fan/Heater - 230 Volt – 1 Phase
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 44"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 19.0 FLA	3HP/#10 19.0 FLA	15 HP/#3 78 FLA	136 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T1611B - 16 Foot Dryer – Single Fan / Heater - 230 Volt – 3 Phase
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 44"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 8.8 FLA	3 HP/#10 8.8 FLA	15 HP/#6 42 FLA	71 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T1611C - 16 Foot Dryer – Single Fan / Heater - 460 Volt – 3 Phase
Main Switch = 100 Amps**

	Top Auger	Bottom Auger	Fan	Minimum Amps	Maximum Amps
Motor	3HP/#14 4.1 FLA	3HP/#14 4.1 FLA	15HP/#10 19.5 FLA	33 Amps	100 Amps

**** See Auxiliary Kits section for options**

**T1612A - 12 Foot Dryer – Single Fan/Heater - 230 Volt – 1 Phase, Natural Gas
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 19.0 FLA	3HP/#10 19.0 FLA	15 HP/#2 78 FLA	136 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T1612B - 12 Foot Dryer – Single Fan / Heater - 230 Volt – 3 Phase, Natural Gas
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#14 8.8 FLA	3 HP/#14 8.8 FLA	15 HP/#6 42 FLA	71 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T2011B - 20 Foot Dryer – Single Fan / Heater - 230 Volt – 3 Phase
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 44"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	30 HP/#3 80 FLA	127 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T2011C - 20 Foot Dryer – Single Fan / Heater - 460 Volt – 3 Phase
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 44"	Minimum Amps	Maximum Amps
Motor/Wire	5HP/#12 7 FLA	5HP/#12 7 FLA	30HP/#10 39 FLA	63 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T2012B - 20 Foot Dryer – Single Fan / Heater - 230 Volt – 3 Phase, Natural Gas
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 44"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	30 HP/#3 80 FLA	127 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T2012C - 20 Foot Dryer – Single Fan / Heater - 460 Volt – 3 Phase, Natural Gas
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 44"	Minimum Amps	Maximum Amps
Motor/Wire	5HP/#12 7 FLA	5HP/#12 7 FLA	30HP/#10 39 FLA	63 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T2411B - 24 Foot Dryer – Single Fan / Heater - 230 Volt – 3 Phase
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Fan 44"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	30 HP/#3 108 FLA	135 Amps	250 Amps

**** See Auxiliary Kits section for options**

TWO FAN MODELS

T1631A – 16 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 230V – 1 Phase Main Switch = 400 Amps

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 19.0 FLA	3HP/#10 19.0 FLA	10-17HP/#3 78 FLA	10-15HP/#4 66 FLA	202 Amps	400 Amps

** See Auxiliary Kits section for options

T1631B – 16 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 230V – 3 Phase Main Switch = 250 Amps

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#14 8.8 FLA	3 HP/#14 8.8 FLA	15HP/#6 39 FLA	15HP/#6 40 FLA	107 Amps	250 Amps

** See Auxiliary Kits section for options

T1631C – 16 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 460V – 3 Phase Main Switch = 100 Amps

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 4.1 FLA	3HP/#10 4.1 FLA	10-17HP/#3 20 FLA	10-15HP/#4 19.5 FLA	47.7 Amps	100 Amps

** See Auxiliary Kits section for options

T1632A – 16 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 230V – 1 Phase, Natural Gas Main Switch = 400 Amps

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 19.0 FLA	3HP/#10 19.0 FLA	10-17HP/#3 78 FLA	10-15HP/#4 66 FLA	202 Amps	400 Amps

** See Auxiliary Kits section for options

T1632B – 16 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 230V – 3 Phase, Natural Gas Main Switch = 400 Amps

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	3 HP/#10 19.0 FLA	3HP/#10 19.0 FLA	10-17HP/#3 78 FLA	10-15HP/#4 66 FLA	202 Amps	400 Amps

** See Auxiliary Kits section for options

T2021A - 20 Foot Dryer – 2 Fan / 2 Heater - 230 Volt – 1 Phase – 50/50 split plenum Main Switch = 400 Amps

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5HP/#10 23 FLA	5HP/#10 23 FLA	15HP/#2 78 FLA	15HP/#2 78 FLA	322 Amps	400 Amps

** See Auxiliary Kits section for options

T2021B - 20 Foot Dryer – 2 Fan / 2 Heater - 230 Volt – 3 Phase – 50/50 split plenum Main Switch = 250 Amps

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	15HP/#6 42 FLA	15HP/#6 42 FLA	178 Amps	250 Amps

** See Auxiliary Kits section for options

**T2021C - 20 Foot Dryer – 2 Fan / 2 Heater - 460 Volt – 3 Phase – 50/50 split plenum
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5HP/#12 6.7 FLA	5HP/#12 6.7 FLA	15HP/#10 19.5 FLA	15HP/#10 19.5 FLA	86 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T2022B - 20 Foot Dryer – 2 Fan / 2 Heater - 230 Volt – 3 Phase – 50/50 split plenum, NG
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	15HP/#6 42 FLA	15HP/#6 42 FLA	178 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T2022C - 20 Foot Dryer – 2 Fan / 2 Heater - 460 Volt – 3 Phase – 50/50 split plenum, NG
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5HP/#12 6.7 FLA	5HP/#12 6.7 FLA	15HP/#10 19.5 FLA	15HP/#10 19.5 FLA	86 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T2031A – 20 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 230V – 1 Phase
Main Switch = 400 Amps**

	Top Auger	Bottom Auger	Upper Fan	Lower Fan	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#10 23 FLA	5HP/#10 23 FLA	10-17HP/3 78 FLA	10-15HP/4 66 FLA	210 Amps	400 Amps

**** See Auxiliary Kits section for options**

**T2031B – 20 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 230V – 3 Phase
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 44"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	5HP/#12 13.4 FLA	5HP/#12 13.4 FLA	15HP/#6 42 FLA	15HP/#6 40 FLA	176 Amps	250 Amps

**** See Auxiliary Kits section for options**

**T2031C - 20 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 460 Volt – 3 Phase
Main Switch = 100 Amps**

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5HP/#12 6.7 FLA	5HP/#12 6.7 FLA	15HP/#10 20 FLA	15HP/#10 19.5 FLA	53 Amps	100 Amps

**** See Auxiliary Kits section for options**

**T2032A – 20 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 230V – 1 Phase, Natural Gas
Main Switch = 400 Amps**

	Top Auger	Bottom Auger	Upper Fan	Lower Fan	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#10 23 FLA	5HP/#10 23 FLA	10-17HP/3 78 FLA	10-15HP/4 66 FLA	210 Amps	400 Amps

**** See Auxiliary Kits section for options**

**T2032B - 20 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 230 Volt – 3 Phase, Natural Gas
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	15HP/#6 42 FLA	15HP/#6 42 FLA	178 Amps	250 Amps

** See Auxiliary Kits section for options

**T2032C - 20 Foot Dryer – 2 Fan / Heater 2/3 – 1/3, 460 Volt – 3 Phase, Natural Gas
Main Switch = 100 Amps**

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5HP/#12 6.7 FLA	5HP/#12 6.7 FLA	15HP/#10 20 FLA	15HP/#10 19.5 FLA	53 Amps	100 Amps

** See Auxiliary Kits section for options

**T2421B - 24 Foot Dryer – 2 Fan / 2 Heater - 230 Volt – 3 Phase – 50/50 split plenum
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	20 HP/#6 52.7 FLA	20 HP/#6 52.7 FLA	202 Amps	250 Amps

** See Auxiliary Kits section for options

**T2421C - 24 Foot Dryer – 2 Fan / 2 Heater - 460 Volt – 3 Phase – 50/50 split plenum
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan	Lower Fan	Minimum Amps	Maximum Amps
Motor/Wire	5HP/#12 6.7 FLA	5HP/#12 6.7 FLA	20 HP/#10 24 FLA	20 HP/#10 24 FLA	96 Amps	250 Amps

** See Auxiliary Kits section for options

**T2422B - 24 Foot Dryer – 2 Fan / 2 Heater - 230 Volt – 3 Phase – 50/50 split plenum
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 38"	Lower Fan 38"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	20 HP/#6 52.7 FLA	20 HP/#6 52.7 FLA	202 Amps	250 Amps

** See Auxiliary Kits section for options

**T2431B – 24 Foot Dryer – 2 Fan / 2 Heater – 230 Volt – 3 Phase – 2/3-1/3 split plenum
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 44"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	30 HP/#3 80 FLA	15 HP/#6 40FLA	223 Amps	250 Amps

** See Auxiliary Kits section for options

**T2431C – 24 Foot Dryer – 2 Fan / 2 Heater – 460 Volt – 3 Phase – 2/3-1/3 split plenum
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 44"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#14 6.7 FLA	5 HP/#14 6.7 FLA	30 HP/#6 37 FLA	15 HP/#10 20 FLA	108 Amps	250 Amps

** See Auxiliary Kits section for options

**T2432B – 24 Foot Dryer – 2 Fan / 2 Heater – 230 Volt – 3 Phase – 2/3-1/3 split plenum, NG
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 44"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 13.4 FLA	5 HP/#12 13.4 FLA	30 HP/#3 80 FLA	15 HP/#6 40FLA	223 Amps	250 Amps

** See Auxiliary Kits section for options

**T2432C – 24 Foot Dryer – 2 Fan / 2 Heater – 460 Volt – 3 Phase – 2/3-1/3 split plenum, NG
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 44"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#14 6.7 FLA	5 HP/#14 6.7 FLA	30 HP/#6 37 FLA	15 HP/#10 20 FLA	108 Amps	250 Amps

** See Auxiliary Kits section for options

**T2831B – 28 Foot Dryer – 2 Fan / 2 Heater – 230 Volt – 3 Phase – 2/3-1/3 split plenum
Main Switch = 400 Amps**

	Top Auger	Bottom Auger	Upper Fan 44"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#12 20 FLA	5 HP/#12 20 FLA	30 HP/#4 80 FLA	20 HP/#6 54 FLA	174 Amps	400 Amps

** See Auxiliary Kits section for options

**T2831C – 28 Foot Dryer – 2 Fan / 2 Heater – 460 Volt – 3 Phase – 2/3-1/3 split plenum
Main Switch = 250 Amps**

	Top Auger	Bottom Auger	Upper Fan 44"	Lower Fan 28"	Minimum Amps	Maximum Amps
Motor/Wire	5 HP/#14 9.2 FLA	5 HP/#14 9.2 FLA	30 HP/#10 40 FLA	20 HP/#12 27 FLA	86 Amps	250 Amps

** See Auxiliary Kits section for options

Auxiliary Load and Unload Kit Options:

** Dryers may be equipped with auxiliary load and or unload motor starters / overloads. These can either be installed at the factory, or field installed. There are different numbers for these kits depending on if it is field or factory installed.

From the charts below, cross the desired voltage to the HP rating to get the correct auxiliary kit number.

Field Installation

HP	Voltage	Phase	Part No.	Starter/Protector	Contactore	Wire Size	Min Amps	Max Amps
5	230	1	T4270	J5230 (16-25A)	J5246 (40A)	#6	16	25
5	230	3	T4271	J4243 (13-18A)	J5246 (40A)	#8	13	18
5	460	3	T4272	J5236 (6-10A)	J5246 (40A)	#10	6	10
7.5	230	1	T4273	J5232 (25-40A)	J5247 (60A)	#6	25	40
7.5	230	3	T4274	J5230 (16-25A)	J5246 (40A)	#8	16	25
7.5	460	3	T4275	J5237 (9-14A)	J5246 (40A)	#10	9	14
10	230	1	T4276	J5242 (40-63A)	J5247 (60A)	#6	40	63
10	230	3	T4277	J5232 (25-40A)	J5246 (40A)	#8	25	40
10	460	3	T4278	J5243 (13-18A)	J5246 (40A)	#10	13	18

Factory Installation

HP	Voltage	Phase	Part No.	Starter/Protector	Contactore	Wire Size	Min Amps	Max Amps
5	230	1	T4280	J5230 (16-25A)	J5246 (40A)	#6	16	25
5	230	3	T4281	J4243 (13-18A)	J5246 (40A)	#8	13	18
5	460	3	T4282	J5236 (6-10A)	J5246 (40A)	#10	6	10
7.5	230	1	T4283	J5232 (25-40A)	J5247 (60A)	#6	25	40
7.5	230	3	T4284	J5230 (16-25A)	J5246 (40A)	#8	16	25
7.5	460	3	T4285	J5237 (9-14A)	J5246 (40A)	#10	9	14
10	230	1	T4286	J5242 (40-63A)	J5247 (60A)	#6	40	63
10	230	3	T4287	J5232 (25-40A)	J5246 (40A)	#8	25	40
10	460	3	T4288	J5243 (13-18A)	J5246 (40A)	#10	13	18

Auxiliary Load and Unload kit specifications:

- All Dryers have been pre-configured to handle up to 2 (two) 10 HP kits on single module dryers.

If additional auxiliaries are required, the Dealer is responsible to determine if the dryer can handle the additional load. If the dryer is not able to handle the extra load, the auxiliary must have it's own power source independent of the dryer.

Temperature Compensated Overloads, 3 Phase Units:

All Dryers manufactured as three phase units, are equipped with temperature compensated overloads. It is recommended if auxiliary load and unload kits are installed and not purchased from Sukup Manufacturing Company, that temperature compensated units be used.

Electrical Load Requirements, Stack Dryers

Note: A Service Rated Disconnect needs to be installed leading into the Dryer power distribution box. This disconnect is not included with the dryer and should be installed by a qualified electrician.

The following charts provide information for the electrician wiring the Grain Dryer. It is recommended that you contact your local Power Company and have a representative inspect the installation to see that your wiring is compatible with their system and that sufficient power is supplied to your dryer.

Caution: The only thing connected to the recommended service amps should be your Grain Dryer.

Standard electrical safety practices and codes should be used. Refer to the National Electrical Code Standard Handbook by the National Fire Protection Association.
Only a qualified electrician should make all electrical wiring installation.

Dryer Electrical Specifications:

T1651A - 2 Module / 16 Foot Dryer – 2 Fan / 2 Heater Module #1 - 1 Fan / 1 Heater Module #2 - 230 Volt 1 Phase – 50/50 split plenum on Modules #1 – LP
Main circuit breaker = J5216 / 400 Amp 1PH

	Module #1		Module #2		Module #3	Minimum Amps	Maximum Amps
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan		
Motor	3 HP 19 FLA	3 HP 19 FLA	10 HP 43 FLA	10 HP 43 FLA	15 HP 78 FLA	159 Amps	400 Amps

* See Auxiliary Kits section for required parts

T1651B - 2 Module / 16 Foot Dryer – 2 Fan / 2 Heater Module #1 - 1 Fan / 1 Heater Module #2 – 230 Volt 3 Phase – 50/50 split plenum on Modules #1 – LP
Main circuit breaker = J5212 / 250 Amp 3PH

	Module #1		Module #2		Module #3	Minimum Amps	Maximum Amps
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan		
Motor	3 HP 8.8 FLA	3 HP 8.8 FLA	10 HP 34 FLA	10 HP 34 FLA	20 HP 53 FLA	159 Amps	250 Amps

* See Auxiliary Kits section for required parts

T1651C - 2 Module / 16 Foot Dryer – 2 Fan / 2 Heater Module #1 - 1 Fan / 1 Heater Module #2 – 460 Volt 3 Phase – 50/50 split plenum on Modules #1 – LP
Main circuit breaker = J5212 / 250 Amp 3PH

	Module #1		Module #2		Module #3	Minimum Amps	Maximum Amps
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan		
Motor	3 HP 4.7 FLA	3 HP 4.7 FLA	10 HP 18 FLA	10 HP 18 FLA	15 HP 23 FLA	69 Amps	250 Amps

* See Auxiliary Kits section for required parts

T1652A - 2 Module / 16 Foot Dryer – 2 Fan / 2 Heater Module #1 - 1 Fan / 1 Heater Module #2 - 230 Volt 1 Phase – 50/50 split plenum on Modules #1 – LP
Main circuit breaker = J5216 / 400 Amp 1PH

	Module #1		Module #2		Module #3	Minimum Amps	Maximum Amps
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan		
Motor	3 HP 19 FLA	3 HP 19 FLA	10 HP 43 FLA	10 HP 43 FLA	15 HP 78 FLA	159 Amps	400 Amps

* See Auxiliary Kits section for required parts

**T2051B - 2 Module / 20 Foot Dryer – 2 Fan / 2 Heater Module #1 – 1 Fan / 1 Heater
Module #2- 230 Volt, 3 Phase – 50/50 split plenum on Module #1 – LP
Main circuit breaker = J5214 / 400 Amp**

	Module #1		Module #2			Minimum Amps	Maximum Amps
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan		
Motor	5 HP 13.4 FLA	5 HP 13.4 FLA	15HP 42FLA	15HP 42FLA	30HP 80FLA	280 Amps	400 Amps

* See Auxiliary Kits section for required parts

**T2051C - 2 Module / 20 Foot Dryer – 2 Fan / 2 Heater Module #1 - 1 Fan / 1 Heater Module
#2 – 460 Volt 3 Phase – 50/50 split plenum on Modules #1 – LP
Main circuit breaker = J5212 / 250 Amp 3PH**

	Module #1		Module #2			Minimum Amps	Maximum Amps
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan		
Motor	5 HP 6.7 FLA	5 HP 6.7 FLA	15 HP 20 FLA	15 HP 20 FLA	30 HP 37 FLA	69 Amps	250 Amps

* See Auxiliary Kits section for required parts

**T2052B - 2 Module/ 20 Foot Dryer – 2 Fan / 2 Heater Module #1 –
1 Fan / 1 Heater Module #2 - 230 Volt, 3 Phase – 50/50 split plenum on Module #1 - NG
Main circuit breaker = J5214 / 400 Amp**

	Module #1		Module #2			Minimum Amps	Maximum Amps
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan		
Motor	5 HP 13.4 FLA	5 HP 13.4 FLA	15HP 42 FLA	15HP 42 FLA	30HP 80 FLA	267 Amps	400 Amps

** See Auxiliary Kits section for required parts

**T2052C - 2 Module / 20 Foot Dryer – 2 Fan / 2 Heater Module #1 - 1 Fan / 1 Heater Module
#2 – 460 Volt 3 Phase – 50/50 split plenum on Modules #1 – NG
Main circuit breaker = J5212 / 250 Amp 3PH**

	Module #1		Module #2			Minimum Amps	Maximum Amps
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan		
Motor	5 HP 6.7 FLA	5 HP 6.7 FLA	15 HP 20 FLA	15 HP 20 FLA	30 HP 37 FLA	69 Amps	250 Amps

* See Auxiliary Kits section for required parts

**T2061B - 2 Module / 20 Foot Dryer – 2 Fan / 2 Heater Module #1 - 2 Fan / 2 Heater Module
#2 – 230 Volt 3 Phase – 50/50 split plenum on Modules– LP
Main circuit breaker = J5214 / 400 Amp**

	Module #1		Module #2				Minimum Amps	Maximum Amps
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan		
Motor	5 HP 15.2 FLA	5 HP 15.2 FLA	15 HP 42 FLA	15 HP 42 FLA	15 HP 42 FLA	15 HP 42 FLA	265 Amps	400 Amps

** See Auxiliary Kits section for required parts

T2061C - 2 Module / 20 Foot Dryer – 2 Fan / 2 Heater Module #1 - 2 Fan / 2 Heater Module #2 – 460 Volt 3 Phase – 50/50 split plenum on Modules #1 & #2 – LP

Main circuit breaker = J5212 / 250 Amp 3PH

	Module #1		Module #2					
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan	Minimum Amps	Maximum Amps
Motor	5 HP 6.7 FLA	5 HP 6.7 FLA	15 HP 20 FLA	15 HP 20 FLA	15 HP 20 FLA	15 HP 20FLA	94 Amps	250 Amps

* See Auxiliary Kits section for required parts

T2062B - 2 Module/ 20 Foot Dryer – 2 Fan / 2 Heater Module #1 – 2 Fan/2 Heater Module #2 - 230 Volt 3 Phase – 50/50 split plenum on Mod #1 & #2 – NG

Main circuit breaker = J5214 / 400 Amp

	Module #1		Module #2					
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan	Minimum Amps	Maximum Amps
Motor	5 HP 15.2 FLA	5 HP 15.2 FLA	15 HP 42 FLA	15 HP 42 FLA	15 HP 42 FLA	15 HP 42 FLA	265 Amps	400 Amps

** See Auxiliary Kits section for required parts

T20XXB – 3 Module / 20 Foot Dryer – 2 Fan / 2 Heater Module #1 – 2 Fan / 2 Heater Mod #2 – 2 Fan / 2 Heater Module #3 – 230 Volt 3Phase – 50/50 split plenum on all mods - LP

Main circuit breaker = J5214 / 400 Amp

	Module #1		Module #2		Module #3					
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan	#5 Fan	#6 Fan	Min Amps	Max Amps
Motor	5 HP 13.4 FLA	5 HP 13.4 FLA	15 HP 42 FLA	15 HP 42 FLA	15 HP 42 FLA	15 HP 42 FLA	15 HP 42 FLA	15 HP 42 FLA	346 Amps	400 Amps

** See Auxiliary Kits section for required parts

T20XXC – 3 Module / 20 Foot Dryer – 2 Fan / 2 Heater Module #1 – 2 Fan / 2 Heater Mod #2 – 2 Fan / 2 Heater Module #3 – 460 Volt 3Phase – 50/50 split plenum on Modules - LP

Main circuit breaker = J5212 / 250 Amp

	Module #1		Module #2		Module #3					
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan	#5 Fan	#6 Fan	Min Amps	Max Amps
Motor	5 HP 6.7 FLA	5 HP 6.7 FLA	15 HP 20FLA	15 HP 20 FLA	15 HP 20 FLA	15 HP 20 FLA	15 HP 20 FLA	15 HP 20 FLA	165 Amps	250 Amps

** See Auxiliary Kits section for required parts

T2451B - 2 Module / 24 Foot Dryer – 2 Fan / 2 Heater Module #1- 1 Fan / 1 Heater Module #2 - 230 Volt 3 Phase – 50/50 split plenum on Module #1 – LP

Main circuit breaker = J5214 / 400 Amp

		Module #1		Module #2			
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	Minimum Amps	Maximum Amps
Motor	5 HP 13.4 FLA	5 HP 13.4 FLA	20 HP 52.7 FLA	20 HP 52.7 FLA	40 HP 108 FLA	324 Amps	400 Amps

** See Auxiliary Kits section for required parts

T2451C - 2 Module / 24 Foot Dryer – 2 Fan / 2 Heater Module #1 - 1 Fan / 1 Heater Module #2 – 460 Volt 3 Phase – 50/50 split plenum on Modules #1 – LP
Main circuit breaker = J5212 / 250 Amp 3PH

	Module #1		Module #2				
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	Minimum Amps	Maximum Amps
Motor	5 HP 6.7 FLA	5 HP 6.7 FLA	20 HP 24 FLA	20 HP 24 FLA	40 HP 49 FLA	69 Amps	250 Amps

* See Auxiliary Kits section for required parts

T2452B - 2 Module/ 24 Foot Dryer – 2 Fan / 2 Heater Module #1 -1 Fan / 1 Heater Module #2 – 230 Volt 3 Phase – 50/50 split plenum on Module #1 – NG
Main circuit breaker = J4847 / 400 Amp

	Module #1		Module #2				
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	Minimum Amps	Maximum Amps
Motor	5 HP 13.4 FLA	5 HP 13.4 FLA	20 HP 52.7 FLA	20 HP 52.7 FLA	40 HP 108 FLA	324 Amps	400 Amps

** See Auxiliary Kits section for required parts

T2461B - 2 Module / 24 Foot Dryer – 2 Fan / 2 Heater Module #1 – 2 Fan / 2 Heater Mod #2 230 Volt 3 Phase – 50/50 split plenum on Modules – LP
Main circuit breaker = J4847 / 400 Amp

	Module #1		Module #2					
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan	Minimum Amps	Maximum Amps
Motor	5 HP 15.2 FLA	5 HP 15.2 FLA	20 HP 54 FLA	20 HP 54 FLA	20 HP 54 FLA	20 HP 54 FLA	294 Amps	400 Amps

** See Auxiliary Kits section for required parts

T2462B - 2 Module / 24 Foot Dryer – 2 Fan / 2 Heater Module #1 - 2 Fan / 2 Heater Module #2 - 230 Volt 3 Phase – 50/50 split plenum on Modules - NG
Main circuit breaker = J4847 / 400 Amp

	Module #1		Module #2					
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan	Minimum Amps	Maximum Amps
Motor	5 HP 13.4FLA	5 HP 13.4FLA	20 HP 52.7FLA	20 HP 52.7FLA	20 HP 52.7FLA	20 HP 52.7FLA	294 Amps	400 Amps

** See Auxiliary Kits section for required parts

T2482B – 3 Module / 24 Foot Dryer – 2 Fan / 2 Heater Module #1 – 1 Fan / 1 Heater Mod #2 – 1 Fan / 1 Heater Module #3 – 230 Volt 3 Phase – 50/50 split plenum on Mod #1 – NG
Main circuit breaker = 400 AMP

	Module #1		Module #2		Module #3			
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan	Minimum Amps	Maximum Amps
Motor	7.5 HP 20 FLA	7.5 HP 20 FLA	20 HP 52.7 FLA	20 HP 52.7 FLA	40 HP 108 FLA	40 HP 108 FLA	390 Amps	400 Amps

**** If Auxiliary Kits are needed, an external power supply must be provided

**T2491C – 3 Module / 24 Foot Dryer – 6 Fan / 6 Heater Module #1 – 2 Fan / 2 Heater Mod#2
2 Fan / 2 Heater Module #3 – 460 Volt 3Phase – 50/50 split plenum on Modules - LP
Main circuit breaker = J5212 / 250 Amp**

	Module #1		Module #2		Module #3					
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan	#5 Fan	#6 Fan	Min Amps	Max Amps
Motor	7.5 HP 9.2 FLA	7.5 HP 9.2 FLA	20 HP 24 FLA	20 HP 24 FLA	20 HP 24 FLA	20 HP 24 FLA	20 HP 24 FLA	20 HP 24 FLA	200 Amps	250 Amps

** See Auxiliary Kits section for required parts

**T2492C – 3 Module / 24 Foot Dryer – 6 Fan / 6 Heater Module #1 – 2 Fan / 2 Heater Mod
#2 – 2 Fan / 2 Heater Module #3 – 460 Volt 3Phase – 50/50 split plenum on Modules - NG
Main circuit breaker = J5212 / 250 Amp**

	Module #1		Module #2		Module #3					
	Upper Auger	Lower Auger	#1 Fan	#2 Fan	#3 Fan	#4 Fan	#5 Fan	#6 Fan	Min Amps	Max Amps
Motor	7.5 HP 9.2 FLA	7.5 HP 9.2 FLA	20 HP 24 FLA	20 HP 24 FLA	20 HP 24 FLA	20 HP 24 FLA	20 HP 24 FLA	20 HP 24 FLA	200 Amps	250 Amps

** See Auxiliary Kits section for required parts

Auxiliary Load and Unload Kit Options:

** Dryers may be equipped with auxiliary load and or unload motor starters / overloads. These can either be installed at the factory, or field installed. There are different numbers for these kits depending on if it is field or factory installed.

From the charts below, cross the desired voltage to the HP rating to get the correct auxiliary kit number.

Field Installation

HP	Voltage	Phase	Part No.	Starter/Protector	Contactore	Wire Size	Min Amps	Max Amps
5	230	3	T4620	J4243 (13-18A)	J5246 (40A)	#8	13	18
5	460	3	T4272	J5236 (6-10A)	J5246 (40A)	#10	6	10
7.5	230	3	T4623	J5230 (16-25A)	J5246 (40A)	#8	16	25
7.5	460	3	T4275	J5237 (9-14A)	J5246 (40A)	#10	9	14
10	230	3	T4626	J5232 (25-40A)	J5246 (40A)	#8	25	40
10	460	3	T4278	J5243 (13-18A)	J5246 (40A)	#10	13	18

Factory Installation

HP	Voltage	Phase	Part No.	Starter/Protector	Contactore	Wire Size	Min Amps	Max Amps
5	230	3	T4630	J4243 (13-18A)	J5246 (40A)	#8	13	18
5	460	3	T4282	J5236 (6-10A)	J5246 (40A)	#10	6	10
7.5	230	3	T4633	J5230 (16-25A)	J5246 (40A)	#8	16	25
7.5	460	3	T4634	J5237 (9-14A)	J5246 (40A)	#10	9	14
10	230	3	T4636	J5232 (25-40A)	J5246 (40A)	#8	25	40
10	460	3	T4637	J5243 (13-18A)	J5246 (40A)	#10	13	18

Auxiliary Load and Unload kit specifications:

- Dryers have been pre-configured to handle up to 2 (two) 10 HP kits on **single** module dryers.

****If additional auxiliaries are required, the Dealer is responsible to determine if the dryer can handle the amperage load. If the dryer is not able to handle the extra load, the auxiliary must have it's own power source independent of the dryer.

Temperature Compensated Overloads, 3 Phase Units:

All Dryers manufactured as three phase units, are equipped with temperature compensated overloads. It is recommended if auxiliary load and unload kits are installed and not purchased from Sukup Manufacturing Company, that temperature compensated units be used.

Fuel Information

LIQUID PROPANE

Sukup dryers for liquid propane use must be connected to a supply tank to draw liquid from the bottom of the tank. The tank should be 1,000 gallons or larger, and have no regulator mounted to it. The connection to the dryer should be with a flexible hose designed for LP gas. Have your LP gas supplier make proper connections and safety controls to meet local codes and National Fire Protection Association standards.

Do not use tanks that have previously been used for ammonia or fertilizer solutions. These substances are extremely corrosive and can damage fuel supply and burner parts.

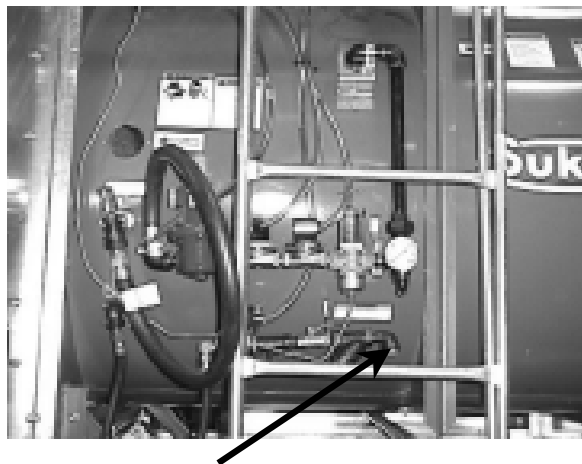
Water in the supply tank may freeze in the pipe train or controls, causing damage. To ensure the tank is free of moisture, the best precaution is to purge with methanol. Check with the gas supplier if this needs to be done. Do not use tanks with an accumulation of oil or heavy hydrocarbons from long use on a vapor withdrawal system.

If more than one tank is needed to supply liquid propane to the dryer, the vapor sides of the tanks must be connected together to equalize the pressure from each tank. Have your LP gas supplier make proper connections and safety controls to meet local codes and National Fire Protection Association standards.

FUEL SYSTEM RECOMMENDATIONS

LIQUID PROPANE

DRYER SIZE	MAXIMUM HEAT CAPACITY (BTU/HR)	MAXIMUM FUEL FLOW (GAL/HR)	FUEL LINE SIZE (MINIMUM UP TO 100')
12 FT, SINGLE HEATER	5,000,000	54	1 / 2"
16 FT, SINGLE HEATER	6,000,000	65	1 / 2"
16 FT, 2 MODULE	13,000,000	142	3 / 4"
16 FT, 3 MODULE	20,000,000	218	1"
20 FT, SINGLE HEATER	7,000,000	76	1 / 2"
20 FT, DUAL HEATER	9,000,000	98	3 / 4"
20 FT, 2 MODULE	16,500,000	180	3 / 4"
20 FT, 3 MODULE	25,000,000	272	1"
24 FT, DUAL HEATER	10,000,000	109	3 / 4"
24 FT, 2 MODULE	20,000,000	218	1"
24 FT, 3 MODULE	30,000,000	326	1"



1. See fuel specification chart above for recommended line size.
2. DO NOT use a pressure regulator at the supply tank.
3. Open LP shut-off valves slowly to prevent inadvertent closing of excess flow valves

Connection to liquid manifold on Dryer

NATURAL GAS

Sukup dryers for natural gas use are designed to function at a heat value of approximately 1000 BTU per cubic foot. A regulated pressure of 15 PSI must be provided for connection to the dryer. Ensure also that sufficient volume is maintained for the correct operating pressure.

NATURAL GAS

DRYER SIZE		MAXIMUM HEAT CAPACITY (BTU/HR)	MAXIMUM FUEL FLOW (CUBIC FEET/HR)	FUEL LINE SIZE (MINIMUM UP TO 100')
12 FT, SINGLE HEATER		5,000,000	5000	1 1 / 2"
16 FT, SINGLE HEATER		6,000,000	6000	1 1 / 2"
16 FT, 2 MODULE		13,000,000	13,000	2 1 / 2"
16 FT, 3 MODULE		20,000,000	20,000	2 1 / 2"
20 FT, SINGLE HEATER		7,000,000	7000	2"
20 FT, DUAL HEATER		9,000,000	9000	2"
20 FT, 2 MODULE		16,500,000	16,500	2 1 / 2"
20 FT, 3 MODULE		25,000,000	25,000	3"
24 FT, DUAL HEATER		10,000,000	10,000	2"
24 FT, 2 MODULE		20,000,000	20,000	2 1 / 2"
24 FT, 3 MODULE		30,000,000	30,000	3"



1. See fuel specification chart above for
2. recommended line size.

Connection to natural gas manifold on dryer

2 fan/heater natural gas dryer

Dryer Installation Information

Dryer set up / supports:

⚠ Warning: The wheel transport kit is for transport only and is NOT to be used when operating the dryer. The dryer MUST be mounted and supported in an approved manner.

The dryer must be mounted a minimum of 16 inches above the surface to allow for clean out.

Optional dryer supports are available from Sukup Mfg. in 2-foot, 3-foot, and 4-foot lengths. The support kits come with attaching hardware to attach the supports to the dryer frame. Customer must supply hardware for attachment to concrete pad (Recommend 1/2" or 5/8" hardware).

Optional Dryer ladder extensions are available from Sukup Mfg. in 2-foot, 3-foot and 4-foot lengths.

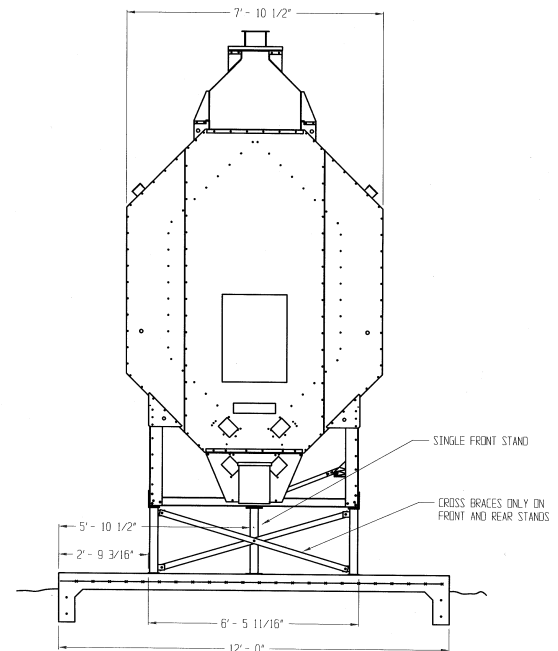
Contact your Sukup Dealer to order either the supports and / or ladder extensions.

Refer to pages 9 and 10 for proper support leg locations for 12, 16, 20 and 24 foot dryers.

Cross support braces and Front stand

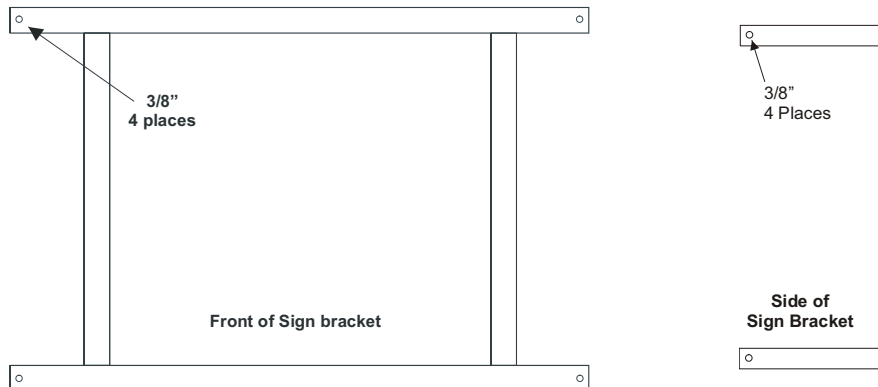
If the dryer is not mounted using Sukup Mfg supports, the following guidelines must be followed:

- Supports under grain columns must be at least every 6 feet
- Support under front hitch
- Tie down dryer to foundation



Installation of customer sign

A sign, showing customer name or farm name and / or dealer name, is provided at no additional charge by Sukup Manufacturing. The dealer will order the sign, specifying the appropriate information to be printed on it.



The bracket pictured above can be mounted to the outside of the dryer, on any two-foot grain column section. The sign is then mounted to the bracket.



Unload Auger Time Delay Off and Secondary Auxiliary Time Delay Off Adjustment

If you desire to have your unload system have a timed delay off function, (To clear augers so as not to heavily load them on restart), this is provided. This feature is adjustable from 0 to 60 seconds of "Off Delay".

If you desire to have your second fill auxiliary have a timed delay off function, (To clear any vertical augers so as not to heavily load them on restart) this is also provided. This feature is adjustable from 0 to 20 seconds of "Off Delay".

The function of the auxiliaries is detailed in the General Dryer Functions, p 27 in the technical data portion of the catalog.

The following steps will guide you through both procedures.

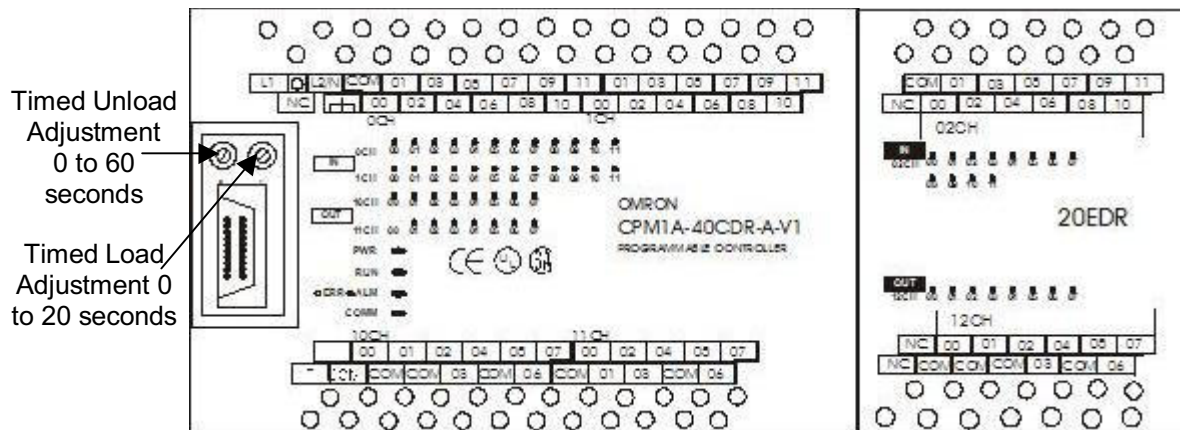
Note: The unload and fill system will still shut off immediately under the following conditions for safety reasons. 1.) Rear Door open. 2.) Grain discharge chute open. 3.) Motor Overload.

Step 1. Gain access to the inside of the control box by opening the front door and the inner panel.

Step 2. Locate the Programmable Logic Controller, (PLC), which is on the middle of the back panel.

Step 3. Open the access door by lifting up on the right side (hinged on left). (Refer to picture above)

Step 4. There are two adjustable potentiometers located at the top of opening (see picture below).



General Dryer Operation

Continuous Flow:

Continuous Flow dryer operation requires creating a gradient of moisture from the top to the bottom of the dryer and is accomplished by three main functions; initial dry, stabilization, and continuous flow. Before the first drying operation is started, the user must enter the incoming moisture and the desired output moisture into the control panel. These moistures are used to calculate the time necessary to perform the initial dry at a set temperature, during which no grain is unloaded from the dryer. After initial dry is complete, the user will set the desired drying plenum temperatures and the controller calculates a meter roll speed corresponding to the input plenum temperatures. The dryer then performs a stabilization routine. During stabilization, a gradient of moisture is established in the dryer by drying and unloading one full load of corn without adjusting the meter roll speed. After stabilization has completed, the dryer enters continuous flow operation. During this operation, the dryer adjusts the meter roll speed for variances seen in the actual output moisture compared to the desired output moisture. When the final dry of the season is achieved, the user simply enters the final dry function and follows the simple instructions listed on the screen of the control panel.

When continuing a drying operation after the dryer has run out of grain or has been shut down, it is often desirable to run with the settings as before the shut down. Therefore, quick methods of restarting the dryer have been developed to meet this demand. Restarting the dryer with or without stabilization, depending upon the particular situation, can be accomplished by following a short series of steps, laid out on the control panel screen during normal startup operation.

Automatic Batch:

Automatic batch is a standard feature of the Sukup Continuous Flow Grain **Dryer. Batch operations enable operators to dry their grain in a manner they have** become accustomed to, enables them to dry extremely wet grain, and allows single fan dryers to be operated in a heat cool manner.

Two controlling operations of automatic batch have been developed. The first method dries batches according to time entries. The operator enters set times into the control panel during which the dryer will heat, cool, and unload the grain. During unload the dryer calculates the average moisture of each batch and prints it. The user can then adjust the time entries according to the desired output moisture. The second method of operation requires purchasing the temperature control option. The operator enters a desired dry temperature value into the control panel. When the kernel temperature in the column reaches the set temperature, the dryer proceeds to the next operation.

The set variables may be changed to the operator's choosing at anytime during the batch operation.

Grain Transfer:

Increasingly, operators require the dryer to transfer grain through it to reach their storage facilities. A mode of grain transfer has been developed to simplify this process. The control panel display steps the user through a simple process to begin and end the procedure through normal startup operation.

Manual:

Manual operation serves many purposes. When operators want complete control of their dryer, manual operation fulfills this need. Manual operation serves as a redundant control set, allowing the user to operate their dryer while the dealer meets any necessary service demands. Manual operation is a simple procedure of manually turning on fans, heaters, loads, and unloads. The dryer automatically loads the dryer during manual operation while the user has control of the meter roll speeds.

Auxiliary Operation:

Auxiliary controls can be setup in a number of configurations. Three control channels exist, one for the auxiliary unload and two for the auxiliary fill. For the unload, a single control channel is used to start an external unload device at the same time as the unload of the dryer. The auxiliary fill operations have two control channels. When turning the fill of the dryer on, a delay of 5 seconds exists between the start of each motor, the dryer fill motor, the first auxiliary load, and the second auxiliary load. The fill paddle will send a signal to the controls that the dryer is nearly full, a switch is triggered to turn the second auxiliary load off. This operation can be delayed by up to 20 seconds with a simple setting on the PLC, explained in detail in the manual. Upon the signal that the dryer is completely full, all auxiliary motors are shut off. If the second auxiliary is within its delay period, it will shut off when the dryer is full.

Time delay off:

A time delay off has been included with the dryer to allow up to a 60 second clean out of the dryer to be performed upon shut down. The instructions to set-up this operation are listed in the manual.

Optional Phone Modem:

An optional phone modem, purchased separately, can be used to contact the operator of the dryer upon shutdown.

Appendix A: Estimated Bushels Per Hour Information Per Module

Dryer	12 Foot 1 Module	16 Foot 1 Module	20 Foot 1 Module	24 Foot 1 Module	16 Foot 2 Module	20 Foot 2 Module	24 Foot 2 Module	20 Foot 3 Module	24 Foot 3 Module
10% Meter Roll	120	160	200	240	240	300	360	300	360
20% Meter Roll	240	320	400	480	480	600	720	600	720
30% Meter Roll	360	480	600	720	720	900	1,080	900	1,080
40% Meter Roll	480	640	800	960	960	1,200	1,440	1,200	1,440
50% Meter Roll	600	800	1,000	1,200	1,200	1,500	1,800	1,500	1,800
60% Meter Roll	720	960	1,200	1,440	1,440	1,800	2,160	1,800	2,160
70% Meter Roll	840	1,120	1,400	1,680	1,680	2,100	2,520	2,100	2,520
80% Meter Roll	960	1,280	1,600	1,920	1,920	2,400	2,880	2,400	2,880
90% Meter Roll	1,080	1,440	1,800	2,160	2,160	2,700	3,240	2,700	3,240
100% Meter Roll	1,200	1,600	2,000	2,400	2,400	3,000	3,600	3,000	3,600

Appendix B: Sukup Dryer Suggested Dealer Parts Inventory

Number of Dryers Sold	Comp #	Description	Qty
1	J6772	3 Position Amber Switch	1
	J6777	Contact Block behind switch	1
	J5260	Auxiliary Contact kits 30-60 Amp	1
	J38802	120V Ice Cube Relay	1
	J3881	120 Volt Relay Socket	1
	J38804	240V Ice Cube Relay	1
	J38811	240 V Relay Socket	1

Number of Dryers Sold	Comp #	Description	Qty
5	J6707	SCR-Bottom w/metal plate	1
	J6709	SCR-Signal Isolator	1
	J5536	SCR-Resistor	1
	J5862	Air Pressure Switch	1
	J6019	Screen For Air Flow Switch	1
	J4483	Proximity Switch	1

Number of Dryers Sold	Comp #	Description	Qty
10	F60672	Complete Processor Board	1
	J6726	PLC, Omron, programmed	1
	J6757	PLC expander module	1
	F60673	I/O Board Complete - 2 Fan	1
	J6780	Plenum Temp Display	1
	J6791	Plenum RTD Amp Board	1
	J5641	RTD Transmitter, sends signal to amp board	1
	J5642	RTD Capillary, 16 foot	1
	J5643	RTD Capillary, 24 foot	1
	F60337	Output Moisture Sensor	1
	F60679	LCD Complete, Control Panel Screen	1
	J47602	Keypad16-key	1
	J4630	Power Supply - control panel	1
	J4733	Printer	1
	F60674	Power supply Harness	1
	F60678	Keypad Harness	1
	F6087	Printer Harness	1
	F7080	Programmed PROM	1
	J48184	½ Amp Breaker	1
	J48185	3 Amp Breaker	1
	J4547	Control Panel Switch LED	1
	J4548	Control Panel Switch Light Bulb	1

Upgrade Kits

Comp #	Description	Qty
F69985	Sensor & EPROM update	1
F6092	Control Panel Heater	1
T17999	Dryer Phone Modem	1

Remanufactured Boards

Comp #	Description	Qty
F60672R-T	Rebuilt Processor Through Hole	1
F60672S-T	Rebuilt Processor Surface Mount	1
F60673-R	Rebuilt Single Fan I/O Board	1
F60520-R	Rebuilt Two Fan I/O Board	1

Parts must be readily accessible from an electrical wholesaler

Comp #	Description	Qty
J4658	3 Amp Glass Fuse	1
J46684	7 Amp Cartridge Fuse	1
J46685	10 Amp Cartridge Fuse	1
J4678	0.25 Amp Mini Fuse	1
J4679	0.5 Amp Glass Fuse	1
J5317	B19.5 Overload Heater	1
J5349	C90 Overload Heater	1
J5353	5.5 To 8.0 Amp Overload	1
J5354	7.0 To 10.0 Amp Overload	1
J5357	12.0 To 18.0 Amp Overload	1
J5358	37 To 50 Amp Overload	1
J5359	17 To 25 Amp Overload	1
J5360	48 To 65 Amp Overload	1
J5363	60 To 100 Amp Overload	1

Safety Circuits necessary for operation, recommended

Comp #	Description	Qty
J4487	Rear Door Switch	1
F6991	Chain And Key For Rear Door Switch	1
J5900	Vapor High Limit Switch	1
J5772	Heater Housing High Limit Switch	1
J4516	Grain Column Over Temperature Switch	1
J4440	Tilt Switch	2
J4483	Proximity Switch - Unload And Meter Rolls	1
J5862	Air Pressure Switch	1
J5747	Flame Sensor	2
J4533	Grain Column Overtemp 24 Ft. (New Capillary Type)	1
J4532	Grain Column Overtemp 16 Ft. (New Capillary Type)	1
J4516	Plenum Overtemp Switch	1

Common heater parts on all units

Comp #	Description	Qty
D3948	Board, Sukup, Ignition	1
D40246	Wire Harness, Ignition	1
D4402	Light, Red, With Spades	1
F60344	Circuit Assembly, MOV & RC	1
J3880	Relay, Dayton	1
J3881	Socket, 11 pin	1
J5595	Relay, Purge	1
J5772	Hi Limit, Brnr, W/RS	1
J5747	Flame Sensor	1
J5739	Spark Plug	1

Specific pipe train components for heaters with specific size fans

Fan Size	Comp #	Description	Qty
28" LP	J6025	1/4" Liquid Solenoid Valve	1
	J6030	1/4" Liquid Solenoid Coil	1
	J6111	1/2" Regulator	1
	J6254	1/2" Solenoid Valve	1
	J6268	1/2" Solenoid Coil	1
	J6177	1/2" Mod Valve Capillary	1

28" NG	J6264	3/4" Solenoid Valve	1
	J6268	3/4" Solenoid Coil	1
	J6180	3/4" Mod Valve Capillary	1

38" LP & 44" 15 HP LP	J6257	1/2" Liquid Solenoid Valve	1
	J6256	1/2" Liquid Coil	1
	J6112	3/4" Regulator	1
	J6264	3/4" Solenoid Valve	1
	J6268	3/4" Solenoid Coil	1
	J6180	3/4" Mod Valve Capillary	1

38" NG & 44" 15 HP NG	J6247	1 1/2" Solenoid Valve & Coil	1
	J6182	1 1/4" Mod Valve Capillary	1

44" 30 HP LP & 44" 40 HP LP	J6257	1/2" Liquid Solenoid Valve	1
	J6256	1/2" Liquid Coil	1
	J6112	3/4" Regulator	1
	J6264	3/4" Solenoid Valve	1
	J6268	3/4" Solenoid Coil	1
	J6180	3/4" Mod Valve Capillary	1

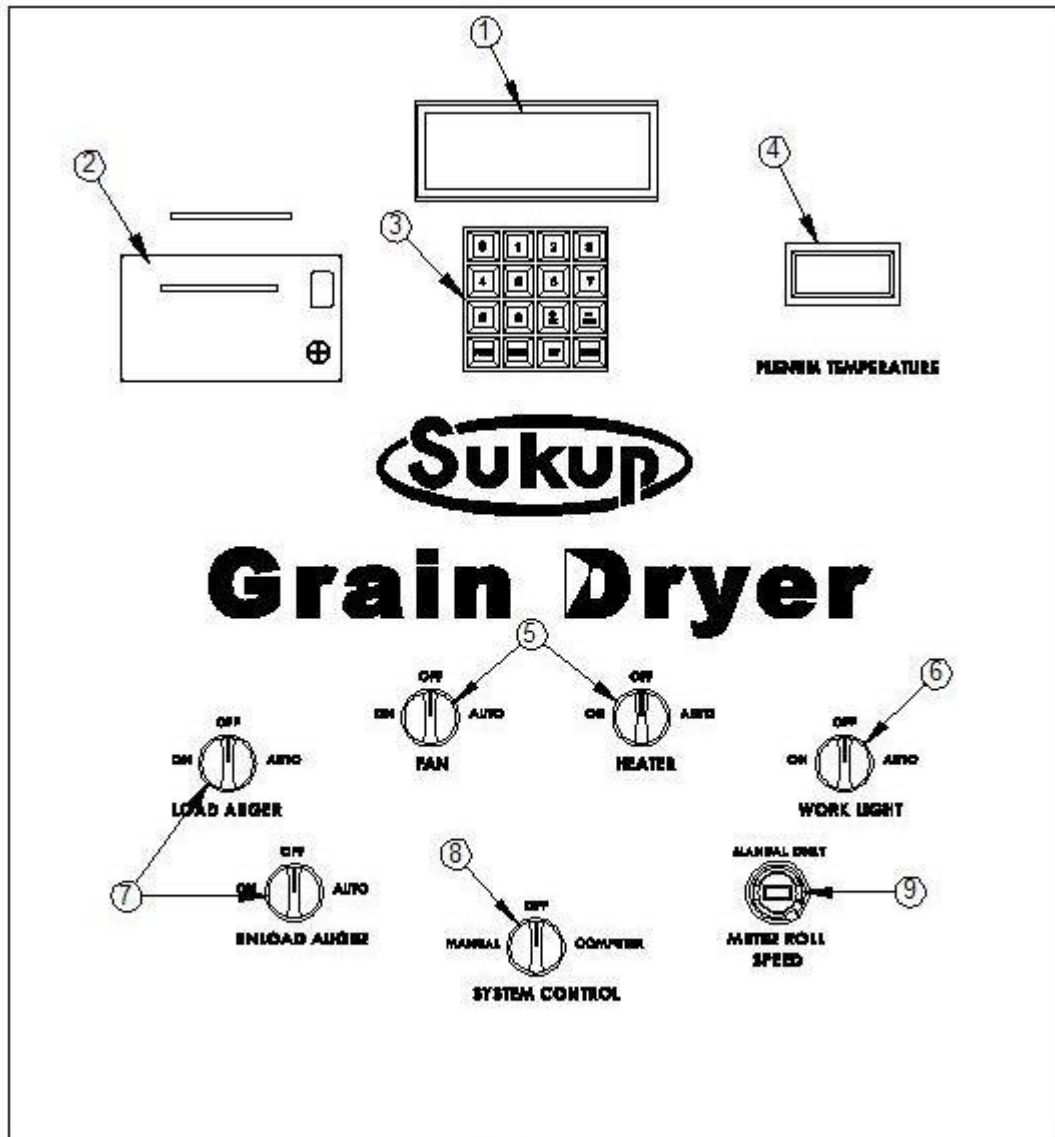
44" 30 HP NG & 44" 40 HP NG	J6247	1 1/2" Solenoid Valve & Coil	1
	J6155	2" Mod Valve Capillary	1

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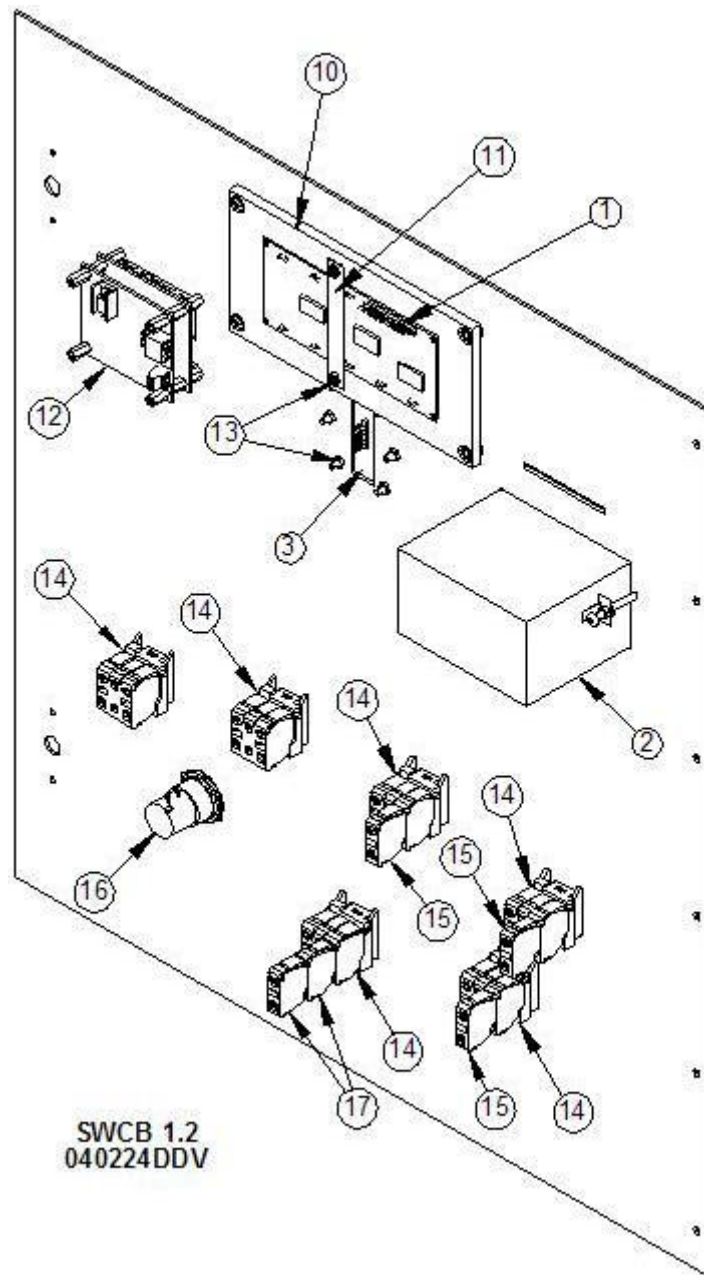
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SWCB1.1 Control Box Front Panel – Single Fan Diagram

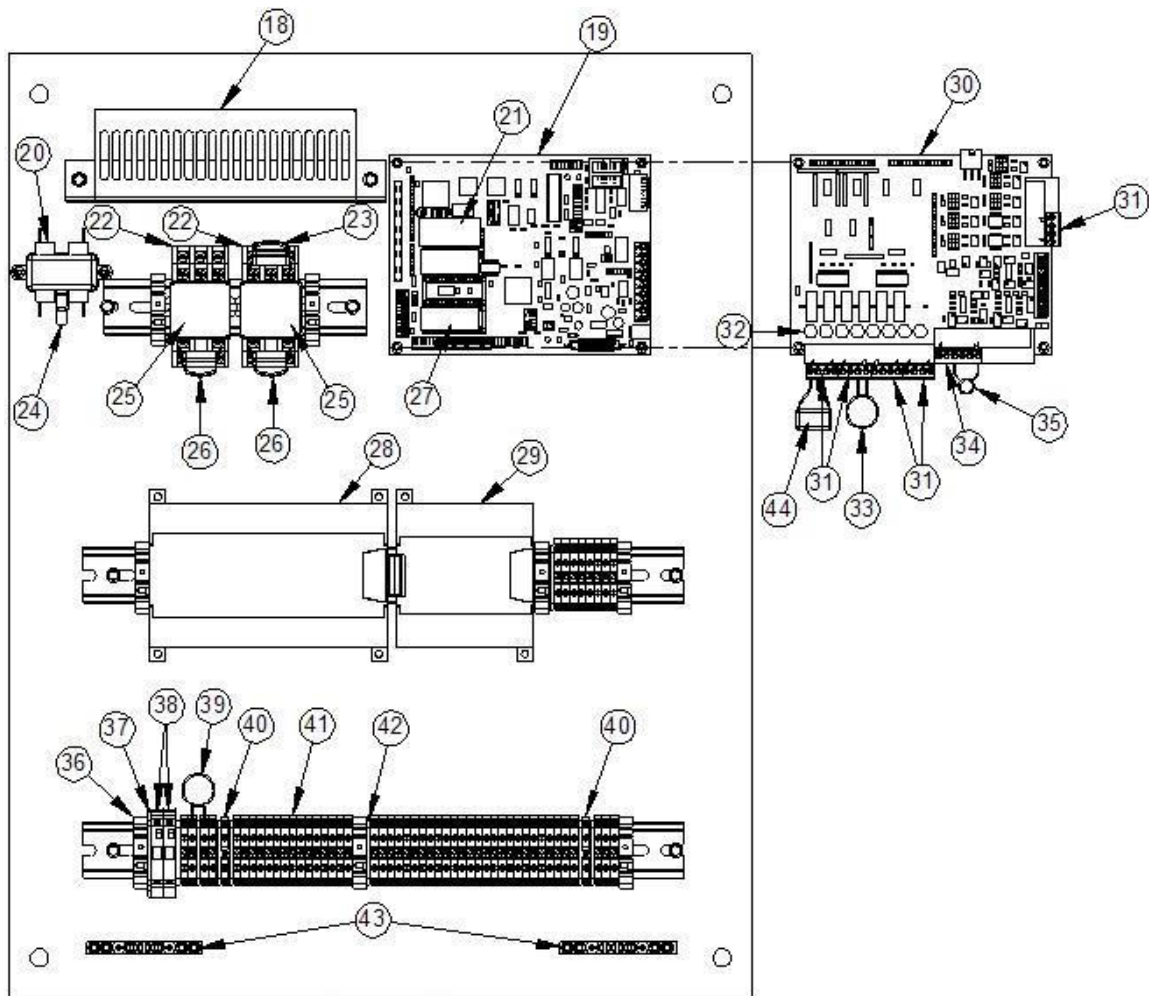


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SWCB1.2 Control Box Front Panel (Rear) Diagram



SWCB1.3 Control Box Inside Panel Diagram

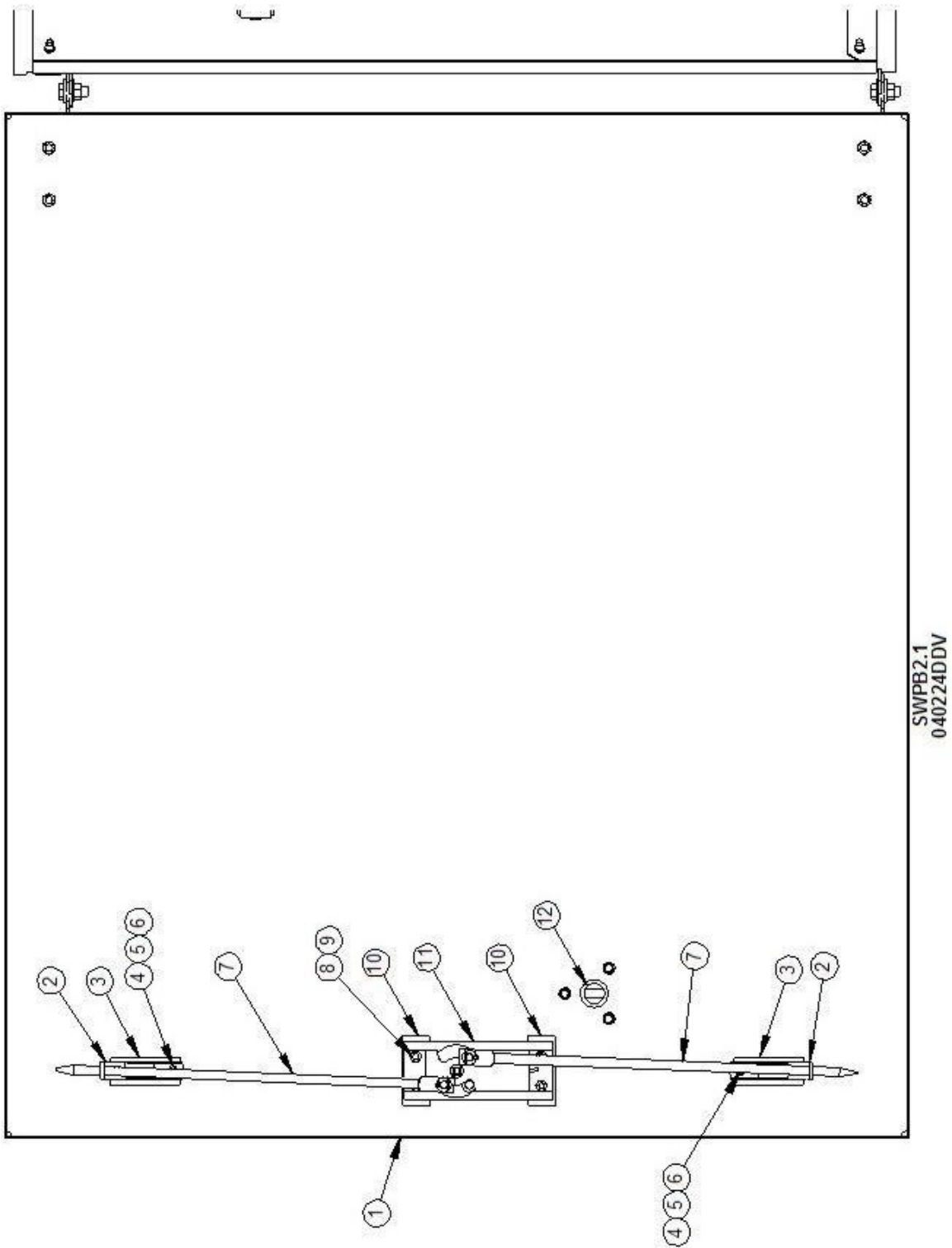


SWCB1.3
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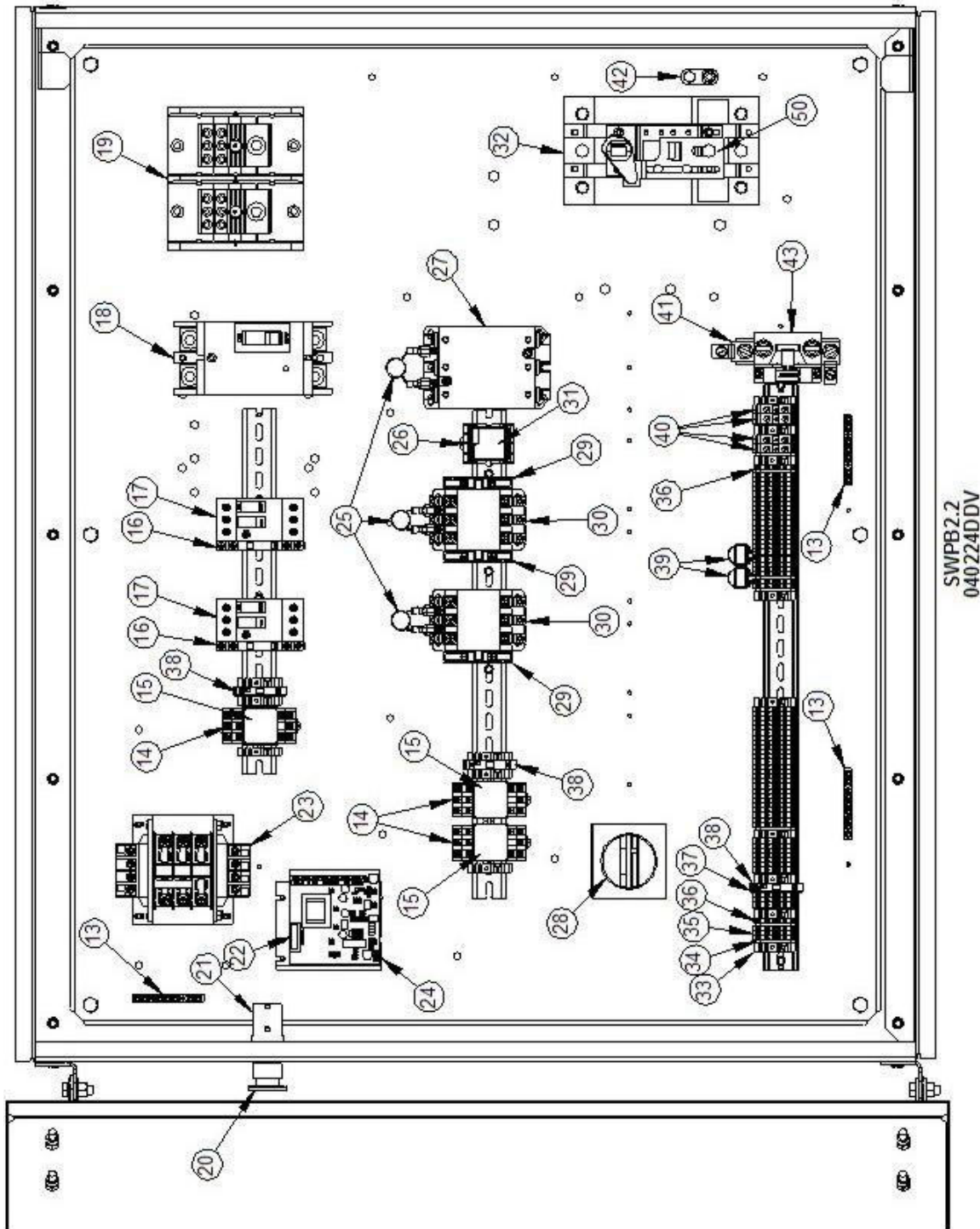
SINGLE FAN / SINGLE & THREE PHASE PARTS – CONTROL BOX

Part Label Number	Drawing Number	Parts for Model Numbers: T1211, T1212, T1611, T1612, T2011, & T2012	Description
1	SWCB1.1 & SWCB1.2	F60679	LCD,W/CONNECTOR
2	SWCB1.1 & SWCB1.2	J4733	PRINTER,DATAC PM 1000
3	SWCB1.1 & SWCB1.2	J47602	KEYPAD,84SY3326-70
4	SWCB1.1	J47511	FILTER & BEZEL,ASSEMBLY
5	SWCB1.1	J6772	AMBER 3 POS.ILLUM.OPERATOR
6	SWCB1.1	J6774	OPERATOR,CLEAR,3 POS.ILLUM.
7	SWCB1.1	J6773	BLUE 3 POS.ILLUM.OPERATOR
8	SWCB1.1	J6775	OPERATOR,GREEN,3 POS.ILLUM
9	SWCB1.1	F606701	ASSEMBLY,POTENTIOMETER
10	SWCB1.2	T16474	FRAME,DISPLAY
11	SWCB1.2	J6768	EXTRUS,TOP MARKING,TME 2
12	SWCB1.2	J6780 & J6791	BOARD,TEMP DISPLAY & BOARD,RTD AMP
13	SWCB1.2	J0982	NUT,HEX,6-32,PLT,MS
14	SWCB1.2	J6777	SUPPLYLIGHT,DIRECT,W/2N.O
15	SWCB1.2	J6792	CONTACT,SUPLITE,2N.C
16	SWCB1.2	J6734	POTENTIOMETER,MULTI-TURN
17	SWCB1.2	J6771	CONTACT,SUPLITE,2N.0
18	SWCB1.3	F6068	BRACKET,MOUNTING,TEL
19	SWCB1.3	F60672	PROCESSOR,COMPLETE
20	SWCB1.3	J4751	FILTER,CORCOM,1VB1
21	SWCB1.3	J4603	SMART WATCH,DS1243Y-120
22	SWCB1.3	J3881	SOCKET,11 PIN,8501NR82
23	SWCB1.3	F60343	CIRCUIT, ASSY, 10J MOV & RC
24	SWCB1.3	QP23934	ADAPTOR,3 WAY (63V)
25	SWCB1.3	J38802	RELAY,8501KU13V20
26	SWCB1.3	F60344	CIRCUIT, ASSY, 100J MOV&RC
27	SWCB1.3	T7080V3.4	PROM, PROGRAM, 2005
28	SWCB1.3	J6726	OMRON PLC
29	SWCB1.3	J6757	EXPANDER MODULE
30	SWCB1.3	J46501	I/O BOARD POPULATED
31	SWCB1.3	J4641	4 TERMINAL PLUG
32	SWCB1.3	J4678	SCHURTER MINI FUSE, 0.25A
33	SWCB1.3	J6787	VARISTOR,100 JOULE
34	SWCB1.3	J4623	PLUG,6 TERMINAL
35	SWCB1.3	F60346	CIRCUIT, .1UF CAP & SHRINK
36	SWCB1.3	J6754	STOP,DIN END
37	SWCB1.3	N/A	N/A
38	SWCB1.3	J48184	½ AMP BREAKER
39	SWCB1.3	J6787	VARISTOR,100 JOULE
40	SWCB1.3	J67491	GROUND,TERMINAL
41	SWCB1.3	J67504	TERMINAL,FEED THRU
42	SWCB1.3	J67532	BARRIER,END
43	SWCB1.3	J47901	GROUND BAR,7 HOLE ALUM
44	SWCB1.3	F60347	CIRCUIT,ASSY,RC ONLY

SWPB2.1 Power Box Door Diagram



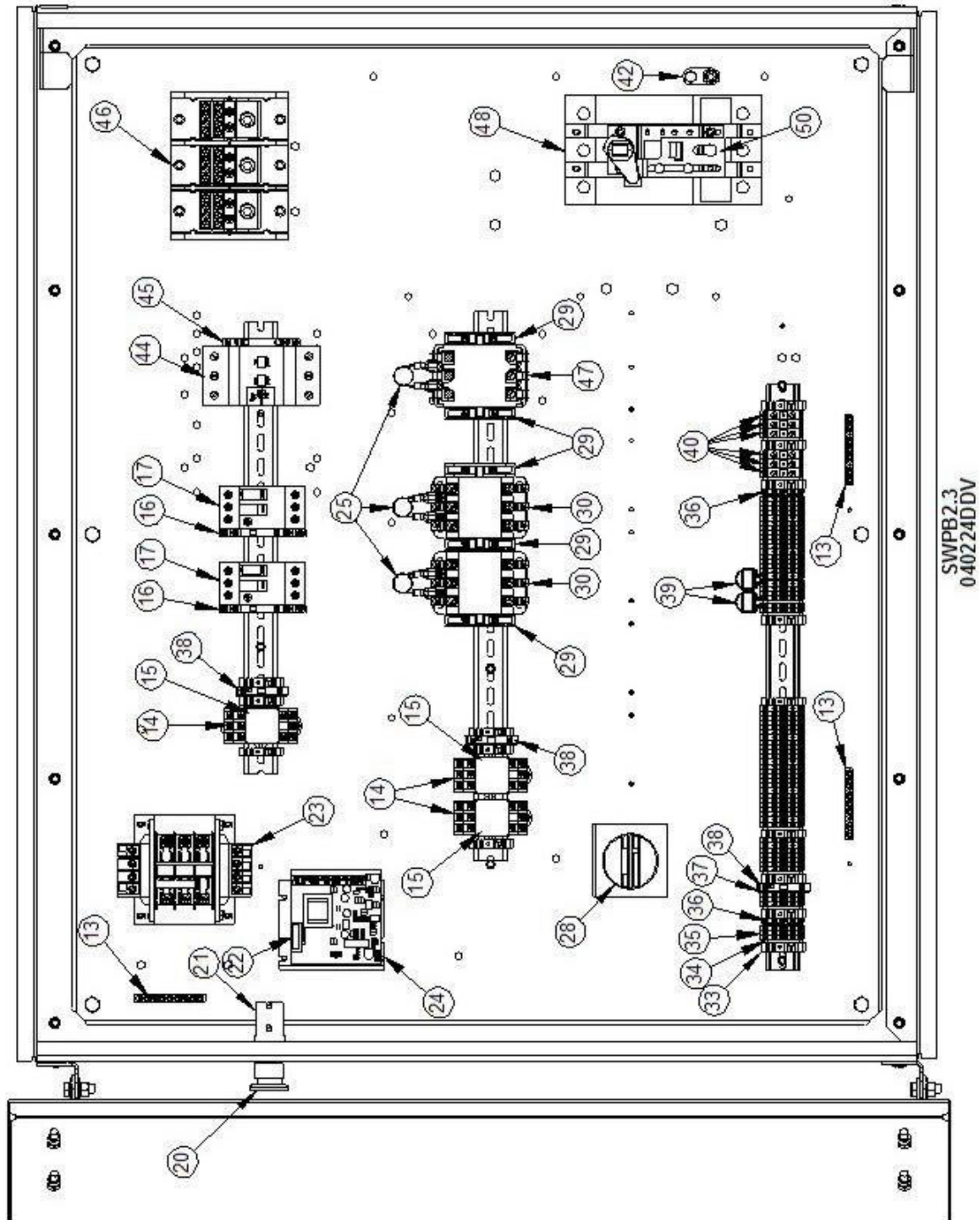
SWPB2.2 Power Box Single Phase / Single Fan Diagram



SINGLE FAN / SINGLE PHASE 230 VOLT PARTS – POWER BOX

Part Label Number	Drawing Number	Parts for Model Numbers: T1211, T1212, T1611, & T1612	Description
1	SWPB2.1	T16511	DOOR, POWER DIST BOX
2	SWPB2.1	Part of T16525	SHAFT, SWITCH DISCONNECT, W/OP
3	SWPB2.1	T16520	SPACER, NYLON, GUIDE
4	SWPB2.1	J0472	SCREW, 10-24 X 1 1/4, HEX
5	SWPB2.1	Part of T16525	SHAFT, SWITCH DISCONNECT, W/OP
6	SWPB2.1	J0985	NUT, HEX, 10-24, PLT, MS
7	SWPB2.1	T16523	POWER BOX LATCH RODS (PR), W/LOC
8	SWPB2.1	J0513	SCREW, 1/4-20, 1.25, PLT, GR5, HHCS
9	SWPB2.1	J0990	NUT, HEX, 1/4-20, PLT
10	SWPB2.1	T16521	SPACER, NYLON, LATCH
11	SWPB2.1	Part of T16525	SHAFT, SWITCH DISCONNECT, W/OP
12	SWPB2.1	Part of T16525	SHAFT, SWITCH DISCONNECT, W/OP
13	SWPB2.2	J47901	GROUND BAR, 7 HOLE ALUM
14	SWPB2.2	J3881	SOCKET, 11 PIN
15	SWPB2.2	J38802	RELAY
16	SWPB2.2	J5265	AUX CONTACT
17	SWPB2.2	J5238	STARTER, PROTECTOR, 17-23 AMPS
18	SWPB2.2	J4818	BREAKER, FAN CIRCUIT, 150AMP
19	SWPB2.2	J6698	BLOCK, POWER DIST, 1P
20	SWPB2.2	J4492	OPERATOR, MUSHROOM, 2 POS. MAINT
21	SWPB2.2	J6729	DIRECT SUPPLY LIGHT MOD. W/N.C.
22	SWPB2.2	J5536	RESISTOR, 1/2 TO 1H, SCR BRD
23	SWPB2.2	J6706	COVER ASS'Y
24	SWPB2.2	J6794	SCR, DC DRIVE
25	SWPB2.2	J6787 & J3829	VARISTOR, 100 JOULE & SPADE, FEMALE
26	SWPB2.2	J38811	SOCKET, ROUND 8 PIN
27	SWPB2.2	J5248	CONTACTOR, 90A, 115V
28	SWPB2.2	J4766	HOURLY METER, 115V, 60HZ
29	SWPB2.2	J5260	AUX CONT, 30/60AMP
30	SWPB2.2	J5246	CONT, 40A, 115V CL
31	SWPB2.2	J38804	RELAY, 8PIN
32	SWPB2.2	J5213	SWITCH, MAIN, 250 AMP 2 POLE
33	SWPB2.2	J6754	STOP, DIN END
34	SWPB2.2	J67532	BARRIER, END
35	SWPB2.2	J67504	TERMINAL, FEED THRU
36	SWPB2.2	J67491	GROUND, TERMINAL
37	SWPB2.2	J67481	CAP, END, FUSE
38	SWPB2.2	J67471	TERMINAL, FUSE
39	SWPB2.2	F60344	CIRCUIT, ASSY, 100J MOV&RC
40	SWPB2.2	J67421	TERMINAL, FEED THRU, 70 AMP
41	SWPB2.2	J5274	OVERLOAD, 86 AMPS
42	SWPB2.2	J4048 & J1195	LUG, COPPER TERMINAL & WASHER, LOCK
43	SWPB2.2	J5349	HEATER STRIP

SWPB2.3 Power Box Three Phase / Single Fan Diagram

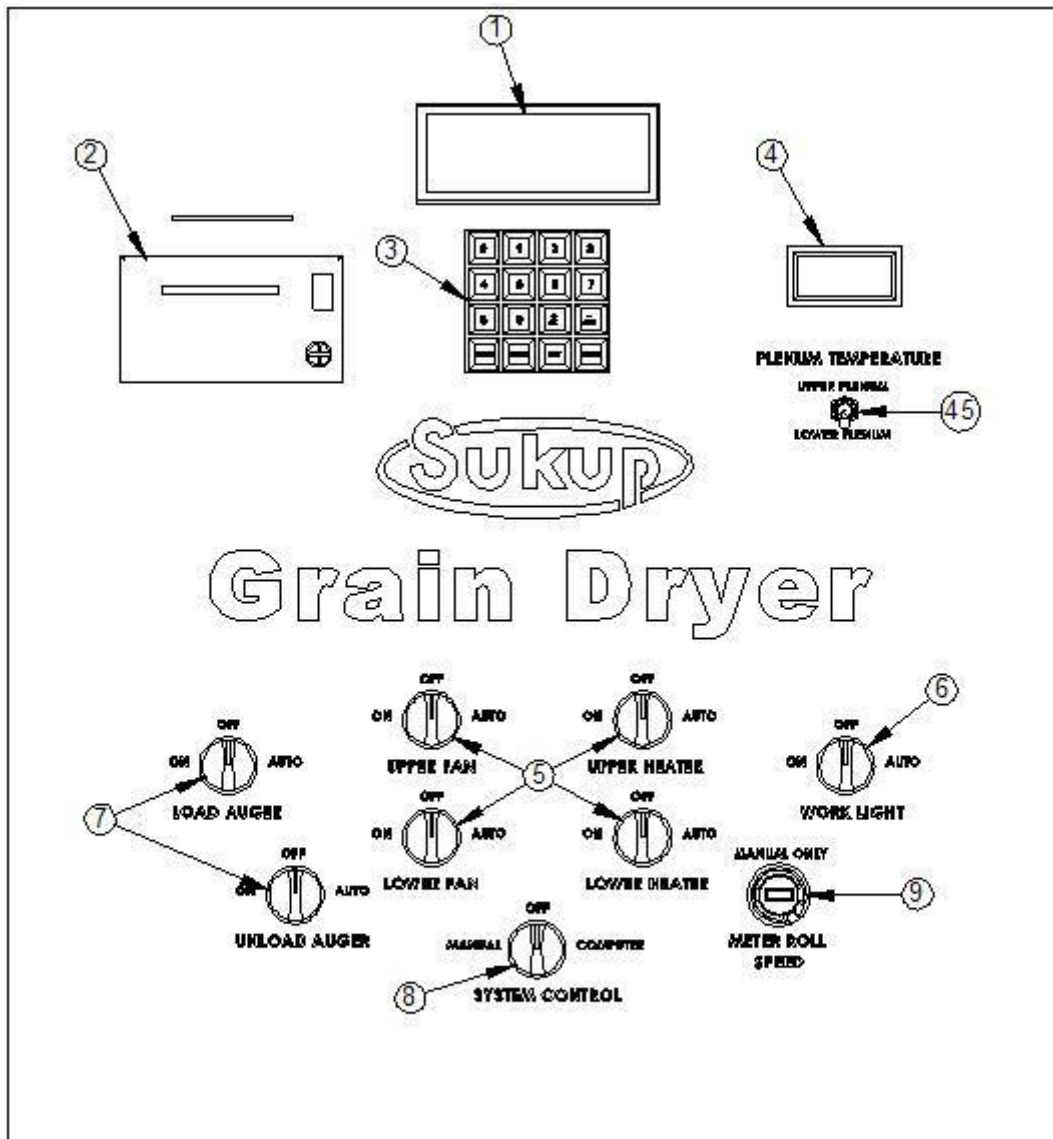


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SINGLE FAN / THREE PHASE 230 VOLT PARTS – POWER BOX

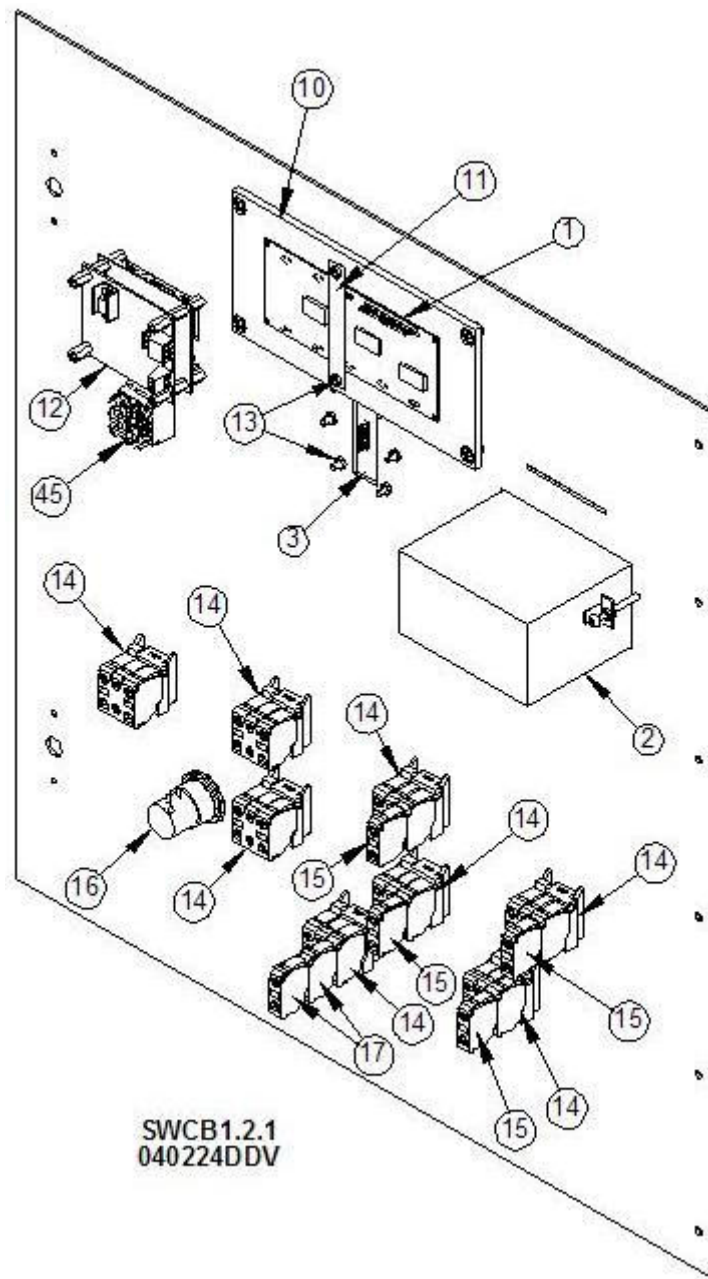
Part Label Number	Drawing Number	Parts for Model Numbers: T1211, T1212, T1611, &T1612	Parts for Model Numbers: T2011 & T2012	Parts for Model Numbers: TC2011	Description
1	SWPB2.1	T16511	T16511	T16511	DOOR, PWER DIST BOX
2	SWPB2.1	Part of T16525	Part of T16525	Part of T16525	SHAFT, SWITCH DISC
3	SWPB2.1	T16520	T16520	T16520	SPACER, NYLON,GUIDE
4	SWPB2.1	J0472	J0472	J0472	SCREW, 10-24 X 1 1/4
5	SWPB2.1	Part of T16525	Part of T16525	Part of T16525	SHAFT, SWITCH DISC
6	SWPB2.1	J0985	J0985	J0985	NUT, HEX, 10-24
7	SWPB2.1	T16523	T16523	T16523	LATCH RODS
8	SWPB2.1	J0513	J0513	J0513	SCREW, 1/4-20, 1.25
9	SWPB2.1	J0990	J0990	J0990	NUT, HEX, 1/4-20
10	SWPB2.1	T16521	T16521	T16521	SPACER, NYLON,LATCH
11	SWPB2.1	Part of T16525	Part of T16525	Part of T16525	SHAFT, SWITCH DISC
12	SWPB2.1	Part of T16525	Part of T16525	Part of T16525	SHAFT, SWITCH DISC
13	SWPB2.3	J47901	J47901	J47901	GROUND BAR
14	SWPB2.3	J3881	J3881	J3881	SOCKET, 11 PIN
15	SWPB2.3	J38802	J38802	J38802	RELAY
16	SWPB2.3	J5265	J5265	J5265	AUX CONTACT
17	SWPB2.3	J5238	J5243	J5243	STARTER, PROTECTOR
20	SWPB2.3	J4492	J4492	J4492	OPERATOR, MUSHRM
21	SWPB2.3	J6729	J6729	J6729	DIRECT SUPPLYLIGHT
22	SWPB2.3	J5536	J5536	J5536	RESISTOR
23	SWPB2.3	J6706	J6706	J6706	COVER ASS'Y
24	SWPB2.3	J6794	J6794	J6794	SCR, DC DRIVE
25	SWPB2.3	J6787 & J3829	J6787 & J3829	J6787 & J3829	VARIISTOR & SPADE
28	SWPB2.3	J4766	J4766	J4766	HOURLMETER, 115V
29	SWPB2.3	J5260	J5260	J5260	AUX CONT, 30/90AMP
30	SWPB2.3	J5246	J5246	J5246	CONT, 40A, 115V
33	SWPB2.3	J6754	J6754	J6754	DIN END STOP
34	SWPB2.3	J67532	J67532	J67532	END BARRIER
35	SWPB2.3	J67504	J67504	J67504	FEED THRU TERMINAL
36	SWPB2.3	J67491	J67491	J67491	GROUND TERMINAL
37	SWPB2.3	N/A	N/A	N/A	N/A
38	SWPB2.3	J48185	J48185	J48185	3 AMP BREAKER
39	SWPB2.3	F60344	F60344	F60344	100J MOV/RC CIRCUIT
40	SWPB2.3	J67421	J67421	J67421	70A FEED TERMINAL
42	SWPB2.3	J4048 & J1195	J4048 & J1195	J4048 & J1195	COPPER LUG
44	SWPB2.3	J5242	J5235	J5241	STARTER PROTECTOR
45	SWPB2.3	J5266	J5263	J5263	AUX CONTACT
46	SWPB2.3	J6700	J6700	J6697	POWER DIS BLOCK
47	SWPB2.3	J5247	J5248	J5244	CONT, 123A, 120V
48	SWPB2.3	J5212	J5212	J5212	MAIN SWITCH, 250 AMP

SWCB1.1.1 Control Box Front Panel – Two Fan Diagram

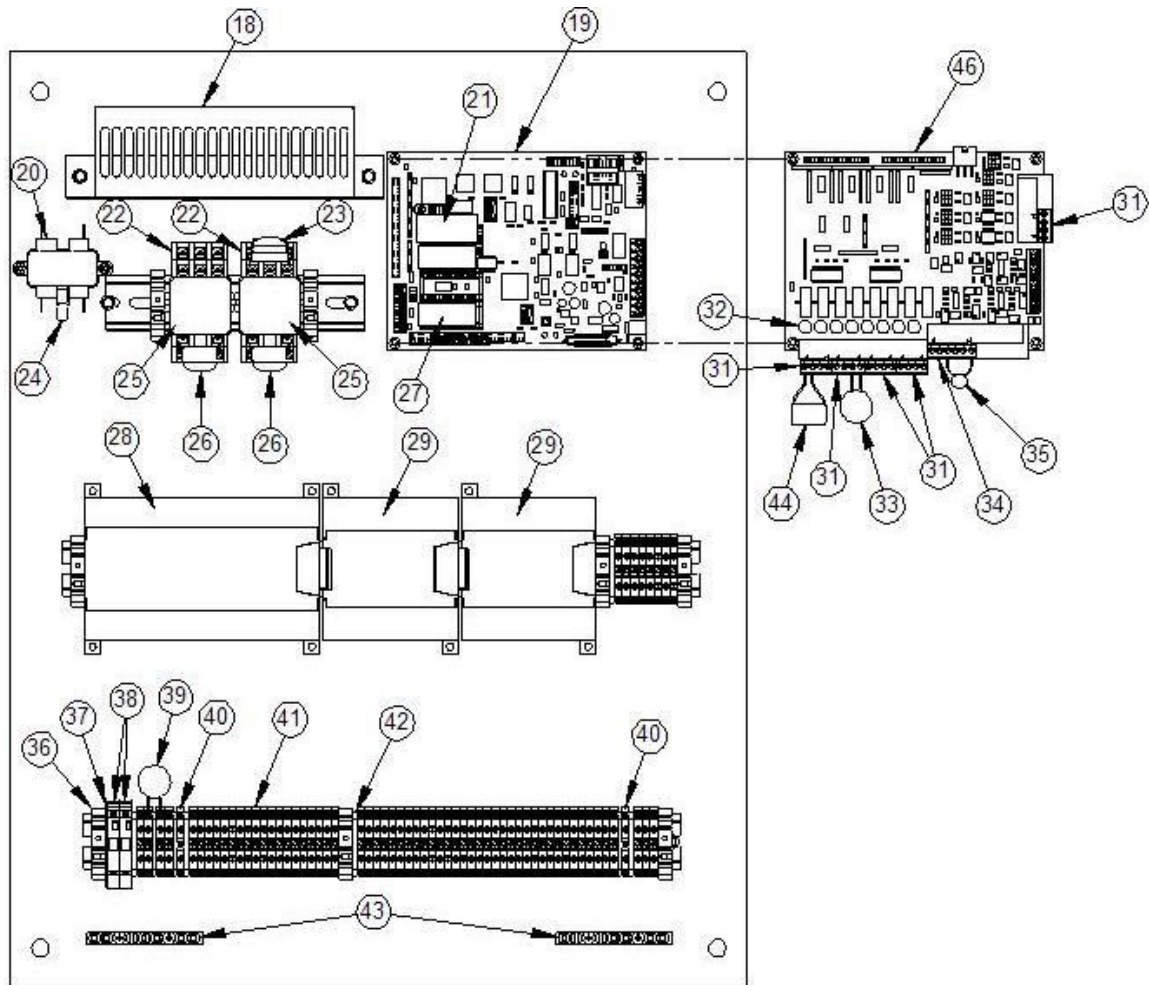


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SWCB1.2.1 Control Box Front Panel (Rear) – Two Fan Diagram



SWCB1.3.1 Control Box Inside Panel – Two Fan Diagram

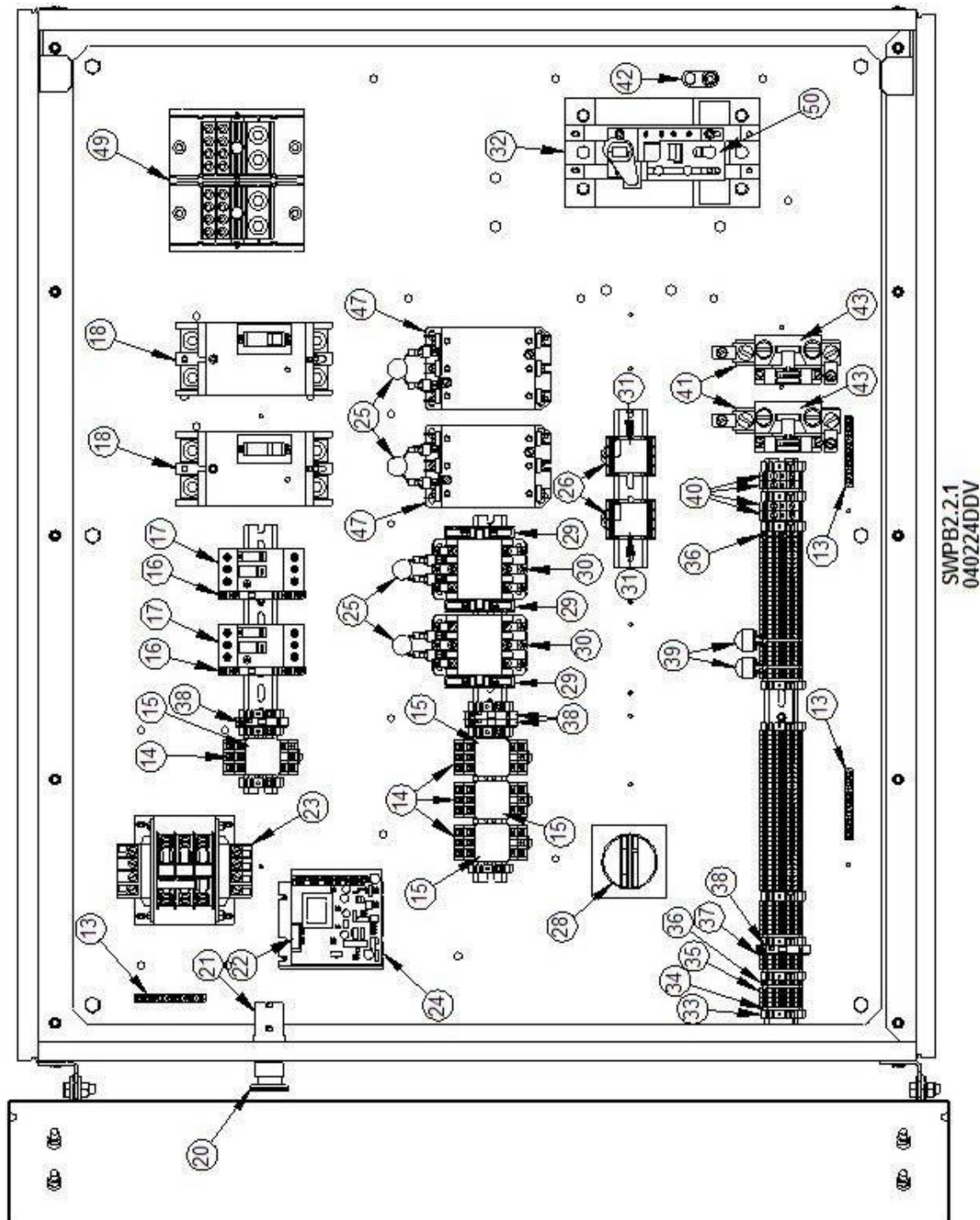


SWCB1.3.1
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TWO FAN / SINGLE & THREE PHASE PARTS – CONTROL BOX

Part Label Number	Drawing Number	Parts for Model Numbers: T1631, T1632, T2021, T2022, T2031, T2032, T2421, T2422, T2431 & T2432	Description
1	SWCB1.1.1 & SWCB1.2.1	F60679	LCD W/ CONNECTOR
2	SWCB1.1.1 & SWCB1.2.1	J4733	DATA C PRINTER
3	SWCB1.1.1 & SWCB1.2.1	J47602	KEYPAD
4	SWCB1.1.1	J47511	FILTER & BEZEL ASSY
5	SWCB1.1.1	J6772	AMBER 3 POS. OPERATOR
6	SWCB1.1.1	J6774	CLEAR 3 POS. OPERATOR
7	SWCB1.1.1	J6773	BLUE 3 POS. OPERATOR
8	SWCB1.1.1	J6775	GREEN 3 POS. OPERATOR
9	SWCB1.1.1	F606701	POTENTIOMETER ASSY
10	SWCB1.2.1	T16474	DISPLAY FRAME
11	SWCB1.2.1	J6768	MARKING EXRTUS
12	SWCB1.2.1	J6780 & J6791	TEMP DIPLAY & AMP BDS
13	SWCB1.2.1	J0982	NUT, HEX, 6-32
14	SWCB1.2.1	J6777	DIRECT SUPPLY LIGHT
15	SWCB1.2.1	J6792	N.C. CONTACT
16	SWCB1.2.1	J6734	POTENTIOMETER
17	SWCB1.2.1	J6771	N.O. CONTACT
18	SWCB1.3.1	F6068	PWR SUPPLY COMPLETE
19	SWCB1.3.1	F60672	PROCESSOR COMPLETE
20	SWCB1.3.1	J4751	CORCOM FILTER
21	SWCB1.3.1	J4603	SMART WATCH
22	SWCB1.3.1	J3881	11 PIN SOCKET
23	SWCB1.3.1	F60343	10J MOV&RC CIRCUIT
24	SWCB1.3.1	QP23934	3 WAY ADAPTOR
25	SWCB1.3.1	J38802	RELAY
26	SWCB1.3.1	F60344	100J MOV&RC CIRCUIT
27	SWCB1.3.1	T7080V3.4	PROM, PROGRAM, 2005
28	SWCB1.3.1	J6726	OMRON PLC
29	SWCB1.3.1	J6757	EXPANDER MODULE
31	SWCB1.3.1	J4641	WARNING ALARM HORN
32	SWCB1.3.1	J4678	4 TERMINAL PLUG
33	SWCB1.3.1	J6787	100 JOULE VARISTOR
34	SWCB1.3.1	J4623	6 TERMINAL PLUG
35	SWCB1.3.1	F60346	0.1UF CAP CIRCUIT
36	SWCB1.3.1	J6754	DIN END STOP
37	SWCB1.3.1	N/A	N/A
38	SWCB1.3.1	J48184	1/2 AMP BREAKER
39	SWCB1.3.1	J6787	100 JOULE VARISTOR
40	SWCB1.3.1	J67491	GROUND TERMINAL
41	SWCB1.3.1	J67504	FEED THRU TERMINAL
42	SWCB1.3.1	J67532	END BARRIER
43	SWCB1.3.1	J47901	GROUND BAR
44	SWCB1.3.1	F60347	RC CIRCUIT
45	SWCB1.1.1 & SWCB1.2.1	J4477	TOGGLE SWITCH
46	SWCB1.3.1	J46501	I/O BOARD, POPULATED

SWPB2.2.1 Power Box Single Phase / Two Fan Diagram

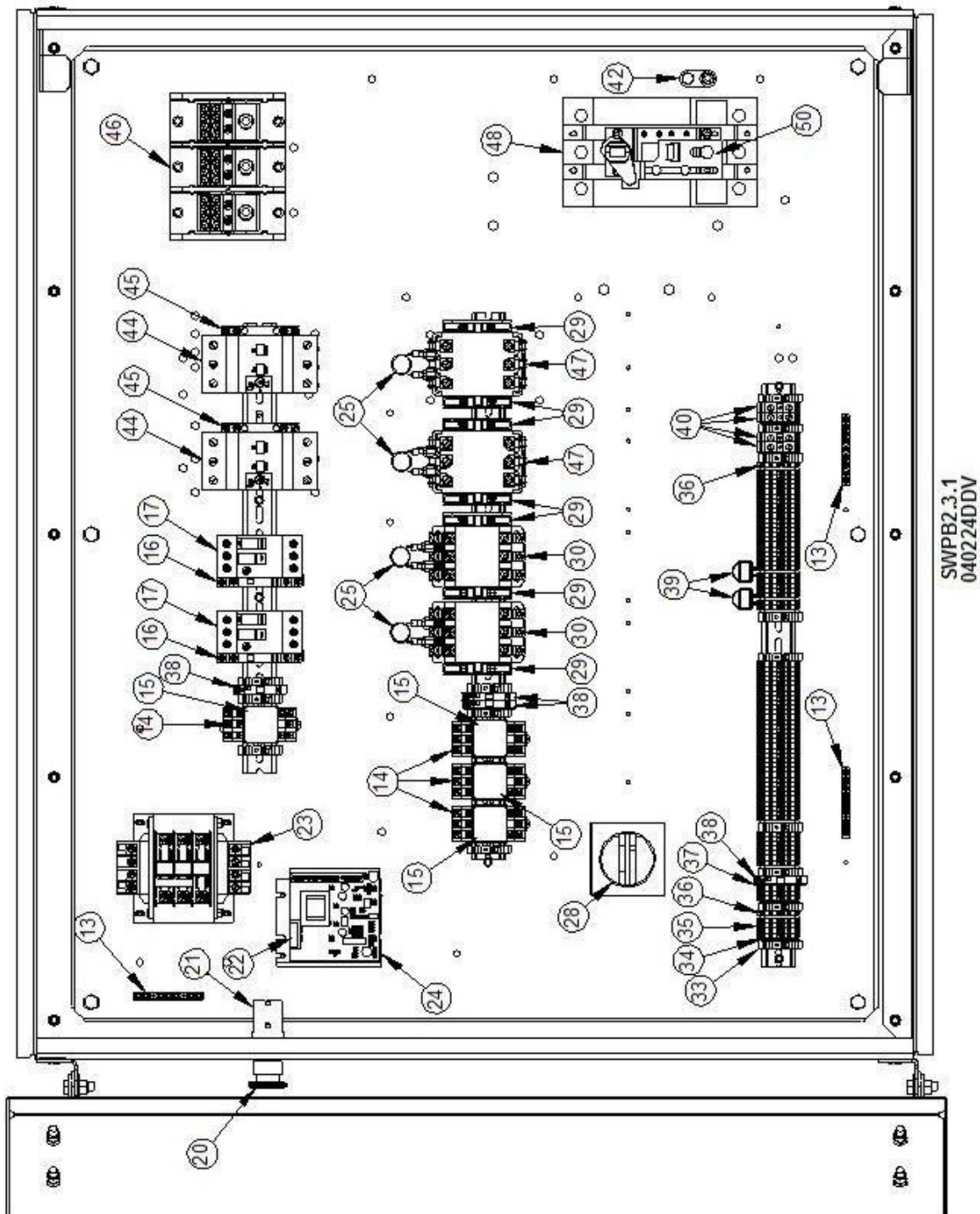


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TWO FAN / SINGLE PHASE 230 VOLT PARTS – POWER BOX

Part Label Number	Drawing Number	Parts for Model Numbers: T1631A & T1632A	Parts for Model Numbers: T2021A	Parts for Model Numbers: T2031A & T2032A	Description
1	SWPB2.1	T16511	T16511	T16511	POWER BOX DOOR
2	SWPB2.1	Part of T16522	Part of T16522	Part of T16522	PWR DISCON SHAFT
3	SWPB2.1	T16520	T16520	T16520	NYLON SPACER
4	SWPB2.1	J0472	J0472	J0472	SCREW, 10-24 X 1 1/4
5	SWPB2.1	Part of T16522	Part of T16522	Part of T16522	PWR DISCON SHAFT
6	SWPB2.1	J0985	J0985	J0985	NUT, HEX, 10-24
7	SWPB2.1	T16523	T16523	T16523	LATCH RODS
8	SWPB2.1	J0513	J0513	J0513	SCREW, 1/4-20, 1.25
9	SWPB2.1	J0990	J0990	J0990	NUT, HEX, 1/4-20
10	SWPB2.1	T16521	T16521	T16521	NYLON LATCH SPACER
11	SWPB2.1	Part of T16522	Part of T16522	Part of T16522	PWR DISCON SHAFT
12	SWPB2.1	Part of T16522	Part of T16522	Part of T16522	PWR DISCON SHAFT
13	SWPB2.2.1	J47901	J47901	J47901	GROUND BAR
14	SWPB2.2.1	J38804	J38804	J38804	8 PIN RELAY
15	SWPB2.2.1	J3881	J3881	J3881	11 PIN SOCKET
16	SWPB2.2.1	J5265	J5266	J5266	AUX CONTACT
17	SWPB2.2.1	J5238	J5230	J5230	STARTER PROTECTOR
18	SWPB2.2.1	J4818	J48182	J48181 OR J48182	FAN BREAKER
20	SWPB2.2.1	J4492	J4492	J4492	MUSHRM OPERATOR
21	SWPB2.2.1	J6729	J6729	J6729	DIRECT SUPPLYLITE
22	SWPB2.2.1	J5536	J5536	J5536	RESISTOR
23	SWPB2.2.1	J6490	J6490	J6490	CNTRL TRANSFOMER
24	SWPB2.2.1	J6794	J6794	J6794	SCR DRIVE
25	SWPB2.2.1	J6787	J6787	J6787	100 JOULE VARISTOR
26	SWPB2.2.1	J38811	J38811	J38811	8 PIN ROUND SOCKET
28	SWPB2.2.1	J4766	J4766	J4766	HOURLMETER
29	SWPB2.2.1	J5260	J5260	J5260	AUX CONTACT
30	SWPB2.2.1	J5246	J5246	J5246	40A CONTACTOR
31	SWPB2.2.1	J38802	J38802	J38802	11 PIN RELAY
32	SWPB2.2.1	J5216	J5216	J5216	MAIN SWITCH
33	SWPB2.2.1	J6754	J6754	J6754	DIN END STOP
34	SWPB2.2.1	J67532	J67532	J67532	END BARRIER
35	SWPB2.2.1	J67504	J67504	J67504	FEED THRU TERMINAL
36	SWPB2.2.1	J67491	J67491	J67491	GROUND TERMINAL
37	SWPB2.2.1	N/A	N/A	N/A	N/A
38	SWPB2.2.1	J48185	J48185	J48185	3 AMP BREAKER
39	SWPB2.2.1	F60344	F60344	F60344	100J MOV&RC CIRCUIT
40	SWPB2.2.1	J67421	J67421	J67421	70A FEED THRU TERM
41	SWPB2.2.1	J5274	J5274	J5274	OVERLOAD
42	SWPB2.2.1	J4048	J4048	J4048	COPPER LUG
43	SWPB2.2.1	J5349 OR J53491	J5274	J5349 OR J53491	HEATER STRIP
47	SWPB2.2.1	J5248	J5248	J5248	CONTACTOR
49	SWPB2.2.1	J6695	J6695	J6695	PWR DIST BLOCK
50	SWPB2.2.1	Part of T16522	Part of T16522	Part of T16522	PWR DISCON SHAFT

SWPB2.3.1 Power Box Three Phase / Two Fan Diagram



Parts Index

TWO FAN / THREE PHASE 230 VOLT PARTS– POWER BOX

Part Label Number	Drawing Number	Parts for Model Numbers: T2421B & T2422B	Parts for Model Numbers: T2021B,T2022B, T2031B,T2032B	Parts for Model Numbers: T1631B & T1632B	Description:
1	SWPB2.1	T16511	T16511	T16511	POWER BOX DOOR
2	SWPB2.1	Part of T16525	Part of T16525	Part of T16525	PWR DISCON SHAFT
3	SWPB2.1	T16520	T16520	T16520	NYLON SPACER
4	SWPB2.1	J0472	J0472	J0472	SCREW, 10-24 X 1 1/4
5	SWPB2.1	Part of T16525	Part of T16525	Part of T16525	PWR DISCON SHAFT
6	SWPB2.1	J0985	J0985	J0985	NUT, HEX, 10-24
7	SWPB2.1	T16523	T16523	T16523	LATCH RODS
8	SWPB2.1	J0513	J0513	J0513	SCREW, 1/4-20, 1.25
9	SWPB2.1	J0990	J0990	J0990	NUT, HEX, 1/4-20
10	SWPB2.1	T16521	T16521	T16521	NYLON LTCH SPACER
11	SWPB2.1	Part of T16525	Part of T16525	Part of T16525	PWR DISCON SHAFT
12	SWPB2.1	Part of T16525	Part of T16525	Part of T16525	PWR DISCON SHAFT
13	SWPB2.3.1	J47901	J47901	J47901	GROUND BAR
14	SWPB2.3.1	J3881	J3881	J3881	11 PIN SOCKET
15	SWPB2.3.1	J38802	J38802	J38802	11 PIN RELAY
16	SWPB2.3.1	J5265	J5265	J5265	AUX CONTACT
17	SWPB2.3.1	J5243	J5242	J5236	STARTER PROTECTOR
20	SWPB2.3.1	J4492	J4492	J4492	MUSHRM OPERATOR
21	SWPB2.3.1	J6729	J6729	J6729	DIRECT SUPPLYLITE
22	SWPB2.3.1	J5536	J5536	J5536	RESISTOR
23	SWPB2.3.1	J6490	J6490	J6490	CNTRL TRANSFORMER
24	SWPB2.3.1	J6794	J6794	J6794	SCR DRIVE
25	SWPB2.3.1	J6787	J6787	J6787	100 JOULE VARISTOR
28	SWPB2.3.1	J4766	J4766	J4766	HOURLMETER
29	SWPB2.3.1	J5260	J5260	J5260	AUX CONTACT
30	SWPB2.3.1	J5246	J5246	J5246	40A CONTACTOR
33	SWPB2.3.1	J6754	J6754	J6754	DIN END STOP
34	SWPB2.3.1	J67532	J67532	J67532	END BARRIER
35	SWPB2.3.1	J67504	J67504	J67504	FEED THRU TERMINAL
36	SWPB2.3.1	J67491	J67491	J67491	GROUND TERMINAL
37	SWPB2.3.1	N/A	N/A	N/A	N/A
38	SWPB2.3.1	J48185	J48185	J48185	3 AMP BREAKER
39	SWPB2.3.1	F60344	F60344	F60344	100J MOV&RC CIRCUIT
40	SWPB2.3.1	J67421	J67421	J67421	70A FEED THRU TERM
44	SWPB2.3.1	J5242	J5242	J5242	STARTER PROTECTOR
45	SWPB2.3.1	J5266	J5266	J5266	AUX CONTACT
47	SWPB2.3.1	J5247	J5247	J5247	CONTACTOR
48	SWPB2.3.1	J5212	J5212	J5212	MAIN SWITCH
50	SWPB2.3.1	Part of T16525	Part of T16525	Part of T16525	PWR DISCON SHAFT



2004 Sukup Automatic Grain Dryer

Troubleshooting Guide

L14106
08/27/2004 Rev.1

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Safety Section



The above safety-alert means "ATTENTION! Be Alert! Your personal safety is involved" This symbol draws your attention to important instructions concerning your personal safety. Read the message carefully to avoid personal injury or death.

FOLLOW MACHINE SAFETY SIGN & MESSAGES

Observe safe operating practices. Carefully read this manual and all safety signs on your equipment. Safety sign must be kept in good condition. Replace missing or damaged safety decals; available from Sukup Mfg. Co.; Box 677, Sheffield, Iowa 50475 at no charge.

Learn how to use controls and operate machine. Do not let anyone operate unit (especially youth) without thorough training of basic operating and safety procedures.

Make no unauthorized modifications to machine. Modifications may endanger function and/or safety of unit. Keep unit in good working condition.

EMERGENCIES - KNOW WHAT TO DO

Have emergency numbers near your telephone:

For doctors:

Emergency medical squad:

Ambulance service:

Hospital:

Fire department:

Have written directions to your location.

TRANSPORT SAFETY WARNING:

HAULER/TRANSPORTER IS TO PROVIDE APPROVED SAFETY CHAIN WHEN TOWING DRYER.



WARNING: Transporting this equipment on public roads may result in serious injury or death. If road travel is required it is essential that all the following procedures be followed:

1. Read and understand -- operator's manual.
2. Check and comply with state & local regulations.
3. Use required emblems or lights.
4. Travel at reasonable and safe speeds. Reduce speed and/or use lower gear on rough ground or slopes.
5. Stop slowly.
6. Have extended rear angle mirrors on vehicles.
7. Signal & check behind you when turning.



WARNING: Check for other vehicles when turning. **(2/3 of roadway farm accidents occurs when turning.)**

- Use mirrors
- Be sure to have clear visibility,
- Use signal lights



WARNING: do not transport unit in areas of poor visibility --

- Especially on hills,
- During poor weather conditions,
- Or at night

Failure to do so may cause serious injury or death. Use good judgement when transporting. Maintain complete control of unit at all times. Comply with State and local laws governing. Read safety regulations when moving units. Always strive to prevent accidents! Watch out for other vehicles.



WARNING:

TO PREVENT EXPLOSION OR FIRE

- Carefully review operators manual.
- Clean under unit, as fines may cause a bin fire.
- Check for gas leaks, (spray soapy solution on piping and joints.)
- Run fan at least a half minute before starting heater.
- NEVER start heater if you smell gas or hear a hissing sound.
- NEVER run heater with inspection door open.



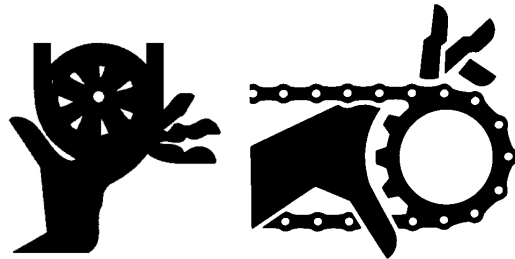
Failure to heed these warnings may cause serious injury or death.



WARNING:

KEEP CLEAR OF ALL MOVING PARTS

Keep people (ESPECIALLY YOUTH) away from equipment, particularly during operation. Keep away from all moving parts. Entanglement can cause serious injury or death. Keep inlet guard in place and in good working condition.



Failure to follow the above precautions may cause serious injury or death.

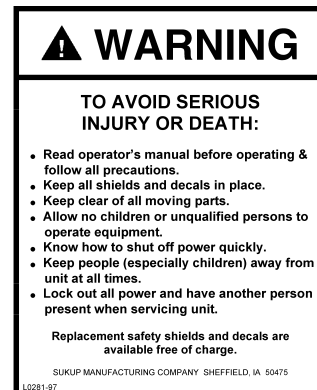
Mount safety decals when unit is assembled. Please check that all decals are in place according to the drawing/picture and in good legible condition.

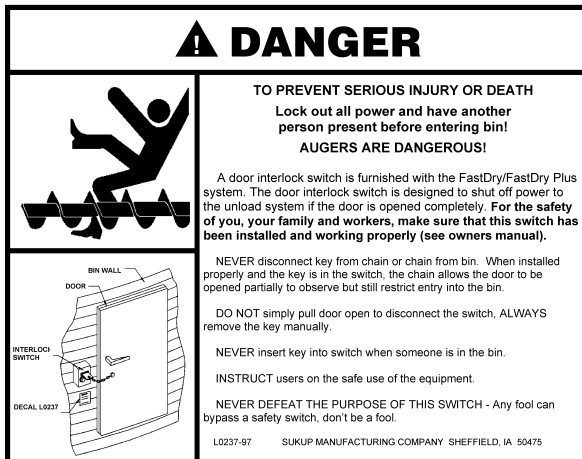
IMPORTANT!! If suggested locations are not clearly visible, place safety decals in more suitable area. Never cover up any existing safety decals.

Make sure location for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position. To order replacement decals (no charge) contact Sukup Manufacturing Company, P.O. Box 677, Sheffield, Iowa 50475
Phone 515 - 892 - 4222 - Please specify computer number.

1. **WARNING - L0281**-To Avoid serious injury or death.

2. **DANGER - L02741-98** - Keep away from any electrical lines, especially when moving unit.





3. **DANGER - L0237** - Door interlock switch. Augers are dangerous.

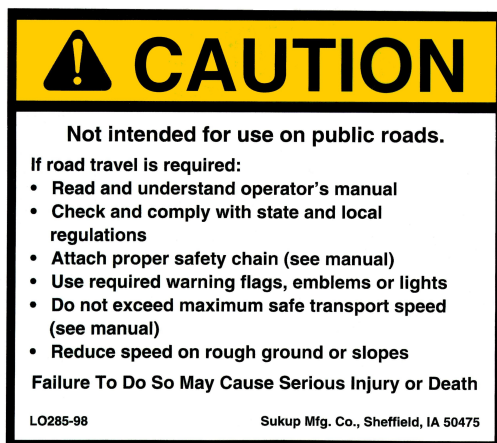


4. **WARNING - L0166** - Guards & shields in place. Disconnect Electricity. Check fan blade.



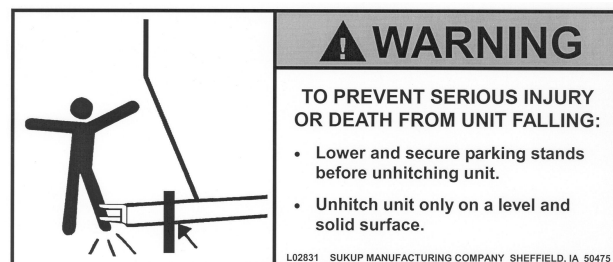
5. **DANGER -L0271** - Shield missing, do not operate.

6. **WARNING - L0284-98**
Keep away from all moving parts.



7. **CAUTION - L0285-98**
Not intended for use on public roads.
If road travel is required:

8. **WARNING - L02831**
Lower and secure parking stands before unhitching unit.





9. **DANGER - L0301**
Rotating augers are dangerous!

SAFETY DECAL LOCATIONS FOR FAN & HEATER

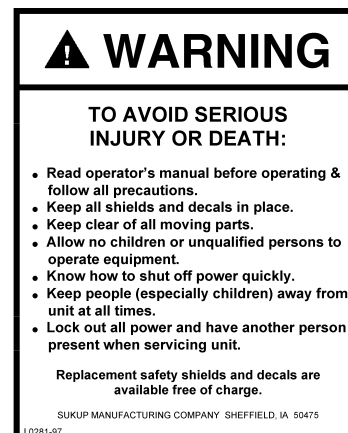
Safety decals and shields are mounted whenever possible at factory. Please check that all decals are in place according to these drawings and in good legible condition. To order replacement decals or shields (NO CHARGE) contact your dealer or **Sukup Mfg. Co., 1555 - 255th Street - P.O. Box 677 - Sheffield, Iowa 50475**. Please specify computer number.

IMPORTANT ! The following safety decals should be mounted on your equipment as shown below. If suggested locations are not clearly visible, place safety decals in more suitable area. Never cover up any existing safety decals.

Make sure location area for decal is free from grease, oil and dirt. Remove backing from decal and place in proper position.

1. **WARNING - L0281**
Safe operation decal.

2. **WARNING - L0165**
Disconnect Electricity; Bleed gas



3. **WARNING - L0166**

Disconnect electricity; guards, shields in place; Check fan blade tight.

4. **DANGER - L0204**
Close service door.

The numbers on the drawings below refer to the location of the safety decals listed above.

General Fault Device Characteristics

1. 24 VDC is fed to all fault Input devices.
2. In the NO - FAULT condition, 24 VDC passes through all of the fault devices.
3. In the no fault condition, the Input light on the PLC will be ON.
4. All of the faults except the Heater Housing O/T device reset themselves. The Heater Housing O/T must be manually reset inside of the heater box.
5. All of the dryer fault device wiring is routed through the Power Box and then to the Control Box.
6. On single module dryers, the fault devices feed 24 VDC to the Inputs of the PLC. Fault outputs of the PLC are then fed to the processor.
7. On two and three module dryers, the fault devices feed the inputs to the PLC and the processor at the same time.
8. The Meter Rolls and the Unload Auger use a negative switching sensor.
9. Different AC voltages are commonly found on Sukup Dryers.

Voltage	Phase	Where Found
460 VAC	3 Phase	Main Supply
460 VAC	3 Phase	Main Supply
230 VAC	1 Phase	Main Supply
230 VAC	1 Phase	SCR Drive Unit
120 VAC	1 Phase	Control Voltage

10. Three DC voltages are used on the dryer.

Voltages	Where Found
5 VDC	Processor – I/O
15 VDC	I/O – RTD
24 VDC	Fault Devices

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Fault Troubleshooting

Grain Discharge Chute Sensor

The Grain Discharge Chute Sensor is present on the dryer to detect the Discharge Chute opening during operation. This fault usually indicates a problem with the take-away system.

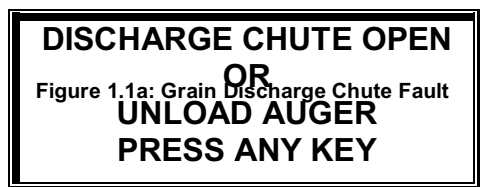


Figure 1.1b: Grain Discharge Chute Sensor

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer	0CH07	42	11CH03	2
2 Fan Portable Dryer	0CH07	42	11CH03	2
2 Module Stack Dryer	3CH02	42	N/A	N/A
3 Module Stack Dryer	3CH02	42	N/A	N/A

1. Is the Discharge Chute open?
 - a. Determine the cause of the door being opened and return the door to the closed position.
2. Is the sensor out of adjustment?
 - a. This can be determined by watching the input light on the PLC. Adjust the angle of the switch after placing the door at the height you wish the fault to occur. The PLC input light is out when a fault occurs.
3. If unable to adjust the sensor and turn on the PLC input light, a voltmeter will be used to determine if the sensor is malfunctioning.
4. At the Discharge Chute, find the junction box fastened to the lid. This box contains the sensor.
 - a. Remove the cover and locate the two wires coming from the sensor. One of the wires should be labeled # 18. Measure for 24VDC from wire #18 to ground. (On older dryers, a jumper may need to be installed in the control box from wire # 95, found on the PLC, to the ground bar at the bottom of the control box).
5. If 24VDC is measured on wire # 18, check for voltage on wire # 42. If 24VDC is not present, tilting the sensor may be necessary to allow the mercury to make contact with the switch contacts. If unable to measure 24VDC on wire # 42, the sensor is bad and must be replaced.
6. If 24VDC is present on wire # 42, but the PLC input light is still off, proceed to the Power Box and measure terminal # 42 for 24VDC. If unable to measure 24VDC on terminal # 42, check connections between the Discharge Chute Sensor and the Power Box.
7. If 24VDC was measured on terminal # 42 in the Power Box, proceed to the control box and measure terminal # 42 for 24VDC. If unable to measure 24VDC, check connections between the Power Box and the Control Box.
8. If 24VDC was measured on terminal # 42 in the control box, measure for 24VDC at the PLC input. If unable to measure 24VDC on the PLC input, check the connections between the control box terminal strip and the PLC.
9. If 24VDC is now measured on the PLC input, but the input light is not on, the PLC may be malfunctioning.
10. If the PLC input light is on but the PLC output light (on portable dryers) is not on, the PLC may be malfunctioning.
11. If the PLC input light is now on, try clearing the fault by pressing reset on the keypad and determine if the fault is now cleared.

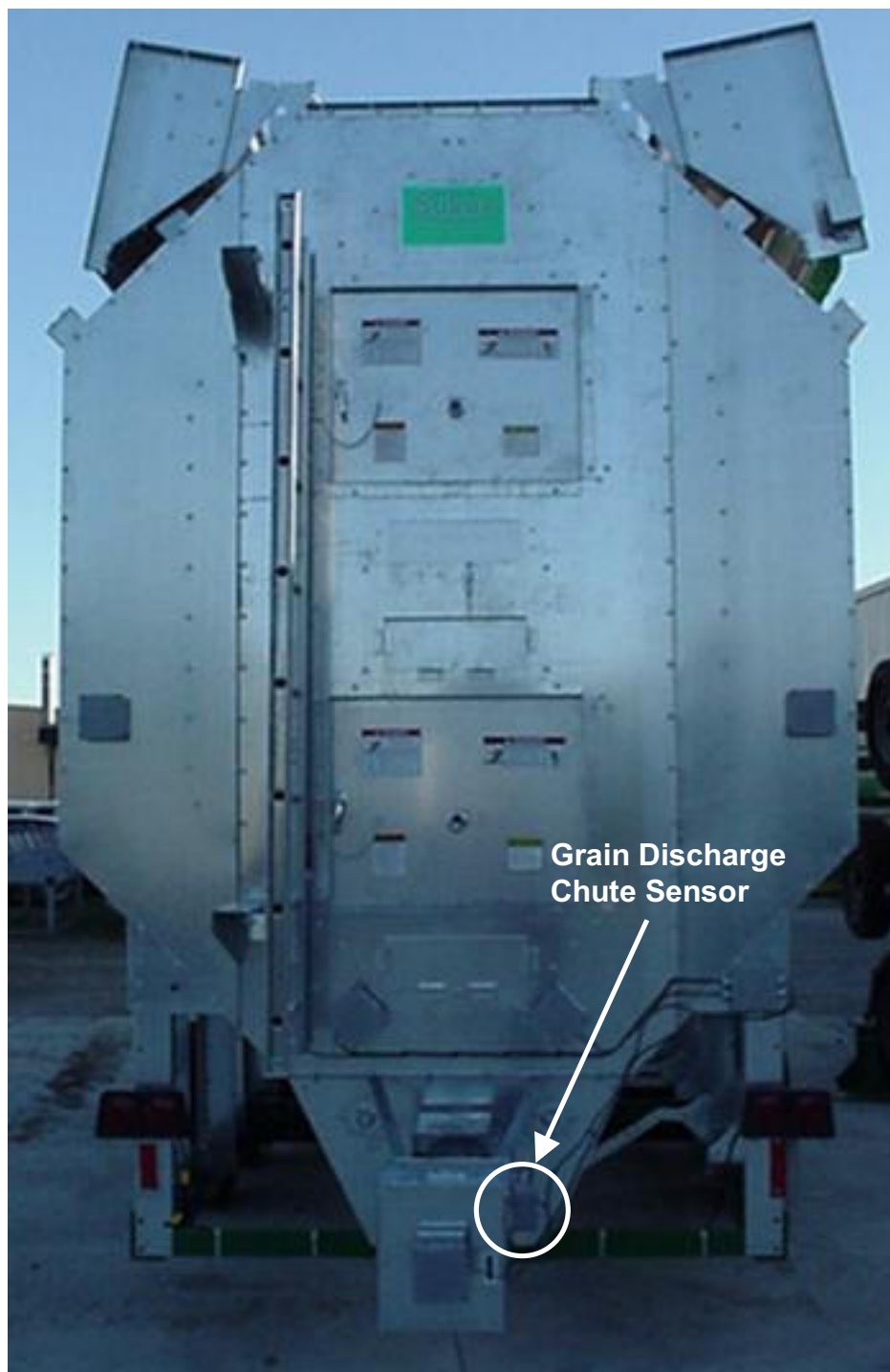


Figure 1.1c: Placement of sensor on dryer

Grain Level Sensor

The Grain Level sensor is located on the side of the dryer connected to the paddle switch. This sensor is used to indicate when the dryer is running low or out of grain. A fault will be displayed when this occurs.



Figure 1.2a: Fault Display



Figure 1.2b: Grain Level Sensor

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer	0CH09	44	12CH06	9
2 Fan Portable Dryer	0CH09	44	12CH06	10
2 Module Stack Dryer	0CH03	44	N/A	N/A
3 Module Stack Dryer	3CH03	44	N/A	N/A

- Is the wet bin out of grain?
 - If this is the last load for the season, press 2 for Final Dry.
- Has an auxiliary load malfunctioned?
 - Repair the cause of the load failure and press RESET.
- If wet grain is available and the load auxiliaries are functioning, is the paddle switch bound up?
 - If so, free the paddle switch and repair the cause.
- Are both PLC input lights off? (both lights should be off when the dryer is calling for grain – paddle down)

Are both PLC input lights on? (both lights should be on when the dryer is full. – paddle up)

 - If not, remove the cover from the junction box on the paddle switch assembly and visually check sensors for proper placement in their respective holders. Refer to Fig. 1.2c
- Observe the upper and lower PLC input lights while someone moves the paddle switch from the down position to the up position.
 - If either PLC input light does not turn on, measure for 24VDC on wire #18 to ground. (touch the black probe from the meter to the dryer frame. It may be necessary to connect a jumper to wire #95 on the PLC to the ground bar in the Control Box.)
- If 24VDC is measured on wire #18, measure for 24VDC on the other wire going to the sensor.
 - With the paddle switch in the up position, 24VDC should be measured on wire #44 and #53.
 - If not, replace the respective sensor and recheck for voltage.
- If the paddle switch is in the up position and 24VDC is present on both sensors, but one or both of the PLC input lights are off, voltage will need to be measured on the respective terminal on the Power Box terminal strip.
 - If 24VDC is not measured on the respective terminal, check the wiring connections between the Paddle Switch junction box and the Power Box terminal strip.
- If 24VDC is measured at the Power Box terminal strip and the PLC input lights are not on, measure for 24VDC on the terminal strip in the control box.

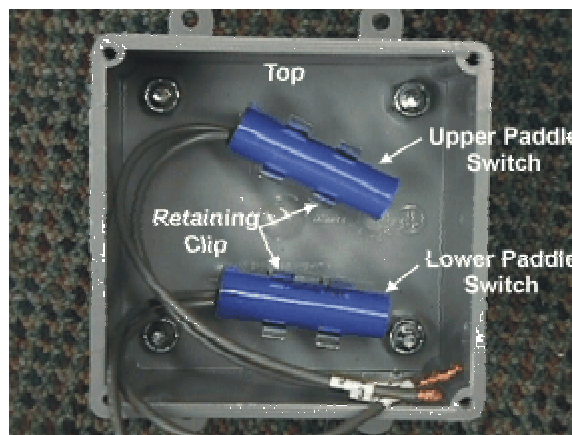


Figure 1.2C: Grain Level Sensor Installed

9. If unable to measure 24VDC on the control box terminal, check wiring connections between the Power Box and the Control Box terminal strips.
10. If 24VDC is measured on the Control Box terminal strip but the PLC input lights are not on, measure for 24VDC at the PLC inputs.
 - a. If 24VDC is measured on the PLC inputs but the light is off, the PLC could be malfunctioning.
 - b. If 24VDC is not measured on the PLC inputs, check the wiring connections from the Control Box terminal to the PLC inputs.

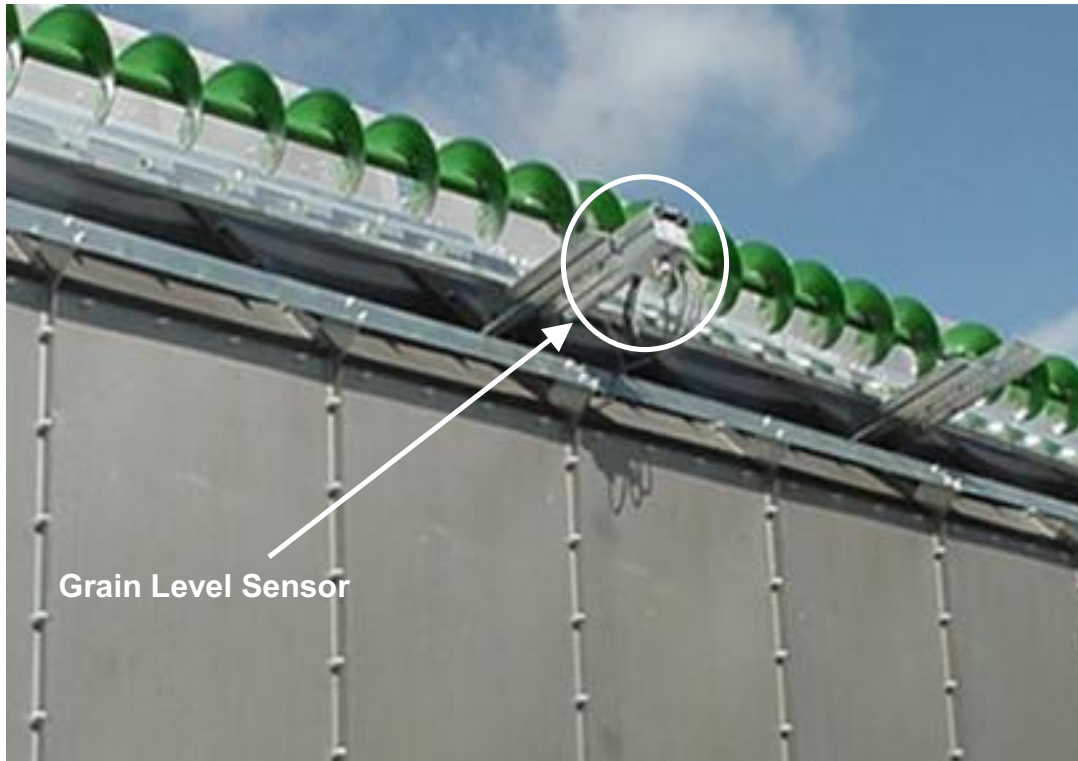


Figure 1.2d: Grain Level Sensor Installed on Dryer (wet bin down)

Unload Auger Proximity Sensor

The Unload Auger sensor is located on the discharge bin on the end of the unload auger. This sensor monitors the unload auger and will give a fault and stop the dryer if the unload auger stops turning.



Figure 1.3a: Fault Display

***This sensor uses NEGATIVE switching**



Figure 1.3b: Unload Auger Proximity Sensor

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer	2CH06	96	11CH03	2
2 Fan Portable Dryer	3CH06	96	11CH03	2
2 Module Stack Dryer	3CH02	96	N/A	N/A
3 Module Stack Dryer	4CH02	95	N/A	N/A

1. Visually inspect the load auger for a problem.
 - a. Are the belts tight and in good condition?
 - b. Does the motor smell or feel hot?
 - c. Is a Motor Overload fault being displayed along with the Unload Auger fault? If so, do not restart the Unload motor until a definite cause for the overload has been determined. After repairing the cause of the fault, reset the motor overload. Then press RESET on the keypad.
2. If no fault is being displayed, go to Manual and turn on the Unload and check for rotation.
 - a. While the auger is rotating, check the PLC Input light, this light should be flashing at a regular rate, indicating rotation.
 - b. If the PLC Input light is not flashing, check auger for rotation. If the auger is not rotating, find the cause and repair.
3. If rotating, look at the back of the sensor itself. A small, orange light should be visible and flashing on and off.
4. If the orange light on the back of the sensor is not flashing, find the junction box attached to the discharge chute and remove the cover.
 - a. Locate the Brown, Black, and Blue wires coming from the Unload Auger Sensor. Measure for 24VDC on wire # 18 (brown), with respect to wire # 95 (blue).
 - b. If 24VDC is not measured on wire # 18, go to the Power Box terminal strip and measure for 24VDC on the bottom terminal strip.
 - c. If 24VDC is not measured on wire # 18 in the Power Box, go to the Control Box and measure for 24VDC on the terminal strip.
 - d. If 24VDC is not measured on wire # 18 in the control box, go to the PLC and measure for 24VDC on the topside of the PLC.
5. If possible, position the flag over the sensor so that the sensor will be in the ON condition.

NOTE: This sensor is a negative switching device. This means that when the sensor is in the on condition, the voltage on the output wire (black) will be 0VDC.

- a. With the sensor in the ON condition, the light on the back of the sensor should be on. Measure for 0VDC on the output wire (black).
If the light is on but 0VDC is not measured on the output (black) sensor wire, the sensor is malfunctioning.
- b. If 0VDC is measured on the output (black) sensor wire, go to the PLC in the Control Box and check the PLC Input light. This light should be on when the sensor is in the ON condition.
- c. If 0VDC is measured on the output (black) sensor wire but the PLC input light is not on, measure for 0VDC on the Power Box terminal strip. If 0VDC is not measured, in the Power Box, check wiring connections between the junction box and the Power Box.
- d. If 0VDC is measured in the Power Box, go to the Control Box and measure for 0VDC on the terminal strip.
- e. If 0VDC is not measured in the Control Box, check wiring connections between the Power Box and the Control Box.
- f. If 0VDC is measured in the Control Box, go to the PLC and measure for 0VDC on the PLC input terminal.
- g. If 0VDC is not measured at the PLC input, check wiring connections between the terminal strip and the PLC input.

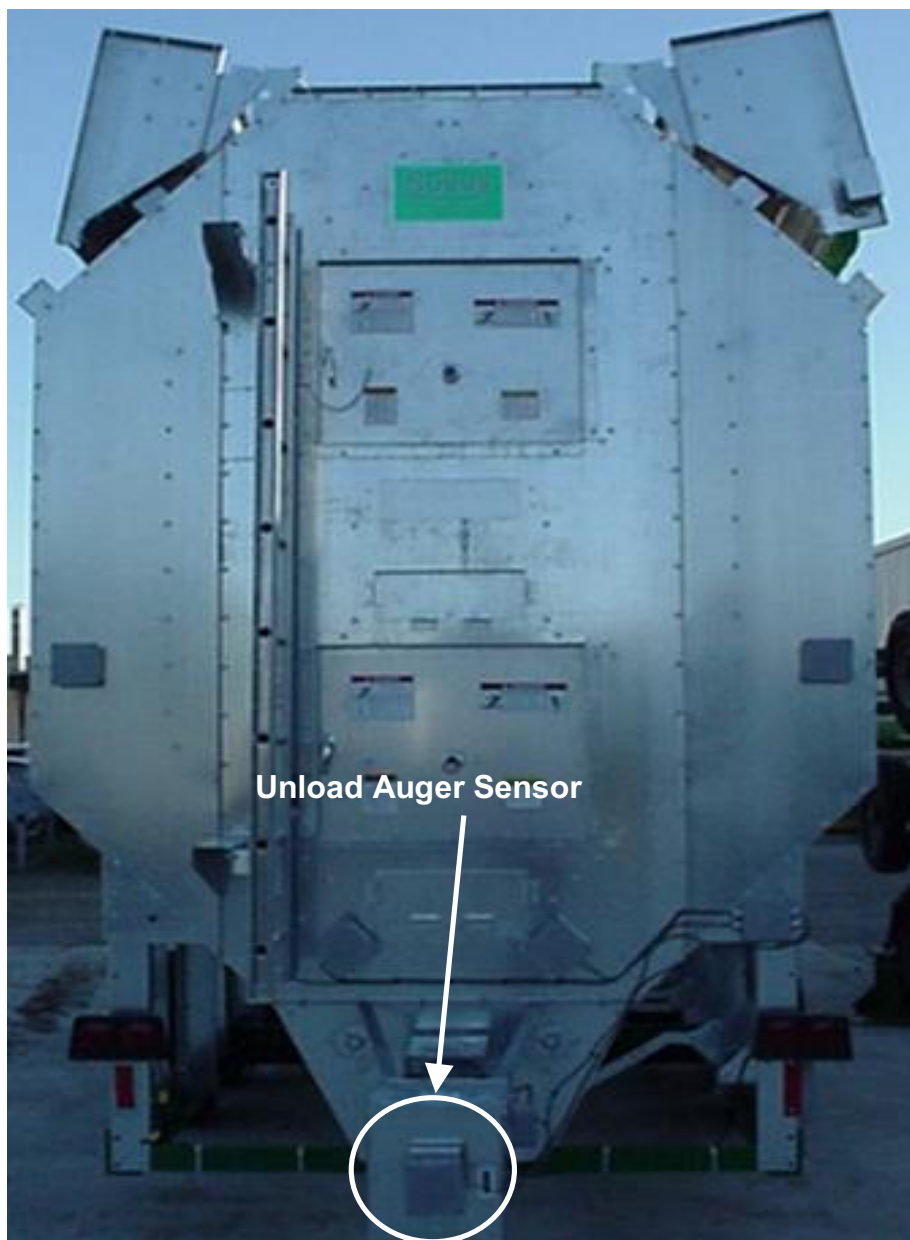


Figure 1.3c: Unload Auger Proximity Sensor Installed on Dryer

Vapor Over-Temperature Sensor

The Vapor Over-Temperature Sensor is located on the pipe train for the heater(s). It is provided to prevent the gas from over heating the vaporizer and causing vapor to vaporize.

**VAPORIZER HIGHT
TEMP ALARM
ADJ. VAPORIZER COIL
AND CHK FUEL SUPPLY**

Figure 1.4a: Fault Display



Figure 1.4b: Vapor Over-Temperature Sensor

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer	0CH02	37	11CH03	3
2 Fan Portable Dryer (Lower)	0CH01	102	10CH06	3
2 Fan Portable Dryer (Upper)	0CH02	37	10CH06	3
2 Module Stack Dryer (#1)	0CH08	37	N/A	N/A
2 Module Stack Dryer (#2)	0CH09	102	N/A	N/A
2 Module Stack Dryer (#3)	0CH10	202	N/A	N/A
2 Module Stack Dryer (#4)	0CH11	302	N/A	N/A
3 Module Stack Dryer (#1)	2CH00	37	N/A	N/A
3 Module Stack Dryer (#2)	2CH01	102		
3 Module Stack Dryer (#3)	2CH02	202		
3 Module Stack Dryer (#4)	2CH03	302		
3 Module Stack Dryer (#5)	2CH04	402		
3 Module Stack Dryer (#6)	2CH05	502		

- This fault indicates when the output of the vaporizer coil has become too hot (above 140 F.)
 - The tubing near the fault device should be fairly warm to the touch but not hot.
 - Check the fuel supply - is the tank low on fuel?
 - Air inlet obstruction – clean debris from the fan grill.
 - Vaporizer coil is too close to the flame. – Adjust vaporizer coil.
- Has the Vaporizer Coil had sufficient time to cool down?
 - This device will automatically reset when the device has cooled down.
- Is the PLC Input light on?
 - After the device has cooled down and reset, the PLC Input light should now be ON.
 - If not, follow the wiring from the coil to the heater box and measure for 24VDC on wire # 18.
- If 24VDC is not measured on wire # 18, go to the Power Box and measure 24VDC on the terminal strip.
 - If 24VDC is measured on wire # 18 on the Power Box terminal strip, check the wiring connections from the Heater Box to the Power Box.
 - If 24VDC is not measured on wire # 18 on the Power Box terminal strip, go to the Control Box and check for 24VDC on wire # 18 on the terminal strip.
- If 24VDC is not measured on wire # 18 on the Control Box terminal strip, go to the PLC and measure for 24VDC on the power supply output.
 - If unable to measure 24VDC on the power supply output at the PLC, remove all of the wires from the terminal and check for 24VDC. If 24VDC is not measured, the PLC 24VDC power supply is bad.
 - If, after removing all wires from the terminal, 24VDC can be measured, one of the wires connected to that terminal is shorted and will have to be isolated and the short corrected.

Vapor Over-Temperature Sensor (continued)

6. With 24VDC now being measured on wire # 18 on one wire of the vaporizer O/T switch, and the device has cooled down to ambient temperature, measure for 24VDC on the other wire (not # 18) coming from the O/T switch.
 - a. If 24VDC is NOT measured on the other wire, the O/T switch is bad.
 - b. If 24VDC is measured on the other wire coming from the O/T switch, take note of the wire number and go to the Power Box and measure for 24VDC on the terminal strip.
 - c. If 24VDC is NOT measured on the Power Box terminal strip, check the wiring connections between the Power Box and the Heater Box.
 - d. If 24VDC is measured on the Power Box terminal strip, go to the Control Box and measure for 24VDC on the terminal strip. (same wire number)
 - e. If 24VDC is NOT measured on the terminal strip, check the wiring connections between the Power Box and the Control Box.
 - f. If 24VDC is measured on the Control Box terminal strip, go to the PLC Input terminal for that wire # and measure for 24VDC.
 - g. If 24VDC is NOT measured, check the wiring connections between the Control Box terminal strip and the PLC Input terminal.
 - h. If 24VDC is measured on the Input terminal, and the Input light is NOT on, and the fault message is still being displayed (after pressing RESET), the PLC is malfunctioning.



Figure 1.4c: Vapor Over-Temperature Sensor Installed on Dryer

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Rear Door Interlock Switch

The Rear Door Interlock Switch is located to the left of each rear door on the dryer. This device is used to keep the dryer from running when the rear door is open and a person may be in the plenum of the dryer.

**REAR ACCESS DOOR IS
OPEN. CHECK DOOR AND
INTERLOCK SWITCH
PRESS ANY KEY**

Figure 1.5a: Fault Display



Figure 1.5b: Rear Door Interlock Switch

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer	0CH00	36	10CH04	1
2 Fan Portable Dryer	0CH00	36	10CH04	1
2 Module Stack Dryer	0CH11	36A-D	N/A	N/A
3 Module Stack Dryer	3CH02	36	N/A	N/A

1. Check the rear door or doors to be sure that the doors are closed and the keys are inserted into the switch. If a key is found out of a switch, make sure you check inside the plenum for personnel who may be working on the dryer.
2. If all keys are inserted, but you still have a fault, check that the PLC input light is ON.
 - a. If the light is not ON, go to the junction box on the back of the dryer containing the wire from the key switches. Remove the cover and locate and measure 24VDC on input wire.

NOTE: On the single module dryers, wire # 18 feeds into the key switch and out of the key switch. If more than one plenum, the switches are connected in series and then routes back to the PLC input.

NOTE: On the 2 and 3 module dryers, the Discharge Chute and the Rear Door switches are connected in series. This means that Wire # 18 feeds 24VDC to the Discharge Chute sensor and then becomes wire # 36 which is then fed to the Rear Door key switches, which are all in series.
3. If 24VDC is not present on input wire, check (ON STACKS - make sure the Discharge Chute door is closed) that 24VDC is measured on wire #18.
 - a. If 24VDC is present on input wire, but the PLC input light is not ON, check for 24VDC returning from the key switches. Generally, each additional key switch adds a letter to the wire number after coming out each successive key switch. 36 – 36A – 36B – etc.
 - b. If 24VDC is not returned from the key switches, a voltage check on the wire coming from each key switch may be required. (Rear Door key switches are in SERIES)
4. If 24VDC is being returned from the last key switch, measure for 24VDC on the appropriate wire on the Power Box terminal strip.
 - a. If 24VDC is not measured on the Power Box terminal strip, check the wiring connections between the junction box and the Power Box.
 - b. If 24VDC is measured on the Power Box terminal strip, go to the Control Box and measure the appropriate wire for 24VDC.
 - c. If 24VDC is not measured on the Control Box terminal strip, check wiring connections between the Power Box and the Control Box.
 - d. If 24VDC is measured on the Control Box terminal strip, measure for 24VDC at the PLC input terminal.
 - e. If 24VDC is measured on the terminal strip in the Control Box but not at the PLC input, check wiring from the terminal strip to the PLC input terminal.
5. If 24VDC is measured on the PLC input terminal but the input light is not on, and you have a Rear Door fault on the LCD screen, the PLC is malfunctioning.

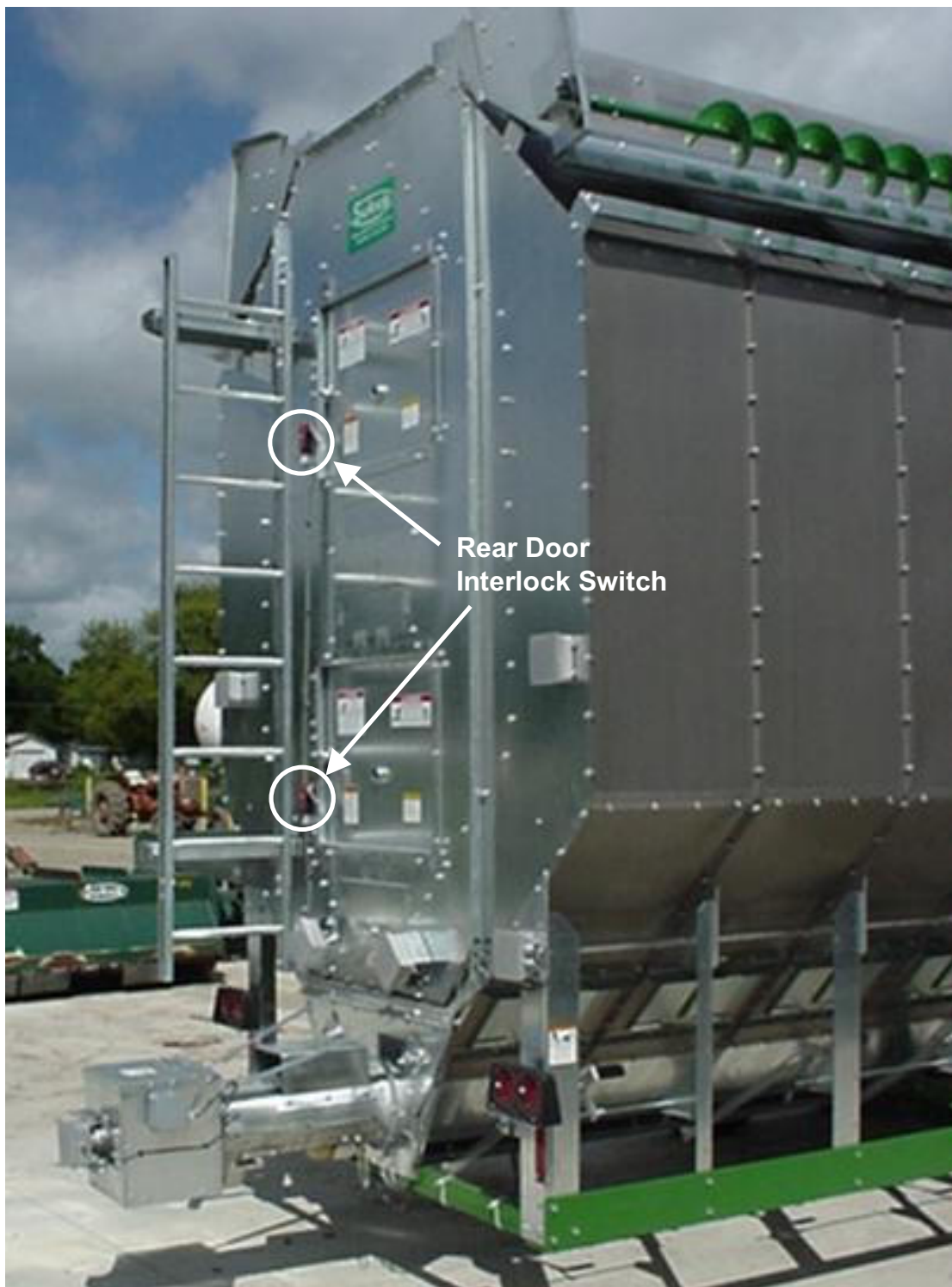


Figure 1.5c: Rear Door Interlock Switch Installed on Dryer

Grain Column Over-Temperature Sensor

The Grain Column Over-Temp sensor is located in conduit running through the grain columns horizontally. This device is used to monitor the temperature of the columns and will turn the dryer off if the columns reach 300° F.

**COLUMN HIGH TEMP
POSSIBLE CLOG OR
TEMPERATURE SETTING
PRESS ANY KEY**

Figure 1.6a: Fault Display



Figure 1.6b: Grain Column Over-Temperature Sensor

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer (Right)	0CH05	40	11CH01	6
1 Fan Portable Dryer (Left)	0CH06	41		
2 Fan Portable Dryer (Right)	0CH05	40	11CH01	6
2 Fan Portable Dryer (Left)	0CH06	41		
2 Module Stack Dryer (Right)	0CH00	40	N/A	N/A
2 Module Stack Dryer (Left)	0CH01	41		
3 Module Stack Dryer (Right)	3CH00	40	N/A	N/A
3 Module Stack Dryer (Left)	3CH01	41		

1. Check all of the grain columns for an obstruction, which would prevent the grain from flowing through the grain column.
 - a. If an obstruction is found, do not restart the dryer until the obstruction has been cleared.
2. If no obstruction is found and grain is flowing freely through each column, the plenum temperature may need to be reduced.

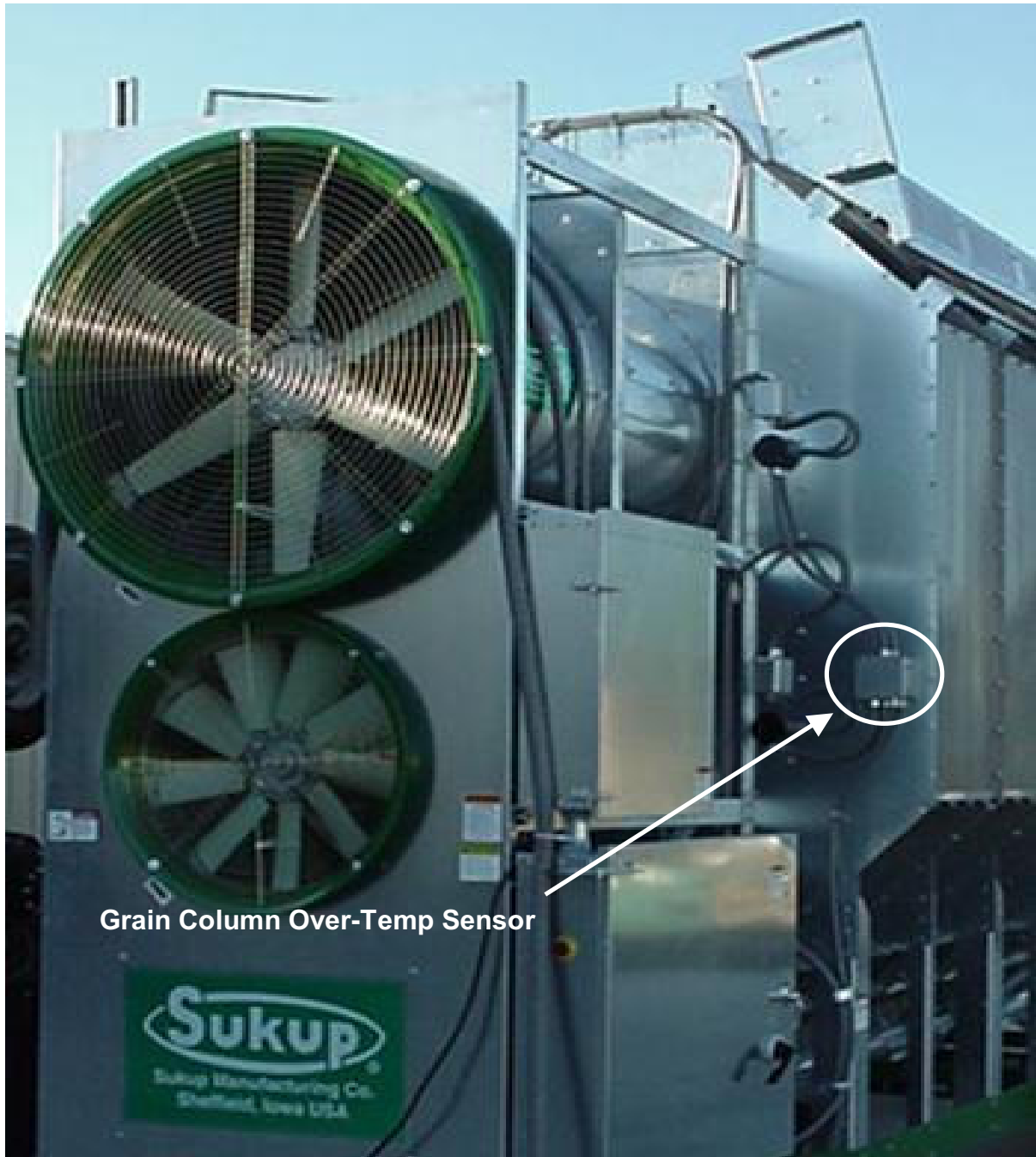
NOTE: To check for an obstruction, go to manual and turn the Load to OFF and turn the Unload to ON. Run the Unload long enough for the grain level in the columns to drop at least 1 foot. Stand back from the dryer and look through the screens to notice the grain level in each column. Any column, which has an obstruction, will be readily visible.
3. If the column temperature has cooled down and the RESET button has been pressed on the keypad, and the fault message is still being displayed, remove the junction box cover and measure for 24VDC on wire # 18.
4. If 24VDC is NOT measured on wire # 18 go to the Power Box terminal strip and measure for 24VDC on the terminal strip.
 - a. If 24VDC is measured on the Power Box terminal strip, check the wiring connections between the junction box and the Power Box.
 - b. If 24VDC is NOT measured on the Power Box terminal strip, go to the Control Box and measure for 24VDC on the terminal strip.
 - c. If 24VDC is measured on the Control Box terminal strip, check the wiring connections between the Power Box and the Control Box.
 - d. If 24VDC is NOT measured on the Control Box terminal strip, go to the PLC and measure for 24VDC coming from the PLC 24VDC power supply.
 - e. If 24VDC is not measured coming from the power supply, remove all Wires from the terminal and measure again for 24VDC.
 - f. If the 24VDC returns, one of the wires has a short to ground and will need to be isolated and corrected.
 - g. If unable to measure 24VDC coming from the PLC power supply, the PLC is defective.

Grain Column Over-Temperature Sensor (continued)

5. At this point, 24VDC should be measured on wire # 18 at the O/T sensor. Measure for 24VDC on the other wire (not # 18) coming from the sensor.
 - a. If 24VDC is NOT measured, the O/T sensor is defective.
 - b. If 24VDC is measured on the wire coming from the O/T sensor but The PLC Input light is NOT on, note the wire number and go to The Power Box and measure for 24VDC on the terminal strip.
 - c. If 24VDC is NOT measured on the terminal strip in the Power Box, check the wiring connections between the junction box and the Power Box.
 - d. If 24VDC is measured on the terminal strip in the Power Box, go to the Control Box and measure for 24VDC on the terminal strip.
 - e. If 24VDC is NOT measured on the Control Box terminal strip, check the wiring connections between the Power Box and the Control Box.
 - f. If 24VDC is measured on the Control Box terminal strip, go to the PLC and measure for 24VDC on the Input terminal.
 - g. If 24VDC is NOT measured on the Input terminal, check the wiring connections between the Control Box terminal strip and the PLC Input terminal.
 - h. If 24VDC is measured on the Input terminal but the Input light is not on, but the fault message is still being presented (after pressing RESET), the PLC is defective.



Grain Column Over-Temp Sensor



Grain Column Over-Temp Sensor

Heater Housing Hi-Limit Switch

Heater Housing Hi-Limit switch is the reset button located in the heater box mounted above the heater. This switch trips when the heater reaches a temperature considered too high for drying grain.

**HEATER HOUSING
HIGH TEMP ALARM
INSPECT HTR HOUSING
AND/OR TEMP SETTING**

Figure 1.7a: Fault Display



Figure 1.7b: Heater Housing Hi-Limit Switch

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer	0CH03	38	10CH07	4
2 Fan Portable Dryer (Upper)	0CH03	38	10CH07	4
2 Fan Portable Dryer (Lower)	1CH04	103		
2 Module Stack Dryer (#1)	1CH00	38	N/A	N/A
2 Module Stack Dryer (#2)	1CH01	103		
2 Module Stack Dryer (#3)	1CH02	203		
2 Module Stack Dryer (#4)	1CH03	303		
3 Module Stack Dryer (#)	2CH06	38	N/A	N/A
3 Module Stack Dryer (#)	2CH07	103		
3 Module Stack Dryer (#)	2CH08	203		
3 Module Stack Dryer (#)	2CH09	303		
3 Module Stack Dryer (#)	2CH10	403		
3 Module Stack Dryer (#)	2CH11	503		

1. Check for proper fan operation and airflow.
 - a. Check the ignition harness for burned wires. Replace is necessary.
 - b. Check for a plugged fan grill and remove any debris.
 - c. Remove the cover from the faulted Heater Box and push the RED reset button located at the center of the Heater Box.
 - d. Go to manual and turn on the fan. Insure that the fan is running at the proper speed.
 - e. Turn the burner switch to ON and observe the burner for proper operation.
2. After allowing time enough to cool, the RED reset button on the hi-limit switch should push in and latch.
 - a. If the reset button will not latch, the hi-limit switch is defective.
 - b. If the reset button will latch but the fault remains after RESET is pressed, voltage measurements will need to be taken.
3. Locate the two wires plugged on to the hi-limit switch. Measure for 24VDC on wire # 18.
 - a. If 24VDC is not present on wire # 18, go to the Power Box and check for 24VDC on the terminal strip.
 - b. If 24VDC is measured on the terminal strip, check wiring connections between the Heater Box and the Power Box.
 - c. If 24VDC is NOT measured on the terminal strip, go to the Control Box and check for 24VDC on wire # 18 on the terminal strip.
 - d. If 24VDC is measured on the terminal strip, check wiring connections between the Power Box and the Control Box.
 - e. If 24VDC is NOT measured on the terminal strip, go to the PLC and Measure for 24VDC coming from the 24VDC Power Supply.
 - f. If 24VDC is not measured at the Power Supply + terminal (wire # 18), remove all of the wires from the terminal and measure for 24VDC, If 24VDC has returned, one of the wires is shorted. This wire must be isolated and the short corrected.

Heater Housing Hi-Limit Switch (continued)

4. At this point, 24VDC should be measured on wire # 18 at the hi-limit switch in the Heater Box.
 - a. Measure for 24VDC on the other wire connected to the hi-limit switch. With the RED reset button latched in, 24VDC should be present.
 - b. If 24VDC is NOT measured, the hi-limit switch is defective.
 - c. If 24VDC is measured but the PLC Input light is not ON, take note of the wire number and go to the Power Box and measure for 24VDC on the terminal strip.
 - d. If 24VDC is NOT measured on the terminal strip, check the wiring connections between the Heater Box and the Power Box.
 - e. If 24VDC is measured on the Power Box terminal strip, go to the Control Box terminal strip and measure for 24VDC.
 - f. If 24VDC is NOT measured on the terminal strip, check the wiring connections between the Power Box and the Control Box.
 - g. If 24VDC is measured on the terminal strip, go to the PLC Input terminal and measure for 24VDC.
 - h. If 24VDC is NOT measured on the input terminal, check the wiring connections from the Control Box terminal strip to the PLC Input terminal.
 - i. If 24VDC is measured on the input terminal on the PLC but the input light is NOT on, but the fault message is still being displayed after pressing RESET on the keypad, the PLC is defective.

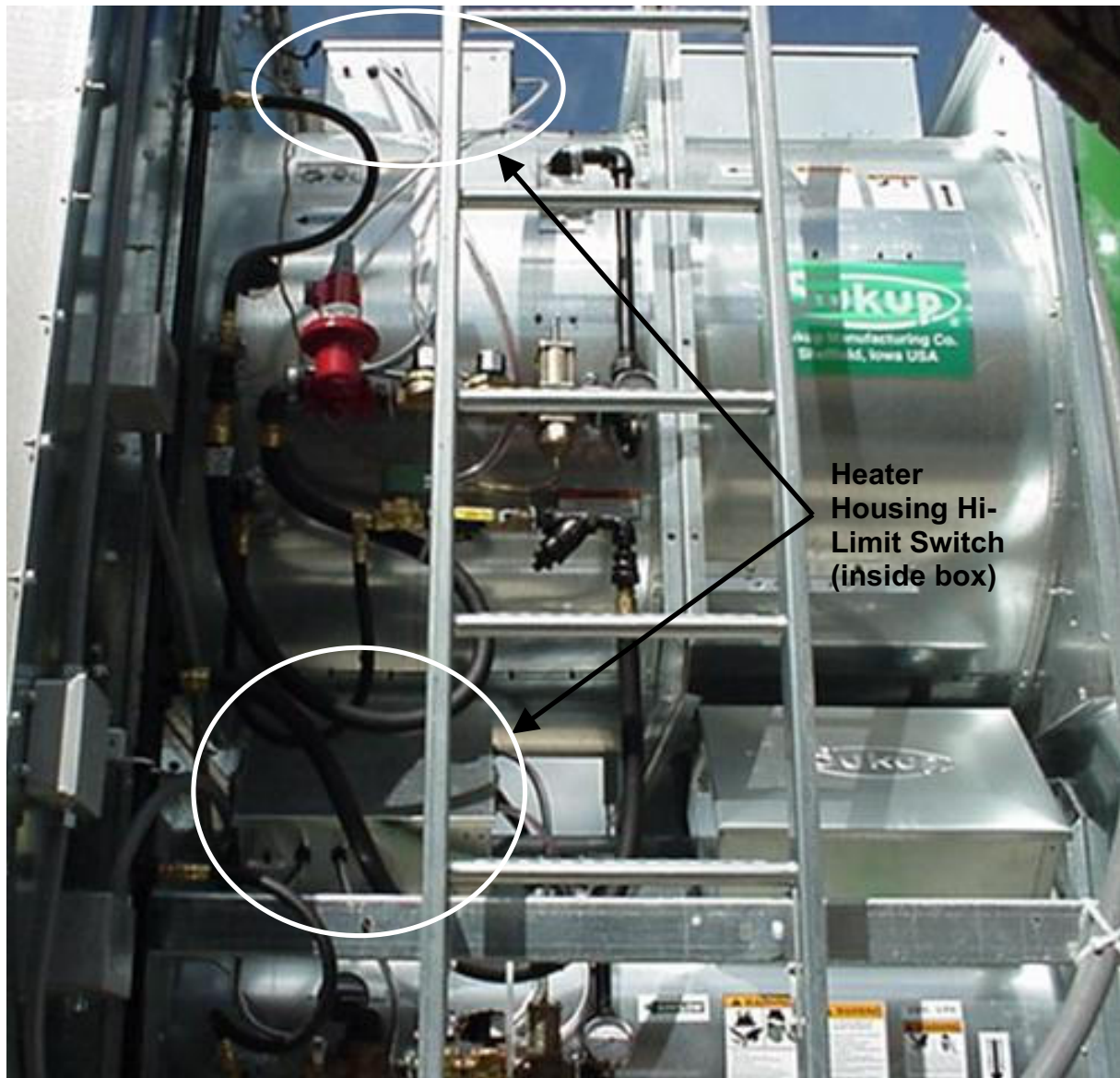
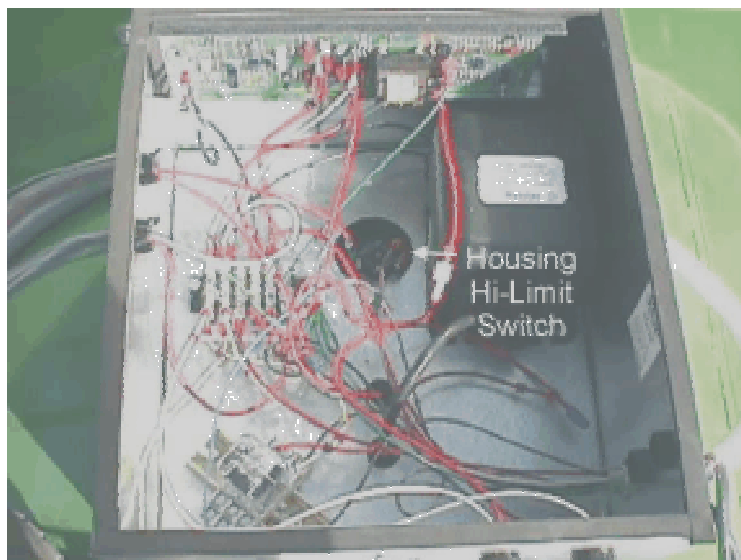


Figure 1.7c: Heater Housing Hi-Limit Switch Installed on Dryer



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Metering Roll Proximity Switch

The Metering Roll Proximity Switches are located in junction boxes at the back of the dryer. This device is used to monitor the metering rolls for rotation. If the rolls cease to turn, the fault will be displayed and the dryer will shut down.

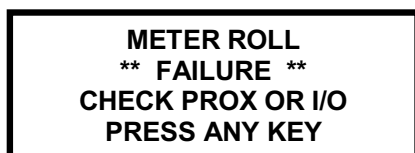


Figure 1.8a: Fault Display



Figure 1.8b: Metering Roll Proximity Switch

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer (Left)	2CH04	92	11CH02	91
1 Fan Portable Dryer (Right)	2CH05	93		
2 Fan Portable Dryer (Left)	3CH04	92	11CH02	4
2 Fan Portable Dryer (Right)	3CH05	93		
2 Module Stack Dryer (Right)	3CH04	92	N/A	N/A
2 Module Stack Dryer (Left)	3CH05	93		
3 Module Stack Dryer (Right)	4CH04	92	N/A	N/A
3 Module Stack Dryer (Left)	4CH05	93		

1. Turn the Control Panel switches to OFF.
2. Turn the manual Meter Roll Speed control to 150 (15%).
3. Turn the control system from off to manual.
4. Turn the Unload switch to ON.
5. Observe the chain on the Meter Rolls DC Motor for movement.
 - a. If the chain is moving than check to see if the Meter Rolls are turning.
 - b. If the Meter Rolls are not turning, check for a broken chain.
6. If the mechanical operation of the Meter Rolls drive train appears to be ok, but the Meter Rolls motor is not turning, voltage measurements will need to be taken at the SCR Drive Unit in the Power Box.

NOTE: Because these measurements are taken inside the Power Box, qualified electrical service personnel should do this work. HIGH VOLTAGE IS PRESENT IN THIS BOX REFER TO THE SCR DRIVE TROUBLE SHOOTING SHEET.

7. If the Meter Rolls are turning, go to the back of the dryer and look at the back of the Meter Roll sensor for the orange light turning on and off.
 - a. Check both PLC Inputs for the Input lights turning on and off.
 - b. After determining which Meter Roll Input signal is missing, go to that Meter Roll box which houses the proximity switch and remove the cover. Make sure that the flag is within 1/8" of the sensor head when passing over the sensor. If not, this adjustment will need to be made before proceeding. Turn the Unload OFF at a point where the Meter Roll flag is positioned above the proximity sensor. The orange light on the back of the proximity sensor should now be on.
 - a. If the orange light is not on, follow the wire from the proximity sensor to the junction box. Remove the junction box cover.
 - b. Measure for 24VDC on wire # 18.
 - c. If 24VDC is not measured on wire # 18 go to the Power Box and measure for 24VDC on the terminal strip.
 - d. If 24VDC is measured on the Power Box terminal strip, check the wiring connections between the junction box and the Power box.
 - e. If 24VDC is not measured on the Power Box terminal strip, go to the Control Box terminal strip and measure for 24VDC on wire #18 on the terminal strip.

Metering Roll Proximity Switch (continued)

- f. If 24VDC is measured on the Control Box terminal strip, check the wiring from the Power Box to the Control Box.
 - g. If 24VDC is not measured on wire # 18 on the Control Box terminal strip, go to the PLC and measure for 24VDC coming from the 24VDC Power Supply terminals.
 - h. If 24VDC is not measured on the 24VDC Power Supply, remove all of the wires on the output terminal. (# 18 wires) and measure again for 24VDC. If 24VDC is now measured on the terminal, one of the # 18 wires is causing a short and must be isolated and corrected.
 - i. If 24VDC is still NOT measured on the Power Supply output terminal, the PLC is defective.
8. At this point, 24VDC should be present on wire # 18 in the junction box on the back of the dryer. (brown sensor wire) This voltage is referenced to ground. (blue sensor wire)

NOTE: This sensor is a negative switching device. This means that when the sensor is in the on condition, the voltage on the output wire (black sensor wire) will be 0 VDC.

9. Make sure the flag is over the proximity sensor head and adjusted to 1/8th inch or less.
10. The light on the back of the proximity sensor should be on, and 0VDC should be measured on the output (black sensor wire). If not, the sensor is defective.
11. If 0 VDC is measured on the output (black) wire, go to the Control Box and check the PLC Input light. The input light should be ON when the sensor is in the ON condition.
- a. If 0 VDC is measured on the black sensor wire but the PLC Input light is not ON, take note of the wire number and go to the Power Box terminal strip and measure for 0 VDC.
 - b. If 0 VDC is NOT measured on the Power Box terminal strip, check the wiring connections between the junction box and the Power Box.
 - c. If 0 VDC is measured on the Power Box terminal strip, go to the Control Box and measure for 0 VDC on the terminal strip.
 - d. If 0 VDC is NOT measured on the Control Box terminal strip, check the wiring connections between the Power Box and the Control Box.
 - e. If 0 VDC is measured on the Control Box terminal strip, go to the PLC and measure for 0 VDC on the PLC Input terminal.
 - f. If 0 VDC is measured on the PLC Input terminal but the light is NOT ON, the PLC may be defective.
 - g. If 0 VDC is NOT measured on the input terminal, check the wiring between the Control Box terminal strip and the PLC Input terminal.

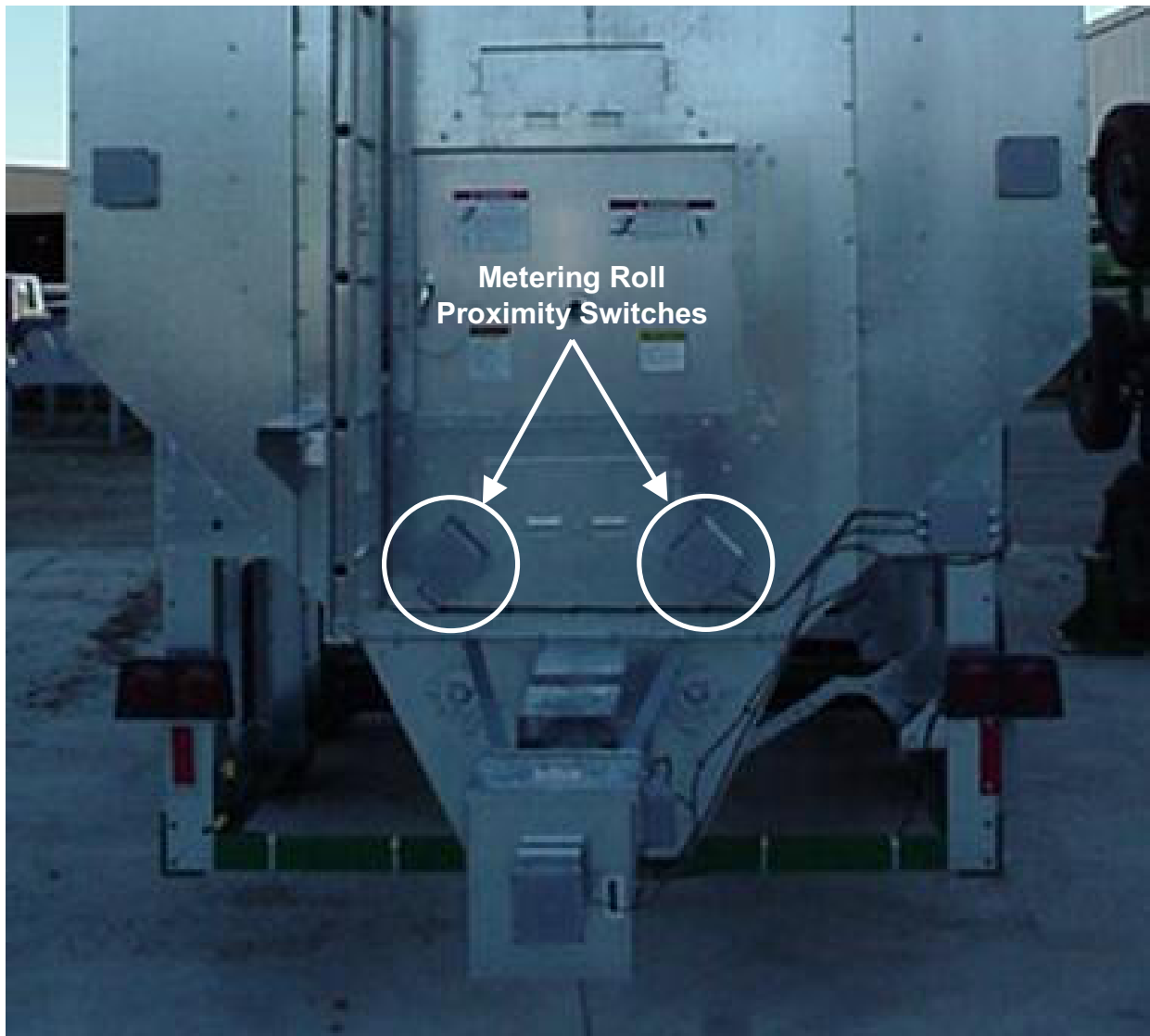


Figure 1.8c: Metering Roll Proximity Switches Installed on Dryer

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Static Air Pressure Sensor

The Static Air Pressure sensor is located in the junction box with the air switch (see below). It monitors the amount of static pressure in the plenum and will shut down the dryer if there is not enough present.



Figure 1.9b: Static Air Pressure Sensor Apart

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer	0CH08	43	11CH04	11
2 Fan Portable Dryer (Upper)	0CH08	43	11CH04	11
2 Fan Portable Dryer (Lower)	1CH09	105	13CH05	6B
2 Module Stack Dryer (#1)	1CH08	43	N/A	N/A
2 Module Stack Dryer (#2)	1CH09	105		
2 Module Stack Dryer (#3)	1CH10	205		
2 Module Stack Dryer (#4)	1CH11	305		
3 Module Stack Dryer (#1)	0CH01	43	N/A	N/A
3 Module Stack Dryer (#2)	0CH03	105		
3 Module Stack Dryer (#3)	0CH05	205		
3 Module Stack Dryer (#4)	0CH07	305		
3 Module Stack Dryer (#5)	0CH09	405		
3 Module Stack Dryer (#6)	0CH11	505		

1. To develop static air pressure in the plenum, the dryer must be full of grain. Check the grain level in the columns.
 - a. If columns are not full, check for the out of wet grain cause, and correct.
2. Place the Main System switch to Manual and turn the fan switch to ON.
 - a. Check the fan for proper operation and air flow.
3. If a fault message is displayed on the LCD screen, the air switch may not be adjusted correctly.
 - a. Remove the junction box cover containing the air switch.
 - b. With the dryer full of grain, and the fan switch turned to ON, check the PLC Input light. The input light should be ON at this time.
 - c. If the input light is NOT on, using a small tipped screwdriver, turn the adjustment screw counter-clockwise until the input light turns on.
 - d. Once the input light is on, turn the fan off and observe the PLC Input light. The light should turn OFF as the fan slows down.
 - e. If the light remains ON after the fan has slowed, turn the adjustment screw clockwise very slowly until the input light turns off.
 - f. While watching the PLC Input, turn the fan ON and then OFF, making sure that the input light is turning on and off with the fan.
4. If, after going through the above procedure, the PLC Input light remains in either the on or the off position without changing, voltage measurements will be necessary.
 - a. Locate wire # 18 in the junction box and measure for 24VDC.
 - b. If 24VDC is NOT measured, go to the Power Box and measure for 24VDC on the terminal strip.
 - c. If 24VDC is measured on the terminal strip, check the wiring connections between the junction box and the Control Box.
 - d. If 24VDC is NOT measured on the Power Box terminal strip, go to the Control Box and measure for 24VDC on wire # 18 on the terminal strip.
 - e. If 24VDC is measured on the terminal strip, check the wiring connections between the Power Box and the Control Box.
 - f. If 24VDC is NOT measured on the terminal strip, go to the PLC and measure for 24VDC on the 24VDC Power Supply terminals.
 - g. If 24VDC is measured at the (+) terminal, check the wiring connections between the Control Box terminal strip and the PLC Power Supply terminals.

**AIR TIMEOUT
(PLC). CHECK FAN/AIR
SWITCH
PRESS ANY KEY**

Figure 1.9a: Fault Display

Static Air Pressure Sensor (continued)

- h. If 24VDC is NOT measured on the (+) terminal, remove all of the wires from the terminal and again measure for 24VDC.
- i. If 24VDC has returned, one of the wires has a short and will need to be isolated and the short corrected.
- 5. At this point, 24VDC should now be measured on wire # 18 at the air switch.
- 6. Measure for 24VDC on the other wire coming from the Air Switch.
 - a. If 24VDC is measured on this wire, use a small screwdriver and turn the adjustment clockwise until the 24VDC is no longer present.
 - b. If turning the adjustment screw clockwise fails to turn OFF the Air Switch, the switch is defective.
 - c. If 24VDC is NOT measured on the wire coming from the Air Switch, use a small screwdriver and turn the adjustment screw counter-clockwise until 24VDC is measured.
 - d. If turning the adjustment screw counter-clockwise fails to turn ON the Air Switch, the switch is defective.
- 7. After replacing the Air Switch, follow the previous instructions on switch adjustment for proper operation.
 - a. If the PLC Input light is not turning on when the Air Switch is on, voltage measurements will need to be taken.
 - b. Adjust the Air Switch to the ON position. Measure for 24VDC on the wire coming from the Air Switch.
 - c. Take note of the wire number and go to the Power Box and measure for 24VDC on the terminal strip.
 - d. If 24VDC is NOT measured on the terminal strip, check the wiring connections between the junction box and the Power Box terminal strip.
 - e. If 24VDC IS measured on the terminal strip, go to the Control Box and measure for 24VDC on the terminal strip.
 - f. If 24VDC is NOT measured on the terminal strip, check the wiring connections between the Power Box and the Control Box.
 - g. If 24VDC is measured on the terminal strip, go to the PLC Input terminal and measure for 24VDC.
 - h. If 24VDC is NOT measured on the input terminal, check wiring connections between the terminal strip and the PLC.
 - i. If 24VDC is measured on the PLC Input terminal but the input light is not on, but the fault message is still being displayed on the LCD screen after pressing RESET, the PLC is defective.

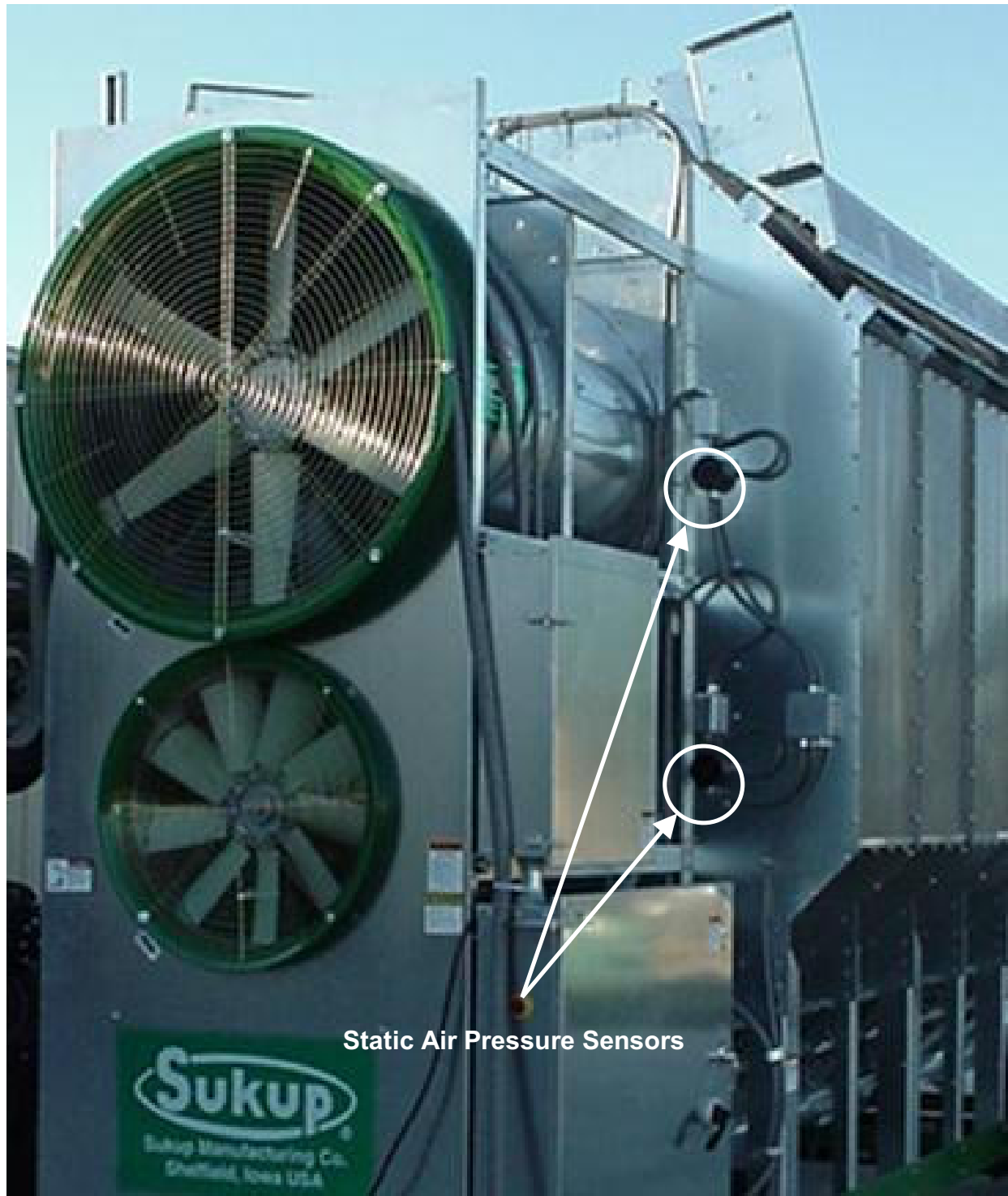


Figure 1.9c: Static Air Pressure Sensors Installed on Dryer

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Plenum Over-Temperature Sensor

The Plenum Over-Temperature Sensor is located inside the plenum of the dryer. It is provided to protect from the plenum over heating.

**PLENUM HIGH
TEMPERATURE ALARM
INSPECT PLENUM AREA
AND/OR TEMP SETTING**

Figure 1.10a: Fault Display



Figure 1.10b: Plenum Over-Temperature Sensor Old and New (Left to Right)

Model	Input	Wire #	Output	Wire #
1 Fan Portable Dryer	0CH04	39	11CH00	5
2 Fan Portable Dryer (Upper)	0CH04	39	11CH00	5
2 Fan Portable Dryer (Lower)	1CH08	104	13CH04	1B
2 Module Stack Dryer (#1)	1CH04	39	N/A	N/A
2 Module Stack Dryer (#2)	1CH05	104		
2 Module Stack Dryer (#3)	1CH06	204		
2 Module Stack Dryer (#4)	1CH07	304		
3 Module Stack Dryer (#1)	4CH06	39	N/A	N/A
3 Module Stack Dryer (#2)	4CH07	104		
3 Module Stack Dryer (#3)	4CH08	204		
3 Module Stack Dryer (#4)	4CH09	304		
3 Module Stack Dryer (#5)	4CH10	404		
3 Module Stack Dryer (#6)	4CH11	504		

1. Check the fan grill for obstruction and remove any accumulated debris.
2. With the dryer shut down, remove the key from the key-lock switch at the plenum access door. Open the door and inspect the plenum for any problems.
3. After the plenum has cooled down, press the RESET key on the keypad. The fault should be cleared from the display.
4. If the fault has not cleared, remove the cover from the junction box containing the Plenum O/T sensor and measure for 24VDC on wire # 18.
 - a. If 24VDC is NOT measured on wire # 18, go to the Power Box and measure for 24VDC on wire # 18 on the terminal strip.
 - b. If 24VDC is measured on wire # 18 in the Power Box, check the wiring connections between the junction box and the Power Box.
 - c. If 24VDC is NOT measured on the terminal strip, go to the Control Box and measure for 24VDC on the terminal strip.
 - d. If 24VDC is measured on wire # 18 on the terminal strip, check the wiring connections between the Power Box and the Control Box.
 - e. If 24VDC is NOT measured on the terminal strip go to the PLC 24VDC Power Supply and measure for 24VDC.
 - f. If 24VDC is measured on the (+) terminal of the Power Supply, check the wiring connections between the terminal strip and the PLC Power Supply.
 - g. If 24VDC is NOT measured on the (+) terminal of the PLC Power Supply, remove all of the wires from the terminal and measure for 24VDC. If the voltage has returned, one of the wires is shorted and will have to be isolated and the short corrected.
5. At this point, 24VDC should be measured on wire # 18 on the Plenum O/T switch.

Plenum Over-Temperature Sensor (continued)

6. Measure for 24VDC on the other side of the switch.
 - a. If the O/T switch is cooled down and 24VDC is NOT measured on the other wire, the sensor is defective.
 - b. If 24VDC is measured on the other wire coming from the sensor, Go to the PLC and check the input light. If the input light is ON, press RESET on the keypad and the fault should clear.
 - c. If the input light is not ON, take note of the wire number coming out of the O/T sensor and go to the Power Box and measure for 24VDC on the terminal strip.
 - d. If 24VDC is NOT measured on the Power Box terminal strip, check the wiring connections between the junction box and the Power Box.
 - e. If 24VDC is measured on the Power Box terminal strip, go to the Control Box and measure for 24VDC on the terminal strip.
 - f. If 24VDC is NOT measured on the terminal strip, check the wiring between the Power Box and the Control Box.
 - g. If 24VDC is measured on the Control Box terminal strip, measure for 24VDC on the PLC Input terminal.
 - h. If 24VDC is measured on this terminal, and the input light is OFF, but the fault message is still being displayed, the PLC is defective.
 - i. If 24VDC is NOT measured on the PLC Input terminal, check the wiring connections between the Control Box terminal strip and the PLC Input terminal.

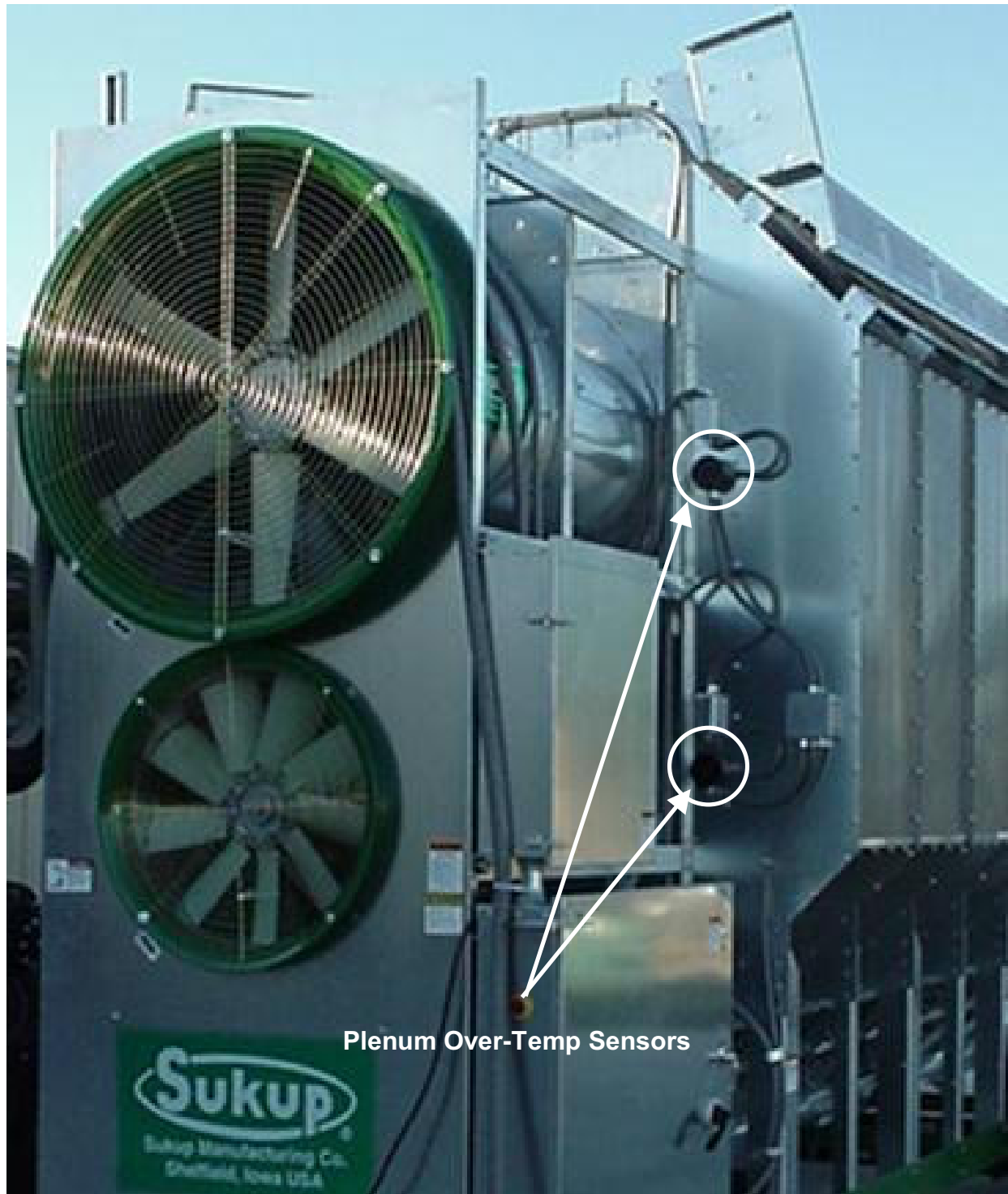


Figure 1.9c: Plenum Over-Temperature Sensors Installed on Dryer

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Device Troubleshooting

Discharge Moisture Sensor

The Discharge Moisture sensor is found under the discharge chute at the rear of the dryer. It is used to calculate the moisture and temperature of the grain as it is discharged from the dryer.

**SYSTEM SHUTDOWN
SENSOR NOT FOUND!**

PRESS ANY KEY

Figure 2.1a: Fault Display

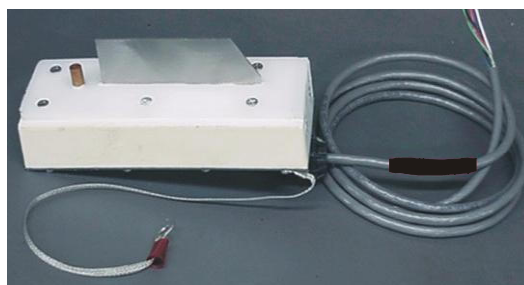


Figure 2.1b: Discharge Moisture Sensor

If the moisture sensor is in question, please make the following checks before taking any voltage measurements.

1. Turn the main system switch to Computer.
2. Go to Mode 4 from the start screen (this screen will show the information coming back from the moisture sensor).
3. With the moisture sensor hanging from the dryer (from the ground strap), the screen should read ambient temperature and 0.0 for moisture.
4. With the moisture sensor flag grounded, the screen should still show ambient temperature with a moisture reading of approximately 48% – 50%.
5. If these readings are not close to the above information, go to Mode 5 and select the moisture sensor, which is currently in use on the dryer.
6. If, after going through the above procedures, the information displayed is incorrect, voltage measurements will be required.
7. In the Control Box, locate the I/O Board. On the bottom right hand side of the board, find the six-wire plug with the gray cable attached.
8. The colors of the wires in this connector are from left to right, red, brown, blue, black white, green & shield.
9. Take voltage measurements from the green wire to all of the other wires and compare to the following readings.

Sensor w/ Black Shrink	Sensor w/ Red Shrink	Sensor w/ NO Shrink
Red = 15VDC	Red = 15VDC	Red = 15VDC
Brown = 15VDC	Brown = 15VDC	Brown = 15VDC
Blue = 0 – 5VDC	Blue = .250 - .350VDC	Blue = .250 -.350VDC
Black = .300 – 5VDC	Black = .300 – 5VDC	Black = 5.25 –7.50VDC
White = 8.5VDC	White = 8.5VDC	White = 8.5VDC

10. Taking voltage measurements at the I/O board would be the first step.
11. If the readings are incorrect, voltage readings should be taken at the junction box located near the discharge chute.
12. If the readings obtained in the junction box are the same as those obtained at the I/O board plug-in, the sensor is probably defective.
13. If the readings are different, the strong possibility exists that a wiring connection is loose. In that case, take readings on the wires coming back from the moisture sensor to the terminal strip in the junction box.
14. Go to the Power Box and take the same readings and compare these readings.
15. To those taken in the junction box. If the readings are different, check the wiring connections from the junction box to the Power Box.

16. If the readings are the same, go to the Control Box and recheck the voltage readings at the I/O board plug-in connector.
17. If the readings are different from those taken at the I/O board, check the wiring connections between the Power Box and the I/O board.



Figure 2.1c: Discharge Moisture Sensor Installed on Dryer

Printer Paper Roller

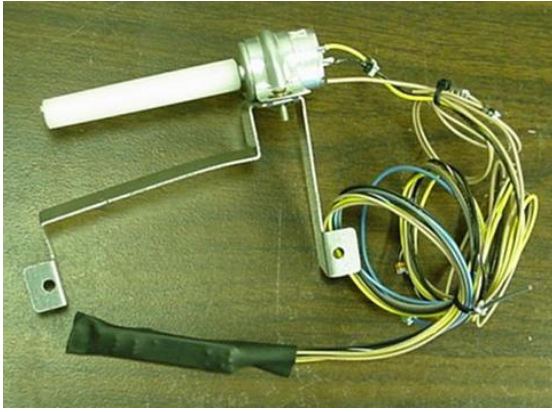


Figure 2.2a: Paper Roller



Figure 2.2b: Paper Roller Installed

1. Although not essential to dryer operation, there are a few checks that can be made if the paper roll fails to operate.
 - a. Measure for 15VDC on terminals # 83 & # 85.
 - b. This voltage comes from the power supply. If 15VDC is not measured on these terminals, check wiring connections between the terminal strip and the Power Supply.
 - c. Wire # 82 is connected to the same terminal strip as wires # 83 & # 85.
This signal would be difficult to measure accurately with a voltmeter, but if the Printer is working, and the wiring connections to the terminal strip are tight, then the Paper Roll board is receiving a signal to turn on each time the printer starts printing.

NOTE: A small electronic circuit board is connected to the Paper Roll motor. This electronic circuit is constantly checking the Data Line for information being sent to the printer. Each time information is detected, the Paper Roll is turned on for approximately 10 seconds.

- d. Near the Paper Roll motor are two BROWN wires. The dryer is shipped with these wires tied near the motor but not connected.
These wires may be connected to a pushbutton switch if the owner wishes to manually energize the Paper Roll motor.
- e. Another test would be to momentarily short the two BROWN wires together which will cause the motor to turn on.
- f. If the Paper Roll motor still does not turn, short the two brown wires and check for 15VDC on the two motor terminals.
- g. If 15VDC is measured at the motor terminals, the motor is defective, or a wire connection is loose.

SCR Drive

MAIN POWER - 220VAC - L1 & L2

If the dryer is a 460VAC, the 220VAC is supplied from a step-down transformer located in the Power Box, through fuse 3A (10 AMP).

If the dryer is a 230VAC dryer, the 220VAC is supplied directly from the distribution block.

The 220VAC then routes through two N.O. contacts on relay CR5, through fuse F4 (3 AMP), to the L1 and L2 terminals on the SCR Drive Unit.

Relay CR5 is energized at the same time the Unload Coil - M3 is energized (in Automatic or Manual).



Figure 2.4a: SCR Board

1. If the meter rolls are turning in Manual or Automatic, the SCR Drive Unit is OK. If the meter rolls are not turning in either Automatic or Manual, voltage measurements will need to be taken. The SCR Drive Unit is located in the Power Box.

NOTE: Measurements will need to be taken in the Power Box with power turned on. This work should be performed by electrically qualified personnel only. HIGH VOLTAGE IS PRESENT!

2. With power on, locate relay CR5 and measure for 220VAC on the two wires located on the topside of the ice cube relay. If 220VAC is NOT measured, check fuse F4.
 - a. If fuse F4 is OK, and the dryer is 460 VAC, check fuse F3A (located on the transformer).
 - b. If fuse F4 is OK, and the dryer is a 230VAC dryer, go to the distribution block and measure for 230VAC.
 - c. If 220VAC is not measured at the distribution block, check to make sure the main power switch is turned on.
 - d. If 220VAC is measured at the distribution block but not on the top of relay CR5, check the wiring connections between the distribution block and the CR5 terminals.
3. At this point, 230VAC should now be measured on the two wires on the top of CR5. Turn the Main System switch to the Manual position and the Unload switch to the ON position. CR5 should now be energized.
 - a. Measure for 230VAC on the two wires on the bottom of relay CR5.
 - b. If 230VAC is NOT measured, measure for 120VAC on the two coil wires. If 120VAC is measured and relay appears to be energized, relay is defective.
 - c. If 120VAC is NOT measured on the coil wires, check the Unload motor Starter M3. The coil should be energized. If this coil is not energized, make sure the Unload switch is turned to ON and the Main System switch is turned to Manual.
 - d. 120VAC should now be measured on terminals L1 and L2 (3rd and 4th terminals from the top).
4. Before the SCR Drive Unit will feed DC voltage to the motor, a reference voltage must be present on the SIG and COM terminals of the drive unit. The voltage measured will be from 1.0VDC – 9.5VDC depending on the percentage of meter roll speed selected. (2nd and 3rd terminals from the bottom).
 - a. With the Unload turned on and 220VAC measured on L1 and L2, measure for DC voltage on the SIG and COM terminals at the drive unit.
 - b. If DC voltage is NOT measured, go to the Control Box and locate relay CR2 (ice cube relay).
 - c. Measure for DC voltage on the two wires on the bottom of the relay next to the back panel (labeled #16 and #17).

NOTE: In Manual, the voltage is supplied by the manual potentiometer. In Automatic, the voltage is supplied by the processor board.

Plenum Temperature Sensor (RTD)

Averaging RTD – Resistive Temperature Device

The averaging RTD is a device, which measures the average resistance over the length of the tube. The dryer commonly uses 16ft. and 24ft. lengths.

The RTD is used in conjunction with a transmitter which converts the resistance into a 1.0VDC – 5.0VDC signal.

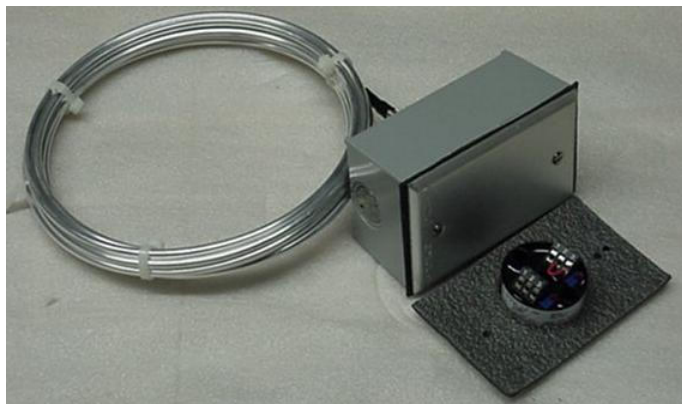


Figure 2.7a: Plenum Temperature Sensor

This voltage is then fed into the Plenum Temperature Display, which will be located on the Control Panel and near the pipe train of each heater.

If the RTD is in question, a voltage and resistance comparison can be made to determine if the unit is defective.

1. Begin by locating the junction box containing the RTD transmitter. This is a rectangular box approximately 4in. by 2 1/2in. The transmitter is attached to the cover.
2. A white label should be attached to the transmitter. Also, two terminal strips, each with three terminals will be located on the top of the transmitter.
3. Next to the terminal strips is a small adjustment screw. NEVER adjust either of these screws. These are calibration adjustments and once moved, the transmitter will not work correctly until a factory calibration is performed.
4. Locate the terminal strip with the output, +, and – connections. Measure for 15VDC on terminal #2 and #3.
5. If 15VDC is not present, note the wire numbers and go to the Power Box and check for voltage on the terminal strip.
6. With 15VDC present at the transmitter, measure the output voltage (#1 and #3). A voltage between 1.0VDC and 5.0VDC should be measured.
7. With 15VDC present on terminals #2 and #3 but no voltage is measured between terminals #1 and #3, the transmitter is defective.
8. If a voltage is measured, use the chart on the next page to determine if the voltage is reasonable.
9. If a voltage is measured between terminals #1 and #3, go to the other terminal strip and remove the two wires coming from the RTD (red and yellow).
10. A jumper should be connected between terminals #2 and #3.
11. Take a resistance reading with the meter. The resistance of the RTD is directly related to the temperature of the RTD.

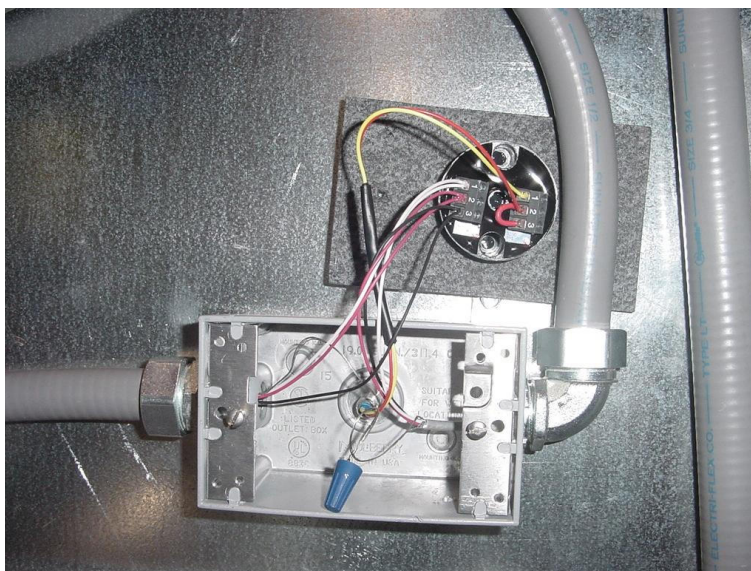


Figure 2.7b: Plenum Temperature Sensor Installed

NOTE: This reading should be taken with the dryer cooled down and at ambient temperature.

Plenum Temperature Sensor (RTD) (continued)

12. If the reading shows infinite (open) resistance, the RTD is defective. Compare the resistance reading to the following table to determine if the resistance is reasonable.

Temperature	Resistance	Voltage
10	952	1.16
15	963	1.24
20	973	1.32
25	984	1.40
30	995	1.48
35	1006	1.56
40	1017	1.64
45	1028	1.72
50	1039	1.80
55	1049	1.88
60	1060	1.96
65	1071	2.04
70	1082	2.12
75	1093	2.20
80	1103	2.28
85	1114	2.36
90	1125	2.44
95	1136	2.52
100	1146	2.60
105	1157	2.68
110	1168	2.76
115	1178	2.84
120	1189	2.92
125	1200	3.00
130	1211	3.08
135	1221	3.16
140	1232	3.24
145	1243	3.32
150	1253	3.40

13. If the resistance compares to the ambient temperature around the dryer, and the voltage on the output wire is close to the ambient temperature, then the transmitter and the RTD are functioning correctly.

Go to the Plenum Temperature Display trouble-shooting sheet to continue.

Plenum Temperature Display

1. If the display reading is incorrect by only a few degrees, please look at the diagram below to locate the adjustment potentiometer.
2. While watching the display, use a small screwdriver and turn the screw clockwise or counter-clockwise until the correct temperature is being displayed. Check the other display (one display is located on the Control Panel and the other display is located on the dryer) each should read within + or – a few degrees of each other.
3. If the display is dark and appears to be without power, measure for voltage on the white plug on the RTD Amplifier board. 15VDC should be measured.
4. If 15VDC is not measured, go to the control box, and measure for voltage on the terminal strip located in the middle-right of the box (wire #83 and #85).
5. If 15VDC is measured, check the wiring connections between the Control Box and the Plenum Temperature Display.
6. If 15VDC is now measured on the white plug at the display, measure between the wire marked #83 and the wire attached to the green connector (signal voltage from the RTD).
7. If a voltage (1.0 VDC – 5.0 VDC) is not measured on the wire connected to the green connector, refer to the RTD trouble-shooting section.
8. Using the chart found under the RTD trouble-shooting section, compare the measured voltage to the temperature. If this voltage is correct, and the display cannot be adjusted (refer to the diagram on the following page for display adjustment) to the correct temperature, the display is defective.



Figure 2.6a: Plenum Temp Display

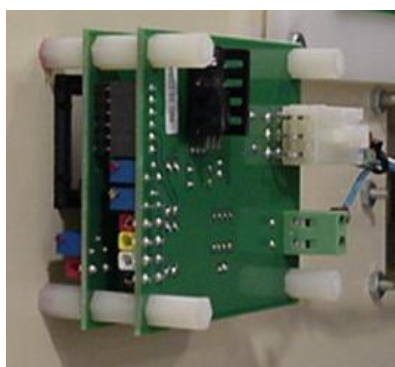


Figure 2.6b: Plenum Temp Display

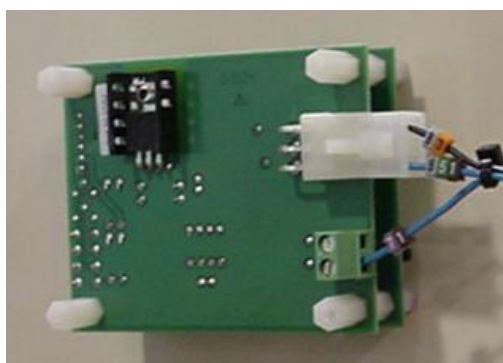
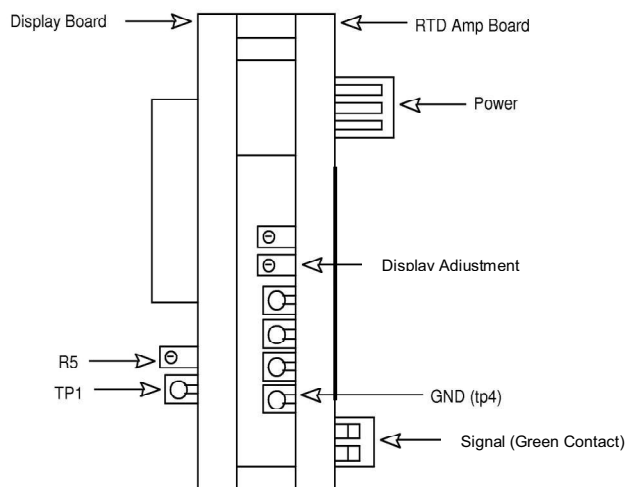


Figure 2.6c: Plenum Temp Display Rear Right

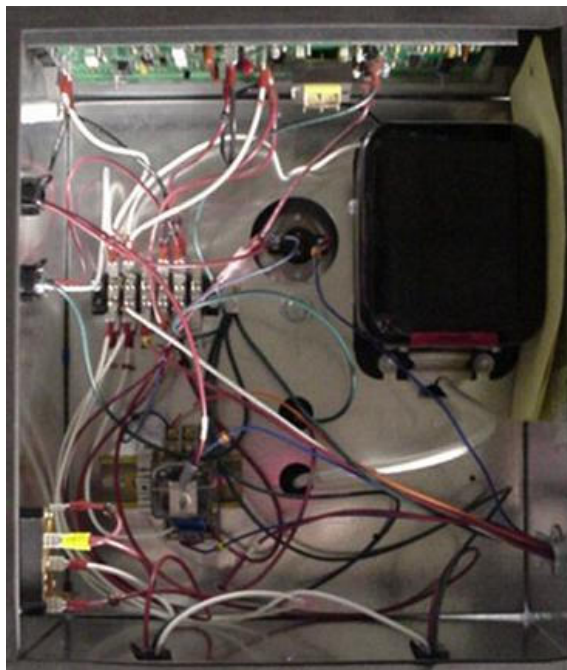




Heater Box

HEATER IGNITION SEQUENCE

1. When heat is called for, the relay on the I/O board is energized.
K4 – Upper Heat
K8 – Lower Heat
2. This in turn energizes relay CR3 for the Upper Heater and relay CR6 for the Lower Heater (located in the Power Box).
3. This relay sends 120 VAC to the respective heater box and 24 VDC to the PLC indicating the heat is on.
4. The 120 VAC must go through F9 for the Upper Heater and F10 for the Lower Heater. This 120 VAC, which is sent to the respective heater board is sent through wire # 4 for the Upper Heater and wire # 112 for the Lower Heater.
5. Once the 120 VAC is present at the heater board, a 25 – 30 second purge time begins.
6. After the purge cycle is complete, 120 VAC is sent out on wire # 10 to the liquid solenoid and the 1st vapor solenoid. The external purge relay is also energized at this time.
7. The external purge relay (located in the Heater Box) has a timing of 60 seconds (red wire # 21).
8. At the same time the purge relay is energized, the ignition transformer is energized for 10 seconds.
9. At this point, the ignition transformer is energized and the 1st vapor solenoid is energized. Gas flows through this solenoid and through the drilled orifice in the 2nd vapor solenoid (2nd vapor solenoid is closed at this time).
10. After the ignition transformer has shut off, the gas remains on for an extra 5 seconds. If a flame has not been detected by this time, the heater board shuts the gas off and goes into a lockout condition.
11. During the ignition attempt, the flame relay in the heater box is energized, sending a signal to the PLC (24 VDC – Blue # 45).
12. Input to the PLC is 0CH10 for the Upper heater and 1CH10 for the Lower heater.
13. If flame has been detected, after the external purge timer has timed out (60 sec.).
14. The 2nd vapor solenoid is energized and the burner is now operational.



NOTE: The RED Light on the heater box is on during the ignition sequence.

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Wire Numbers and their uses

Wire Number	Description	Use
0	110V supply from transformer	Conductor between transformer and E-Stop
1	110V supply after E-Stop	Emergency Switched Control Supply
2	Neutral Wire	Provides Return for 110V circuits
3	System switched 110V supply	110V present when Main System Switch is in manual or computer
4	110V Upper heater power on	110V present upper heater circuit will begin firing sequence
5	110V 5 second auxiliary	110V present energizes 5 second auxiliary contactor (where applicable)
6	110V load contactor	110V present energizes load contactor
7	110V 5 second load auxiliary supply (common to wire #5)	Provides switched 110V from system to auxiliary controls
8	110V 10 second load auxiliary supply (common to wire #9)	Provides switched 110V from system to auxiliary controls
9	110V 10 second auxiliary	110V present energizes 10 second auxiliary contactor (where applicable)
10	110V unload power on	110V present energizes unload contactor
10A	110V powers CR5 relay	CR5 relay, when energized provides 230V power to SCR board
11	110V upper fan power on	110V present energizes upper fan (pos. #1) contactor
12	110V upper heater switch leg	110V present; power available for upper heater pending upon fan on/off
13	110V powers CR3 relay (upper) heat turn on safety due to fan failure	110V present energizes CR3 relay, system calls for upper heat. Wired to aux. Contact or relay to provide protection due to fan not running while contactor energized
14	110V unload auxiliary supply	Provides switched 110V from system to auxiliary controls
15	110V unload auxiliary	110V present energizes unload auxiliary contactor (where applicable)
16	Meter roll reference voltage (neg.)	0 to 10 volt reference for SCR board, 1V=10% meter roll, 10V=99% meter roll
17	Meter roll reference voltage (pos.)	
17A	Processor meter roll reference	0 to 10 volt reference for SCR board from processor for computer control of meter roll. 1V=10% meter roll, 10V=99% meter roll
17B	Manual control reference from front panel	0 to 10 volt reference for SCR board, 1V=10% meter roll, 10V=99% meter roll; potentiometer fed from 15V source, using inline resistor to drop voltage
18	24V supply	Powered from PLC DC supply, provides voltage for sensors
19	110V switch leg for worklight	Provides switched 110V for worklight (110V present, worklight on)
21	Not used	Spare
22	110V supply for system power up	Provides 110V power for PLC and DC power supply via fuses F6 and F7
23	110V supply for PLC	Provides 110V power for PLC from fuse F6
24	Main control switched 110V power for unload and heaters, manual mode	Provides 110V power to unload and heaters while in manual control
25	110V supply for DC power supply	Provides DC power supply with 110V
26	110V supply for CR2 relay (Auto/Manual)	Provides CR2 relay with 110V when in manual mode

31	Control from PLC for CR Unload	Provides control to the PLC for the unload auger; control is through the CR unload relay, energized when fault occurs turning off meter rolls
32	Control from PLC for Load in manual mode	Provides load circuit with PLC controlled 110V while in manual mode
33	Control from PLC for switched AC for system, switches terminal #3	Provides control for system switched 110V control, PLC controls switched power due to fault possibilities
36	Rear door signal wire	24V present = Door closed, provides voltage at PLC for rear door status
37	Upper vapor high limit switch	24V present = Status ok, provides voltage at PLC for upper vaporizer high temperature status
38	Upper housing high limit switch	24V present = status ok, provides voltage at PLC for upper heater housing high temperature status
39	Upper plenum over temperature switch	24V present = status ok, provides voltage at PLC for upper plenum high temperature status
40	Right grain column over-temperature	24V present = status ok, provides voltage at PLC for upper plenum high temperature status
41	Left grain column over-temperature	24V present = status ok, provides voltage at PLC for upper plenum high temperature status
42	Grain discharge chute	24V present = status ok, provides voltage back to PLC for grain discharge chute status
43	Upper plenum static air switch	24V present = status ok, provides voltage back to PLC for upper static air status
44	Grain paddle switch (Lower)	24V present = status grain not empty, lower grain switch
45	Upper heater flame sense	24V present = status upper heater flame present; flame detected
46	PLC upper fan on input	24V present = fan on, provides PLC with status of upper fan operation
47	PLC load on input	24V present = load auger on, provides PLC with status of load operation (on or off)
48	Heater on relay signal to PLC 24V = On	24V present = on, Tells the PLC the system is calling for the heater to turn on
49&19A-49L	Motor overload switches	24V present = status ok, provides voltage back to PLC for overload status
51	PLC, status from I/O board for dryfire	Provides PLC with input for dryfire status (True or False)
52	PLC, status from I/O board	Provides PLC input to the status of the processor through the I/O board
52A-52C	Manual mode fail to safety circuit	Old version on dryers prior to 2004, provided information to the PLC for switch placement when clearing a fault, see wire 95A – 95C on 2004 dryers.
53	Grain paddle switch	24V present = Status dryer not full
54	PLC auto/manual status	Provides PLC with current status weather auto/manual
55	Modem alarm contact	Modem supplies a signal to 55 and during fault status 55 and 56 connect, modem receives signal back through 56. N/O switch
56	Modem Alarm contact	
70	Automatic batch RTD signal wire	Provides signal to processor for autobatch temperature drying, 0 – 5 volt DC reference
71	RTD signal wire lowest fan	Provides control panel with 0 – 5 volt DC reference for plenum temperature indication
72	RTD Signal wire fan pos. #2	Provides control panel with 0 – 5 volt DC reference for plenum temperature indication
73	RTD Signal wire fan pos. #3	Provides control panel with 0 – 5 volt DC reference for plenum temperature indication
74	RTD Signal wire fan pos. #4	Provides control panel with 0 – 5 volt DC reference for plenum temperature indication

75	RTD Signal wire fan pos. #5	Provides control panel with 0 – 5 volt DC reference for plenum temperature indication
76	RTD Signal wire fan pos. #6	Provides control panel with 0 – 5 volt DC reference for plenum temperature indication
81	Pos. power wire for paper roller	Provides 15VDC to the motor for the paper roller
80	Neg. common wire for paper roller	Provides common return for the paper roller
82	Gray 22ga., serial connection to the printer from the processor	(To J2 on the processor) signal to the printer for printing
83	Black w/white, 22ga. power supply common	Supply for RTD sensor transmitter (neg.); power supply common
84	Red w/white, 22ga. 5V from power supply	5V supply, printer and I/O board
85	Blue, 15V DC supply 22ga.	Supply for RTD sensor transmitters (pos.); power supply voltage
86	Load 110V supply while in computer mode	Provides 110V to front panel load switch for computer; I/O relay controlled
87	Unload 110V supply while in computer mode	Provides 110V to front panel unload switch for computer; I/O relay controlled
88	Upper fan 110V supply while in computer mode	Provides 110V to front panel upper fan switch for computer; I/O relay controlled
89	Upper heater 110V supply while in computer mode	Provides 110V to front panel heater switch for computer; I/O relay controlled
91	Meter roll fault from the PLC	Provides the processor with signal after there is a meter roll fault, loss of signal = fault
92	Right meter roll proximity signal wire	Provides PLC with square wave oscillating signal, designating rotation
93	Left meter roll proximity signal wire	Provides PLC with square wave oscillating signal, designating rotation
94	24V unload contactor auxiliary signal	Provides PLC with signal for unload on/off status; status = on when unload connected to common
95A-95C	Manual mode fail to safety circuit	Provides control over status of switches upon startup. PLC requires switches to off. Stated '04
95	Common reference on PLC for 24V supply	All items referenced to this terminal
96	Unload auger proximity signal wire	Provides PLC with square wave oscillating signal, designating rotation
1A	24V signal to the I/O board for a rear door fault	Provides signal to the processor through the I/O board for fault occurrence
2A	24V signal to the I/O board for a grain discharge chute fault	Provides signal to the processor through the I/O board for fault occurrence
3A	24V signal to the I/O board for a upper vaporizer high limit fault	Provides signal to the processor through the I/O board for fault occurrence
4A	24V signal to the I/O board for a upper heater housing high limit fault	Provides signal to the processor through the I/O board for fault occurrence
5A	24V signal to the I/O board for a upper plenum hi limit fault	Provides signal to the processor through the I/O board for fault occurrence
6A	24V signal to the I/O board for a right grain column high limit	Provides signal to the processor through the I/O board for fault occurrence
7A	24V signal to the I/O board for a left grain column high limit	Provides signal to the processor through the I/O board for fault occurrence
8A	24V signal to the I/O board for a motor overload fault	Provides signal to the processor through the I/O board for fault occurrence
9A	24V signal to the I/O board for a lower paddle tilt switch activation	Provides signal to the processor through the I/O board for fault occurrence
10A	24V signal to the I/O board for a upper paddle tilt switch activation	Provides signal to the processor through the I/O board for fault occurrence
11A	24V signal to the I/O board for a 5 second upper static air timeout fault	Provides signal to the processor through the I/O board for fault occurrence
12A	24V signal to the I/O board for a 45 second upper heater timeout fault	Provides signal to the processor through the I/O board for fault occurrence

13A	24V signal to the I/O board for a 45 minute grain fault	Provides signal to the processor through the I/O board for fault occurrence
14A	24V signal to the I/O board for a manual/auto mode	Provides signal to the processor through the I/O board for fault occurrence
15A	24V signal to the I/O board for a upper static air sense switch	Provides signal to the processor through the I/O board for fault occurrence
16A	24V signal to the I/O board for a upper flame sense switch	Provides signal to the processor through the I/O board for fault occurrence
1B	24V signal to the I/O board for a lower flame sense switch	Provides signal to the processor through the I/O board for fault occurrence
2B	24V signal to the I/O board for a lower static air sense switch	Provides signal to the processor through the I/O board for fault occurrence
3B	24V signal to the I/O board for a lower vaporizer high limit fault	Provides signal to the processor through the I/O board for fault occurrence
4B	24V signal to the I/O board for a lower plenum hi limit fault	Provides signal to the processor through the I/O board for fault occurrence
5B	24V signal to the I/O board for a lower heater housing high limit fault	Provides signal to the processor through the I/O board for fault occurrence
6B	24V signal to the I/O board for a 5 second lower static air time out fault	Provides signal to the processor through the I/O board for fault occurrence
7B	24V signal to the I/O board for a 45 second lower heater timeout fault	Provides signal to the processor through the I/O board for fault occurrence
D1	Moisture sensor red, 15V moisture sensor circuit supply	Supply voltage for the moisture sensor circuit
D2	Moisture sensor brown, 15V temperature sensor circuit supply	Supply voltage for the temperature sensor circuit
D3	Moisture sensor blue, 1.5V to 3.5V temperature signal to the processor	Provides the processor with a voltage signal corresponding to temperature (Older models used a 0.25 to 0.35V signal)
D4	Moisture sensor black, 0 to 5V moisture signal to the processor	Provides the processor with a voltage signal corresponding to moisture (Older models used a 5.5 to 7.5V signal)
D5	Moisture sensor white, 8.5V reference voltage to the processor	Prior to 2004, dryers, this signal was used for a reference. Later models do NOT use this ref.
D6	Moisture sensor green, ground	Ground
D7	Moisture sensor grounding braid (shielded ground)	Grounds the shielding for noise purposes
102	Lower vapor high limit	24V = status ok, provides voltage at PLC for lower vaporizer high temperature status
103	Lower housing high limit switch	24V = status ok, provides voltage at PLC for lower heater housing high temperature
104	Lower plenum over temp. switch	24V = status ok, provides voltage at PLC for lower plenum high temperature status
105	Lower plenum static air switch	24V present = status ok, provides voltage back to PLC for lower static air status
106	Lower heater flame sense	24V present = status upper heater flame present; flame detected
107	PLC lower fan on input	24V present = fan on, provides PLC with status of lower fan operation
108	PLC lower heat on input	24V present = on, tells the PLC the system is calling for the heater to turn on
109	110V lower heater switch leg	110V present; power available for lower heater pending upon fan on/off
110	110V lower fan power on	110V present energizes lower fan (pos #2) contactor
111	110V power CR6 relay (lower) heat turn on safety due to fan failure	110V present energizes CR3 relay, system calls for upper heat. Wired to aux. contact or relay to provide protection due to fan not running while contactor energized

112	110V lower heater power on	110V present lower heater circuit will begin firing sequence
113	Lower heater 110V supply while in computer mode	Provides 110V to front panel heater switch for computer; I/O relay controlled
114	Lower fan 110V supply while in computer mode	Provides 110V to front panel lower fan switch for computer; I/O relay controlled
120	Lower fan PLC controlled turn on	Allows control over the lower fan by the PLC for manual mode
121	Upper fan PLC controlled turn on	Allows control over the upper fan by the PLC for manual mode
831	Black w/white, 22ga. isolated power supply common	Printer
832	Black w/white, 22ga. isolated power supply common	Printer
841	Red w/white, 22ga. 5V supply from the power supply	Printer
851	Blue, 22ga. 15V supply from the power supply	Plenum Temperature Indicator
Pink to Proc	Moisture sensor signal to processor	Provides the processor with a voltage signal corresponding to moisture (Older models used a 5.5 to 7.5V signal and did not connect directly to the processor. There was calibration and signal conditioning done by the I/O board)
Gray to Proc	Temperature sensor signal to processor	Provides the processor with a voltage signal corresponding to temperature (Older models used a 0.25 to 0.35V signal and did not connect directly to the processor. There was calibration and signal conditioning done by the I/O board)

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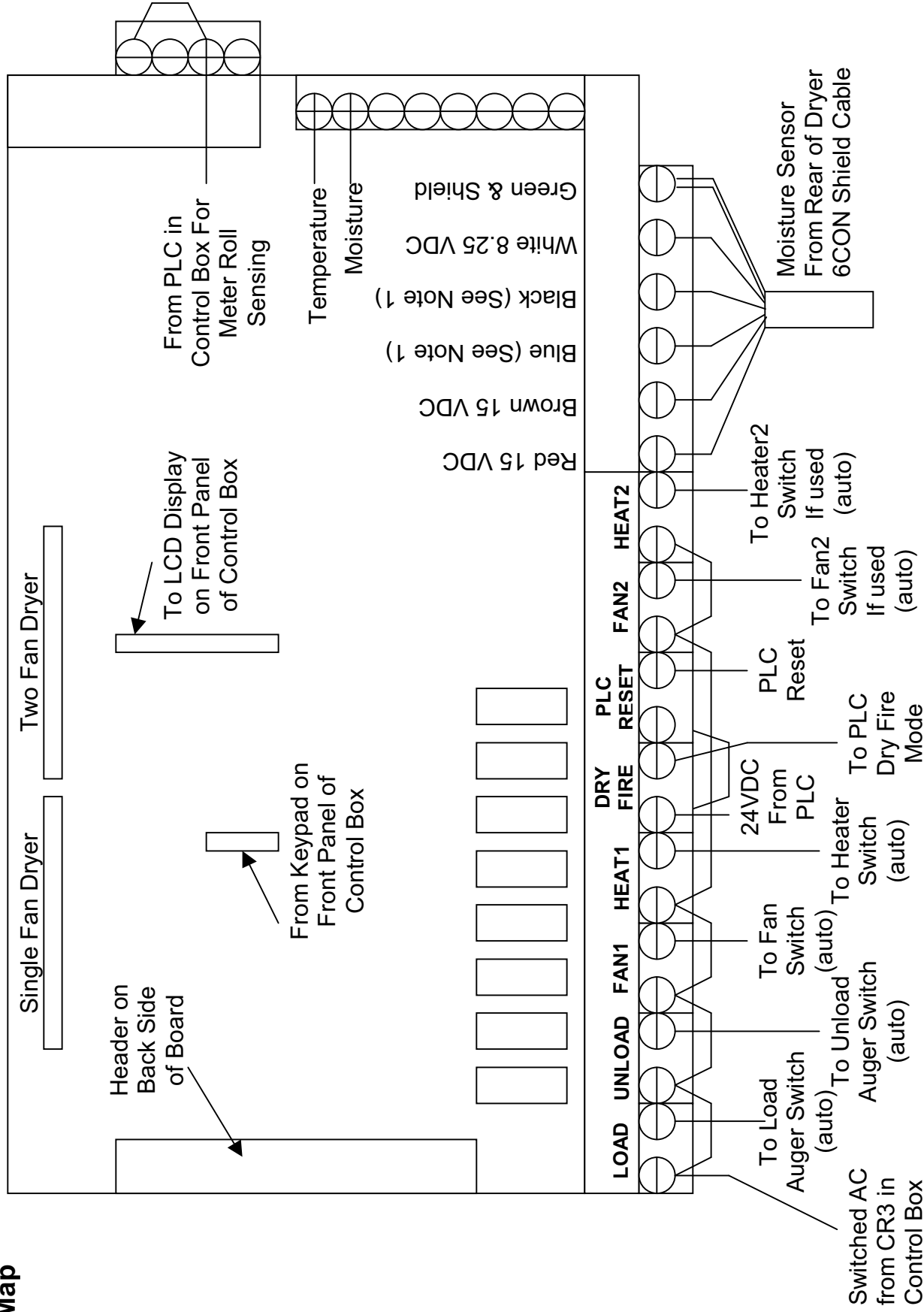
Auxiliary Load and Unload Terminals

Note: Terminals A through F can be used as either dry contacts or switched 115VAC by using Terminals 2 (Neutral) and 3 (115VAC)

2		3		Neutral	115VAC
5		7		1 ST Aux Load 5 Sec. Delay On	
8		9		2 ND Aux Load 10 Sec. Delay On	
14		15		Aux Unload	
18	49 D		Motor Overload Safety Circuit		

I/O Board Map

16 Pin Header Faults and Inputs From the Dryer



NOTE1: Original Moisture Sensor

RED Moisture Sensor

BLACK Moisture Sensor

Blue wire = 0.25VDC – 0.35VDC Black = 5.5VDC – 7.5VDC

Blue wire = 0.25VDC – 0.35VDC Black = 0.3VDC – 5.0VDC

Blue wire = 1.00VDC – 5.00VDC Black = 0.3VDC – 5.0VDC